

VEICHI

Manual

AC200 Frequency Inverter

VEICHI

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Version:2017 V1.0
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Chapter 1 Overview





Thanks for using AC200 high-performance VC frequency inverter produced by Veichi electric co.,ltd. This manual tells you how to use it perfectly. Please read this manual carefully and fully understand the safety requirement and cautions before use (installation, wiring, operation, maintain, checking, and etc...).

1.1 Safety requirement and cautions

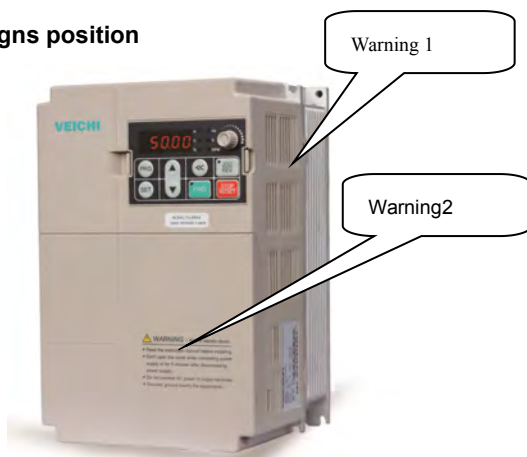
Pls do totally understand this part before using the inverter.

Warning signs and meanings

This manual has used belowing signs that mean there is an important part of security. While observing against the rules, there is danger of injury even death or machine system damage.

	Danger: Wrong operation may cause death or large accident.
	Warning: Wrong operation may cause death or large accident.
	Caution: Wrong operation may cause minor wound.
	Important: Wrong operation may cause the inverter and other machine system damage

Warning signs position



Drawing 1: Warning positions on crust of AC200 series inverter

Operation requirement




Only Professional trained person are allowed to operate the equipment such as installation, wiring, running, maintain and etc. "Professional trained person" in this manual means the workers on this

product must experience professional skill train, must be familiar with installation, wiring, running and maintain and can rightly deal with emergency cases in use.



Safety guidance

Safety regulations and warning signs come for your security. They are measures to prevent the operator and machine system from damage. Pls carefully read this manual before using and strictly observe the regulations and warning signs while operating. Safety regulations and warning signs are classified into: routine regulation, transport and store regulation, installation and wiring regulation, running regulation, maintenance regulation, dismantlement and disposal regulation.


● Routine regulation


	<ul style="list-style-type: none"> ● This product carries dangerous voltage and controls driver machine with potential danger. If you don't abide by the regulations or requirements in this manual, there is danger of body injury even death and machine system damage. ● Only qualified personnels are allowed to operate the equipment.this product. Before using, the operator must be familiar with all safety specifications and operation regulations in this manual. Safe and stable work of the product is based on right operation and maintenance. ● Do not wire while the power is connected. Otherwise, there is danger of death for electric shock. Before wiring, inspection, maintenance, please cut power supply of all related equipments and ensure mains DC voltage in safe range. And please operate it after 5 mins.
	<ul style="list-style-type: none"> ● Away from children and public. ● Only used in application fields as maker stated. No use in equipments related to special fields such as emergency, succor, ship, medical treatment, aviation, nuclear and etc. ● Unauthorized alteration or use of accessories which are not sold or recommended by the maker may cause faults.
	<ul style="list-style-type: none"> ● Please make sure this manual is in the final user' hand before using. ● Before installation and debugging please carefully read and totally understand these safety regulation and warning signs.

● Transport and store regulation


	<ul style="list-style-type: none"> ● Correct transport, store, installation and careful operation an maintenance are important for inverter safe operation.
	<ul style="list-style-type: none"> ● In transport and store process, make sure the inverter is free from impact and vibration. It must be stored where is dry without corrosive air and conductive dust, and the temperature must be lower than 60℃.

● Installation and wiring regulation

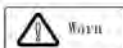
	<ul style="list-style-type: none"> ● Only professional trained person can operate it. ● Power wire, motor wire and control wire should be all connected firmly. Earth must be reliable and earth resistance must be lower than 10Ω. ● Before opening the inverter, please disconnect all related equipment power supply and make sure the mains DC voltage is in safe range and operate after 5mins. ● Human body electrostatic will damage inner sensitive components seriously. Before operation, please follow ESD measures. Otherwise, there is danger of
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	<p>inverter damage.</p> <ul style="list-style-type: none"> ● Inverter output voltage is pulse wave. If components such as capacitor which improves power factor and pressure-sensitive resistance for anti-thunder and so on are installed at the output side, please dismantle them or change to input side. ● No switch components such as breaker and contactor at the output side. (If there must be one, please make sure the output current is 0 while the switch acting).
	<ul style="list-style-type: none"> ● The power supply cable and motor cable specifications must satisfy all conditions in table 3-7 3-8 .


● Run regulation

	<ul style="list-style-type: none"> ● Inverter runs at high voltage. So dangerous voltage is in some components inevitably. ● No matter where the fault is, there is danger of serious accident, even human body injury what means dangerous malfunction possibility. So there must be additional external prevent measures or other safety devices, such as independent current limiting switch, machinery fence and so on.
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● Maintenance regulation

	<ul style="list-style-type: none"> ● Only Veichi Electric co., ltd service department or its authorized service center or professional person trained and authorized by Veichi can maintain the products. They should be very familiar with the safety warning and operation gist in this manual. ● Any defective components must be changed in time. ● Before opening the inverter to repair please cut power supply of all related equipments and ensure mains DC voltage in safe range. And please do operation after 5 mins.
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● Dismantlement and disposal regulation

	<ul style="list-style-type: none"> ● Packing case can be reused. Please keep them and reuse or send back to maker. ● Dismantled metal components are retractable and can be reused. ● Some components such as electrolytic capacitor are harmful to environment. Please dispose according to environmental protection departments.
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1.2 Technical criterion

Items		Criterion
Power input	Voltage,frequency	Single phase 220V 50/60Hz Three phase 380V 50/60Hz Three phase 220V 50/60Hz Three phase 660V 50/60Hz Three phase 1140V 50/60Hz
	Allowable fluctuations	Voltage:320V~440V; voltage unbalance rate:<3%; Frequency:±5% aberration rate: as IEC61800-2 required
	Inrush current	Lower than rated current

	Power factor	≥0.94(with DC reactor)
	Efficiency	≥96%
Output	Output voltage	Output under rated condition:3 phase, 0 ~ input voltage, inaccuracy<5%
	Output frequency	G type:0-320Hz
	Output frequency accuracy	Max frequency ±0.5%
	Overload capacity	G type:150% rated current/1 min, 180% rated current/10s, 200% rated current/0.5s
Main Control performance	Motor control mode	V/F without PG ,VC without PG, V/F with PG,VC with PG
	Modulate mode	Optimized SVPWM mode
	Carrier frequency	0.7~16.0kHz
	Speed range	VC without PG: rated load 1:100 VC with PG: rated load 1:1000
	Steady speed accuracy	VC without PG: ≤2% rated synchronized speed VC with PG: ≤0.05% rated synchronized speed
	Starting torque	VC without PG: when 0.5Hz, 150% rated torque VC with PG: when 0Hz, 200% rated torque
	Torque response	VC without PG: ≤20ms VC with PG: ≤10ms
	Frequency accuracy	Digit setting:max frequency×±0.01% Analog setting:max frequency×±0.2%
	Frequency resolution	Digit setting:0.01Hz Analog setting:max frequency×0.05%
Basic functions	DC braking capacity	Starting frequency:0.00~50.00Hz Braking time:0.0~60.0s Braking current:0.0~150.0% rated current
	Torque upgrade capacity	Auto torque upgrade 0.0%~100.0% Manual torque upgrade 0.0%~30.0%
	V/F curve	4 modes: one linearity torque characteristic curve ,one user set V/F curve mode, one drop torque characteristic curve (1.1- 2.0 powers)、 and square V/F curve mode.
	Acceleration/Deceleration curve	2 modes: One linear Acceleration/Deceleration and two S curve Acceleration/Deceleration.4 sets of Acceleration/Deceleration time ,unit 0.01s selectable, longest time: 650.00s.
	Rated output voltage	Rely on power supply voltage compensate function, while motor rated voltage is 100%, set it at the range of 50-100%(output can not over input voltage).
	Voltage auto-adjust	While power supply voltage fluctuates,it can auto-keep constant output voltage.

	Auto energy-saving running	According to load situation, auto-optimize output voltage to save energy.	
	Auto-limit current	Auto-limit the current while running to prevent over current break trouble.	
	Instant power off treatment	While instant power off, realize continual operation by bus voltage control.	
	Standard functions	PID control, speed track, power off restart, jump frequency, upper/lower frequency limit control, program operation, multi-speed, RS485, analog output, frequency impulse output.	
	Frequency set channels	Keyboard digital set, keyboard potentiometer, analog voltage terminal VS, analog voltage/current terminal AI, analog current terminal AS, communication given and multi channels terminal selection, master-slave channels combination, expansion card, switch by various ways	
	Feedback input channel	Voltage terminal VS, voltage/current terminal AI, current terminal AS, communication given, pulse input PUL.	
	Running command channel	Operation panel given, external terminal given, communication given, expansion card given	
	Input command signal	Start, stop, FOR/REV, JOG, multi-step speed, free stop, reset, Acceleration/Deceleration time selection, frequency set channel selection, exterior fault alarm.	
	Exterior output signal	Two relay output, one collector output, one AO output: 0~10V output or 4~20mA output, another AO output: 0~10V output or 4~20mA output or frequency pulse output.	
Protection function		Over-voltage, under-voltage, current limit, over-current, overload, electric thermal relay, overheat, over-voltage stall, data protection, rapid protection, input/output loss phase protection	
Keyboard display	LED display	Single file 5 digital tube	Can monitor one state variable
		Two file 5 digital tube	Can monitor two state variables
	Parameter copy	Can upload or download function code information of inverter to realize fast parameter copy.	
	State monitor	Output frequency, given frequency, output current, input voltage, output voltage, motor speed, PID feedback, PID given value, module temperature etc monitor parameters..	
	Fault alarm	Over-voltage, under-voltage, over-current, short circuit, open phase, overload, overheat, over-voltage speed lost, current limit, or data protection is destroyed; Fault running state; Fault history.	
Environment	Install place	Indoor, altitude $\leq 1000\text{m}$, above 1000m down the rated amount, each increase of 100m down the rated amount of 1%; no condensation, ice, rain, snow, hail; solar radiation below $700\text{W}/\text{m}^2$, air pressure 70-106 kPa	

Temperature, humidity	-10 ~ +50℃, above 40℃ down the rated amount,the maximum temperature :60℃ (no load running), 5%—95%RH(no condensation)
Vibration	Under 20Hz≤0.5g
Store temperature	-30—+60℃
Installation	Hanging type, cabinet type
Protection degree	IP20
Cooling mode	Forced cooling

Table 1-1: Technical criterion

Chapter 2 Before Use

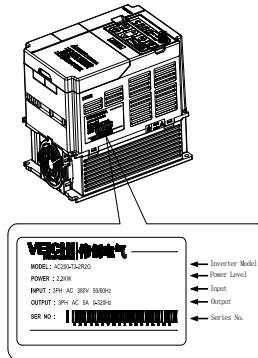
2.1 Purchase Inspection

On receiving your order, please check the package and confirm intact before opening, and check if there's any damage, scratch or dirt (damages caused during transportation are not within the company's warranty). If there's any damage caused during transportation, please contact us or the transport company immediately.

After confirming the receipt of the goods intact, please re-confirm if the product and your order are consistent. Model of the product is on the "MODEL" column. If you find the product model is not the one you ordered, please contact the dealer you purchased the product or the sales department of VEICHI immediately.

2.2 Nameplate

Nameplate Position and Content



Drawing2-1: AC200 Series Inverter Nameplate Position

Model Specification

AC200 - T 3 - 011 G

Symbol	Series
AC200	

Symbol	Phase
T	Three-phase
S	Single-phase

Symbol	Power Level
2	220V
3	380V
6	660V
11	1140V

Symbol	Power Level
G	General
GD	Cabinet machine with base
PD	Cabinet machine with base

Symbol	Power Level
7R5	7.5
011	11
018	18
132	132

Drawing 2-2: Meaning and Naming Rules of AC200 Series Inverter Nameplate

2.3 Inverter Rated Output Current



Input Voltage	220V	380V	660V	1140V
Rated Power	Rated Output Current (A)			
0.4	2.5			
0.75	4	2.3		
1.5	7	3.7		
2.2	10	5.0		
4	16	10		
5.5	20	13		
7.5	30	17	10	
11	42	25	15	
15	55	32	18	
18.5	70	38	22	
22	80	45	28	
30	110	60	35	
37	130	75	45	25
45	160	90	52	31
55	200	110	63	38
75	260	150	86	52
90	320	180	98	58
110	380	210	121	75
132	420	250	150	86
160	550	310	175	105
185	600	340	198	115
200	660	380	218	132
220	720	415	235	144
250		470	270	162
280		510	330	175
315		600	345	208
355		670	380	220
400		750	430	260
450		810	466	270
500		860	540	325
560		990	600	365
630		1100	680	400

Chapter 3 Installation and Wiring


3.1 Safety Precautions

This section specifies the various considerations necessary for reliable and safe operation of the product by users.

Inverter

	<ul style="list-style-type: none"> ● When the inverter is installed in closed cabinet, please ensure the temperature at the air-in port below 40°C by way of cooling fans or air conditioners and other cooling equipment to ensure the safe and reliable operation of the inverter.
	<ul style="list-style-type: none"> ● When installing, please cover the inverter with cloth or paper to prevent metal dust, oil, water and others. And remove these cover carefully after working. ● Please follow the ESD regulations when operating the inverter, otherwise, the inverter may be damaged. ● If several inverters are installed in a cabinet, enough space must be set aside on the upper part of the inverter in order to change the cooling fan. ● Inverter can't work over rated range. Otherwise, the inverter may be damaged. ● When transporting the inverter, please hold the case firmly. There might be danger of inverter main body falling, personnel injury or inverter damage if only holding the pre-cover.

Motor

	<ul style="list-style-type: none"> ● Different motor has different max allowable running speed. Motor can't run over the max allowable running speed. ● When inverter is running at low speed, the motor auto-cooling effect would seriously decrease. If motor runs at low speed for long term, it will be damaged for overheating. If needed, please use special motor for inverter. ● When constant speed machinery runs at inconstant speed, there might be sympathetic vibration. Please install vibration-proof rubber under motor rack or use jumping frequency control function. ● When using frequency inverter or working frequency power supply to drive, the torque characteristics are different. Please do confirm the torque characteristic of the equipment connected. ● The rated current of shift gear motor is different from that of standard motor. Please confirm and choose the right frequency inverter. Moreover, please do switch the pole when the inverter input current is 0. Otherwise, it may bring inverter damage. ● When the wiring distance between motor and inverter is far, the max torque of the motor would reduce due to voltage drop. So please use cable thick enough when the distance between the motor and the inverter is long.
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3.2 Dealing Methods for Inverter after Long-term Storage

If the inverter storage time is over one year, the aluminum capacitor in the inverter must be pre-charged again and make sure the aluminum capacitor characteristic recovered before installation. For specific method, please follow the grads in the chart below and give more than 30 mins corresponding proportional voltage for every grad when the inverter is no-load.

If the input voltage of one grad is at the critical point of contactor, fan or other equipments, please increase or reduce the corresponding input voltage for the grad to avoid any related components working under critical state.

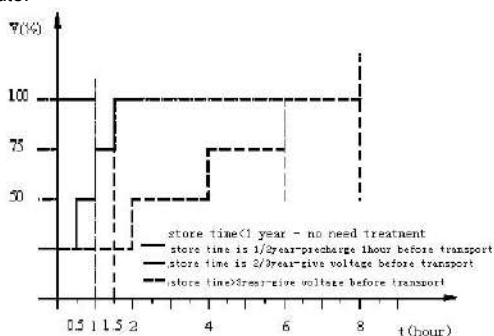


Chart 3-1: Dealing Methods for Inverter after Long-term Storage

3.3 Stable Running Environment for Inverter

Installation environment is very important to maximize the performance of this product and maintain long-term function, so please install the product in the environment as required in the following chart.

Environment	Requirement
Installation site	Indoor without direct sunshine
Operating temperature	-10 ~ +50°C
Storage temperature	-30 ~ +60°C
Environment humidity	<95%RH, no condensation
Surroundings	<p>Please install the inverter in place as follows:</p> <ul style="list-style-type: none"> ● Place without oil mist, corrosive gases, flammable gas, dust, etc. ● Place where metal dust, oil, water would not get inside the inverter (please do not install inverter on flammable material such as wood, etc). ● Place without radioactive material or flammable material. ● Place without poisonous gases or liquid. ● Place with little salt corrosion. ● Place without direct sunshine.
Altitude	<1000m ,above 1000m down the rated amount
Vibration	9~200Hz:5.9m/s ² (0.6g)

<p>Installation and cooling</p>	<ul style="list-style-type: none"> ● Inverter must be installed vertically and longitudinally, and it can't be installed horizontally. ● Please independently install high heating equipments such as braking resistor and it can't be installed in the same cabinet with inverter. Installation of high heating equipments at the air-in port of the inverter is strictly prohibited.
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Chart 3-1:AC200 Series Inverter Running Environment Condition

- To improve product reliability, please use the inverter where temperature would not change suddenly; when using in a closed cabinet, cooling fan or air conditioning for cooling is needed to prevent the internal temperature from exceeding allowed temperature; please avoid freezing of the inverter since low temperatures may cause malfunction of some devices due to freezing.
- Derate according to the chart when temperature exceeds limit.

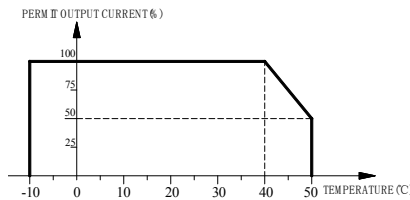


Chart 3-2:AC200 Series Inverter Derating Curve When Exceeding Permitted Temperature

- Derate according to the chart when altitude exceeds limit.

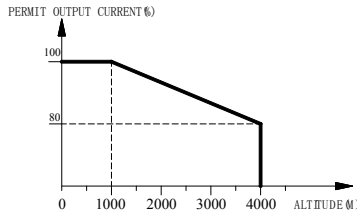


Chart 3-3:AC200 Series Inverter Derating Curve When Exceeding Permitted Altitude

3.4 EMI Protection



The designing features of inverter allow it to run with strong electromagnetic interference. Generally, if the quality of the installation is good, the safe and trouble-free operation of the inverter can be guaranteed. Please implement installation according to the following rules to ensure reliable and effective installation of inverters and avoiding electromagnetic interference.

- Make sure that all equipments in the cabinet have been connected reliably to the public Y-type earth point or earth bus with thick and short cable. The motor earth should be as close as possible. Please do not connect the motor shell to earth terminal of the inverter or the protective area of control system.
- Make sure that all devices connected to the inverter are connected to the same earth net or Y-type earth point with thick and short cable.
- It would be better for conductors to be flat and multi-core since they have lower impedance at high frequencies.
- When cutting off the tip, the cable should be as neat as possible to make sure that the

unscreened wires are as short as possible.

- Wiring of control cable should be away from the power supply cable and motor cable as far as possible; separate trunk should be used and a 90° vertical cross must be used when the supply power cable and the motor cable intersect.
- Make sure that the contactor should be installed in a cabinet with a surge suppressor. Alternatively, the AC contactor coil is connected with 'R-C' damping circuit, using a coil voltage corresponding varistor; the DC contactor coil is connected with 'flywheel' diodes or pressure thermistor type devices corresponding to the coil voltage, which is particularly important when the contactor frequently operates and when contactor is controlled by the output relay of the inverter.
- Cable connected to motor should be shielded cable or armored cable. The two barriers are earthed reliably by cable earthing card.
- Installation of 'Input Noise Filter' can reduce electromagnetic interference from other devices of the grid side, 'Input Noise Filter' must be as close to the inverter input terminals, at the same time, the filter must earth reliably as the inverter.
- Installation 'output side noise filter' can reduce interference from radio interference and induction noise. 'Output side noise filter' must be as close to the inverter output terminals, at the same time, the filter must earth reliably as the inverter.
- Control circuit cable should be shielded cables all the time;
- Adding zero phase reactor in power supply wire near inverter input terminal, adding zero phase reactor in the motor wire near inverter output terminal and adding zero phase reactor in control wire near inverter control terminal to efficiently reduce electromagnetic interference to the inverter.
- Earth

Right and reliable earth is the basic condition of safe and reliable running of the product. For right earth, please read the following notice carefully.

	<ul style="list-style-type: none"> ● To avoid electric shock, earth cable should be the size as specified in the technical standards for electrical equipment. And cable length should be as short as possible. Otherwise, leakage current of inverter would cause unstable potential of the earth terminal which is far from the earth point, and electric shock accident would happen frequently. ● Be sure to ground the ground terminal. Grounding resistance 10Ω or less, it may cause injury or death ● Earth terminal must be earth. Earth resistance must be below 10Ω. Otherwise, there is danger of injury and death.
	<ul style="list-style-type: none"> ● Please do not share earth cable with welder or other big current/pulse power equipment. Otherwise, inverter would act abnormally. ● When multi inverters are used at the same time, please do not wind the earth wire to loop-type. Otherwise, inverter will act abnormally.

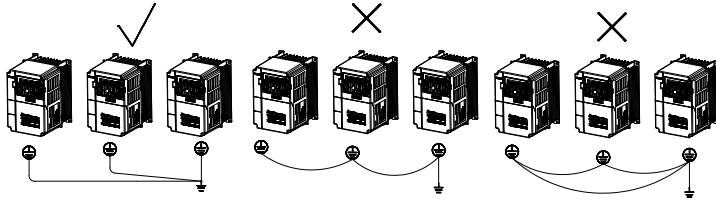


Chart 3-4: Multi AC200 Series Inverters United Earth

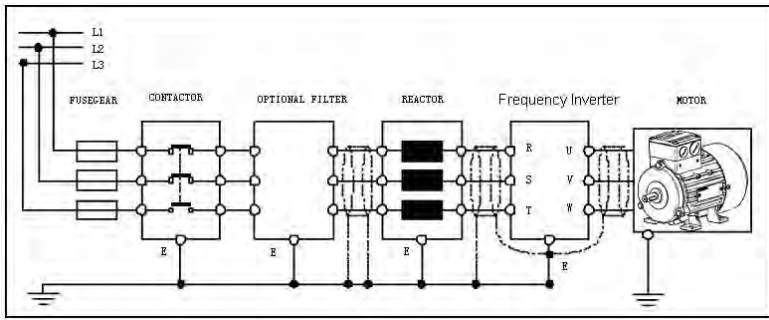


Chart 3-5: AC200 Series Inverter System Earth

Note: motor must earth as close as possible. Motor shell can't be connected to the inner earth terminal of the inverter and it can't share the earth net with the control system either.

● Power cable, motor cable, control cable of inverter

Shielding layer (reticulate/armored) should be wound reliably by cable earth card and then fixed to inverter earth piece by bolt. Please refer to the following chart.

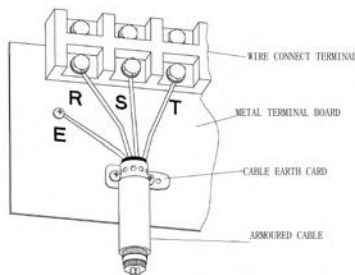


Chart 3-6: Cable Earth Card for Cable Earth

● Correspondence between inverter and motor cable length and carrier frequency

When wiring distance between inverter and motor is long (especially low-frequency output), cable voltage drop will cause the motor torque reduction. Moreover, high-frequency leakage current will increase, thereby causing an increase of inverter output current, which would cause the inverter over current trip. And the current detection accuracy and running stability would be seriously affected. Please refer to the cable length in the following table to adjust the carrier frequency. When

system requires the wiring distance to be more than 100m, please adopt distributed capacity reduce measure (Such as “no metal conductor covers cable”, “wire each phase cable apart” and so on)

Cable length	<20m	20~50m	50~100m	>100m
Carrier frequency	0.7~16kHz	0.7~8kHz	0.7~4kHz	0.7~2kHz

Chart 3-2: Correspondence between Inverter and Motor Cable Length and Carrier Frequency

3.5 Machinery Installation

Installation Notice and Related Requirement

- AC200 inverter components

Chart 3-7: AC200 Series Inverter Components

- Installation Direction

To prevent reduction of inverter cooling effect, please do install the inverter longitudinally-mounted.

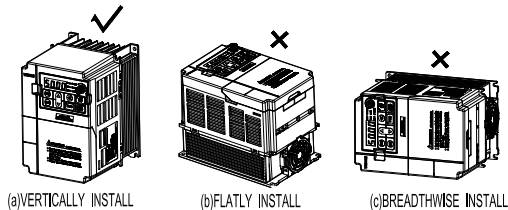


Chart 3-8: AC200 Series Inverter Installation Direction

- Installation Space

Single machine installation: to ensure enough ventilation and wiring space for inverter cooling, please follow installation conditions as follows. The back of the inverter should stick to the wall so that the surrounding air of radiator can flow freely to ensure the cooling effect.

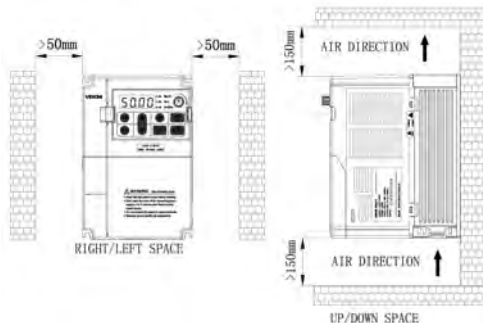


Chart 3-9: Single AC200 Series Inverter Installation Space

Multi inverters paratactic installation: when installing multi inverters in cabinet, please ensure installation space as required below.

