Preface

Thank you for using high performance general vector control inverter manufactured by Shenzhen EasyDrive Electric Co., Ltd.

This series inverter is a general-purpose frequency converter based on flux vector algorithm control. It has a series of practical functions such as motor parameter self-identification, big torque at low frequency , wobble frequency control, droop control, simple PLC, fixed length control and flexible frequency set mode, and can achieve a variety of frequency combinations setting and RS485 communication.

Before using the inverter, the inverter user and the relevant technicians shall read the User Manual carefully to ensure the correct installation and operation of the inverter and its optimal performance.

The User Manual is subject to change without prior notice. The new edition shall prevail.

High performance general vector frequency inverter

User Manual

Edition Code： V1.0

Date： 2016-01-07

Danger

The frequency converter must be earthed reliably, If not, there is a potential risk of personal injury in the unit.

Intended Readers

The User Manual is intended for the following people to read:

Inverter installation personnel, engineers and technicians (electrical engineers and electrical operators), and designers, etc.

Please ensure the User Manual is to be received by end user.

Conventions

Sign Convention

Note The operation not in accordance with requirements may cause moderate injury or minor injury.

Danger The operation not in accordance with requirements may cause death or serious injury.

—Contents—

Chapter 1 General

1.1 Confirmation of product

After unpacking, please check whether the inverter is scratched or damaged in course of carrying, and whether the rated value on the nameplate is in line with your order requirement. If finding any problems, please contact supplier or us.

Model description

GT210 – 4 T 0055 G

Inverter Series

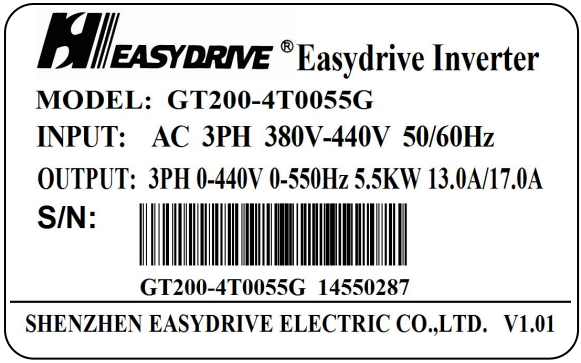
Voltage	No.
380V	4
220V	2

Input Voltage	No.
Single-pha	S
Three-Phas	T

No.	Inverter Type
G	Constant Torque
P	Variable (fan/pump) torque

No.	Adaptation Motor
0055	5.5KW
0075	7.5KW
0110	11KW
0150	15KW

There is a nameplate with inverter model and rated value stuck on the top or the lower part of right plate of inverter case, the information in it as follows:



1.2 Some parts name of GT210 inverter

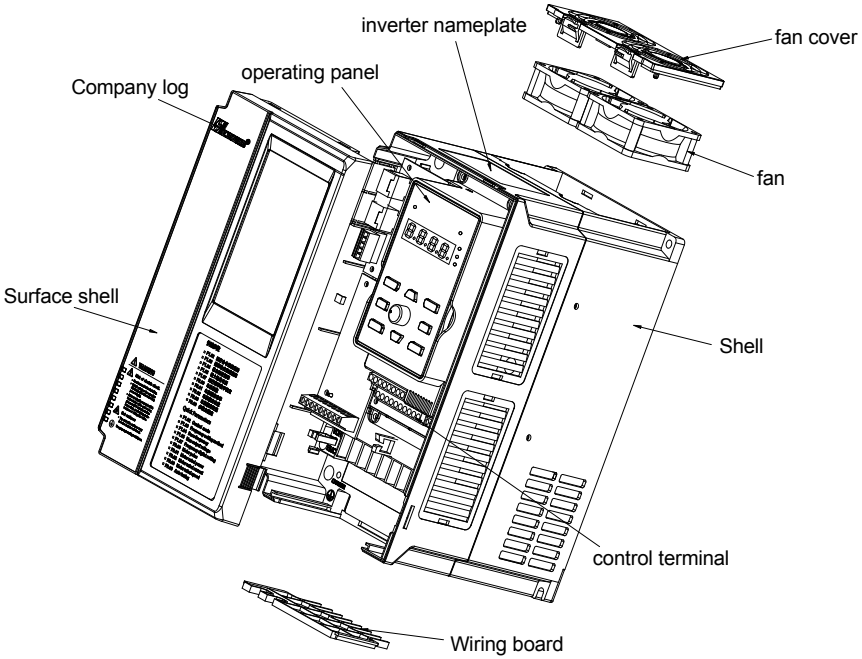


Diagram 1-3 Outline of inverter

1.3 Safety attentions

- **Check after having received product**

Warning

1. **The damaged inverter or the inverter lack of parts can't be installed.**
   Otherwise, danger of injury would be caused.

- **Installing**

Warning

1. **When carrying, please hold the bottom of inverter.**
   Only the panel is held, the inverter would fall off and such that you would be injured.
2. **Please install it on metallic plate not apt to be burned.**
   Install it on the flammable material, there would be fire caused.
3. **If two or more inverters are installed in the same control cabinet, please mount a fan and keep the air inlet temperature at below 40℃.**
   If too hot, there would be fire or other accidents caused.

● **Connection**

Danger

1. **Please make sure the input power supply has been cut off before connecting.**
   Otherwise, danger of electric shock and fire would be caused.
2. **Lease invites electric engineering technicians to connect the wire.**
   Otherwise, danger of electric shock and fire would be caused.
3. **The earthing terminal must be earthed reliably. (Class 380V: Suitable for earthing 3).**
   Danger of electric shock and fire would be caused.
4. **After electrifying the emergency stop terminal, please check the operation is available.**
   Otherwise, danger of injury would be caused. (The connection responsibility is borne by user)
5. **Please never touch output terminal directly, connect inverter output terminal to enclosure, or give the short connection among output terminals.**
   Otherwise, danger of electric shock and short circuit would be caused.

Warning

1. **Please make sure that AC main circuit power supply is identical with the rated voltage of inverter.**
   Otherwise, danger of injury and fire would be caused.
2. **Never conduct withstand voltage test for inverter.**
   Otherwise, damage of semiconducting elements would be caused.
3. **Please connect the braking resistor or braking unit according to diagram.**
   Otherwise, danger of fire would be caused
4. **Please fasten the terminal by the screwdriver with specified torque.**
   Otherwise, danger of fire would be caused.
5. **Never connect the input power line to terminals U, V, W.**
   Such that, the voltage is applied to output terminal, the inner of inverter would be damaged.
6. **Never connect the phase-shift capacitor and LC/RC noise filter to output circuit.**
   Otherwise, the inverter inner would be damaged.
7. **Never connect electromagnetic switch and electromagnetic contactor to output circuit.**
   When the inverter is running with the load, the surge current caused by operation of electromagnetic switch and electromagnetic contactor would cause over current protection circuit operation of inverter.

- **Maintaining and checking**

Danger

1. **Never touch the connection terminal of inverter as the terminal has high voltage.**
   Otherwise, danger of electric shock would be caused.
2. **Before electrifying, please install the terminal enclosure reliably, and must cut off the power before disassembling the enclosure.**
   Otherwise, danger of electric shock would be caused.
3 **Laypeople are not allowed to maintain and check.**
   Otherwise, danger of electric shock would be caused.

Warning

1. **As CMOS integrated circuit is mounted on keyboard plate, control circuit plate, driving circuit plate, please pay special attention when using.**
   Once the circuit plate is touched by finger, the integrated chip on circuit plate would be damaged for electrostatic induction.
2. **In electrifying, never change the connecting wire or disassemble the connecting wire of terminal.**
   In running, please never check the signal. Otherwise, the equipment would be damaged.

1.4 Attentions of use

Please pay attention following points when using CV3100 series inverter.

1.4.1 Constant-torque and low-speed running

In case that the inverter with common motor runs at low speed for a long time, the life of motor would be affected for the poor heat radiation. So if it is needed low-speed & constant-torque long time running, professional inverter must be selected.

1.4.2 Confirmation of motor insulation

When using CV3100 series inverter with motor, please check up the insulation of motor to protect equipment. In addition, if the motor is used in the harsh environment, it is very necessary to check up the insulation of motor regularly, so as to protect the safety of system.

1.4.3 Negative-torque running

In the occasions with strict requests for motor acceleration/deceleration time , the inverter would generate over current or over voltage fault and it would trip, in case of this, a braking resistor shall be mounted.

1.4.4 Mechanical resonance point of load device

In the certain output frequency range, the inverter is likely to meet the mechanical resonance point of load device, if that, the jumping frequency must be set to avoid this point.

1.4.5 Capacitor or pressure sensitive element that improves power factor

If there is a capacitor or varistor for lightning protection that improves power factor mounted on the output side, they shall be removed, otherwise, the inverter would trip for fault or the parts would be damaged, because output voltage of inverter is the type of impulse wave. In addition, on the output side, it is suggested that air switch and contactor would not be installed either, shown as diagram 1-4. (If the switch unit has to be mounted on the side of

output, the output current of inverter must be zero when the switch operates.)

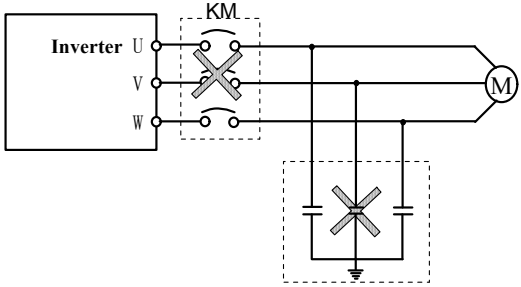


Diagram 1-4 Inverter output side never mounted with a capacitor

1.4.6 Run at over 50Hz.

If the inverter has to run at over 50Hz, the applicable speed range of motor bearing and mechanical equipment must be guaranteed in addition to considering the vibration and noise of motor, and please inquire before inverter runs.

1.4.7 Electronic heat protection value of motor

When a motor chosen is applicable, the inverter can provide the motor with heat protection. If the motor doesn't match with the rated capacity of inverter, the protection value must be adjusted or other protection measures must be taken, to guarantee the motor runs safely.

1.4.8 Altitude and derating use

If the inverter runs in area of over 1000m altitude, it must be derated by reason that the heat radiation of inverter gets poor for rarefied air. Diagram 1-5 shows the relation between rated current of inverter and altitude.

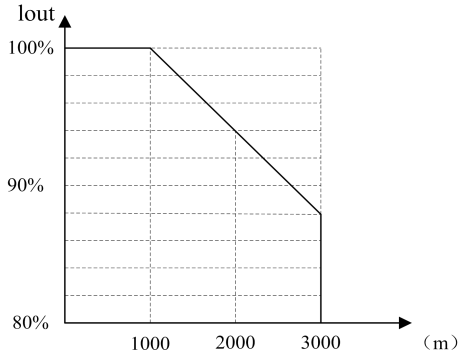


Diagram 1-5 Relation between rated output current of inverter and altitude

1.4.9 Protection degree

Protection degree IP 20 of the inverter is got in the state of use or keyboard display.

1.5 Rejection attentions

Before scrapping the inverter, please pay attention following information:

When burning, the electrolytic capacitor of main circuit and electrolytic capacitor of printed board are likely to explode, and the plastic part will produce noxious gas. Therefore, the inverter shall be handled as the industrial rubbish.

Chapter 2 Product specification and order notification

2.1 Inverter series model

The inverter voltage is 380V-440V. The applicable motor power range is 0.75KW~630KW. CV3100 series inverter model is shown as table 2-1.

Table 2-1 Inverter Model

Model（G:Constant torque；P:Fan/pump）		Rated Capacity（kVA）	Rated output current（A）	Matching motor（kW）
GT210-4T0055G	—	8.5	13	5.5
GT210-4T0075G	GT210-4T0075P	11	17	7.5
GT210-4T0110G	GT210-4T0110P	17	25	11
GT210-4T0150G	GT210-4T0150P	21	32	15
GT210-4T0185G	GT210-4T0185P	24	37	18.5
GT210-4T0220G	GT210-4T0220P	30	45	22
GT210-4T0300G	GT210-4T0300P	40	60	30
GT210-4T0370G	GT210-4T0370P	50	75	37
GT210-4T0450G	GT210-4T0450P	60	90	45
GT210-4T0550G	GT210-4T0550P	72	110	55
GT210-4T0750G	GT210-4T0750P	100	157	75
GT210-4T0900G	GT210-4T0900P	116	180	90
GT210-4T1100G	GT210-4T1100P	138	214	110
GT210-4T1320G	GT210-4T1320P	167	256	132
GT210-4T1600G	GT210-4T1600P	200	307	160
GT210-4T2000G	GT210-4T2000P	250	385	200
GT210-4T2200G	GT210-4T2200P	280	430	220
—	GT210-4T2800P	396	525	280

Remind: If you need other power range inverter, please consult with the factory before ordering!

2.2 Specifications

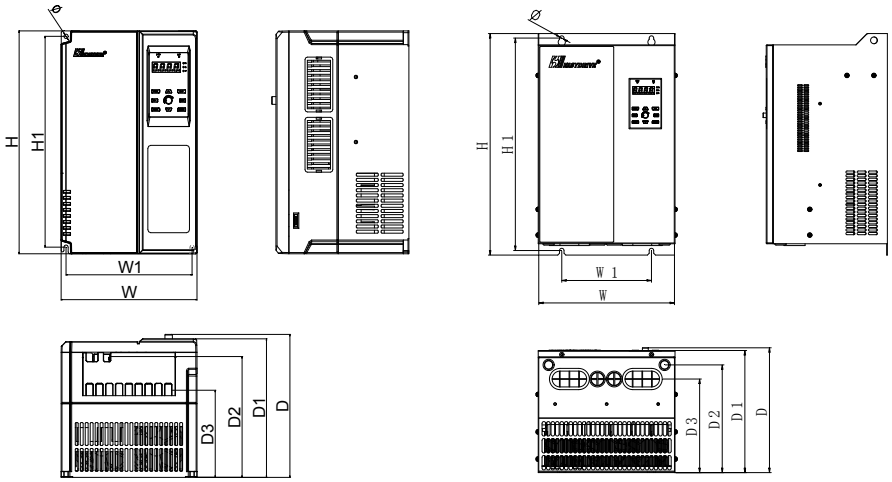
Table 2-2 Product technicalspecifications

Item		Description
Input	Rated voltage/ Frequency	three-phase,380V-440Vac;50Hz/60Hz
	Allowed voltage range	Voltage:380v(-15%)～440v(+10%);Voltage unbalance rate: < 3%;Frequency:±5%
Output	Rated voltage（V）	380Vac～440Vac
	Frequency	0Hz～550Hz
	Overload capacity	G type:150% rated current for 60s ;P type:120% rated current for 60s
Main control function	Control mode	Magnetic field vector PWM modulation
	Range of speed regulation	1：100
	starting torque	150% rated torque when 0.5Hz
	Speed control accuracy	≤±0.5% rated synchronous speed
	Frequency accuracy	Digital set :max. frequency×±0.01% Analog set：max.frequency×±0.2%
	Frequency resolution	奠拟Digital set :1Hz ;Analog set：max. frequency×0.1%
	Torque rise	Auto torque ascension,manual torque ascension 0.1%～30.0%
	V/F curve	Four ways:1 kind of user set V/F curve way、3 kinds of drop torque characteristic curve way(2.0 times power，1.7 times power，1.2 times power
	Acceleration/deceleration curve	Three ways:line acceleration/deceleration、S curve acceleration/deceleration、Auto acceleration/deceleration four acceleration/deceleration time，with the unit of time（minute/second） optional ,max.time set 60 hours
	DC braking	DC braking start frequency:0.00Hz～60.00Hz;braking time:0.0～30.0s;braking current:G type 0.0～100.0%;P type 0.0～80.0%
	Jogging	Jog frequency range:0.10Hz～50.0Hz
	Multi-speed operating	It can be realized by interior-PLC or control terminal

Item		Description
	Built-in PID	Be convenient to make closed-loop control system
	Auto energy-saving running	According to load condition, V/F curve can be optimized automatically to get the aim of energy-saving running.
	Auto voltage adjustment	when rhe voltage of network changes,the output voltage can be automatically kept constant
	Auto current limiting	During the operation, the current is automatically limited to prevent frequent flow to falut trip
	Auto carrier adjustment	According to the load characteristics ,automatically adjust the carrier frequency
Customized function	Textile swing frequency	Textile swing frequency control,it can realize the function of fixed and variable swing frequency
	Fixed length control	Length reached stop function
	Sagging function	Applicable to multiple inverters drive one load
	Instant stop/non-stop control	when power-supply off instantly,it can realize keep running through control bus voltage
	Binding function	Running command channel and frequency given channal can be binded and change at same time
Running function	Running command channel	Operation panel,control terminal and communication port , can be switched through many ways
	Frequency given channel	Digial given, keypad potentiometer,analog voltage given,analog current given, pulse given,communication port given,can be switched through many ways
	Auxiliary frequency given channel	Realize flexible auxiliary frequency fine-turing and frequency combination operation
	Pulse output terminal	0～50KHz pulse square wave signal output,can realize output setting frequency and output frequency ect.
	Analog output terminal	2 ways analog output,0～10v、0～20mA to get output of physical quantity such as setting frequency and output frequency
Operating panel	LED display	It can display 20 kinds of parameters such as setting frequency,output frequency,output voltage,output current and so on
	Key Locked and function choose	Define the function scope of part of the keys,in case of mistake operation
protection function		Phase-loss protection(optional),over current protection,over voltage protection,under voltage

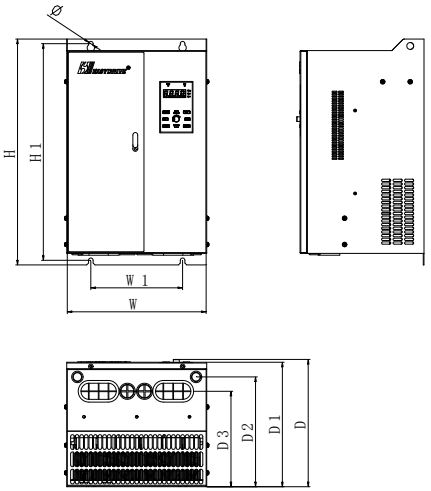
Item		Description
		protection,over heat protection,over load
Environment	Service location	Indoor,not suffer from sun,dust,corrosive gas,oil fog,steam and so on
	Altitude	Less than 1000m (derating at higher than 1000m)
	Environment temperature	－10°C～＋40°C (Derating use in 40°C～50°C)
	Humidity	Less than 90%RH，no condensation
	Vibration	Less than 5.9m/s2
	Storage temperature	－40℃～＋60℃
	Pollution degree	PD2
Structure	Protection class	IP20
	Cooling way	Froced air cooling
Installation Way		Wall-hanging,Cabinet, Trough-wall installation
Distribution System		TN、TT
efficiency		≥93%

2.3 Outline size



(a) A Standard sizes

（b）B Standard sizes



（c）C　Standard sizes

Form 2-3 Inverter Exterior and Mounting Dimensions b(Unit:mm)

Model	W	W1	H	H1	D	D1	D2	D3	Mounting Holes(Φ)	Refer
GT210-4T0055G/ 4T0075P	150	138	259	248	183	176	150	105	5.5	(a)
GT210-4T0075G/ 4T0110P										
GT210-4T0110G/ 4T0150P	205	188	322	305	219	210	168	143	6.5	(a)
GT210-4T0150G/ 4T0185P										
GT210-4T0185G/ 4T0220P	235	218	370	350	237	230	200	145	7	(a)
GT210-4T0220G/ 4T0300P										

Model	W	W1	H	H1	D	D1	D2	D3	Mounting Holes(Φ)	Refer
GT210-4T0300G/ 4T0370P	305	200	490	470	278	270	235	207	10	(b)
GT210-4T0370G/ 4T0450P										
GT210-4T0450G/ 4T0550P	320	197	560	535	308	302	275	237	10	(b)
GT210-4T0550G/ 4T0750P										
GT210-4T0750G/ 4T0900P										
GT210-4T0900G/ 4T1100P	355	240	678	659	320	307	257	257	11	(b)
GT210-4T1100G/ 4T1320P										
GT210-4T1320G/ 4T1600P	450	300	900	875	378	372	345	300	12	(b)
GT210-4T1600G/ 4T2000P										
GT210-4T2000G/ 4T2200P	480	-	1070	-	424	406	320	-	-	(c)*
GT210-4T2200G/ 4T2500P										
GT210-4T2500G/ 4T2800P	520	-	1300	-	430	420	390	-	-	(c)*
GT210-4T2800G/ 4T3150P										

Note: The size of the model with *,please consult with the factory before ordering.

2.4 Keyboard Size

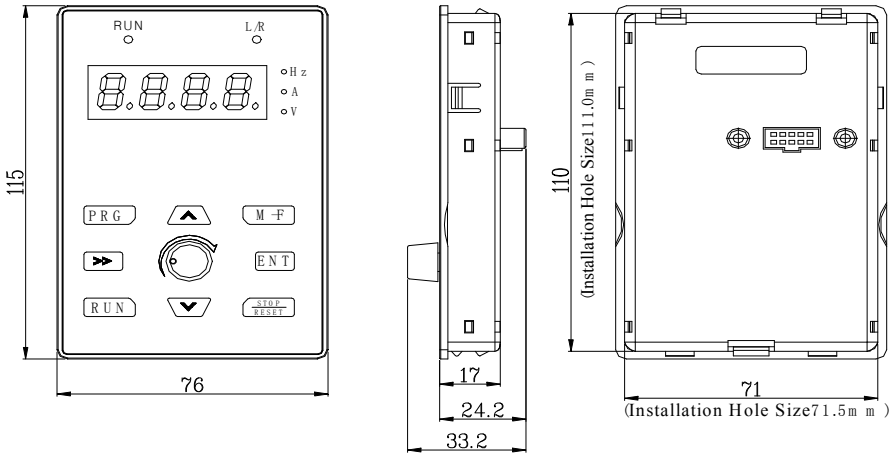


Diagram 2-2 Keyboard Size

2.5 Breaking Resistor

Energy-consumption braking resistor is provided as shown in table 2-4, and the installation of braking resistor wire is provided as shown in 2-3

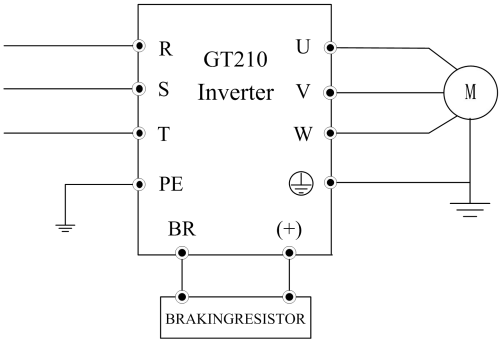


Diagram 2-3 Connection between inverter and braking uni

NOTE:

(1)Braking resistor power derating coefficient had better not more than 30%, otherwise there is the risk of fire.

(2)The device of 22kw and below 22kw are matched with built-in breaking unit , the device of 30KW and above need to be connected with braking unit outside.

(3)Wiring of braking resistor should be less than 5m;The braking resistor would have temperature rise due to feedback energy consumption during dynamic braking, please ensure the safety protection and good ventilation.

Braking resistance value and power are selected according to the actual situation, the greater of the system inertia, the shorter of the deceleration time, the more frequent braking, then the greater of braking resistor power and smaller of resistance value.Table 2-4 is recommended according to general applications(Breaking Utilization rate FC.01 is 10%)

Table 2-4 Selectable table of braking resistor

Model No.	Applicable motor Power（KW）	Resistor Resistance (Ω)	Resistor Power (W)
GT210-4T0055G	5.5	≥80	750
GT210-4T0075P			
GT210-4T0075G	7.5	≥50	1100
GT210-4T0110P			
GT210-4T0110G	11	≥50	1500
GT210-4T0150P			
GT210-4T0150G	15	≥45	1800
GT210-4T0185P			
GT210-4T0185G	18.5	≥45	2200
GT210-4T0220P			
GT210-4T0220G	22	≥24	3000
GT210-4T0300P			

Chapter3 Installation and Wiring of Inverter

3.1 Installation environment of inverter

3.1.1 Installation environment condition

(1) The inverter shall be installed indoors of perfect ventilation,and the environment temperature shall be in the range of -10℃~40℃，in case that the temperature exceeds 40℃， the external air-blast cooling or derating shall be used.
(2) Avoid being installed in location where suffers from the sun,dust,floatation firber and metallic power
(3) Never to be installed in location where corrosive and explosive gas has
(4) The humidity shall be lower than 90%RH,no condensation
(5) The inverter shall be installed in the location where the plane fixed vibration is less 5.9 m/s 2
(6) The inverter had better be kept far away from the electronmagnetic interference device

3.1.2 Installation direction and space

(1) Shall be installed vertically usually
(2) The installation space and min distance are shown as diagram3-1
(3) As shown in diagram 3-2,there shall be baffler mounted among them,when several inverters are installed vertically.

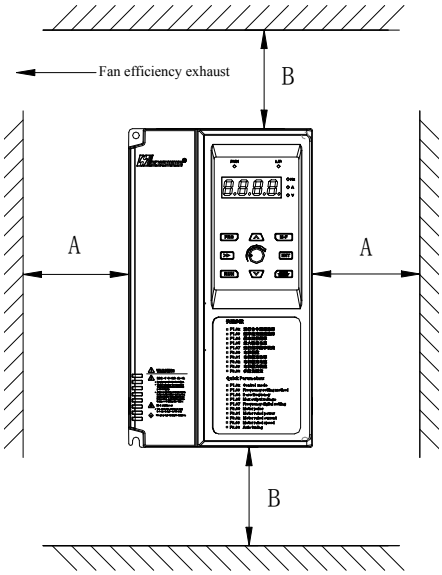


Diagram3-1 Installation space

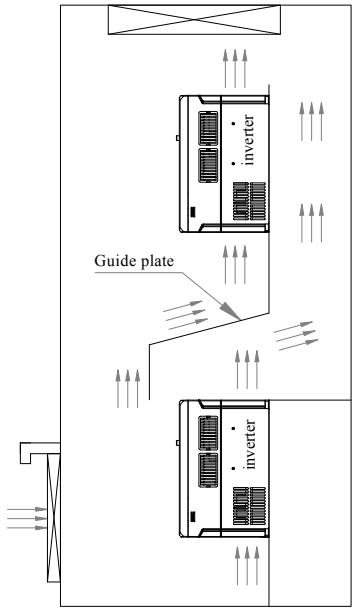


Diagram 3-2 Installation of multi inverters

Diagram3-1 Installation space condition

Inverter type	Installation space（mm）	
	A	B
GT210-4T0055G/0075P～GT210-4T0370G/0450P	≥50	≥100
GT210-4T0450G/0550P～GT210-4T2800P	≥50	≥200

3.1.3 Inverter Installation Method and Steps

GT210 series according to different power levels, there are two kinds of plastic and sheet metal structure;Depending on the different installation application, GT210 series has two installation methods of wall-mounted and embedded

1、Plastic structure wall- mounted installation

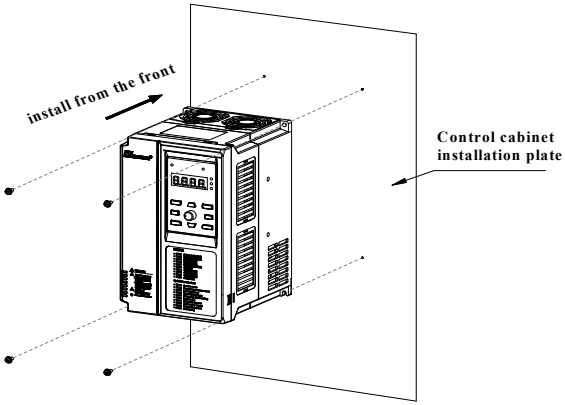


Diagram3-3 Plastic structure wall-mounted installation

2、Plastic structure embedded mounting.

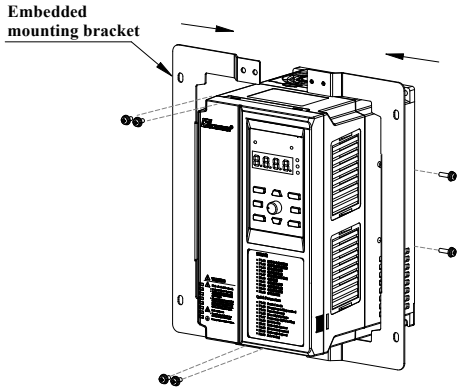


Diagram3-4 Plastic structure embedded mounting bracket installation

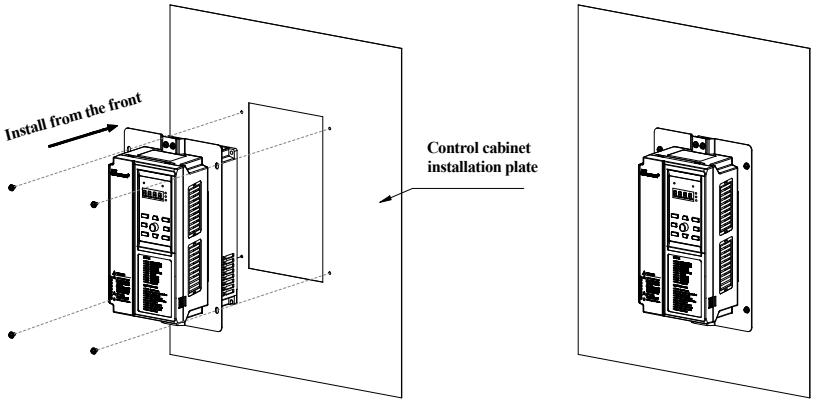


Diagram3-5 Plastic structure embedded mounting

3、Sheet metal structure wall-mounted installation

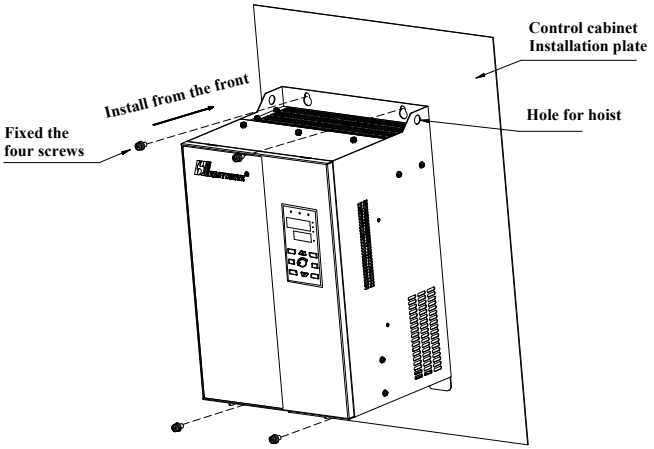


Diagram3-6 Sheet metal structure wall-mounted installation

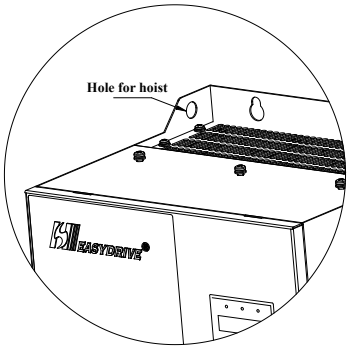


Diagram3-7 Hoisting diagram of sheet metal structure

4、Sheet metal structure embedded mounting

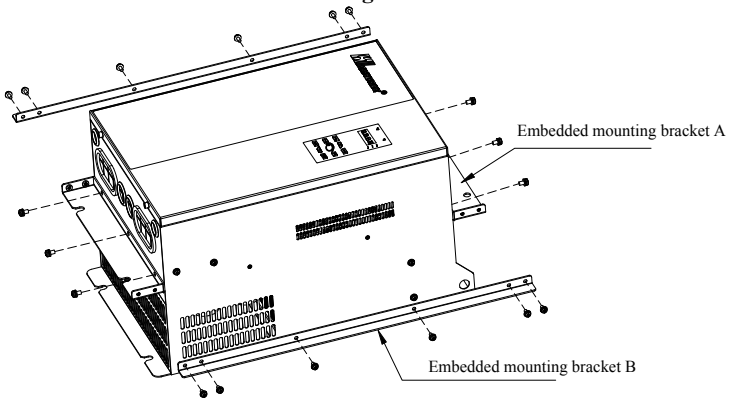


Diagram3-8 Sheet metal structure install schematic external bracket diagram

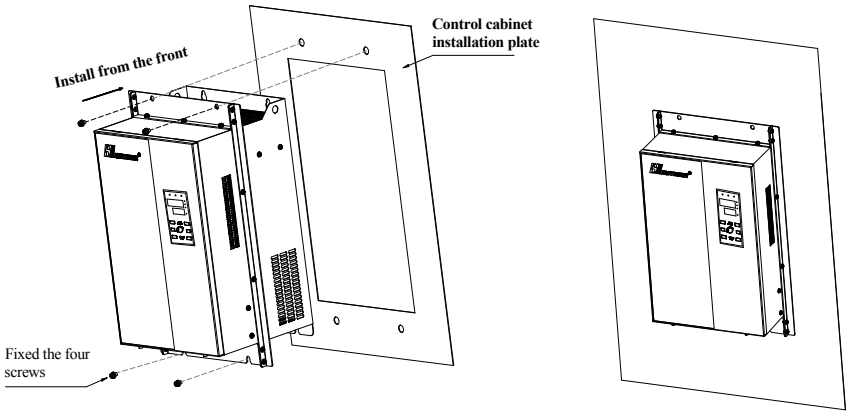


Diagram3-9 Sheet metal structure embedded mounting diagram

3.2 Disassembling and installation of inverter panel

3.2.1 Cover plate disassembly and installation of plastic enclosure inverter

◆ Disassemble Cover Plate

Shown as diagram3-10,push out the hooks on the left and right sides of the cover from inside at 1 direction with tools, then lift the panel from direction 2

◆ Install Cover Plate

Shown as diagram3-11,Align the groove above the cover with card buckle on the enclosure,press down the cover plate from direction 1 , until we hear a "click" sound

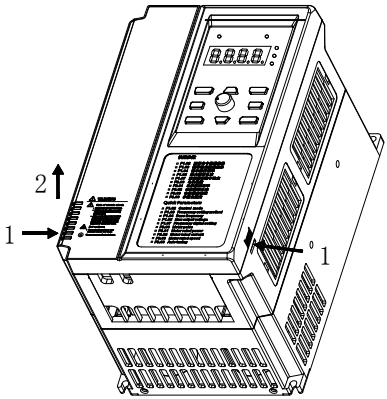


Diagram3-10 Disassembly of cover

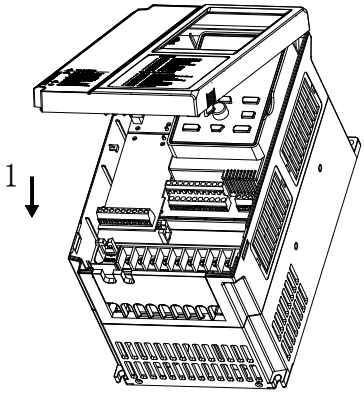


Diagram3-11 Installation of cover

3.2.2 Cover plate disassembly and installation of Sheet metal inverter enclosure

◆ Disassemble Cover Plate

Shown as diagram3-12,Disassemble mounting screw at Cover plate 1 ,then lift the panel from 2 direction

◆ Install Cover Plate

Shown as diagram 3-13,Card buckle on cover embedded groove of the inverter enclosure, according to the direction 1 install cover plate,then tighten the screws at the cover 2.

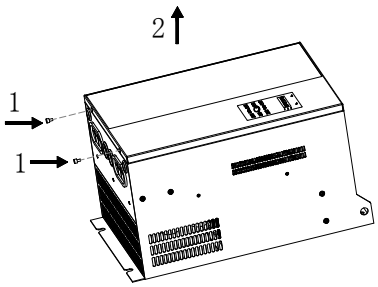


Diagram3-12 Disassembly of cover

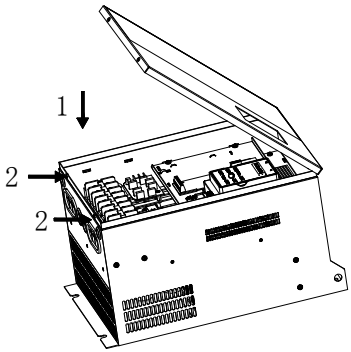


Diagram3-13 Installation of cover

3.2.3 .Operation panel disassembly and installation

◆ **Disassemble Cover Plate**

Pls refer to the diagram 3-10 to 3-13

◆ **Disassemble operation panel**

According to the diagram3-14,Press down on the groove 1 on both sides of the operation panel with your fingers,and then take out the operation panel body along the direction 2

◆ **Install Operation Panel**

Shown as the diagram 3-15,Press down operation panel from direction 1,until hear a "click" sound. Never to install operation panel from any other direction,otherwise will lead to poor contact of operation panel

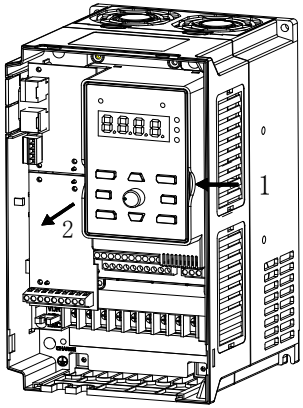


Diagram3-14 Operation panel disassembly

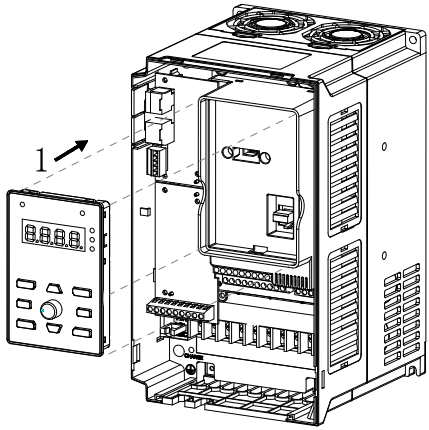


Diagram3-15 Operation panel installation

3.3 Attention Of Wiring

Warning

1. Before connecting, please make sure the power supply has been cut off for more than 10min, otherwise, there would be electric shock danger.
2. Never to connect the power line to the output terminals U,V,W of inverter.
3. Because there is leakage current in the inverter,the inverter and motor must be grounded safely, the ground wire shall be copper conductor of more than 3.5mm² (refer to diagram3-1)，and the grounding resistance shall be less than 10Ω.
4. User shall not conduct the withstand voltage test for the inverter as it has passed T this test before leaving factory.
5. Between inverter and motor shall not be installed with eletronicmagnetic contactor and absorbing capacitor or other resistance--capacitance absorbing implements as diagram 1-4
6. To take the convenience for over-current protection of input side and power failure maintenance, the inverter shall be connected to power supply through intermediate breaker.
7. DI and DO connect wire should choose more than 0.75mm²twisted wire or shielded wire,
   Detail refer to 3.7.2 Field Wiring and the grounding wire shall be less 50m.

Danger

1. Make sure the power supply of inverter has been cut off thoroughly,all LED lamps of Keyboard has went out, and wait for 10 min, confirm the DC current voltage value between the inverter main circuit terminal (+) (-) to drop below DC36V, till now, can perform the wiring operation.
2. Only the qualified professional who has been trained and authorized can perform the wiring operation.
3. Please pay attention that before energizing,check whether the voltage class of inverter is identical with the supply voltage,otherwise,it would be result in person casualty and damage of device.

3.4 Wiring OF Main Circuit Terminal

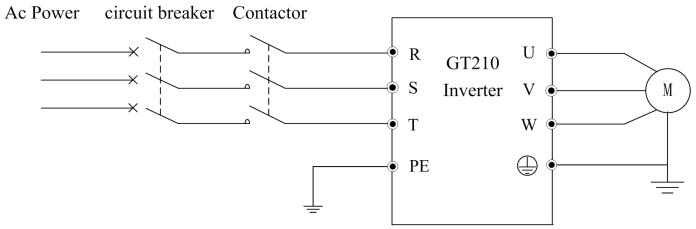


Diagram3-16 Main circuit basic wiring

3.4.1 Connection of inverter and option

(1) Between power grid and inverter, Breaking device like isolating switch shall be installed for Human safety and compulsive power cutting during Maintaining the device

(2) The supply circuit of inverter must be Mounted With the fuse or circuit breaker with over current Protection,to avoid the spread of fault.

(3) When the power supply quality of Power Grid is not quite high,an AC input reactor shall Be mounted additionally. The AC reactor also Can improve the power factor of input side

(4) The contactor is only for control of power supply

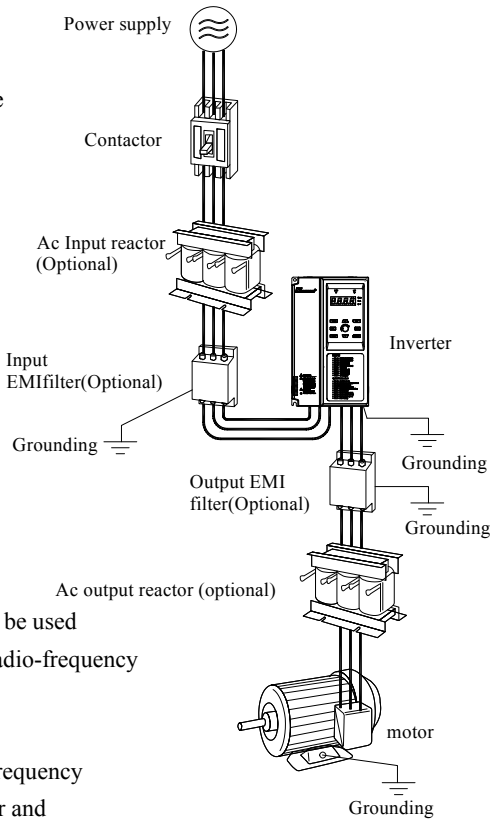


Diagram3-17 Connection of inverter and option

(5) EMI filter on the input side:The EMI can be used to prevent high-frequency conductivity and radio-frequency Interference from the inverter power line.

(6) EMI filter on the output side:
The EMI filter can be used to prevent radio-frequency interference noise from output side of inverter and leakage current from conductor

(7) Ac output reactor:
When the wire connecting inverter to motor is 50m,AC output reactor had better be mounted to

Reduce the leakage current and prolong the service life of motor. When installing,please consider the Voltage drop problem of AC output reactor; Or the input/output voltage of inverter is stepped up or the motor is derated to protect the motor .

(8) Safe grounding wire

The inverter and motor must be earthed separately for safely as there is leakage current in the inverter, the grounding resistance shall be less than 10Ω. The grounding wire shall be as short as possible, and its diameter shall be in line with the standard given in table3-2.(Only two kinds of conductors are provided with the same metal, the value in the table can be correct,if not, the sectional area of protective conductor is determined with equivalent conductive factor method and referred to table 3-2)

Table3-2 Sectional area of protective conductor

Corresponding conductor sectional area（mm^2）	Min sectional area of corresponding grounding conductor（mm^2）
$S \leq 16$	S
$16 < S \leq 35$	16
$35 < S$	S/2

(9) Checking the compatibility of no grounding IT system and angle grounding TN system

Warning

1. It shall disconnect the internal EMC filter when install inverter on no grounding IT power system or high impedance (more than 30 Ω) grounding power system.other wise the system will be grounded through the EMC filter capacitors,which may cause damage to the inverter
2. when the inverter is installed on angle grounding TN system,the internal EMC filter shall be disconnected,otherwise the inverter will be damaged.

If install at no grounding IT system or angle grounding TN system, disconnect internal EMC filter by removing the EMC screw of safety capacitor group.