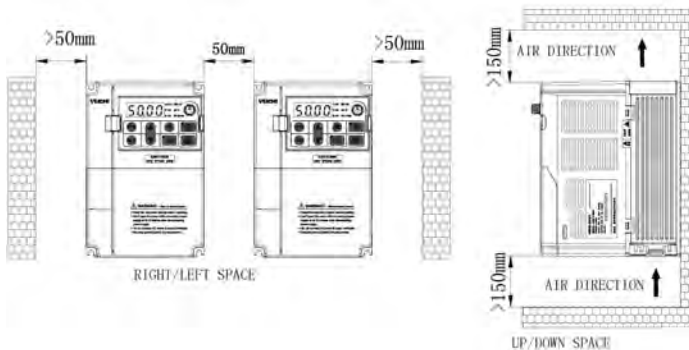
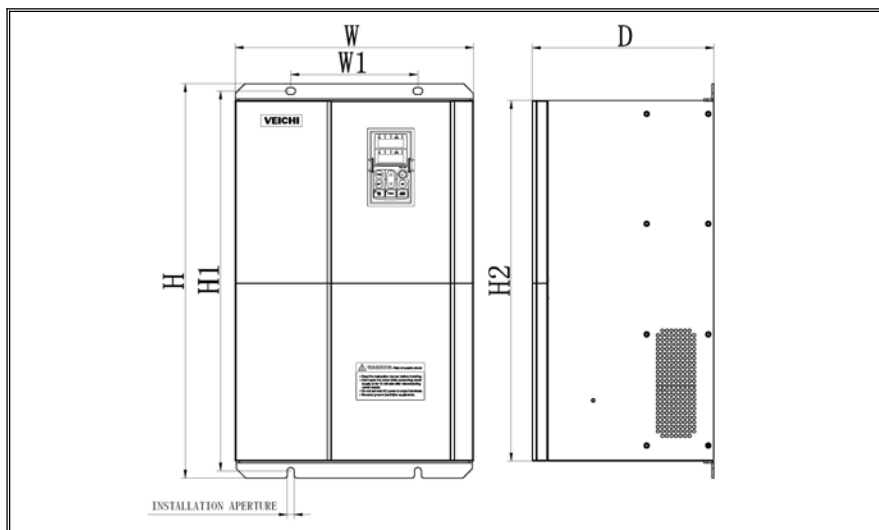


Chart 3-10: Multi AC200 Series Inverters Paratactic Installation Space Requirement Overall Dimension of Inverter and Keyboard

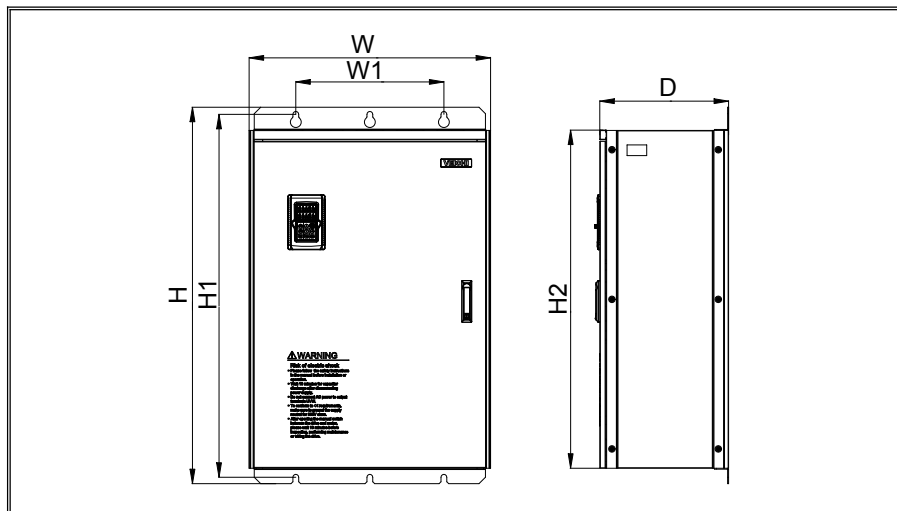
MODEL	W	W1	H	H1	D	D1	INSTALLATI ON APERTURE

AC200-S2-R40G	122	112	182	171	154.5	145	φ5
AC200-S2-R75G							
AC200-S2-1R5G							
AC200-S2-2R2G	159	147.2	246	236	157.5	148	φ5.5
AC200-T3-R75G	122	112	182	171	154.5	145	φ5
AC200-T3-1R5G							
AC200-T3-2R2G							
AC200-T3-004G	159	147.2	246	236	157.5	148	φ5.5
AC200-T3-5R5G							
AC200-T3-7R5G	195	179	291	275	167.5	158	φ7
AC200-T3-011G							
AC200-T3-015G	230	208	330	315	200	190	φ7
AC200-T3-018G							
AC200T3-022G							



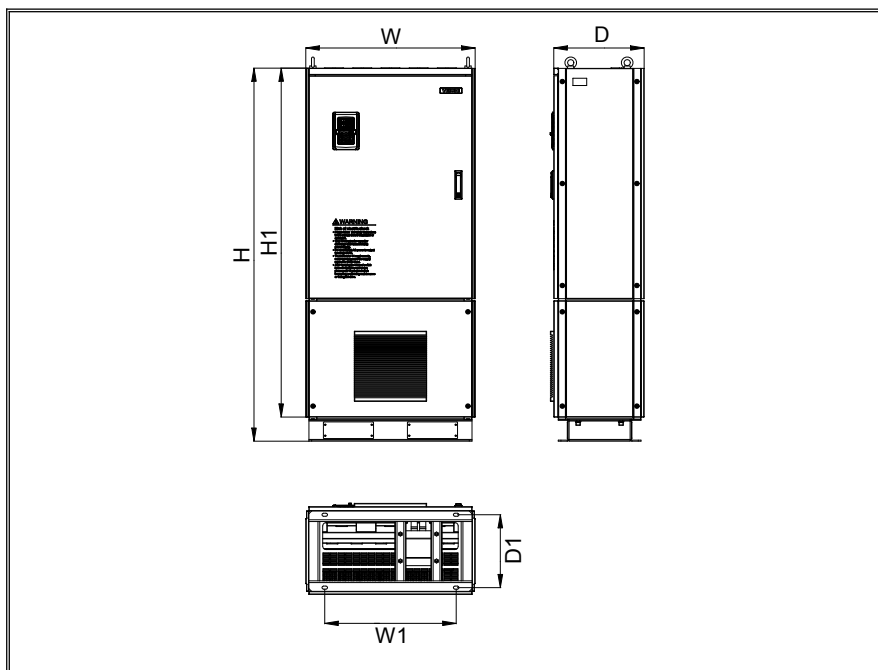
MODEL	Overall Dimension				Instillation Position		INSTALLATI ON APERTURE
	W	H	D	H2	W1	H1	
AC200-T3-030G	255	410	225	370	180	395	φ7
AC200-T3-037G	305	570	260	522	180	550	φ9

AC200-T3-045G							
AC200-T3-055G							
AC200-T3-075G	380	620	290	564	240	595	φ11
AC200-T3-090G							
AC200-T3-110G							



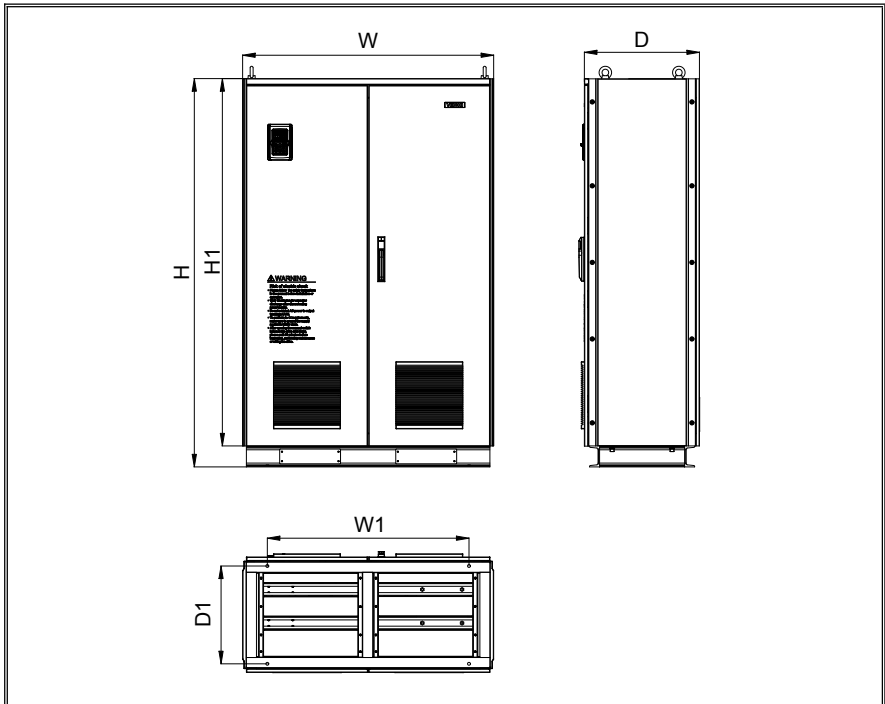
MODEL	Overall Dimension				Instillation Position		INSTALLATI ON APERTURE
	W	H	D	H2	W1	H1	
AC200-T3-132G	500	780	340	708	350	755	φ11
AC200-T3-160G	650	1060	400	950	400	1023	φ16
AC200-T3-185G							
AC200-T3-200G							
AC200-T3-220G	750	1170	400	1050	460	1128	φ18
AC200-T3-250G							
AC200-T3-280G							
AC200-T3-315G	850	1280	450	1150	550	1236	φ20
AC200-T3-355G							
AC200-T3-400G							

Notice: No DC Reactor Inside



MODEL	Overall Dimension				Instillation Position		INSTALLATI ON APERTURE
	W	H	D	H1	W1	D1	
AC200-T3-160GD	650	1600	400	1500	492	332	φ14
AC200-T3-185GD							
AC200-T3-200GD							
AC200-T3-220GD	750	1700	400	1600	582	332	φ14
AC200-T3-250GD							
AC200-T3-280GD							
AC200-T3-315GD	850	1800	450	1700	622	382	φ14
AC200-T3-355GD							
AC200-T3-400GD							

Notice: DC Reactor Inside



MODEL	Overall Dimension				Instillation Position		INSTALLATION APERTURE
	W	H	D	H1	W1	D1	
AC200-T3-450G	1200	1850	550	1750	960	466	φ14
AC200-T3-500G							
AC200-T3-560G							

Chart 3-3: AC200 Series Inverter Overall Dimension

Keyboard Shape and Mouth Dimension

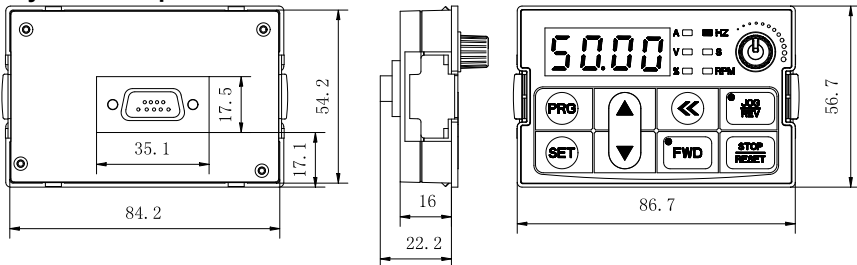


Chart 3-11:AC200 Series Inverter Single Line LED Keyboard Overall Dimension

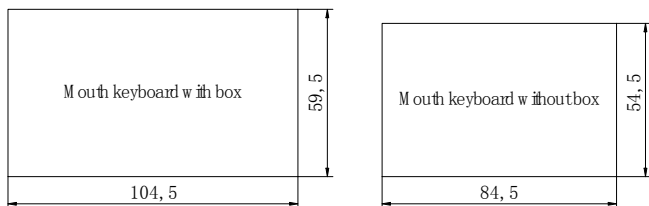


Chart 3-12:AC200 Series Inverter Mouth Dimension for Single Line LED Keyboard Case

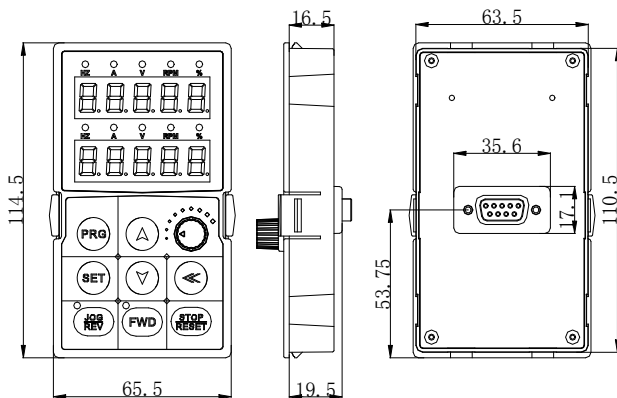


Chart 3-13: AC200 Series Inverter Double Line LED Keyboard Overall Dimension

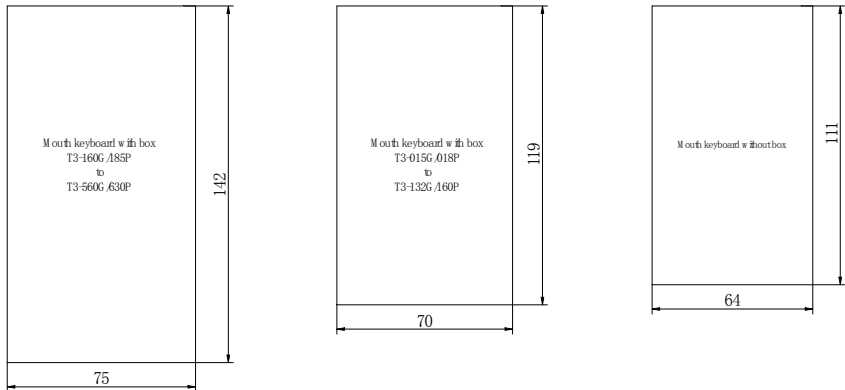
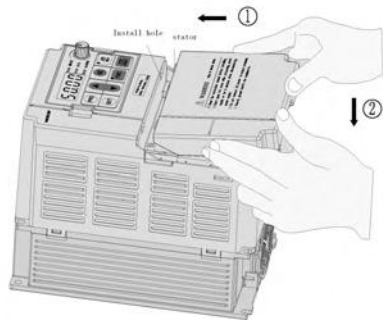


Chart 3-14: AC200 Series Inverter Mouth Dimension for Double Line LED Keyboard Case
Note: LCD and LED keyboard overall dimensions and the opening dimensions are fully compatible.

Installation and Dismantlement of Tail-hoc

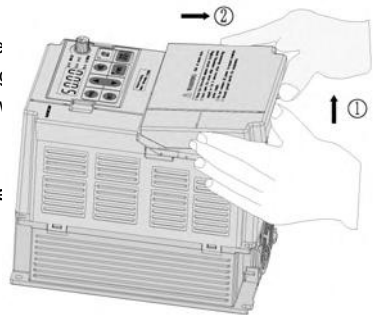
Installation: First the tail-hood upwardly inclines around degree and then inserts the top fixed flat into the fixed the front cover. Then slightly press the tail-hood down. When you hear "Ka", it means that the tail-hood is inst in place.

Chart 3-15:AC200 Series Inverter Tail-hood Installa



Dismantlement: At the tail of the frequency inverter, there special dismantlement hole design. Put your finger through hole, upwardly pull the cover slightly until the buckle between the tail-hood and the crust tear off, and then remove the tail-hood.

Chart 3-16:AC200 Series Inverter Tail-hood Dismantle



Installation and Dismantlement of keyboard

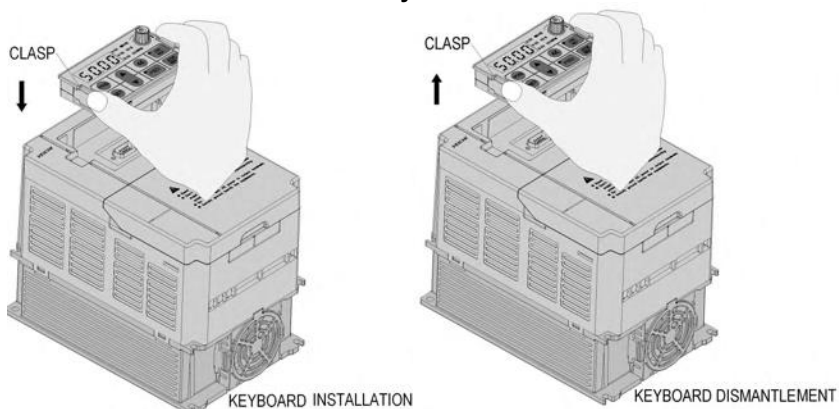





Chart 3-17:AC200 Series Inverter Keyboard Installation and Dismantlement

3.6 Electrical Installation

To ensure safe, reliable and rational use of this product, please fully understand the safety precautions described in this manual before using.

Safety Precautions

	<ul style="list-style-type: none"> ● Inverter must earth reliably when running. Otherwise there is danger of casualty and unstable inverter performance. ● To ensure safety running, only trained personnel can do installation and wiring job. ● No operation under power connected state. Otherwise there might be danger of electric shock even death. ● Please turn off the power of all related equipment, and make sure the main circuit DC voltage has dropped to a safe level, and wait five minutes before any relevant job.
	<ul style="list-style-type: none"> ● The wiring of control cables, power cables and motor connection cables must be isolated from each other and do not put them in the same cable though or cable racks. ● The device can only be used as specified by the manufacturer, Please consult Veichi when using in special case.
	<ul style="list-style-type: none"> ● No insulation tests for the inverter or the related cable by HV insulation test equipment. ● If the inverter or the peripheral equipment (filer, reactor and etc) needs insulation test, firstly 500V meter should be used to test the insulation resistance, which should not be lower than 4MΩ.

Standard Connection Diagram

● Standard Connection Diagram

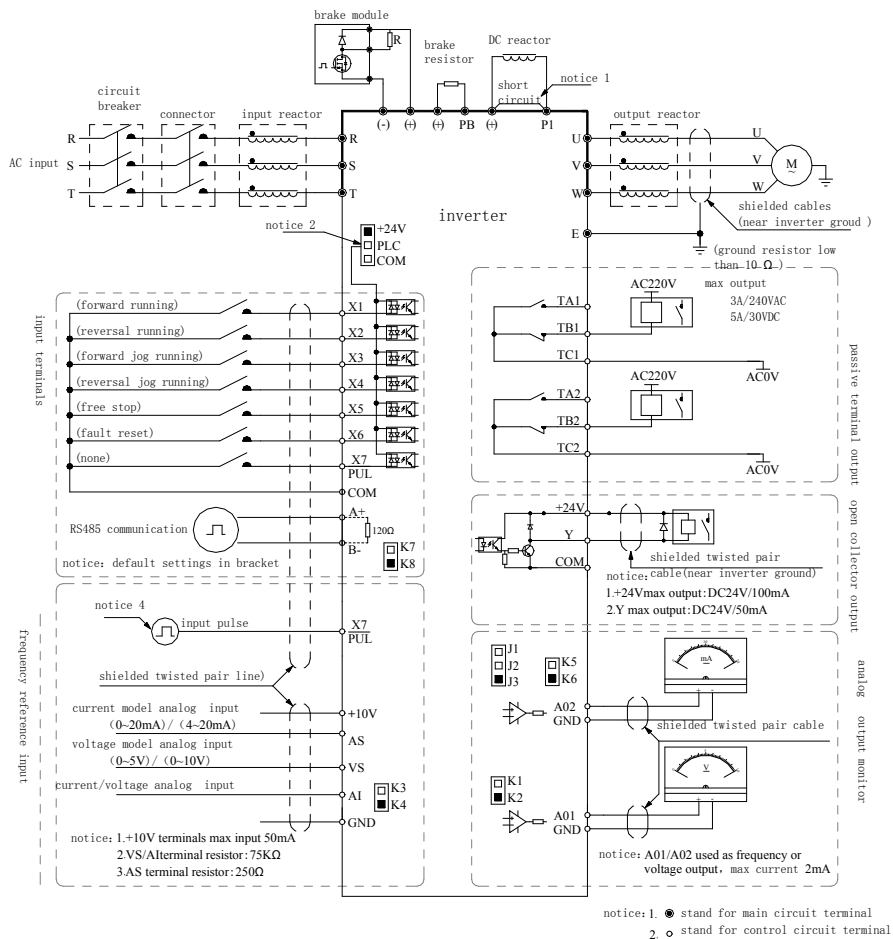


Chart 3-18: AC200 Series Inverter Standard Connection Diagram

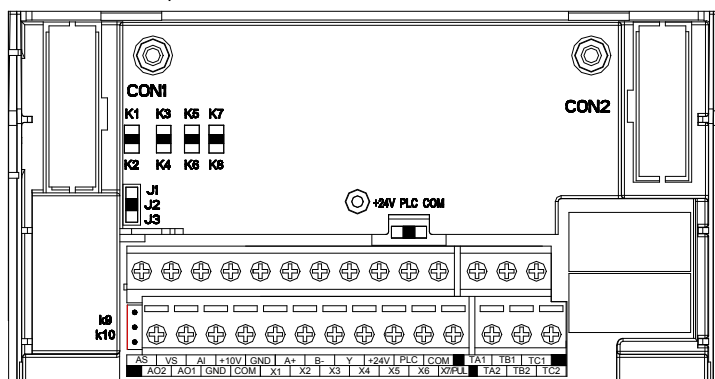
- Note: 1. When installing DC reactor, make sure to dismantle the short connector between terminal P1 and (+).
- NPN or PNP transistor signal can be selected as input of multi-function input terminal (X1~X7/PUL). Inverter built-in power supply (+24V terminal) or external power supply (PLC terminal) can be chosen as bias voltage. Factory setting '+24V' short connect with 'PLC'.
 - Analog monitor output is the special output for meters such as frequency meter, current meter and voltage meter. It can't be used for control operations such as feedback control.
 - As there are multi pulse styles, please refer to the line connect mode description details.

● Auxiliary Terminal Output Capacity

Terminal	Function Definition	Max Output
+10V	10V auxiliary power supply output, constitutes loop with GND.	50mA
A01/A02	Analog monitor output, constitutes loop with GND.	Max output 2mA as frequency, voltage signal,
+24V	24V auxiliary power supply output, constitutes loop with COM.	100mA
Y	Collector open circuit output; can set the action-object by program.	DC24V/50mA
TA1/TB1/T C1 TA2/TB2/T C2	Passive connector output; can set the action-object by program.	3A/240VAC 5A/30VDC

Chart 3-4: AC200 Series Inverter Auxiliary Terminals Output Capacity

● Connection Function Specification of Switch Terminals



Switch Terminal	Selecting Position	Function Specification
S1	K1	AO1:0~20mA or 4~20mA current output
	K2	AO1:0~10V voltage output
S2	K3	AI:0~20mA or 4~20mA input current
	K4	AI: 0~10V input voltage
S3	K5	AO2: 0.0~100kHz (J1 on), open collector circuit output
	K6	AO2:0.0~100kHz (J1 on), active source output
S4	K7	RS485: connect with 120Ω terminal resistor
	K8	RS485:connect without 120Ω terminal resistor
S5	J1	AO2:0.0~100kHz frequency output

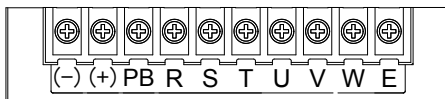
	J2	AO2:0~20mA or 4~20mA current output
	J3	0~10V voltage output
S6	+24V	Short +24V terminal and PLC terminal
	PLC	PLC terminal receiving external power input, detailed in Drawing
	COM	Short PLC terminal and COM terminal
S7	K9	Disconnect GND terminal and PE discharge loop
	K10	Connect GND terminal and PE discharge loop

Chart 3-5: AC200 Series Inverter Switch Terminal Connection Function Specification

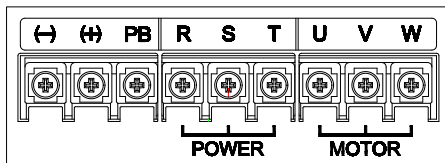
Main Circuit Terminals

- Main circuit terminals array and definition

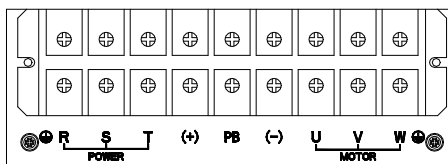
Arrangement sequence of main circuit terminal with 18.5kW or less power(15 ~ 18.5KW for steel cover machine)



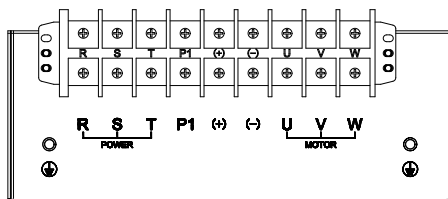
Arrangement sequence of main circuit terminal with 15-22KW(15~22KW for plastic cover machine)



Arrangement sequence of main circuit terminal with 22~30KW (standard machine without PB terminal) (22KW for steel cover machine)



Arrangement sequence of main circuit terminal with 37~110kW



Terminal	Name	Function Definition
(-)	DC power terminal	DC power output, (-) means DC bus cathode, (+) means DC bus anode, used for external braking unit.
(+)		
(+) PB	Braking resistance terminal	Used for external braking resistance to realize quick stop.
P1	DC reactor terminal	Used for external DC reactor.
(+)		
R	Inverter input terminal	Used to connect 3-phase AC power supply.
S		
T		
U	Inverter output terminal	Used to connect the motor.
V		
W		
\oplus E	Earth	Earth terminal, earth resistance<10Ω

Chart 3-6:AC200 Series Inverter Main Circuit Terminals Array and Definition

● 3-phase 380V Machine Main Circuit Wiring

Model	Main Circuit Terminals Screw Specifications	Suggested Fixed Moment (N·m)	Suggested Copper-core Cable Specification mm ² (AWG)
AC200-T3-R75G	M4	1.2~1.5	1.5mm ² (14)
AC200-T3-1R5G	M4	1.2~1.5	2.5mm ² (12)
AC200-T3-2R2G	M4	1.2~1.5	2.5mm ² (12)
AC200-T3-004G	M4	1.2~1.5	4mm ² (10)
AC200-T3-5R5G	M4	1.2~1.5	6mm ² (9)
AC200-T3-7R5G	M5	2~2.5	6mm ² (9)
AC200-T3-011G	M5	2~2.5	10mm ² (7)
AC200-T3-015G	M6	4~6	10mm ² (7)
AC200-T3-018G	M6	4~6	16mm ² (5)
AC200-T3-022G	M8	8~10	16mm ² (5)
AC200-T3-030G	M8	8~10	25mm ² (3)
AC200-T3-037G	M8	8~10	25mm ² (3)
AC200-T3-045G	M8	8~10	35mm ² (2)

AC200-T3-055G	M10	11~13	35mm ² (2)
AC200-T3-075G	M10	11~13	50mm ² (1)
AC200-T3-090G	M10	11~13	50mm ² (1/0)
AC200-T3-110G	M10	11~13	70mm ² (2/0)
AC200-T3-132G	M10	11~13	95mm ² (3/0)
AC200-T3-160G	M12	14~16	95mm ² (4/0)
AC200-T3-185G	M12	14~16	120mm ²
AC200-T3-200G	M12	14~16	150mm ²
AC200-T3-220G	M12	14~16	150mm ²
AC200-T3-250G	M12	14~16	185mm ²
AC200-T3-280G	M12	14~16	185mm ²
AC200-T3-315G	M16	20~23	240mm ²
AC200-T3-355G	M16	20~23	240mm ²
AC200-T3-400G	M16	20~23	300mm ²
AC200-T3-450G	M16	20~23	400mm ²
AC200-T3-500G	M16	20~23	400mm ²
AC200-T3-560G	M16	20~23	500mm ²

Note: Here we suggest using copper joins for mains electric connectors for machine over 185KW. Please refer to diagram above for the cut section area.