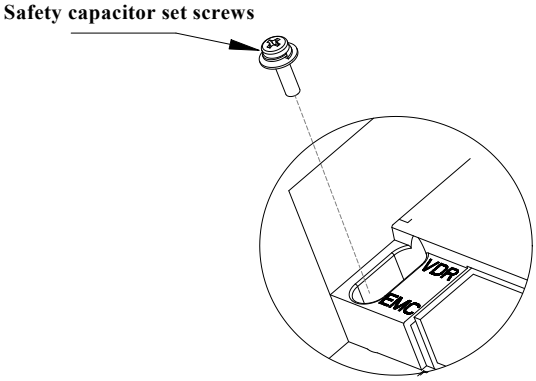
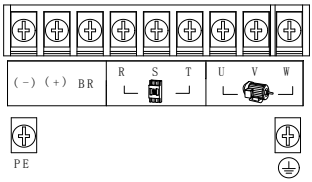
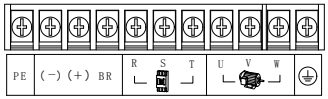
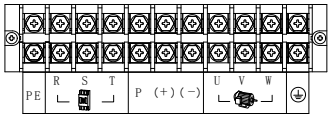
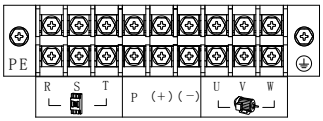
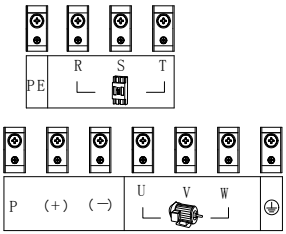


Diagram3-18 Location diagram of safety capacitor (EMC) short crew

3.4.2 The wiring of main circuit terminal

(4) Input/output terminal of main circuit shown as table 3-3

Application model	Terminal of main circuit	Terminal name	Function description
GT210-4T0055G GT210-4T0075P GT210-4T0075G GT210-4T0110P GT210-4T0110G GT210-4T0150P GT210-4T0150G GT210-4T0185P		R、S、T	3-phase Ac 380v input
		U、V、W	3-phase Ac output
		(+)、BR	Braking resistor connection
		⏚	Motor grounding
		(+)、(-)	Dc positive and negative bus output,external braking unit
		PE	Protect grounding
GT210-4T0185G GT210-4T0220P GT210-4T0220G GT210-4T0300P		R、S、T	3-phase Ac 380v input
		U、V、W	3-phase Ac output
		(+)、BR	Braking resistor connection
		(+)、(-)	Dc positive and negative bus output,external braking unit
		⏚	Motor grounding
		PE	Protect grounding

Application model	Terminal of main circuit	Terminal name	Function description
GT210-4T0300G GT210-4T0370P GT210-4T0370G GT210-4T0450P		R、S、T	3-phase Ac 380v input
		U、V、W	3-phase Ac output
		P、(+)	External connect DC reactor
		(+)、(-)	Dc positive and negative bus output,external braking
		⏚	Motor Grounding
		PE	Protect Grounding
GT210-4T0450G GT210-4T0550P GT210-4T0550G GT210-4T0750P		R、S、T	3-phase Ac 380v input
		U、V、W	3-phase Ac 380v input
		P、(+)	External connect DC reactor
		(+)、(-)	Dc positive and negative bus output,external braking
		⏚	Motor Grounding
		PE	Protect Grounding
GT210-4T0750G GT210-4T0900P GT210-4T0900G GT210-4T1100P GT210-4T1100G GT210-4T1320P GT210-4T1320G GT210-4T1600P GT210-4T1600G GT210-4T1850P GT210-4T1850G GT210-4T2000P GT210-4T2000G GT210-4T2200P		R、S、T	3-phase Ac 380v input
		U、V、W	3-phase Ac 380v input
		P、(+)	External connect DC reactor
		(+)、(-)	Dc positive and negative bus output,external braking
		⏚	Motor grounding
		PE	Protect grounding

(2)Table3-4 The selection of main circuit cable diameter,Into the line protection circuit breaker QF or fuse as following

Model		Circuit breaker （A）	Fuse （A）	Input/output wire （mm^2）	Control wire （mm^2）
GT210-4T0055G/ 4T0075P		25	45	4	1
GT210-4T0075G/4T0110P		40	60	6	1
GT210-4T0110G/4T0150P		63	78	10	1
GT210-4T0150G/4T0185P		63	105	10	1
GT210-4T0185G/4T0220P		100	114	16	1
GT210-4T0220G/4T0300P		100	138	16	1
GT210-4T0300G/4T0370P		125	186	25	1
GT210-4T0370G/4T0450P		160	228	25	1
GT210-4T0450G		200	270	35	1
GT210-4T0550G	GT210-4T0550P	200	315	35	1
GT210-4T0750G	GT210-4T0750P	250	420	70	1
GT210-4T0900G	GT210-4T0900P	315	480	70	1
GT210-4T1100G	GT210-4T1100P	400	630	95	1
GT210-4T1320G	GT210-4T1320P	400	720	150	1
GT210-4T1600G	GT210-4T1600P	630	870	185	1
GT210-4T2000G	GT210-4T2000P	630	1110	240	1
GT210-4T2200G	GT210-4T2200P	800	1230	150×2	1
GT210-4T2800P		1000	1500	185×2	1

Diagram of wiring for basic running

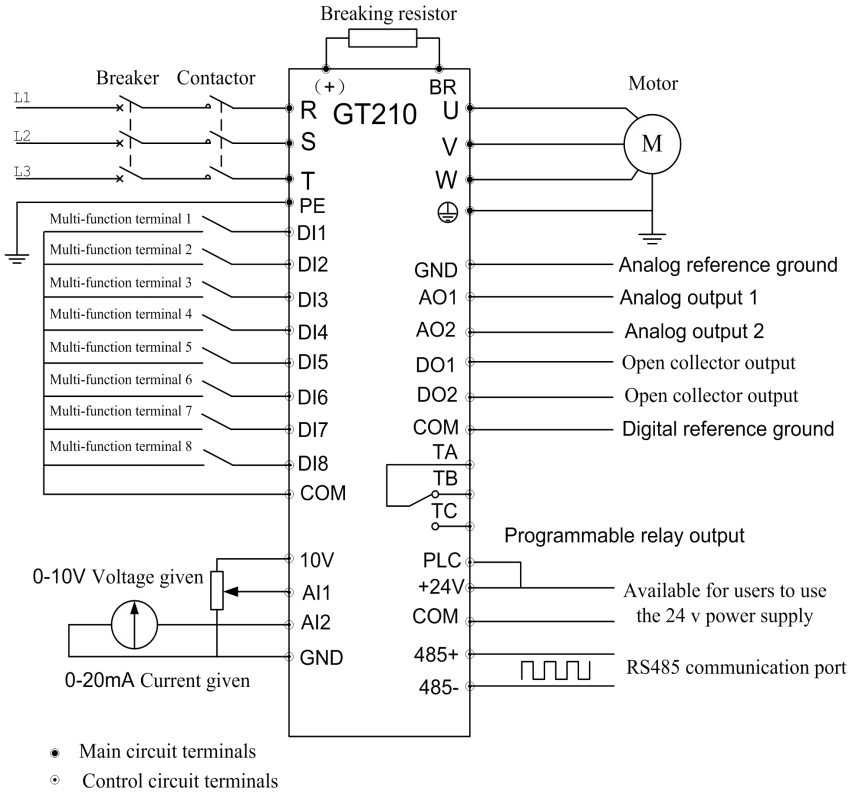
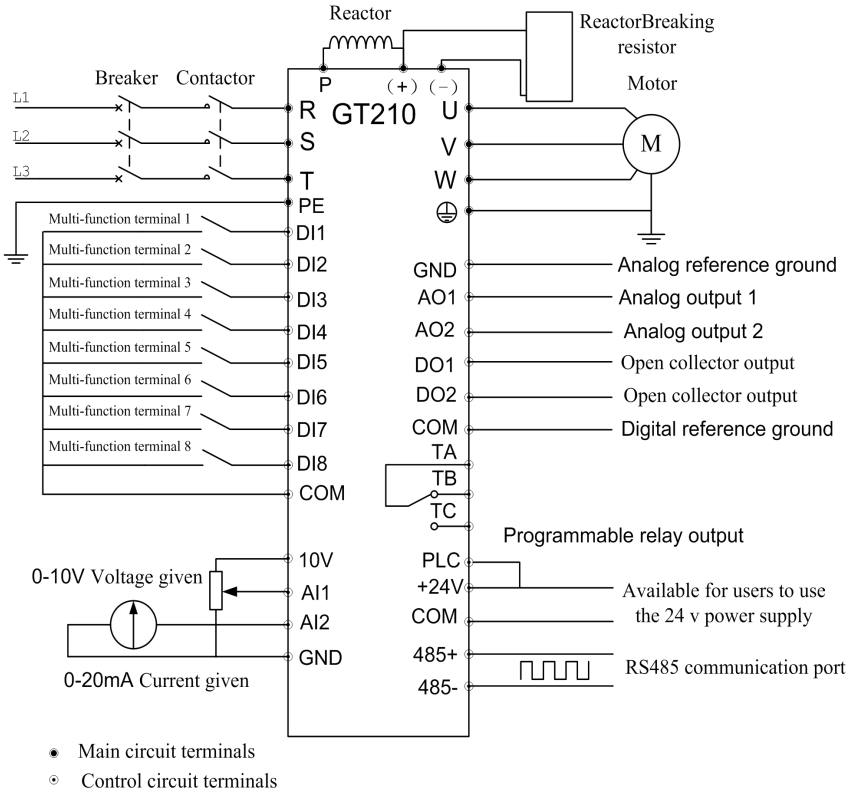


Diagram3-19 Diagram of wiring for basic running

Application model：Less than GT210-4T0220G/0300P

🕮 Introduction：Analog output AO1 and AO2 can output voltage or output current. AO1 and AO2 default to 0 ~ 10V voltage output.J1 and J2 jumper select the current output . the corresponding physical output set by F6.24 and F6.25



Diagrm3-20 Wiring for basic running

Application model：More than GT210-4T0300G/0370P

3.5 Control circuit configuration and wiring

3.5.1 Layout of control circuit terminal as follows:

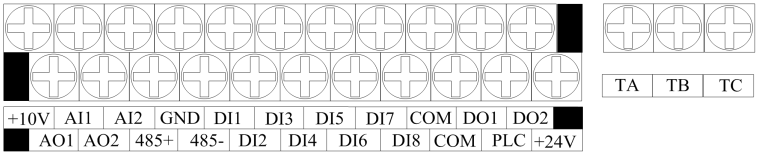


Diagram3-21 Diagram of control panel terminals arrangement

3.5.2 CN3 function description,shown as table3-5

Type	Terminal no.	Name	Terminal function description	Specification
Communication	485+	RS485 Communication interface	RS485 different signal positive terminal	Standard RS485 communication interface, please use Twisted pair or shielded wire
	485-		RS485 different signal negative terminal	
Multi-function Output terminal	DO1 DO2	Open collector Output terminal	Programmable is defined Switch output terminals with multiple functions, detail refer to output terminal function introduction of F6.11F6.12 (Common port: COM)	Optical coupling isolation output Working voltage:9～30V Max output current :50mA
Relay output terminal	TA TB TC	Programmable relay output terminal	Normal：TA-TB normally closed; TA-TC normally open; Action：TA-TB normally open; TA-TC normally closed （Detail refer to F6.13）	Rating of contact NO：5A 250VAC NC：3A 250VAC
Analog input	AI1	Analog input AI1	Accept the input of analog voltage (Reference ground：GND)	Input voltage range：0～10V (input impedance：100KΩ) Resolution：1/1000

	AI2	Analog input AI2	Accept input of analog current and voltage (Reference ground：GND) Selected by Jumper pin J3	Input current range：0～20mA (input impedance：500Ω) Resolution：1/1000
Analog output	AO1 AO2	Analog output	Provide analog voltage output, Corresponding to 12 kinds of physical quantities,output frequency as factory default （refer to F6.24/F6.25）	Voltage output range：0～10V Current output range：0～20mA
Multi-function input terminal	DI1	Multi-function input terminal 1	Programmable multi-function switch output terminals is referred to introduction about input terminal function(Switch input and output) on Chapter 6 terminals function parameters (Common port:COM) （Detail refer to F6.00-6.07）	
	DI2	Multi-function input terminal 2		
	DI3	Multi-function input terminal 3		
	DI4	Multi-function input terminal 4		
	DI5	Multi-function input terminal 5		
	DI6	Multi-function input terminal 6		
	DI7	Multi-function input terminal 7		
	DI8	Multi-function input terminal 8		
Power supply	10V	+10V Power suppy	Provide +10V power supply for external	Max output current:50mA
	GND	+10V power common terminal	Analog signal and reference ground of +10v power supply	Mutual inner isolation shall be produced between COM and GND

	COM	+24Vpower common terminal	Input/output public terminal of digital signal	
	+24V	+24V power supply	Digital signal power supply	Max output current:200mA
	PLC	Multi-function input public terminal	DI1—DI8 public terminal	Short circuit with 24v as factory default

Table3-5 Control terminal function table

3.5.3 The wiring of analog input/output

（1）AI1 terminal modify and accept analog voltage（0～10V）input

（2）AI2 terminal accept the input of analog signal ，Input voltage（0～10V）or input current（0～20mA）selected by J3 jumper.Terminal wiring as follows diagram3-22

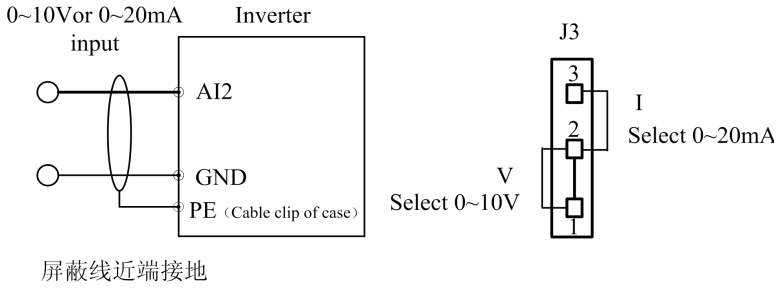


Diagram3-22 Wiring for analog input terminal

Notice： J3 jumping to location “I ”is current signal, Jumping to location “V” is voltage signal, Factory default to “V”

(3)AO1 corresponds to J1 terminal, can select 0～20mA and 0～10V, The wiring shown as the diagram 3-23（A）;AO2 corresponds to J2 terminal, can select 0～20mA and 0～10V, the wiring shown as diagram3-23(B):

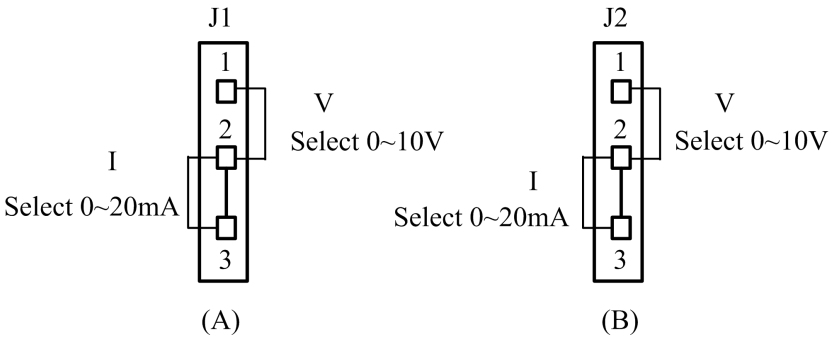


Diagram3-23 The wiring figure for analog output terminal

Notice:Diagram3-23(A) J1 jumping to location “I” is current signal, Jumping to location “V” is voltage signal, factory default to “V”. Diagram 3-23(B) J2 jumping to location “I” is current signal, Jumping to “V” is voltage signal, factory default to “V”

3.5.4 PLC terminal wiring

Description for NPN and PNP model switch terminal ,shown as diagram 3-24 to diagram 3-27

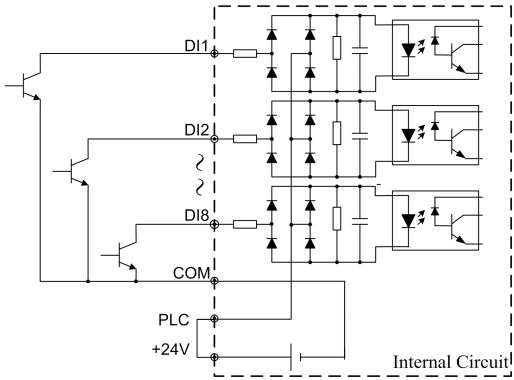


Diagram3-24 Internal power supply NPN figure(OC)

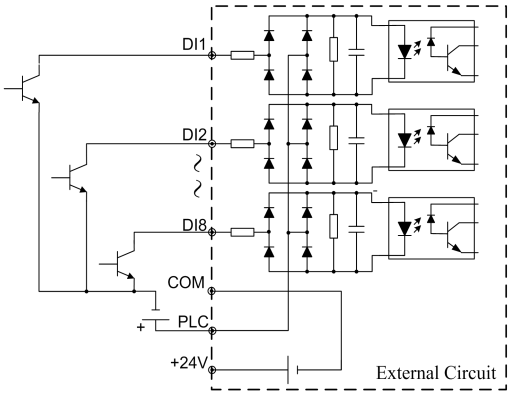


Diagram3-25 External power supply NPN figure(OC)

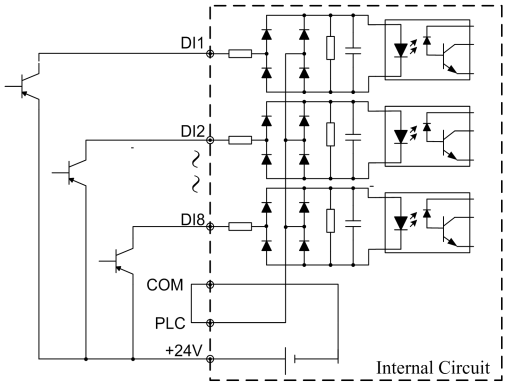


Diagram3-26 Internal power supply PNP figure (OE)

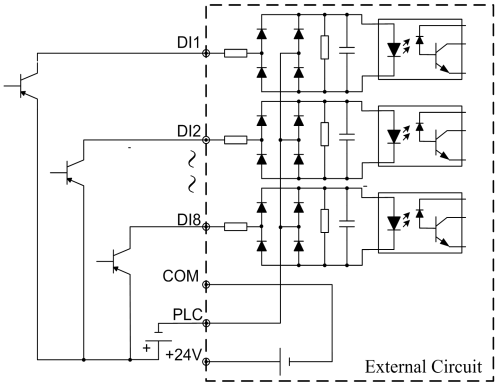


Diagram3-27 External power supply PNP figure(OE)

3.6 Installation guide in line with EMC requirement

3.6.1 The basic solution of noise suppress

Inverter is a strong interference equipment. In the process of running, it will make noise for the reasons of installation system,wiring ,grounding and any others unreasonable factors. The noise may affect the others equipment of system to work normally, Please refer to the following table for rectification:

Table3-6 solution table for noise suppress

Noise transmission path	Interference phenomenon	Solution for reduction influence
Leakage current grounding wire loop noise	Leakage protection action：When peripheral equipment through the inverter wiring form closed-loop circuit，Inverter ground leakage current,which make equipment produce malfunction	➢ Motor shell is connected to inverter terminal； ➢ Inverter PE terminal connect grid ; ➢ Input power cord with safety capacitance box； ➢ Reduce the carrier frequency, shorten the output cable length, equipped with leakage suppression equipment.
The power wire transmission noise	When the power supply of peripheral equipment and power supply of inverter are provided with the same system, the noise from inverter will transmit with inverting the power line which will make others equipment in the same system produce malfunction	Mount an electromagnetic noise filter at input terminal of inverter,other equipment is isolated with isolating transformer or power filter.
Noise transmission path	**Interference phenomenon**	**Solution for reduction influence**

Space radiation noise（Include：motor wire、power wire and inverter radiation noise）	Devices and signal lines that handle weak signals such as measuring instruments, radios, sensors, etc., are susceptible to malfunction due to spatial noise if they are installed in the same cabinet with the inverter and the wiring is very close	➢ The equipment and signal wire that is apt to be interfered shall be kept far from the inverter.The signal wire shall be shielded wire.The signal end of shielded layer shall be earthed,and kept away the inverter and its input/output wire as far as possible.If the signal wire must be crossed with heavy-current cable they are must be kept in quadrature（refer to cable wiring requirement）。 ➢ The input and output side of the inverter are installed radio noise filter and linear noise filter (ferrite common mode choke), which can inhibit the power line radiation noise; ➢ The cable of motor shall be put in the shield of large thickness,if installed in the pipe of over 2mm or embedded into cement slot,the power line shall be covered in the metallic pipe and the shielded wire is used to earth (The motor cable shall be of 4 cores,one end is earthed on the side of inverter ,the other is connected to enclosure of motor)
Electrostatic and electromagnetic induction noise	If the signal lines and power lines are wired in parallel or bundled together with the power lines, electromagnetic induction noise, electrostatic induction noise and noise propagate in the signal lines, which may cause malfunction of the equipment	Shall avoid such wiring, and keep the affected equipment as far away from the inverter as possible. The easily affected signal line shall be kept away from the input/output wire of inverter. The signal wire and power wire shall be the shielded wire and set into the metal tube respectively which the effect is better. At least 20 cm distance between the metal tube.

3.6.2 Field wiring and grounding requirement.

1. Filed wiring requirement

1) In order to avoid interference with mutual coupling, motor cables must be far away from the other cable to go line;

2) Avoid the motor cable and other cables to parallel go line with long distance,if the space is limited, please ensure that the distance shown as below, and can also be placed in different shielding trunking, while shortening the distance of parallel going line.

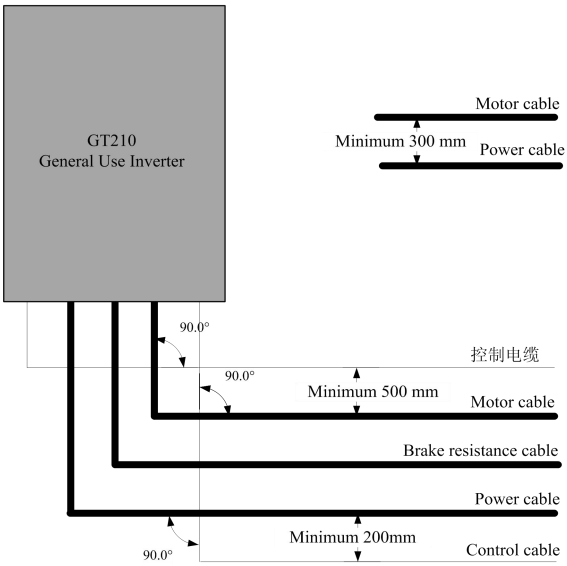


Figure3-28 System wiring requirement

3) If the motor cable is too long or the cross-sectional area of the motor cable is too large, it should be derated to use. The cable of the inverter should use the cable with the specified area.Because the larger the cross-sectional area of the cable, the greater the capacitance to ground, the greater the leakage current, the use of larger cross-sectional area of the cable should reduce the output current,the area of every increase a current decrease about 5%.

4) Power input and output cable recommended shielded / armored cable that is high-frequency low-impedance shielded cable. Such as woven copper wire mesh, aluminum wire mesh or barbed wire.

5) It is recommended that the control cable be a shielded cable, and that the shield wire must be connected to the sheet metal chassis of the inverter through the cable clamps at both ends.

2. Grounding

Special Grounding Pole (Best)

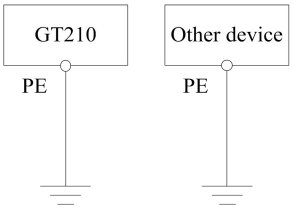


Figure3-29 Grounding figure 1

Common grounding pole(Can)

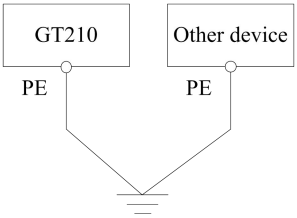


Figure3-27 Grounding figure 2

Common grounding cable(Not good): If the various parts of the system ground terminal is in a connection, the leakage current become a noise source, which will affect the system equipment, so the inverter shall be separated with the ground terminal of other audio equipment, sensors ,computers and others

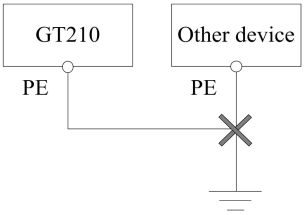


Figure 3-30 grounding diagram 3

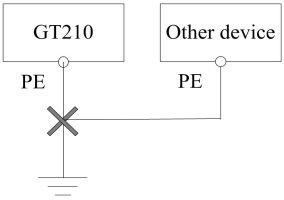


Figure3-31 Grounding figure 4

In addition, still should pay attention to the following points:

Should adopt large grounding cable as far as possible to avoid that the system grounding impedance is too large； The use of flat cable is relatively good, because of the cross-sectional area of the same cable, high-frequency impedance of flat conductor is smaller than the circular conductor.

One end of the yellow-green line of the 4-core motor cable should be grounded on the inverter side and the other end connected to the motor ground. If the motor and the inverter have a special grounding pole, the effect is better.

To obtain a lower high-frequency impedance, the mounting bolts of the device can be used as high-frequency terminals connected to the rear panel of the cabinet, taking care to remove the insulating paint at the fixed point.

The grounding cable should be as short as possible, ie the ground point should be as close as possible to the inverter.

Arrangement grounding cable should be far away from the noise sensitive equipment I/O wiring, and ground wire as short as possible.

3.7.2 Field wiring and grounding

Control signal line should use shielded cable, and shielding wire mesh must be connected to the metal chassis through both ends of the cable clamp, shown as figure 3-32

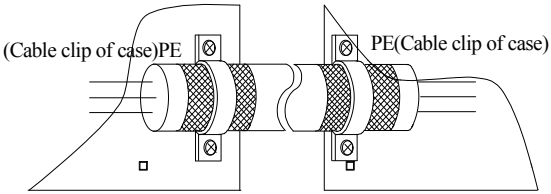


Figure3-32 The correct shielding grounding method

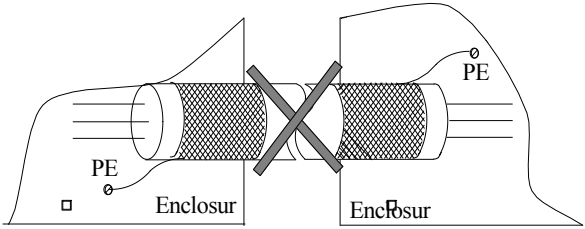


Figure3-33 The wrong shielding grounding method

Chapter 4 Frequency Inverter's operation and instruction

4.1 noun explanation

The contents of each chapter will be referred to the term describing the control, operation and status of the inverter. Please read this section carefully, which will help you understand and properly use the features mentioned below.

4.1.1 Frequency Inverter operation command channel

It specifies the physical channel for the frequency inverter to accept operating commands: start, stop, jog, etc..

There are three kinds of Run command channel:

Operation panel: use the RUN, STOP/RESET, M-F key to control the operation panel.

Control terminal: control terminal DI1-DI8, COM (two wire), DIx (three wire) control.

Serial port: through the host computer start, stop control.

Command channel selection through the function code F1.01, the operation panel PRG key and ENT key, multi-function input terminal selection (F6.00 ~ F6.07 select 27, No. 28, function).

Tip: Before command channel switching , be sure to switch debugging, otherwise there will be damage to equipment and even personal injury risk!

4.1.2 Frequency inverter given channel

There are seven kinds of frequency given physical channels under the common operation mode of the frequency inverter, they are:

The key operating panel ▲、▼"given;

Terminal UP/DN given;

Serial port given;

Analog AI1 given;

Analog AI2 given;

Terminal pulse (PULSE) given;

Keyboard potentiometer given;

The frequency of the final output of the frequency inverter is determined by the combination of seven basic channels. Calculation involves the concept of master setting frequency and auxiliary setting frequency.

Main setting frequency: given by F1.02, multi segment frequency, PLC or closed loop.

The main setting frequency is determined by the operation priority of the inverter. Priority order: jog operation > closed loop run >PLC run > multi segment speed run > General run.

For example,if the inverter is in multi - stage speed operation,then multi - segment frequency is the major setting frequency.

Auxiliary setting frequency: frequency set by FC.24 ~ FC.28.

Final output frequency: the sum of the main setting frequency and the auxiliary setting frequency. Proportion coefficient determined by FC.29, FC.30. Calculation formula see Chapter fifth FC.29, FC.30

4.1.3 Inverter working status

The working state of frequency inverter is divided into shutdown state, running state and motor parameter self-tuning state.

Shutdown state: after the power on the inverter initialization, if there is no running command input, or run the shutdown command, the inverter is in the shutdown state.

Operating status: received operation command, inverter into the running state.

Motor parameter self-tuning state: the functional parameter F3.09 is set to 1 or 2 after running command, enter the motor parameters self-tuning state. After the parameter self tuning is completed, it enters the shutdown state.

4.1.4 Operation mode of frequency inverter

This series of frequency innverter operation mode is divided into five kinds, according to priority order: jog operation > closed loop run >PLC run > multistage speed run > ordinary operation. As shown in figure 4-1.

Dynamic operation:

Inverter in the shutdown state, received point operation command (such as the operating panel M-F key press), according to the jog frequency operation. (see function code F2.20 ~ F2.23)

Closed loop operation:

Closed loop selection function (F8.00=1), the inverter will choose the closed-loop operation mode, that is, in accordance with the given and feedback PI adjustment (see F8 group function code). Through the multi-function terminal (function 20) can be closed loop operation failure, switching to a lower level of operation.

PLC run:

PLC function selection effective (F9.00 bit is not 0), the inverter will choose PLC operation mode, inverter in accordance with pre-set operation mode (see F9 group function code instructions) run. Through the multi-function terminal (function 21) can PLC operation mode failure, switch to lower level operation mode.

Multi speed operation:

Through the multi-function terminal (1, 2, No. 3 function) open / close combination, select multi segment frequency 1 ~ 7 (F9.01 ~ F9.07) for multi segment speed operation. Note: three terminals can not be in the "OFF" state, otherwise, for the general operating mode.

General operation: that is a simple open-loop operation mode.

The evolution logic of this series inverter running state as shown in figure 4-1:

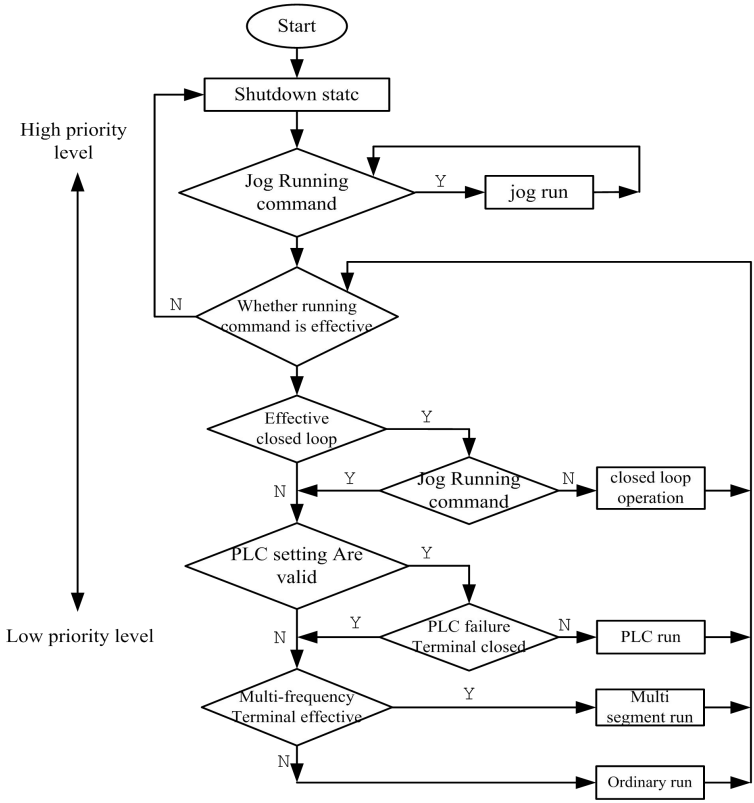


Diagram 4-1 The evolution logic of inverter operating state

Five modes of operation provide five basic frequency sources. In addition to "point dynamic operation" frequency, the other four frequency sources can be assisted frequency superposition, frequency adjustment, "PLC operation", "multi segment operation", "ordinary operation" can also swing frequency adjustment processing.

4.2 Detailed operation guide

4.2.1 User instruction of operating panel

The operation panel is the main unit of accepting orders and displaying parameters. Outline dimensions of the operation panel is showed as diagram4-2.

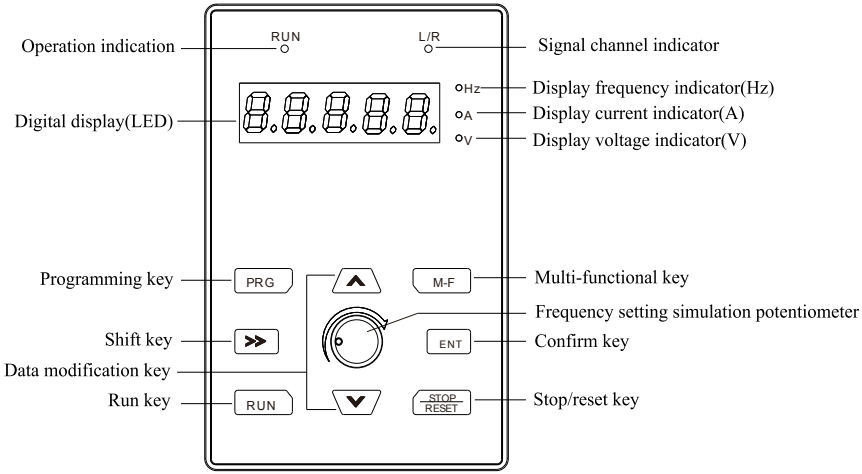


Figure 4-2 schematic diagram of the operation panel

4.2.2 button function description

The frequency converter operation panel is provided with 8 keys, each function definition of the key is shown in table 4-3.

Table 4-3 operation panel function table

Keys	Name	Icon	Function explanation
PRG	Edit/Exit Key	PRG	Entry or exit programming status
▶▶	Shift/monitor key	▶▶	In the edit state, you can choose to set the data modification bit; in other state, switch display monitoring parameters
ENT	Confirm key	ENT	Enter menu or data confirmation
M-F	Multi-functional key	M-F	According to F0.01 set effective, ex factory value: point action control
RUN	Operation key	RUN	In the operation keyboard mode, the button inverter operation
STOP/RESET	Stop/ reset key	STOP/RESET	When the frequency inverter is in the normal operation condition, if the frequency innverter operates the instruction channel to set the keyboard to stop the effective way, presses this key frequency change to stop according to the set way. When the inverter is in fault state, press the key to reset the inverter and return to normal shutdown state.

▲	Increasing key	▲	Data or function code increments (continuous press, can increase the incremental speed)
▼	Descending key	▼	Decline in data or function code (continuous press, can increase the rate of decline)

Tip: keys RUN, M-F, STOP/RESET characteristics are also restricted by the function code FC.31.

Project		Function Explanation	
Display function	Digital display	Display the current running state parameters and setting parameters. Note: when the parameter exceeds four digits, only the first four digits are displayed.	
	LED Indicator light	Hz、A、V	Current digital display parameters corresponding to the physical unit (current A, voltage V, frequency) The rate is Hz
		L/R	The indicator light, indicating that the inverter is in the operating panel control state;
			When the indicator light is off, the inverter is in the terminal control state;
			The indicator flashes, indicating that the inverter is running in the serial state.
		A	When the LED indicator A is on, the digital tube display parameter unit is current ampere.
		V	When the LED indicator V is on, digital display parameter unit voltage volts.
		Hz	When the LED indicator V is on, the digital tube displays the parameter unit frequency hz.
		When the LED indicator Hz and V light, digital display parameters as a percentage.	
		When the LED indicator Hz and A light, digital display parameters for speed.	
		When the LED indicator V and A light, digital display parameters for linear speed.	
		When the LED indicator lights V, A and Hz light, digital display parameters for temperature.	

4.2.4 keyboard display status

This series of operation keyboard display state is divided into four states:power initialization display, function code parameters and monitoring parameters display, fault alarm state display, running state parameter display. The machine is powered on, the LED lights will all become bright, then the digital tube (LED) displays "P.oFF" character, and then enter the set frequency display, as shown in figure 4-3.

4.3 stop parameter display status

Inverter is in shutdown state, operation keyboard display downtime monitoring parameters, factory defaults to set frequency. As shown in Figure 4-4, the unit indicator above the digital tube shows the unit Hz of the parameter.

▶▶Keys, can be displayed in different cycle state monitoring parameters, the corresponding position of the function code F7.03 set up its display function, see functional parameter table F7.03 downtime monitoring parameter selection settings.

4.4 running parameters display status

After the inverter receives the effective operation command, it enters the running state, operates the keyboard to display the running state monitoring parameter, and the factory defaults to the output frequency. As shown in Figure 4-4, the unit indicator above the digital tube shows the unit Hz of the parameter.

▶▶Button, can be displayed loop running state monitoring parameters, by the function code F7.01, F7.02 corresponding position set its display function, see functional parameter table F7.01, F7.02 running state monitoring parameter selection settings.

4.4.1 power on initialization, display "P.oFF"

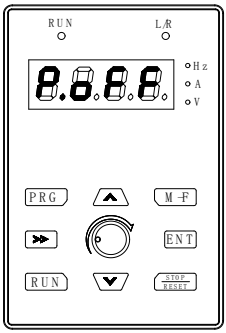


Figure 4-3 electrical parameter display status

4.4.2 display downtime setting frequency "50.00"

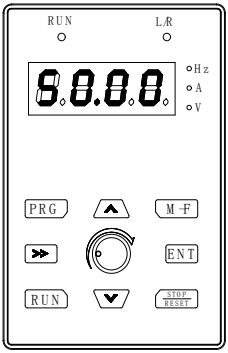


Figure 4-4 shutdown parameter display status

4.4.3 display runtime output frequency "20.00"

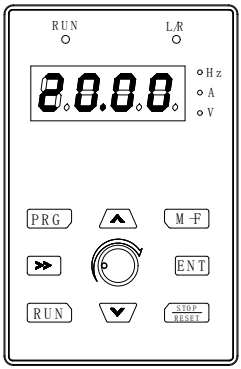


Figure 4-5 operating parameters display status

4.5 fault alarm display status

When the inverter fault alarm display fault signal detected, enter fault alarm display, display fault code (as shown in Figure 4-6): ▶▶key parameters related to check after shutdown; if you want to view the fault information, you can press the PRG key to enter the programming to query the status of FD group parameters. After troubleshooting, the operation can be done by operating the STOP/RESET key, control terminal or communication command of the keyboard. If the fault persists, the display failure code is maintained.

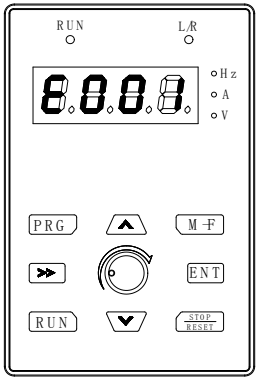


Figure 4-6 acceleration over-current fault alarm display

Tip: for some serious faults, such as inverter module protection, over-current, over-voltage, etc., in the absence of confirmed fault has been ruled out, must not be forced to reset the operation, so as not to damage the inverter.

4.6 function code edit display status

In shutdown, operation or fault alarm state, press the PRG button, can enter edit mode (if you set the user password, enter the password before entering the editing, editing, see F0.04 instructions) according to the two level menu display. Press ENT key to enter. In the functional parameter display state, press the ENT key parameter storage operation, press the PRG key to modify the parameters are not stored, can only return to the higher menu.

4.7 keyboard operation method

A variety of inverter operation could be done by the operation of the keyboard , for example:

4.7.1 monitor parameter view

Display switching of monitoring parameters

Press the ▶▶ button, F7.01-F7.03 display state control parameter, and the corresponding indicator lights, such as display setting frequency, light emitting diode unit "Hertz" corresponding to the light (Hz). Monitor parameter settings refer to the F7.01-F7.03 parameter description.

4.7.2 Setting of function code parameters

Function code setting example:

Example 1: will forward point dynamic frequency setting by 5Hz modified to 10Hz (F2.20 from 5.00Hz to 10.00Hz)

1) press the PRG key to enter the program, LED digital tube display parameter "-F0-", press the ▲ key to change LED digital tube display "-F2-".

2 by ENT you can see the blinking bit in the function item bit flicker, by ▶▶ moving flicker bit to ten bit.

3) according to the ▲ key to the LED digital tube display F2.20.

4) press the ENT key, will see F2.20 corresponding data (5), at the same time, its unit frequency corresponding light-emitting diode (Hz) light.

5) press ▶▶ button, flashing displacement to the top 5,press ▲ five times ,change to 10.

6) press the ENT key to save the value of F2.20 and automatically display the next function code (F2.21).

7) press the PRG key to exit the programming state.

4.7.3 Set user password to enter the function code editing operation

User password settings are used to prohibit unauthorized personnel from accessing and modifying functional parameters. The user password F0.04 factory set value of "0000", the user interface can set parameters (note here the parameter setting is not password protected, but limited by the other conditions, including but not limited to operation can modify the monitoring parameters can not be modified, etc).

Set the user password, enter four digits, press ENT to confirm, after this direct power down password automatically. Password, if not properly set the password, the user can not enter the F group menu interface settings function code parameters. Password set successfully, you can view, modify the function code.

Need to change the password, select the F0.04 function code, press the ENT key to enter the password verification status, password verification success, enter the modified state, enter a new password, and press the ENT key to confirm that the new password into effect. Invalid

when setting password less than 100.

4.8 power for the first time

4.8.1 Check before power on

Wire connection in accordance with the technical requirements provided in the specification "inverter wiring".

4.8.2 initial power up operation

Wiring and power check, close the inverter input side air switch to the inverter AC power supply, power inverter control panel, the first show "8.8.8.8.", when the contactor normal operate, digital tube display characters into a set frequency, showed that the frequency innverter has been initialized.

If the L/R indicator light of the operation panel is on, it is indicated as the control state of the operation panel.

The first power up operation is as follows:

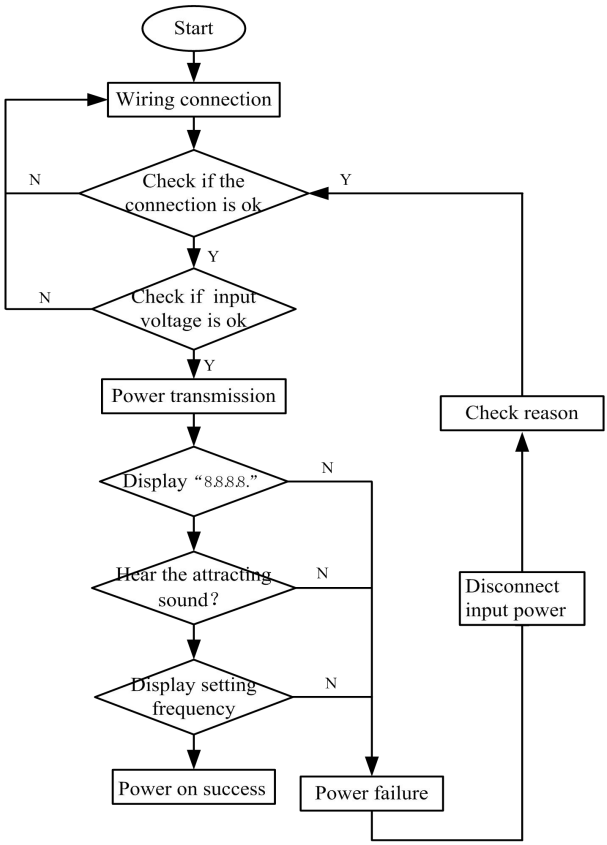


Figure 4-16 Inverter first power up operation flow

Chapter 5 Function Parameters

5.1 Symbol Description:

×—means that the parameter cannot be modified during the operation process

○—means that the parameter can be modified during the operation process

●—shows actually detected parameter which cannot be modified

*—shows manufacturer retention parameter which is forbidden to modify

5.2 Function Parameters

Parameter code	Parameter name	Setting range	Mini munit	Default value	Mod ition
System management parameter F0 group					
F0.00	Parameter write protection	0：All the data is allowed to be modified; 1：Forbidden to modify except for direct setting frequency and this function code; 2：Forbidden to modify except for this function code	1	0	○
F0.01	Multifunction key selection	0：JOG function 1：Remote switchover function	1	0	○
F0.02	Parameter initialization	0：Parameter modification status 1：Clear breakdown memory information (Fd.04～09) 2：Recover default setting value (except for F0 group, Fd group, F1.08 and F3.00)	1	0	×
F0.03	Reserved			0	*
F0.04	User code	0：No password Others: password protection	0	0	○
Basic operation parameter F1 group					
F1.00	Reserved	-	-	0	×
F1.01	Run command channel selection	0：Operation panel run command channel (LED light on) 1：Terminal run command channel (LED light off) 2：Serial port run command channel (LED flickering)	1	0	○

Parameter code	Parameter name	Setting range	Mini munit	Default value	Mod ition
F1.02	Frequency given channel selection	0：Number given 1, operation panel ▲ ▼ regulating 1：Number given 2, terminal UP/DN regulating 2：Number given 3, serial port given 3：AI1 given 4：AI2 given 5：Terminal pulse given 6：Keyboard potentiometer given	1	0	○
F1.03	Numerical frequency control	LED units digit: 0：Setting frequency power down storage 1：Setting frequency power down no storage LED tens digit: 0：Halt setting frequency keeping 1：Halt setting frequency recovery	1	00	○
F1.04	Basic operation frequency	1.00～550.0Hz	0.01Hz	50.00Hz	×
F1.05	Maximum output voltage	1～480V	1V	Frequency converter	×
F1.06	Maximum output frequency	MAX{50.00,550.0}	0.01Hz	50.00Hz	×
F1.07	Operation frequency digit setting	Upper limiting frequency～lower limiting frequency	0.01Hz	50.00Hz	○
F1.08	Model selection	0：G type 1：P type	1	0	×
F1.09	Upper limiting frequency	Lower limiting frequency～ maximum frequency	0.01Hz	50.00Hz	○
F1.10	Lower limiting frequency	0.00～upper limiting frequency	0.01Hz	0.00Hz	○
F1.11	Acceleration time 1	0.1～3600 Note: default unit second; refer to FC.09 for units of acceleration and deceleration time selection	0.1	5.5G~22G: 6.0s Others: 20s	○
F1.12	Deceleration time 1	0.1～3600 Note: default unit second; refer to FC.09 for units of acceleration and deceleration time selection	0.1	5.5G～22G: 6.0s Others:20s	○
F1.13	Torque promoting	0.0:(automatic) 0.1%～30.0%	0.1%	0.0%	○

Parameter code	Parameter name	Setting range	Mini munit	Default value	Mod ition
F1.14	Manual torque promoting cutoff point	0.0～50.0%(relative to F1.06)	0.1%	10.0%	○
F1.15	Reserved	-	-	0	*
F1.16	V/F curve setting	0：User setting V/F curve (confirmed by F1.17～F1.22 function code) 1：Reduced torque characteristic curve 1(2.0 hypo-power) 2：Reduced torque characteristic curve 2(1.7 hypo-power) 3：Reduced torque characteristic curve 3(1.2 hypo-power)	1	0	×
F1.17	V/F frequency value F1	0.00～F0.19	0.01Hz	0.00Hz	×
F1.18	V/F voltage value V1	0～F0.20	0.1%	0.0%	×
F1.19	V/F frequency value F2	F0.17～F0.21	0.01Hz	0.00Hz	×
F1.20	V/F voltage value V2	F0.18～F0.22	0.1%	0.0%	×
F1.21	V/F frequency value F3	F0.19～F1.04	0.01Hz	0.00Hz	×
F1.22	V/F voltage value V3	F0.20～100.0%	0.1%	0.0%	×
F1.23	Reserved	-	-	0	*
F1.24	Running direction setting	0：Foreward 1：Reversal	1	0	○
F1.25	Carrier frequency setting	5.5～45kW：3.0Hz～15.0kHz 55～110kWP：1.0kHz～10kHz 110kWG～280kW：0.7～6kHz	0.1kHz	8.0kHz 3.0kHz 2.0kHz	○
F1.26	Carrier frequency automatic adjustment selection	0：Close automatic carrier frequency adjustment 1：Open automatic carrier frequency adjustment	1	1	○
On-off control F2 group					
F2.00	Start operation	0：Start from start frequency 1：Brake first and then start from start frequency 2：Rotate speed tracking (including direction judgment) and then start; start from start frequency when rotate speed is 0.	1	0	×

Parameter code	Parameter name	Setting range	Mini munit	Default value	Mod ition
F2.01	Start frequency	0.20～60.00Hz	0.01Hz	0.50Hz	○
F2.02	Start frequency retention time	0.0～10.0s	0.1s	0.0s	○
F2.03	Start DC braking current	132kW and above power P type: 0.0～80.0% frequency converter rate current Other power grades: 0.0～100.0% frequency converter rate current	0.1%	0.0%	○
F2.04	Start DC braking time	0.0 (no action) 110kW (P type) and below power: 0.1～60.0s Other power grades: 0.1～30.0s	0.1s	0.0s	○
F2.05	Acceleration and deceleration mode selection	0：Straight line acceleration and deceleration 1：S curve acceleration and deceleration 2：Automatic acceleration and deceleration	1	0	×
F2.06	S curve initial stage time	10.0%～50.0%(Acceleration and deceleration time) F2.06+F2.07≤90%	0.1%	20.0%	○
F2.07	S curve ascent stage time	10.0%～80.0%(Acceleration and deceleration) F2.06+F2.07≤90%	0.1%	60.0%	○
F2.08	Stop mode	0：Stop deceleration 1：Stop free running 2：Stop deceleration+DC braking	1	0	×
F2.09	Stop DC braking start frequency	0.00～60.00Hz	0.01Hz	0.00Hz	○
F2.10	Stop DC braking waiting time	0.00～10.00s	0.01s	0.00s	○
F2.11	Stop DC braking current	132kW and above P type: 0.0～80.0% frequency converter rated current Other power grades: 0.0～100.0% frequency converter rated current	0.1%	0.0%	○
F2.12	Stop DC braking time	0.0 (no action) 110kW (P type) and below power: 0.1～60.0s Other power grades: 0.1～30.0s	0.1s	0.0s	○
F2.13	Reserved	-	-	0	*

Parameter code	Parameter name	Setting range	Mini munit	Default value	Mod ition
F2.14	Acceleration time 2	0.1～3600 Note: default unit second; refer to FC.09 for units of acceleration and deceleration time selection	0.1	5.5G～22G: 6.0s 30G～315P: 20.0s	○
F2.15	Deceleration time 2	0.1～3600 Note: default unit second; refer to FC.09 for units of acceleration and deceleration time selection	0.1		○
F2.16	Acceleration time 3	0.1～3600 Note: default unit second; refer to FC.09 for units of acceleration and deceleration time selection	0.1		○
F2.17	Deceleration time 3	0.1～3600 Note: default unit second; refer to FC.09 for units of acceleration and deceleration time selection	0.1	5.5G～22G: 6.0s 30G～315P: 20.0s	○
F2.18	Acceleration time 4	0.1～3600 Note: default unit second; refer to FC.09 for units of acceleration and deceleration time selection	0.1		○
F2.19	Deceleration time 4	0.1～3600 Note: default unit second; refer to FC.09 for units of acceleration and deceleration time selection	0.1	5.5G～22G: 6.0s Others:20s	○
F2.20	Jog operation frequency	0.10～50.00Hz	0.01Hz	5.00Hz	○
F2.21	Jog interval time	0.0～100.0s	0.1s	0.0s	○
F2.22	Jog acceleration time	0.1～60.0s	0.1	5.5G～22G: 6.0s Others:20s	○
F2.23	Jog deceleration time	0.1～60.0s	0.1	5.5G～22G: 6.0s Others:20s	○
F2.24	Skip frequency 1	0.00～550.0Hz	0.01Hz	0.00Hz	×
F2.25	Skip frequency 1 range	0.00～30.00Hz	0.01Hz	0.00Hz	×
F2.26	Skip frequency 2	0.00～550.0Hz	0.01Hz	0.00Hz	×
F2.27	Skip frequency 2 range	0.00～30.00Hz	0.01Hz	0.00Hz	×

Parameter code	Parameter name	Setting range	Mini munit	Default value	Mod ition
F2.28	Skip frequency 3	0.00～550.0Hz	0.01Hz	0.00Hz	×
F2.29	Skip frequency 3 range	0.00～30.00Hz	0.01Hz	0.00Hz	×
F2.30	Anti-reverse selection	0：Reverse allowed 1：Reverse prohibited	1	1	×
F2.31	Forward and reverse dead time	0～3600s	0.1s	0.0s	×
Motor parameter F3 group					
F3.00	Motor pole quantity	2～14	2	4	×
F3.01	Rated power	0.4～999.9kW	0.1kW	Confirmed by model	×
F3.02	Rated current	0.1～999.9A	0.1A	Confirmed by model	×
F3.03	No-loading current I0	0.1～999.9A	0.1A	Confirmed by model	×
F3.04	Stator resistance %R1	0.00%～50.00%	0.01%	Confirmed by model	○
F3.05	Leakage inductive	0.00%～50.00%	0.01%	Confirmed by model	○
F3.06	Rotor resistance %R2	0.00%～50.00%	0.01%	Confirmed by model	○
F3.07	Interaction inductive reactance %X m	0.0%～2000%	0.1%	Confirmed by model	○
F3.08	Rated slip frequency	0.00～20.00Hz	0.01HZ	0.00Hz	○
F3.09	Parameter self-tuning	0：No action 1：Action (motor static) 2：Action (motor rotate)	1	0	×
F3.10	Motor stable factor	0～255	1	≤45kW：10 ≥55kW：20	○
F3.11～ F3.21	Reserved	-	-	0	*
Swing frequency parameter F4 group					

Parameter code	Parameter name	Setting range	Mini munit	Default value	Mod ition
F4.00	Swing frequency function selection	0：Not select swing frequency function 1：Select swing frequency function	1	0	×
F4.01	Swing frequency operation mode	LED units digit: start mode 0：Automatic (Press F4.03) 1：Terminal manual operation LED tens digit: amplitude control 0：Relative to center frequency 1：Relative to maximum frequency LED hundreds digit: Swing frequency status memory 0：Halt memory 1：No halt memory LED thousands digit: Swing frequency status power off storage 0：Storage 1：No storage	1	0000	×
F4.02	Swing frequency preset frequency	0.00Hz～550.0Hz	0.01Hz	0.00Hz	○
F4.03	Swing frequency preset frequency waiting time	0.0～3600.0s	0.1s	0.0s	○
F4.04	Swing frequency amplitude	0.0～50.0%	0.1%	0.0%	○
F4.05	Kick frequency	0.0～50.0%(Relative to F4.04)	0.1%	0.0%	○
F4.06	Swing frequency cycle	0.1～999.9s	0.1s	10.0s	○
F4.07	triangular wave rise time	0.0 ～ 100.0%(Refer to swing frequency cycle)	0.1%	50.0%	○
Analog quantity terminal parameter F5 group					
F5.00	Frequency given curve selection	LED units digit: AI1 frequency curve selection 0：Curve 1 1：Curve 2 LED tens digit: AI2 frequency curve selection 0：Curve 1 1：Curve 2 LED hundreds digit: Pulse frequency curve selection 0：Curve 1 1：Curve 2	1	000	○

Parameter code	Parameter name	Setting range	Mini munit	Default value	Mod ition
F5.01	Given channel gain	0.00～9.99	0.01	1.00	○
F5.02	Given smoothing constant	0.01～50.00s	0.01s	0.50s	○
F5.03	Maximum input pulse frequency	0.1～50.0k	0.1k	10.0k	○
F5.04	Curve 1 minimum given	0.0%～F5.06 (Specific value between minimum given value 1 and reference value 10V/20mA/F1.03)	0.1%	0.0%	○
F5.05	Curve 1 minimum given corresponding frequency	0.00～F1.06	1	0.00Hz	○
F5.06	Curve 1 maximum given	F5.04～100.0% (Specific value between maximum given value 1 and reference value 10V/20mA/F5.03)	0.1%	100.0%	○
F5.07	Curve 1 maximum given corresponding frequency	0.00～F1.06	1	50.00Hz	○
F5.08	Curve 2 minimum given	0.0%～F5.10 (Specific value between minimum given value 2 and reference value 10V/20mA/F1.03)	0.1%	0.0%	○
F5.09	Curve 2 minimum given corresponding frequency	0.00～F1.06	1	0.00Hz	○
F5.10	Curve 2 maximum given	F5.08～100.0% (Specific value between maximum given value 2 and reference value 10V/20mA/F5.03)	0.1%	100.0%	○
F5.11	Curve 2 maximum given corresponding frequency	0.00～F1.06	1	50.00Hz	○

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
Digital quantity terminal parameter F6 group					
F6.00	Multifunction input terminal DI1 Function selection	0：No function 1：Multistage frequency terminal 1 2：Multistage frequency terminal 2 3：Multistage frequency terminal 3 4：Acceleration and deceleration time terminal 1 5：Acceleration and deceleration time terminal 2 6：External fault normally open input 7：External fault normally close input 8：External reset (STOP/RESET) input 9：External Forward jog control 10：External reverse jog control 11：Free stop input (FRS) 12：Freq. increasing command (UP) 13：Freq. decreasing command (DOWN) 14：Simple PLC Suspend running command 15：Acceleration and deceleration forbidden command 16：Three-wire operation control 17：External interruption normally open contact input 18：External interruption normally close contact input 19：Stop DC braking input command DB 20：Ineffective closed loop 21：PLC failure 22：Frequency source selection 1 23：Frequency source selection 2 24：Frequency source selection 3 25：Frequency switch to AI2 26：Reserved 27：Command switch to terminal 28：Command source selection 1 29：Command source selection 2 30：Multistage voltage terminal 1 31：Multistage voltage terminal 2	1	0	×
F6.01	Multifunction input terminal DI2 Function selection			0	
F6.02	Multifunction input terminal DI3 Function selection			0	
F6.03	Multifunction input terminal DI4 Function selection			0	
F6.04	Multifunction input terminal DI5 Function selection			0	

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
Digital quantity terminal parameter F6 group					
F6.05	Multifunction input terminal DI6 Function selection	32：Multistage voltage terminal 3 33：Swing frequency start 34：Swing frequency status clear away 35：External halt command (Effective to all the control modes, stop according to the current stop mode) 36：FWD terminal function 37：REV terminal function 38：Frequency converter running prohibited 39：Length reset 40：Auxiliary given frequency reset 41：PLC halt memory clear away 42：Counter reset signal input 43：Counter trigger signal input 44：Length counting input 45：Pulse frequency input 46：Single phase speed measurement input 47：Speed measurement input SM1 (only set for DI7) 48：Speed measurement input SM2(Only set for DI8)	1	0	×
F6.06	Multifunction input terminal DI7 Function selection			0	
F6.07	Multifunction input terminal DI8 Function selection			0	
F6.08	Reserved	-	-	0	*
F6.09	FWD/REV operation mode setting	0：Two-wire control mode 1 1：Two-wire control mode 2 2：Three-wire operation control 1－self-hold function (additional any terminal among DI1～DI8) 3：Three-wire operation control 2－self-hold function (additional any terminal among DI1～DI8)	1	0	×
F6.10	UP/DN rate	0.01～99.99Hz/s	0.01 Hz/s	1.00Hz/s	○

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
Digital quantity terminal parameter F6 group					
F6.11	Bothway open collector output terminal DO1	0：Inverter running indication (RUN) 1：Frequency arrival signal (FAR) 2：Frequency level detection signal (FDT1) 3：Frequency level detection signal (FDT2) 4：Overload detection signal (OL) 5：Stop for undervoltage block (LU) 6：External fault halt (EXT) 7：Frequency upper limit (FHL) 8：Frequency lower limit (FLL) 9：Frequency converter zero-speed running 10：Simple PLC stage running completion instruction 11：PLC circulation completion indication 12：Reach setting count value 13：Reach specified count value 14：Setting length arrival indication 15：Frequency converter running preparation completed (RDY) 16：Frequency converter fault 17：Upper computer switching signal 18：Swing frequency upper and lower limit 19：Reach setting accumulated running time **Note:** The following functions are inapplicable to DO1 and relay output. 20：Output frequency before slip reimbursement (0~maximum) 21：Output frequency after slip reimbursement (0~maximum)	1	0	×
F6.12	Bothway open collector output terminal DO2		1	1	×

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
Digital quantity terminal parameter F6 group					
F6.13	Relay output function selection	22：Setting frequency (0～maximum) 23：Output current（0～2*Iei） 24：Output current（0～2*Iem） 25：Output torque（0～2*Tem） 26：Output voltage（0～1.2*Ve） 27：Busbar voltage（0～800V） 28：AI1（0～10V） 29：AI2（0～10V/0～20mA） 30：Output power（0～2*Pe） 31：Upper computer percentage（0～65535）	1	16	×
F6.14	FDT1 level	0.00～550.0Hz	0.01Hz	50.00Hz	○
F6.15	FDT1 lag	0.00～550.0Hz	0.01Hz	1.00Hz	○
F6.16	FDT2 level	0.00～550.0Hz	0.01Hz	25.00Hz	○
F6.17	FDT2 lag	0.00～550.0Hz	0.01Hz	1.00Hz	○
F6.18	Frequency reaches (FAR) detection width	0.00～550.0Hz	0.01Hz	2.50Hz	○
F6.20	DO2 maximum output pulse	0.1～50.0(Maximum 50k)	0.1k	10.0k	○
F6.21	Counter reset value setting (Setting count value reached given value)	F6.22～9999	1	0	○
F6.22	Counter detection value setting (Setting count value reached given value)	0～F6.21	1	0	○

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
F6.23	Terminal positive and negative logic	Binary system setting 0：Breakover effective 1：Disconnect effective LED units digit: BIT0～BIT3：DI1～DI4 LED tens digit: BIT0～BIT3：DI5～DI8 LED hundreds digit: BIT0～BIT1：FWD、REV BIT2～BIT3：DO1、DO2	1	000	○
F6.24	AOV output function selection	0：Output frequency before slip reimbursement (0~maximum) 1：Output frequency after slip reimbursement (0~maximum) 2：Setting frequency (0~maximum) 3：Output current（0～2*Iei） 4：Output current（0～2*Iem） 5：Output torque（0～2*Tem） 6：Output voltage（0～1.2*Ve） 7：Busbar voltage（0～800V） 8：AI1（0～10V） 9：AI2（0～10V/0～20mA） 10：Output power（0～2*Pe） 11：Upper computer percentage（0～65535）	1	0	○
F6.25	AOI output function selection	0：Output frequency before slip reimbursement (0~maximum) 1：Output frequency after slip reimbursement (0~maximum) 2：Setting frequency (0~maximum) 3：Output current（0～2*Iei） 4：Output current（0～2*Iem） 5：Output torque（0～2*Tem） 6：Output voltage（0～1.2*Ve） 7：Busbar voltage（0～800V） 8：AI1（0～10V） 9：AI2（0～10V/0～20mA） 10：Output power（0～2*Pe） 11：Upper computer percentage（0～65535）	1	3	○

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
F6.26	Analog output range selection	LED units digit: AOV bias selection 0：0～10V or 0～20mA 1：2～10V or 4～20mA LED tens digit：AOI bias selection 0：0～10V or 0～20mA 1：2～10V or 4～20mA	1	00	○
F6.27	AOV output gain	0.0～200.0%	0.1%	100.0%	○
F6.28	AOI output gain	0.0～200.0%	0.1%	100.0%	○
F6.29～ F6.36	Reserved	-	-	0	*
Human-computer interface F7 group					
F7.00	Reserved		1	0	○
F7.01	LED running display parameter selection 1	Binary system setting: 0：No display; 1：Display LED units digit: BIT0：Output frequency (Hz)(before reimbursement) BIT1：Output frequency(Hz)(after reimbursement) BIT2：Setting frequency(Hz flickering) BIT3：Output current(A) LED tens digit: BIT0：Running rotate speed (r/min) BIT1：Setting rotate speed (r/min flickering) BIT2：Running line speed (m/s) BIT3：Setting line speed (m/s flickering) LED hundreds digit: BIT0：Output power BIT1：Output torque（%） Note: It will display running frequency before reimbursement when all of them are 0.	1	00d	○

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
F7.02	LED running display parameter selection 2	Binary system setting: 0：No display; 1：Display LED units digit: BIT0：Output voltage (V) BIT1：Busbar voltage BIT2：AI1（V） BIT3：AI2（V） LED tens digit: BIT0：Simulated closed loop feedback （%） BIT1：Simulated closed loop setting（% flickering） BIT2：External count value (no unit) BIT3：Terminal status (no unit) LED hundreds digit: BIT0：Actual length BIT1：Setting length	1	003	○
F7.03	LED halt display parameter selection	Binary system setting: 0：No display; 1：Display LED units digit: BIT0：Setting frequency（Hz） BIT1：External count value (no unit) BIT2：Running rotate speed （r/min） BIT3：Setting rotate speed （r/min） LED tens digit: BIT0：Running line speed（m/s） BIT1：Setting line speed（m/s） BIT2：AI1（V） BIT3：AI2（V） LED hundreds digit: BIT0：Simulated closed loop feedback（%） BIT1：Simulated closed loop setting（%） BIT2：Actual length BIT3：Setting length LED thousands digit: BIT0：Terminal status (no unit) BIT1：Busbar voltage Note: It will display setting frequency when they are all 0.	1	2001	○

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
F7.04	Rotate speed display coefficient	0.1～999.9% Mechanical rotate speed=actually measured rotate speed*F7.04(PG) Mechanical rotate speed =120*running frequency/F3.00*F7.04(non-PG) Setting rotate speed=closed loop setting rotate speed*F7.04(PG) Setting rotate speed =120*setting frequency/F3.00*F7.04(non-PG)	0.1%	100.0%	○
F7.05	Linear speed coefficient	0.1～999.9% Linear speed=running frequency*F7.05（non-PG） Linear speed=mechanical rotate speed*F7.05（PG） Setting linear speed=setting frequency*F7.05(non-PG) Setting linear speed=setting rotate speed*F7.05(PG)	0.1%	1.0%	○
F7.06	Closed loop analog display coefficient	0.1～999.9% Note: Closed loop analog given/feedback display range: 0～999.9	0.1%	100.0%	○
PID control parameter F8 group					
F8.00	Closed loop running control selection	0：No action 1：Action	1	0	×
F8.01	Given channel selection	0：Number given; （Refer to F8.06 when F8.02=6; refer to F8.05 in other conditions） 1：AI1； 2：AI2； Note: For speed closed loop, analog given 10V for synchronous speed of maximum frequency F1.06	1	1	○
F8.02	Feedback channel selection	0：AI1； 1：AI2； 2：AI1+AI2； 3：AI1-AI2； 4：MIN（AI1，AI2）； 5：MAX（AI1，AI2）； 6: Pulse: (PG closed loop single\double is confirmed by terminal)	1	1	○

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
F8.03	Given channel smoothing	0.01～50.00s	0.01s	0.50s	○
F8.04	Feedback channel smoothing	0.01～50.00s	0.01s	0.50s	○
F8.05	Given quantity number setting	0.00V～10.00V	0.01	0.00	○
F8.06	Speed closed loop given	0～39000RPM	1	0	○
F8.07	Pulse encoder every revolution	1～9999	1	1024	○
F8.08	Minimum given quantity	0.0%～(F8.10) (The percentage of minimum given quantity and reference value 10V;20mA)	0.1%	0.0	○
F8.09	Corresponding feedback quantity of minimum given quantity	0.0～100.0% (The percentage of corresponding feedback quantity of minimum given quantity and reference value 10V;20mA)	0.1%	20.0%	○
F8.10	Maximum given quantity	(F8.08)～100.0% (The percentage of maximum given quantity and reference value 10V;20mA)	0.1%	100.0%	○
F8.11	Corresponding feedback quantity of maximum given quantity	0.0～100% (The percentage of corresponding feedback quantity of maximum given quantity and reference value 10V;20mA)	0.1%	100.0%	○
F8.12	Proportional gain KP	0.000～9.999	0.001	2.000	○
F8.13	Integral gain Ki	0.000～9.999	0.001	0.100	○
F8.14	Sampling period	0.01～50.00s	0.01s	0.10s	○
F8.15	Deviation extremity	0.0～20.0% （Corresponding closed loop given value）	0.1%	2.0%	○

F8.16	Closed loop regulating characteristic	0：Direct action 1：Reaction Note: Relation between given speed and rotate speed	1	0	×
Parametr code	**Parameter name**	**Setting range**	**Mini munit**	**Default valu**	**Mod ition**
F8.17	Integral control selection	0：Stop integral control if frequency reaches upper or lower limit. 1：Continue integral control if frequency reaches upper or lower limit.	1	0	×
F8.18	Closed loop preset frequency	0.00～550.0Hz	0.01Hz	0.00Hz	○
F8.19	Closed loop preset frequency hold time	0.0～3600s	0.1s	0.0s	×
F8.20	Multistage closed loop given 1	0.00～10.00V	0.01V	0.00V	○
F8.21	Multistage closed loop given 2	0.00～10.00V	0.01V	0.00V	○
F8.22	Multistage closed loop given 3	0.00～10.00V	0.01V	0.00V	○
F8.23	Multistage closed loop given 4	0.00～10.00V	0.01V	0.00V	○
F8.24	Multistage closed loop given 5	0.00～10.00V	0.01V	0.00V	○
F8.25	Multistage closed loop given 6	0.00～10.00V	0.01V	0.00V	○
F8.26	Multistage closed loop given 7	0.00～10.00V	0.01V	0.00V	○

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
Multistage speed control parameter F9 group					
F9.00	Simple PLC running mode selection	LED units digit: PLC running mode 0：No action 1：Stop after single loop 2：Keep final value after single loop 3：Continuous loop LED tens digit: start mode 0：Rerun from the first stage 1：Continue to run from the stage of halt (or fault) 2：Continue to run from the stage, frequency of halt (or fault) LED hundreds digit: power down storage 0：No storage 1：Store the stage and frequency of power down moment LED thousands digit: stage time unit selection 0：second 1：minute	1	0000	×
F9.01	Multistage frequency 1	F1.10(lower limit frequency) ～ F1.09(upper limit frequency)	0.01Hz	5.00Hz	○
F9.02	Multistage frequency 2	F1.10(lower limit frequency) ～ F1.09(upper limit frequency)	0.01Hz	10.00Hz	○
F9.03	Multistage frequency 3	F1.10(lower limit frequency) ～ F1.09(upper limit frequency)	0.01Hz	20.00Hz	○
F9.04	Multistage frequency 4	F1.10(lower limit frequency) ～ F1.09(upper limit frequency)	0.01Hz	30.00Hz	○
F9.05	Multistage frequency 5	F1.10(lower limit frequency) ～ F1.09(upper limit frequency)	0.01Hz	40.00Hz	○
F9.06	Multistage frequency 6	F1.10(lower limit frequency) ～ F1.09(upper limit frequency)	0.01Hz	45.00Hz	○
F9.07	Multistage frequency 7	F1.10(lower limit frequency) ～ F1.09(upper limit frequency)	0.01Hz	50.00Hz	○

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
Multistage speed control parameter F9 group					
F9.08	Stage 1 setting	LED units digit: 0：Multistage frequency 1(F9.01) 1：Determined by F1.02 function code 2：Multistage closed loop given 1(F8.20) 3：Determined by F8.01 function code LED tens digit: 0：Foreward 1：Reversal 2：Determined by run command LED hundreds digit: 0：Acceleration and deceleration time 1 1：Acceleration and deceleration time 2 2：Acceleration and deceleration time 3 3：Acceleration and deceleration time 4	1	000	○

F9.10	Stage 2 setting	LED units digit: 0：Multistage frequency 2(F9.02) 1：Determined by F1.02 function code 2：Multistage closed loop given 2(F8.21) 3：Determined by F8.01 function code LED tens digit: 0：Foreward 1：Reversal 2：Determined by run command LED hundreds digit: 0：Acceleration and deceleration time 1 1：Acceleration and deceleration time 2 2：Acceleration and deceleration time 3 3：Acceleration and deceleration time 4	1	000	○
Parametr code	**Parameter name**	**Setting range**	**Mini munit**	**Default valu**	**Mod ition**
F9.11	Stage 2 running time	0.0～5500	0.1	20.0	○

F9.12	Stage 3 setting	LED units digit: 0：Multistage frequency 3(F9.03) 1：Determined by F1.02 function code 2：Multistage closed loop given 3(F8.22) 3：Determined by F8.01 function code LED tens digit: 0：Foreward 1：Reversal 2：Determined by run command LED hundreds digit: 0：Acceleration and deceleration time 1 1：Acceleration and deceleration time 2 2：Acceleration and deceleration time 3 3：Acceleration and deceleration time 4	1	000	○
F9.13	Stage 3 running time	0.0～5500	0.1	20.0	○

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition

F9.14	Stage 4 setting	LED units digit: 0：Multistage frequency 4(F9.04) 1：Determined by F1.02 function code 2：Multistage closed loop given 4(F8.23) 3：Determined by F8.01 function code LED tens digit: 0：Foreward 1：Reversal 2：Determined by run command LED hundreds digit: 0：Acceleration and deceleration time 1 1：Acceleration and deceleration time 2 2：Acceleration and deceleration time 3 3：Acceleration and deceleration time 4	1	000	○
F9.15	Stage 4 running time	0.0～5500	0.1	20.0	○

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition

F9.16	Stage 5 setting	LED units digit: 0：Multistage frequency 4(F9.04) 1：Determined by F1.02 function code 2：Multistage closed loop given 4(F8.23) 3：Determined by F8.01 function code LED tens digit: 0：Foreward 1：Reversal 2：Determined by run command LED hundreds digit: 0：Acceleration and deceleration time 1 1：Acceleration and deceleration time 2 2：Acceleration and deceleration time 3 3：Acceleration and deceleration time 4	1	000	○
F9.17	Stage 5 running time	0.0～5500	0.1	20.0	○
F9.18	Stage 6 setting	LED units digit: 0：Multistage frequency 4(F9.04) 1：Determined by F1.02 function code 2：Multistage closed loop given 4(F8.23) 3：Determined by F8.01 function code LED tens digit: 0：Foreward 1：Reversal 2：Determined by run command LED hundreds digit: 0：Acceleration and deceleration time 1 1：Acceleration and deceleration time 2 2：Acceleration and deceleration time 3 3：Acceleration and deceleration time 4	1	000	○
Parametr code	**Parameter name**	**Setting range**	**Mini munit**	**Default valu**	**Mod ition**

F9.19	Stage 6 running time	0.0～5500	0.1	20.0	○
F9.20	Stage 7 setting	LED units digit: 0：Multistage frequency 4(F9.04) 1：Determined by F1.02 function code 2：Multistage closed loop given 4(F8.23) 3：Determined by F8.01 function code LED tens digit: 0：Foreward 1：Reversal 2：Determined by run command LED hundreds digit: 0：Acceleration and deceleration time 1 1：Acceleration and deceleration time 2 2：Acceleration and deceleration time 3 3：Acceleration and deceleration time 4	1	000	○
F9.21	Stage 7 running time	0.0～5500	0.1	20.0	○
Protection function parameter FA group					
FA.00	Motor overload protection mode selection	0：No action 1：Common motor (with low speed reimbursement) 2：Variable frequency motor (without low speed reimbursement)	1	1	×
FA.01	Motor overload protection coefficient	20.0～110.0%	0.1%	100.0%	×
FA.02	Reserved	-	-	0	*
FA.03	Reserved	-	-	0	*
FA.04	Overvoltage stall selection	0：Prohibited (when installing brake resistor) 1：Allowed	1	1	×
FA.05	Stall overvoltage point	120.0～150.0%Udce	0.1%	140.0%	×

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition

FA.06	Automatic current limiting level	20.0%～200.0%Ie	0.1%	150.0%	×
FA.07	Automatic current limiting action selection	0: Constant speed ineffective 1: Constant speed effective Note: Acceleration and deceleration is always effective	1	1	×
FA.08	Frequency descent rate during current limiting	0.00～99.99Hz/s	0.01Hz/s	10.00 Hz/s	○
FA.09	Automatic reset times	0～10,0 shows no automatic reset function Note: Module protection and external device fault has no reset function.	1	0	×
FA.10	Automatic reset interval time	2.0～20.0s/time	0.1s	5.0s	×
FA.11	Overload pre-alarm detection setting	LED units digit: Action selection 0：Detecting all the time 1：Detect only in constant speed LED tens digit: Alarming selection 0： No alarming, continue to run 1： Alarm, halt LED hundreds digit: Detection quantity selection 0：Relative to motor rated current（E014） 1：Relative to frequency converter rated current（E013）	1	000	×
FA.12	Overload pre-alarm detection level	20.0%～200.0%	0.1%	130.0%	×
FA.13	Overload pre-alarm detection time	0.0～60.0s	0.1s	5.0s	×

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
FA.14	Protective action selection 1	LED units digit: Undervoltage fault indication action selection 0：No action 1：Action (regard undervoltage as fault) LED tens digit: Automatic reset interval fault indication action selection 0：No action 1：Action LED hundreds digit: Fault lock function selection 0：Prohibited 1：Open (Fault indication no action) 2：Open (Fault indication action) LED thousands digit: Default phase action selection 0：Both input and output default phase are protected 1：Input default phase no action 2：Output default phase no action 3：Both input and output default phase no action	1	0000	×

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
FA.15	Protective action selection 2	LED units digit: communication abnormal action selection 0：Alarming and free halt 1：No alarming and continue to run 2：No alarming and stop according to stop mode(Only in serial port control mode) 3：No alarming and stop according to stop mode(In all control modes) LED tens digit: Contactor abnormal action selection 0：Alarming and free halt 1：No alarming and continue to run LED hundreds digit: EEPROM abnormal action selection 0：Alarming and free halt 1：No alarming and continue to run	1	000	×
Serial port communication parameter FB group					
Fb.00	Local address	0～247，0 is broadcast address	1	1	×

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
Fb.01	Communicatio n configuration	LED units digit: Baud rate selection 0：1200BPS 1：2400BPS 2：4800BPS 3：9600BPS 4：19200BPS 5：38400BPS LED tens digit: data format 0：1-8-2-N format, RTU 1：1-8-1-E format, RTU 2：1-8-1-O format, RTU 3：1-7-2-N format, ASCII 4：1-7-1-E format, ASCII 5：1-7-1-O format, ASCII LED hundreds digit: analog input terminal 0：Ineffective 1：Effective LED thousands digit: wiring method 0：Direct cable connection (485) 1：Reserved	1	0003	×
Fb.02	Reserved	-	-	0	*
Fb.03	Local response delay	0～1000mS	1	5ms	×
Fb.04	Communicatio n overtime detection time	0.0～1000s	0.1	0.0s	×
Fb.05～ Fb.11	Reserved	-	-	0	*
Advanced function parameter FC group					
FC.00	Dynamic braking selection	0：Non-use 1：Use	1	0	×
FC.01	Braking usage rate	0.0～100.0% Note: Only effective to 5.5/7.5kW built-in; add dynamic braking automatically during deceleration	0.1%	2.0%	×

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
FC.02	AVR function	0：No action 1：Action all the time 2：No action only in deceleration	1	2	×
FC.03	Automatic energy saving running	0：No action 1：Action	1	0	○
FC.04	Slip reimbursement gain	0.0%～300.0%	0.1%	100.0%	○
FC.05	Slip reimbursement limiting	0.0%～250.0%	0.1%	200.0%	○
FC.06	Reimbursed time constant	0.1～25.0s	0.1s	2.0s	×
FC.07	Motor note tuning	0～10	1	0	○
FC.08	Cooling fan control	0：Automatic running 1：Fan always running when power on Note: Run for 3 minutes after stop	1	0	×
FC.09	Acceleration and deceleration time unit	0：（second） 1：（minute）	0	0	×
FC.10	Droop control	0.00～10.00Hz	0.01Hz	0.00Hz	○
FC.11	Overmodulation enabled	0：Ineffective 1：Effective	1	1	×
FC.12	Zero frequency running threshold value	0.00～550.00Hz	0.01Hz	0.00Hz	○
FC.13	Zero frequency return difference	0.00～550.00Hz	0.01Hz	0.00Hz	○
FC.14	Setting length	0.000（Fixed length halt function ineffective）～65.535(km)	0.001 (km)	0.000 (km)	○
FC.15	Actual length	0.000～65.535(km)（power down storage）	0.001 (km)	0.000 (km)	○

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
FC.16	Length multiplying power	0.001～30.000	0.001	1.000	○
FC.17	Length correction coefficient	0.001～1.000	0.001	1.000	○
FC.18	Measurement axis perimeter	0.01～100.00(cm)	0.01 (cm)	10.00(cm)	○
FC.19	Axis pulse per turn	1～9999	1	1	○
FC.20	Instantaneous stop/no stop function selection	0：No action 1：Action（low voltage compensation）（effective for 22kW and below）	1	0	×
FC.21	Frequency drop rate in voltage reimbursement	0.00～99.99Hz/s	0.01 Hz/s	10.00 Hz/s	○
FC.22	Power failure restart function selection	0：No action 1：Action	1	0	×
FC.23	Power failure restart waiting time	0.0～10.0s	0.1s	0.5s	○

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
FC.24	Run command channel binding frequency given channel	LED units digit: Frequency channel selection when keyboard is started or stopped 0：No binding 1：Keyboard ▲ ▼ given 2：Terminal UP/DN given 3：Serial port given 4：AI1 analog given 5：AI2 analog given 6：Terminal pulse given 7：Keyboard potentiometer given LED tens digit: Frequency channel selection when terminal is started or stopped 0：No binding 1：Keyboard ▲ ▼ given 2：Terminal UP/DN given 3：Serial port given 4：AI1 analog given 5：AI2 analog given 6：Terminal pulse given 7：Keyboard potentiometer given LED hundreds digit: Frequency channel selection when serial port is started or stopped 0：No binding 1：Keyboard ▲ ▼ given 2：Terminal UP/DN given 3：Serial port given 4：AI1 analog given 5：AI2 analog given 6：Terminal pulse given 7：Keyboard potentiometer given	1	000	○

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
FC.25	Auxiliary given channel	0：No action; 1：Keyboard ▲ ▼ given (given by FC.27 directly); 2：Terminal UP/DN given (given by FC.27 directly); 3：Serial port given (given by FC.27 directly); 4：AI1； 5：AI2； 6：PULSE； 7：-AI1； 8：-AI2； 9：-PULSE 10：AI1-5； 11：AI2-5； 12：PULSE-1/2*F1.03 Note: Ineffective when it is the same as main given channel; frequency of item 4-12 uses parameters confirmed in F5.00 13：Keyboard potentiometer given	1	0	○
FC.26	Analog auxiliary given coefficient	0.00～9.99（only for FC.25=4～12）	0.01	1.00	○
FC.27	Figure auxiliary frequency	0.00～550.0Hz	0.01	0.00Hz	○
FC.28	Figure auxiliary frequency control	LED units digit: Storage control 0：Power down storage 1：Power down no storage LED tens digit: 0：halt holding 1：halt reset LED hundreds digit: Frequency polarity 0：positive 1：negative Note: Only effective to FC.25=1,2,3	1	000	○
FC.29	Setting frequency proportion adjustment selection	0：No action 1：Relative to F1.06 2：Relative to current frequency	1	0	○

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
FC.30	Setting frequency proportion adjustment coefficient	0.0%～200.0%	0.1%	100.0%	○
FC.31	Operation panel key function and lock selection	LED units digit: STOP/RESET key function selection 0：Ineffective in non-panel control mode 1：Stop according to stop mode in non-panel mode 2：E015 free halt in non-panel mode LED tens digit: M-FUNC key function selection 0：Ineffective 1：Effective in halt status 2：Effective in both halt and running LED hundreds digit: Keyboard lock function 0：No lock 1：All lock 2：All lock except for STOP/RESET key 3：All lock except for ▶▶ key 4：All lock except for RUN and STOP/RESET key	1	000	×
Monitoring parameter FD group					
Fd.00	Rectifier bridge temperature	0.0～100.0℃	0.1	0℃	*
Fd.01	IGBT temperature	0.0～100.0℃	0.1	0℃	*
Fd.02	Setting running time	0～maximum 65.535k hours	0.001k hour	0	○
Fd.03	Accumulated running time	0～maximum 65.535k hours	0.001k hour	0	*

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
Fd.04	The 1st abnormal type	0：No abnormal record 1：Frequency converter accelerated running overcurrent (E001) 2：Frequency converter decelerated running overcurrent (E002) 3：Frequency converter constant speed running overcurrent (E003) 4：Frequency converter accelerated running overvoltage (E004) 5：Frequency converter decelerated running overvoltage (E005) 6：Frequency converter constant speed running overvoltage (E006) 7：Reserved 8：Motor overload (E008) 9：Frequency converter overload (E009) 10：Power module protection (E010) 11：Input side default phase (E011) 12：Output side default phase (E012) 13：Inverter module radiator overheating (E013) 14：Rectifier module radiator overheating (E014) 15：External fault (E015) 16：485 communication mistake (E016) 17：Current detection circuit fault (E017) 18：Poor self-tuning (E018) 19：E^{2}PROM read-write fault (E019) 20：Reserved	1	0	*
Fd.05	The 2nd abnormal type		1	0	*

Parametr code	Parameter name	Setting range	Mini munit	Default valu	Mod ition
Fd.06	The 3rd abnormal type	21：Reserved 22：Reserved 23：Keyboard parameter copy mistake（E023） 24：System interference（E024） 25：Control power overvoltage（E025） 26：Contactor not pulled in（E026） Notes: ① E025 can be detected only after 18.5G/22G is stopped for 3 minutes. 15G and below is not detected. Others are always detecting; ② E010 can be reset after 10 seconds;	1	0	*
Fd.07	Busbar voltage in the latest fault	0～999V	1V	0V	*
Fd.08	Output current in the latest fault	0.0～999.9A	0.1A	0.0A	*
Fd.09	Running frequency in the latest fault	0.00～550.0Hz	0.01Hz	0.00Hz	*

Chapter 6 Detailed Instruction on Parameter Use

6.1 Group F0 System Management Parameter

F0.00	Parameter write protection	0～2	1

Settings of this function code, and protection level deciding inverter parameters are as follows:

0: All parameters are allowed to be modified;

1: Except for setting frequency (F1.07) and this function code, other function code parameters are prohibited to be modified;

2: Except for this function code, other function code parameters are prohibited to be modified.