Chart 3-7: Suggested Cable Diameter and Fixed Moment of 3-phase 380V Machine Main Circuit

● Single-phase 220V Machine Main Circuit Wiring

Model	Main Circuit Terminals Screw Specifications	Suggested Fixed Moment (N·m)	Suggested Copper-core Cable Specification mm ² (AWG)
AC200-S2-R40G	M4	1.2~1.5	1.5mm ² (14)
AC200-S2-R75G	M4	1.2~1.5	2.5mm ² (12)
AC200-S2-1R5G	M4	1.2~1.5	2.5mm ² (12)
AC200-S2-2R2G	M4	1.2~1.5	4mm ² (10)

Chart 3-8: Suggested Cable Diameter and Fixed Moment Single-phase 220V Machine Main Circuit

● Suggested Main Circuit Components Specification

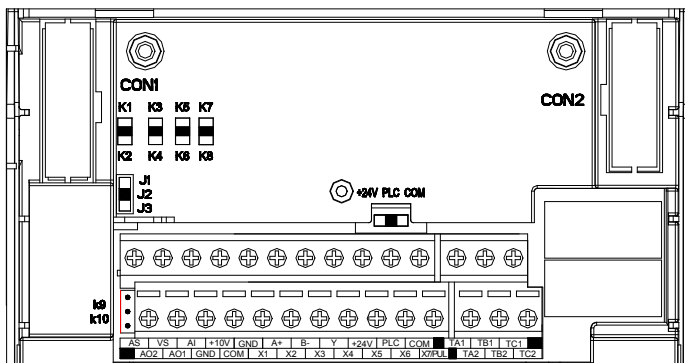
Model	Contactur Specificatio	Breaker Specificatio	DC Reactor	Input Filter	Output Filter
AC200-T3-R75G	10A	10A	-----	NFI-005	NFO-010
AC200-T3-1R5G	10A	10A	-----	NFI-005	NFO-010
AC200-T3-2R2G	16A	15A	-----	NFI-010	NFO-010
AC200-T3-004G	16A	20A	-----	NFI-010	NFO-010
AC200-T3-5R5G	25A	20A	-----	NFI-020	NFO-020
AC200-T3-7R5G	25A	30A	-----	NFI-020	NFO-020

AC200-T3-011G	32A	40A	-----	NFI-036	NFO-036
AC200-T3-015G	40A	50A	-----	NFI-036	NFO-036
AC200-T3-018G	50A	60A	-----	NFI-050	NFO-050
AC200-T3-022G	50A	75A	-----	NFI-050	NFO-050
AC200-T3-030G	63A	100A	DCL-80	NFI-080	NFO-080
AC200-T3-037G	80A	125A	DCL-100	NFI-100	NFO-100
AC200-T3-045G	100A	150A	DCL-110	NFI-100	NFO-100
AC200-T3-055G	125A	175A	DCL-125	NFI-150	NFO-150
AC200-T3-075G	160A	200A	DCL-150	NFI-150	NFO-150
AC200-T3-090G	220A	250A	DCL-200	NFI-200	NFO-300
AC200-T3-110G	220A	300A	DCL-200	NFI-200	NFO-300
AC200-T3-132G	250A	400A	DCL-300	NFI-300	NFO-300
AC200-T3-160G	300A	500A	DCL-300	NFI-300	NFO-300
AC200-T3-185G	400A	600A	DCL-400	NFI-400	NFO-400
AC200-T3-200G	400A	700A	DCL-400	NFI-400	NFO-400
AC200-T3-220G	630A	800A	DCL-500	NFI-600	NFO-600
AC200-T3-250G	630A	1000A	DCL-600	NFI-600	NFO-600
AC200-T3-280G	630A	1200A	DCL-600	NFI-600	NFO-600
AC200-T3-315G	630A	1200A	DCL-800	-----	-----
AC200-T3-355G	800A	1400A	DCL-800	-----	-----
AC200-T3-400G	1000A	1600A	DCL-1000	-----	-----
AC200-T3-450G	1000A	2000A	DCL-1000	-----	-----
AC200-T3-500G	1000A	2000A	DCL-1200	-----	-----
AC200-T3-560G	-----	2000A	DCL-1200	-----	-----

Note: For specification details and circuit mode of DC reactor, input filter, output filter and other components, please refer to Chapter 7 "Peripheral Equipments and Options".

Chart 3-9: Suggested Mains Fittings for 3-phase 380V Machine**Control Loop Terminals**

- Control Loop Terminals Array:



Category	Terminal Symbol	Name	Function Definition
Power	+10V-GND	+10V power supply	Supply +10V power, max output current: 50 mA, usually used for potentiometer supply, resistance of potentiometer range: 1K Ω ~ 5K Ω
	+24V-COM	+24V power supply	Supply +24V power, usually used for digital input/output terminals and external sensors, max output current: 100 mA
	PLC	Public terminal	Connect with +24V terminal by factory default. When using external signal to drive X1-X7/PUL, PLC must be connected with external power, and be disconnected with +24V terminal (detailed in Drawing 3-22, 3-23)
Analog input	AS-GND	Current analog input	1. input current range: DC 0mA ~ 20mA 2. input impedance: 500 Ω
	VS-GND	Voltage analog input	1. input voltage range: DC 0V ~ 10V 2. input impedance: 75 K Ω
	AI-GND	Voltage or current analog input	1. input range: DC 0V ~ 10V/0mA ~ 20mA, decided by switch S2 (detailed in Drawing 3-5) 2. voltage input impedance: 75 K Ω 3. current input impedance: 500 Ω
Digital input	X1-PLC	Multi-function input 1	Optocoupler, compatible with bipolar input. 1. input resistor: 4.4 K Ω 2. Voltage range when level input: 10 ~ 30V
	X2-PLC	Multi-function input 2	
	X3-PLC	Multi-function input 3	
	X4-PLC	Multi-function input 4	

	X5-PLC	Multi-function digital input 5	
	X6-PLC	Multi-function digital input 6	
	X7/PUL-PLC	Multi-function digital input 7/High speed impulse input	
Analog output	AO1-GND	Analog output 1	Selecting slide switch S1 determine the voltage or current output(See chart 3-5) 1. Output voltage range: DC 0V ~ 10V 2. Output current range: DC 0mA ~ 20mA
	AO2-GND	Analog output 2	Selecting slide switch S5 determine the voltage/current/high speed impulse output(See chart 3-5) 1. Output voltage range: DC 0V ~ 10V 2. Output current range: DC 0mA ~ 20mA 3. Impulse output range: 0 ~ 100kHz When impulse output, set [F3.53] "00" digit = 3. Selecting slide switch S5 determine active pulse or open collector output(See chart 3-5)
Digital output	Y-COM	Digital output 1	Optocoupler , open collector output 1. Output voltage range: DC 0V ~ 30V 2. Output current range: DC 0mA ~ 50mA
Relay output	TA1-TC1	Normally open terminal 1	Contactor drive capability: 240VAC, 3A 30VDC, 5A
	TB1-TC1	Normally closed terminal 1	
	TA2-TC2	Normally open terminal 2	
	TB2-TC2	Normally closed terminal 2	
Communication terminal	A+	Communication terminal A+	RS485 communication interface. Selecting slide switch S4 determine RS485 communication terminal resistor 120 Ω
	B-	Communication terminal B-	

Chart 3-10: AC200 Series Inverter Control Loop Terminals Array and Definition

● Control Loop Terminal Wiring Specification

Terminal	Bolt Specification (mm)	Fixed Moment (N·m)	Cable specification (mm ²)	Cable Type
----------	-------------------------	--------------------	--	------------

A+ B-	M2.5	0.4~0.6	0.75	Twisted-pair shielded cable
+10V GND A01 A02 AS VS AI	M2.5	0.4~0.6	0.75	Twisted-pair shielded cable
+24V COM Y TA1 TB1 TC1 TA2 TB2 TC2 PLC X1 X2 X3 X4 X5 X6 X7/PUL	M2.5	0.4~0.6	0.75	Shielded cable

Chart 3-11: Control Loop Terminal Wiring Specification

Braking Unit (Braking Resistance) Connection

- Brake resistance wiring of machine with 18.5KW or less power (15KW-18.5KW for steel cover machine)

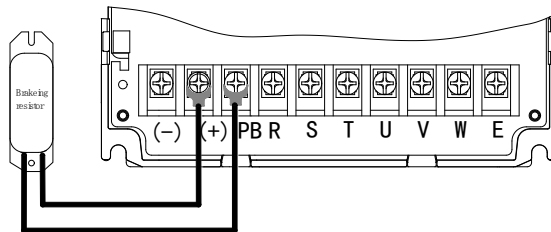


Fig 3-19: AC200 Series Frequency Inverter Brake resistance wiring of machine with 18.5KW or less power

- Brake resistance wiring of machine with 15-22KW (for plastic cover machine)

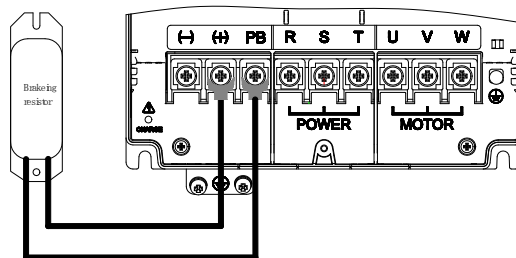


Fig 3-20: AC200 Series Frequency Inverter Brake resistance wiring of machine with 15-22KW (for plastic cover machine)

- Brake resistance wiring of machine with 22KW and 30KW(built-in brake is optional) (22KW for steel cover machine)

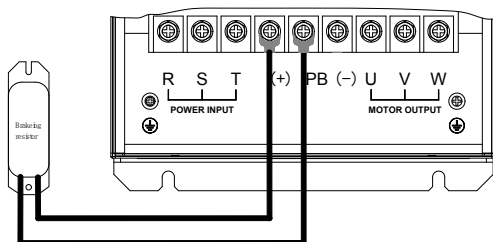


Fig 3-21: AC200 Series Frequency Inverter Brake resistance wiring of machine with 22KW and 30KW(built-in brake is optional) (22KW for steel cover machine)

- Brake resistance wiring of machine with 37KW or above

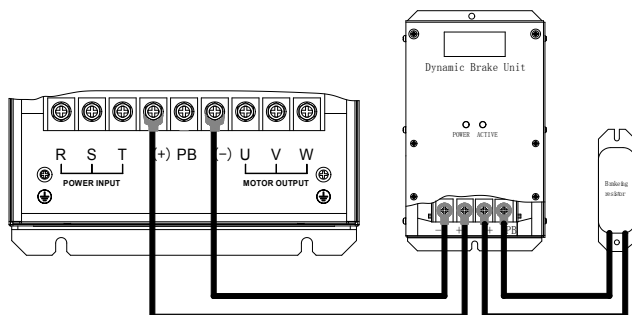


Fig 3-22: AC200 Series Frequency Inverter Brake resistance wiring of machine with 37KW or above

- Suggested braking resistance specification parameters

The braking resistance value and resistance power in the chart below are in accordance with the general inertia of the load and intermittent braking mode. In large inertia and long braking frequent occasions, adjust resistance value and power according to the inverter specification and the rated parameter of braking unit. If any problem, please consult customer service department of Shenzhen Veichi Electric Co., Ltd.

Three-phase 380V			
Motor power(kW)	Resistance	Resistance Power(kW)	Braking Moment (%)
0.75 kW	750 Ω	150W	100%
1.5 kW	400 Ω	300W	100%
2.2 kW	250 Ω	400W	100%
4.0 kW	150 Ω	500W	100%
5.5 kW	100 Ω	600W	100%
7.5 kW	75 Ω	780W	100%
11 kW	50 Ω	1,200W	100%

15 kW	40 Ω	1,500W	100%
18.5 kW	32 Ω	2,000W	100%
22 kW	32 Ω	2,000W	100%
30 kW	24 Ω	3,000W	100%
37 kW	20 Ω	3,700W	100%
45 kW	16 Ω	4,500W	100%
55 kW	13 Ω	5,500W	100%
75 kW	9 Ω	7,500W	100%
90 kW	6.8 Ω	9,300W	100%
110 kW	6.2 Ω	11,000W	100%
132 kW	4.7 Ω	13,000W	100%
160 kW	3.9 Ω	15,000W	100%
185 kW	3.3 Ω	17,000W	100%
200 kW	3 Ω	18,500W	100%
220 kW	2.7 Ω	20,000W	100%
250 kW	2.4 Ω	22,500W	100%
280 kW	2 Ω	25,500W	100%
315 kW	1.8 Ω	30,000W	100%
355 kW	1.5 Ω	33,000W	100%
400 kW	1.2 Ω	42,000W	100%
450 kW	1.2 Ω	42,000W	100%
500 kW	1 Ω	42,000W	100%
560 kW	1 Ω	50,000W	100%
Single-phase 220V			
Motor power(kW)	Resistance	Resistance power(kW)	Braking moment (%)
0.4 kW	400Ω	100W	100%
0.75 kW	200Ω	120W	100%
1.5 kW	100Ω	300W	100%
2.2 kW	75Ω	300W	100%

Chart 3-12: Suggested Braking Resistance Specification Parameters of AC200 Series Inverter

- Build-in braking unit max braking performance

Braking unit of AC200 series product with low power can be selected according to the suggested braking resistance specification parameters in chart 3-11. In large inertia or long time frequent braking occasion, the moment should be increased. The max braking power is stated in the following chart and the range of which can't be exceeded in use. Otherwise the equipment may be damaged. If any problem, please consult customer service department of Shenzhen Veichi Electric

Co., Ltd.

Three-phase 380V			
Inverter Model	Motor Power	Max Braking Current	Min Resistance
AC200-T3-R75G	0.75 kW	3.5A	200 Ω
AC200-T3-1R5G	1.5 kW	3.5A	200 Ω
AC200-T3-2R2G	2.2 kW	7A	100 Ω
AC200-T3-004G	4 kW	10A	75 Ω
AC200-T3-5R5G	5.5 kW	10A	75 Ω
AC200-T3-7R5G	7.5 kW	14A	50 Ω
AC200-T3-011G	11 kW	17A	40 Ω
AC200-T3-015G	15 kW	23A	30 Ω
AC200-T3-018G	18.5 kW	28A	25 Ω
AC200-T3-022G	22 kW	28A	25 Ω
Single-phase 220V			
Inverter Model	Motor Power	Max Braking Current	Min Resistance
AC200-S2-R40G	0.4 kW	3.8A	100 Ω
AC200-S2-R75G	0.75 kW	3.8A	100 Ω
AC200-S2-1R5G	1.5 kW	6.5A	60 Ω
AC200-S2-2R2G	2.2 kW	10.5A	40 Ω

Chart 3-13: AC200 Series Inverter Build-in Braking Unit Max Braking Power

Multi-functional Contact Input Connection

- NPN transistor connection mode

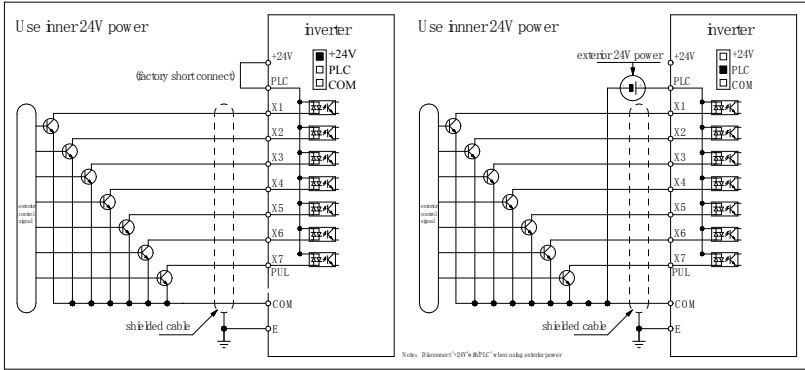


Chart 3-23: NPN Transistor Digital Input Signal Connection Mode

- PNP transistor connection mode

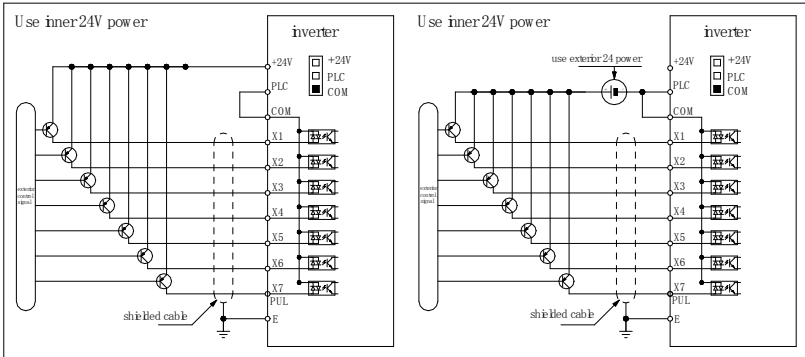


Chart 3-24: PNP Transistor Digital Input Signal Connection Mode

Digital output signal connection

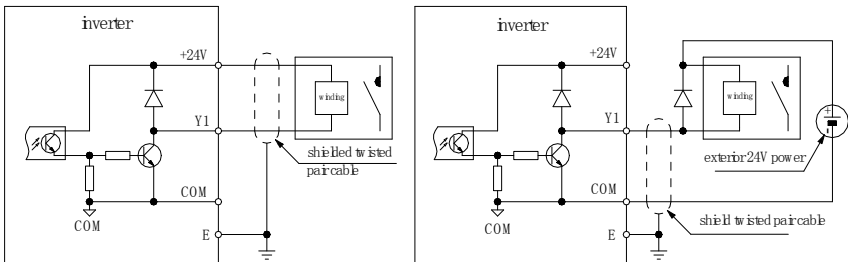


Chart 3-25: AC200 Series Inverter Digital Output Signal Connection Mode

Analog Output Signal Connection

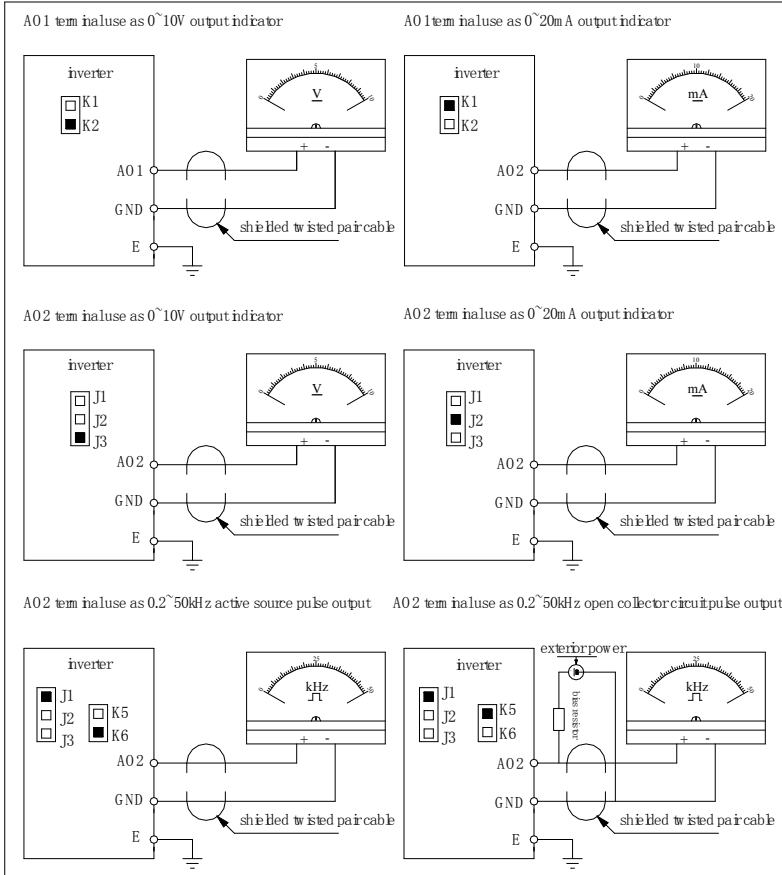


Chart 3-26: AC200 Series Inverter Analog Output Signal Connection Mode

Connection of Pulse Input Signal

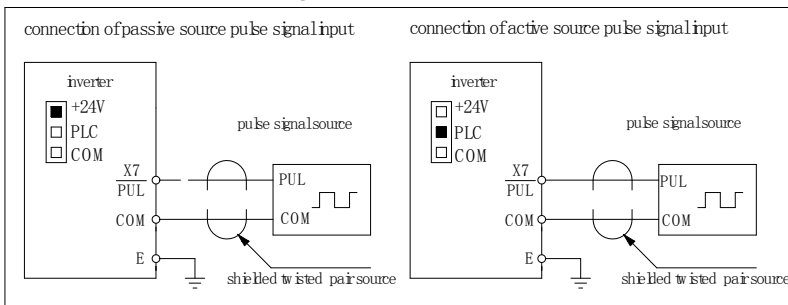


Chart 3-27: Pulse Input Signal Connection Mode of AC200 Series Inverter

Standby Control System

Frequency inverter is composed of semiconductor, passive electronic component and driving part. And these devices have working life even under normal working conditions and these devices may also have characteristic variation or failure. These characteristics change or failure would inevitably lead to failure of the product. Setting standby control system when using the inverter is highly recommended to prevent lost production caused by product failure.

Figure 3-28 is the standby control system for manual switch converting to direct driving motor of power supply when inverter fails. Standby control systems such as power supply Y/Δ step-down start way driving motor, power supply self-coupling reduction voltage start mode driving motor, power supply soft start mode driving motor or standby inverter system can be chose to use according to the actual needs and environment.

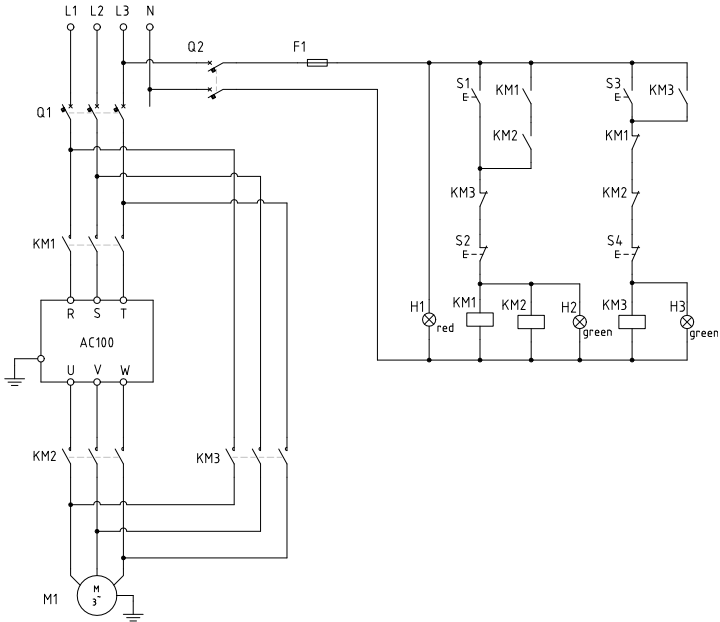





Figure 3-28: Standby Control System of Power Supply Direct Driving Mode

Chapter 4 Basic Operation and Trial Run

4.1 Safety Precautions









	<ul style="list-style-type: none"> ● No wiring while power supply is connected. Otherwise there is danger of electric shock.
	<ul style="list-style-type: none"> ● No operation while the cover is open. Otherwise, there is danger of electric shock. ● Please ensure reliable earth. Otherwise, there is danger of electric shock and fire. ● Before wiring please cut power supply of all related equipments and ensure main DC voltage in safe range. And please do operation after 5 mins. ● Only professional trained person is allowed to operate this product. ● Please do not dismantle the inverter cover while it is electrified. Otherwise, there is danger of electric shock. ● Please do not touch the printed circuit board of the inverter while it is electrified. Otherwise, there is danger of electric shock. ● Please ensure reliable mains cable connection. If the mains cable is loose, there is danger of fire caused by joint overheat. ● Before electrifying, please check the power voltage again. Wrong power voltage can cause fault or damage the inverter, even cause fire. ● Please do not install inverter on flammable material or attach flammable material to the inverter. Before electrifying, please clear the surroundings.
	<ul style="list-style-type: none"> ● While operation, please follow the ESD regulations. Otherwise, the inverter maybe damaged. ● Please don't cut the power directly while the inverter drives the motor running. The power can't be cut until the motor totally stop. Otherwise, the inverter maybe damaged. ● Please don't cut or connect motor while the inverter drives the motor running. The motor can't be cut or connect until the inverter output is 0. Otherwise, the inverter maybe damaged. ● Control cable should be twisted-pair shielded cable. The barrier should be connected to the inverter earth terminal reliably to prevent the inverter from abnormal working. ● Unprofessional person can not operate, install, wiring, debug and maintain. ● Change, dismantle or maintain without permission may cause inverter damage. This case is not in our quality assurance range.

4.2 Keyboard layout and functions specification

● Keyboard appearance



● Key function

Key	Name	Function
	Menu key	Enter menu while standby or running. Press this key to return while modify parameter. While standby or running, press for 1 sec to enter condition monitoring interface.
	Confirm/modify key	Press to modify parameter while in menu interface. Press again to confirm after modifying. While standby or running, press to change LED monitoring items at stop.
	Up/down key	Select parameter group in menu interface. Modify parameter while in modify interface. Modify given frequency, PID while at standby or condition monitoring state (While given frequency, PID are set by keyboard and [F4.09])
	Shift key	Select digit of function no modified by up/down key: Select parameter digits modified in parameter modify state.
	Forward run key	While run/stop is controlled by keyboard, press this key, the inverter forward rotate and the indicator is always on. While reverse, the indicator sparks.
	Jog/reverse key	This key function can be defined by parameter [F4.07]. Press it, machine reverses and indicator is off if this key is defined as REVERSE. Machine will jog and indicator is on if this key is defined as JOG.
	Stop/reset key	Machine stops if press it while run/stop is controlled by keyboard. Its efficiency range is defined via function no [F4.08]. Inverter resets if press it in fault state (no reset if fault is not solved).
	Keyboard potentiometer	Can be used as input channel for given frequency, upper frequency limit, given torque, given PID or PID feedback setting.

● Indicator light meanings

Name	State	Meaning	
Unit indicator light	Hz	Spark/On	Indicate the frequency unit.
	A	On	Indicate the current unit.
	V	Spark/On	Indicate the voltage unit.
	S	On	Indicate the time unit.
	RPM	On	Indicate the speed unit.
	%	Spark/On	Indicate the percentage unit.
State indicator light	FWD	On	Inverter is forward rotating.
	FWD	Spark	Inverter is reverse rotating.
	FWD	Off	Inverter stops.
Function indicator light	REV/JOG	On	Jog.
	REV/JOG	Off	Reverse.

Chart 4-1: Indicator light meanings

● Number and character table

Number, character	LED display	Number, character	LED display	Number, character	LED display
0	0	C	C	O	0
1	1	D	d	P	P
2	2	E	E	Q	9
3	3	F	F	R	8
4	4	G	G	S	5
5	5	H	H	T	0
6	6	I	0	U	0
7	7	J	0	V	0
8	8	K	E	W	00
9	9	L	0	X	No display
A	8	M	00	Y	4
B	6	N	0	Z	No display

Chart 4-2: Number and character table

● LCD keyboard operation is similar to LED keyboard operation. Please refer to LED keyboard operation instruction.

● Basic LED operation

It displays frequency 50.00Hz when stop. Here F0.09=100.00 setting will be taken as an example to explain the basic LED operation.

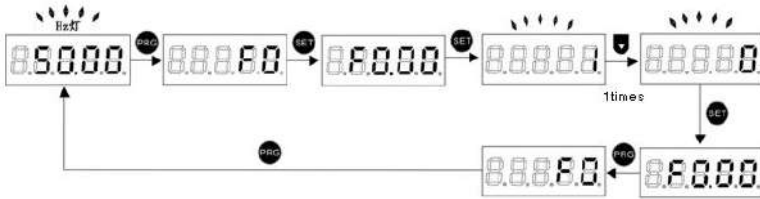


Chart 4-3: Core control mode selections

● Run command instructions

Four run command channels: 0: keyboard control, 1: terminal control, 2:RS485 communication control, 3: optional card. It can be set by F0.02. Here we set F0.02=1 (terminal control) as an example:

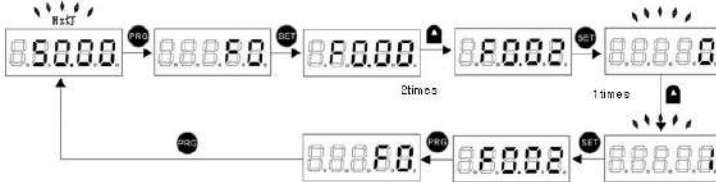


Chart 4-4: Run command instructions

It introduces terminal control two-wire 1, which is one kind of terminal control mode. For the other control modes, please refer the chapter 9.