Note: When leaving the factory, this function code parameter is 1, and it is only allowed to modify running frequency by default, while other function codes are not allowed to be modified. If it is required to modify function code settings, please set this function code to 0.After parameter modification is completed, if it is required to carry out parameter protection, you can modify this function code settings to the desired protection level.

F0.01	Multi-function key selection	0～1	1

Settings of this function code are used to select specific functions of multi-function key **M-F**.

0**: Jog function;**

1: Remote shift function; 485 communication communicates with upper computer

F0.02	Parameter initialization	0～2	0

0: No operation

1: Clean fault records

When store this function code into parameter 1, clear operation will be carried out on fault records (Fd.04～Fd.09).

2: Restore manufacturer parameters

When store this function code into parameter 2, function codes before FC.31, except inverter model (F1.08), pole number (F3.00), will be restored to manufacturer parameters according to model.

After clearing memory or restoring manufacturer parameters, this function code will restore to 0 automatically.

Note: For inverters of 4T0550G/4T0750P and those with power below it, when restoring manufacture parameters is valid, motor parameters will match the selection (F1.08) of model G and P.

F0.03	Reserved	-	-
F0.04	User password	0000～9999	0000

The setting function of user password is used to forbid unauthorized personnel to view and modify function parameters.

When user password function is not required, this function code can be set to 0000.

When user password function is required, firstly, input four digits as user password, press the ENT key to confirm, after that, if no pressing operation in consecutively 5 minutes, password will validate automatically.

Change password:

Press the PRG key to enter password verification state, enter parameter edit state after inputting the original four digit password correctly, select F0.04 (where F0.04＝0000), enter a new password, and press the ENT key to confirm, the new password will validate.

Note: When the password is set below 100, the setting will be invalid; please make sure to remember the set user password.

6.2 Group F1 Basic Operating Parameters

F1.00	Reserve	-	-
F1.01	Operating command channel	0～2	0

0: Keyboard control valid

Operate commands by keys such as RUN, STOP/RESET **and M-F**etc. on keyboard to control the running and stopping of inverter.

1: Terminal control valid

Inverter operating commands are controlled by connected/disconnected state of external multifunctional terminals (related functions of corresponding multifunctional terminals must be defined by F6 parameters).

2: Communication control valid

Operating commands are given by means of upper computer communication.

F1.02	Selection of channels with given	0～6	0

0: Digit given to 1, with adjustment on operation panel ▲ and ▼.

1: Digit given to 2, multifunctional terminal settings with UP/DN for frequency adjustment, the initial value is set to F1.07, with adjustment of multifunctional terminal UP/DN.

2: Digit given to 3, and the set frequency is changed via serial port frequency setting commands.

3: AI1 simulation given (AI1-GND) frequency settings are confirmed by AI1 terminal simulation voltage, and input voltage range is:

DC 0～10V。

4: AI2 simulation given (AI2-GND) frequency settings are confirmed by AI2 terminal simulation voltage/current, and input range is:

DC 0～10V (select V side for J3 jumper), DC 0～20mA (select I side for J3 jumper).

5: Terminal pulse given frequency settings are confirmed by terminal pulse frequency (input by DI7 and DI8, see function code F6.06～F6.07 definition), input pulse signal specification: Voltage range is 9～30V; dual phase (when DI7 and DI8 are used together) frequency range is 0～50.0kHz, and single phase (when DI7 or DI8 is used) frequency range is 0～100.0kHz.

6: Frequency adjustment of keyboard potentiometer given is made by potentiometer knob on keyboard.

Note: The relationship curve of frequency calculation for method 3, 4 and 5 is confirmed by function code F5.00 ~ F5.11, please refer to Section 5.2.

F1.03	Digit frequency control	00～11	00

Only valid for F1.02=0, 1, 2.

The unit:

0 (set frequency will store during power off): When inverter is powered off or undervoltage, F1.07 will set value at the current frequency and refresh automatically.

1 (set frequency will not store during power off): When inverter is powered off or undervoltage, F1.07 will keep unchanged.

Decade:

0 (Set frequency hold during shutdown): When inverter is shut down, the frequency set value is the final modified value.

1 (Set frequency to restore to F1.07 during shutdown): When inverter is shut down, the frequency will be set to restore to F1.07 automatically.

F1.04	Basic running frequency	1.00～550.0Hz	50.00Hz
F1.05	Max. output voltage	0～484V	Inverter
F1.06	Max. output frequency	Max{50.00， F1.09upper limit frequency} ～ 550.0Hz	50.00Hz

Max. output frequency is the highest frequency allowed to be output by inverter, as shown in Fig. 6-1 f_{max}.

Basic running frequency is the min. frequency when the inverter outputs the highest voltage, which is generally the rated frequency of the motor. As shown in Fig. 6-1 f_b.

When max. output voltage is the basic running frequency output by the inverter, the corresponding output voltage is generally the rated voltage of the motor, as shown in Fig. 6-1 V_{max}.

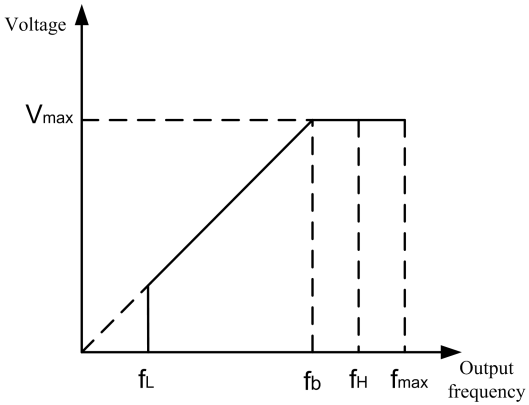


Fig. 6-1 Voltage and Frequency Diagram

As shown in Fig. 6-1, f_H and f_L are defined as the upper limit frequency and lower limit frequency in F1.09 and F1.10 respectively.

Note: Please make sure to follow motor parameter settings of f_{max}, f_b and V_{max}, otherwise, it may cause damage to the device.

F1.07	Running frequency digit settings	Lower limit frequency ~ Upper limit frequency	50.00Hz

When frequency source is selected to digit settings (F1.02=0, 1 and 2), during power-on of the inverter, it will set the value of F1.07 to the current set frequency of the inverter. The running frequency digit is set to be restricted within the range of upper and lower limit frequency.

F1.08	Model selection	0～1	0

0: Model G (constant torque load model)

1: Model P (Fan and pump load model)

The factory setting of the inverter is model G, and operate as follows to select model P:

If F1.08 is set to 1, it is required to update motor parameter F3 group or restore factory value (F0.02 is set to 2).

F1.09	upper limit frequency	F1.10～F1.06	50.00Hz
F1.10	Lower limit frequency	0.00 Hz～F1.09	50.00Hz

Upper limit frequency is used to set the upper limit of the output frequency, as shown in the following figure f3.Lower limit frequency is used to set the lower limit of the output frequency, as shown in the following figure f1.The basic running frequency f2 is min. output frequency when the inverter outputs the max. voltage.F4 is the max. frequency. In the following figure, V_{max} is the Max. output voltage of the inverter.

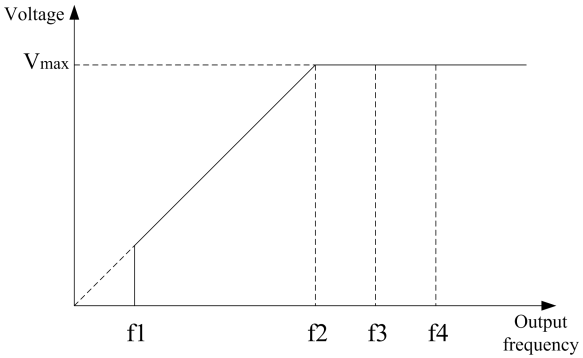


Fig. 6-2 Voltage and Frequency Diagram

🕮 Instructions:

1. Max. output frequency, upper limit frequency and lower limit frequency should be set with cautions according to nameplate parameters and running state of the actually controlled motor.

2. Except for restrictions of upper limit frequency and lower limit frequency, output frequency of the inverter during running is also restricted by the set value of parameters such as start frequency, shutdown DC brake starting frequency and jump frequency etc.

F1.11	Accelerating time 1	0.1～3600s	Model confirmati
F1.12	Decelerating time 1	0.1～3600s	Model confirmati

Accelerating time refers to the time required by the inverter to accelerate from 0 frequency to max. output frequency, as shown in the following figure t1.Decelerating time refers to the time required by the inverter to decelerate from max. output frequency to 0 frequency, as shown in the following figure t2.

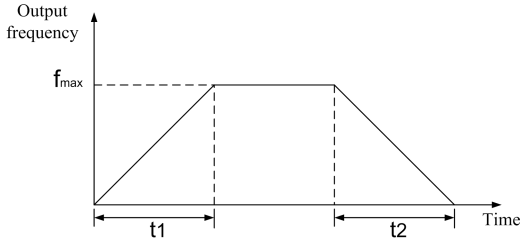


Fig. 6-3 Setting Instructions on Accelerating Time and Decelerating Time

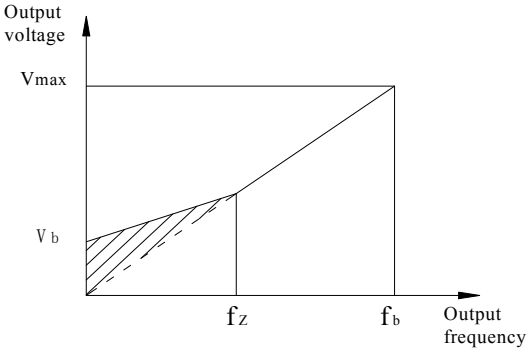
There're four groups of accelerating and decelerating time parameters for inverters of this series, and other accelerating and decelerating time (2, 3 and 4) will be defined in parameters F2.14～F2.19.The default accelerating time and decelerating time are accelerating time 1 and decelerating time 1 when leaving the factory. If to select other accelerating and decelerating time groups, it is required to select via terminals by group (please refer to parameters in F6 group).Accelerating and decelerating time during automatic tuning and running of the motor, shall be executed according to accelerating and decelerating time 1.M-F accelerating and decelerating time during running, shall be set independently in F2.21 and F2.22.

🕮 Instructions:

Accelerating time is only valid for normal speed-up process, not including start DC brake time and start frequency hold time. Decelerating time is only valid for normal speed-down process, not including shutdown DC brake time.

F1.13	Torque lifting	0.0 ～ 30.0% (0.0 is automatically lifting)	0.0%

Torque lifting is to compensate inverter's output voltage when the inverter is running at low frequency. Torque lifting can improve low frequency characteristics under V/F control mode. Torque lifting shall not be set too large, if so, motor efficiency will decrease, excitation current of the motor will increase, and the motor will heat. Torque lifting cut-off frequency: Torque lifting is valid at this frequency, and Torque lifting will validate when exceeding this set frequency.



V_b: Manual torque lifting voltage Vmax: Max. output voltage

f_z: Torque lifting's cut-off voltage f_b: Basic running frequency

Fig. 6-4 Torque Lifting Diagram

Note:

1. It may cause heated motor or overcurrent protection if this parameter is set improperly.

2. See function code F1.14 for the definition of fz.

3. When driving the synchronous motor, users are suggested to use the manual torque lifting, and to adjust the V/F curve according to motor parameters and usage occasions.

F1.14	Torque lifting cut-off point	0.0 ～ 50.0% (Relative F1.06)	10.0%

This function defines the percentage of torque lifting's cut-off frequency to basic running frequency F1.04, see fz in Fig. 6-5.This cut-off frequency is applicable for any V/F curve determined by F1.16.

F1.15	Reserved	-	-
F1.16	V/F curve settings	0～3	0
F1.17	V/F frequency value F1	0.00～Frequency valueF2	0.00Hz
F1.18	V/F Voltage value V1	0.0～Voltage value V2	0.0%
F1.19	V/F Frequency valueF2	Frequency value F1 ～	0.00Hz

F1.20	V/F Voltage value V2	Voltage value V1 ～	0.0%
F1.21	V/F Frequency valueF3	Frequency value F2 ～	0.00Hz
F1.22	V/F Voltage value V3	Voltage value V2 ～	0.0%

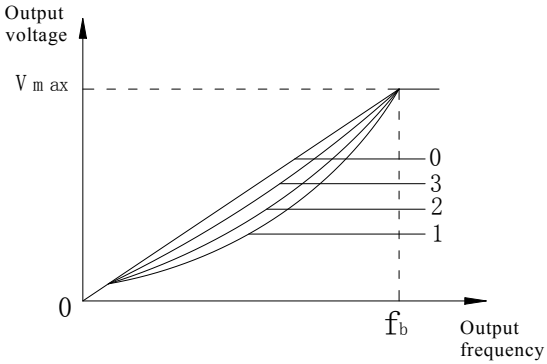
This group of function codes defines V/F setting method, to meet the needs of different load characteristics.3 fixed curves and 1 customized curve could be selected according to definition of F1.16.

When 1 is selected, it is the 2.0 power drop of torque characteristics; as shown in curve 1 in Fig. 6-5.

When 2 is selected, it is the 1.7 power drop of torque characteristics; as shown in curve 2 in Fig. 6-5.

When 3 is selected, it is the 1.2 power drop of torque characteristics; as shown in curve 3 in Fig. 6-5.

The above curves are applicable for variable torque loads of fans and pumps, and users could reach the optimal energy saving effect by adjusting according to load characteristics.



Vmax: Max. output voltage F1.04 f_b: Basic running frequency F1.05

Fig. 6-5 V/F Curves

When 0 is selected for F1.16, users could adopt the method of adding three-point fold lines of (V1，F1), (V2，F2) and (V3, F3) to define V/F curves, via customizing V/F curves by F1.17～F1.22, as shown in Fig. 6-6, to adapt to special load characteristics.

This function parameter group is used to set V/F curves required by users in a flexible manner, as shown in the following figure:

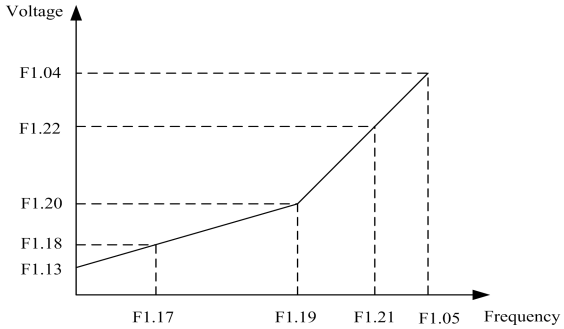


Fig. 6-6 V/F Customized Curves

F1.23	Reserved	-	-
F1.24	Rotation direction settings	0～1	0

0: Forward rotating

The actual rotation coincides with the set rotation.

1: Reversal

When this mode is selected, the actual output phase of the inverter will be reversed to the set one, i.e. during terminal control, the function of RUN on keyboard will become reversed.

F1.25	Carrier frequency settings	0.7～15.0 kHz	Model

Table 6-1 Relationship Chart of Model and Carrier Frequency

Carrier frequency / Model	Highest Carrier Frequency (kHz)	Lowest Carrier Frequency(kHz)	Factory Settings (kHz)
Model G: 5.5kW～55kW Model P: 7.5kW～75kW	15	3	8
75kW～110kW	10	1	3
132kW and Above	6	0.7	2

Table 6-2 Carrier Frequency Characteristics Table

Carrier Frequency	Motor Noise	Leakage Current	Interference
Decrease	↑	↓	↓
Increase	↓	↑	↑

Note:

1. In order to obtain sound control characteristics, the ratio of carrier frequency to the highest running frequency of the inverter is suggested to be no less than 36.

2. When is relatively low, error may exist in current display value.

F1.26	Carrier frequency automatic adjustment selection	0～1	1

0: Invalid

1: Valid

During automatic adjustment selection of carrier frequency, the inverter could adjust carrier frequency automatically according to temperature inside the machine etc. In this case, the actual highest working carrier frequency of the inverter will be restricted by the carrier frequency (F1.25) set by function code.

6.3 Group F2 Start-Stop Control Parameter

F2.00	Start mode	0～2	0

0: Start frequency starting

When the inverter is put into running, it will start from start frequency (F2.01) according to the settings of F2.01 and F2.02, and run for the set time (F2.02) at this frequency; then it will enter normal speed-up stage according to parameters such as the set accelerating and decelerating time, accelerating and decelerating time methods etc., to accelerate to the set frequency.

1: DC braking + start frequency starting

When the inverter is put into running, it will implement the DC braking process before starting according to DC braking time of DC braking current set by F2.03 and F2.04; then start and run from this frequency to the set time according to regulations of F2.01 and F2.02; then enter normal speed-up stage according to the set parameters such as accelerating and decelerating time, accelerating and decelerating time methods etc., to accelerate to the set frequency.

The process of braking first, and then starting from the start frequency is shown in the following figure:

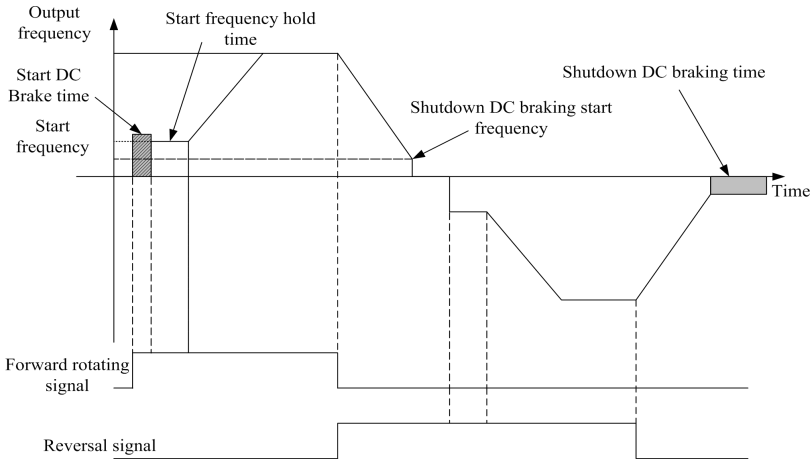


Fig. 6-7 Start Method 1 Diagram

2: Rotational speed tracking start

When the inverter is put into running, it will detect rotational speed and direction of the motor, and then track the motor's current rotational speed and direction directly according to detection results, to carry out smooth starting free of impact on motor still rotating.

When this start method is selected, it is required to consider the system's rotary inertia, and to properly increase parameter setting values for increasing and decreasing time.

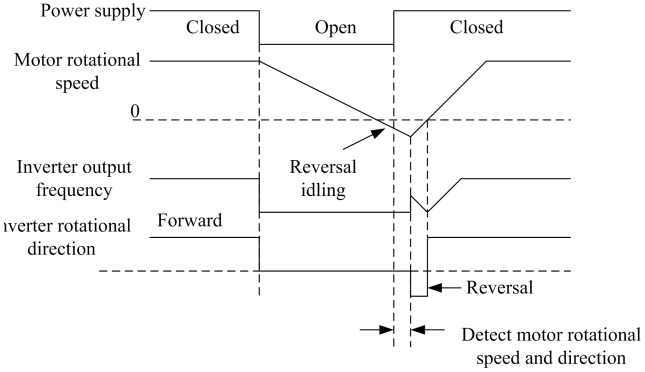


Fig. 6-8 Rotational Speed Tracking Restart Diagram

Note:

1. Start method 1 is applicable for small inertia loads with forward rotating or reversal in the motor when the inverter is shut down, for large inertia loads running at high speed, it is not suitable to adopt start method 1.

2. Start method 2 is applicable for instantaneous power-off restart of large inertia loads with forward rotating or reversal in the motor when the inverter is shut down.

3. Start performance of start method 2 is relative with motor parameters, please set related parameters of motor parameter group F3 correctly.

4. When driving synchronous motor, users are suggested to use start method 0.

F2.01	Start frequency	0.20～60.00Hz	0.50Hz
F2.02	Start frequency hold time	0.0～10.0s	0.0s

Start frequency refers to initial frequency at the start of the inverter, and start frequency hold time refers to the time for the inverter to keep running at the start frequency, during the start of inverter, as shown in Fig. 6-9 t_1.

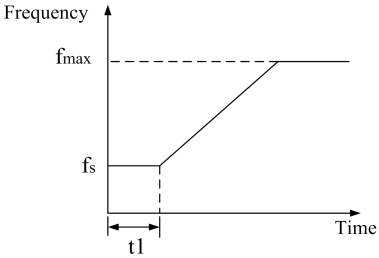


Fig. 6-9 Start Frequency and Start Time Diagram

Note: The start frequency is not restricted by the lower limit frequency.

F2.03	Start DC braking current	0.0～100.0%	0.0%
F2.04	Start DC braking time	0.0～60.0s	0.0 s

F2.03 and F2.04 are valid only when the first braking then starting method (F2.00=1) is selected as starting method,

as shown in Fig. 6-10.

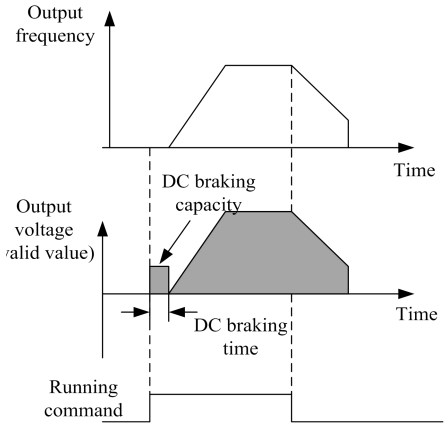


Fig. 6-10 Start Method 1 Description

The setting range of start DC braking current and start DC braking time is confirmed by model, see Table 6-3.

The setting of start DC braking current is the percentage to the inverter's rated current. When the start DC braking time is 0.0s, there's no DC braking process.

Table 6-3 Setting Range of Start DC Braking Function

Model	Start DC Braking Current Range	Start DC Braking Time Range
Model G	0～100.0%	0.0～30.0s
Model P	0～80.0%	0.0～30.0s

F2.05	Accelerating and Decelerating Method Selection	0～2	0

0: Straight line accelerating and decelerating

Output frequency increases and decreases according to a constant inclination, as shown in Fig. 6-11.

1: S curve accelerating and decelerating

Output frequency increases and decreases according to an S curve, as shown in Fig. 6-12.

2: Automatic accelerating and decelerating

According to loads, keep the inverter output current below the automatic current limiting level (see FA.06), to complete the accelerating and decelerating process stably.

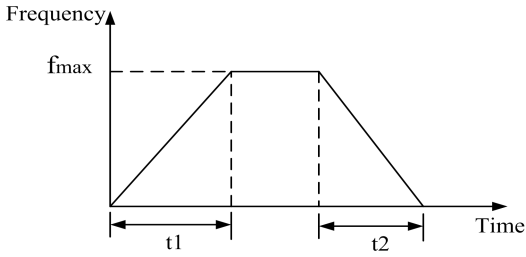


Fig. 6-11 Straight Line Accelerating and Decelerating

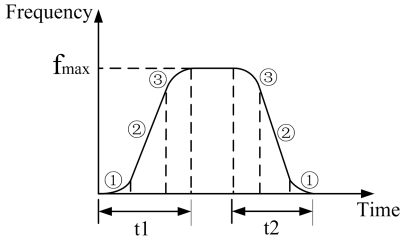


Fig. 6-12 S Curve Accelerating and Decelerating

Note: The settings on accelerating and decelerating time function codes (F1.11, F1.12, F2.14 ~ F2.19) under automatic accelerating and decelerating method will invalidate.

F2.06	S CURVE START	0.0～50.0%	20.0%
F2.07	S CURVE RISE	0.0～80.0%	60.0%

The start stage of S curve is shown as ① in the above figure, which is a process of output frequency's inclination increasing from zero gradually;

S curve's rise stage is shown as ② in the above figure, which is a process of output frequency's inclination keeping constant;

The end stage of S curve is shown as ③ in the above figure, which is a process of output frequency's inclination decreasing to zero gradually;

The combined usage of the above parameters is especially applicable for the start and stop process of loads such as transmitting and transporting etc.

F2.08	Shutdown method	0～2	0

0: Decelerating shutdown

After the inverter receiving a shutdown command, it will decrease the output frequency according to decelerating time gradually, and shut down when the frequency decreases to zero.

1: Free stop

After the inverter receiving a shutdown command, it will terminate output immediately,

and load will stop freely according to mechanical inertia.

2: Decelerating stop + DC brake

After the inverter receiving a shutdown command, it will decrease output frequency according to decelerating time, when the start frequency for shutdown braking is reached, it will start DC braking. Output voltage and frequency are shown in Fig. 6-13.

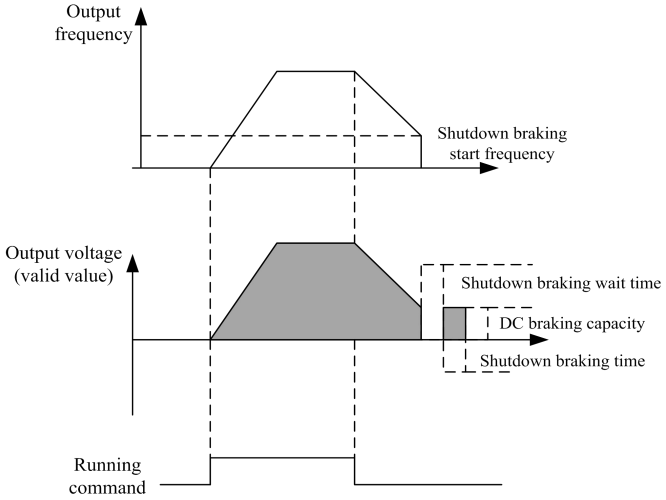


Fig. 6-13 Decelerating Stop + DC Braking Diagram

For functions related to shutdown DC braking, see definition in F2.09～F2.12.

F2.09	Shutdown DC braking	0.00～60.00Hz	0.00Hz

Shutdown DC braking start frequency: It refers to, during decelerating and shutdown process of the inverter, the frequency at the conversion point when the output frequency drops to zero suddenly when decreases along decelerating curve. During decelerating and shutdown process of the inverter, when the set frequency is lower than the shutdown DC braking start frequency, the output frequency will be zero.

Shutdown DC braking start frequency will be valid during the decelerating process of the shifting between forward rotating and reversal.

If the operation condition has no strict requirements on shutdown braking, the shutdown DC braking start frequency should be set as small as possible.

F2.10	Shutdown DC braking	0.00～10.0s	0.0s
F2.11	Shutdown DC braking	Model confirmation	0.0%
F2.12	Shutdown DC braking	Model confirmation	0.0s

Shutdown braking wait time: During the decelerating shutdown process, the time interval from the running frequency reaching the braking start frequency (F2.09), to starting to apply

DC braking.

The inverter has no output during shutdown braking wait time, and such time could effectively prevent current overshoot at the start of braking for motors of large power .

The setting range of shutdown braking current and shutdown braking time is confirmed by model, see Table 6-4.

The setting of shutdown DC braking current is the percentage to the inverter's rated current. When the shutdown braking time is 0.0s, there's no DC braking process.

Table 6-4 Setting Range of Shutdown Braking Function

Model	Shutdown Braking Current Range	Shutdown Braking Time Range
Model G	0～100.0%	0.0～30.0s
Model P	0～80.0%	0.0～30.0s

Note: The shutdown braking current (F2.11) is the percentage to the inverter's rated current.

F2.13	Reserved	-	-
F2.14	Accelerating time 2	0.1～3600s	Model confirmation
F2.15	Decelerating time 2	0.1～3600s	Model confirmation
F2.16	Accelerating time 3	0.1～3600s	Model confirmation
F2.17	Decelerating time 3	0.1～3600s	Model confirmation
F2.18	Accelerating time 4	0.1～3600s	Model confirmation
F2.19	Decelerating time 4	0.1～3600s	Model confirmation

Accelerating and decelerating time 1 are defined in F1.11 and F1.12.

Factory value of accelerating and decelerating time for models from 5.5kW to 22kW is 6.0s, and that of accelerating and decelerating time for models above 30kW and above is 20.0s.Users could select accelerating and decelerating time 1, 2, 3 and 4 via multifunctional terminals.(Refer to group F6 parameters)

F2.20	Jog running frequency	0.10～50.00 Hz	5.00Hz
F2.21	Jog interval	0.0～100.0s	0
F2.22	Jog accelerating time	0.1～60.0s	Model confirmation
F2.23	Jog decelerating time	0.1～60.0s	Model confirmation

This group of parameters defines related parameters during jog running, and the definition of frequency and accelerating & decelerating time as well as that of inverter RUN key are the same.

🕮 Instructions:

1. The set value of jog running frequency is not restricted by lower limit frequency, but restricted by upper limit frequency.
2. Jog running is not restricted by start frequency and shutdown DC braking start frequency.

F2.24	Jump frequency 1	0.00～550.0Hz	0.00Hz
F2.25	Jump frequency 1 range	0.00～30.00Hz	0.00Hz
F2.26	Jump frequency 2	0.00～550.0Hz	0.00Hz
F2.27	Jump frequency 2 range	0.00～30.00Hz	0.00Hz
F2.28	Jump frequency 3	0.00～550.0Hz	0.00Hz
F2.29	Jump frequency 3 range	0.00～30.00Hz	0.00Hz

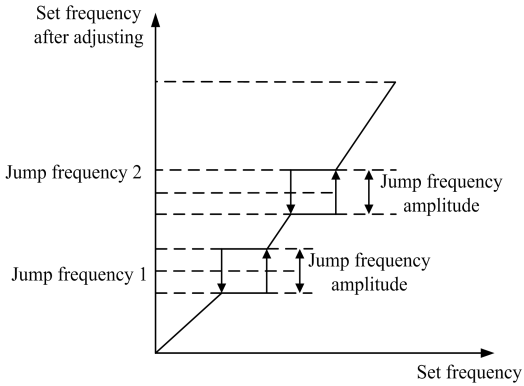


Fig. 6-14 Frequency Jump Diagram

By setting jump frequency, it could make the inverter avoid mechanical resonance points of load, if jump frequency is set to 0, this function will invalidate. Once these jump points are set, during running, the inverter will avoid stably running at these frequency points automatically. As shown in the following figure:

🕮 Instructions:

Do not overlap or nest two jump frequency ranges. During accelerating and decelerating process, the output frequency of the inverter could override the jump frequency zone normally.

F2.30	Anti-reversal selection	0～1	0

0: Allow reversal

1: Forbid reversal

Note: This function is valid for all running command channels (operation panel running command channel, terminal running command channel and serial port running command channel).

F2.31	Forward-rotating and reversal dead time	0.0～3600s	0.0s

During running, after the inverter receiving a reversal command, the transition interval for the inverter to wait at zero output frequency, when transiting from the current running direction to the reversal running direction. As shown in the following Fig. 6-15 t1.

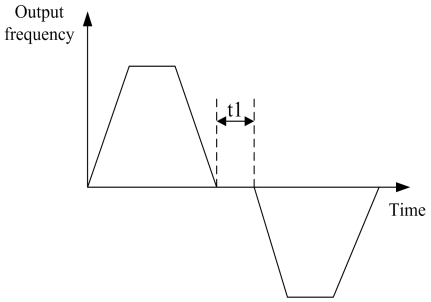


Fig. 6-15 Forward-rotating and Reversal Dead Time

6.4 Group F3 Motor Parameters

F3.00	Pole number	2～14	4
F3.01	Rated power	0.4～999.9kW	Model confirmation
F3.02	Rated currency	0.1～999.9A	Model confirmation

Set parameters of the controlled motor.

In order to control performance, please make sure to set F3.00 ～ F3.02 correctly according to nameplate parameters of the motor.

The motor shall match the inverter's power level. In generally, it is only allowed to be two levels larger or one level greater than the inverter, otherwise, it could not guarantee the control performance.

F3.03	No load current I0	0.1～999.9A	Model confirmation
F3.04	Stator resistance % R1	0.00%～50.00%	Model confirmation
F3.05	Leakage inductance % Xl	0.00%～50.00%	Model confirmation
F3.06	Rotor resistance %R2	0.00%～50.00%	Model confirmation
F3.07	Mutual inductance %Xm	0.0%～2000%	Model confirmation

Specific significance of the above motor parameters is shown in Fig. 6-16.

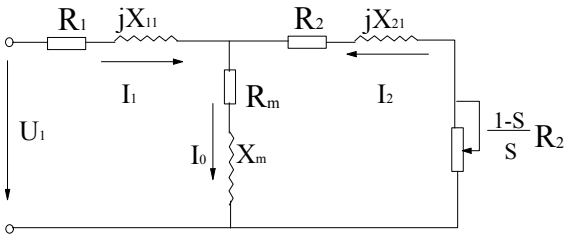


Fig. 6-16 Steady-state Equivalent Circuit Diagram of Asynchronous Motor

R_1, X_{1l}, R_2, X_{2l}, X_m and I_0 in Fig. 6-17 represent: Stator resistance, rotor leakage inductance, rotor resistance, rotor Leakage inductance, mutual inductance and no load current. Function code F3.05 is the sum of stator and rotor leakage inductances.

The above F3.04～F3.07 are all percentage of the above motor parameters, and the calculation formula is as follows:

Calculation formula of resistance (stator resistance or rotor resistance):

$$\%R = \frac{R}{V/(\sqrt{3} \times I)} \times 100\%$$

R: Stator resistance or actual rotor resistance converted to stator side;

V: Rated voltage;

I: Motor rated currency

Calculation formula of inductance (leakage inductance or mutual inductance):d

$$\%X = \frac{X}{V/(\sqrt{3} \times I)} \times 100\%$$

X: The sum of stator and rotor leakage inductances (converted to stator side) relative to basic frequency or mutual inductance;

V: Rated voltage;

I: Motor rated currency

If motor parameters are all known, please write calculation value to F3.04 ～F3.07 according to the above shown calculation formula.

If to carry out automatic tuning of motor parameters, after automatic tuning is completed normally, the setting values of F3.03～F3.07 will be updated.

After modifying motor frequency F3.01, the inverter will set parameters F3.02～F3.07 to motor parameters of corresponding power.

F3.08	Rated slip frequency	0.00～20.00Hz	0.00Hz

Motor rated slip frequency could be calculated from motor rated rotational speed (nameplate label):

Rated slip frequency = Motor rated frequency (which is basic running frequency F1.04)×(Motor synchronous rotational speed – motor rated rotational speed) ÷ motor synchronous speed.

Among which: Motor synchronous rotational speed = Motor rated frequency×120÷pole number (F3.00)

After setting slip frequency, slip compensation will act under the cooperation of FC.04～FC.06.

F3.09	Parameter automatic tuning	0～2	0

This function could automatically determine and write in motor parameters.

0: Do not carry out parameter automatic tuning.

1: Motor static tuning

Before automatic tuning, please make sure to enter nameplate parameters of the motor under control (F3.00～F3.02).

During static tuning, the motor is under static state, in this case, the stator resistance of automatic measuring motor (%R1), rotor resistance (%R2) and leakage inductance (%X1) of corresponding basic frequency, all measured parameters shall be written in F3.04, F3.05 and F3.06 automatically.

2: Motor rotary tuning

During rotary tuning, the motor is under static state first, in this case, the stator resistance (%R1), rotor resistance (%R2) and leakage inductance (%X1) relative to basic frequency of the motor will be measured automatically, and then the motor will be under rotary state, measuring the motor's mutual inductance (%XM) and no load current (I0) automatically, while all measured parameters will be written in F3.04, F3.05, F3.06, F3.07 and F3.03 automatically.

After automatic tuning is completed, the set value of F3.09 will be set to 0 automatically.

Automatic tuning steps

1. According to motor characteristics, set functions ""F1.04 basic running frequency" and "F1.05 max. output voltage" correctly.

2. Set functions "F3.00 pole number", "F3.01 rated power" and "F3.02 rated currency" correctly.

3. When F3.09 is selected to 2, please set accelerating time (F1.11) and decelerating time (F1.12), and then remove the load from the motor, while confirm its safety carefully.

4. Set to 1 or 2, after pressing the ENT key, press the RUN key to start automatic tuning.

5. When operating indicator turns off on LED operation panel, it indicates automatic tuning finishes.

Note:

When F3.09 is set to 2, if overcurrent, overvoltage faults occur during automatic tuning, accelerating and decelerating time could be increased properly;

When F3.09 is set to 2, during rotary tuning, it is required to remove the load from the motor, and the motor is prohibited to carry out rotary automatic tuning with load;

Before starting automatic tuning, it is required to guarantee the motor is under stop state, otherwise, automatic tuning could not be carried out normally;

On some occasions (i.e. the motor cannot disengaged from the load), when rotary tuning is not feasible or users have not that high requirements on motor control, static tuning or no tuning could be carried out, in this case, please input motor nameplate parameters (F3.00 ~ F3.02) correctly.

If unable to carry out automatic tuning, and users have known correct motor parameters, in this case, users should input motor nameplate parameters (F3.00 ~ F3.02) correctly, and then input the calculation values the know motor parameters (F3.03 ~ F3.07) according to the calculation formula of resistance and inductance, please make sure to set parameters correctly.

If automatic tuning is not successful, E024 fault will alarm.

F3.10	Motor stable factors	0～255	Model

This function is used to inhibit natural oscillation when the inverter is cooperating with the motor. If repeated change in output current occurs during the running of constant load, adjust this function code on the basis of factory parameters could eliminate oscillation, to make the motor run stably.

F3.11～ F3.21	Reserved	-	-

6.5 Group F4 Textile Swing Frequency Parameters

Swing frequency is applicable for occasions requiring traversing and rolling functions in textile and chemical fabric etc. industries, and its typical work is shown in Fig. 6-18.

Generally, a swing frequency process is as follows: Firstly, accelerate to swing frequency's preset frequency (F4.02) according to accelerating time and wait for a period of time (F4.03), and transmit to swing frequency center frequency according to accelerating and decelerating time, and then cycle according to the set swing frequency amplitude (F4.04), jump frequency (F4.05), swing frequency cycle (F4.06) and swing frequency rise time (F4.07), till decelerate to shut down according to decelerating time because of any shutdown command.

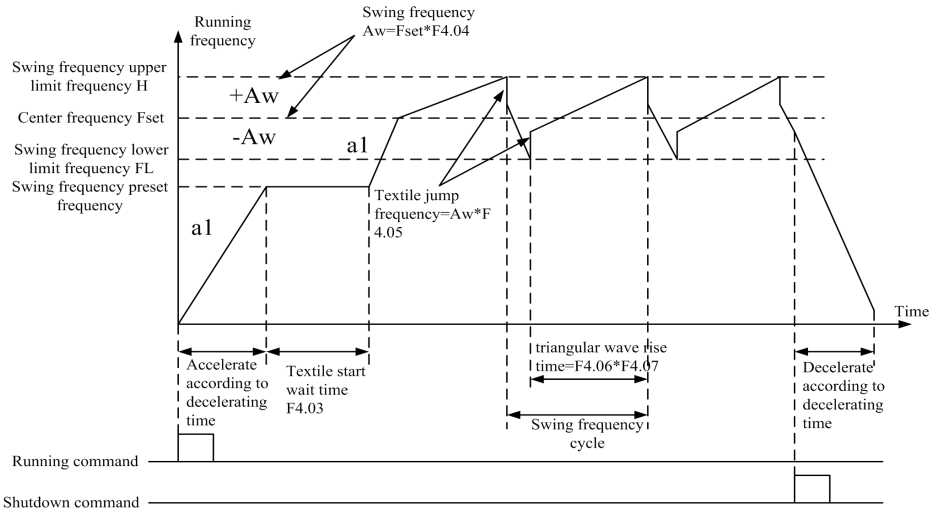


Fig. 6-17 Swing Frequency Diagram

Center frequency originates from the set frequency of normal running, multi-segment running or PLC running;

It will cancel swing frequency automatically during jogging or closed-loop running.

If PLC and swing frequency run at the same time, during PLC segment shift, swing frequency will invalidate, after transmitting to PLC set frequency according to accelerating and decelerating settings in PLC stage, swing frequency will start, if shut down, decelerate according to decelerating time in PLC stage.

F4.00	Swing frequency function selection	0～1	0

This function decides whether to use the swing frequency function.

0: Do not use the swing frequency function.

1: Use the swing frequency function.

F4.01	Swing frequency running method	0000～1111	0000

To set the running mode for swing frequency function, users could program at random according to needs, and significance of all display bits of LED is shown in Fig. 6-18.

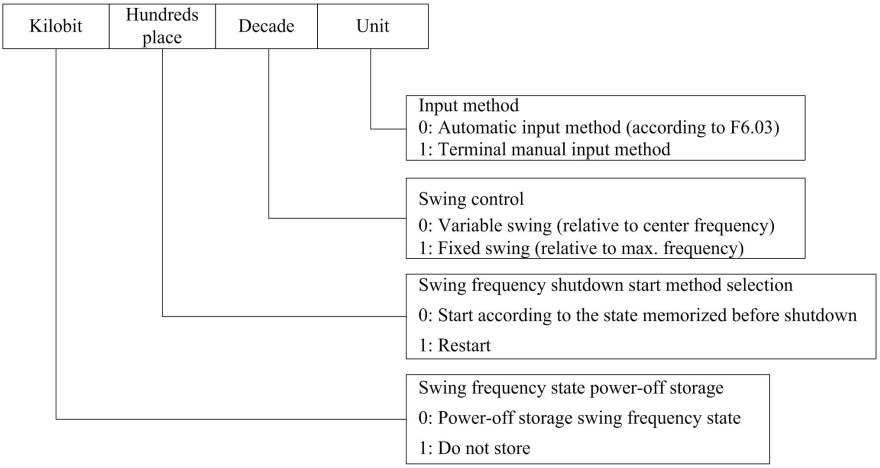


Fig 6-18 Parameter Significance of Swing Frequency Operation Mode

The unit: Input method

0: Automatic input method

After start, run a period of time (F4.03) at preset frequency (F4.02) of swing frequency, and then enter swing frequency to run automatically.

1: Terminal manual input method

If the multifunctional terminal (DI definition is function 33) is set to valid, it will enter swing frequency state; if invalid, it will exit swing frequency state, and running frequency will keep at the preset frequency of F4.02 of swing frequency.

Decade: Swing control

0: Variable swing

Swing AW will change with center frequency, and its change rate, see definition in F4.04.

1: Fixed swing

Swing AW is determined by max. frequency and F4.04.

Hundreds place: Swing frequency shutdown and start method selection

0: Start according to the state memorized before shutdown.

1: Restart again

Kilobit: Power-off storage under swing frequency state

Store swing frequency state parameters during power off, and this function is valid only when starting according to the state memorized before shutdown.

0: Store swing frequency state during power off.

1: Do not store swing frequency state during power off.

Note: Terminal (DI definition function 34) could be used to carry out swing frequency state reset.

F4.02	Swing frequency preset frequency	0.00～550.0Hz	0.00Hz
F4.03	Swing frequency preset frequency wait time	0.0～3600s	0.0s

F4.02 is used to the running frequency of the inverter before entering swing frequency running state.

When automatic start method is selected, F4.03 is used to set the duration of running at swing frequency preset frequency, before entering swing frequency state; when manual start method is selected, F4.03 will be invalid.

See instructions in Fig. 6-17.

F4.04	Swing frequency amplitude	0.0～50.0%	0.0%

Variable swing: AW = Center frequency ×F4.04

Fixed swing: AW = Max. running frequency F0.05×F4.04

Note: The swing frequency running frequency is restricted by upper and lower limit frequency; if set improperly, swing frequency will work abnormally.

F4.05	Jump frequency	0.0 ～ 50.0% (Relative to F4.04)	0.0%

As shown in Fig. 6-17, there's no jump frequency if set to 0.