● Frequency command instructions

There are many kinds of frequency command instruction selections. Please refer to chapter 9 for details. Here we set F0.03=1 (keyboard potentiometer give frequency) as an example:

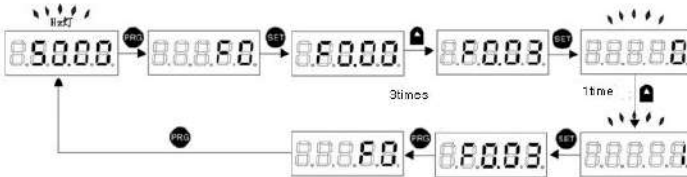


Chart 4-5: Frequency command instructions

● Start-up mode selections

Three start-up modes: 0: direct start-up, 1: braking firstly, then start by start-up frequency, 2: speed track and start-up. Here we set F1.00=2 (Speed tracking, judge direction then start) as an example:

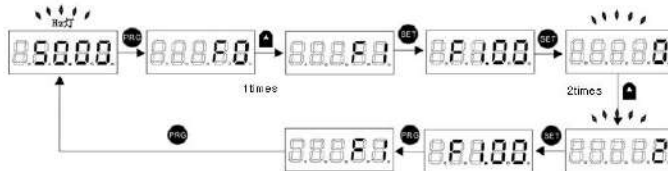


Chart 4-6: Start-up mode selections

● Stop mode selections

Two stop modes: 0: deceleration stop, 1: free stop, Here we set F1.10=1 (free stop) as an example:

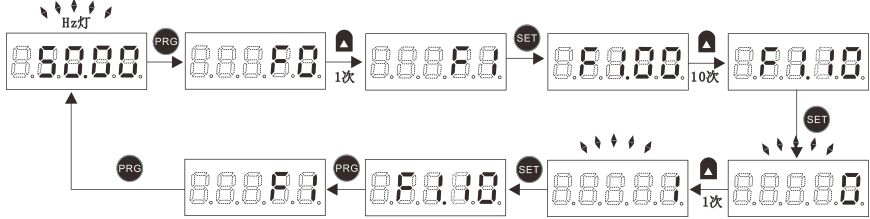


Chart 4-7: Stop mode selections

● Acceleration/deceleration time selections

There are 4 groups of acc/dec time. If no note, it is acc/dec time 1. Take setting F0.14=8.0 (acc/dec time 1) as example:

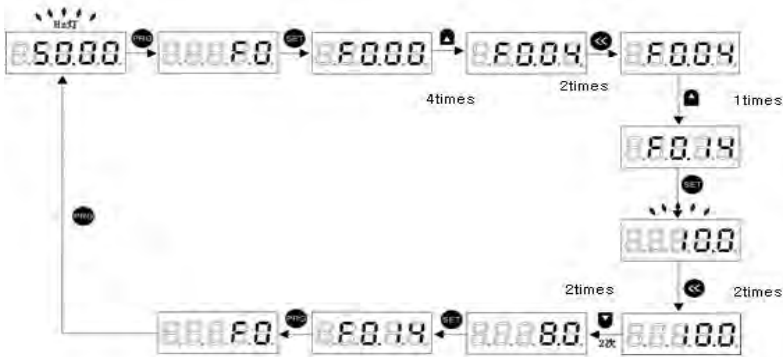


Chart 4-8: Acceleration/deceleration time selections

● Motor parameter setting

Set [F5.02] (motor rated power), [F5.03] (motor rated frequency), [F5.04] (motor rated speed), [F5.05] (motor rated voltage) according to the motor nameplate. Other parameter setting can be got by inverter self-study.

Please refer to the following operation mode chart:

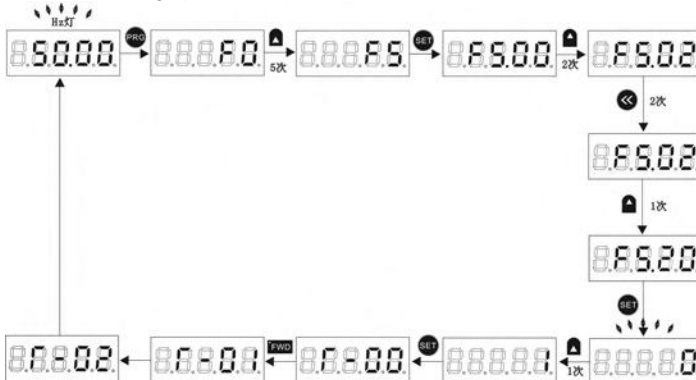


Chart 4-9: Motor parameter setting

● Parameter copy function selection

4. 4 Trial run

● Trial run debugging guide

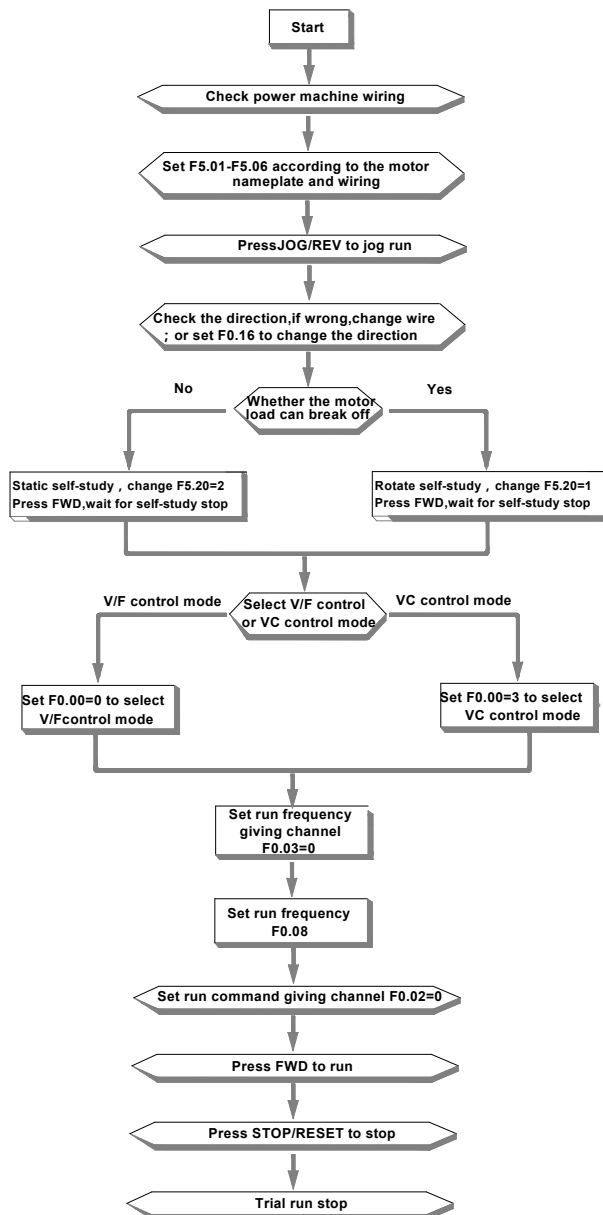


Chart 4-13: Trial run

● Parameter self-tuning selection

Motor parameter self-tuning

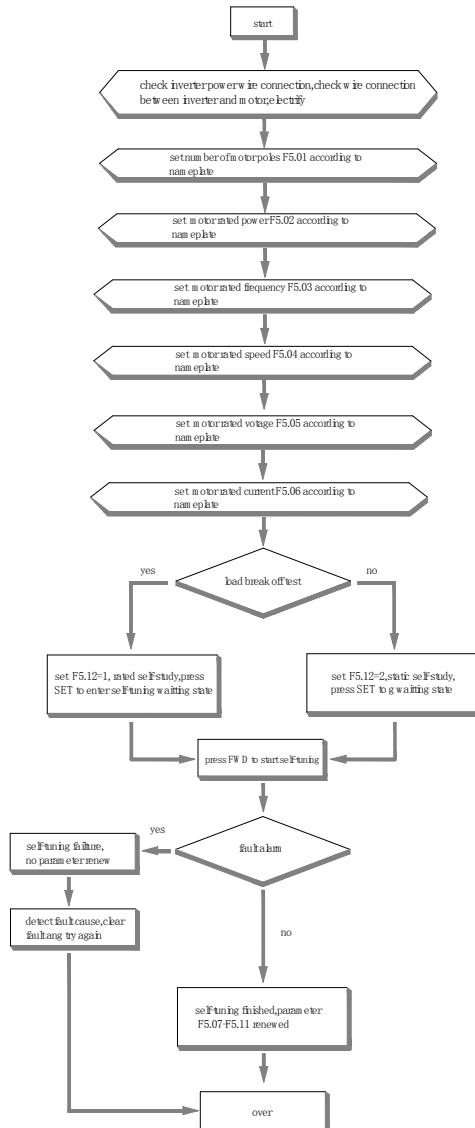


Chart 4-14: Parameter self-tuning selections

● Frequency giving flow

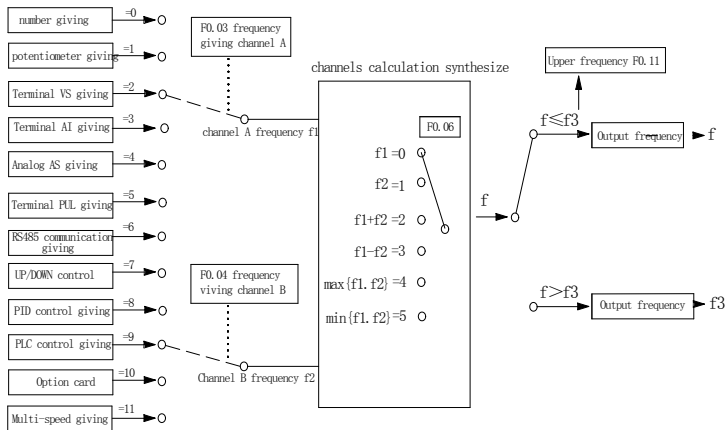


Chart 4-15: Frequency giving flow

● Start/stop control flow

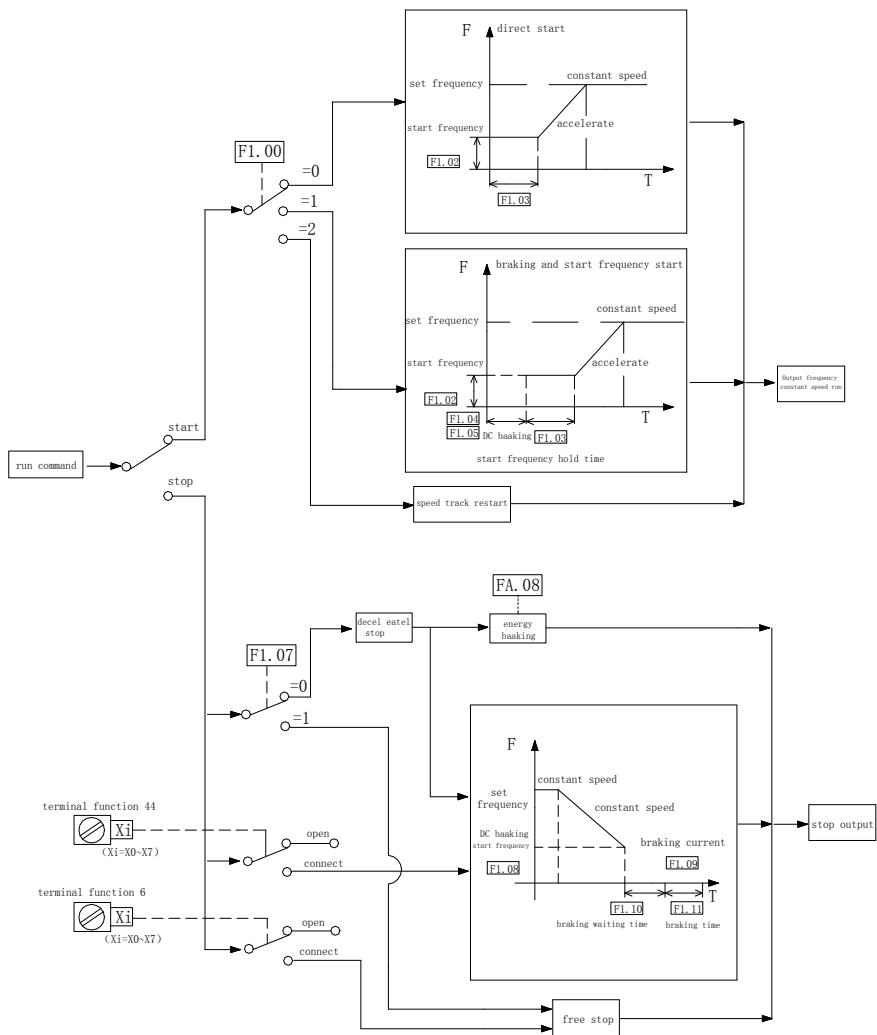


Chart 4-16: Start/stop control flow

● VC control without PG

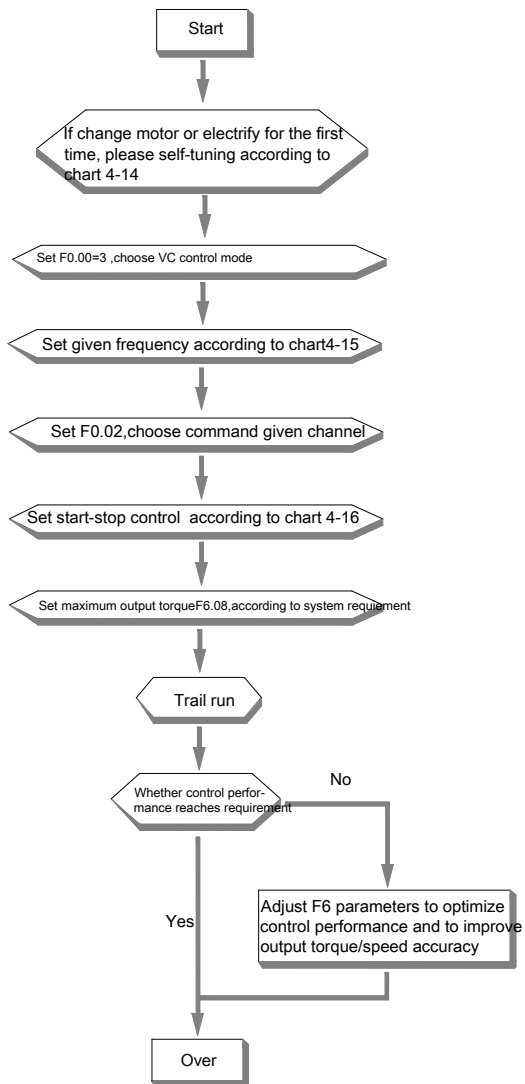


Chart 4-17: VC control without PG




Chapter 5 Fault Diagnoses and Processing

This chapter explains the display content and process of the inverter fault, alarm and operation fault. It also simply explains the bad situation caused by inverter or motor fault and how to solve it. For the adjustment guide in trial run, please refer to this chapter too.

5.1 Fault types












Type	Inverter action while fault happens
Equipment fault	<p>While inverter detect fault, the state likes this:</p> <ul style="list-style-type: none"> ● Keyboard display character showing fault content. ● Inverter stops output. Motor free slide stops. ● While function F2.45 is set as 3(output fault), Y terminal output valid open-collector digital output. ● While function F2.46/F2.47 is 3(fault output), TA1-TC1, TA2-TC2 terminals output closed passive digital output, TB1-TC1, TB2-TC2 terminals output open passive digital output. ● While there is fault as OL, OC, SC, OV, UL2, if FA.37 is not 0, the inverter will restart automatically after FA.38 setting time.
External fault	<p>In certain application occasions, external related equipments fault signals are considered in the inverter control system as usage of monitoring, protection or switch control. At this time, if one multi function terminal is defied as "external fault", the inverter stops output alarm signal.</p>








5.2 Fault information and details

Keyboard display	Fault code	Fault type	Possible causes	Treatment
	L.U.1	Too low while stop	<ul style="list-style-type: none"> ● Power supply is too low ● Voltage detection circuit is abnormal 	<ul style="list-style-type: none"> ● Check input power, eliminate fault. ● Seek support from factory.
	E.LU2	Too low voltage in run	<ul style="list-style-type: none"> ● Power supply is too low ● Power capacitance is too small, or there is big impact current in the power grid. ● Inner DC main contactor is not closed. 	<ul style="list-style-type: none"> ● Check input input power, eliminate fault. ● Improve power-supply system. ● Seek support from factory.
	E.oU1	Acc over-voltage	<ul style="list-style-type: none"> ● Power voltage fluctuation over limit. ● Start running motor. 	<ul style="list-style-type: none"> ● Detect power voltage and eliminate fault. ● Restart motor until it totally stop.Set F1.00 as 1or 2.

E.oU2	E.oU2	Dec over-voltage	<ul style="list-style-type: none"> ● Deceleration time is too short. ● Load potential energy or inertia is too large. ● Power voltage fluctuation over limit. 	<ul style="list-style-type: none"> ● Prolong deceleration time properly. ● Reduce load inertia or improve inverter capacitance or add braking unit. ● Detect input power and clear fault.
E.oU3	E.oU3	Constant speed over-voltage	<ul style="list-style-type: none"> ● Power voltage fluctuation over limit. 	<ul style="list-style-type: none"> ● Detect input power voltage and eliminate fault. ● Install input reactor.
E.oU4	E.oU4	Over-voltage while stop	<ul style="list-style-type: none"> ● Power voltage fluctuation over limit. 	<ul style="list-style-type: none"> ● Check input power, eliminate fault. ● Seek support from factory.
E.oC1	E.oC1	Acc over-current	<ul style="list-style-type: none"> ● Acceleration time is too short. ● Start running motor. ● V/F curve setting is not suitable.Or torque boost too high. ● Inverter capacitance is too small. 	<ul style="list-style-type: none"> ● Prolong acc time. ● Restart motor until it totally stop.Set F1.00 as 1or 2. ● Reset V/F curve or torque boost value. ● Select inverter with right capacitance.
E.oC2	E.oC2	Dec over-current	<ul style="list-style-type: none"> ● Deceleration time is too short. ● Load potential energy or inertia is too large. ● Power voltage fluctuation over limit. 	<ul style="list-style-type: none"> ● Prolong deceleration time. ● Connect external braking resistance or braking unit. ● Select inverter with right capacitance.
E.oC3	E.oC3	Constant speed over-current	<ul style="list-style-type: none"> ● Sudden load change. ● Power grid voltage is too low. 	<ul style="list-style-type: none"> ● Check load change and eliminate it. ● Check input power, eliminate fault.
E.oL1	E.oL1	Motor over-load	<ul style="list-style-type: none"> ● V/F curve setting is not suitable.Or torque boost too high. ● Power grid voltage is too low. ● Unright overload protection setting. ● Locked-rotor run or too heavy load. ● Universal motor long time low speed run. 	<ul style="list-style-type: none"> ● Reset V/F curve or torque boost value. ● Check input power, eliminate fault. ● Unreasonable [F5.06/FA.16] setting. ● Adjust load or select inverter with right capacitance. ● If need long low-speed operation, please choose

				special motor for inverter.
E.oL2	E.oL2	Inverter over-load	<ul style="list-style-type: none"> ● Load is too heavy. ● Acceleration time is too short. ● Start running motor. ● V/F curve setting is not suitable.Or torque boost too high. 	<ul style="list-style-type: none"> ● Select inverter with right capacitance. ● Prolong acceleration time ● Restart motor until it totally stop. Set F1.00 as 1or2. ● Reset V/F curve or torque boost value.
E. SC	E. SC	System abnormality	<ul style="list-style-type: none"> ● Acceleration time is too short. ● Short circuit between inverter output phases or earth. ● Module is damaged. ● Electromagnetic disturb. 	<ul style="list-style-type: none"> ● Prolong acceleration time properly. ● Check periphery equipments and restart after fault eliminating. ● Seek support from factory. ● Check system wiring, earth, shield and deal as required.
E.oH1	E.oH1	Inverter over-heat	<ul style="list-style-type: none"> ● Temperature is too high. ● Air channel is blocked. ● Fan connection parts is loose. ● Fan is damaged. ● Temperature detection circuit fault 	<ul style="list-style-type: none"> ● Make the environment meet the requirement. ● Clear the air channel. ● Check and reconnect the wire ● Change the same new fan. ● Seek support from factory.
E.oH2	E.oH2	Rectifier over-heat	<ul style="list-style-type: none"> ● Temperature is too high. ● Air channel is blocked. ● Fan connection parts is loose. ● Fan is damaged. ● Temperature detection circuit fault 	<ul style="list-style-type: none"> ● Make the environment meeting the requirement. ● Clear the air channel. ● Check and reconnect the wire. ● Change the same new fan. ● Seek support from factory.
E.TE1	E.TE1	Motor static detection fault	<ul style="list-style-type: none"> ● Detection overtime ● Start static detection while motor is running. ● Capacitance difference is too big between motor and inverter. ● Motor parameter setting mistake. 	<ul style="list-style-type: none"> ● Check motor connection wire. ● Detect after motor stopping totally. ● Change inverter model. ● Reset parameter according to nameplate.

	E.EEP/ A.EEP	Memory fault	<ul style="list-style-type: none"> ● Electromagnetic disturb in memory period. ● EEPROM damage. 	<ul style="list-style-type: none"> ● resume load and save. ● Seek support from factory.
	LIFE	Reserved	<ul style="list-style-type: none"> ● 	<ul style="list-style-type: none"> ● Expand fault code.
	E.ILF/ A.ILF	Input side open phase	<ul style="list-style-type: none"> ● 3-phase input power open phase. 	<ul style="list-style-type: none"> ● Check 3-phase power supply and the phase. ● Check 3-phase power supply wiring.
	E.oLF	Output side open phase	<ul style="list-style-type: none"> ● 3-phase output power open phase 	<ul style="list-style-type: none"> ● Check 3-phase output voltage and current. ● Check wiring.
	E.Gnd	Output earth	<ul style="list-style-type: none"> ● Output earth terminal short circuit. 	<ul style="list-style-type: none"> ● Check wiring and insulation.
	E.HAL	Current detection fault	<ul style="list-style-type: none"> ● Detect circuit fault. ● Phase imbalance 	<ul style="list-style-type: none"> ● Seek for technic support. ● Check motor and wiring.
	E. EF	Inverter external fault	<ul style="list-style-type: none"> ● Peripheral equipment fault protection. 	<ul style="list-style-type: none"> ● Check peripheral equipment.
	E.PAn	Keyboard connect fault	<ul style="list-style-type: none"> ● Keyboard wire fault. ● Keyboard component damage. 	<ul style="list-style-type: none"> ● Check keyboard wire. ● Seek support from factory.
	E. CE	Rs485com munication fault	<ul style="list-style-type: none"> ● Unsuitable baud rate setting. ● Communication wire breaks. ● Communication format does not match upper machine. 	<ul style="list-style-type: none"> ● Set suitable baud rate setting. ● Check communication wire. ● Set right communication format.
	E.CPE	Parameter copy fault	<ul style="list-style-type: none"> ● Parameter copy communication is fault. ● Copy keyboard is not match the inverter. 	<ul style="list-style-type: none"> ● Check wire. ● Select the specified external keyboard model.
	E.ECF	Extend card connection fault	<ul style="list-style-type: none"> ● Communication between extend card and frequency inverter overtime. ● Extend card does not match frequency inverter. 	<ul style="list-style-type: none"> ● Check connector, and re-insert wire. ● Choose the named card.

	E.PG	PG card connection abnormal	<ul style="list-style-type: none"> ● PG card and inverter connection failure 	<ul style="list-style-type: none"> ● Check the connection
	E.PID/ A.PID	PID feedback failure	<ul style="list-style-type: none"> ● PID feedback upper limit of disconnection alarm is improper ● PID feedback lower limit of disconnection alarm is improper ● PID feedback wiring unreliable ● Sensor with feedback failure ● Feedback input loop failure 	<ul style="list-style-type: none"> ● Confirm the sensor state, if broken, change it. ● Repair the wiring. ● Confirm the setting value of [Fb.27] and [Fb.28].
	E.IAE	Initial position angle study failure	<ul style="list-style-type: none"> ● Check motor parameter 	<ul style="list-style-type: none"> ● Check motor parameters; ● Study after motor stop; ● Seek support from factory.
	E.DEF /A.DEF	Speed deviation too large	<ul style="list-style-type: none"> ● Detection time or detection level setting unreasonable ● Motor parameters abnormal 	<ul style="list-style-type: none"> ● Check motor parameter, and self study again; ● Check FA.24/FA.25 parameter setting; ● Seek support from factory.
	E.SP /A.SP	Rapid protection	<ul style="list-style-type: none"> ● FA.27/FA.28 parameter setting abnormal ● Motor parameters abnormal ● Check F6 VC control parameter 	<ul style="list-style-type: none"> ● Check motor parameter, and self study again; ● Check FA.27/FA.28 parameter setting;
	E.LD1 /A.LD1	Load protection 1	<ul style="list-style-type: none"> ● Detection time or detection level setting unreasonable 	<ul style="list-style-type: none"> ● Check FA.18/FA.19 parameter setting;
	E.LD2 /A.LD2	Load protection 2	<ul style="list-style-type: none"> ● Detection time or detection level setting unreasonable 	<ul style="list-style-type: none"> ● Check FA.20/FA.21 parameter setting;


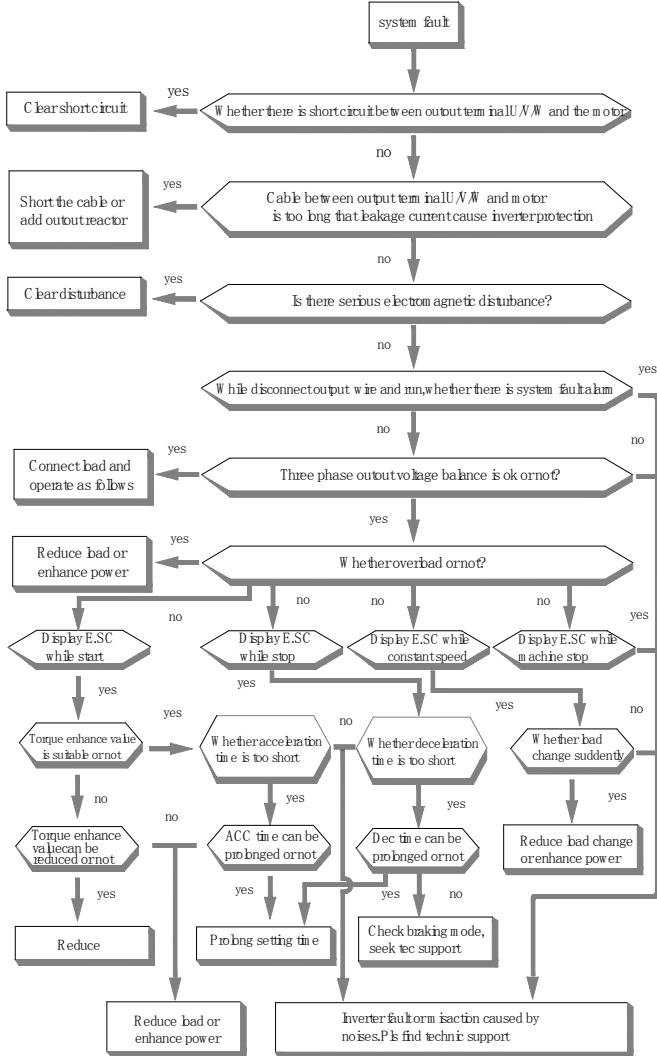
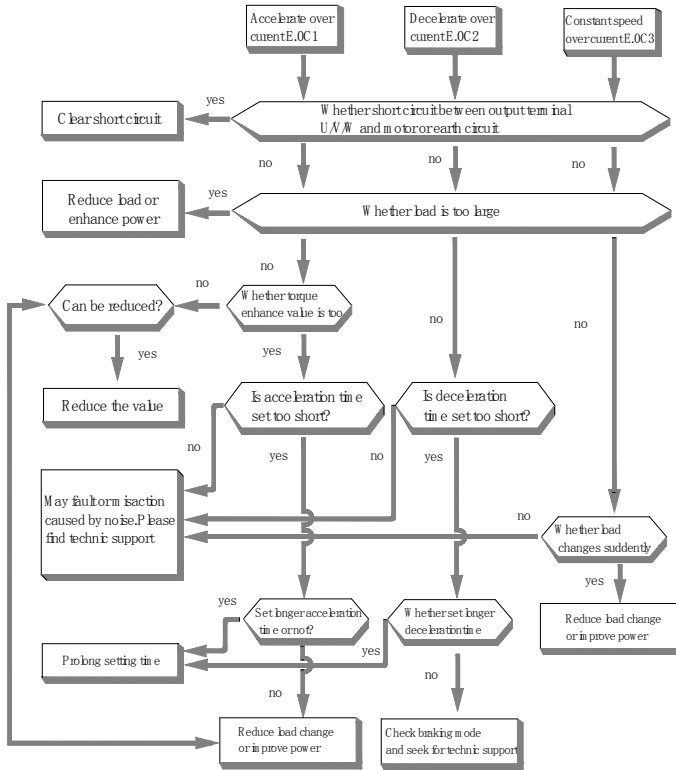
	E.CPU	CPU timeout	● CPU timed timeout	● Seek support from factory.
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Chart 5-1: Fault information and details

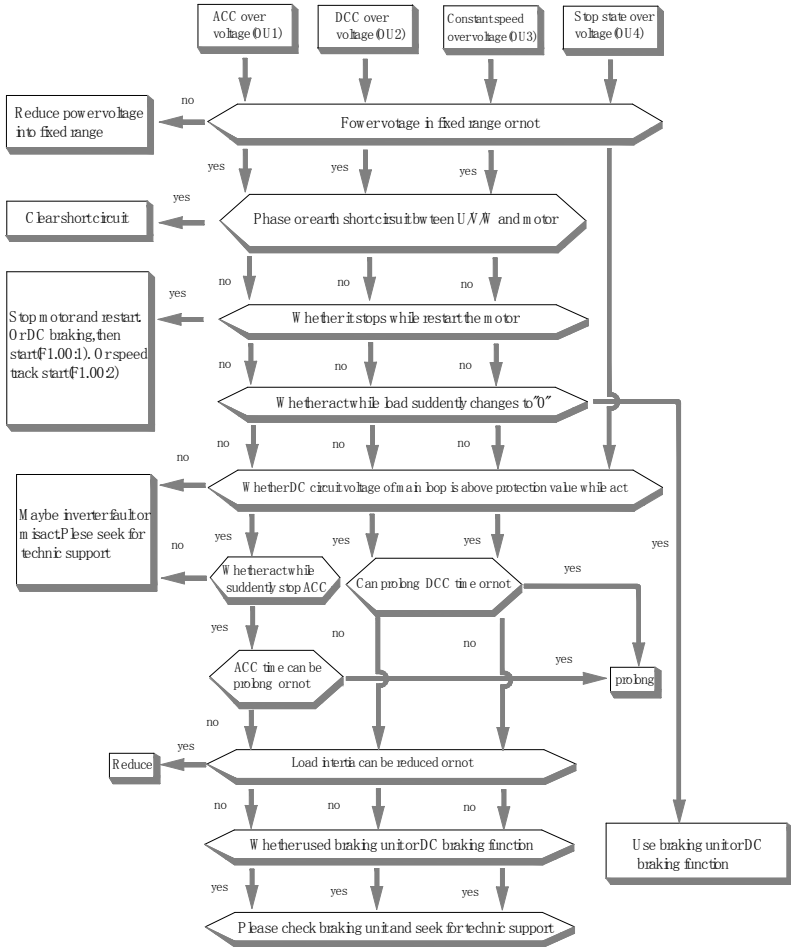
5.3 Fault diagnoses process
System fault diagnoses process



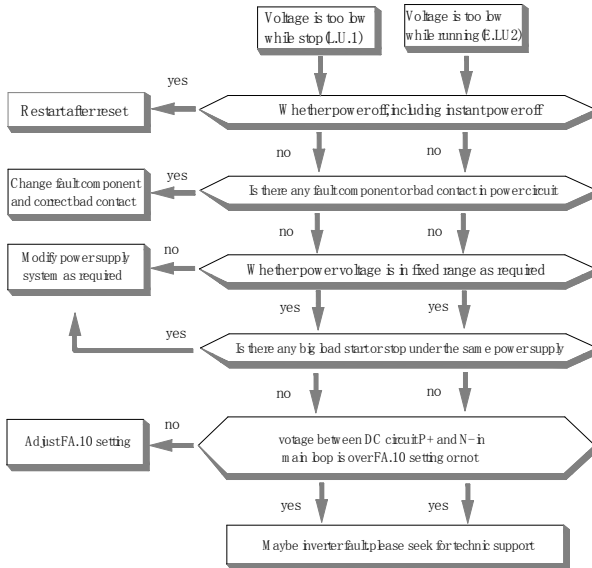
Over current diagnoses process



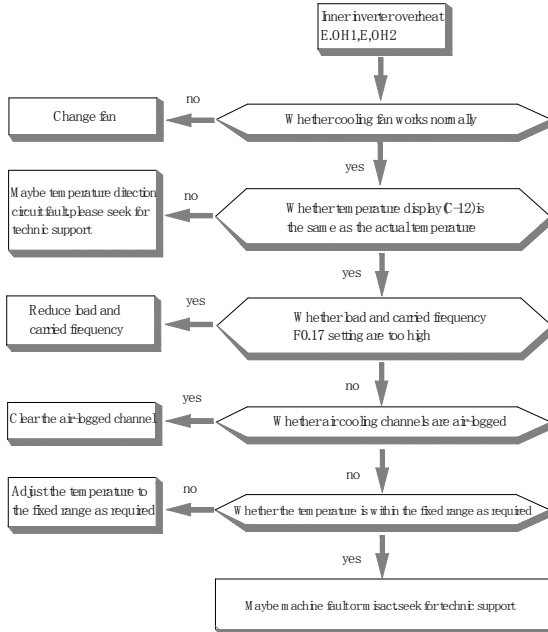
Over voltage diagnoses process



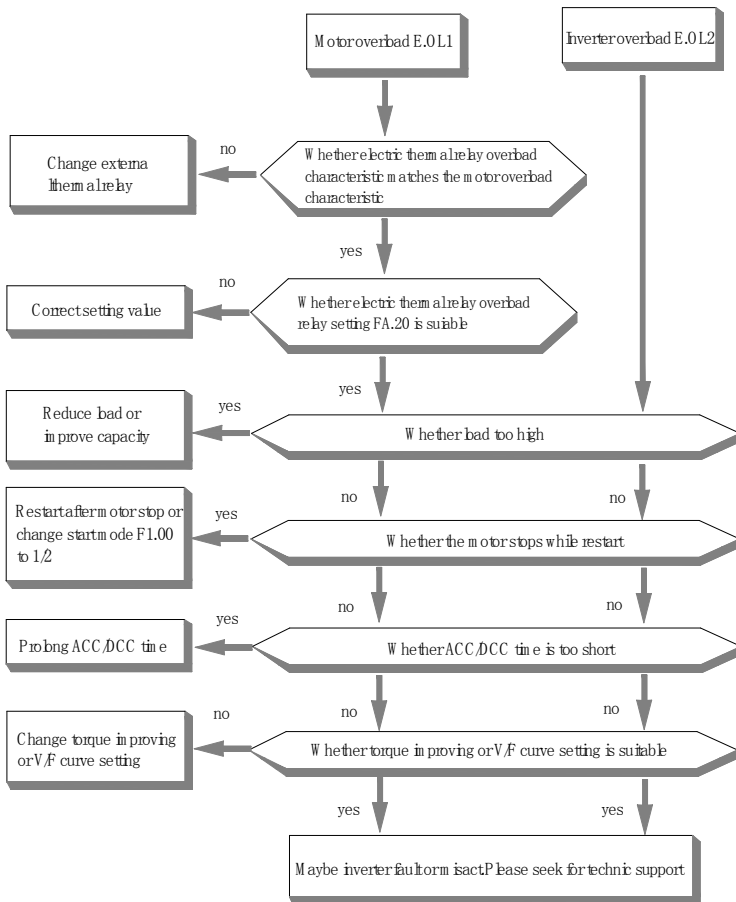
Supply voltage is too low



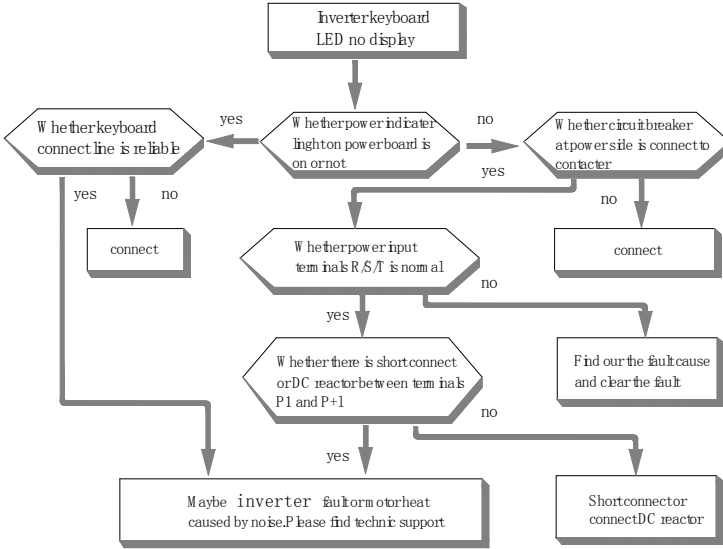
Inner inverter over heat



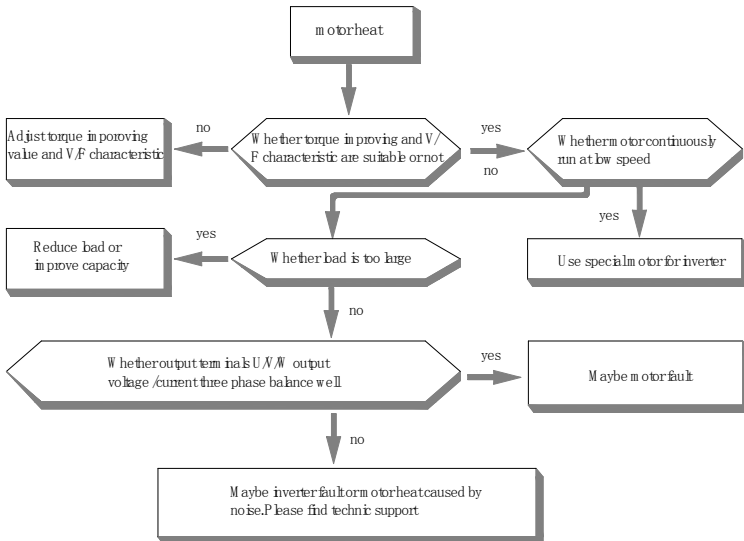
Over load



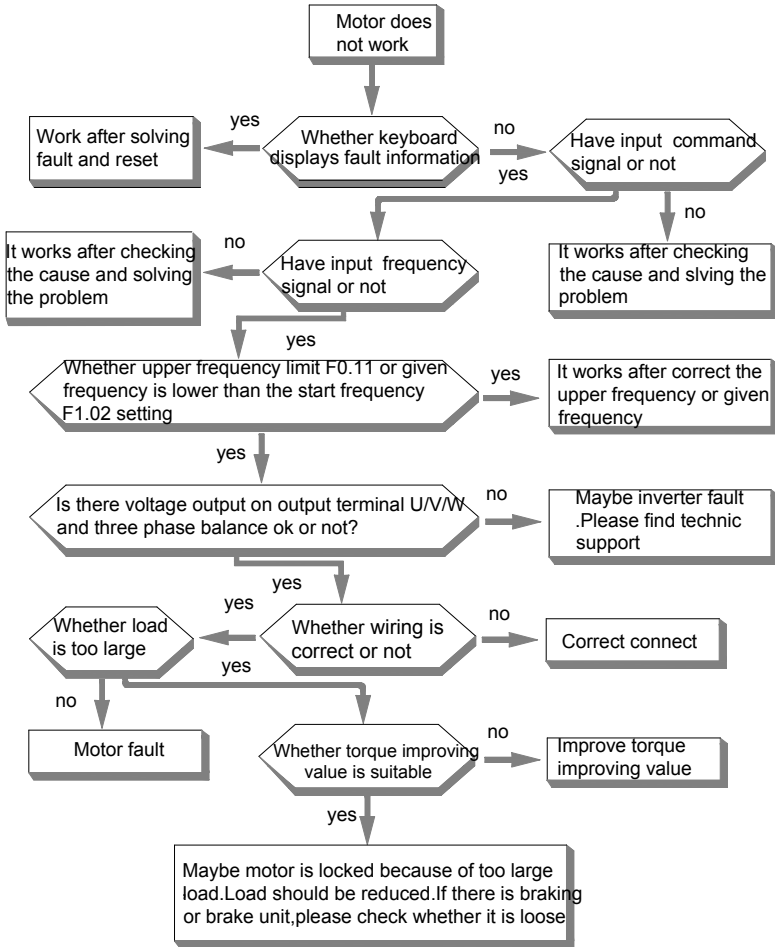
No display



Motor heat






Motor does not rotate



Chapter 6 Periodic Overhaul and Maintenance

6.1 Safety Precautions

This chapter explains the safety rules in overhaul and maintenance.

	<ul style="list-style-type: none"> ● No operation under power connected state. Otherwise, there is danger of electric shock even death. ● Before operation, please cut all related equipments power, ensure that the main circuit DC current has dropped to safe range. And please operate after
	<ul style="list-style-type: none"> ● No operation while cover/panel is dismantled. Otherwise there is danger of electric shock even death. ● Do not dismantle the cover or PCB under power connected state. Otherwise there is danger of electric shock death. ● Only professional person can maintain or change fittings. Otherwise, there is danger. ● Do not wear loose clothes when install, debug, maintain. Related protective tools and safeguard should be adopted. ● Tighten screw according to named torque. If main circuit wire connection is loose, there is danger of overheat fire. ● Machine and motor earth must be reliable. Otherwise, there is danger of electric shock if touch the cover.
	<ul style="list-style-type: none"> ● While operation, please follow the ESD regulations. Otherwise, the inverter maybe damaged. ● Do not change the circuit or structure of the inverter. Otherwise, the inverter maybe damaged. ● Please confirm the rotate direction while no-load. Wrong direction can bring body injury or huge wealth loss. ● Do not use damaged machine. Otherwise, there is danger of accident.

6.2 Overhaul

Frequency inverter is composed by semi-conductive components, passive electronic component and motive component. All of these components have useful life. Even under normal working environment, some of the components can not work after the life time. To avoid malfunction, daily checking, periodic overhaul, component changing and other maintenance should be carried out to prevent. We suggest one overhaul every 3-4 months after installation. The overhaul period should be shortened while under cases as below.

- High temperature, high altitude;
- Start and stop frequently;
- AC power supply or load fluctuate badly;
- With serious vibration or impact;
- With dust, metal dust, salt, vitriol, chlorine;
- Bad storage environment;

● **Daily checking**

To avoid machine damage and to prolong life time, please check the following items everyday.

Items	Checking content	Treatment
Power supply	Check if power supply meets the requirement and whether there is lack-phase.	Treat it as nameplate explains.
Surroundings	Check whether it meets the table3-1 requirement.	Make sure the problem and solve it.
Cooling system	Check whether the inverter or the motor heat or change color abnormally and cooling fan working state.	Check whether it overload. Tighten screw. Check whether cooling fan is dirty or stall rotate.
Motor	Check if there is abnormal vibration or noise.	Tighten machine and electric connection and lubricate the machine components.
Load	Check whether output current is over the rated value of the motor or the inverter and has lasted for a period.	Make sure whether it overload and whether the machine model is right.



No operation under power connected state. Otherwise, there is danger of electric shock death. Before operating, please cut all related equipments power, ensure that the main circuit DC current has dropped to safe range. And please operate after 5 mins.

● **Periodic overhaul**

Under normal state, one overhaul every 3 or 4 months is ok. Please confirm the actual overhaul period according to the machine use condition and work circumstance while using the machine.

Main circuit

Items	Checking content	Treatment
Whole	Check insulated resistance; Check circumstance.	Tighten and change bad component; Clear and improve circumstance.
Electric connection	<ul style="list-style-type: none"> ● Check whether the wire and connector color changes, whether there is disrepair, crack color change or aging in insulated layer. ● Check whether the connect terminals are frayed, damaged or loose. ● Earth checking. 	<ul style="list-style-type: none"> ● Change bad wire. ● Fasten terminals and change bad terminals. ● Measure earth resistance and fasten earth terminals.
Mechanical connection	<ul style="list-style-type: none"> ● Check if there is abnormal vibration or noise or something is loose. 	<ul style="list-style-type: none"> ● Tighten, lubricate and change the bad components.
semi-conductive component	<ul style="list-style-type: none"> ● Check whether there is dust or rubbish. ● If there is obvious out change 	<ul style="list-style-type: none"> ● Clean operation environment ● Change damaged component

Electrolytic capacitor	<ul style="list-style-type: none"> Whether there is liquid leak, color change or crack. Whether the safety valve outcrop, inflation, creak or liquid leak. 	<ul style="list-style-type: none"> Change damaged component
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Peripheral equipment	<ul style="list-style-type: none"> Peripheral equipment outlook and insulation checking. 	<ul style="list-style-type: none"> Clear and change damaged component.
PCB	<ul style="list-style-type: none"> Peculiar smell color change, bad rust and connector checking. 	<ul style="list-style-type: none"> Fasten connector Clear PCB Change damaged PCB
Cooling system	<ul style="list-style-type: none"> Check whether the fan is damaged or blocked up. Whether rubbish and dust is stuck to the heatsink . Is air inlet/outlet blocked? Or is there something sticking to the inlet/outlet. 	<ul style="list-style-type: none"> Clean operation environment Change damaged component
Keyboard	<ul style="list-style-type: none"> Whether it is damaged. Check whether display is complete. 	<ul style="list-style-type: none"> Change damaged component
Motor	<ul style="list-style-type: none"> Check if there is abnormal vibration or noise. 	<ul style="list-style-type: none"> Tighten machine and electric connection and lubricate the machine components.



No operation under power connected state. Otherwise, there is danger of electric shock death. Before operating, please cut all related equipments power, ensure that the main circuit DC current has dropped to safe range. And please operate after 5 mins.

6.3 Maintenance

All equipments and components have useful life. Right maintenance can prolong the lifetime. But it can not avoid damage. Please change the components before their lifetime over.

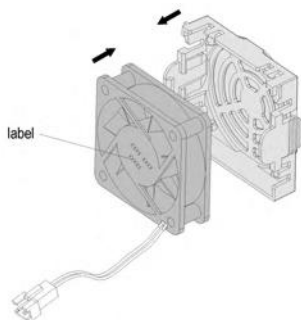
Component	Useful lifetime
Fan	2~3year
Electrolytic capacitor	4~5 year
PCB	8~10 year

● Fan

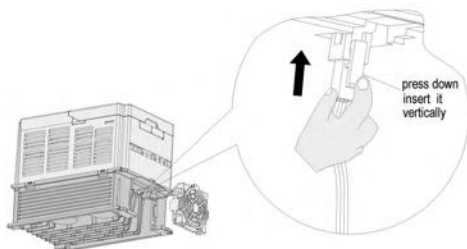


While changing fan, please use original fan. You can contact Veichi company or the dealer. There are inverter models with many fans in one machine. To prolong these machines' lifetime, you had better to change all fans while changing the cooling fan.

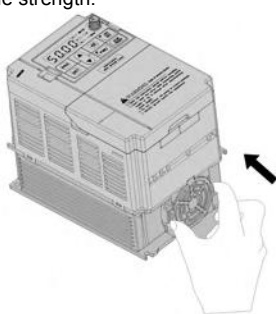
● Fan change method:



1. Install the fan vertically into the cover as shown in the picture (the label should face the outside).

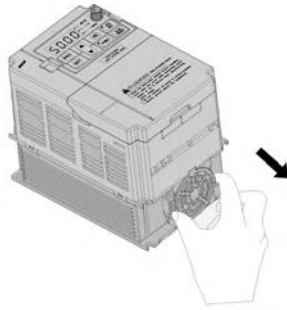


2. Press the elastic clip of the fan by finger toward the inner side and insert the leading terminal of the fan vertically by a little strength.

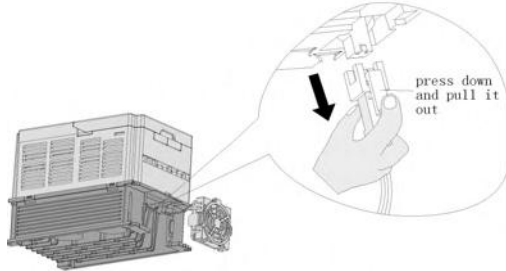


3. Insert the two elastic clips of the fan cover vertically into the fan installation slots.

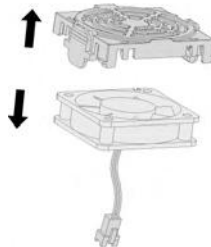
- **Fan dismantlement:**



1. Pinch the two elastic clips of the fan and pull out. Then dismantle the fan cover.



2. Press the elastic clip of the fan by finger toward the inner side and pull out the leading terminal of the fan vertically by a little strength.



3. Poke the clips toward the outside and detach the fan from the cover by a little strength.



- ① No operation under power connected state. Otherwise, there is danger of electric shock death. Before operating, please cut all related equipments power, ensure that the main circuit DC current has dropped to safe range. And please operate after 5 mins.
- ② While the inverter is working, the heatsink temperature will be higher as the consumption. To prevent from scald, please do not touch the heatsink and do not change the fan until the temperature being safe.
- ③ To ensure the best performance of the inverter, please use the original fan.




● Other components

The replacement of the other components has strict requirements on maintenance technic and product familiarity. And they can not be used without strict detection after replacement. So we suggest the user not to replace the other inner components. If they need to change indeed, please contact to the dealer or the sales department of Veichi electric company.

Chapter 7 Peripheral Equipments and Options




7.1 Safety Precautions












User must obey to the following safety rules and related requirements while using the peripheral equipments and selecting components.

	<ul style="list-style-type: none"> ● No operation under power connected state. Otherwise, there is danger of electric shock. ● Before operation, please cut all related equipments power, ensure that the main circuit DC current has dropped to safe range. And please operate after 5 mins.
	<ul style="list-style-type: none"> ● No operation while cover/panel is dismantled. Otherwise, there is danger of electric shock. ● Do not dismantle the cover or PCB under power connected state. Otherwise, there is danger of electric shock. ● Only professional person can install, debug or maintain the peripheral equipments and options. Otherwise, there is danger. ● Do not wear loose clothes when install, debug, maintain. Rated protective tools and safeguard should be adopted. ● Do not change wire, dismantle jumping wire, optional card, or change cooling fan while the inverter is running. Otherwise, there is danger of electric shock. ● Tighten screw according to named torque. If main circuit wire connection is loose, there is danger of overheat fire. ● Earth of the peripheral equipments and options must be reliable to prevent human body injury.
	<ul style="list-style-type: none"> ● While operation, please follow the ESD regulations. Otherwise, the inverter maybe damaged. ● Do not cut the power supply while the inverter is outputting voltage. Otherwise, the inverter maybe damaged.

7.2 Peripheral equipments

Normal peripheral equipments are showed as follows. To order the peripheral equipments, please consult our dealer or sales department.

Peripheral equipment		Functions
	Breaker	Protect power system and prevent malfunction impact other equipments working when short-circuit happens. And over-load protection.
	Leakage current breaker	Earth protection prevent electric shock(suggest to use the type which can prevent high-frequency leakage current)
	Electromagnetic contactor	Separate power and inverter indeed and realize basic relay control.

	AC input reactor	Improve power side factor and isolate the noise disturbance to the frequency inverter from the power side.
	DC reactor	Restrain ultra harmonics and improve power factor.
	Input side noise filter	Reduce frequency inverter disturbance to the power and reduce the power grid disturbance.
	Braking resistor	Passive energy consume unit of electric braking.
	Consumption braking unit	Electric braking control unit, controlling the braking resistance consume the regenerated electric power of the motor efficiently.
	Output side noise filter	Reduce the output side wire electromagnetic disturbance.
	Standby system	Standby system for inverter malfunction.
	Heat relay	Protect the motor while over load.
	0-phase reactor	Reduce electromagnetic disturbance of the frequency inverter (suitable for input/output side).
	Main loop surge absorption unit	Restrain surge voltage while main loop switch components act.
	Winding surge absorption unit	Restrain surge voltage when the AC contactor acts.

7.3 The use of peripheral equipments

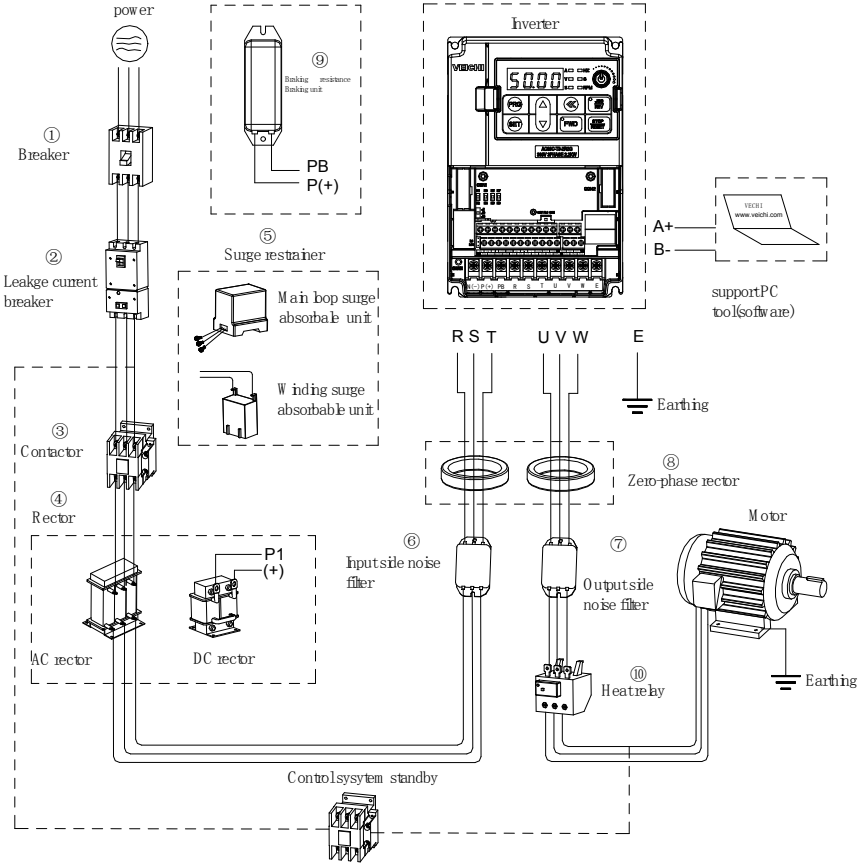


Chart 7-1: Peripheral equipments connection fig

Note:

① Wiring breaker

To ensure wiring safe, protect power system and prevent malfunction impact other equipment working when short-circuit happens, and protect while over-load, please do use wiring breaker between power supply and main loop power input terminals R,S,T.



While choosing the breaker, the capacitance should be about 1.5-2 times of the rated output current of the frequency inverter. Please compare the time characteristic of breaker and the characteristic of the inverter protection (150% of the rated output current, one minute). Make sure there will be no skip.



Before main loop wiring, make sure to cut the breaker and electromagnetic contactor. Otherwise, there is danger of electric shock.

② Leakage current breaker

The frequency inverter outputs peak voltage high-speed switch square wave, so there is high frequency leakage current. For earth protection to prevent electric shock and leakage current fire,

please install leakage current breaker. Usually, one frequency inverter will bring 100mA leakage current (while the power cable length is 1m). If the length prolongs 1m, there will be 5mA more leakage current. So please use leakage current breaker special for high frequency leakage at the power input side of the frequency inverter. The factors which impact leakage current are as follows:

- Capacitance of inverter;
- Carrier frequency;
- Motor cable type and wire length;
- EMI/RFI filter.

To protect human body and inverter, please choose leakage current breaker which can use AC/DC power and can reply high frequency leakage current. There should be one leakage current breaker with more than 200mA sensitive current for every frequency inverter. If the frequency inverter outputs different wave, the high frequency leakage current will be higher, what will make the breaker malfunction. At this case, please take following treatments:

- Improve the sensitive current of the leakage current breaker;
- Reduce the carrier frequency of the inverter.