F4.06	Swing frequency cycle	0.1～999.9s	10.0s

The time of a complete cycle for defining the rise and drop of swing frequency.

Note: Under swing frequency running method, it is not allowed to select automatic accelerating and decelerating running method, otherwise swing frequency cycle will be abnormal.

F4.07	Triangle wave rise time	0～100.0%	50.0%

Define the running time for swing frequency rise stage = F4.06×F4.07 (second), and the running time for drop stage = F4.06×(1-F4.07) (second).Please see instructions in Fig. 6-17.

Note: Users could select S curve accelerating and decelerating method while selecting swing frequency, so that the swing frequency will run in a more smooth manner.

6.6 Group F5 Frequency Given Parameters

F5.00	Frequency given curve selection	000～111	000
F5.01	Given channel gain	0.00～9.99	1.00
F5.02	Given filter constant	0.01～50.00s	0.50s
F5.03	Max. input pulse frequency	0.1～50.0kHz	10.0kHz
F5.04	Curve 1 min. given	0.0%～F5.06	0.1%
F5.05	Corresponding frequency of curve 1 min. given	0.0～F1.06	0.00Hz
F5.06	Curve 1 max. given	F5.04～100.0%	100.0%
F5.07	Corresponding frequency fo curve 1 max. given	0.0～F1.06	50.00Hz
F5.08	Curve 2 min. given	0.0%～F5.10	0.1%
F5.09	Corresponding frequency of curve 2 min. given	0.0～F1.06	0.00Hz
F5.10	Curve 2 max. given	F5.08～100.0%	100.0%
F5.11	Corresponding frequency of curve 2 max. given	0.0～F1.06	50.00Hz

When selecting AI1 or AI2 or pulse frequency as open-loop frequency given channel, the relationship between the given and set frequency is shown below:

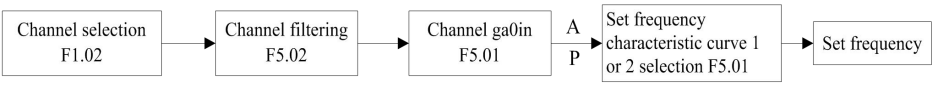
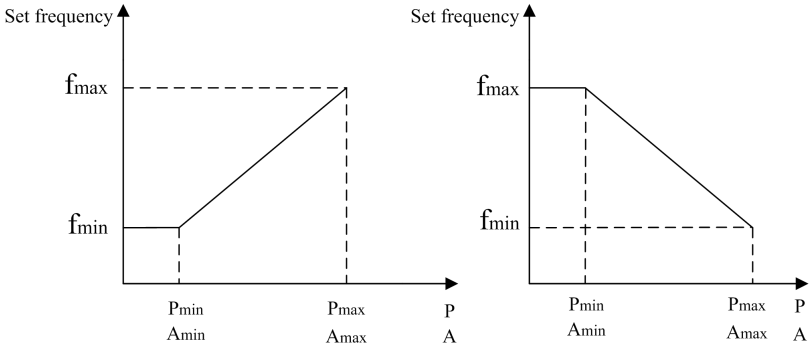


Fig. 6-19 Relationship between Given Channel Input and Set Frequency

After frequency given signals are processed via filtering and gaining, the relationship with the set frequency is determined by curve 1 or curve 2.Curve 1 is defined by F5.04～F5.07 and curve 2 is defined by F5.08～F5.11.Both could realize positive action characteristics and reaction characteristics independently, as shown in Fig. 6-21.



(1) Positive action characteristics (2) Reaction characteristics

P: Terminal pulse given A: Analog quantity AI or AI2 given

Pmin, Amin: Min. given Pmax, Amax: Max. given

Fmin: Corresponding frequency min. given fmax: Corresponding frequency of max. given

Fig. 6-20 Output Frequency Characteristic Curve

When analog input A is 100%, it corresponds to 10V or 20mA; when pulse frequency P is 100%, it corresponds to max. input pulse frequency defined by F5.03.

F5.02 defines channel filtering time constant, to carry out filtering transaction on input signals, and longer filtering time will lead to stronger capacity for anti-interference, but the response will slow down; while shorter filtering time will lead to quicker response, but the anti-interference capacity will weaken.

F5.00 is used to select output frequency characteristic curves of AI1, AI2 and PULSE frequency given channels, see Fig. 6-21.

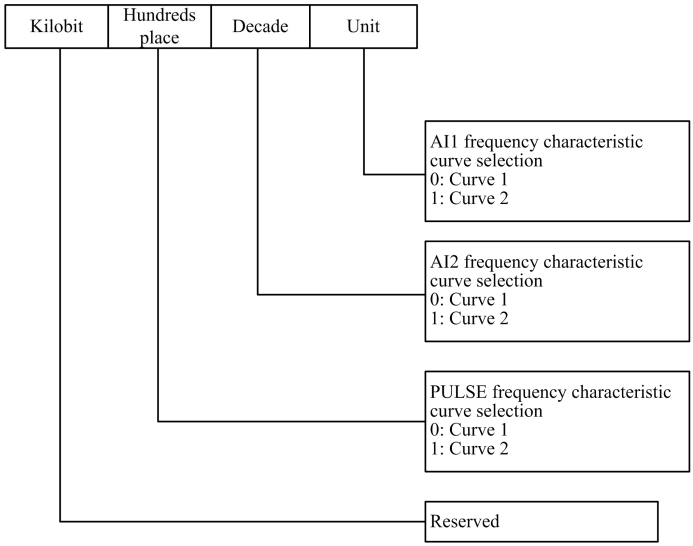


Fig. 6-21 Frequency Given Curves

For example, requirement analysis:

① Set given frequency using pulse signals input by terminals;

② Range of input signals: 1kHz～20kHz;

③ It is required that the set frequency correspondent to 1kHz input signal is 50Hz, and the set frequency correspondent to 20kHz input signal is 5Hz;

According to the above requirements, parameters are set as follows:

① F1.02=5, use terminal PULSE given as frequency given channel;

② F6.06=45, input pulse signals from terminal DI7;

③ F5.00=100, select curve 2;

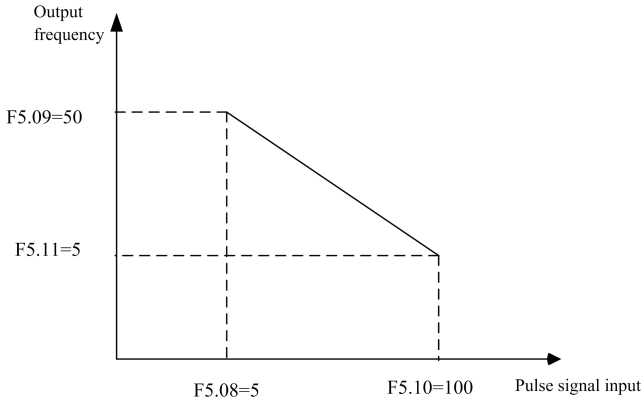
④ F5.03=20.0kHz, set the max. pulse input frequency to 20kHz;

⑤ F5.08=1÷20×100%=5.0%, set curve 2 min. given as the percentage of 1kHz to 20kHz (F5.03);

⑥ F5.09=50.00Hz, set the set frequency correspondent to min. given (1kHz pulse signal);

⑦ F5.10=20÷20×100%=100.0%, set curve 2 max. given as the percentage of 20kHz to 20kHz (F5.03);

⑥ F5.11=5.00Hz, set the set frequency correspondent to max. given (20kHz pulse signal);



F1.02=5，F5.00=100，F5.03=20，F6.06=45

Fig. 6-22 Pulse Signal Input Instance Parameter Settings

6.7 Group F6 Terminal Function Parameters

F6.00	Multifunction Input Terminal DI1 Function Selection	0～43	0
F6.01	Multifunction Input Terminal DI2 Function Selection	0～43	0
F6.02	Multifunction Input Terminal DI3 Function Selection	0～43	0
F6.03	Multifunction Input Terminal DI4 Function Selection	0～43	0
F6.04	Multifunction Input Terminal DI5 Function Selection	0～43	0
F6.05	Multifunction Input Terminal DI6 Function Selection	0～43	0
F6.06	Multifunction Input Terminal DI7 Function Selection	0～47	0
F6.07	Multifunction Input Terminal DI8 Function Selection	0～46，48	0
F6.08	Reserved	-	-

Multifunction input terminals DI1 ～ DI8 have abundant functions, which could be selected according to needs conveniently, that is to define DI1～DI8 functions according to the set F6.00～F6.07 values, and see Table 6-5 for set values and functions.

Table 6-5 Multifunction Input Selection Function Table

Contents	Corresponding Functions	Contents	Corresponding Functions
0	No function	1	Multi-band frequency terminal1
2	Multi-band frequency terminal 2	3	Multi-band frequency terminal3
4	Accelerating and decelerating time terminal 1	5	Accelerating and decelerating time terminal 2
6	External fault normal open input	7	External fault normal close input
8	External reset (STOP/RESET) input	9	External forward rotating jog running control input
10	External reversal jog running control input	11	Free parking input (FRS)
12	Frequency increasing instruction (UP)	13	Frequency decreasing instruction (DN)
14	Simple PLC pause running instruction	15	Accelerating and decelerating inhibit instruction
16	Three-line running control	17	External interrupt normal open contact input
18	External interrupt normal close contact input	19	Shutdown DC braking input instruction (DB)
20	Closed-loop failure	21	PLC failure
22	Frequency given channel selection 1	23	Frequency given channel selection 2
24	Frequency given channel selection 3	25	Frequency shifted to AI2
26	Reserved	27	Command shifted to terminal
28	Running command channel selection 1	29	Running command channel selection 2
30	Multi-segment closed-loop terminal 1	31	Multi-segment closed-loop terminal 2
32	Multi-segment closed-loop terminal 3	33	Swing frequency input
34	Swing frequency state reset	35	External shutdown instruction
36	Forward rotating (FWD) terminal function	37	Reversal (REV) terminal function

Contents	Corresponding Functions	Contents	Corresponding Functions
38	Inverter running inhibit	39	Length clear
40	Auxiliary given frequency clear	41	PLC shutdown state reset
42	Counter clear signal input	43	Counter trigger signal input
44	Length count input	45	Pulse frequency input
46	Single phase speed test input	47	Speed test input SM1 (set only for DI7)
48	Speed test input SM2 (set only for DI8)		

Introduction on functions listed in Table 6-5 is shown in the following:

1～3: Multiple segments of speed running terminals

By selecting terminal ON/OFF combination of these functions, 8 segments of speed running curves could be defined at the most.

Table 6-6 Multiple Segments of Speed Running Selection Table

K3	K2	K1	Frequency Settings
OFF	OFF	OFF	Normal running frequency
OFF	OFF	ON	Multi-band frequency 1
OFF	ON	OFF	Multi-band frequency 2
OFF	ON	ON	Multi-band frequency 3
ON	OFF	OFF	Multi-band frequency 4
ON	OFF	ON	Multi-band frequency 5
ON	ON	OFF	Multi-band frequency 6
ON	ON	ON	Multi-band frequency 7

These frequencies will be used in multi-band speed running and simple PLC running, and multi-band speed running is taken as an example for instruction. For control terminals

DI1, DI2 and DI3, the following definition is made: After F6.00=1, F6.01=2 and F6.02=3, DI1, DI2 and DI3 will be used to realize multi-band speed running, as shown in Fig. 6-23.

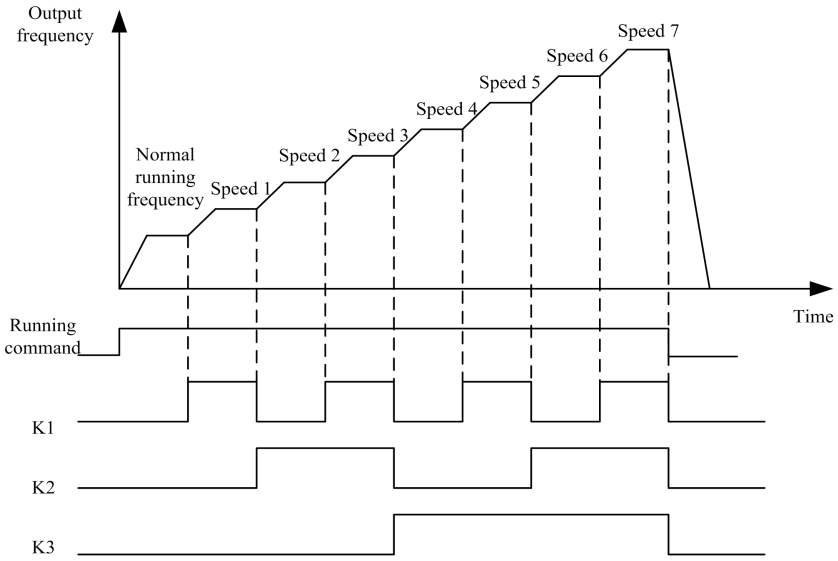


Fig. 6-23 Multi-band Speed Running Diagram

In Fig. 6-25, terminal running command channel is taken as an example, set F6.03=36 and F6.04=37, control could be carried out on running direction by K4 and K5.Via different logic combinations of K1, K2 and K3, users could select normal running frequency and bands 1～7 of multi-band frequency according to the above table for multi-band speed running.

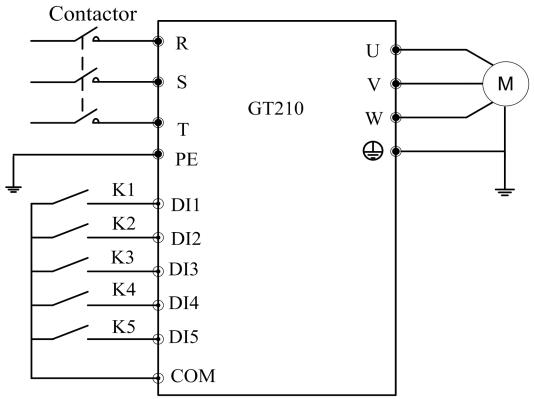


Fig. 6-24 Multi-band Speed Running Wiring Diagram

4～5: Accelerating and decelerating time terminal selection

Table 6-7 Accelerating and Decelerating Time Selection Expression

Terminal 2	Terminal 1	Accelerating or Decelerating Time Selection
OFF	OFF	Accelerating Time 1 / Decelerating Time 1
OFF	ON	Accelerating Time 2 / Decelerating Time 2
ON	OFF	Accelerating Time 3 / Decelerating Time 3
ON	ON	Accelerating Time 4 / Decelerating Time 4

Via ON/OFF combination of accelerating and decelerating time terminal 1 and 2, users could realize the selection on accelerating and decelerating time 1～4.

6～7: External device fault normal open / normal close input

Via this terminal, users could input fault signals of external device, so that the inverter could carry out fault monitoring on external device. After the inverter receiving fault signals of external device, it will display “E015”, which is an external device fault alarm, and fault signals could adopt two input methods of normal open and normal close.

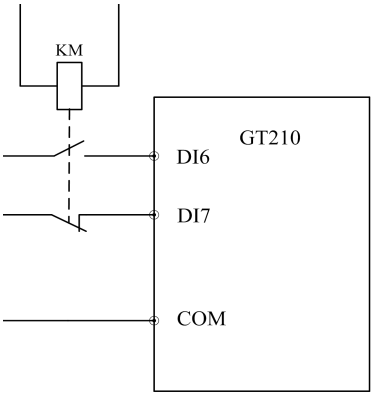


Fig. 6-25: External Device Fault Normal Open / Normal Close Input Diagram

As shown in Fig. 6-25, DI6 is normal open input method, and DI7 is normal close input method. Here, KM is an external device fault relay.

8: External reset input

After fault alarm of the inverter, via this terminal, fault reset could be carried out. Its function is the same with the keyboard’s STOP/RESET function.

9～10: External jog running control input JOGF/JOGR

It is used to control the jog running control in terminal mode, JOGF is forward rotating of Jog, while JOGR is reversal of Jog, Jog running frequency, Jog interval and Jog accelerating and decelerating time are defined in F2.20～F2.23.

11: Free parking input

This function has the same meaning with free running parking defined in F2.08, but here it is realized using control terminals, which is convenient for remote control.

12～13: Frequency increasing instruction UP / decreasing instruction DN

Increasing or decreasing of the frequency is realized via control terminals, to carry out remote control instead of operation panel. For normal running, when F1.02=1, or FC.25=2 (as auxiliary frequency), it is valid. Decreasing speed is set by F6.10.

14: Simple PLC pause instruction:

It is used to realize pause control on PLC process during running, when this terminal is valid, it will run at zero frequency, while PLC running is not timed; if invalid, automatic rotational speed tracking will start, to continue PLC running. For use methods, refer to function instructions in F9.00, F9.08～F9.21.

15: Accelerating and decelerating inhibit instruction

Guarantee the motor would not be impacted by any external signals (excluding shutdown command), and would maintain running at the current rotational speed.

Note: It is invalid during normal decelerating shutdown process.

16: Three-line running control

Refer to function introduction in F6.09 rotation mode 2 and 3 (three-line rotation mode 1 and 2).

17～18: External interrupt normal open / normal close contact input

When the inverter is running, after receiving any external interrupt signal, it will lock output and run at zero frequency. Once external interrupt signals are dissolved, the inverter's automatic rotational speed tracking will start to restore running.

There're two types of external interrupt inputs, normal open contact and normal close contact. As shown in Fig. 6-26, DI6 is normal open input, and DI7 is normal close input.

Note: Different from No. 6 ~ 7 functions, external interrupt will not cause inverter's alarm output, after interrupt signal is dissolved, the inverter will restore running.

19: Shutdown DC braking input instruction

Carry out DC braking on motor during shutdown using control terminal, to realize emergency parking and accurate positioning of the motor. Braking start frequency, braking wait time and braking current are defined in F2.09～F2.11, while braking time should be the larger one from the time defined in F2.12 and valid duration of this control terminal.

20: Closed-loop failure

It is used to realize flexible shifting with low-level running method under closed-loop running state (see introduction in 4.1.4).

Note: Shifting between closed-loop and low-level running could be made only during closed-loop running (F8.00=1). When shifting to low-level running, start-stop control, direction addition and decelerating time observe the settings of corresponding running method.

21: PLC failure

It is used to realize flexible shifting with low-level running method under PLC running state.

Note: Shifting between PLC and low-level running could be made only during PLC running (the unit of F9.00≠0).

When shifted to low-level running method, start-stop control, direction addition and decelerating time should follow the settings of corresponding running method.

22～24: Frequency given channel selection 1～3

Via ON/OFF combination of frequency given channel selection terminals 1, 2 and 3, users could realize frequency given channel shifting in Table 6-8.The relationship between terminal shifting and function code F1.02 setting will be valid later.

Table 6-8 Frequency Given Channel Selection Expression

Frequency Given Channel Selection Terminal 3	Frequency Given Channel Selection Terminal 2	Frequency Given Channel Selection Terminal 1	Frequency Given Channel Selection
OFF	OFF	OFF	Frequency Setting Hold
OFF	OFF	ON	Digit Given 1
OFF	ON	OFF	Digit Given 2
OFF	ON	ON	Digit Given 3
ON	OFF	OFF	AI1 Analog Given
ON	OFF	ON	AI2 Analog Given
ON	ON	OFF	Terminal Pulse Given
ON	ON	ON	Terminal Pulse Given

25: Frequency shifted to AI2

When this function terminal is valid, frequency given channel will be forced to shift to AI2 given, while frequency given channel will restore after this function terminal is invalid.

26: Reserved

27: Command shifted to terminal

When this function terminal is valid, the running command channel will be forced to shift to terminal running command channel, while running command channel will restore after this function terminal is invalid.

28～29: Running command channel selection 1～2

Table 6-9 Running Command Channel Selection Expression

Running Command Channel Selection Terminal 2	Running Command Channel Selection Terminal 1	Running Command Channel
OFF	OFF	Running Command Channel Hold
OFF	ON	Operation Panel Running Command Channel
ON	OFF	Terminal Running Command Channel
ON	ON	Serial Port Running Command Channel

Control command selection in Table 6-9 could be realized via ON/OFF combination of running command channel selection terminal 1 and 2.

30～32: Multi-segment closed-loop terminal 1～3

Table 6-10 Multi-segment Closed-loop Given Selection Expression

Multi-segment Closed-loop Terminal 3	Multi-segment Closed-loop Terminal 2	Multi-segment Closed-loop Terminal 1	Multi-segment Closed-Loop Given Selection
OFF	OFF	OFF	Closed-Loop Given is Determined by F8.01
OFF	OFF	ON	Multi-segment Closed-Loop Given 1
OFF	ON	OFF	Multi-segment Closed-Loop Given 2
OF	ON	ON	Multi-segment Closed-Loop Given 3
ON	OFF	OFF	Multi-segment Closed-Loop Given 4
ON	OFF	ON	Multi-segment Closed-Loop Given 5
ON	ON	OFF	Multi-segment Closed-Loop Given 6
ON	ON	ON	Multi-segment Closed-Loop Given 7

Multi-segment closed-Loop given selection in Table 6-10 could be realized by ON/OFF combination of multi-segment closed-loop terminal 1～3.

33: Swing frequency input

When start method of swing frequency is manual input, if this terminal is valid, the swing frequency function will be valid, see group F4 function parameter instruction.

34: Swing frequency state reset

When swing frequency function is selected, no matter automatic or manual input method, if this terminal is closed, it will clear swing frequency's state information memorized in the inverter. After disconnecting this terminal, swing frequency will restart. See group F4 function introduction.

35: External shutdown instruction

This command is valid for all running command channels, if this function terminal is valid, the inverter will shut down according to the method set in F2.08.

36: Forward rotating FWD

37: Reversal REV

38: Inverter running inhibition

When this terminal is valid, the running inverter will park freely, and the standby inverter will inhibit starting. It is mainly used on occasions requiring security interaction.

39: Length clearing

When this function terminal is valid, it will clear actual length function code FC.15.

40: Auxiliary given frequency clearing

It is only valid for digit auxiliary frequency (FC.25=1, 2, 3), and when this function terminal is valid, it will clear auxiliary frequency given value, while the set frequency will be completely determined by the primary given.

41: PLC shutdown state reset

Under shutdown state of PLC running mode, if this function terminal is valid, it will clear information such as PLC running stage, running time and running frequency etc. in PLC shutdown memory, please refer to group F9 function introduction.

42: Counter clear signal input

Carry out clearing on counters built in the inverter, which is used in combination with No. 43 function (counter trigger signal input).

43: Counter trigger signal input

For counting pulse input port of built-in counter, max. pulse frequency is 200Hz, which could store and memorize the current counting value during power off. See function code F6.21 and F6.22.

44: Length counting input

Only valid for multifunction input terminal DI7 and DI8, this function terminal is used for fixed length control, which calculates length via pulse input, see details in function introduction of FC.14～FC.19.

45: Pulse frequency input

Only valid for multifunction input terminal DI7 and DI8, this function terminal receives pulse signals as frequency given, and the relationship between the input signal pulse frequency and the set frequency, refer to instruction on group F5 frequency given characteristic curve.

46: Single phase speed detection input

Only valid for multifunction input terminal DI7 and DI8, and see Chapter III, Section 3.5 for input characteristics; speed control accuracy is ±0.1%.This input port, under the cooperation of pulse coder (PG), realizes single phase pulse speed feedback control.

47: Speed test input SM1

48: Speed test input SM2

Only valid for multifunction input terminal DI7 and DI8, and see Chapter III, Section 3.5 for input characteristics; speed control accuracy is ±0.1%.Under the cooperation of pulse coder (PG), it realizes double-phase pulse speed feedback control.

Note: When motor parameter automatic tuning is running, functions 44 ~ 47 set with respect to DI7 will invalidate automatically.

F6.09	FWD/REV rotation mode setting	0～3	0

This parameter defines four different inverter running methods controlled by external terminals.

0: Two-line rotation mode 1

1: Two-line rotation mode 2

2: Three-line rotation mode 1

3: Three-line rotation mode 2

K2	K1	Running instruction
0	0	Stop
1	0	Reversal
0	1	Forward rotating
1	1	Stop

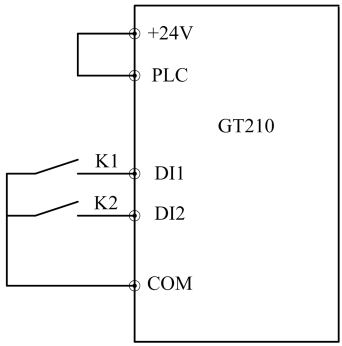


Fig. 6-26 Two-line Rotation Mode 1

K2	K1	Running instruction
0	0	Stop
1	0	Stop
0	1	Forward rotating
1	1	Reversal

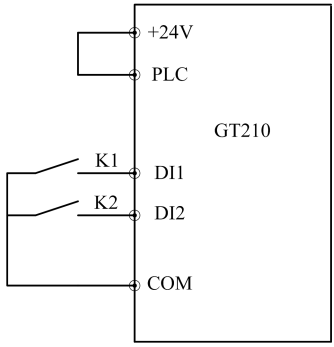


Fig. 6-27 Two-line Rotation Mode 2

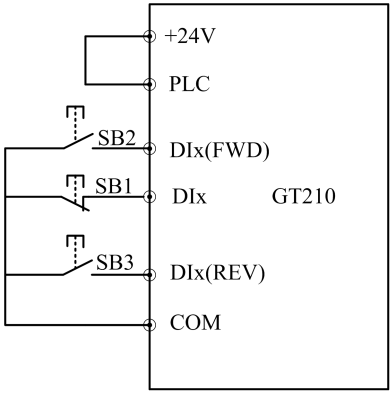
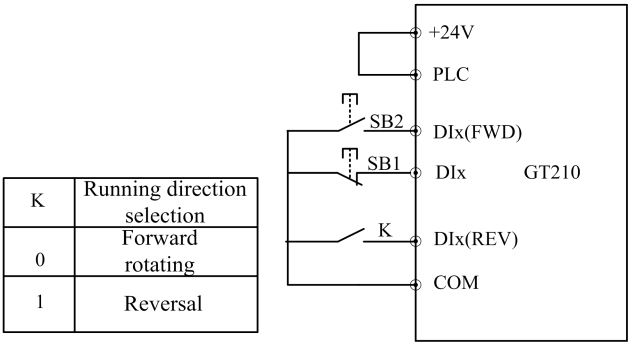


Fig. 6-28 Three-line Rotation Mode1

Among which:
SB1: Stop button
SB2: Forward rotating button
SB3: Reversal button

Dix is the multifunction input terminal of DI1 ～ DI8, in this case, its corresponding terminal function shall be defined as No. 16 function “three-line running control”. Corresponding terminal function of Dix (FWD) is defined as No. 36 function, and corresponding terminal function of Dix (REV) is defined as No. 37 function.

3: Three-line rotation mode 2



K	Running direction selection
0	Forward rotating
1	Reversal

Fig. 6-29 Three-line Rotation Mode 2

Among which:

SB1: Running button

SB2: Stop button

Dix is the multifunction input terminal of DI1 ～ DI2, in this case, its corresponding terminal function shall be defined as No. 16 function “three-line running control”. Corresponding terminal function of Dix (FWD) is defined as No. 36 function, and corresponding terminal function of Dix (REV) is defined as No. 37 function.

Note: Under terminal control mode, for two-line rotation mode 1 and 2, although terminal level is valid, when shutdown command is generated from other sources and makes the inverter shut down, even if the control terminal is defined as FWD/REV, it will still be valid, and no running command will be generated. To make the inverter run again, it is required to trigger again. For example, terminal function 11 and 35 (see F6.00 ~ F6.07), PLC single cycle shutdown, fixed length shutdown, and valid STOP/RESET shutdown under terminal running command channel (see FC.31).It is not the case during fault alarm shutdown, if it is defined as reset fault when FWD/REV control terminal is under valid state, the inverter will start immediately.

F6.10	UP/DN speed	0.01～99.99Hz/s	1.00Hz/s

This function code defines the change rate of the set frequency modified using UP/DN terminal.

F6.11	Open circuit collector output terminal DO1	0～19	0
F6.12	Open circuit collector output terminal DO2	0～31	1
F6.13	Relay output function selection	0～19	16

For DO1 and DO2 open circuit collector output terminal and relay output terminals, see instructions in Chapter III, Section 3.5 for output characteristics, and Table 6-10 lists optional

items for the above three function parameters, allowing to select the same output terminal functions repeatedly.

Table 6-11 Output Terminal Function Selection Table

Contents	Corresponding Functions	Contents	Corresponding Functions
0	Inverter Running Signal (RUN)	1	Frequency Arrival Signal (FAR)
2	Frequency Level Detection Signal (FDT1)	3	Frequency Level Detection Signal (FDT2)
4	Overload Detection Signal (OL)	5	During Undervoltage Locking Stop (LU)
6	External Fault Shutdown (EXT)	7	Frequency Higher Limit (FHL)
8	Frequency Lower Limit (FLL)	9	During Inverter Zero Speed Running
10	Simple PLC Stage Rotating Completion Indication	11	PLC CYCLING COMPLETION INDICATION
12	Set Count Value Arrival	13	Specified Count Value Arrival
14	Set Length Arrival Indication	15	Inverter Running Preparation Completion (RDY)
16	Inverter Fault	17	Upper Computer Extended Function 1
18	Upper and Lower Swing Frequency Limit	19	Set Running Time Arrival
20	Output Frequency before Slip Compensation (0～max.)	21	Output Frequency after Slip Compensation (0～max.)
22	Set Frequency (0～max.)	23	Output Current (0～2*Idea)
24	Output Current (0～2*Iem)	25	Output Torque (0～2*Tem)
26	Output Voltage (0～1.2*Ve)	27	Bus Voltage (0～800V)
28	AI1 (0～10V)	29	AI2 (0～10V/0～20mA)
30	Output Power (0～2*Pe)	31	Upper Computer Percentage (0～65535)

Introduction on functions listed in Table 6-11 is shown in the following:

0: Inverter Running Signals (RUN)

The inverter is under running state, and outputs indicating signals.

1: Frequency Arrival Signal (FAR)

Refer to function description in F6.18.

2: Frequency Level Detection Signal (FDT1)

Refer to function description in F6.14～F6.15.

3: Frequency Level Detection Signal (FDT2)

Refer to function description in F6.16～F6.17.

4: Overload Detection Signal (OL)

When inverter output current exceeds FA.12 overload detection level, and the time exceeds FA.12 overload detection time, it will output indication signals. Usually used in overload alarming/warning. See description in Fig. 6-57 in group FA.

5: During Undervoltage Locking Stop (LU)

When DC bus voltage is lower than the level restricted by undervoltage, it will output an indication signal, and LED will display "P.oFF".

6: External Fault Shutdown (EXT)

When an external fault trip alarm (E015) occurs in the inverter, it will output an indication signal.

7: Frequency Higher Limit (FHL)

Set Frequency≥upper limit frequency and the running frequency reaches the upper limit frequency,it will output an indication signal.

8: Frequency Lower Limit (FLL)

When the set frequency≤lower limit frequency and the running frequency reaches the lower limit frequency, it will output an indication signal.

9: During Inverter Zero Speed Running

The output frequency of the inverter is 0, but it will output an indication signal if under running state.

10: Simple PLC Stage Rotating Completion Indication

After the rotation of the current stage of simple PLC is completed, it will output an indication signal (single pulse signal, with width of 500ms).

11: PLC Cycling Completion Indication

After the simple PLC completes one running cycle, it will output an indication signal (single pulse signal, with width of 500ms).

12: Set Set Count Value Arrival

13: Specified Count Value Arrival

For 12～13, refer to F6.21～F6.22 function description.

14: Set length reaches the indication

When actual length FC.15≥FC.14 (set length), it will output an indication signal. The length counting terminal is the terminal of No. 44 function set in DI1～DI8.

15: Inverter running preparation completed

If this signal output is valid, it indicates the inverter has no fault, bus voltage is normal, and the inverter running inhibition terminal is invalid, which could accept start command.

16: Inverter Fault

If the inverter is fault, it will output indication.

17: Upper computer extended function 1

Output signals of DO1, DO2 or TC directly controlled by serial port. Please refer to this communication protocol.

18: Upper and Lower Swing Frequency Limit

After selecting the swing frequency function, if the frequency fluctuation range of the swing frequency calculated by the center frequency exceeds the upper limit frequency F1.09

or is below the lower limit frequency F1.10, it will output an indication signal, as shown in Fig. 6-30.

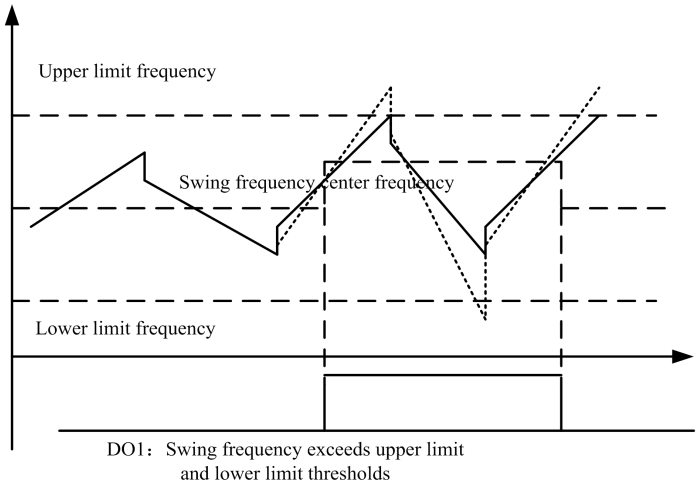


Fig. 6-30 Swing Frequency Amplitude Limit

19: Set Running Time Arrival

When the accumulated running time of the inverter (FD.03) reaches the set running time (FD.02), it will output an indication signal.

20～31: Skipped.

F6.14	FDT1 level	0.00～550.0Hz	50.00Hz
F6.15	FDT1 lag	0.00～550.0Hz	1.00Hz
F6.16	FDT2 level	0.00～550.0Hz	25.00Hz
F6.17	FDT2 lag	0.00～550.0Hz	1.00Hz

F6.14～F6.15 is the supplementary definition for No. 2 function in Table 6-11, while F6.16～F6.17 is the supplementary definition for No. 3 function in Table 6-10, both of which have the same usage, taking F6.14～F6.15 as an example for introduction in the following. When the output frequency is larger than or equal to a certain set frequency (FDT1 level), it will output an indication signal, till the output frequency drops to a certain frequency lower than FDT1 level (FDT1 level - FDT1 lag).As shown in Fig. 6-31.

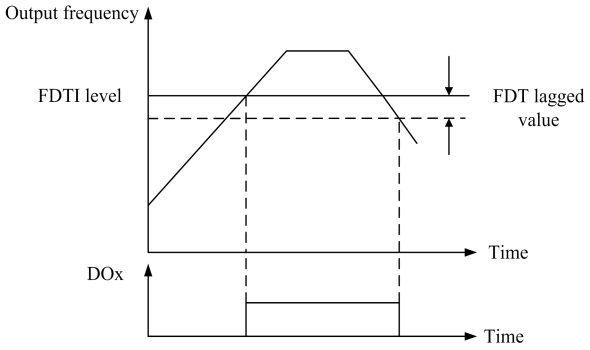


Fig. 6-31 Frequency Level Detection Diagram

F6.18	Frequency reaches the (FAR) detection width	0.00～550.0Hz	2.50Hz
F6.19	Reserved	-	-

This parameter is the supplementary definition on No.1 function in Table 6-11.As shown in Fig. 6-32, when the inverter's output frequency is within the positive/negative detection width of the set frequency, it will output a pulse signal.

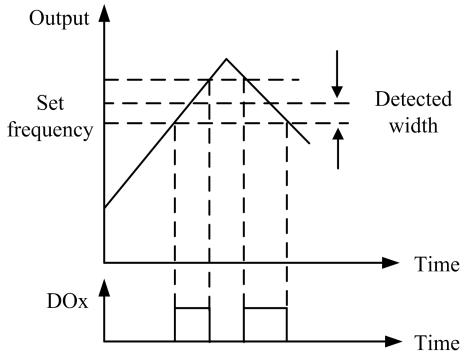


Fig. 6-32 Frequency Arrival Signal Output Diagram

F6.20	DO2 Max. Output Pulse Frequency	0～50.0kHz	10.0kHz

Define the max. frequency allowed to be output by DO2 terminal, refer to description in F6.12.

Output range of DO2 pulse frequency: 0～Max. output pulse frequency.

Note: When DI8 terminal selects functions 44 ~ 46, No. 20 ~ 31 functions of DO2 will invalidate automatically.

F6.21	Counter reset value given	F6.22～9999	0
F6.22	Counter detection value given	0～F6.21	0

F6.21 and F6.22 are the supplementary definitions on No.12 and No.13 functions in Table 6-11.

The set count value given, refers to the number of pulses input from Dix (signal input function terminals triggered by counting), so that one indication signal could be output by DOx (open circuit collector output terminal) or relay.

As shown in Fig. 6-33.When Dix inputs the 8th pulse, DO1 will output one indication signal. Where F6.21=8.

The specified count value given, refers to the number of pulses from Dix, so that one indication signal could be output by DOx or relay, till the set count value arrival.

As shown in Fig. 6-33.When Dix inputs the 5th pulse, DO2 will output one indication signal. Till the set count value 8 is reached. Where, F6.22=5.When the specified count value is larger than the set count value, the specified count value is invalid.

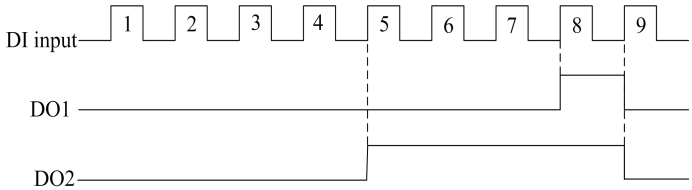


Fig. 6-33 Set Count Value Given and Specified Count Value Given Diagram

F6.23	Terminal positive/negative logic	000～FFF	000

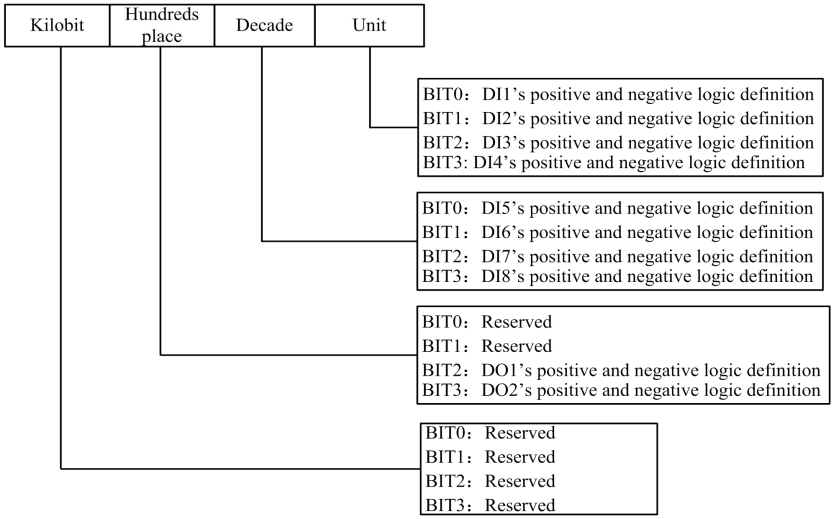


Fig. 6-34 Terminal Positive/Negative Logic Setting

This function code defines the terminal's positive/negative logic.

Positive logic: Valid if Dix terminals etc. are connected to corresponding public terminals, and invalid if disconnected.

Negative logic: Invalid if Dix terminals etc. are connected to corresponding public terminals, and valid if disconnected.

When BIT selects 0, it represents a positive logic; if 1, it represents a negative logic.

For example:

If DI1～DI8 are required to be positive logic, DO1 to be positive logic and DO2 to be negative logic, it is set as follows:

If logic state of DI4～DI1 is 0000, and corresponding hex is 0, LED unit is 0; if logic state of DI8～DI5 is 0000, and corresponding hex is 0, LED decade is 0; if logic state of DO2 and DO1 is 1000, and corresponding hex is 8, LED hundreds place is 8; in this case, function code F6.23 shall be set to 0800.

Confirmation method of the set value is shown in Table 6-12:

Table 6-12 Corresponding Relationship between Binary System and LED Bit Display Value

Binary System Settings				Hex (LED Bit Display Value)
BIT3	BIT2	BIT1	BIT0	
0	0	0	0	0
0	0	0	1	1
0	0	1	0	2

Binary System Settings				Hex (LED Bit Display Value)
BIT3	BIT2	BIT1	BIT0	
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	A
1	0	1	1	B
1	1	0	0	C
1	1	0	1	D
1	1	1	0	E
1	1	1	1	F

LED bit refers to kilobit, hundreds place, decade or unit displayed by LED on the operation panel.

Note: Factory settings of all terminals are positive logic.

F6.24	AO1 terminal output function selection	0～11	0
F6.25	AO2 terminal output function selection	0～11	3

Both AO1 and AO2 are analog output terminals.

For output characteristics of AO1 and AO2, see description in Chapter III, Section 3.5, and analog output range is determined by function code F6.26.

Linear corresponding relationship between the output of AO1 & AO2 and indication range is shown in Table 6-13.

Table 6-13 Output Terminal Indication

Contents	Corresponding Functions	Indication Range
0	Output frequency before Slip Compensation	0～Max. output frequency
1	Output frequency after slip compensation	0～Max. output frequency
2	Set frequency	0～Max. output frequency
3	Output current	0～2 times of inverter rated currency
4	Output current	0～2 times of motor rated currency
5	Output torque	0～2 times of rated motor torque
6	Output voltage	0～1.2 times of inverter rated voltage
7	Bus voltage	0～800V
8	AI1	0～10V
9	AI2	0～10V/0～20mA
10	Output power	0～2 times of rated power
11	Upper computer extension function 2	0～65535

Upper computer extension function 2 is to directly control the output of AO1 and AO2 by a serial port.65535 corresponds to the max. output 10V (or 20mA), please refer to this communication protocol.

For example:

AO1 output of 4～20mA corresponds to bus voltage of 0～800V.

The settings are as follows:

① F6.24=7, output bus voltage;

② F6.26=01, AO1 output type is 4～20mA;

③ F6.27=100%, output gain is 100%;

④ AO1 jumper J1's "I" side short circuit.

F6.26	Analog output range selection	00～11	00

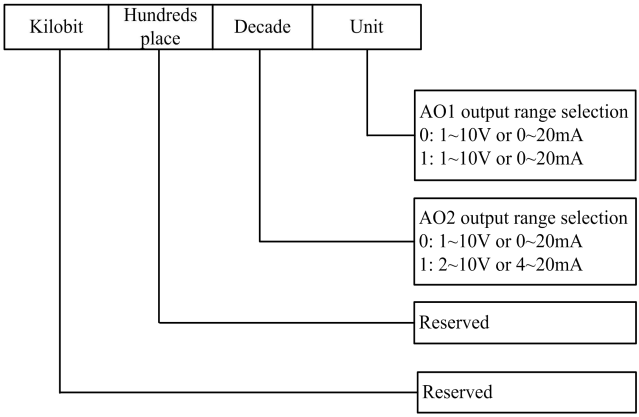


Fig. 6-35 Analog Output Offset Setting

This function code is used to select analog output range of AO1 and AO2.

F6.27	AO1 OUTPUT GAIN	0.0～200.0%	100.0%
F6.28	AO2 OUTPUT GAIN	0.0～200.0%	100.0%

For AO1 and AO2 analog outputs, if users need to modify display range or calibrate header error, they could realize via adjusting the output gain.

Note: This function code impacts analog output in a real-time manner during modification.

6.8 Group F7 Human-Machine Interface

F7.00	Reserved	-	-
F7.01	LED running disply parameter selection 1	000～3FF	00d

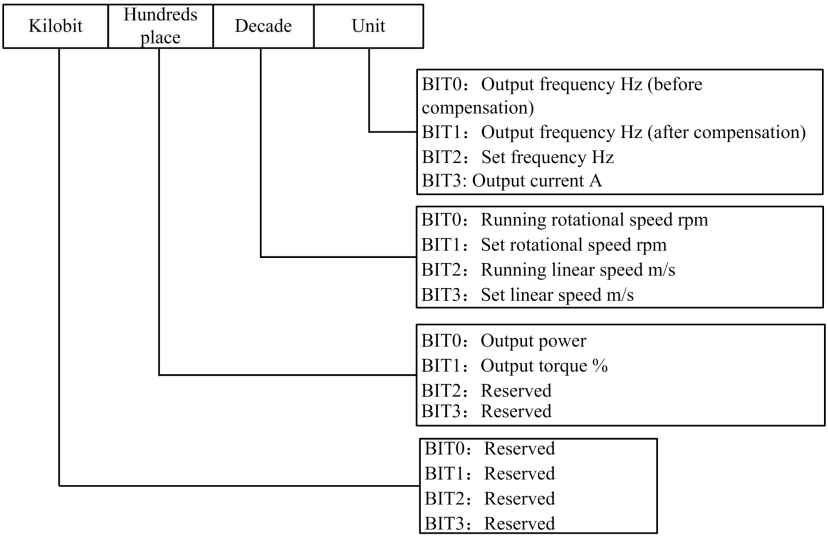


Fig. 6-36 LED Running Display Parameter Selection 1 Setting

F7.01 and F7.02 define state parameters able to be displayed by LED, under the inverter running state.

When BIT selects 0: It indicates not to display this parameter.

When BIT selects 1: It indicates to display this parameter.

For example, the unit of LED BIT0 is the display on/off code for “output frequency before compensation”, when BIT0=0, it indicates not to display this parameter, when BIT0=1, it indicates to display this parameter.

The correspondence of BIT value and LED display value determined by required display parameters should be the same as described in F6.23.

F7.02	LED running disply parameter selection 2	000～3FF	000

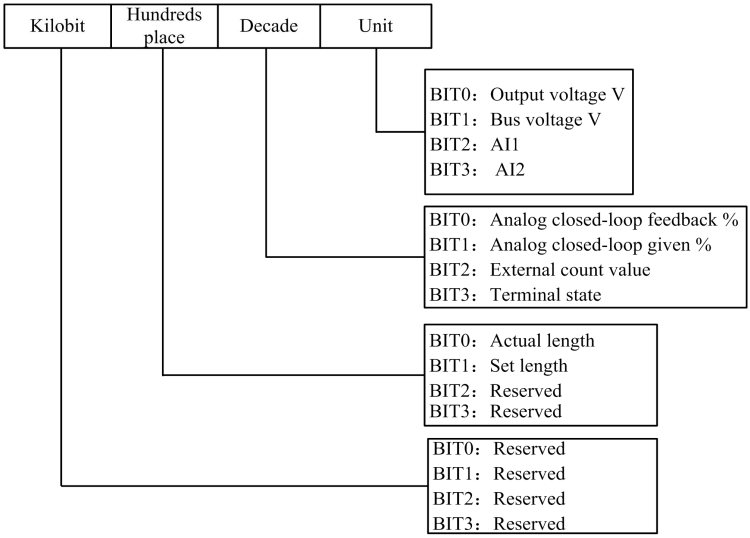


Fig. 6-37 LED Running Display Parameter Selection 2 Setting

The displayed terminal information includes multifunctional terminals DI1 ～ DI8, dual-way open circuit collector output terminals DO1 and DO2, as well as TC state of relay output terminal, and the state of all function terminals is indicated by on/off of a specified segment of LED digital tube, if on, it indicates corresponding terminal state is valid, if off, it indicates corresponding terminal state is invalid, as shown in Fig. 6-39:

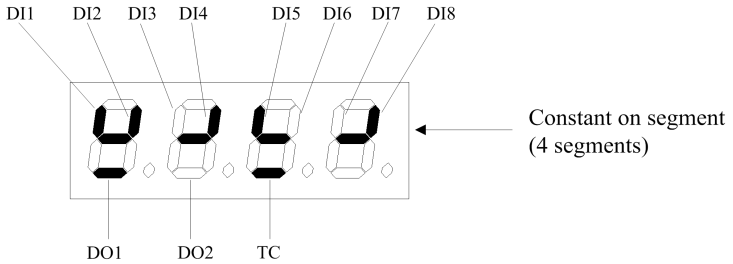


Fig. 6-38 Terminal State Display

Terminal state in Fig. 6-38 displays that, multifunctional terminals DI1, DI2, DI4, DI5 and DI8 are valid, DI3, DI6 and DI7 are invalid, dual-way open circuit collector output terminal DO1, relay output terminal TC are invalid, while DO2 terminal is invalid. There're four constant on segments in the digital tube, which are convenient for observation.

Note: When rotational speed and linear speed are displayed, users could use ▲ and ▼ to carry out real-time modification (without needing to shift to frequency state).When both

F7.01 and F7.02 are 0, it will display output frequency before compensation. Under display state of running parameters, users could press shift key ▶▶ to shift display parameters accordingly.

F7.03	LED shutdown display	0000～3FFF	2001

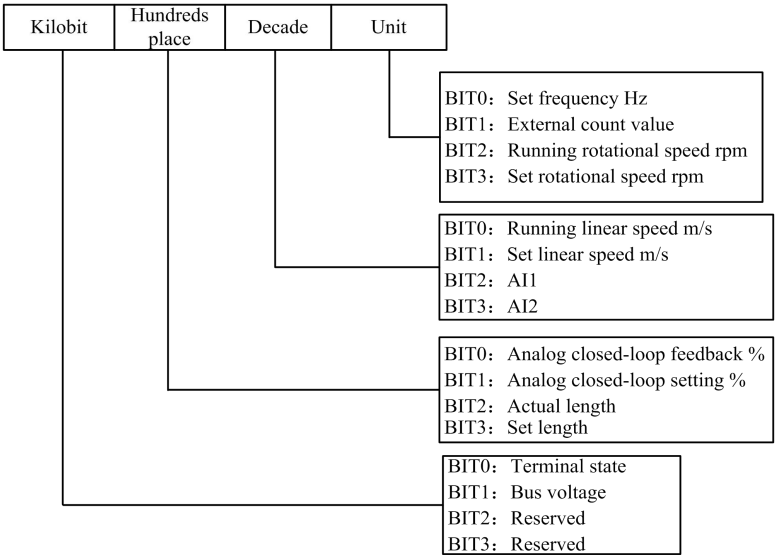


Fig. 6-39 LED Shutdown Display Parameter Selection Setting

This parameter defines state parameters able to be displayed by LED, under the inverter shutdown state.

When BIT selects 0: It indicates not to display this parameter.

When BIT selects 1: It indicates to display this parameter.

For example, BIT0 is the display on/off code for “Set Frequency”, when BIT0=0, it indicates not to display this parameter, when BIT0=1, it indicates to display this parameter.

Note: When rotational speed and linear speed are displayed, users could use ▲ and ▼ to carry out direct modification (without needing to shift to frequency state).When F7.03 set values are all 0, it will display the set frequency. Under display state of shutdown parameters, users could press shift key ▶▶ to shift display parameters accordingly.

F7.04	Rotational speed display coefficient	0.1～999.9%	100.0%

This function code is used to calibrate the scale display error of rotational speed, and has no impact on actual rotational speed.

F7.05	Linear speed coefficient	0.1～999.9%	1.0%

This function code is used to calibrate the scale display error of linear speed, and has no impact on actual rotational speed.

F7.06	Closed-loop analog display coefficient	0.1～999.9%	100.0%

This function code is used to calibrate the display error between actual physical quantities (pressure and flow etc.) and given or feedback quantities (voltage and current), and has no impact on closed-loop PI adjustment.

6.9 Group F8 PID Control Parameters

The commonly used closed-loop control system could be classified into two types of analog closed-loop and pulse closed-loop according to different feedback quantities. As shown in Fig. 6-40 and Fig. 6-41, these are the wiring diagrams for analog closed-loop control and pulse feedback closed-loop control of the inverter.

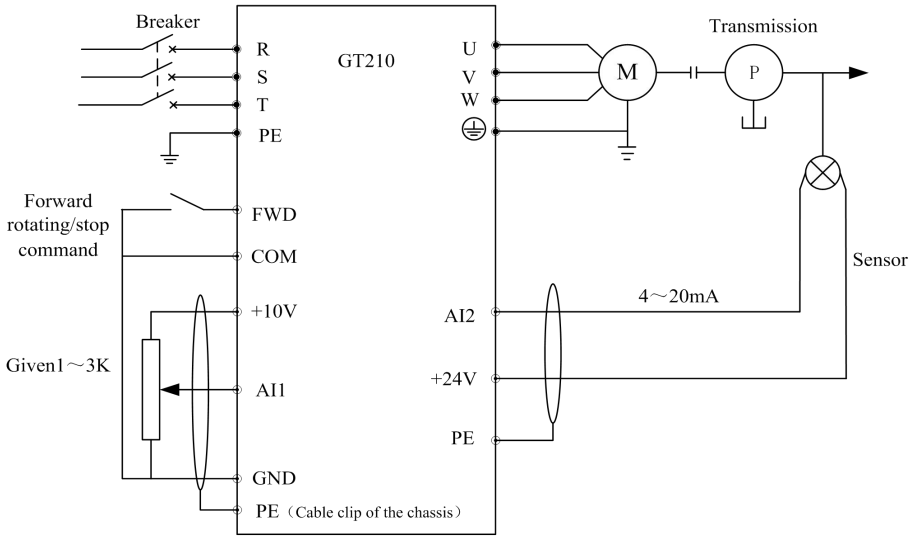


Fig. 6-40 Built-in PI Analog Feedback Control System Diagram

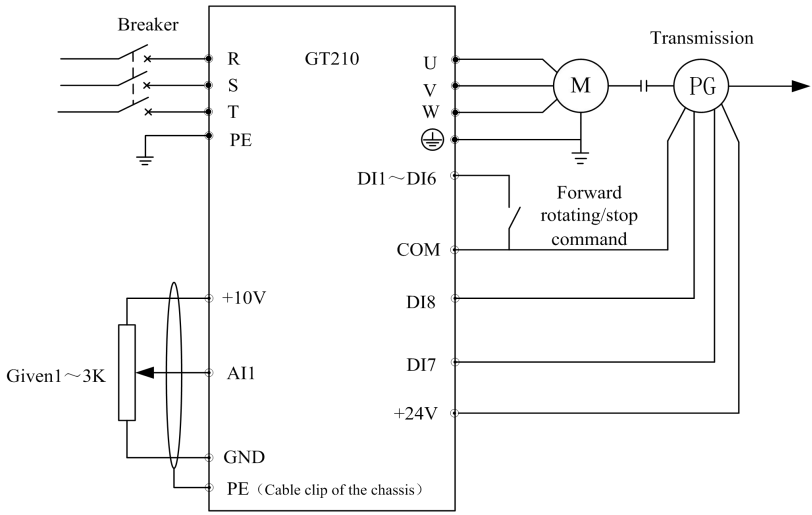


Fig. 6-41 PG Speed Closed-loop Control System Wiring Diagram

Feedback sensor adopting pressure transmitter as its built-in PI, could form an analog feedback control system.

As shown in Fig. 6-40, pressure given should be set with the potentiometer in the form of voltage and input from AI1 port, while pressure feedback should be input from AI2 port in the form of 0/4～20mA current, both the given and feedback are collected via analog channel, and the start-stop of closed-loop is realized by FWD of that defined as FWD terminal.

The above system could also be used by TG (speed test generator) as speed closed-loop control.

PG closed-loop speed control system:

Speed closed-loop control system could be formed by adopting external control terminals DI7 and DI8, and combining pulse encoder (PG), .

As shown in Fig. 6-42, the given of speed closed-loop is set by analog channel AI1 in the form of voltage using a potentiometer, while the feedback of PG closed-loop is input by external terminals DI7 and DI8 in the form of pulse using a pulse encoder, which realizes the start and stop of closed-loop via a terminal externally defined as FWD.

In Fig. 6-41, A and B are dual phase orthogonal pulse outputs of PG;

GND and +24 connect to PG's working power supply;

Speed given adopts analog voltage signals of 0～10V, it corresponds to the synchronous rotational speed n_0 corresponding to 0～max. frequency (F1.06) in a linear way, f_{max} is the max. frequency (F1.06), and P is the pole number of the motor (F3.00).

$$n_0 = 120 \times \frac{f_{\max}}{P}$$

For characteristics of input terminals DI7 and DI8, please refer to F6.00～F6.07, for speed test input, refer to functions 46～48.

Note:

1. Given could also adopt digit given of the operation panel and serial port given.

2. Dual-phase input pulse could help to improve the speed detection accuracy, and to make single phase pulse input wiring concise.

3. Dual-phase pulse input could only adopt the orthogonal method.

4. If the inverter terminal +24 is adopted to supply power for the encoder, in this case, the max. load current of the optical encoder should ≤200mA.

The inverter's built-in PID working principle diagram is as follows: :

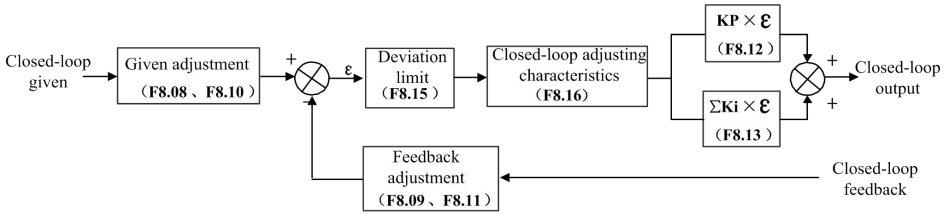


Fig. 6-42 PI Principle Diagram

In the above figure, KP: Proportional gain; KI: Integral gain

In Fig. 6-42, the definition of closed-loop given, feedback, deflection limit and proportional integral parameters is the same with normal PI adjustment, see definition in F8.01～F8.15.

Built-in PI of the inverter has the following two characteristics:

The relationship between given and corresponding expected feedback is defined via F8.08～F8.11.

For example: In Fig. 6-43, when the given is analog a signal of 0 ～ 10V, expected corresponding control is 0～1MPa, and the corresponding pressure sensor signal is 4～20mA, the relationship between the given and expected feedback is shown in Fig. 6-43.

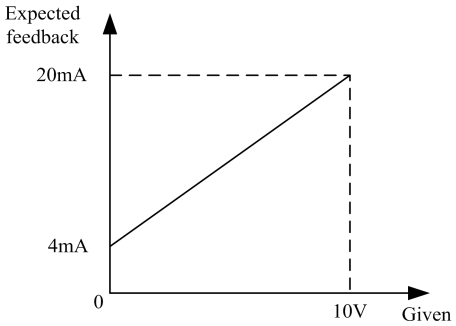


Fig. 6-43 Given and Expected Feedback

Here the determination of the given is based on 10V; the determination of feedback is based on 20mA.Where: In Fig. 6-43, adjustment on the given and the feedback means both the given and the feedback adopt uniformed quantity internally.

Closed-loop characteristics are selected via F8.16, to meet different application occasions.

In actual control system, in order to reach the control requirements, when the given increases, and it requires to accelerate the motor's rotational speed, such closed-loop characteristics are positive; on the contrary, when the given increases, and it requires to decelerate the motor's rotational speed, such closed-loop characteristics are negative.

As shown in Fig. 6-44, the definition of F8.16 is to adapt to requirements of these two closed-loop characteristics.

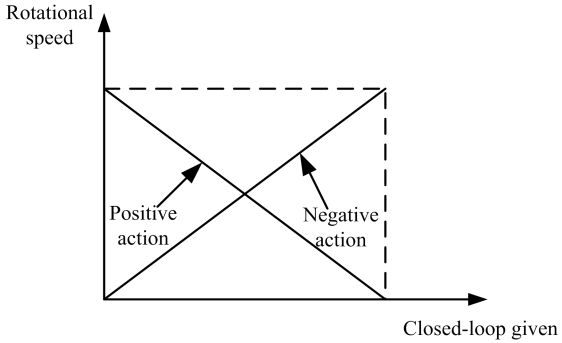


Fig. 6-44 Closed-loop Adjustment Characteristics Diagram

After system confirmation, basic steps for closed-loop parameter settings are as follows:

① Confirm closed-loop given and feedback channel (F8.01, F8.02);

② Analog closed-loop needs to set the relationship between closed-loop given and feedback (F8.08～F8.11);

③ Speed closed-loop needs to confirm speed closed-loop given and encoder rotations (F8.06～F8.07);

④ Confirm closed-loop adjustment characteristics, if the relationship between the given and required motor rotational speeds is reverse, set the closed-loop characteristics adjustment to negative action (F8.16=1);

⑤ Set integral adjustment selection and closed-loop preset frequency function (F8.17～F8.19);

⑥ Adjust closed-loop filtering time, sampling cycle, deflection limit and gain coefficient (F8.12～F8.15).

F8.00	Closed-loop running control selection	0～1	0

0: Closed-loop running control invalid

1: Closed-loop running control valid

F8.01	Given channel selection	0～2	1

0: Digit given

Take the value of F8.05 (When set to analog feedback closed-loop, F8.02＝0～5);

Take the value of F8.06 (When set to pulse feedback closed-loop, F8.02＝6);

1: It is given by AI1 analog voltage (0～10V)

2: It is given by AI2 analog

Analog given input range: 0～10V (select V side for J3 jumper), 0～20mA (select I side for J3 jumper).

Note: Use pulse feedback to carry out speed control, and use analog signal as the given, analog given 10V (20mA) will correspond to the motor's synchronous rotational speed n_0 ($n_0 = 120 \times \frac{f_{max}}{P}$).

F8.02	Feedback channel selection	0～6	1

0: AI1 analog voltage input 0～10V

1: AI2 analog input

2: AI1+AI2

3: AI1-AI2

4: Min{AI1，AI2}

5: Max{AI1，AI2}

AI2's jumper selection is the same with the above. When current input is selected, it will convert to voltage internally, and its relationship is as follows:

Voltage volt = mA value / 2;

6: Pulse: It could be used as PG closed-loop single-phase feedback or dual-phase feedback. Please refer to definition in multifunction input terminals DI7 and DI8 (F6.06～F6.07 terminal functions).

F8.03	Given channel filtering	0.01～50.00s	0.50s
F8.04	Feedback channel filtering	0.01～50.00s	0.50s

External given signals and feedback signals usually have superposition of interference, for filtering via setting F8.03 and F8.04 filtering time constants, longer filtering time will lead to

stronger anti-interference ability, but the response will slow down; shorter filtering time will lead to quicker response, but the anti-interference ability will weaken.

F8.05	Given digit setting	0.00～10.00V	0.00

When analog feedback is adopted (F8.02=0～5), this function realizes digit settings of the givens of operation panel or serial port.

F8.06	Speed closed-loop given	0～39000rpm	0 rpm

When PG pulse feedback is adopted (F8.02=6), the rotational speed given is set via operation panel or serial port communication.

F8.07	Pulse encoder pluses per rotation	1～9999	1024

It is determined by the pulse encoder's characteristic parameters.

F8.08	Min. given	0.0%～F8.10	0.0%
F8.09	Max. given	0.0～100.0%	20.0%
F8.10	Max. given	F8.08～100.0%	100%
F8.11	Feedback corresponding to max. given	0.0～100.0%	100%

F8.08～F8.11 defines the relationship curve of analog closed-loop given and expected feedback. The set value is the percentage of the actual value of the given and feedback physical quantities to reference value (10V or 20mA).

Feedback positive adjustment

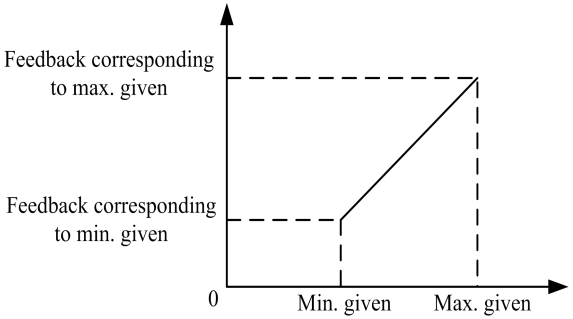


Fig. 6-45 Given and Feedback Curve Diagram 1

Feedback negative adjustment

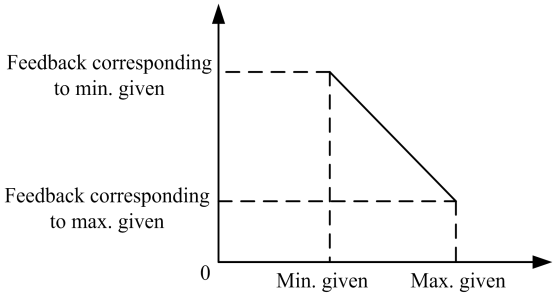


Fig. 6-46 Given and Feedback Curve Diagram 2

F8.12	Proportional gain KP	0.000～9.999	2.000
F8.13	Integral gain Ki	0.000～9.999	0.100
F8.14	Sampling cycle T setting	0.01～50.00s	0.10s

Larger proportional gain KP will lead to quicker response, but too large is easy to generate oscillation.

Only using proportional gain KP to adjust, could not eliminate deflection completely, in order to eliminate remaining deflection, integral gain Ki could be adopted to form PI control. Larger Ki will lead to quicker response to variable deflection, but too large is easy to generate oscillation.

Sampling cycle T is the sampling cycle of feedback, and PI adjuster will operate once during each sampling cycle. Larger sampling cycle will lead to slower response.

F8.15	Deflection limit	0.0～20%	2.0%

The allowed max. deflection of system output value relative to closed-loop given value, as shown in Fig. 6-47, when feedback is within this range, PI adjustor will stop adjusting. Proper settings of this function will help to consider both accuracy and stability of system output.

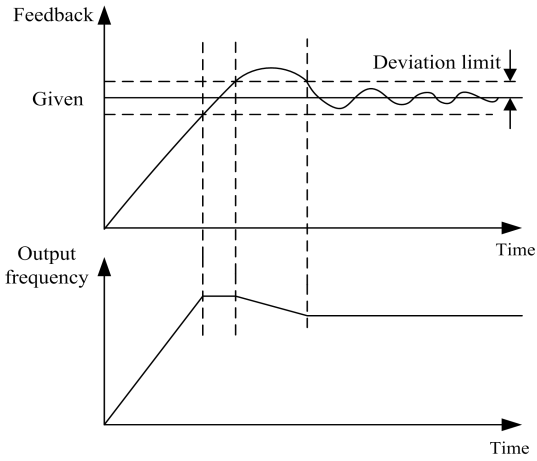


Fig. 6-47 Deflection Limit Diagram

F8.16	Closed-loop adjustment characteristics	0～1	0

0: Positive action

It is selected when motor rotational speed is required to increase, when the given increases.

1: Negative action

It is selected when motor rotational speed is required to decrease, when the given increases.

F8.17	Integral adjustment selection	0～1	0

0: When frequency reaches upper or lower limit, it will stop integral adjustment.

1: When frequency reaches upper or lower limit, it will continue integral adjustment.

For systems needing quick response, it is suggested to cancel continuing integral adjustment.

F8.18	Closed-loop preset frequency	0.0～550.0Hz	0.00Hz
F8.19	Closed-loop preset frequency hold time	0.0～3600s	0.0s

This function code could make closed-loop adjustment enter stable stage quickly.

After closed-loop running starts, frequency will first accelerate to closed-loop preset frequency F8.18 according to accelerating time, and will keep running for a period of time F8.19 at this frequency point, after that, it will run according to closed-loop characteristics.

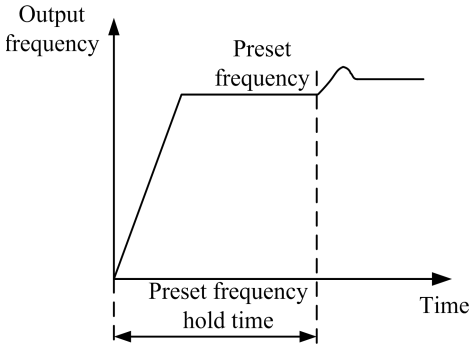


Fig. 6-48 Closed-loop Preset Frequency Running Diagram

Note: If closed-loop preset frequency function is not required, set both the preset frequency and hold time to 0.

F8.20	Multi-segment Closed-Loop Given 1	0.0～10.00V	0.00V
F8.21	Multi-segment Closed-Loop Given 2	0.0～10.00V	0.00V
F8.22	Multi-segment Closed-Loop Given 3	0.0～10.00V	0.00V
F8.23	Multi-segment Closed-Loop Given 4	0.0～10.00V	0.00V
F8.24	Multi-segment Closed-Loop Given 5	0.0～10.00V	0.00V
F8.25	Multi-segment Closed-Loop Given 6	0.0～10.00V	0.00V
F8.26	Multi-segment Closed-Loop Given 7	0.0～10.00V	0.00V

In closed-loop given channels, except for three channels defined in F8.01, voltage value of multi-segment closed-Loop given defined by F8.20 ～ F8.26 could also be used as closed-loop given.

Multi-segment closed-loop given's segments 1 ～ 7 voltage selection could also realize flexible shifting via external terminals, see F6.00～F6.07 terminal functions 30～32.It could also be used in combination with simple PLC closed-loop segments, see group F9 function code description.

6.10 Group F9 Multi-segment of Speed Control Parameters

F9.00	Simple PLC running method	000～1123	0000

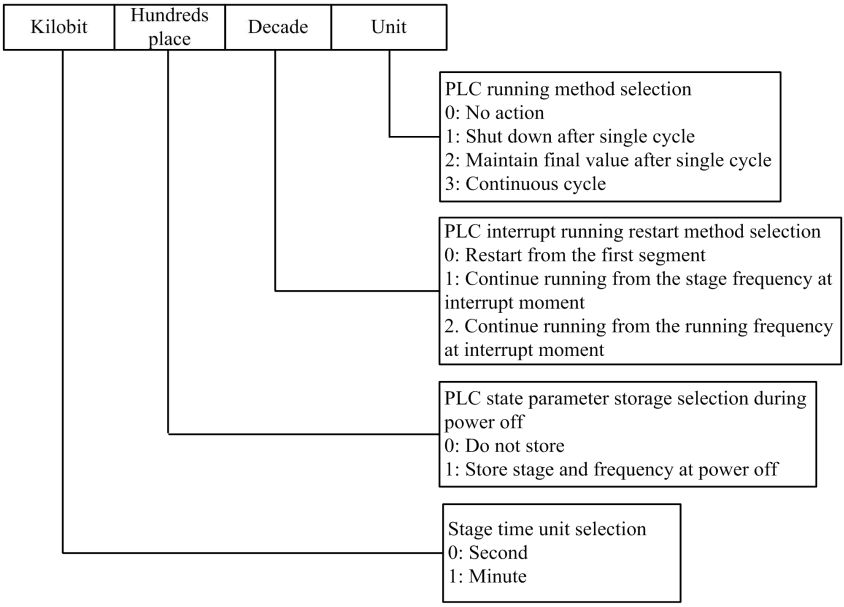


Fig. 6-49 Simple PLC Running Method Selection

The unit: PLC running method selection

0: No action

PLC running method invalid.

1: Shutdown after single cycle.

As shown in Fig. 6-50, the inverter will shut down automatically after completing one cycle, and could start only after a running command is given again.

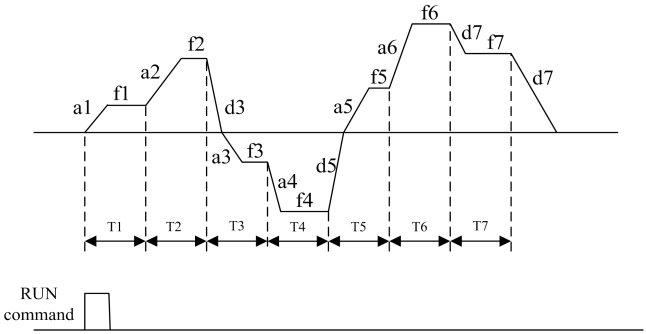


Fig. 6-50 Shutdown Method after PLC Single Cycle

2: Maintain the final value after single cycle

As shown in Fig. 6-51, the inverter will maintain the running frequency and direction of the last segment automatically after completing one cycle.

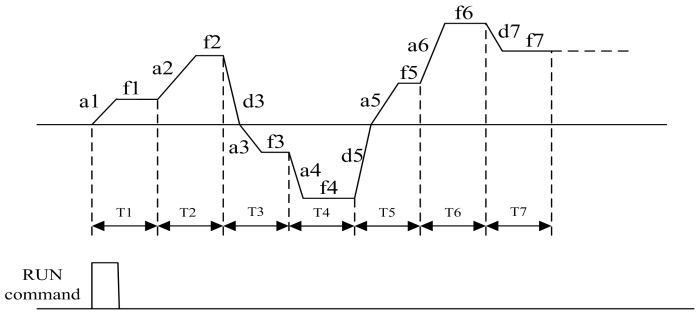


Fig. 6-51 Hold Method after PLC Single Cycle

3: Continuous cycle

As shown in Fig. 6-52, the inverter will start the next cycle automatically after completing one cycle, till a shutdown command is sent.

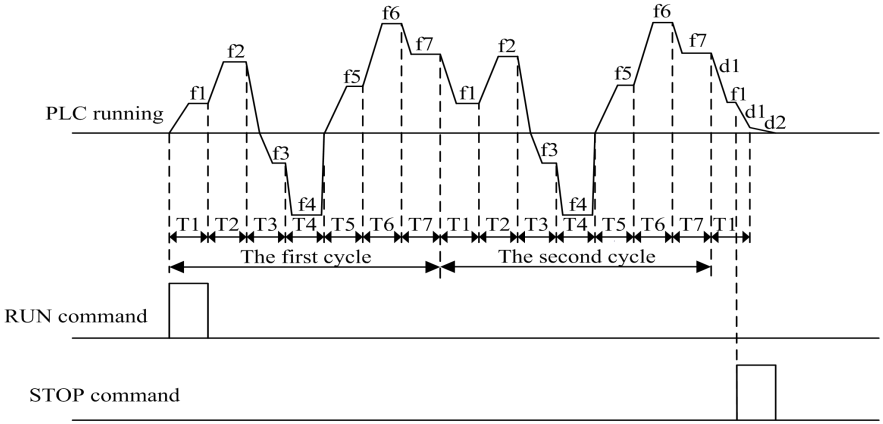


Fig. 6-52 PLC Continuous Cycle Method

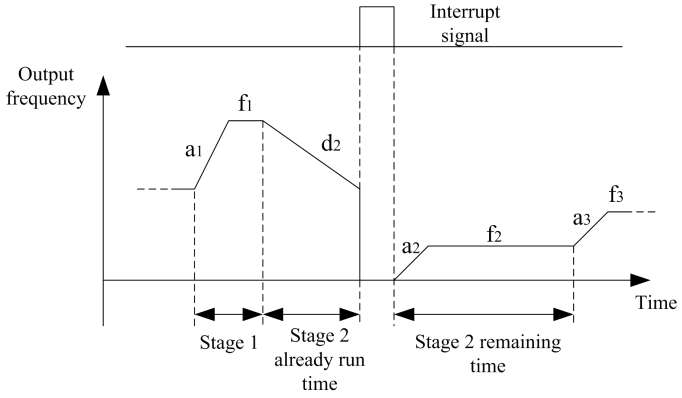
Decade: PLC interruption running restart method selection

0: Start running from the first segment

For running shutdown (caused by shutdown command, fault or power off), it will start running from the first segment after restart.

1: Continue running from the stage frequency at the interrupt moment.

For running shutdown (caused by shutdown command or fault), the inverter will record the run time of the current stage automatically, and enter this stage automatically after restart, while continue the running for remaining time at the frequency defined by this stage, as shown in Fig. 6-53.



a1: Stage 1 Accelerating Time a2: Stage 2 Accelerating Time

a3: Stage 3 Accelerating Time d2: Stage 2 Decelerating Time

f1: Stage 1 Frequency f2: Stage 2 Frequency

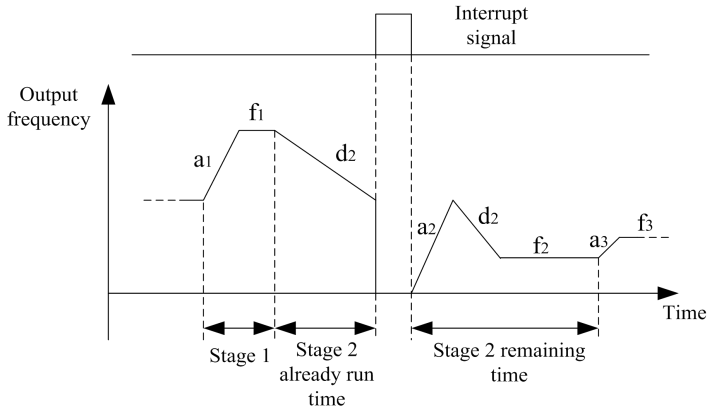
f3: Stage 3 Frequency

Fig. 6-53 PLC Start Method 1

2: Continue running at the running frequency from the interrupt moment

For running shutdown (caused by shutdown command or fault), the inverter does not only record the run time of the current stage, but the running frequency at the shutdown moment, while it will restore to the running frequency at shutdown first after restart, and then continue the running of remaining stage, as shown in Fig. 6-54.

Note: The difference between method 1 and 2 lies in that method 2 has one more running frequency at shutdown than method 1, and it will continue running from this frequency after restart.



a1: Stage 1 Accelerating Time a2: Stage 2 Accelerating Time

a3: Stage 3 Accelerating Time d2: Stage 2 Decelerating time

f1: Stage 1 Frequency f2: Stage 2 Frequency

f3: Stage 3 Frequency

Fig. 6-54 PLC Start Method 2

Hundreds place: PLC state parameter storage selection during power off

0: Do not store.

Do not memorize PLC running state during power off, and restart from the first segment after power on.

1: Storage

Memorize PLC running state during power off, including power off moment stage, running frequency and run time. After power on, run according to PLC interrupt running restart method defined by decade.

Kilobit: Stage time unit selection

0: Second

1: Minute

This unit is only valid for time definition during PLC running stage, and unit selection for accelerating and decelerating time during PLC running period should be determined by FC.09.

F9.01	Multi-band frequency 1	Lower limit frequency～upper limit frequency	5.00Hz
F9.02	Multi-band frequency 2	Lower limit frequency～upper limit frequency	10.00Hz
F9.03	Multi-band frequency 3	Lower limit frequency～upper limit frequency	20.00Hz

F9.04	Multi-band frequency 4	Lower limit frequency～upper limit frequency	30.00Hz
F9.05	Multi-band frequency 5	Lower limit frequency～upper limit frequency	40.00Hz
F9.06	Multi-band frequency 6	Lower limit frequency～upper limit frequency	45.00Hz
F9.07	Multi-band frequency 7	Lower limit frequency～upper limit frequency	50.00Hz
F9.08	Stage 1 setting	000～323	000
F9.09	Stage 1 running time	0～6500s (min)	20.0s
F9.10	Stage 2 setting	000～323	000
F9.11	Stage 2 running time	0～6500s (min)	20.0s
F9.12	Stage 3 setting	000～323	000
F9.13	Stage 3 running time	0～6500s (min)	20.0s
F9.14	Stage 4 setting	000～323	000
F9.15	Stage 4 running time	0～6500s (min)	20.0s
F9.16	Stage 5 setting	000～323	000
F9.17	Stage 5 running time	0～6500s (min)	20.0s
F9.18	Stage 6 setting	000～323	000
F9.19	Stage 6 running time	0～6500s (min)	20.0s
F9.20	Stage 7 setting	000～323	000
F9.21	Stage 7 running time	0～6500s (min)	20.0s

F9.08, F9.10, F9.12, F9.14, F9.16, F9.18 and F9.20 are used to configure running frequency, direction, accelerating and decelerating time during all PLC stages, which are selected by bit.7 stages of PLC could be set to MS or closed-loop given, which correspond to all stages of MS or closed-loop settings, as shown in Fig. 6-55.

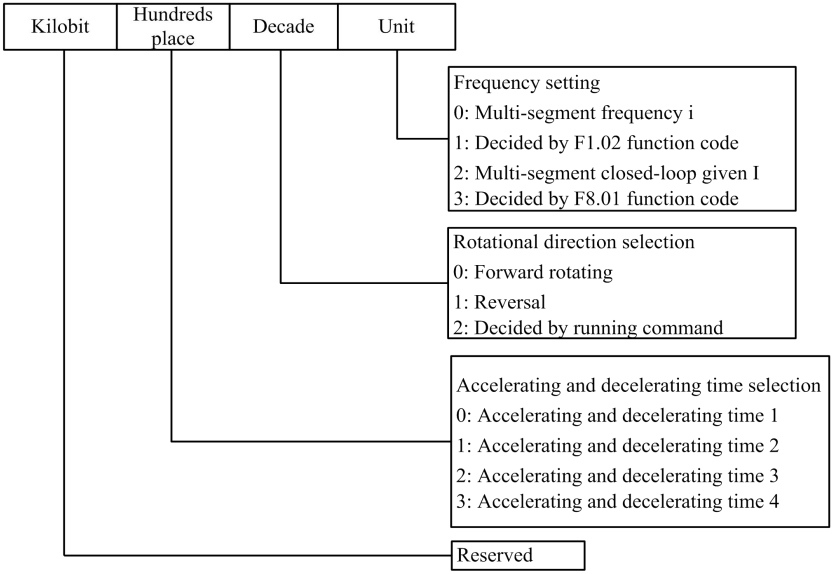


Fig. 6-55 PLC Stage i Setting (i=1～7)

The unit of stage i setting:

0: Select multi-band frequency i, for example: When i=3, the frequency of stage 3 is multi-band frequency 3, and see F9.01 for the definition related to multi-band frequency.

1: The frequency is decided by F1.02 function code.

2: Multi-segment closed-loop given i, for example: When i=2, the frequency of stage 2 is multi-segment closed-loop given 2, and see F8.20 ～ F8.26 for definition related to multi-segment closed-loop given.

3: It is decided by F8.01 function code.

PLC could realize closed-loop running during a certain stage, and closed-loop given channel could be: Multi-segment closed-loop given i could be decided by F8.01 function code; feedback channel could be decided by F8.02.When the given channel is decided by F8.01 function code, via multi-segment closed-loop given selection terminal, the closed-loop given channel could be shifted to the given value of multi-segment closed-loop. Please refer to detailed description in function code F6.00～F6.07 and F8.20～F8.26.

Note: When the running direction during PLC stage is determined by running command, motor rotational direction could be modified by an external command in a real-time manner. For example: Users could use DIx (FWD)-COM to realize forward rotating, and use DIx (REV)-COM to realize reversal. The rotational direction is the determined direction for running command; if the direction cannot be determined, it will carry on the rotational direction of the previous segment.

6.11 Group FA Protection Function Parameters

FA.00	Motor overload protection method selection	0～2	1

0: No action

There's no motor overload protection (use with cautions), in this case, the inverter has no overload protection on the motor;

1: Normal motor (with low-speed compensation)

For heat dissipation effect of normal motor under low speed condition will become worse, corresponding electronic heat protection value should also be adjusted properly, and the low speed compensation feature herein is to decrease the overload protection threshold of motors with a running frequency below 30Hz.

2: Variable frequency motor (without low-speed compensation)

For the heat dissipation of motors specially used for variable frequency would not be impacted by heat dissipation, it is not required to carry out protection value adjustment during low speed running.

FA.01	Motor overload protection coefficient	20.0～110.0%	110.0%

In order to implement valid overload protection on motors of different models, it is necessary to adjust the max. value of the output current allowed by the inverter. As shown in Fig. 6-56.

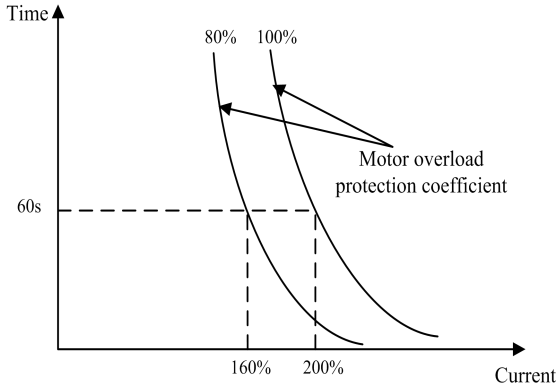


Fig. 6-56 Motor Overload Protection Coefficient Setting

This adjustment value could be determined by the following formula:

$$\text{Motor overload protection coefficient value}=\frac{\text{Allowed max. load current}}{\text{Inverter rated output current}}\times 100\%$$

Generally, it is defined that the max. load current should be the rated currency of the load motor.

Note: When the rated currency value of the load motor does not match the rated currency of the inverter, overload protection on the motor could be realized by setting the value of FA.00 ~ FA.01.

FA.02～ FA.03	Reserved	-	-
FA.04	Overvoltage stall selection	0～1	1
FA.05	Stall overvoltage point	120～150%	140.0%

0: Prohibited

1: Allowed

During decelerating running of the inverter, for the impact of load inertia, the actual decreasing rate of the motor rotational speed may be lower than that of the output frequency, in this case, the motor will feed back electric energy to the inverter, causing inverter DC bus voltage to rise, if no action is taken, overvoltage trip will occur.

During decelerating running of the inverter, the overvoltage stall protection function is compared to the stall overvoltage point defined by FA.05 (relative to the standard bus voltage) via detecting bus voltage, if the stall overvoltage point is exceeded, the inverter's output frequency will stop decreasing, when the bus voltage is detected to be under the stall overvoltage point again, decelerating running will be implemented again, as shown in Fig. 6-57.

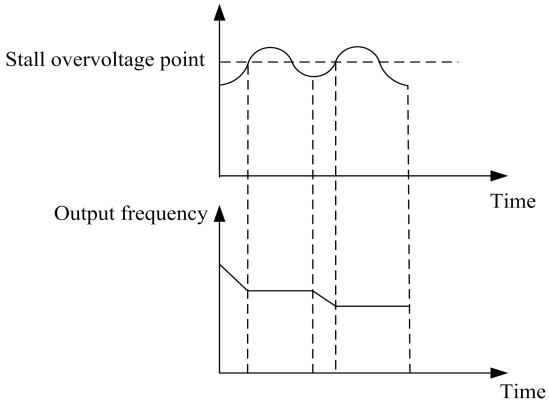


Fig. 6-57 Overvoltage Stall Function

Note:

1. When the overvoltage stall state is maintained for above 1 minute, inverter fault alarm E015 will occur.

2. When the stall point is set relatively low, users are suggested to lengthen the decelerating time to a proper extent.

FA.06	Automatic current limiting level	20.0～200.0%	Model confirmation
FA.07	Automatic current limiting action selection	0～1	1
FA.08	Frequency decreasing rate during current limiting	0.00～99.99Hz/s	10.00Hz/s

The automatic current limiting function is to set its automatic current limiting level (FA.06) automatically, via real-time control on load current, to prevent any fault trip caused by current overshoot, for load occasions with relatively large inertia or tremendous change, this function is applicable very well.

Automatic current limiting level (FA.06) defines the current threshold for automatic current limiting action, and its set range is the percentage relative to the rated currency of the inverter. Factory value of model G inverter is 150%, and factory value of model P inverter is 110%.