③ Electromagnetic contactor

Electromagnetic contactor is a peripheral equipment what is set to separate power and inverter connection. While inverter protective function is acting or carrying out emergency stop operation, the main loop power can be cut by peripheral equipment. Please do not connect the electromagnetic switch or electromagnetic contactor to output circuit. Otherwise, the inverter maybe damaged. While the power recovers after instant stop, if it needs to prevent the inverter to auto-restart, please install electromagnetic contactor for control at the input side.

④ AC input reactor and DC reactor

To restrain current sharp change and high hypo harmonic current, it needs to use AC input reactor and DC reactor. It can also improve power factor at the input side. In the following cases, AC input reactor or DC reactor must be used (use both will bring better effect).

- Need to restrain ultra harmonics current and improve power side factor;
- Need to switch input phase capacitance;

When frequency inverter is connected to large capacitance power transformer (600kVA above);

Silicon-controlled converters such as DC motor driver are connected to the same power system.

If user has higher requirement on other harmonic restraint, please connect the external DC reactor .Before connecting the external DC reactor, make sure to dismantle the short connector between the terminals P1 and (+).

⑤ Surge restrainer

Surge restrainer is divided to winding surge restrainer and main loop surge restrainer according to the use position. Pls choose the right one which is suitable for the occasion. The aim of surge restrainer installation is restraining the surge voltage brought by switch components such as inductive load which is surrounding the frequency inverter (electromagnetic contactor, electromagnetic relay, electromagnetic valve, electromagnetic winding, electromagnetic detent). Do not connect the surge restrainer to the output side of the frequency inverter. Otherwise, the frequency inverter will be damaged.

⑥ Input side noise filter

Rectifier bridge of the inverter is uncontrolled rectifier. And input current is discontinuous impulse current. So the harmonic current noise signal, what flows to power wire from the inverter

inner, maybe bring bad impact on the surrounding machines (radio, phone, noncontact switch, sensor). This time, we suggest to instal input side noise filter to lighten the noise into the power wire. Besides, it can also reduce noise from the power wire into the frequency inverter.



Please use the special noise filter for the frequency inverter and the connection wire between the filter and the inverter should be as short as possible.

⑦ Output side noise filter

The frequency inverter outputs square wave with high-speed peak value voltage switch. So there is high-speed dv/dt conver on the output cables that will produce a large number of radio disturbance and inductive signal. By installation noise filter at the output side, the impact can be relieved. Please do not install the into phase capacitance and the noise filter to the output circuit. Otherwise, there is danger of damage to the frequency inverter.

⑧ 0-phase reactor

0-phase reactor is used for reducing the electromagnetic interference of the frequency inverter, which is suitable for the input side and output side. It equals to a three-phase common mode inductance. In actual use, according to the actual magnetic core size and cable specification, it is better to make sure 3-5 circles winding ratio to bring the best performance.

⑨ Braking reactor or braking unit

Renewable electricity consumption unit, please see the sixth part of the chapter three "electric installation".

⑩ Heat relay

Please install the heat relay at the output side of the frequency inverter. When the motor enters into overload state, it will cut the power source to protect the motor. While using one frequency inverter to drive one motor, it is unnecessary to install heat relay. The motor overload protection current [FA.16] of the frequency will work. While using one frequency inverter to drive multiple motors or the motor is drove directly by the power grid, please install heat relay between the inverter and the motor. While installing the heat relay, please design to cut the sequence control circuit of the MC at the main loop iuput side by the connection spot of the relay or design to input the heat relay action into the frequency inverter as the exterior malfunction. And please pay attention to the following tips to avoid heat relay malfunction and motor overheating at low speed.

Run at low speed

One frequency inverter run multiple motors

Motor cable is very long

Detect malfunction mistakenly for carrier frequency is too higher.

Low speed and heat relay

In normal case, the heat relay is suitable for the universal motor. While using the frequency inverter to run the universal motor (standard motor), the motor current is 5-10% higher, comparing with the commercial power supply. Besides, at low speed, even in the motor rated current range, the cooling capability of the fan drove by the motor axis will reduce, which will bring motor overheat. So please set the motor overheat protection current [FA.16] in the frequency inverter to be valid.

Motor cable is longer

While the motor cable is longer and the carrier frequency is higher, impacted by the leakage current, the heat relay maybe malfunction. To avoid it, please reduce the carrier frequency or set higher detection value of the heat relay. Before enhance the detection value, do confirm whether there is other cause for the motor overheat. Otherwise, there is danger.

Chapter 8 Quality Guarantee

8.1 Guarantee time and range

Guarantee time

Users can enjoy the following “three guarantee” service from the day of buying products if meeting products quality problem:

- We guarantee for repair, return and replacement for one month after delivery;
- We guarantee for repair and replacement for three months after delivery;
- We guarantee for repair for eighteen months after delivery;
- The articles above do not apply to export.

Guarantee range

Installation and debugging: In principle, it should be carried by users. Our company provides technical support. But we can afford installation and debugging service with charge.

On-site diagnosis: In principle, it should be carried by users. Our company gives technical support. But we can afford on-site diagnosis service with charge. According to diagnosis, if it is our liability, it will be free.

Malfunction maintain: While meeting malfunction, if it is quality problem and within guarantee time, we will repair free of charge. The malfunctions, caused by the reasons mentioned as follows, can only enjoy the paid service even if the product under warranty:

- The malfunctions caused by improper storage or faulty operation which are not in compliance with this user manual.
- The malfunctions caused by unauthorized transformation.
- The malfunctions caused by over-range operation.
- Have over guarantee time.
- The malfunctions caused by nature causes.

8.2 Liability exemption

Our company only takes on the liability according to our guarantee time and range. If you need more liability guarantee, you should buy proper commercial insurance from insurance company in advance. The other extended loss caused by malfunctions of our product is not within our guarantee range. Cases as follows, regardless of whether it is within guarantee time, it is not within our guarantee range. If need service, you has to pay for it.

- The malfunctions caused by improper storage or faulty operation.
- The malfunctions caused by unauthorized transformation.
- The malfunctions caused by over-range operation.
- Have been over guarantee time.
- The malfunctions caused by nature causes.
- User has not paid off the payment according to the contract.

8.3 Product application

- This product is not designed and produced for the case of vital importance.
- If need to apply this product in manned mobile machine, medical, aerospace, unclear energy, electric power, devices or system for submarine communications transit, please contact the sales department of our company. We do not take on the liability of the accident while this product is used in these cases without authorization.
- This product is produced under strict quality management. But we can not ensure that there will be no malfunction. If the user requires more safety requirement and reliability, standby

device should be deployed. If the user need more guarantee, proper commercial insurance should be considered.

9 FUNCTION PARAMETER SPECIFICATION

9.1 Basic parameters

F0.00	Control mode	Setting range: 0-8	Factory set: 0
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Asynchronous motor control mode(AM):

0: V/F control control voltage/frequency ratio, can automatically compensate stator resistance voltage loss, and automatically compensate slip frequency. Compared with control mode 1, it has higher low-frequency torque and speed accuracy. It can be used for situations without encoder speed feedback which has higher requirements for low-frequency torque.

1: Reserved.

2: Reserved

3: High performance VC without PG: VC control mode without speed sensor. This mode is used for all speed control. Please set this mode when you need high accuracy speed control.

In this mode, the torque can respond quickly even without motor feedback signal. Low speed motor can also have high torque when it runs.

4: High performance VC with PG: VC control mode without speed sensor. This mode is used for all speed control in which quick torque response and high-performance torque control are necessary. High accuracy speed control to zero speed. To receive motor speed feedback signal, it needs to use PG option card.

Mainly used for applications which have strict requirements for control performance such as high accuracy speed control, torque control, simple servo control, etc.

Synchronous motor control mode(SM):

5: Reserved

6: High-performance VC without PG: Permanent magnet synchronous machine (PMSM) VC control without PG. By software algorithm, set the whole model and observer of PMSM. The model requires complete identification of no-load motor, and is suitable for occasions which have higher requirements for ACC /DEC time and impact load.

7: VC with PG: PMSM VC control with PG, has characteristics of dynamic response and high control performance. It can be used for torque control, weak magnetic and high speed run and high power servo control.

Other control:

8: Voltage frequency differential output: output voltage and output frequency can be set and adjusted individually, usually used for EPS power, torque motor control, high frequency heat etc industry.

- Note:**
- 1. PG:** means inspects speed pulse encoder, used for VC control with PG. Usually there are photoelectric encoder and rotary encoder. Choose corresponding PG card according to the type and parameters. Please refer to function code [F5.30].
 - While choosing VC control mode, before the first running, it has to input right motor parameters and motor parameters self adjust to gain right motor parameter. Please refer to details of F5 parameter groups.
 - Rightly setting VC control parameters to ensure good stable and dynamic control performance. For VC control parameter setting and adjustment, please refer to details of F6 parameter groups.
 - While choosing VC control mode, all inverters can only drive one motor, and the capacitance rating difference between the inverters and the motor can't be too large. The inverter can be 2 ratings bigger or 1 rating smaller than the motor. Otherwise, it

will descend the control performance. Or the drive system can't run normally.

F0.01	Reserved
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F0.02	Run channel command	Setting range: 0-3	Factory set: 0
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It is channel for inverter receiving run and stop order and run direction. It is only used for starting and stopping control under torque control.

0: Keyboard control Inverter run and stop is controlled by keyboard key **FWD, REV/JOG, STOP/RESET**. **REV/JOG** key is defined as reverse while **[F4.07]** set as "0" and jog while **[F4.07]** set as "1".

1: Terminal control Run command control by multi-function input terminal FWD, REV, FWD JOG, REVJOG etc. Please refer to details of [F2.00~F2.06]. Terminal control running mode refers to details of [F2.26]. Terminal start protection refers to details of [F2.27].

2: RS485 communication control Upper machine gives running command by communication given. Communication parameters setting refers to Fd communication control parameter group.

When point to point broadcast communicates, slave machine chooses running command transferred by master machine as the running command. Please refer to instruction of [Fd.09].

When Modbus RS485 communication is valid, running command is set and changed by address 0x3001/0x2001. Details refer to appendix 2.

When PROFIBUS-DP communication is valid, running command is set and changed by corresponding address. Details refer to option card Profibus-DP card manual.

When CANopen communication is valid, running command is set and changed by corresponding address. Details refer to option card CANopen card manual.

AC200 supports Modbus, Profibus-DP, CANopen upper machine communication mode. The three modes couldn't be used at the same time. Profibus-DP, CANopen mode need to install communication card, which is optional accessory, and users can choose according to the needs.

3: Optional card Inverter run and stop is controlled by external optional card communication. For the optional card installation, parameter setting and so on, please refer use manual packing with the optional card.

Note:1. While fault reset, key **STOP/RESET**, control terminal reset order and RS485 communication terminal are valid reset order.

2. While inverter input frequency is 0Hz or lower than min output frequency **[F1.26]**. As long as you input run order, keyboard FWD indicator will be on, the motor will run as 0 frequency.

Clew: keyboard key **STOP/RESET** function can be selectable. Under exterior terminal control or communication control, it can be defined as stop function. Please refer to **[F4.08]**. Under exterior terminal control, if use **STOP/RESET** to stop, inverter stops and close exterior terminal run order. It needs to input exterior terminal stop order and unlock. The exterior terminal run order will be valid again. So is the communication control.

F0.03	Frequency given source channel A	Setting range: 0-11	Factory set: 0
F0.04	Frequency given source channel B	Setting range: 0-11	Factory set: 1

It is used to select frequency given gain channel in[F0.03]、[F0.04]. The A and B channel's relationship can be defined by parameter [F0.06].

0: Keyboard number given Given frequency is given by [F0.08] keyboard numbers setting frequency.;and parameter [F4.09] LED "0" digit "keyboard up/down key modification selection" is used to quickly modify [F0.08] setting value. Parameter value power down save and "UP/DOWN key"action limit refer to [F4.09].

1: Keyboard potentiometer given Given frequency is given by keyboard potentiometer.By using potentiometer,the input voltage is linearized and 100% corresponds with Max frequency.Please refer to [F4.10-F4.13] details .

2: Terminal VS voltage analog

3: Terminal AI analog

4: Terminal AS current analog

Given frequency is given and modified by **VS/AI/AS**. By linearizing input analog,100% corresponds with Max frequency. Please refer to [F3] parameter group.

5: Terminal pulse signal Given frequency is given and modified by (**PUL**) input pulse signal.By linearizing input PUL signal,100% corresponds with Max frequency. Please refer to [F2.30-F2.35] .

6:RS485 communication port: Given frequency is given by RS485 communication . Communication parameters refer to Fd communication control parameter groups .

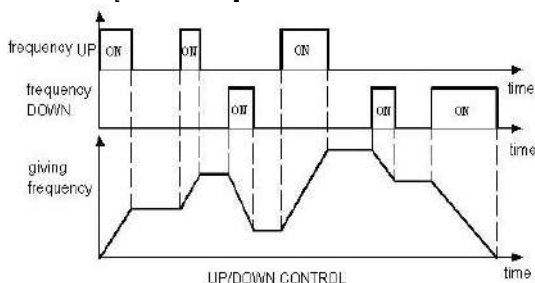
When point to point broadcast communicates, slave machine chooses running command transferred by master machine as the running command. Please refer to instruction of [Fd.09].

When Modbus RS485 communication is valid , running command is set and changed by address 0x3001/0x2001. Details refer to appendix 2.

When PROFIBUS-DP communication is valid,running command is set and changed by corresponding address.Details refer to option card Profibus-DP card manual.

When CANopen communication is valid ,running command is set and changed by corresponding address. Details refer to option card CANopen card manual.

7: UP/DOWN control Given frequency is controlled by terminals to realize increment and decline.The UP/DW terminal set by multifunction terminal(**X1~X7**) realize control by on-off with COM.Please refer to details of [F2.00~F2.06].



8: PID control given While [F0.03]or[F0.04] select this channel,the VFD running mode is process PID given.Set the frequency as output after PID、PID given value、feedback value. Refer to PID control parameters "Fb".

Through [F4.09] LED "0" digit ,select keyboard "UP/DOWN"key to quickly modify parameter [Fb.01] current given value、 parameter power down save and "UP/DW"key action limit selection.Please refer to [F4.09].

PID control state and trait are changed by multifunction terminals. Details refer to [F2.00-F2.06].

9: Program control (PLC) given Given frequency and frequency running direction is controlled by inner simple PLC control. Max 15 steps speed can be process control. Details see “FC” multi step, PLC function and swing frequency parameter group. If one step speed running time is set as “0”, it will jump over this step. It is convenient to set step speed. While **[F0.16]** LED “000” digit is 0, frequency control direction is invalid. While **[F0.16]** LED “00” is 1—REV forbid and any step direction is set as REV, this step run as 0 speed.

PLC and multi steps speed are both for frequency inverter vary speed and run under certain rules. Under multi steps running, step switch and direction change is controlled by the different combination between multi step control terminal and COM defined by multifunction input terminals. PLC not only can define one cycle of multi steps frequency in the function parameters. It can also define the run time, direction, ACC/DEC time and cycle mode of multi steps in the function parameters. Multi steps control terminal can be defined by any multifunction terminal. Details refer to **[F2.00-F2.06]**.

10: Optional card Given frequency is given and modified by optional card communication. For optional card installation, parameter setting please refers to user manual.

11: Multi-steps speed given Frequency setting is selected by multi-step speed terminal. If frequency channel A, B both don't choose multi-step speed given, while multi-step speed terminal is valid, it has higher priority to change frequency to multi-step speed given. If each of channel A and B chooses multi-step speed given, set the combination of frequency source. If all of the multi-step speed terminal is invalid, multi-step given as 0 speed. "Multi-step speed terminal" selection refer to **[F2.00-F2.06]**.

F0.05	Frequency channel B reference source	Setting range: 0~1	Factory setting: 0
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Frequency channel B reference source can be selected by this parameter. Frequency channel A reference source is max frequency **[F0.09]**.

0: Max frequency as reference source

1: Frequency set by channel A as the reference source.

Channel B setting frequency = Channel B frequency given source × Channel A setting frequency absolute value / Max frequency

F0.06	Frequency give channels combinations mode	Setting range: 0-5	Factory set: 0
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Used for inverter frequency setting channel A and channel B combination mode

0: Channel A Only channel A **[F0.03]** is valid, channel B **[F0.04]** is invalid.

1: Channel B Only channel B **[F0.04]** is valid, channel A **[F0.03]** is invalid.

2: Channel A+Channel B The sum of channel A **[F0.03]** add channel B **[F0.04]** is the given frequency of the inverter.

3: Channel A-Channel B The result of channel A **[F0.03]** minus channel B **[F0.04]** is the output frequency of the inverter. Frequency produced by this way could be negative value. Whether the negative value output is valid, depends on **[F0.16]** setting.

4: MAX {Channel A, Channel B} The bigger one of channel A **[F0.03]** and channel B **[F0.04]** is the output frequency of the inverter.

5: MIN {Channel A, Channel B} The smaller one of channel A **[F0.03]** and B **[F0.04]** is the output

frequency of the inverter.

Note: 1. While jog running command is valid, set the jog frequency as the inverter frequency.

2. While neither of channel A and channel B choose multi-step speed given, if multi-step speed terminal selection is valid, set the corresponding frequency selected by multi-speed terminal as the inverter given frequency.

3. While channel A and channel B choose the same reference source, no stack operation. Choose the channel A setting frequency as the inverter frequency.

4. Frequency given source priority : from high to low in order: jog running frequency running、 multi-step speed given (non channel selection)、 running command binding given frequency、 frequency given source channel.

5. If rotate direction selection [F0.16] is set as reverse prohibition, then no matter how the frequency control, when the frequency value is negative, the inverter will output 0.00 Hz frequency.

Note: Given frequency synthesized by channel A and channel B also be limited by upper limit frequency and lower limit frequency.

F0.07	Running command binding	Setting range: 0000~DDDD	Factory set: 0000
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While the parameter is valid, it is used for setting each running command channel binding frequency source channel. When command source has a binding frequency source, during the command source valid period, [F0.03~F0.06] will not be valid for the setting frequency. But [F0.16] LED "000" digit frequency direction control is still valid.

0 : no binding frequency given depends on [F0.03~F0.06] setting.

1 : keyboard number given frequency

2 : Keyboard potentiometer given

3 : Terminal VS voltage

4 : Terminal AI analog given analog given

5 : Terminal AS current analog given

6 : Terminal pulse PUL given

7 : RS485 communication given

8 : Terminal UP/DW control

9 : PID control given

A: Program control (PLC) given

B: Optional card

C: Multi-speed given

D: Reserved

Above 0~12 setting is the same with frequency given channel A [F0.03].

F0.08	Keyboard number setting frequency	Setting range: 0~upper limit	Setting range: 50.00Hz
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This parameter is valid when frequency given channel [F0.03][F0.04] is set "0": keyboard number

given and used to set and modify keyboard number setting frequency.

F0.09	Max frequency	Setting range: upper limit~600.00Hz	Factory set: 50.00Hz
F0.10	Upper limitation source selection	Setting range: 0~7	Factory set:0
F0.11	Number give upper limitation	Setting range: Lower limitation-max output frequency	Factory set: 50.00Hz
F0.12	Lower limitation	Setting range: 0.00-upper limitation	Factory set: 0.00Hz
F0.13	Lower limitation run mode	Setting range: 0-1	Factory set: 1

Max frequency : While analog input、 impulse input、 multi-step speed input are frequency source,for each of them, 100% is relative to max frequency as a calibration .The max frequency the frequency inverter permit to set. While **[F1.16]** LED “0” digit is 0, it is also the base of ACC/DEC time setting.

Upper limitation source selection: To select the give source of upper frequency limitation of frequency inverter. Upper limitation frequency is the upper limitation of the given frequency,and set a limit of the given frequency.

0: Number given Upper limitation set by **[F0.11]**.

1: Keyboard potentiometer given

2: Terminal VS voltage analog given

3: Terminal AI voltage analog given

4: Terminal AS current analog given

5: Terminal pulse signal given

6: RS485 communication given Set by address 0x3004/0x2004.Please refer to appendix 2: Modbus communication protocol.

7. Option card

While use potentiometer、 analog(Vs、 AI、 As)、 terminal pulse、 option card,it is similar with frequency given channel A.Please refer to **[F0.03].**

Number give upper limitation: It is upper limit frequency given channel when **[F0.10]** is set as 0.

Lowest limitation: When given frequency is lower than lower limitation frequency, inverter could run at 0 frequency、 lower limitation frequency.The lower limitation frequency running mode is set by **[F0.13]**.

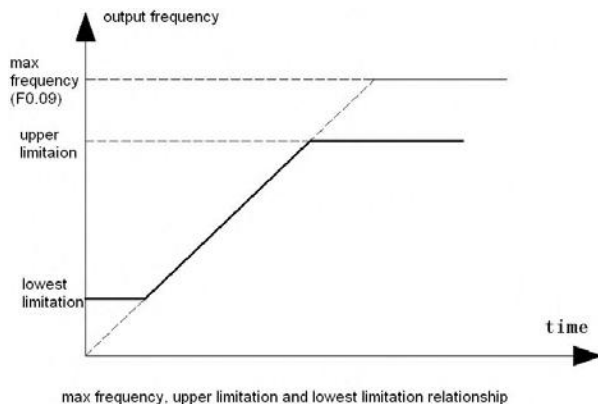
Lowest limitation run mode

0: Stop output, enter into pause running state Keep running state with no voltage output.

1: Run at lower limitation When actual given frequency is lower than the lower limitation, inverter run at the lower limitation.

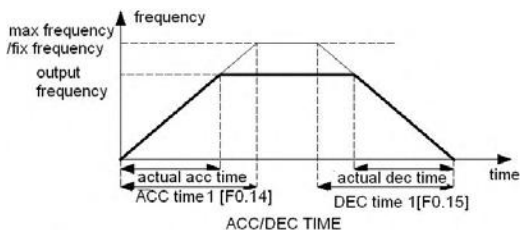
Note: **1.Max frequency, upper limitation and lower limitation set carefully according to actual need please. Except upper limitation and lower limitation, inverter is also limited by parameters set such as start frequency, stop detection frequency, stop DC brake start frequency, jump frequency and so on. Max frequency, upper limitation**

and lowest limitation relationship as below:



F0.14	ACC time 1	Setting range: 0.00-650.00s	Factory set: model set
F0.15	DEC time 1	Setting range: 0.00-650.00s	Factory set: model set

ACC time means the time needed for output frequency accelerate from 0.00Hz to time base frequency. DEC time means the time needed for output frequency decelerate from time base frequency to 0.00Hz. Max frequency, fix frequency 50Hz, given frequency chosen by [F1.16] LED "0" digit can be set as time base frequency. Details refer to [F1.16].



This inverter can set 4 kinds of ACC/DEC time. ACC/DEC time 1 is set by [F0.14~F2.15], and ACC/DEC time 2/3/4 can be set by [F1.21~F2.26]. ACC/DEC time 1 is the default value, if need to select other ACC/DEC time group, it must select by control terminal. Details refer to [F2.00~F2.06].

During process running, each step could select one of the 4 ACC/DEC time groups, and has no relationship with the terminal selection. Please refer to [FC.31~FC.45].

JOG ACC/DEC time set by [F1.39, F1.40].

Emergency stop DEC time is set by [F1.27].

F0.16	Rotate direction	Setting range: 0000-0121	Factory set: 0000
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LED "0" digit: running direction take the opposite To choose the adjustment of motor running direction

0: Direction unchanged The actual run direction is the same as required. Not adjust the current

direction.

1: Direction take the opposite The actual run direction is reverse to requirement. Adjust the current direction.

LED“00”digit: running direction prohibited To choose the effectiveness of motor running direction

0: Forward and reverse commands are allowed Inverter receive forward and reverse commands to control the motor

1: Only forward command is allowed Inverter only receive forward command to control the motor, and the motor doesn't run while given reverse command.

2: Only reverse commands are allowed Inverter only receive reverse command to control the motor, and the motor doesn't run while given forward command.

LED“000”digit: frequency control direction selection Used while the frequency given value is negative, whether the negative frequency is allowed to change the current direction of inverter.

0: Invalid If the calculation result is negative, inverter will output 0.00Hz frequency.

1: Valid If the calculation result is negative, inverter will change current direction and output corresponding frequency.

LED“0000”digit: reserved

Note: While reset to factory set, this setting is not changed. While this parameter is set a certain value, all of the running command channel (operation board, external terminal, RS485 communication, optional card and program running) will be affected by the value.

F0.17~F0.18	Reserved
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F0.19	Parameter initialization	Setting range: 0~3	Factory set: 0
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0: No action

1: Restore factory default (not restoring motor parameters) After the parameters restore factory set, all the function parameters is restored as the factory default except the motor parameters.

2: Restore factory default (restoring motor parameters) After the parameters restore factory set, all the function parameters is restored as the factory default besides the motor parameters.

3: Clear malfunction records Clear [FA.40~FA.59] all the history malfunction records

Note:

1. Not change [F0.16] and [F4.11-F4.14] setting while recover factory setting.

2. Keyboard shows SRVE while recover factory setting. SRVE disappear while initialization finished. If inverter power off during the SRVE display period, it just carries out parts of the parameters recovering. And please recover after power on again.

9.2 Run control parameter

F1.00	Start-up mode	Setting range: 0-2	Factory set: 0
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F1.01	Start pre-excitation time	Setting range: 0.00-60.00s	Factory set: model set
F1.02	Start frequency	Setting range: 0.00-60.00Hz	Factory set: 0.50Hz
F1.03	Start frequency hold time	Setting range: 0.0-50.0s	Factory set: 0.0s
F1.04	Braking current before start	Setting range: 0.0-150.0%	Factory set: 60.0%
F1.05	Braking time before start	Setting range: 0.0-60.0s	Factory set: 0.0s

Start-up mode

0: Start by start-up frequency [F1.02] start-up frequency and [F1.03] start-up frequency hold time control the frequency inverter start. It is suitable for big static friction torque and small load inertia occasion or occasion with external machine brake equipment. Motor spindle can keep static before restart after stop.

1: DC brake and start. Firstly [F1.04] brake current and [F1.05] brake time give certain DC braking energy to motor with load (electromagnetic hold brake). Then start by start-up frequency. It is suitable for stop state, small inertia load with REV and FWD.

2: Speed track, direction judge and start Detect speed and direction firstly, then start as the speed detected out and run to given frequency according to ACC/DEC time.

Note: Only software speed tracking below 4kw under open-loop control.

Start pre-excitation time: It is used to set pre-excitation time for asynchronous motor while start. Building magnetic field before starting, it can improve start performance and reduce start current and start time.

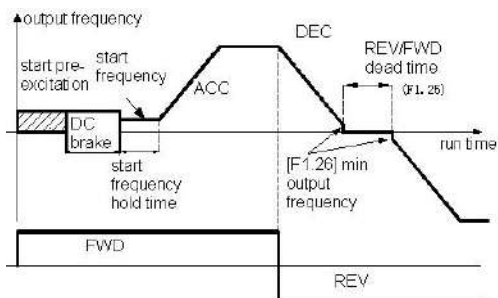
Start frequency: It is the initial output frequency while start. Right start frequency can bring big start torque. While start, certain instant force can be brought for load with big static friction under static state. But if the value is set too big, sometimes it will display E.OC1 fault.

Start frequency hold time: How long the start frequency be hold. Inverter will enter into normal ACC/DEC step after hold time.

Braking current before start: It is the braking current that the inverter gives the motor while DC braking. 100% corresponds to the motor rated current. Only when [F1.00] is 1, there is DC braking while start. When it is 0, DC braking is invalid.

Braking time before start: It is the time that DC braking current hold while start. Only when [F1.00] is 1, there is DC braking while start. There is no DC braking while braking time is 0.0s.

Attention: Start frequency is not limited by lower limitation [F0.12] and 0 speed torque threshold [F1.26].