Frequency decreasing rate during current limiting (FA.07) defines the adjusting rate for output frequency during automatic current limiting action.

If frequency decreasing rate FA.07 is too small during automatic current limiting action, the automatic current limiting state will not be easy to eliminate, which may cause overload fault finally; if the decreasing rate FA.07 is too large, frequency adjusting degree will intensify, and the inverter may be under generating state for a long time, which may cause overload protection.

The automatic current limiting function will be valid under accelerating and decelerating state, and whether the automatic current limiting function is valid during constant speed running should be decided by the automatic current limiting action selection (FA.08).

If FA.08 = 0, it indicates automatic current limiting is invalid during constant speed running;

If FA.08 = 1, it indicates automatic current limiting is valid during constant speed running.

During automatic current limiting action, the output frequency may change, so for occasions requiring a relatively stable output frequency during constant speed running, it is not suitable to use the automatic current limiting function.

When the automatic current limiting is valid, for relatively low setting of the current limiting level, it may impact the inverter's overload capacity.

FA.09	Automatic reset frequency	0～10	0
FA.10	Automatic reset interval	2.0～20.0s	5.0s

The fault automatic reset function could carry out automatic reset on faults during running according to the set frequency and interval. When the automatic reset frequency is set to 0, it indicates automatic reset is prohibited, and fault protection should be carried out immediately.

Note: The inverter module protection (E010), and the external device fault (E015) have no automatic reset function.

During reset interval, output is locked to run at zero frequency, and rotational speed tracking start will run automatically after automatic reset is completed.

Use the fault automatic reset function with cautions, otherwise, it may cause human injuries or property losses.

FA.11	Overload pre-alarm detection selection	000～111	000
FA.12	Overload pre-alarm detection level	20～200%	130.0%
FA.13	Overload pre-alarm detection time	0.0～60.0s	5.0s

The inverter has inverter overload and motor overload protection function, for inverter overload protection, see Chapter II Table 2.1, and for motor overload protection, see FA.00 and FA.01.FA11～FA.13 realizes the monitoring on overload situation before any action of overload protection function.

Overload pre-alarm detection selection (FA.11) defines relative values of overload pre-alarm detection selection, alarm action selection and detection level.

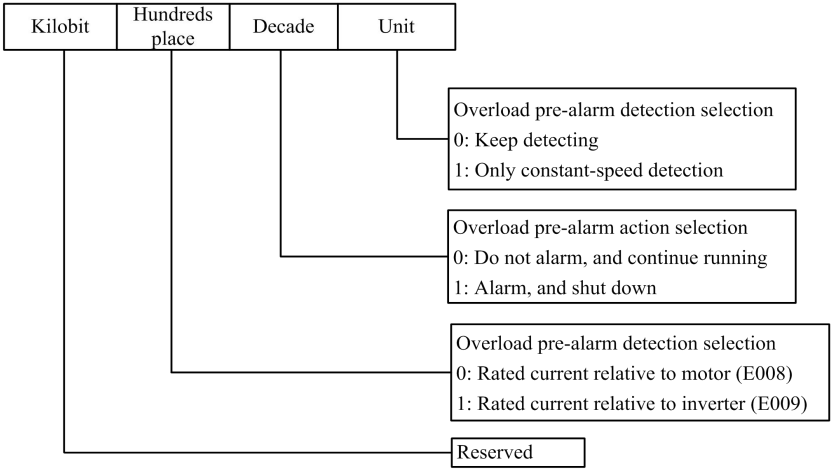


Fig. 6-58 Overload Detection Settings

The unit: Overload pre-alarm detection selection

0: During the running period of the inverter, the overload detection keeps operating.

1: Only when the inverter is running at a constant speed, overload detection will operate.

Decade: Overload pre-alarm action selection

0: When overload detection is valid, it will not alarm and continue running.

1: When overload detection is valid, it will alarm and shut down.

Hundreds place: Overload pre-alarm detection selection

0: The detection level is relative to the motor's rated currency (fault code E008 during an alarm).

1: The detection level is relative to the inverter's rated currency (fault code E009 during an alarm).

The overload pre-alarm detection level (FA.12) defines the current threshold of overload pre-alarm action, and its set value is the percentage relative to the rated currency (see FA.11).

The overload pre-alarm detection time (FA.13) defines when the inverter's output current keeps above the overload detection level (FA.12) for a certain time, it will output an overload pre-alarm signal.

If the overload pre-alarm state is valid, the inverter's working current will exceed the overload detection level and the hold time will exceed the overload detection time.

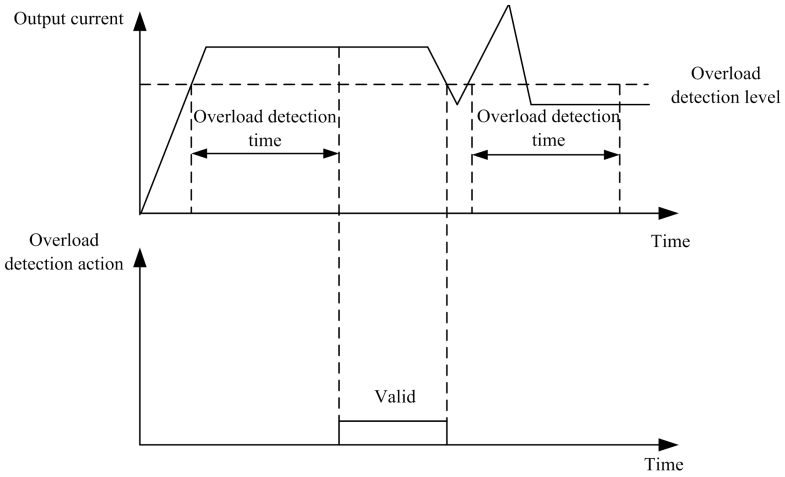


Fig. 6-59 Overload Pre-alarm Detection Function Diagram

Note:

1. Generally, the settings of the overload pre-alarm detection level should be lower than the overload protection level.

2. Within the overload pre-alarm detection time, after the working current is lower than the overload pre-alarm detection level, the overload pre-alarm detection time inside the machine will restart counting.

FA.14	Protection action selection 1	0000～3211	0000
FA.15	Protection action selection 2	000～113	000

The inverter could shield fault alarm and shutdown via setting the protection action selection (FA.14 and FA.15) under certain abnormal state, to maintain running.

FA.14 defines undervoltage state, automatic reset interval, and protection action selection during fault locking.

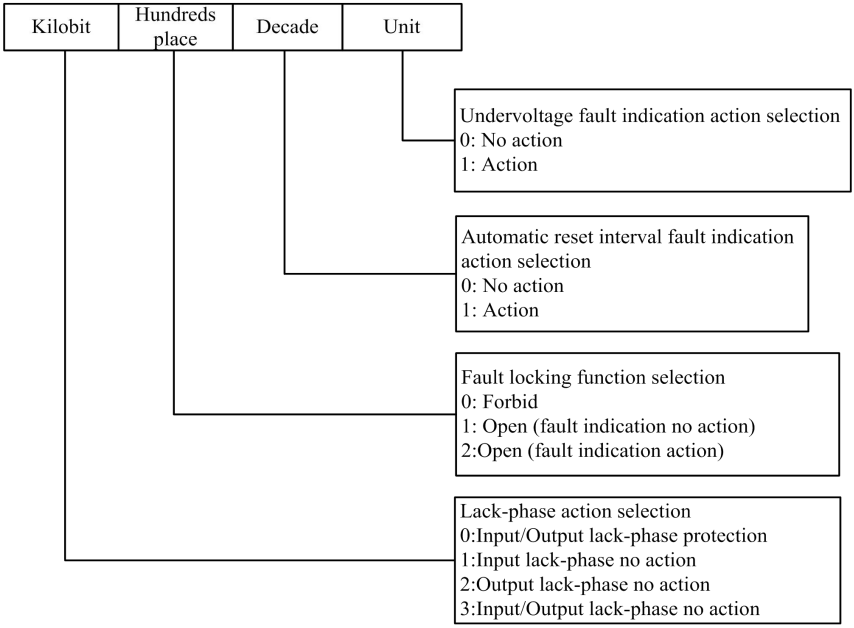


Fig. 6-60 Protection Action Selection 2 Settings

FA.15 defines the protection selection during communication abnormality, contactor abnormality and EEPROM abnormality.

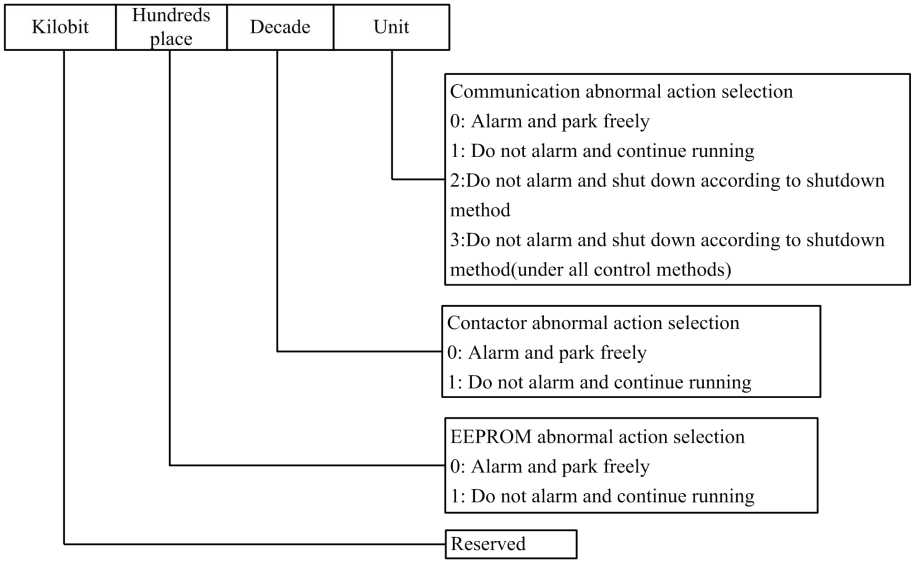


Fig. 6-61 Protection Action Selection 1 Settings

Note: Please select the protection action selection function with cautions, and make sure to select correctly after the fault reasons are confirmed, otherwise it may enlarge accident range, causing human injuries and property losses.

6.12 Group Fb Serial Communication Parameters

Fb.00	Local communication address	0～247	1

During serial port communication, this function code is used to identify the address of this inverter.

Note: 0 is the broadcast address, when set to a broadcast address, it could only receive and execute broadcast commands of the upper computer, rather than respond to the upper computer.

Fb.01	Communication configuration	0～155	003

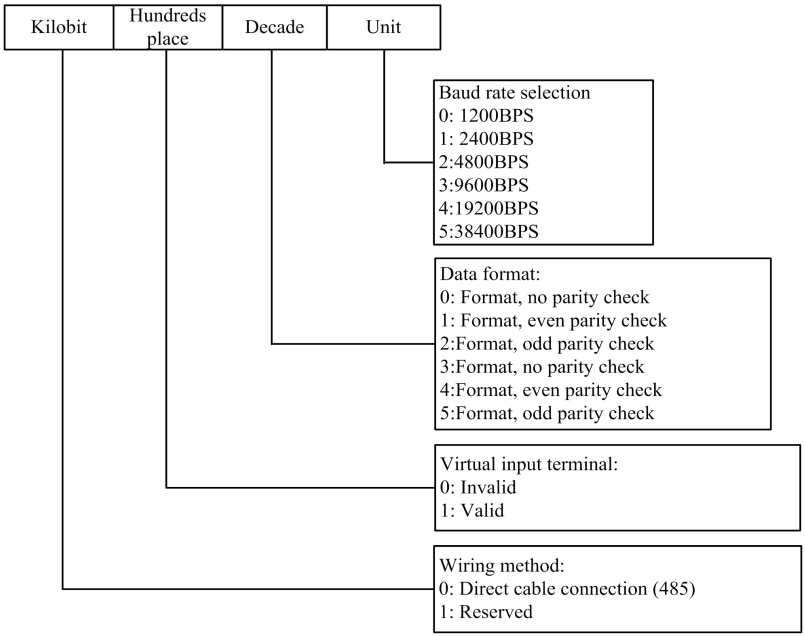


Fig. 6-62 Communication Configuration Settings

This function code is set according to LED bit, and is used to select parameters for serial communication ports.

Virtual terminals simulate actual terminals via instructions sent by the upper computer, and each bit in the running data represents one terminal respectively, while the value of each bit represents corresponding terminal state: BIT0～12: Virtual terminals DI1～DI8, DO1, DO2 and TC. When virtual terminals of the upper computer are valid, the function of actual terminals will be invalid either, and the application of virtual terminals is equal to that of actual terminals.

Fb.02	Reserved	-	-
Fb.03	Local response delay	0～1000ms	5ms

Local response delay refers to the delay time required from the inverter's serial port receiving, explaining and executing a command sent by the upper computer, till returning a response frame to the upper computer, while this function code is used to set this delay. For RTU mode, the actual response delay should not be less than transmission time for 3.5 characters.

Fb.04	Communication overtime detection time	0.0～1000s	0.0s

The time for communication overtime fault is set to 0, and this function is invalid. If the time interval between two communications exceeds the communication overtime fault time, system will report a communication error (E016), and communication situation could also be monitored.

Fb.05～ Fb.11	Reserved	-	-

6.13 Group FC High-level Function Parameters

FC.00	Energy consumption braking selection	0～1	0

0: Prohibited

1: Allowed

Note: Please make sure to set this function parameter correctly according to actual use. Otherwise it will impact control characteristics.

FC.01	Braking use ratio	0.0～100%	2.0%

It is valid for models built in the braking unit.

It is used to adjust the duty ratio of the braking unit, if the braking use ratio is high, the braking unit action will has a high duty ratio, and the braking effect will be strong, however, the inverter's bus voltage will be subject to a large fluctuation during braking.

Note: Settings of this function should consider the braking resistance's value and power.

FC.02	AVR function	0～2	2

0: No action

1: Keep acting.

2: No action only during decelerating.

AVR is automatic voltage regulation.

When the input voltage deflects from the rated value, the output voltage could be kept constant via this function, so generally AVR should act, especially when the input voltage is higher than the rated value.

During decelerating parking, if AVR is selected to have no action, decelerating time will be short, but the running current will be a bit large; if AVR is selected to keep acting, the motor will decelerate stably, and the running current will be relatively small, but the decelerating time will become longer.

FC.03	Automatic energy-saving running	0～1	0

0: No action

1: Action

During no load or light load running of the motor, adjust the output voltage properly via detecting the load current, to reach the goal of energy saving.

Note: Especially this function is valid for loads of fan and pump etc.

FC.04	Slip compensation gain	0.0～300.0%	100.0%

FC.05	Slip compensation limit	0.0～250.0%	200.0%
FC.06	Compensation time coefficient	0.1～25.0s	2.0s

The change of motor load torque will impact the motor's running slip, and cause speed change of the motor. By slip compensation, adjust the inverter's output frequency according to the motor's load torque automatically, to reduce the change in rotational speed caused by motor's changing with the load, as shown in Fig. 6-63.

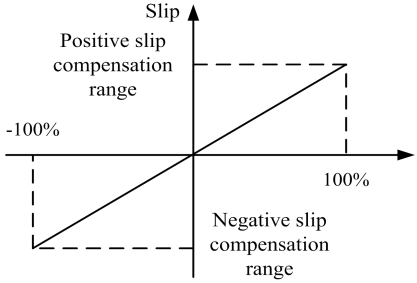


Fig. 6-63 Automatic Slip Compensation

Motor state: When the actual rotational speed is lower than the given speed, improve compensation gain gradually (FC.04).

Power state: When the actual rotational speed is higher than the given speed, improve compensation gain gradually (FC.04).

The adjustment range for slip compensation is slip compensation limit (FC.05) × rated slip (F3.08).

Note: The automatic slip compensation is related with the motor's rated slip, when the slip compensation function is used, it is required to set the motor's rated slip correctly (F3.08).

FC.07	Motor tone adjusting	0～10	0

Adjust this function parameter, to change the tone during the motor is running, which is only valid for carrier frequency (F1.25) settings below 6K.

If set to 0, it indicates there's no tone adjusting.

FC.08	Cooling fan control	0～2	0

0: Automatic stop method

The fan keeps rotating when the inverter is running, after 3 minutes of shutdown, it will start internal temperature detection procedure automatically, and decide rotating or not of the fan according to module temperature.

1: The fan keeps rotating during power on.

The fan keeps rotating after the inverter is powered on.

2: The fan runs when the temperature is higher than 45℃ under running state, and the fan stops when the temperature is lower than 40℃.

FC.09	Accelerating and decelerating time unit	0～1	0

This function determines the time unit for accelerating and decelerating.

0: Second

1: Minute

This function is valid for all accelerating and decelerating processes beyond jogging.

The longest accelerating and decelerating time could be set to 60 hours, which is applicable for occasions requiring long accelerating and decelerating.

Note: It is suggested to select second as time unit as possible as you can.

FC.10	Droop control	0.00～10.00Hz	0.00Hz

This function is applicable for occasions when one load is driven by multiple inverters, by setting this function, even distribution of power could be reached when one load is driven by multiple inverters. For example, the transmission device as shown in Fig. 6-64 (conveyors of 5 motors are driven by 5 inverters).

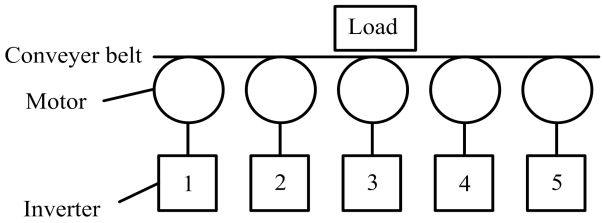


Fig. 6-64 Droop Control Diagram

When the load of a certain inverter is relatively heavy, this inverter will reduce output frequency automatically according to parameters set by this function, to unload part of load. This value could be adjusted from low to high during debugging. The relationship between load and output frequency is shown in Fig. 6-65:

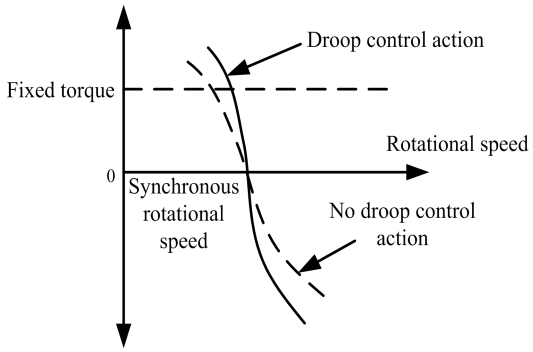


Fig. 6-65 Droop Control Motor Characteristics

FC.11	Over Modulation Enable	0～1	0

Under long-term low power grid voltage (below 85% rated voltage), and long-term heavy load working, the inverter improves the output voltage, via improving the utilization of its own bus voltage. This function decides whether to enable the over modulation function.

0: Invalid, do not enable the modulation function.

1: Valid, enable the modulation function.

Note: When the over modulation function is enabled, the output current harmonic wave will increase a bit.

FC.12	Zero frequency running threshold	0.00～550.0Hz	0.00Hz
FC.13	Zero frequency return difference	0.00～550.0Hz	0.00Hz

These two function codes are used to set the control function of zero frequency return difference.

Taking analog AI2 given channel as an example, as shown in Fig. 6-66:

Start process:

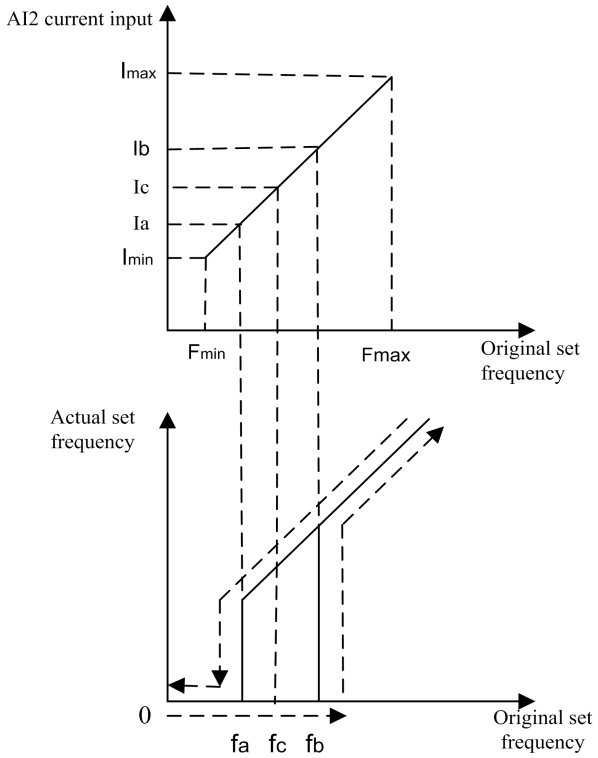
After a running command is sent, only when analog AI2 input reaches or exceeds a certain value Ib, and its corresponding set frequency reaches fb, the motor will start, and will accelerate to the frequency corresponding to analog AI2 input according to accelerating time.

Shutdown process:

During running, when AI2 reduces to Ib, the inverter will not shut down immediately, only when AI2 continues to reduce to Ia, and the corresponding set frequency is fa, the inverter will stop outputting.

Here fa is defined as the zero frequency running threshold, which is defined by FC.12, and the value of fb-fa is defined as zero frequency return difference, which is defined by function code FC.13.

By using this function, sleep function could be achieved, to realize energy saving, while avoiding frequent start of the inverter at threshold frequency via the width of return difference.



f_a: Zero frequency running threshold f_b: f_a+Zero frequency return difference

f_c: Frequency corresponding to AI2 input Ic

Fig. 6-66 Zero Frequency Return Difference Running

FC.14	Set length	0.000～65.535km	0.000km
FC.15	Actual length	0.000～65.535km	0.000km
FC.16	Length ratio	0.001～30.000	1.000
FC.17	Length calibrating coefficient	0.001～1.000	1.000

FC.18	Circumference of measuring axis	0.01～100.00cm	10.00cm
FC.19	Pulse per revolution of axis	1～9999	1

This function is used to realize fixed length shutdown function.

The inverter inputs count pulses from terminals (DI7 or DI8 is defined as function 44), and obtains calculation length according to pluses per revolution of the speed measuring axis (FC.19) and axis circumference (FC.18).

Calculation length = Count pulses ÷ pluses per revolution × circumference of measuring axis

Meanwhile, the calculation length is corrected via length ratio (FC.16) and length calibrating coefficient (FC.17), to obtain actual length.

Actual length＝Calculation length×Length ratio÷Length calibrating coefficient

When actual length (FC.15) ≥ set length (FC.14), the inverter will send a shutdown instruction to shut down automatically. Before restart, it is required to clear actual length (FC.15) or modify actual length (FC.15) < set length (FC.14), otherwise, it will be unable to start.

Note: Multifunction input terminal could be used to clear actual length (DIi is defined as function 39), while normal counting and actual length calculating could be done only after this terminal is disconnected.

Actual length FC.15, will store automatically during power off. When set length FC.14 is 0, the fixed length shutdown function is invalid, but the length calculation is still valid.

FC.20	Instant nonstop function selection	0～1	0
FC.21	Frequency decrease ratio during voltage compensation	0.00～99.99Hz/s	10.00Hz /s

The instant nonstop function is used to define whether the inverter will carry out low voltage compensation during voltage decrease or instant undervoltage. Reduce output frequency properly, and feed back energy via load, to maintain the inverter running without tripping.

FC.20 set to 0, no action

FC.20 set to 1, act, carry out low voltage compensation.

When frequency decrease ratio during voltage compensation FC.21 is set too large, the load instant feedback energy will be very large either, which may cause overvoltage protection; when FC.21 is set too small, the load feedback energy will be very small, which could not make low voltage compensation. During adjusting, please make reasonable selection according to load inertia and load weight.

Note: This function is valid only for 15kW and below.

FC.22	Restart after shutdown function selection	0～1	0
FC.23	Restart after shutdown wait time	0.0～10.0s	0.5s

This function realizes whether the inverter would start running and the wait time before automatic running, under different running command channels, during restart after the inverter is powered off.

When FC.22 is set to 0, the inverter will not run automatically when power on after power off.

When is set to 1, when power on after power off, it starting conditions are met, the inverter will run automatically after wait for a period time defined by FC.23.

This function code's settings, running state during power off, and control command state during power on, jointly decide whether the inverter will run automatically after power on. See Table 6-14.

Table 6-14 Start Conditions for Restart after Power off

FC.22 Setting	State before Power off	Operation Panel	Serial Port	Terminal Three-line 1 and 2, Two-line 1	Terminal Two-line 2	
		Running command during power on: No				Yes
0	Shutdown	0	0	0	0	0
	Run	0	0	0	0	0
1	Shutdown	0	0	0	0	1
	Run	1	1	1	0	1

Note: Actions of the inverter after power on, under various combination conditions are shown in Table 6-14, 0: Enter standby state; 1: Start running automatically. When start-stop is controlled by operation panel, serial port, terminal three-line 1 and 2, it is a pulse command method, while there's no running command at power on. Shutdown will take the priority if there's any shutdown command.

When restart after power on is valid, if power off is not complete during running, and power on again (during inverter LED display "P.OFF" process), it will start according to rotational speed tracking method automatically during restart; if power on again after complete power off (which means LED on operation panel turns off completely), it will restart according to settings of start method F2.00.

FC.24	Running command channel binding frequency given channel	000～777	000

This function defines three kinds of running command channels and six binding

combinations among frequency given channels, to realize synchronous shifting conveniently.

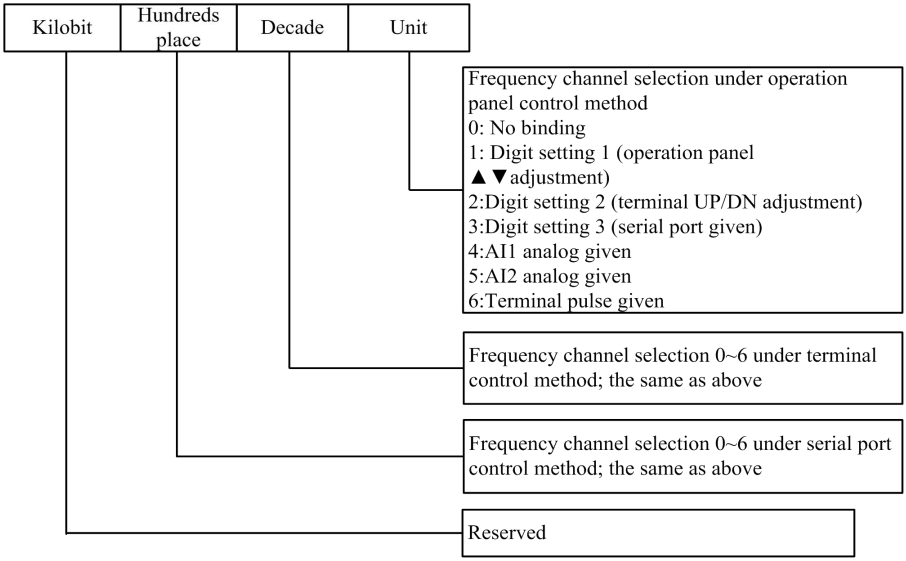


Fig. 6-68 Running Command Channel Binding Frequency Given Channel

Significance of the above frequency given channel is the same with that of frequency setting method F1.02, please refer to description in Section 5.1.

Different running command channels could bind given channels of the same frequency.

Online synchronous shifting after binding could be realized via the following methods:

Method 1: Modify function code “Running command channel selection F1.01”;

Method 2: Use M-F and ENT keys;

Method 3: Use the combination of running command channel selection terminals (terminal function needs to be defined, and DI1～DI8 are set to 28 and 29).

For example:

In order to carry out dual control, it is required that:

① The shifting of running command channel: Remote could adopt terminal shifting, while local could adopt M-F key for shifting.

② Local could use operation panel for control, press RUN key to run, and press STOP to shut down, while use ▲ and ▼ to adjust set frequency.

③ Remote could use external terminals for control, close is defined as forward rotating running of FWD, close is defined as reversal running of REV, while set frequency could be adjusted by AI1.

④ After power on, terminal control method could be used.

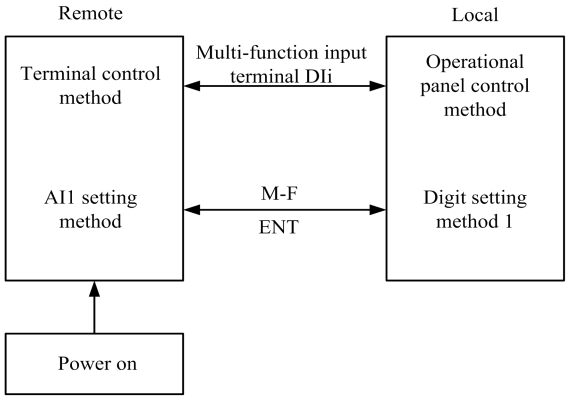


Fig. 6-69 Dual Control Demand

To reach the above purpose, it is required to carry out the following settings:

F1.01=1, it is set to terminal control method, and remote control is realized after power on;

F6.00=28, F6.01=29, set multifunction input terminal DI1 and DI2 to running command channel selection;

F6.09=0, set to two-line control mode 1, when FWD is valid, it is forward rotating, when REV is valid, it is reversal;

FC.31=020, set M-F key to valid;

FC.24=041, set terminal control method to bind AI1 analog given, and operation panel control method to bind digit setting 1.

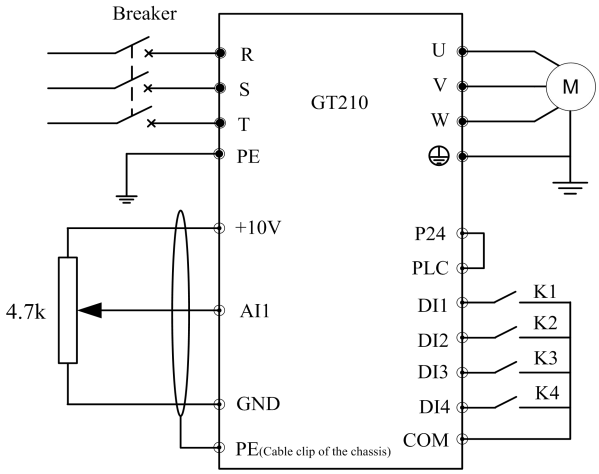


Fig. 6-70 Dual Control Hardware Wiring Diagram

Note: Factory setting is 000: No frequency given channel synchronous shifting.

FC.25	Auxiliary given channel	0～13	0
FC.26	Analog auxiliary given coefficient	0.00～9.99	1.00
FC.27	Digit auxiliary frequency initial value	0.00～550.0Hz	0.00Hz
FC.28	Digit auxiliary frequency control	000～111	000

The inverter's set frequency could be combined by the primary given frequency and auxiliary given frequency, while FC.25～FC.28 is used to define auxiliary frequency given channels. Fig. 6-71 is the process for set frequency formed after proportional adjustment on the primary given frequency and auxiliary given frequency.

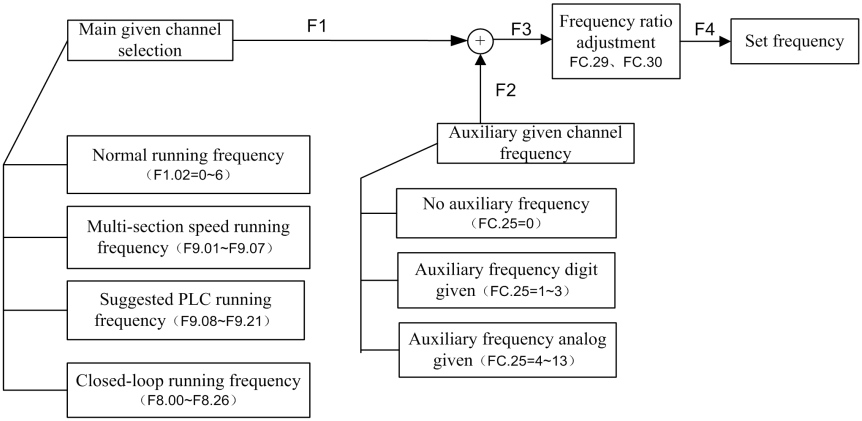


Fig. 6-71 Given Frequency Combination Diagram

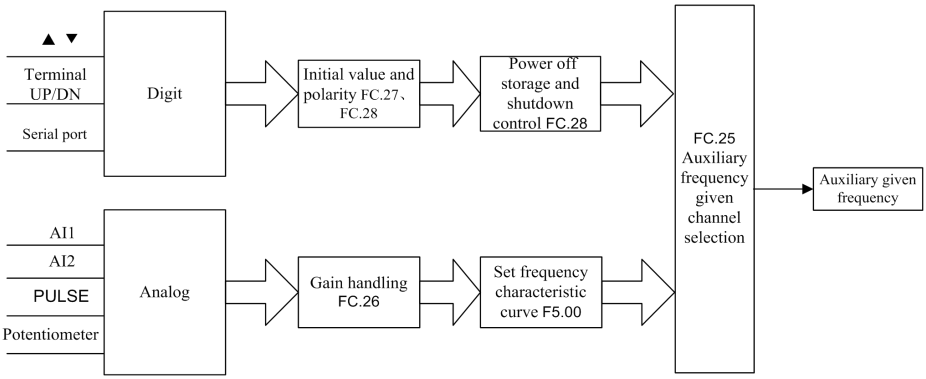


Fig. 6-72 Auxiliary Frequency Given Channel Diagram

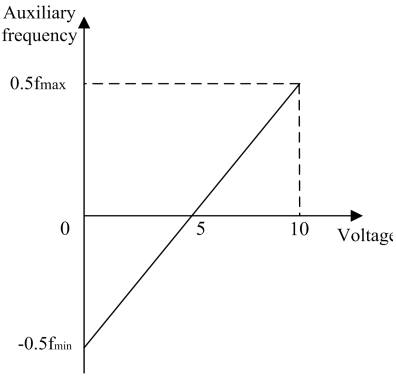
The control on auxiliary frequency is defined by FC.25～FC.28, and FC.25 defines the auxiliary frequency given channel.

Table 6-15 Auxiliary Frequency Given Channel Selection

Channel	Channel Name	Description
0	No auxiliary frequency channel	Auxiliary frequency channel is zero.
1	Set digit to 1, and operate ▲ and ▼ to adjust.	It is given by FC.27 directly, and set according to FC.28, and the modified frequency could be saved to FC.27 after power off.
2	Set digit to 2, and use terminal UP/DN to adjust.	
3	Set digit to 3, and serial port is given	
4	AI1 Analog Given	It is determined according to actual analog, and see F5.00 for frequency relationship characteristic curve.
5	AI2 Analog Given	
6	Terminal pulse given	
7	- AI1 Analog Given	
8	- AI2 Analog Given	
9	- Terminal pulse given	
10	AI1-5	
11	AI2-5	
12	PULSE-0.5×F5.03	
13	Potentiometer given	

When digit is set to 3, and serial port is given, upper computer modify auxiliary frequency via setting FC.27.

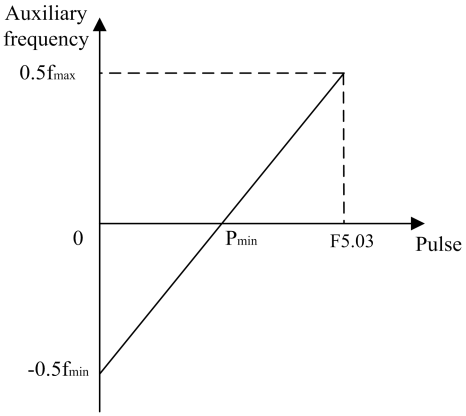
When AI1-5 or AI2-5 is selected as auxiliary frequency given channel, set 5V analog input as center point, 0～5V as negative adjustment, and 5～10V as positive adjustment. For example Fig. 6-73:



F_{max} – Frequency corresponding to the max. analog (F5.07 or F5.11)

Fig. 6-73 AI1-5 or AI2-5 as Auxiliary Frequency Given Channel

When PULSE-0.5×F5.03 is selected as auxiliary frequency given channel, taking 1/2 of F5.03 (max. pulse input frequency) as the center point, 0～0.5 times of the max. pulse frequency input as negative adjustment, and (0.5～1) times of the max. pulse frequency input as positive adjustment. For example Fig. 6-74:



Pmin - 1/2 *Max. Input Pulse Frequency (F5.03)
Fmax – Frequency corresponding to the max. analog (F5.07 or F5.11)

Fig. 6-84 PULSE-0.5×F5.03 as Auxiliary Frequency Given Channel

FC.26: Analog auxiliary given coefficient

It is valid only when FC.25=4～12, first carry out gain calculation using FC.26, and then carry out auxiliary frequency calculation according to frequency characteristic curve defined in F5.00.

FC.27: Digit auxiliary frequency initial value

It is valid only when FC.25=1～3, it is the initial value of the auxiliary frequency given under these three methods.

FC.28: Digit auxiliary frequency control

It is valid only when FC.25=1～3, as shown in Fig. 6-75.

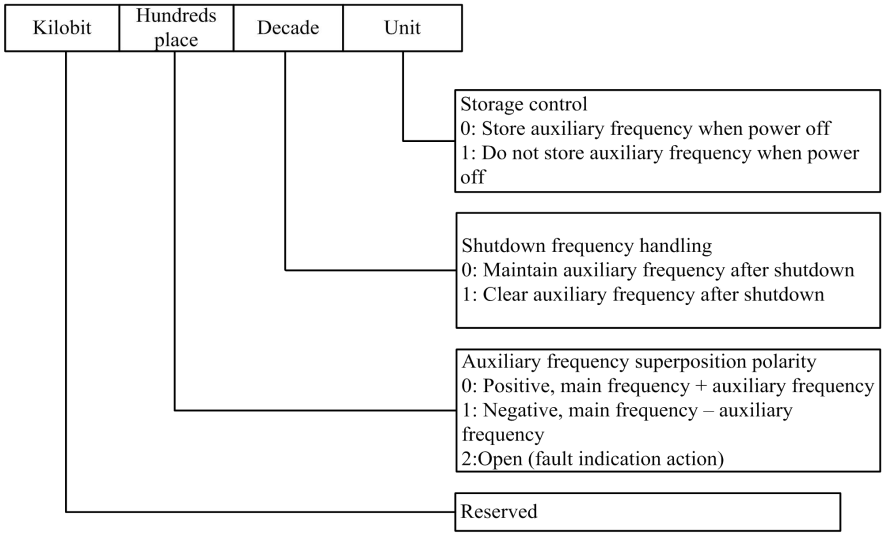


Fig. 6-75 Digit Auxiliary Frequency Control Settings

The unit: Power off storage selection

0: Power off storage auxiliary frequency

During power off, auxiliary frequency will store in FC.27, while auxiliary frequency superposition polarity is stored in FC.28.

1: Power off no storage auxiliary frequency

Power off no storage.

Decade: Shutdown frequency handling

0: Maintain auxiliary frequency after shutdown.

Maintain auxiliary frequency during shutdown.

1: Set frequency clear after shutdown.

Auxiliary frequency clear after shutdown.

Hundreds place: Frequency polarity

0: Positive polarity

The sum of primary frequency and auxiliary frequency is used as the set frequency.

1: Negative polarity

The difference of primary frequency and auxiliary frequency is used as the set frequency.

Note: When auxiliary given channel is the same with the frequency primary given channel, the auxiliary given channel is invalid.

FC.29	Set frequency proportional adjustment selection	0～2	0
FC.30	Set frequency proportional adjustment coefficient	0.0～200.0%	100.0%

This function confirms the adjustment method of set frequency (the combined frequency after the primary given frequency superposition with auxiliary given frequency).As shown in Fig. 6-71.

0: No action

Set frequency without adjusting the primary auxiliary given, which is F4=F3.

1: Relative to the max. output frequency F1.06 adjustment

Set Frequency F4=F3+F1.06×(FC.30-100%).

2: Relative to current frequency adjustment

Set Frequency F4=F3+F3×(FC.30-100%)=F3×FC.30.

FC.31	Operation panel key function and locking selection	000～422	000

This function defines M-F, STOP/RESET and operational panel locking functions etc. on the operation panel.

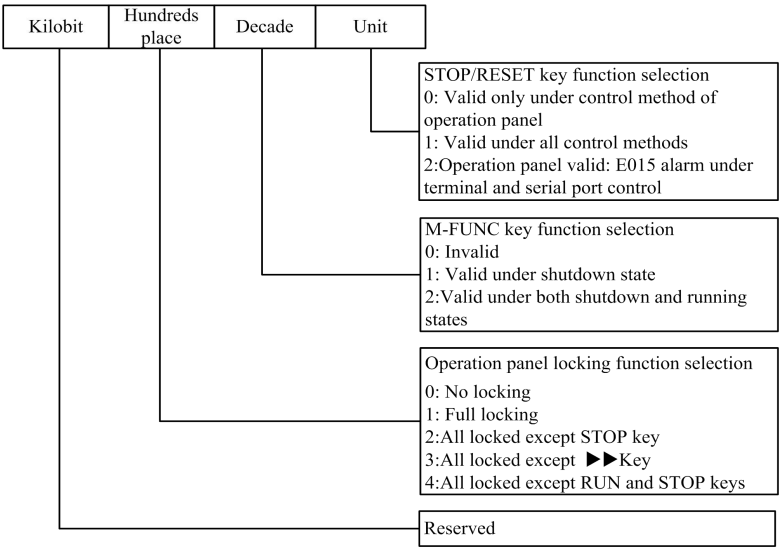


Fig. 6-76 Operation Panel Key Function and Locking Selection Setting

The unit: STOP/RESET key function selection

This is used to set the acting range and working method when key STOP/RESET on the operation panel is used as shutdown key STOP/RESET.

0: It is valid only on running command channel of the operation panel.

1: It is valid on operation panel, terminal, and serial port running command channel. Press this button, the inverter will shut down according to shutdown method.

2: It is valid on operation panel, terminal, and serial port running command channel.

On running command channel of the operation panel, press this button, the inverter will shut down according to shutdown method; on terminal or serial port running command channel, press this button, the inverter will alarm (fault code: E015) and park freely.

When the STOP/RESET key is used as fault reset key STOP/RESET, it will be valid on various running command channels.

Decade: M-F key function selection

This is used set the function and function range of M-F key on operation panel.

0: When M-F key is invalid, this key could not be used to shift the running command channel.

1: The M-F key is valid only under shutdown state, and could not be used to shift running command channel during running.

2: The M-F key could be used to shift the running command channel under shutdown state and running state.

Running command channel shifting sequence:

Operation Panel Running Command Channel (M-F on)→ Terminal Running Command Channel (M-F off)→Serial Port Running Command Channel (M-F flash)→Operation Panel Running Command Channel (M-F on)

Note: After shifting to the required using key M-F, it is required to press the ENT key within 3 seconds to confirm before validation.

Hundreds place: Operation panel locking function

This is used to set the locking selection and range of keys on the operation panel.

0: No locking function, and any key on the operation panel has no locking.

1: Keys on the operation panel are all locked, and any key on the operation panel is invalid after the locking function validating.

2: Other keys except STOP/RESET are all locked. After the locking function validating, only STOP/RESET key could be used normally.

3: Other keys except ▶▶ are all locked. After the locking function validating, only ▶▶ key could be used normally.

4: Other keys except RUN and STOP/RESET are all locked. After the locking function validating, only RUN and STOP/RESET keys could be used normally.

When set according to needs, it is required to follow specific operation methods to validate locking, see description in Chapter IV. Similarly, see description in Chapter IV Section 4.7 for unlocking methods.

6.14 Group Fd Monitoring Parameters

Fd.00	Rectification Module Temperature	0.0～100.0℃	0℃
Fd.01	Inverter Module Temperature	0.0～100.0℃	0℃
Fd.02	Reserved	-	-
Fd.03	Running Time Accumulation	0～65.535kh	0

When the accumulated running time reaches the set time (Fd.02), the inverter could output indication signals, see function description in F6.11～F6.13.

Fd.02 indicates the accumulated running time of the inverter from leaving the factory to now.

Temperature display range: 0～100℃; accuracy: 5%

Fd.04	The 1st fault type	0～50	0
Fd.05	The 2nd fault type	0～50	0
Fd.06	The 3rd fault type (last time)	0～50	0

This series has twenty four abnormal warnings (see Table 7-1), and the latest three abnormal fault types are memorized (Fd.04 ～ Fd.06), and see Chapter VII for detailed instructions of protection warnings and troubleshooting solutions.

Fd.07	Bus voltage at the last fault	0～999V	0V
Fd.08	Output current at the last fault	0～999.9A	0.0A
Fd.09	Running frequency at the last fault	0.00～550.0Hz	0.00Hz

This group of parameters monitor the inverter's voltage, current and frequency at the last fault, for users to query.

Chapter 7 Fault Countermeasures and Abnormality Handling

7.1 Fault Phenomena and Countermeasures

When the inverter is abnormal, LED digit tube will display corresponding fault codes and its contents, the inverter will stop outputting, when a fault occurs, if the motor is rotating, it will park freely, till it stops rotating. Fault types of the inverter which may occur are shown in Table 7-1, when the inverter is fault, users should carry out examination according to this table first, and record fault phenomena in details, when technical services are required, please contact the After sale Dept. of our company directly, or contact dealers of the company.

Table 7-1 Fault Alarming Contents and Countermeasures

Fault Code	Fault Type	Possible Fault Reasons	Countermeasures
E001	Inverter accelerating running overcurrent	Accelerating time is too short	Lengthen accelerating time
		V/F curve is not suitable	Adjust V/F curve settings, adjust manual torque lifting, or correctly set motor parameters to guarantee normal torque lifting
		When instant stop occurs, restart is implemented for rotating motors.	The start method F2.00 is set to rotational speed tracking restart function
		Power grid voltage is too low	Check input power supply
		Inverter power is too low	Select the inverter of large power level.
E002	Inverter decelerating running overcurrent	Decelerating time is too short	Lengthen the decelerating time
		There's any potential energy load or load inertia torque is large.	External proper energy consumption braking parts.
		Inverter power is low	Select the inverter of large power level.
E003	Inverter constant-sped running overcurrent	Load changes in a sudden	Reduce sudden change in load
		Accelerating and decelerating time is set too short	Properly lengthen the accelerating and decelerating time
		Load abnormal	Carry out load check.
		Power grid voltage is low	Check input power supply
		Inverter power is low	Select the inverter of large power level
E004	The inverter	Input voltage abnormal	Check input power supply

Fault Code	Fault Type	Possible Fault Reasons	Countermeasures
	accelerating running overvoltage	Accelerating time is set too short	Properly lengthen the accelerating time
		When instant stop occurs, implement restart on all rotating motors.	Set start method F2.00 as the rotational speed tracking restart function.
E005	The inverter decelerating running overvoltage	Decelerating time is too short (relative to regenerated energy)	Lengthen the decelerating time
		There's potential load or load inertia torque is large.	Select proper energy consumption braking parts.
E006	inverter constant-speed running overvoltage	Input voltage abnormal	Check input power supply
		Accelerating and decelerating time is set too short.	Properly lengthen the accelerating and decelerating time
		Abnormal change occurred in input voltage.	Install input reactor.
		Load has large inertia.	Consider to adopt energy consumption braking parts.
E007	Reserved	-	-
E008	Motor overload	V/F curve not suitable	Correctly set V/F curve and torque lifting.
		Power grid voltage is too low.	Check power grid voltage
		General motor is under long-term low speed running with huge load.	Special motor could be selected for long-term low speed running.
		Motor overload protection coefficient is set incorrectly.	Correctly set the motor overload protection coefficient
		Motor blocked or sudden change in load is too large.	Check load.
E009	Inverter overload	Accelerating time is too short.	Lengthen the accelerating time
		DC braking amount is too large.	Decrease DC braking current, and lengthen braking time.
		V/F curve is not suitable	Adjust V/F curve and torque lifting
		When instant stop occurs, implement restart on all rotating motors.	Set start method F2.00 as the rotational speed tracking restart function.
		Power grid voltage is too low.	Check power grid voltage
		Load is too large	Select inverter of larger power
E010	Inverter module protection	Instant overcurrent of the inverter	See overcurrent countermeasures
		Output three-phase has interface short circuit Or grounding short circuit.	Re-wiring.
		Tunnel blocked or fan damaged.	Smoothen the tunnel or change the fan.
		Ambient temperature is too high.	Reduce ambient temperature.

Fault Code	Fault Type	Possible Fault Reasons	Countermeasures
		Control panel wiring or inserts are loose.	Check and connect again.
		Current waveform abnormal caused by reasons such as output phase fault etc.	Check wiring.
		Auxiliary power supply is damaged, and driving voltage is undervoltage.	Seek for services
		Inverter module shoot-through	Seek for services
		Control panel abnormal	Seek for services
E011	Phase fault on input side	Phase fault for input R, S and T	Check installation assembling line Check input voltage
E012	Phase fault on output side	Phase fault for output U, V and W	Check output wiring Check motor and cable
E013	Inverter module radiator overheated	Ambient temperature is too high	Reduce ambient temperature
		Tunnel is blocked	Clean the tunnel
		Fan is damaged	Change the fan
		Inverter module is abnormal	Seek for services
E014	Rectification module radiator overheated	Ambient temperature is too high	Reduce ambient temperature
		Tunnel is blocked	Clean the tunnel
		Fan is damaged	Change the fan
E015	Emergency parking or external device fault	In non-operation panel mode, use emergency STOP/RESET key.	View function definition of STOP/RESET key in FC.31.
		Use the STOP/RESET key under stall situation.	View function definition of STOP/RESET key in FC.31.
		If the stall state maintains for 1 minute, it will report E015 automatically and shut down.	Correctly set FA.04 and FA.05.
		External fault emergency stop terminal closed	After handling external fault, external fault terminal will be disconnected.
E016	485 communication error	Baud rate setting improper	Set the baud rate properly.
		Serial port communication error	Press the STOP/RESET key to reset, and seek for services
		Fault alarming parameter setting improper	Modify the settings of Fb.04, Fb.03 and FA.15.
		Upper computer does not work	Check whether the upper computer works or not, and whether the wiring is correct or not.
E017	Current detection circuit fault	Control panel wiring or inserts are loose.	Check and connect again.

Fault Code	Fault Type	Possible Fault Reasons	Countermeasures
		Auxiliary power supply is damaged.	Seek for services
		Hall devices are damaged.	Seek for services
		Amplification circuit is abnormal.	Seek for services
E018	Automatic tuning unsound	Motor nameplate's parameter setting error	Correctly set parameters according to motor nameplate.
		Automatic tuning timeout	Check motor wiring.
E019	EEPROM read/write fault	R/W of control parameters is error.	STOP/RESET key reset Seek for services
E020	Reserved	-	-
E021	Reserved	-	-
E022	Reserved	-	-
E023	Operation panel parameters copy error	Operation panel parameters incomplete or operation panel version is inconsistent with the main control panel version.	Refresh operation panel data and version, use F0.03=1 to upload parameters first, and then use F0.03=2 or 3 to download.
		Operation panel EEPROM is damaged.	Seek for services
E024	System interference	Severe interference	Press STOP/RESET key to reset or add a power supply filter outside the power supply.
		Main control panel DSP R/W error.	Press the STOP/RESET key to reset, and seek for services.
E025	Control power supply overvoltage	Input voltage abnormal	Check input power supply or seek for services.
E026	Buffer circuit abnormal	Power grid voltage is too low.	Check power grid voltage
		Thruster is damaged	Change the major loop contactor, and seek for services.
		Power on buffer resistance is damaged	Change the buffer resistance, and seek for services.
		The control loop is damaged	Seek for services
		Input phase fault	Check input R, S and T wiring.

7.2 Operation Abnormalities and Countermeasures

The following abnormalities may occur during the usage, refer to Table 7-2 countermeasures to deal with:

Table 7-2 Operation Abnormalities and Countermeasures

Phenomena	Occurrence Conditions	Possible Reasons	Countermeasures
Operation panel does not respond	Individual keys or all keys do not respond.	Operation panel locking function validates.	Power on of the inverter after complete power off.
		Cable contact of the operation panel is unsound.	Check the connecting cable.
		Operation panel keys are damaged.	Change the operation panel or seek for services.
function code cannot be modified	Unable to be modified under running state.	This function code cannot be modified under running state.	Modify under shutdown state.
	Part of function codes cannot be modified.	Function code F0.00 is set to 1 or 2.	Set F0.00 to 0.
		This function code is actual detection value.	Users cannot change actual parameters.
	Press M-F there's no reaction.	Operation panel locking function validates or others.	See solutions to "No response on operation panel".
	Press M-F system cannot enter, function code display 0.0.0.0.	There's a user password	Correctly input user password
			Seek for services
Unexpected Inverter Shutdown during Running	There's no shutdown command, the inverter shuts down automatically, and running	There's a fault alarm.	Find fault reasons, and reset fault.
		A simple PLC single cycle is completed.	Check PLC parameter settings.
		Fixed length shutdown function validates.	Clear actual length or set FC.14 (Set length) to 0.

Phenomena	Occurrence Conditions	Possible Reasons	Countermeasures
	indicator turns off.	Upper computer or remote control box disconnects from the inverter communication.	Check communication line and Fb.04, Fb.03 and FA.15 settings.
		Power supply is interrupted.	Check power supply situation.
		Running command channel shifting.	Check operation and settings related to running command channel.
		Control terminal positive/negative logic change.	Check whether F6.23 settings comply with requirements.
	No shutdown command is given, motor shuts down automatically, inverter running indicator turns on, and runs at zero frequency.	Fault automatic reset	Check fault automatic reset settings and fault reasons.
		Simple PLC pause	Check PLC pause function terminal.
		External interruption	Check external interruption settings and fault sources.
		Zero frequency shutdown	Check zero frequency shutdown parameter settings FC.12 and FC.13.
		Set frequency is 0.	Check the set frequency
		Jump frequency setting problems.	Check the jump frequency settings.
		Positive action, closed-loop feedback>given Negative action, closed-loop feedback<given	Check closed-loop given and feedback.
		Frequency adjustment set to 0.	Check FC.2 and FC.30 settings.
		Select instant low voltage compensation during power off restart, and power supply voltage is low.	Check power off restart function settings and input voltage.

Phenomena	Occurrence Conditions	Possible Reasons	Countermeasures
Inverter can not run	Press the run key, the inverter would not run, and running indicator is off.	Free parking function terminal is valid.	Check the free parking terminal.
		Inverter forbid the running terminal is valid.	Check the inverter to forbid the running terminal.
		External shutdown function terminal is valid.	Check external shutdown function terminal.
		Fixed length shutdown	Check the fixed length shutdown setting or clear the actual length.
		In three-line control mode, the three-line rotating control function terminal is not closed.	Set and close the three-line rotating control terminal.
		There's a fault alarm.	Troubleshooting
		Upper computer's virtual terminal function is set improperly.	Cancel the upper computer virtual terminal function or use the upper computer to give proper settings, or modify the F6.23 settings.
		The input terminal positive/negative logic settings are improper.	Check the F6.23 settings.
Inverter powers on and runs immediately to report P.OFF	Thyristor or contactor disconnects and inverter load is too large.	For thyristor or contactor is not closed, when the inverter load is relatively large, the main loop DC bus voltage will decrease during running, and the inverter will display P.OFF first, rather than the E026 fault.	Run the inverter again after waiting the thyristor or the contactor closed completely.

Note:

(1) Before reset, it is required to check fault reasons completely and carry out troubleshooting, otherwise it may cause permanent damages to the inverter.

(2) If any fault occurs again because of unable to reset or after reset, check reasons, while continuous resets may damage the inverter.

(3) Overload, it is required to delay for 5 minutes to reset during overheat protection.

Chapter 8 Maintenance

8.1 Maintenance

In case of change of service environment for inverter, such as temperature, humidity, smog and aging of inverter internal parts, the inverter fault may occur. Therefore, the inverter must be examined daily and given the regular maintenance in period of storing and using.

8.1.1 Daily maintenance

When the inverter is turned on normally, please make sure the following items:

(1) Whether the motor has abnormal noise and vibration.

(2) Whether inverter and motor heat or occur abnormity.

(3) Whether environment temperature is too high.

(4) Whether the value of load ammeter is in conformity with the former.

(5) Whether the fan of inverter rotates normally.

8.2 Regular maintenance

8.2.1 Regular maintenance

Before the inverter is maintained and checked, the power supply must be cut off, in addition, the monitor shall have no display and main circuit power indicator lamp goes out. The examined content is shown as table 8-1.

Table 8-1 Regular examined contents

Item	Content	Solution
Screw of main circuit terminal and control circuit terminal	Whether the screw is slack	Tightened by screwdrive
Heat sink	Whether there is dust on it	Blow it away with the dry compressed air of 4-6kg/cm^2 Pressure
PCB(printed circuit board)	Whether there is dust or vapor on it	Clean the surface of PCB board
Fan	Whether it runs normally and makes abnomal sound or vibration ,and whether the accumuiated time runs up to more than 20000 hours	Change the fan
Power unit	Whether there is dust on it	Clear the foreign matter
Aluminum electrolytic capacitor	Whether it has color change,peculiar smell,bubbing,liquid leakge	Changed Aluminum electrolytic capacitor

8.2.2 Regular maintenance

In order to make the inverter run normally for a long time, the electronic elements mounted in inverter shall be maintained regularly. And the service life of electronic elements is different with the service environment and service condition. The maintenance period of inverter as shown in the table 8-2 is provided for referring.

Table 8-2 Changing time of inverter parts

Part name	Standard changing time
Fan	2～3 years
Electrolytic capacitor	4～5 years
PCB	5～8 years
Fuse	10 years

Applicable condition for changing time of aforementioned inverter parts

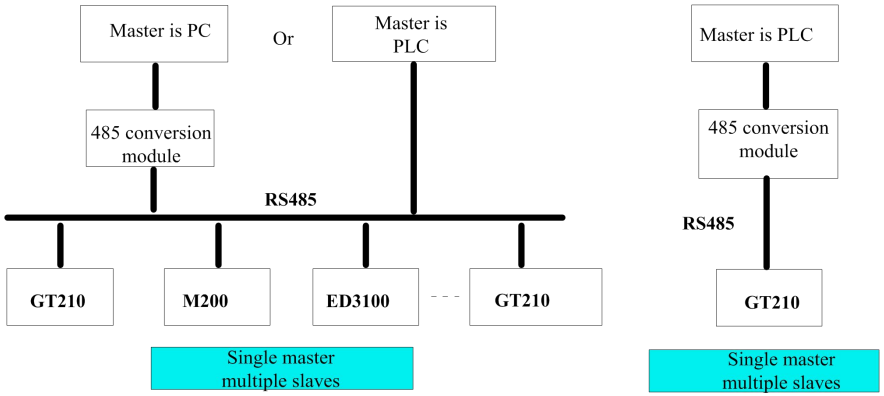
(1) Environment temperature：Annual average is 30℃.

(2) Load factor: Less than 80%

(3) Running time: Less than 12 hours every day

Annex Communication Protocol

Networking Method



Inverter Networking Diagram

Interfacing method

RS485: Asynchronous, half duplex Default: 8-N-2, 9600bps.See group FB description for parameter settings.

Communication method

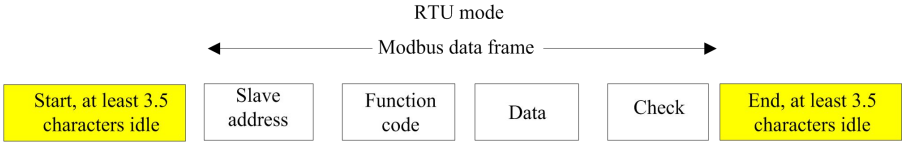
1. Communication protocol of the inverter is the Modbus protocol, except for supporting common register read and write, partial commands are also expanded to carry out management on inverter function codes.

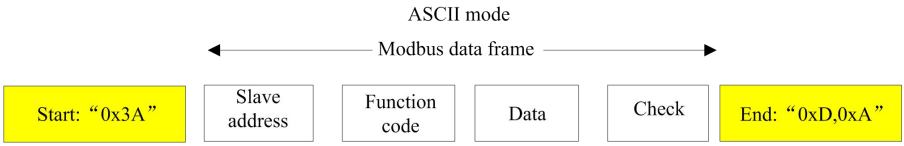
2. The inverter is the slave, master-slave point to point communication. When the master sends commands using broadcast address, the slave will not respond.

3. During multi-machine communication or long distance communication, connecting a resistance of 120Ω at both ends of the communication could improve the communication's interference rejection.

Protocol format

Modbus protocol supports both RTU mode and ASCII mode, and corresponding frame format is as follows:





Modbus adopts the “Big Endian” coding method, which sends high bit bytes first, and then low bit bytes.

RTU method: Under RTU method, idle time between frames could select function code setting or observe inner conventions of Modbus. Min. frame idle agreed inside Modbus is as follows: Frame head and end use bus idle time larger than or equal to 3.5 bytes to determine the frame. Data check adopts CRC-16, and the entire information participates in check, while high and low bits of checksum need to be sent after exchange. For detailed CRC check, please refer to examples in the protocol. It is to be noted that, at least 3.5 characters of bus idle should be kept between frames (or min. bus idle time should be set), while bus idle between frames need not to accumulate start and end idles.

The following is data frame requested for reading parameter 002 of machine 1:

Address	Function Code	Register Address		Read Characters		Checksum	
0x01	0x03	0x00	0x02	0x00	0x01	0x25	0xCA

The following is response frame of machine 1:

Address	Function Code	Response Bytes	Register Content		Checksum	
0x01	0x03	0x02	0x13	0x88	0xB5	0x12

Under ASCII, the frame head is “0x3A”, and the frame end is “0x0D” and “0x0A” by fault, while the frame end could also be set by users. Under ASCII, except for frame head and frame end, other data bytes could all be sent in the form of ASCII code, which are sent to the high 4-bit bytes first, and then to low 4-bit bytes. Under ASCII, the data has a 7-bit length. As for “A”～“F”, ASCII of capitalized letters of it are adopted. In this case, data adopts LRC check, which covers information part from slave address to data. Checksum is equal to the supplementary code of character sum (abandoning carry bits) of all data participating in check.

An example of Modbus data frame of ASCII is as follows:

Write 4000 (0xFA0) into the inner register 002 of slave 1, the format of command frame is shown in the following table:

LRC check=supplementary code of (01+06+00+02+0x0F+0xA0)=0x48

	Frame Head	Address		Function Code		Register Address				Write Content				LRC Check		Frame End	
Character	:	0	1	0	6	0	0	0	2	0	F	A	0	4	8	CR	LF
ASCII	3A	30	31	30	36	30	30	30	32	30	46	41	30	34	38	0D	0A

The inverter, via function code, could set different response delays to adapt to detailed application needs of various master station, for RTU mode, actual response delay is not less than an interval of 3.5 characters, for ASCII mode, actual response delay is not less than 1ms.

Protocol function

The most important function of Modbus is to read and write parameters, and different function codes decide different operation requests. Inverter Modbus protocol supports the following function code operations:

Function Code	Function Code Significance
0x03	Read inverter function code parameters and run state parameters.
0x06	Modify single inverter function code or control parameter, and do not save after power off.
0x08	Wire diagnosis
0x10	Modify multiple inverter function codes or control parameters, and do not save after power off.
0x41	Modify single inverter function code or control parameter, and do not save after power off.
0x42	Function code management

Inverter's function code parameters, control parameters and state parameters are all mapped to Modbus read/write register. Read/Write characteristics and range of function code parameters all comply with instructions in the inverter's user manual. Inverter function code's group number is mapped to high byte address of the register, while group index is mapped to low byte address of the register. Inverter's control parameters are virtualized to inverter function code group 50, while inverter's state parameters are virtualized to inverter function code group 51.The correspondence between function code group number and its mapped register address high byte is as follows:

Group F0: 0x00; group F1: 0x01; group F2: 0x02; group F3: 0x03; group F4: 0x04; group F5: 0x05; group F6: 0x06; group F7: 0x07; group F8: 0x08; group F9: 0x09; group FA: 0x0A; group Fb: 0x0B; group FC: 0x0C; group Fd: 0x0D; group FE: 0x0E; inverter control parameter group: 0x32; inverter state parameter group: 0x33.

For example, register address of inverter function code parameter F3.02 is F3.02, and register address of inverter function code parameter FE.01 is 0xE01.

The overall data frame's format has been introduced in the above, format and significance of Modbus protocol's function code and data part will be introduced in the following, which is the content of "function code" and "data" parts in the above mentioned data frame format.

These two parts form the application protocol data unit of Modbus, and the application protocol data unit in the following refers to these two parts. Description on frame format in the following takes RTU mode as an example, and ASCII mode application layer protocol data unit's length needs to be doubled.

Read inverter parameters' application layer protocol data unit as follows:

Request format is as follows:

Application Layer Protocol Data Unit	Data Length(Bytes)	Value or Range
Function code	1	0x03
Start register address	2	0x0000～0xFFFF
Register number	2	0x0001～0x0004

Response format is as follows:

Application Layer Protocol Data Unit	Data Length(Bytes)	Value or Range
Function code	1	0x03
Read bytes	1	2* Register number
Read contents	2* Register number	

If operation request fails, response should be error codes and abnormal codes. Error code is equal to (function code + 0x80), and abnormal code indicates error reasons. Abnormal codes are listed as follows:

Abnormal Code	Abnormal Code Significance
0x1	Illegal function code.
0x2	Illegal register address.
0x3	Data error, data exceeds upper limit or lower limit.
0x4	Slave operation fails (including data within the range of upper limit and lower limit, but errors caused by invalid data)
0x5	Command valid, under transaction, mainly used in storing data to non-volatile storage.
0x6	Slave is busy, please try later, mainly used in storing data to non-volatile storage.
0x18	Information frame error: Including information length error and check error.
0x20	Parameter unable to be modified.
0x22	Parameters are protected by password.

Modify single inverter parameter's application layer protocol data unit, as follows:

Request format is as follows:

Application Layer Protocol Data Unit	Data Length(Bytes)	Value or Range
Function Code	1	0x06
Register Address	2	0x0000～0xFFFF
Register Content	2	0x0000～0xFFFF

Response format is as follows:

Application Layer Protocol Data Unit	Data Length(Bytes)	Value or Range
Function Code	1	0x06
Register Address	2	0x0000～0xFFFF
Register Content	2	0x0000～0xFFFF

If operation request fails, response should be error code and abnormal code. Error code is equal to (function code＋0x80), and see the above description for any abnormal code.

Application layer protocol data unit of wire diagnosis is as follows:

Request format is as follows:

Application Layer Protocol Data Unit	Data Length(Bytes)	Value or Range
Function Code	1	0x08
Sub Function Code	2	0x0000～0x0030
Data	2	0x0000～0xFFFF

Response format is as follows:

Application Layer Protocol Data Unit	Data Length(Bytes)	Value or Range
Function Code	1	0x08
Sub Function Code	2	0x0000～0x0030
Data	2	0x0000～0xFFFF

If operation request fails, response should be error code and unexpected code. Error code is 88H, and see the above description for any abnormal code.

Sub functions supported by wire diagnosis are listed as follows:

Sub Function Code	Data (Request)	Data (Response)	Sub Function Significance
0x0001	0x0000	0x0000	Re-initialize communication: Make no-response mode failure.

	0xFF00	0xFF00	Re-initialize communication: Make no-response mode failure.
0x0003	“New frame end” and “00” occupy high and low bytes respectively.	“New frame end” and “00” occupy high and low bytes respectively.	Set frame end of ASCII mode, and this “new frame end” will replace the old line feeds (Note: The new frame end cannot be larger than 0x7F, and cannot be equal to 0x3A).
0x0004	0x0000	No response	Set the no response mode, and the slave only responds to “re-initialize communication request” from here. It is mainly used to isolate fault slave.
0x0030	0x0000	0x0000	Set slave “never respond” invalid command and error command.
	0x0001	0x0001	Set slave “respond” invalid command and error command.

Modify multiple inverter function codes and state parameters’ application layer protocol data unit, as follows:

Request format is as follows:

Application Layer Protocol Data Unit	Data Length (Bytes)	Value or Range
Function Code	1	0x10
Start Register Address	2	0x0000～0xFFFF
Operation Register Number	2	0x0001～0x0004
Register Content Bytes	1	2*Operation register number
Register Content	2*Operation register number	

Response format is as follows:

Application Layer Protocol Data Unit	Data Length(Bytes)	Value or Range
Function Code	1	0x10
Start Register Address	2	0x0000～0xFFFF
Operation Register Number	2	0x0001～0x0004

This request modifies the contents of continuous data units from start register address. The mapping of register address is the inverter’s function code parameters and control parameters etc., for detailed mapping relationship, see the mapping relationship definition of

register address in the following. If operation request fails, abnormal response is shown in the above.

When storing multiple register parameters continuously, the inverter starts storing from the register at the lowest address, till the one at the highest address, and the storage may success completely or return from the address failing first.

Function code 0x41 is used to modify individual inverter function code or control parameter, and store it to the non-volatile storage unit. Its command format is similar to 0x06, and the only difference lies in that parameters operated by command 0x06 will not be saved after power off, while parameters operated by 0x41 will be saved after power off. Some control parameters in the inverter cannot be saved into the non-volatile storage unit, as for these parameters, function codes 0x41 and 0x06 have the same operation effects, and these parameters will be introduced in the following.

The management of inverter function codes includes reading upper limit and lower limit of parameters, reading parameter characteristics, reading function code menu's max. group index, reading the next function code group number and the previous function code group number, reading the current display state parameter index as well as displaying the next state parameter etc. Parameter characteristics include information such as parameter readability and writability, parameter unit as well as scaling relation etc. These commands are used to remotely modify inverter function code parameters. Application layer protocol data units managed by function codes are as follows:

Request format is as follows:

Application Layer Protocol Data Unit	Data Length(Bytes)	Value or Range
Function Code	1	0x42
Sub Function Code	2	0x0000～0x0007
Data	2	Detailed range should be decided according to the inverter's type.

Response format is as follows:

Application Layer ProtocolData Unit	Data Length (Bytes)	Value or Range
Function Code	1	0x42
Sub Function Code	2	0x0000～0x0007
Data	2	0x0000～0xFFFF

If operation request fails, response should be error code and abnormal code. If operation fails, carry out abnormal response, and see the above description for any abnormal response code.

Sub functions managed and supported by function codes are listed in the following:

Sub Function Code	Data (Request)	Data (Response)	Sub Function Significance
0x0000	Function code group number and group index occupy high and low bytes respectively.	The upper limit of function code parameter.	Read the upper limit of function code parameter.
0x0001	Function code group number and group index occupy high and low bytes respectively.	The lower limit of function code parameter.	Read the lower limit of function code parameter.
0x0002	Function code group number and group index occupy high and low bytes respectively.	Function code parameter characteristics, for details, see the description in the following.	Read characteristics of function code parameter.
0x0003	Function code group number occupies high byte, and low byte is “00”.	Max. value of group index.	Read the max. value of group index.
0x0004	Function code group number occupies high byte, and low byte is “00”.	The next function code group number occupies high byte, and low byte is “00”.	Read the next function code group number.
0x0005	Function code group number occupies high byte, and low byte is “00”.	The previous function code group number occupies high byte, and low byte is “00”.	Read the previous function code group number.
0x0006	0x3300	Currently displayed state parameter index	Read the currently displayed state parameter index
0x0007	0x3300	The next state parameter index	Display the next state parameter.

State parameter group cannot be modified, and reading upper limit and lower limit operation is not supported.

Function code parameter is featured as a 2-byte length, and bit definition is as follows:

Featured Parameter (BIT)	Value	Significance
BIT2～BIT0	000B	No decimal part
	010B	1 decimal
	011B	2 decimals
	100	3 decimals
	Others	Reserved
BIT3	Reserved	

Featured Parameter (BIT)	Value	Significance
BIT5～BIT4	00B	Modify step length to 1
	Others	Reserved
BIT7～BIT6	01B	Able to be modified.
	10B	Unable to be modified during running
	11B	Factory set, and users cannot modify.
	00B	Actual parameter, unable to be modified.
BIT11～BIT8	0000B	No unit
	0001B	Unit is HZ
	0010B	Unit is A
	0011B	Unit is V
	0100B	Unit is r/min
	0101B	Unit is linear speed (m/s)
	0110B	Unit is percentage (%)
	Others	Reserved
BIT12	1	Modify the upper limit according to 4-bit byte restriction.
	0	Modify the upper limit according to character restriction.
BIT15～BIT13	Reserved	

The inverter control parameters could complete inverter start, stop, and set running frequency etc., via retrieving the inverter's state parameters, it could obtain the inverter's running frequency, output current, output torque etc. Specific inverter's control parameters and state parameters are listed in the following:

Inverter's Control Parameter Index

Register Address	Parameter Name	Whether Save after Power off
0x3200	Control command Character	No
0x3201	Main setting	Main setting value is the running frequency given.
0x3202	Running frequency setting	Yes
0x3203	Digit closed-loop given	Yes
0x3204	Pulse closed-loop given	Yes
0x3205	Analog output A01 setting	No
0x3206	Analog output AO2 setting	No
0x3207	Digit output DO setting	No

0x3208	Frequency proportion setting	No
0x3209	Virtual terminal control setting	No
0x320A	Set accelerating time 1	Yes
0x320B	Set decelerating time 1	Yes

Inverter's State Parameter Index

Register Address	Parameter Name
0x3300	Operation state character 1
0x3301	Actual operation value of the current main setting
0x3302	Slave model
0x3303	Inverter model
0x3304	Software version
0x3305	Current running frequency
0x3306	Output Current
0x3307	Output Voltage
0x3308	Output Power
0x3309	Running rotational speed
0x330A	Running linear speed
0x330B	Analog closed-loop feedback
0x330C	Bus voltage
0x330D	External counter
0x330E	Output torque
0x330F	Switching value input/output terminal state: BIT0～15=X1～X8,Y1,Y2,TC,FAN,BRAKE,FWD,REV
0x3310	Actual length
0x3311	Running frequency after compensation
0x3312	The first running fault
0x3313	The second running fault
0x3314	The third (the latest) running fault
0x3315	Running frequency setting
0x3316	Running rotational speed setting
0x3317	Analog closed-loop given
0x3318	Linear speed setting
0x3319	AI1

0x331A	AI2
0x331B	Set length
0x331C	Set accelerating time 1
0x331D	Set decelerating time 1
0x331E	Running command given channels: 0: Panel control 1: Terminal control 2: Serial port control
0x331F	Inverter state character 2
0x3320	Frequency given channels: 0: Digit given 1, keyboard ▲ ▼ adjustment 1: Digit given 2: Terminal UP/DN adjustment 2: Digit given 3: Serial Port 3: AI1 Analog Given 4: AI2 Analog Given 5: Terminal PULSE given 6: Panel analog given
0x3321	Accumulated length

Inverter's control bits are defined as follows:

Control Words (Bits)	Value	Significance	Function Description
BIT2, 1, 0	111B	Running command	Start the inverter
	110B	Method 0 parking	Park according to the set decelerating time
	101B	Method 1 parking	Park freely
	011B	Method 2 parking	The fastest decelerating time parking.
	100B	External fault parking	Park freely, and the inverter displays an external fault.
	Others	No command	
BIT3	1	Reversal	Rotational direction when the running command is set valid (invalid for Jog commands)
	0	Forward rotating	
BIT4	1	Jog forward rotating	
	0	Jog forward rotating invalid	

BIT5	1	Jog reversal	
	0	Jog reversal invalid	
BIT6	1	Allow accelerating and decelerating	Reserved
	0	Prohibit accelerating and decelerating	
BIT7	1	Upper computer control valid	Control word distributed by the current upper computer valid.
	0	Upper computer control invalid	Control word distributed by the current upper computer invalid.
BIT8	1	Main setting valid	
	0	Main setting invalid	
BIT9	1	Fault reset valid	
	0	Fault reset invalid	
BIT15～10	000000B	Reserved	

Note: For Jog running givens (BIT4, BIT5), they could not be valid together with control words BIT0～BIT2!

Bit definition of the inverter's state word 1 is as follows:

State Word (Bit)	Value	Significance	Remarks
BIT0	1	Inverter running	
	0	Inverter shutdown	
BIT1	1	Inverter reversal	
	0	Inverter forward rotating	
BIT2	1	Reach main setting	
	0	Do not reach main setting	
BIT3	1	Allow communication control	
	0	Forbid communication control	
BIT7～4	0000B	Reserved	

BIT15～8	00～0xFF	Fault code	0: Indicates the inverter is normal; Non-0: Indicates there's a fault, and for the significance of specific fault code, please refer to the user manual for inverter of related type. For example, the fault code of motor overload E014 is 0x0E, while undervoltage is 0x1F.

Bit definition of the inverter's state word 2 is as follows:

State Word (Bit)	Value	Significance
BIT0	1	Jog running
	0	Non-Jog running
BIT1	1	Closed-loop running
	0	Non-closed-loop running
BIT2	1	PLC running
	0	Non-PLC running
BIT3	1	Multi-band frequency running
	0	Non-multi-band frequency running
BIT4	1	Normal running
	0	Abnormal running
BIT5	1	Swing frequency
	0	Non-swing frequency
BIT6	1	Undervoltage
	0	Normal voltage
Others		Reserved

Notes:

1. For data fames of ASCII format, if the frame length is an even, this frame will be discarded.

2. External inverter cannot communicate under restoring to default parameters and parameter identification stage, and communication will return to normal after completion.

3. Internal parameters of the inverter F3.09, F0.03 and F0.04 cannot be modified via communication settings, and communication cannot modify F0.04, but user password could be verified via writing F0.04.

4. When multiple multifunction input terminal functions are set the same, it will cause function disorders, and it is required to avoid such situation when users modify multifunctional terminal function via MODBUS protocol.

CRC Check

Considering the need to improve speed, CRC-16 is usually realized by adopting the form of table, and the following is the C language source code to realize CRC-16, note that high-low bytes have been exchanged in the final result, which means the result is the CRC checksum to be sent.

```
unsigned short CRC16 ( unsigned char *msg, unsigned char length)   /* The function returns the CRC as a unsigned short type */
{

    unsigned char uchCRCHi = 0xFF ;          /* high byte of CRC initialized */
    unsigned char uchCRCLo = 0xFF ;          /* low byte of CRC initialized */
    unsigned uIndex ;                        /* index into CRC lookup table */
    while (length--)                         /* pass through message buffer */
    {
        uIndex = uchCRCLo ^ *msg++ ;         /* calculate the CRC */
        uchCRCLo = uchCRCHi ^ (crcvalue[uIndex] >>8);
        uchCRCHi =crcvalue[uIndex]&0xff;
    }
    return (uchCRCHi | uchCRCLo<<8) ;
}

                                             /* Table of CRC values */
const unsigned int    crcvalue[ ] = {
0x0000,0xC1C0,0x81C1,0x4001,0x01C3,0xC003,0x8002,0x41C2,0x01C6,0xC006,0x8007,0x41C7,
0x0005,0xC1C5,0x81C4,0x4004,0x01CC,0xC00C,0x800D,0x41CD,0x000F,0xC1CF,0x81CE,0x400E,
0x000A,0xC1CA,0x81CB,0x400B,0x01C9,0xC009,0x8008,0x41C8,0x01D8,0xC018,0x8019,0x41D9,
```

0x001B,0xC1DB,0x81DA,0x401A,0x001E,0xC1DE,0x81DF,0x401F,0x01DD,0xC01D,
0x801C,0x41DC,
0x0014,0xC1D4,0x81D5,0x4015,0x01D7,0xC017,0x8016,0x41D6,0x01D2,0xC012,0x8
013,0x41D3,
0x0011,0xC1D1,0x81D0,0x4010,0x01F0,0xC030,0x8031,0x41F1,0x0033,0xC1F3,0x81
F2,0x4032,
0x0036,0xC1F6,0x81F7,0x4037,0x01F5,0xC035,0x8034,0x41F4,0x003C,0xC1FC,0x81
FD,0x403D,
0x01FF,0xC03F,0x803E,0x41FE,0x01FA,0xC03A,0x803B,0x41FB,0x0039,0xC1F9,0x
81F8,0x4038,
0x0028,0xC1E8,0x81E9,0x4029,0x01EB,0xC02B,0x802A,0x41EA,0x01EE,0xC02E,0x
802F,0x41EF,
0x002D,0xC1ED,0x81EC,0x402C,0x01E4,0xC024,0x8025,0x41E5,0x0027,0xC1E7,0x
81E6,0x4026,
0x0022,0xC1E2,0x81E3,0x4023,0x01E1,0xC021,0x8020,0x41E0,0x01A0,0xC060,0x80
61,0x41A1,
0x0063,0xC1A3,0x81A2,0x4062,0x0066,0xC1A6,0x81A7,0x4067,0x01A5,0xC065,0x8
064,0x41A4,
0x006C,0xC1AC,0x81AD,0x406D,0x01AF,0xC06F,0x806E,0x41AE,0x01AA,0xC06A,
0x806B,0x41AB,
0x0069,0xC1A9,0x81A8,0x4068,0x0078,0xC1B8,0x81B9,0x4079,0x01BB,0xC07B,0x8
07A,0x41BA,
0x01BE,0xC07E,0x807F,0x41BF,0x007D,0xC1BD,0x81BC,0x407C,0x01B4,0xC074,0
x8075,0x41B5,
0x0077,0xC1B7,0x81B6,0x4076,0x0072,0xC1B2,0x81B3,0x4073,0x01B1,0xC071,0x8
070,0x41B0,
0x0050,0xC190,0x8191,0x4051,0x0193,0xC053,0x8052,0x4192,0x0196,0xC056,0x805
7,0x4197,
0x0055,0xC195,0x8194,0x4054,0x019C,0xC05C,0x805D,0x419D,0x005F,0xC19F,0x8
19E,0x405E,
0x005A,0xC19A,0x819B,0x405B,0x0199,0xC059,0x8058,0x4198,0x0188,0xC048,0x80
49,0x4189,
0x004B,0xC18B,0x818A,0x404A,0x004E,0xC18E,0x818F,0x404F,0x018D,0xC04D,0x
804C,0x418C,
0x0044,0xC184,0x8185,0x4045,0x0187,0xC047,0x8046,0x4186,0x0182,0xC042,0x804
3,0x4183,
0x0041,0xC181,0x8180,0x4040}

If CRC checksum of each sending byte is calculated online, it will take a long time, but could save program space occupied by tables.CRC codes to be calculated on line are as follows:

```
unsigned int crc_check(unsigned char *data,unsigned char length)
{
    int i;
    unsigned crc_result=0xffff;
  while(length--)
{
    crc_result^=*data++;
    for(i=0;i<8;i++)
    {
        if(crc_result&0x01)
            crc_result=(crc_result>>1)^0xa001;
        else
            crc_result=crc_result>>1;
    }
}
return (crc_result=((crc_result&0xff)<<8)|(crc_result>>8));
}
```

Application examples

The command to start 1#inverter for forward rotating, and to set the rotational speed at 50.00HZ (which is 5000 internally) is as follows:

	Address	Function Code	Register Address	Register Number	Register Content Bytes	Register Content	Checksum
Request	0x01	0x10	0x3200	0x0002	0x04	0x01C7,0x1388	0x0399
Response	0x01	0x10	0x3200	0x0002	None	None	0x4F70

1#inverter parks at the quickest speed:

Address	Function Code	Register Address	Register Content	Checksum
0x01	0x06	0x3200	0x00C3	0xC723
0x01	0x06	0x3200	0x00C3	0xC723

5#inverter Jog rotates forward:

Address	Function Code	Register Address	Register Content	Checksum
0x05	0x06	0x3200	0x00D0	0x876A
0x05	0x06	0x3200	0x00D0	0x876A

5#inverter Jog stops:

Address	Function Code	Register Address	Register Content	Checksum
0x05	0x06	0x3200	0x00C0	0x86A6
0x05	0x06	0x3200	0x00C0	0x86A6

5# inverter fault resets:

Address	Function Code	Register Address	Register Content	Checksum
0x05	0x06	0x3200	0x0280	0x86C6
0x05	0x06	0x3200	0x0280	0x86C6

Read 4#inverter's running frequency, and inverter response running frequency is 50.00HZ:

Address	Function Code	Register Address	Register Number or Read Bytes	Register Content	Checksum
0x04	0x03	0x3301	0x0001	None	0xDADB
0x04	0x03	None	0x02	0x1388	0x7912

Read 4#inverter's running frequency, and inverter response running frequency is 50.00HZ.

Address	Function Code	Register Address	Register Number or Read Bytes	Register Content	Checksum
0x04	0x03	0x3301	0x0001	None	0xDADB
0x04	0x03	None	0x02	0x1388	0x7912

Modify 5#inverter's accelerating time 1 (which is function code F0.10) is 10.0s, which does not save after power off.

Address	Function Code	Register Address	Register Content	Checksum
0x05	0x06	0x000A	0x0064	0xA9A7
0x05	0x06	0x000A	0x0064	0xA9A7

Read 5#inverter's output current, and inverter response output current is 30.0A.

Address	Function Code	Register Address	Register Number or Read bytes	Register Content	Checksum
0x05	0x03	0x3306	0x0001	None	0x6ACB
0x045	0x03	None	0x02	0x12C	0x49C9

Read 5#inverter's decelerating time (which is F0.11), and inverter response decelerating time is 6.0S.

Address	Function Code	Register Address	Register Number or Read bytes	Register Content	Checksum
0x05	0x03	0x000B	0x0001	None	0xF4C4
0x05	0x03	None	0x02	0x003C	0x4995

Inverter's scaling relationship

A) Frequency's scaling is 1: 100

To make the inverter rotate at 50Hz, the main setting should be 0x1388 (5000).

B) Time's scaling is 1: 10

To make the inverter accelerating time as 30S, the function code should be set to 0x012c (300).

C) Current's scaling is 1: 10

If the inverter's feedback current is 0x012c, current of this inverter is 30A.

D) Output power is an absolute value.

F) Others (i.e. terminal input and output etc.) Please refer to the inverter's user manual.

Warranty Agreement

1. Warranty scope only includes the frequency inverter body.
2. For normal use, the drives fail or be damaged within 18 months, the company is responsible for the warranty; more than 18 months, will charge a reasonable maintenance costs.
3. Warranty period starting time is the date of manufacture.
4. Within 18 months, some maintenance fees should be charged in the following situations:
   - Do not follow the operating manual steps to cause the damage to the inverter。
   - Damaging the inverter because of fires, water, abnormal voltage and etc..
   - Wiring error causes the damage to the drive.
   - Damaging the inverter because of using non-normal functions .
5. Related services fees are according to the actual costs. If the fees are written in the contract , the contract prevails.
6. Please keep this card and show it to the maintenance supporter when the frequency inverter is repaired
7. If the problems happen, please contact directly with the supplier, or with our company.