START UP FIG

F1.06	Speed track speed	Setting range: 0.00-60.00s	Factory set: 0.50s
F1.07	Speed tracking stop delay	Setting range: 0.00~60.00s	Factory set: 1.00s

Speed track speed: While inverter speed tracking start, the time output voltage goes to the normal level at current speed. The shorter it is, the quicker speed tracking is, and the bigger the current impact is. Inverter controls tracking speed automatically when time is 0.

Speed tracking stop delay : After inverter stops output, it takes some time to output voltage and restart motor, so that the current impact is ultra small. Inverter controls the delay automatically when time is 0.

F1.08~F1.09	Reserved
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F1.10	Stop mode	Setting range: 0~1	Factory set: 0
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0: DEC to stop According to the set DEC time and DEC mode, DEC to 0.00Hz and stop output. While give frequency is small then stop DC braking start frequency [F1.11], inverter output frequency will change to 0. DC brake and stop work. Otherwise inverter will DEC to min output frequency and stop work.

For inverter with built-in braking unit (under than AC200-T3-018G), braking resistance (optional) can be used. When DC bus voltage is over [F4.23] dynamic braking act voltage, inverter begins to carry out the dynamic braking act.

For inverter without built-in braking unit (upper than AC200-T3-022G), braking unit and braking resistance can be selected. It is mainly used for occasions that need quick braking while stop.

1: Free stop Inverter stop output while receiving the stop order, and motor free running to stop. Usually, it cooperates with external machine hold brake.

F1.11	Initial frequency of stop DC braking	Setting range: 0.00-50.00Hz	Factory set: 0.00Hz
F1.12	Stop DC braking current	Setting range: 0.0-150.0%	Factory set: 60.0%

F1.13	Reserved		
F1.14	Stop DC braking duration	Setting range: 0.0-60.0s	Factory set: 0.0s

Initial frequency of stop DC braking: While inverter DEC to this frequency, it will stop output and start DC braking. While inverter stops and the output frequency is less than this frequency, it will start DC braking. While inverter DEC stops and the given frequency is less than this frequency, it starts DC braking and the output frequency changes to 0. If the running condition doesn't have strict requirement of DC braking, the initial frequency should be set as less as possible at stop.

Stop DC braking current: It is the current that inverter give motor while DC braking. 100% corresponds to the motor rated current. DC braking can afford 0 speed torque. It is usually used for improving stop accuracy and quick stop. It can't be used for DEC braking for normal running, which means that once that it starts DC braking, the inverter will stop output. If the DC braking current is set too big, while stop, it is easily to lead to over-current fault. DC braking is invalid if this parameter is set 0.

Stop DC braking duration: It is DC braking current holding time after stop. It is no DC braking process while braking time is 0.0s, which means that DC braking is invalid. DC braking is invalid if this parameter is set 0.

F1.15	Stop detection frequency	Setting range: 0.00~50.00Hz	Factory set: 0.50Hz
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Stop detection frequency: While DEC to stop, if the inverter output frequency is less than this value, it will stop.

F1.16	ACC/DEC selection	Setting range: 0000~0012	Factory set: 0010
F1.17	ACC start S curve time	Setting range: 0.00~10.00s	Factory set: 0.10s
F1.18	ACC finish S curve time	Setting range: 0.00~10.00s	Factory set: 0.10s
F1.19	DEC start S curve time	Setting range: 0.00~10.00s	Factory set: 0.10s
F1.20	DEC finish S curve time	Setting range: 0.00~10.00s	Factory set: 0.10s

ACC/DEC mode selections

LED "0" digit: ACC/DEC time base selection

- 0: max frequency The max frequency [F0.09] as the ACC/DEC time base
 1: fixed frequency 50Hz 50.00Hz fixed frequency as the ACC/DEC time base
 2: set frequency Given frequency as the ACC/DEC time base. If the frequency is changed frequently, the motor ACC speed is changeable. Pay attention while apply.

LED "00" digit: S ACC/DEC selection

AC200 series inverter support 2 kinds of ACC/DEC mode; In the process of normally start、stop、FWD/REV running、ACC/DEC; both of the two kinds of ACC/DEC mode is valid.

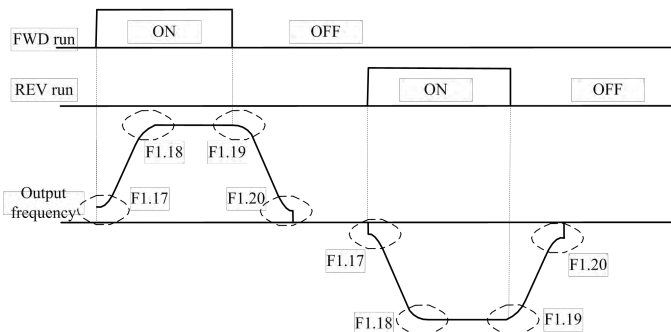
0: Beeline ACC/DEC Usually used for general load.

1: S Curve ACC/DEC S curve ACC/DEC mainly supports for those loads which need to slow down the noise and vibration and decrease the start-stop impact in ACC/DEC process, or low-frequency needs decrement torque; high frequency needs short time ACC etc.

LED "000" digit: reserved

LED “0000” digit: reserved

S curve as follows while FWD/REV running:

**ACC/DEC time will be prolong as follows after S curve is set:**

ACC time = ACC time chosen + $([F1.17]+[F1.18])/2$

DEC time = DEC time chosen + $([F1.19]+[F1.20])/2$

F1.21	ACC time 2	Setting range: 0.01-650.00s	Factory 10.00s	set:
F1.22	DEC time 2	Setting range: 0.01-650.00s	Factory 10.00s	set:
F1.23	ACC time 3	Setting range: 0.01-650.00s	Factory 10.00s	set:
F1.24	DEC time 3	Setting range: 0.01-650.00s	Factory 10.00s	set:
F1.25	ACC time 4	Setting range: 0.01-650.00s	Factory 10.00s	set:
F1.26	DEC time 4	Setting range: 0.01-650.00s	Factory 10.00s	set:

ACC time 2/3/4: When [F1.16] LED“0”digit is 0, it means the time need for output frequency ACC from 0.00Hz to max frequency [F0.09]. When [F1.16] LED“0”digit is 1, it means the time need for output frequency ACC from 0.00Hz to 50.00Hz. Details refer to [F1.16].

DEC time 2/3/4: When [F1.16] LED “0”digit is 0, it means the time need for output frequency DEC from max frequency [F0.09] to 0.00Hz. When [F1.16] LED “0”digit is 1, it means the time need for output frequency DEC from 50.00Hz to 0.00Hz.Details refer to [F1.16].

ACC/DEC time 2/3/4 could only switch current ACC/DEC group(Except PLC program running)by multi-function terminal “ACC/DEC time chosen terminal 1”and “ACC/DEC time chosen terminal 2” on-off combination with COM.

If ACC/DEC time chosen terminal is not set,the factory default is ACC/DEC time 1 valid,and inverter will ACC/DEC as ACC/DEC time 1.

Jog ACC/DEC time is out of this range.Jog ACC/DEC time is individually defined by[F1.39,F1.40].

ACC/DEC time table:

Terminal 2	Terminal 1	ACC/DEC time
OFF	OFF	ACC/DEC time 1
OFF	ON	ACC/DEC time 2

ON	OFF	ACC/DEC time 3
ON	ON	ACC/DEC time 4

If any unclear, please see FC parameter group multi steps time order fig.

F1.27	Emergency stop DEC time	Setting range: 0.01-650.00s	Factory set: 10.00s
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Used for setting emergency stop DEC time.Same as ACC/DEC time definition.

During emergency stop effective period,if the multi-function output terminal is set emergency stop,this terminal will always output effective signal in the process of emergency stop.Please refer to [F2.45~F2.47].

F1.28	FWD&REV dead area	Setting range: 0.0-120.0s	Factory set: 0.0s
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FWD&REV dead area: Waiting time at 0.0Hz while switch between FWD/REV. It sets for equipment with machine dead area while big inertia load and change direction.

F1.29	Zero speed torque frequency threshold	Setting range: 0.0-10.00Hz	Factory set: 0.50Hz
F1.30	Zero speed torque coefficient	Setting range:0.0~150.0%	Factory set:60.0%
F1.31	Zero speed hold torque time	Setting range:0.0-6000.0s	Factory set:0.0s

Zero speed torque function enter condition judgement:

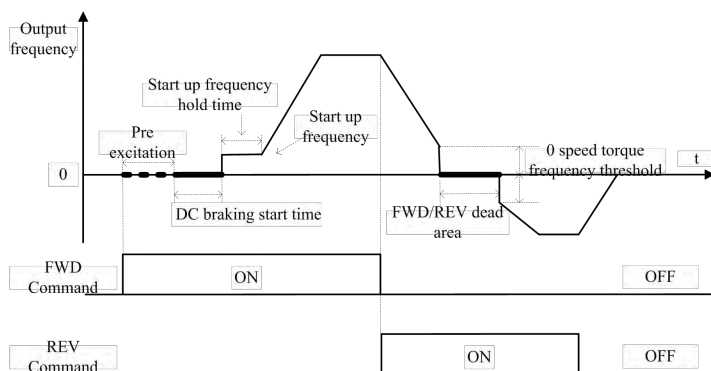
1. While inverter start and ACC,if the frequency given is less than the start frequency,inverter output is 0,but doesn't enter into 0 speed torque function,
2. While inverter start and ACC,if the frequency given is no more than 0 speed torque frequency threshold, the output frequency is 0Hz,and enter into 0 speed torque function.If the frequency given is more than the threshold,inverter doesn't enter into 0 speed torque hold function.
3. While inverter normally running FWD/DEC switch, if the output frequency is less than [F1.29],inverter will output 0Hz,and enter into 0 speed torque function.When the 0 speed torque hold time[F1.31]is more than FWD&REV dead area[F1.28],the hold time is decided by FWD&REV dead area[F1.28].
4. While inverter is normally running, in the process of changing frequency setting value to control ACC/DEC,if DEC to[F1.29],the inverter will output 0 frequency, and enter into 0 speed torque function and exit this function after 0 speed torque hold time.
5. While inverter stop DEC process, if the output frequency is less than 0 speed torque frequency threshold[F1.29],inverter doesn't enter the 0 speed torque function and normally DEC to stop.If stop DC braking start frequency is more than [F1.29],when the output frequency is less than stop DC braking start frequency,inverter enter into stop DC braking state.

0 speed torque hold coefficient: Valid under open-loop V/F or open-loop VC control and set the output torque at 0 speed.100% corresponds to motor rated current.Under closed-loop control

mode, 0 speed torque value is decided by motor load. While using, if the torque is set too big or of long duration, pay attention to motor cooling.

0 speed torque hold time: Set the hold time of inverter entering 0 speed torque. Inverter starts timing when the operation frequency is 0Hz, and stops output when time reaches the 0 speed torque hold time set. The effective timing is 0~5999.9S. Inverter times following the set time when parameters are set within the effective timing and stops 0 speed hold torque after the timing is finished.

Note: Pay attention to the motor temperature rise when 0 speed hold torque is set too big or of long duration. Install motor cooling equipment to improve the motor heat dissipation if the temperature rise is too high.



F1.32~F2.34	Reserved
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F1.35	Power off restart action selection	Setting range: 0-1	Factory set: 0
F1.36	Power off restart waiting time	Setting range: 0.00-60.00s	Factory set: 0.50s

Power off restart operation selection

0: invalid Only run with order power on again. While keyboard control, RS485 communication control or optional card control, automatic clear running order while power off.

1: Valid If inverter is at run state before power off, it start automatically after [F1.36] waiting time. While waiting, it does not accept any orders. But if stop order, it will not restart. Power off restart waiting time [F1.36] setting principle: Accord to rework waiting time of the equipment related to inverter when power on again.

Note: It can make machine automatic re-start while power recovers. Therefore, there is a great contingency. Please use it carefully.

F1.37	Reserved
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F1.38	JOG running frequency setting	Setting range: 0.00-Max frequency	Factory set: 5.00Hz
F1.39	JOG ACC time	Setting range: 0.01-650.00s	Factory set: 10.00s
F1.40	JOG DEC time	Setting range: 0.01-650.00s	Factory set: 10.00s

JOG running frequency setting: Set output frequency while JOG.

JOG ACC time: When [F1.16] LED "0" digit is 0, it means the time need for output frequency ACC from 0.00Hz to max frequency [F0.09]. When [F1.16] LED "0" digit is 1, it means the time need for output frequency ACC from 0.00Hz to 50.00Hz. Details see [F1.16].

JOG DEC time: When [F1.16] LED "0" digit is 0, it means the time need for output frequency DEC from max frequency [F0.09] to 0.00Hz. When [F1.16] LED "0" digit is 1, it means the time need for output frequency DEC from 50.00Hz to 0.00Hz.

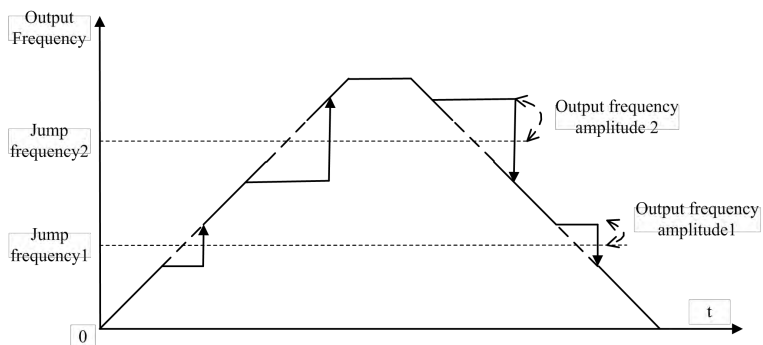
Jog frequency has the highest priority (terminal jog), which means that once that the jog command is valid at any state, inverter runs with the jog ACC/DEC time from current running frequency to jog frequency. Jog ACC/DEC time is defined as ACC/DEC time, and inverter jog could be controlled by jog command of keyboard, control terminal, communication command and option card.

Note: JOG run frequency set is only limited by [F0.09]. While JOG frequency setting is bigger than [F0.11] upper limitation, actual JOG output frequency is limited by upper limitation. Only terminal JOG priority is not limited by run order channels. Other JOG orders have priority only while the channel is the same as others. Such as keyboard JOG is only valid under keyboard control.

F1.41	Jump frequency 1	Setting range: 0.00-Max frequency	Factory set: 0.00Hz
F1.42	Jump frequency range 1	Setting range: 0.00-Max frequency	Factory set: 0.00Hz
F1.43	Jump frequency 2	Setting range: 0.00-Max frequency	Factory set: 0.00Hz
F1.44	Jump frequency range 2	Setting range: 0.00-Max frequency	Factory set: 0.00Hz

While inverter is running with load, to avoid machine load resonance point, the output frequency could be set jump frequency. Inverter could set 2 jump points to carry out the jump operation, and the output frequency would adjust automatically to beyond the range of resonance point to avoid running at this point after setting the jump frequency, even that the frequency given is within the resonance point range.

Jump frequency processed as follows in ACC/DEC process:



Note: Output frequency will through jump frequency area while ACC/DEC.

9.3 Quantum digital terminal functions

F2.00	Multifunction input terminal 1(X1)	Setting range: 0-63	Factory set:1
F2.01	Multifunction input terminal 2(X2)		Factory set:2
F2.02	Multifunction input terminal 3(X3)		Factory set:4
F2.03	Multifunction input terminal 4(X4)		Factory set:5
F2.04	Multifunction input terminal 5(X5)		Factory set:6
F2.05	Multifunction input terminal 6(X6)		Factory set:8
F2.06	Multifunction input terminal 7(X7)		Factory set:0

Machine has seven multifunction terminals(X1-X7) which can be defined by **[F2.00-F2.06]**. And trait and filter time can be defined by **[F2.08-F2.23]**. Details refer to **[F2.08-F2.23]**.X7 and high speed impulse input PUL use the same external input terminal X7/PUL.While function code chooses PUL given, external terminal is used as PUL input,otherwise,used as X7 input.For example,X7/PUL will be used as PUL input when [F2.06]=0,and at this time ,switch signal input is not accepted.

As multifunction terminal has many functions,please set and choose according to the requirement. Setting and function table:

setting	setting	setting	setting
0	No function(can choose again)	32	ACC/DEC time selection terminal 1
1	FWD	33	ACC/DEC time selection terminal 2
2	REV	34	ACC/DEC pause
3	3 line run control(Xi)	35	Swing frequency devotion
4	FWD JOG	36	Swing frequency pause
5	REV JOG	37	Swing frequency reset

6	Free stop	38	Reserved
7	Emergency stop	39	Reserved
8	Fault reset	40	Timer touch terminal
9	Out fault input	41	Timer clear terminal
10	Frequency (UP)	42	Counter clock input terminal
11	Frequency (DW)	43	Counter clear terminal
12	(UP/DW clear)	44	DC brake order
13	Channel A switch to Channel B	45	Pre-excitation order terminal
14	Frequency channel combination switch to channel A	46	Motor select terminal
15	Frequency channel combination switch to channel B	47	Reserved
16	Multi steps terminal 1	48	Command channel switch to keyboard
17	Multi steps terminal 2	49	Command channel switch to terminal
18	Multi steps terminal 3	50	Command channel switch to communication
19	Multi steps terminal 4	51	Command channel switch to option card
20	PID control cancel	52	Run banned
21	PID control pause	53	FWD banned
22	PID trait switch	54	REV banned
23	PID parameter switch	55	Reserved
24	PID given switch 1	56	Reserved
25	PID given switch 2	57	Reserved
26	PID given switch 3	58	Reserved
27	PID feedback switch 1	59	Reserved
28	PID feedback switch 2	60	Speed torque control switch
29	PID feedback switch 3	61	Position control switch
30	PLC pause	62	Reserved
31	PLC restart	63	Reserved

0: No function This terminal invalid.If the function terminal is idle,it is recommended to be set 0,to avoid the misoperation.

1: FWD While run order is given by terminal, and **[F2.26]** is set as 2 line 1, and terminal is valid, inverter will FWD. Other control mode refer to **[F2.26]**.

2: REV While run order is given by terminal, and **[F2.26]** is set as 2 line 1, and terminal is valid, inverter will REV. Other control mode refer to **[F2.26]**.

3: 3 line run control (Xi) While run order is given by terminal, and **[F2.26]** is set as 3 line 1/2, it is 3 line run control (Xi). Details refer to **[F2.26]**.

4: FWD JOG

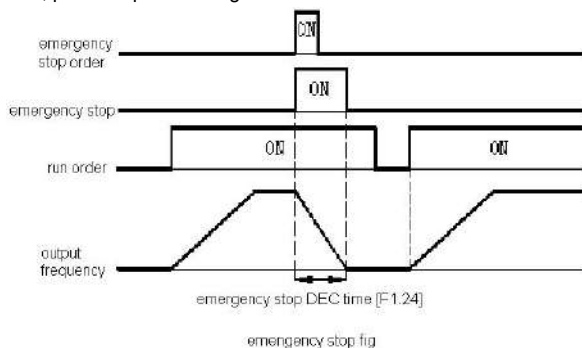
5: REV JOG

FWD/REV command input port.When this terminal is valid,inter jog runs.Terminal jog command has the highest priority.JOG refer to details **[F1.38-F1.40]**.

6: Free stop Free stop command input port.While it is valid, inverter stops output. Motor will free run.While free stop terminal is always valid, inverter does not accept any start order and keep stop state. Whether recover to original order after free stop order is relieved while terminal 2 line control

running, refer to [F2.27] please. It does not recover to original order after free stop order is relieved while keyboard, RS485, optional card and terminal 3 line control running. If need start inverter, it needs to input run order again.

7: Emergency stop If input emergency stop order while running, inverter DEC and stop according [F1.27] DEC time setting. Details refer to [F1.27]. It can not run again before totally stopping. While [F1.10] is set as free stop, emergency stop order and free stop order is same function. Once this terminal is valid, inverter stops output and free stop immediately. If emergency stop terminal is always valid, inverter does not accept start order and keep stop. Under 2 line control mode, whether recover original run order after relieve emergency stop order is decided by [F2.27]. Not recover original order under keyboard, RS485, optional card and terminal 3 line control mode. If need start inverter, please input order again.



Note: Suddenly DEC could lead to over-voltage fault. When there is over-voltage fault, inverter will cut off output and motor will be in free running state, which leads to the motor out of control. Hence, while use emergency stop function, please set right [F1.27] DEC time or work with energy brake function.

8: Fault reset While inverter fault with alarm, it could reset the fault through this terminal. While inverter is under 2 lines control running mode, whether recover original order after fault reset is decided by [F2.27].

9: Out fault input Inverter fault monitors and protects external equipments while accept exterior fault input signal by it. After receiving external fault input signal, motor free run and display malfunction information E.EF.

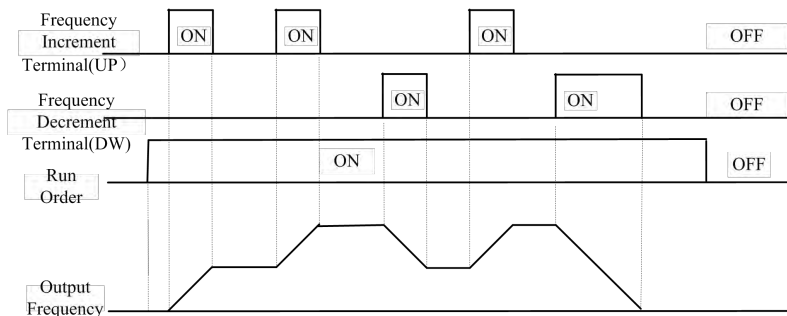
10: Frequency (UP)

11: Frequency (DW)

12: (UP/DW clear)

Achieve given frequency UP/DW through control terminal, and terminal UP/DW control is valid only when [F0.03] is set "7". Set memory and clear mode after UP/DW change the frequency by [F2.36]; details refer to [F2.36]. The rate of ACC/DEC rate of terminal UP/DW controlling given frequency is set by [F2.37].

UP/DW given frequency can be cleared by UP/DW clear terminal at any time.

**13: channel A switch to channel B****14: Frequency combination channel switch to channel A****15: Frequency combination channel switch to channel B**

Switch by the combination of frequency given channel

16: Multi steps terminal 1**17: Multi steps terminal 2****18: Multi steps terminal 3****19: Multi steps terminal 4**

Multi-step speed command input port, coding combination to achieve 15 steps speed. Multi-step speed command has the second priority to jog command. See parameter details of multi steps and FC group of PLC.

20: PID control cancel While [F0.03] is set as 8 and this terminal is valid, it can make PID function be invalid. Main frequency given channel give 0.00Hz. While this terminal is invalid, PID re-count frequency given of main channel.

21: PID control pause While PID given and this terminal is valid, it can make PID adjustment be invalid and keep frequency not change. PID re-count frequency given of main channel.

22: PID trait switch While [F0.03] is set as 8 and this terminal is valid, [Fb.07] LED "0" digit-trait setting will be changed. PID output trait back to [Fb.07] LED "0" digit-trait setting.

23: PID parameter switch While PID parameter switch condition [Fb.17] is set "1", this terminal selection is valid. When this function is invalid, PID adjustment proportion、integral、differential parameter is [Fb.11~Fb.13], and be [Fb.14~Fb.16] when invalid.

24: PID given switch 1**25: PID given switch 2****26: PID given switch 3**

While PID controller give signal source [Fb.00] is set as 8, give signal source channel can be switched by this group of terminals. Details see [Fb.00].

27: PID feedback switch 1**28: PID feedback switch 2****29: PID feedback switch 3**

While PID controller feedback signal source [Fb.03] is set as 8, feedback signal source channel can be switched by this group of terminals. Details refer to [Fb.03].

30: PLC pause While [F0.03] is 9, this valid signal can make PLC pause and inverter output current frequency. Inverter go on as before while this signal disappears. See parameter details of

multi steps and FC group of PLC.

31: PLC restart While [F0.03] is 9, this valid signal can make PLC start from the 1st step again at stop state or running. See parameter details of multi steps and FC group of PLC.

32: ACC/DEC time selection terminal 1

33: ACC/DEC time selection terminal 2

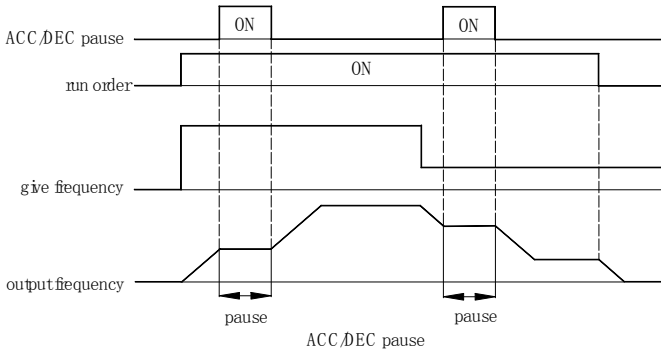
ACC/DEC time selection command input port,coding combination to achieve 4 steps ACC/DEC selection.ACC/DEC time selection terminal 1 is defaulted as valid while not set parameter and terminal invalid. Details see [F1.21-F1.26].

34: ACC/DEC pause In ACC/DEC process, if it is valid, inverter stop ACC/DEC and keep the speed.

35: Swing devotion: While under swing control,if set manual devotion,the swing function is valid when this terminal is valid and inverter starts swing running.

36: Swing pause: While under swing control, inverter keeps current frequency if this terminal is valid. The swing frequency is recovered after canceling the terminal command.Details refer to [FC.49~FC.55].

37: Swing reset: While under swing control, inverter returns centrals frequency if this terminal is valid. Details refer to [FC.49~FC.55].



38: Reserved

39: Reserved

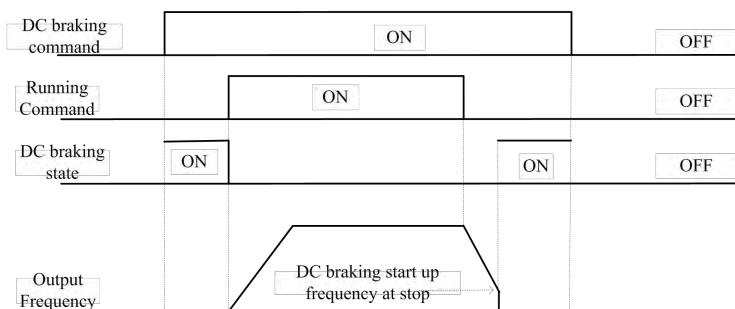
40: Timer touch terminal Port to star timer starting timing.Closed is valid.Detail refer to [F2.39-F2.40].

41: Timer clear terminal Clear timer timing record . Instant closed is valid.Detail refer to [F2.39-F2.40].

42: Counter clock input terminal Clock input terminal of counter function. Detail refer to [F2.41-F2.42].

43: Counter clear terminal Clear counter record and closed is valid.Detail refer to [F2.41-F2.42].

44: DC brake order At stop state, it can start DC brake function.Details refer to [F1.12]. If input run order or JOG order, DC braking will be stopped.



45: Pre-excitation order terminal Only valid under asynchronous VC control. At stop state, it can start pre-excitation function. If input run order or JOG order, pre-excitation order is cancelled.

46: Reserved

47: Reserved

48: Command channel switch to keyboard

49: Command channel switch to terminal

50: Command channel switch to communication

51: Command channel switch to expansion card

Command channel switch terminal can switch to 4 kinds of command given, The priority from high to low is keyboard、terminal、communication、expansion card.

52: Run banned

53: FWD banned

54: REV banned

While run banned terminal selection is valid, run command is valid at stop and free stop at running state.

While FWD banned terminal selection is valid, FWD running command is valid at stop and free stop at running state.

While REV banned terminal selection is valid, REV running command is valid at stop and free stop at running state.

55: Reserved

56: Reserved

57: Reserved

58: Reserved

59: Reserved

60: Speed torque control switch

Only be valid under VC control mode, and switch to torque control when the terminal control is valid.

61: Position control switch

Only be valid under closed-loop VC control mode, and switch to position control mode when the terminal control is valid. The priority of terminal is higher than speed torque control switch.

62: Reserved

63: Reserved

F2.08	X1-X4 terminal trait selection	Setting range: 0000-1111	Factory set: 0000
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X1-X4 terminal trait selection: Set the trait of X1、X2、X3、X4 individually

LED "0" digit: X1 terminal

0: On valid

1: Off valid

LED "00" digit: X2 terminal

0: On valid

1: Off valid

LED "000" digit: X3 terminal

0: On valid

1: Off valid

LED "0000" digit: X4 terminal

0: On valid

1: Off valid

F2.09	X5-X7 terminal trait selection	Setting range: 0000-1111	Factory set: 0000
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Terminal trait selection as above.

F2.10	X1 valid detected delay	Setting range: 0.000-6.000s	Factory set: 0.010s
F2.11	X1 invalid detected delay	Setting range: 0.000-6.000s	Factory set: 0.010s
F2.12	X2 valid detected delay	Setting range: 0.000-6.000s	Factory set: 0.010s
F2.13	X2 invalid detected delay	Setting range: 0.000-6.000s	Factory set: 0.010s
F2.14	X3 valid detected delay	Setting range: 0.000-6.000s	Factory set: 0.010s
F2.15	X3 invalid detected delay	Setting range: 0.000-6.000s	Factory set: 0.010s
F2.16	X4 valid detected delay	Setting range: 0.000-6.000s	Factory set: 0.010s
F2.17	X4 invalid detected delay	Setting range: 0.000-6.000s	Factory set: 0.010s
F2.18	X5 valid detected delay	Setting range: 0.000-6.000s	Factory set: 0.010s
F2.19	X5 invalid detected delay	Setting range: 0.000-6.000s	Factory set: 0.010s
F2.20	X6 valid detected delay	Setting range: 0.000-6.000s	Factory set: 0.010s
F2.21	X6 invalid detected delay	Setting range: 0.000-6.000s	Factory set: 0.010s
F2.22	X7 valid detected delay	Setting range: 0.000-6.000s	Factory set: 0.010s
F2.23	X7 invalid detected delay	Setting range: 0.000-6.000s	Factory set: 0.010s

Valid detected delay: The time delay of input terminal X1~X7 from invalid state switch to valid state.

Invalid detected delay: The time delay of input terminal X1~X7 from valid state switch to invalid state.

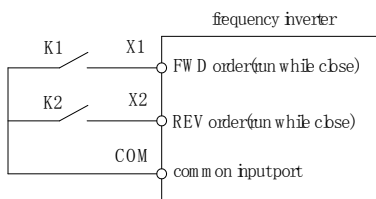
F2.24~F2.25	Reserved
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F2.26	Terminal control mode	Setting range: 0-3	Factory set: 0
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This parameter defines 4 kinds of external terminal control inverter running mode

0:2-line 1 Run and direction in 1, which is the most commonly used. Factory set is X1(FWD), X2(REV) terminals decide motor forward or reverse.

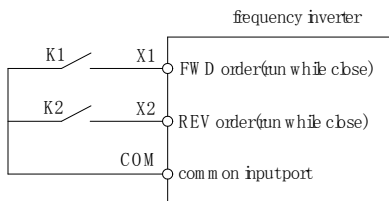
K1	K2	run order
0	0	stop
1	0	FW D
0	1	REV
1	1	COM



0:2-line 1

1:2-line 2 Run and direction is separate. FWD terminal X1 is run terminal. FWD terminal X2 state decides direction.

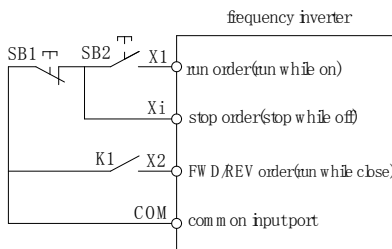
K1	K2	run order
0	0	stop
1	0	FW D
1	1	REV
0	1	stop



1:2-line 2

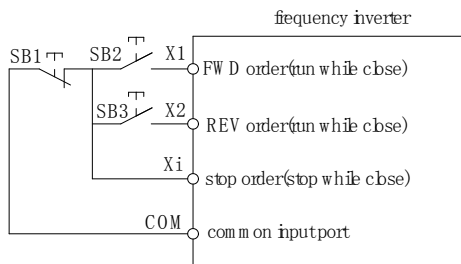
2:3-line 1 Xi is stop run terminal. Run order is decided by FWD terminal X1. Direction is controlled by REV terminal X2. Xi is valid input.

K1	direction control
0	FW D
1	REV



2:3-line 1

3:3-line 2 Xi is stop run terminal. Run order is decided by FWD terminal X1 or REV terminal X2. Direction is controlled by both terminals.



3:3-line 2

Note: SB1: stop button. SB2: FWD button. SB3: REV button. Xi is set as 3 multi function input terminal 3 line control (Xi)].

F2.27	Terminal operate protection	Setting range: 0000-0111	Factory set: 0111
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Only valid while [F0.02] is 1 and two lines control mode ,which means that[F2.26] is set as 0 or 1.The command need to be input again in three lines control mode.

LED “0” digit: terminal operate protection when abnormal exit

0: OFF

1: ON

LED “00” digit: jog terminal operate protection when abnormal exit

0: OFF

1: ON

LED “000” digit: operate protection when command channel switch to terminal

0: OFF

1: ON

LED “0000” digit: reserved

Note: While operate command channel is terminal and the control mode is two lines,inverter will be abnormal and stop under the valid terminal running command state. When the exception is gone,if the protection has turned off,inverter will drive motor immediately;if the protection has turned on,it is necessary to cancel the previous running command before response the new command and start the motor.

F2.28~F2.29	Reserved
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F2.30	PUL input min frequency	Setting range: 0.00-50.00kHz	Factory set: 0.00kHz
F2.31	PUL min frequency corresponding setting	Setting range: 0.00-100.00%	Factory set: 0.00%
F2.32	PUL input max frequency	Setting range: 0.00-50.00kHz	Factory set: 50.00kHz
F2.33	PUL max frequency corresponding setting	Setting range: 0.00-100.00%	Factory set: 100.00%
F2.34	PUL filter time	Setting range: 0.00-9.00s	Factory set: 0.10s
F2.35	PUL end frequency	Setting range: 0.000-1.000kHz	Factory set: 0.010kHz

PUL input min frequency: It defines the smallest frequency that pulse input terminal (PUL) can accept. If smaller than this value, inverter will deal as min frequency.

PUL min frequency corresponding setting: It defines the ratio of setting value corresponding to PUL min input frequency.

PUL input max frequency: It defines the max frequency that pulse input terminal (PUL) can accept. If bigger than this value, inverter will deal as max frequency.

PUL max frequency corresponding setting: It defines the ratio of setting value corresponding to PUL max input frequency.

PUL filter time: It is pulse signal filter time to eliminate disturb signal. The longer filter time is, the stronger anti-disturb force is. The shorter filter time is, the weaker anti-disturb force is. But respond speed will be quicker.

PUL end frequency: It is defined as smallest pulse frequency can be identified by PUL. Pulse frequency smaller than this value can not be identified. It will be deal as 0Hz. The smaller this value is, the smaller the pulse frequency identified by PUL is. When PUL frequency is disappear, the time of 0Hz pulse frequency judged by inverter is longer.

F2.36	UP/DW terminal frequency adjust selection	Setting range: 0-2	Factory set: 0
F2.37	UP/DW terminal frequency add/reduce speed	Setting range: 0.01-50.00Hz/s	Factory set: 0.50Hz/s

UP/DW terminal frequency adjust selection

0: Power down save While UP/DW adjustment, it saves frequency records after power down or stop. Inverter continues last UP/DW adjustment while power on.

1: Power down not save, stop save While UP/DW adjustment, it saves frequency records after stop. Inverter continues last UP/DW adjustment while power on. it does not save frequency record after power down. Inverter runs from 0.00Hz .

2: Valid in running, clear zero at stop While UP/DW adjustment, it does not save frequency records after power down or stop. Inverter continues last UP/DW adjustment while power on. Inverter UP/DW adjusts from 0.00Hz next time.

UP/DW terminal frequency increase/reduce speed: While UP/DW adjustment, it modifies change rate of given frequency.

F2.38	Reserved
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F2.39	Time unit for timer	Setting range: 0-2	Factory set: 0
F2.40	Timer setting	Setting range: 0-65000	Factory set: 0

Time unit for timer:

- 0: Second
- 1: Minute
- 2: Hour

Timer setting: It is used for set timing of inverter. Timer start is finished by external timer touch terminal (select by [F2.00-F2.06]). Time begins while receiving signal. While time arriving, corresponding output terminal (selected by [F2.45-F2.47]) outputs 1s wide pulse signal. While touch terminal is invalid, timer keeps records and continues while touch terminal is valid again.

Timer clear terminal can clear timer records anytime.

Note:Timer can work alone, not limited by the running state of inverter; the inverter timer could be used in certain conditions; timing can be displayed in [C-35], the time unit decided by [F2.39].

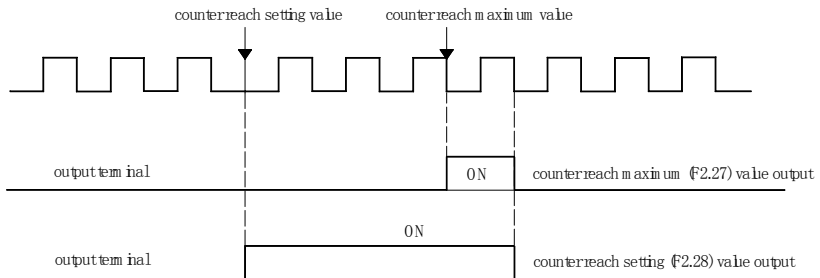
F2.41	Max value of counter	Setting range: 0-65000	Factory set: 1000
F2.42	Setting value of counter	Setting range: 0-65000	Factory set: 500

This parameter stipulates the counting action of the interior counter, clock terminal of the counter is selected by the parameter [F2.00-F2.06].

Max value of counter: When the count value of counter for the external clock reaches the value specified in[F2.41] , in the corresponding output terminal(selected by [F2.45-F2.47]) output a valid signal of which the width is equal to external clock period..

Setting value of counter: When the count value of counter for the external clock reaches the value specified in [F2.42], in the corresponding output terminal (selected by [F2.45-F2.47]) output a valid signal; keep counting until the count value exceeds the value specified in [F2.41], which causes the counter to be cleared, and the output valid signal would be canceled.

Counter can be clear zero anytime by multifunction terminal [F2.00-2.06].



Note:Counter can work alone, not limited by the running state of inverter; the inverter counter could be used in certain conditions;the value can be displayed in [C-22].

F2.43	Reserved
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F2.44	Output terminal polarity selection	Setting range: 0000~0111	Factory set: 0000
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LED “0” digit: Terminal Y

0: Positive

1: Negative

LED “00” digit: Relay output terminal 1

0: Positive

1: Negative

LED “000” digit: Relay output terminal 2

0: Positive

1: Negative

LED “0000” digit: reserved

F2.45	Output terminal 1(Y)	Setting range: 0-31	Factory set: 1
F2.46	Relay output terminal 1(TA1-TB1-TC1)		Factory set: 4
F2.47	Relay output terminal2(TA2-TB2-TC2)		Factory set: 11

0: No output This terminal is invalid ,if the terminal function is idle,it is suggested that set“0” to avoid misoperation.

1: Running Output valid signal while inverter is running.

2: REV Output valid signal while inverter is REV running.

3:FWD Output valid signal while inverter is FWD running.

4: Fault trip alarm 1(alarm while fault self-recover) Output signal while malfunction,including malfunction self recovery.

5: Fault trip alarm 2(no alarm while fault self-recover) Output signal while malfunction, except malfunction self recovery.

6: Out fault stop While multi-function input terminal external malfunction signal,and inverter displays E.EF fault,output valid signal.

7: Under voltage While inverter is under-voltage,output valid signal.

8: Finish ready for running While this signal is valid,it means that the inverter has no fault,the bus voltage is normal,the running banned terminal such as stop or emergency stop is invalid,and can operate after receiving start command.

9: Output frequency level test 1(FDT1)

10: Output frequency level test 2(FDT2) When the output frequency of frequency converter is over test level [F2.51]/[F2.53] setting, it outputs valid signal after [F2.52]/[F2.54] delay frequency. When output frequency is lower than test level, it outputs invalid signal after delay frequency. Details see [F2.51-F2.54].

11: Frequency arrive While the output frequency closes or reaches a certain range of given frequency(set by [F2.55],output valid signal,otherwise output invalid signal.)Details see [F2.55].

12: Run as 0 speed Output valid signal while inverter is running and output 0.00Hz.

13: Upper frequency limit arrive Output valid signal while inverter is running at the upper frequency limit.

14: Lowest frequency limit arrive Output valid signal while inverter is running at the lowest frequency limit.

15: Program running cycle finished One cycle finished, it output 500ms signal.

16: Program running step finished One step finished, it output 500ms signal.

17:PID feedback over upper limit While PID feedback arrive **[Fb.27]** and still over limit after **[Fb.25]** delay time, it output valid signal.

18:PID feedback under lowest limit While PID feedback arrive **[Fb.28]** and still over limit after **[Fb.25]** delay time, it output valid signal.

19: PID feedback sensor wire break Output valid signal while detecting PID feedback sensor wire break.Details see **[Fb.25-Fb.26]**.

20: Reserved

21: Timer time arrive While inverter inner timer reaches set time,it output 1ms impulse signal.Details refer to**[F2.39~F2.40]**.

22: Counter arrive biggest value While counter reaches the max value,the output terminal output a valid signal of which the width equals to the external clock cycle,,and clear the record.Details see **[F2.41-F2.42]**.

23: Counter arrive setting While counter reaches the setting value,the output terminal output a valid signal,and keeps counting until over the max value and then clear the record.Details see **[F2.41-F2.42]**.

24: dynamic braking Output valid signal while satisfying the dynamic braking condition. Details see **[F4.29]**.

25: PG feedback break Output valid signal while detecting the PG feedback break.Details see **[F5.30-F5.32]**.

26: Emergency stop Output valid signal while emergency stop.

27: Pre alarm output for load 1

28: Pre alarm output for load 2 While inverter is in operation and under VF control mode,the motor output current will be regarded as the pre alarm judgment value;while under VC control mode,the motor output torque will be used as the judgment value.The load pre alarm judgment value will be compared with the load pre alarm detecting level to judge whether it outputs a valid signal. Details refer to **[FA.17~FA.21]**.

29: Reserved

30: RS485 given Through RS485 communication (0X3020/0X2020) setting,BIT 0 digit corresponds to Y output,BIT1corresponds to relay 1 output, and BIT 2 digit corresponds to relay 2 output.

Note: Relay output terminal TA1-TC1 ,TA2-TC2 on and TB1-TC1,TB2-TC2 off is valid signal. Y output terminal with low level is combined to (+24V) terminal to output valid signal 24V power.

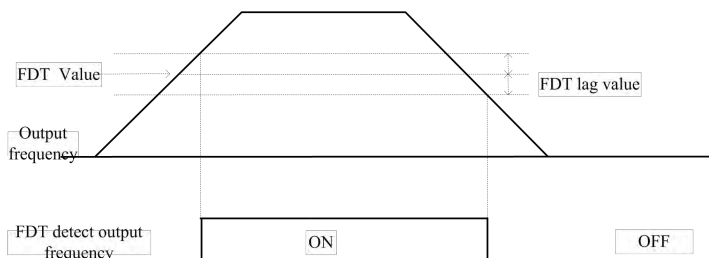
31: Reserved

F2.48	Y output delay time	Setting range: 0.000-6.000s	Factory 0.010s	set:
F2.49	Relay1 output delay time	Setting range: 0.000-6.000s	Factory 0.010s	set:
F2.50	Relay2 output delay time	Setting range: 0.000-6.000s	Factory 0.010s	set:

When the internal logic of the inverter operation is to change the Y terminal status, change after a

set time delay after the actual state of the output terminals Y, where in the delay time considerations are the same as the input terminal. Relay output terminal is the same as above.

F2.51	Output frequency level 1(FDT1)	Setting frequency	range:0.00-max	Factory 30.00Hz	set:
F2.52	FDT1 lag	Setting frequency	range:0.00-max	Factory 1.00Hz	set:
F2.53	Output frequency level 1(FDT2)	Setting frequency	range:0.00-max	Factory 50.00Hz	set:
F2.54	FDT2 lag	Setting frequency	range:0.00-max	Factory 1.00Hz	set:

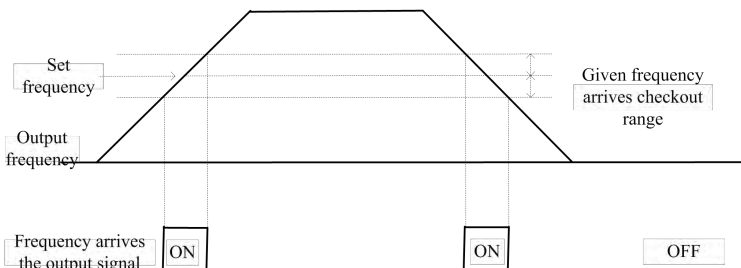


Frequency arrive detecting diagram

While ACC,the output arrives or higher than [F2.51]/[F2.52] setting, FDT 1/2 terminal outputs signal after [F2.52]/[F2.54] delay frequency. While DEC the output arrives or lower than frequency detecting level, FDT 1/2 terminal stops output signal after delay frequency.The output frequency detecting as follows:

F2.55	Given frequency reach detection magnitude	Setting range:0.00-50.00Hz	Factory set: 2.00Hz
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While output frequency arrive or approach given frequency, output terminal Y/TA1-TB1-TC1/TA2-TB2-TC2 output valid signal if it is selected as “given frequency arriving”. This function can be used to adjust test range offset.Frequency arrive output as follows:



F2.56~F2.59	Reserved
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F2.60	Virtual vX1terminal function selection	Setting range: 0-63	Factory default: 0
F2.61	Virtual vX2terminal function selection		
F2.62	Virtual vX3terminal function selection		
F2.63	Virtual vX4terminal function selection		

Virtual vX1-vX4 are the same in terms of function with the X1-X7 on the control panel, which can be used as the multi-functional digital input; please refer to **[F2.00-F2.06]** for detailed information.

F2.64	vX terminal valid state source	Setting range: 0000-1111	Factory default : 0000
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LED "0"digit: virtual vX1

- 0: Internal connection to the virtual vY1
- 1: Connect with physical terminal X1
- 2: Function code setting whether valid

LED"00"digit: Virtual vX2

- 0: Internal connection to the virtual vY2
- 1: Connect with physical terminal X2
- 2: Function code setting whether valid

LED "000"digit: Virtual vX3

- 0: Internal connection to the virtual vY2
- 1: Connect with physical terminal X2
- 2: Function code setting whether valid

LED"0000"digit: Virtual vX4

- 0: Internal connection to the virtual vY2
- 1: Connect with physical terminal X2
- 2: Function code setting whether valid

Virtual vX1 ~ vX4 input terminal status can be set in two ways, selected by **[F2.64]**; when the state of vX1 ~ vX4 is determined by the state of virtual vY1 ~ vY4, whether vX1 ~ vX4 is valid or not is depend on vY1 ~ vY4 output, and vX1 ~ vX4 and vY1 ~ vY4 are tied together.

When selecting state of vX1 ~ vX4 is set by the function code, the corresponding input terminals can be set respectively through the function code **[F2.65]**

F2.65	Virtual vX terminal function code setting valid state	Setting range: 0000-1111	Factory default : 0000
-------	---	--------------------------	------------------------

LED "0"digit: virtual vX1

- 0: invalid.
- 1: valid.

LED"00"digit: Virtual vX2

- 0: invalid.
- 1: valid.

LED “000”digit: Virtual vX3

0: invalid.

1: valid.

LED“0000”digit: Virtual vX4

0: invalid.

1: valid.

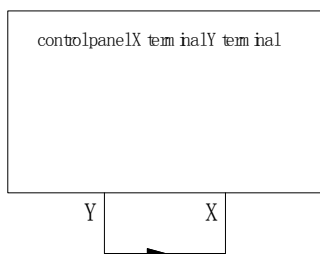
F2.66	Virtual vY1 output selection	Setting range: 0-31	Factory default: 0
F2.67	Virtual vY2 output selection		
F2.68	Virtual vY3 output selection		
F2.69	Virtual vY4 output selection		

Virtual terminals vY1 ~ vY4 output function selection with Y terminal and relay detailed description see [F2.45-F2.47].

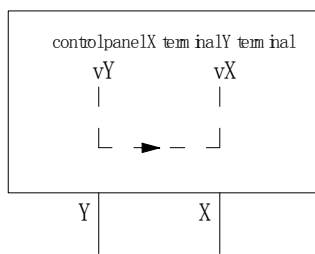
F2.70	Virtual vY1output delay time	Setting range : 0.000-6.000s	Factory default : 0.010s
F2.71	Virtual vY2output delay time	Setting range : 0.000-6.000s	Factory default : 0.010s
F2.72	Virtual vY3output delay time	Setting range : 0.000-6.000s	Factory default : 0.010s
F2.73	Virtual vY4output delay time	Setting range : 0.000-6.000s	Factory default : 0.010s

Virtual terminals vY1 ~ vY4 output delay settings with Y terminals and relay detailed description see [F2.48-F2.50].

Virtual Terminal feature is the combination of vXi and vYi, setting Y terminal output signal as X terminal input signal can be realized through internal vXi connecting with vYi virtual, thus saving the actual X and Y terminals to be used in other aspects..



Connecting by external X and Y terminal



Connecting by virtual terminal internal connection

The following example illustrates the application of virtual vX and vY:

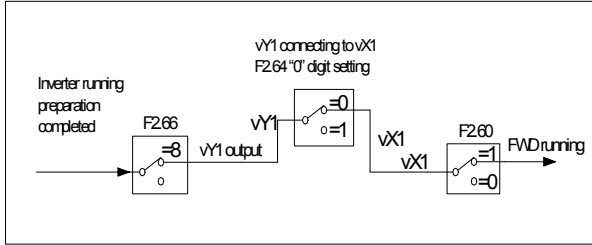
Example 1: cases requires the inverter ready to run when the initialization is completed, under normal conditions an X input terminal would be used; if using a virtual terminal, the real X terminal can be used for other inputs, as follows:

Set F0.02 = 1 Run command source terminal control;

Set F2.26 = 0 two-line control 1;

Set F2.60 = 1 terminal inputs forward run;

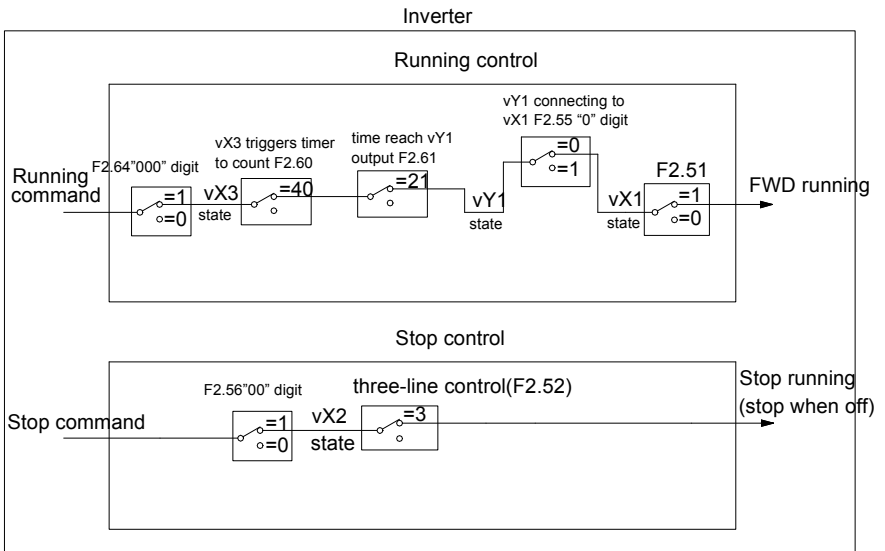
Set F2.64 = 0000 vX1 effective state is determined by vY1;
 Set F2.66 = 8 output when inverter operation ready.



2 line control 1 virtual terminal control

Example 2: cases requires the inverter forward run after 60s delay when the the inverter electrified, as follows:

- Set F0.02 = 1 Run command source terminal control, F2.26 = 2 Three-line control 1;
- Set F2.40 =60 the timer counts 60s;
- Set F2.60 = 1 vX1 terminal function input, run forward;
- Set F2.61 = 3 vX2 terminal function input, three-line running control (Xi);
- Set F2.62 = 40 vX3 terminal function input, timer trigger;
- Set F2.64 = 0110 vX2 and vX3 active source is determined by "0"digit" and "00"digit of F2.64;
- Set F2.65 = 0110 vX2, vX3 setting is valid;
- Set F2.66 = 21 vY1 output when the timer reaches.



Note: It can be seen from the chart when using a conventional method requires access to two actual external X terminal, but if using virtual terminal, access to external actual terminal is not needed.

F2.74	Reserved		
F2.75	Terminal input expansion(D0)	Setting range:0~61	Factory default:0
F2.76	Terminal input expansion(D1)		Factory default:0
F2.77	Terminal input expansion(D2)		Factory default:0
F2.78	Terminal input expansion(D3)		Factory default:0
F2.79	Terminal input expansion(D4)		Factory default:0
F2.80	Terminal input expansion(D5)		Factory default:0

Expand D0~D5 function,the same to X1~X7 in the control board,and can be used as the multifunction digital input.Details refer to **[F2.00~F2.06]**.

F2.81	D0~D2 terminal input output selection	Setting range: 0000~1111	Factory set: 0000
F2.82	D3~D5 terminal input output selection	Setting range: 0000~1111	Factory set: 0000
F2.83	D0~D2 terminal trait selection	Setting range: 0000~1111	Factory set: 0000
F2.84	D3~D4 terminal trait selection	Setting range: 0000~1111	Factory set: 0000
F2.85	D0~D6 expansion terminal complex function	Setting range: 0000~1111	Factory set: 0000

D0~D2 terminal input/output selection: Set the trait of multifunction input terminal D0、D1、D2 individually

LED “0” digit: D0 terminal

0: Input valid

1: Output valid

LED “00” digit: D1 terminal

0: Input valid

1: Output valid

LED “000” digit: D2 terminal

0: Input valid

1: Output valid

LED “0000” digit: Reserved

D3~D5 terminal input/output trait: See D0~D2 terminal input/output selection.

D0~D2 terminal trait selection: Set the trait of multifunction input terminal D0、D1、D2 individually

LED “0” digit: D0 terminal

0: On valid

1: Off valid

LED “00” digit: D1 terminal

0: On valid

1: Off valid

LED “000” digit: D2 terminal

0: On valid

1: Off valid

LED “0000” digit: Reserved

D3~D5 terminal trait selection: See D0~D2 terminal trait selection.

D0~D5 expansion terminal complex function selection: Define the pins' trait of expansion D0~D5 individually

LED “0” digit: D0,D1 terminal

0: Invalid

1: D0,D1 as the CAN pins

LED “00” digit: D3,D4,D5 terminal

0: Invalid

1: D3,D4,D5 as the QEP pins

LED “000” digit: D2 terminal

0: Invalid

1: D2,D3,D4,D5 as the SPI pins

LED “0000” digit: Reserved

F2.86	D0~D5 valid detection delay	Setting range: 0.000-6.000s	Factory set: 0.010
F2.87	D0~D5 invalid detection delay	Setting range: 0.000-6.000s	Factory set: 0.010

Details refer to [F2.10~F2.23]

F2.88	D0~D5 output delay time	Setting range: 0.000-6.000s	Factory set: 0.010
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Details refer to [F2.48~F2.50]

F2.89~F2.98	Reserved
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9.4 Analog terminal functions

F3.00	VS Lowest limit	Setting range: 0.00-10.00V	Factory set: 0.00V
F3.01	VS Lowest limit corresponding setting	Setting range: -100.00-100.00%	Factory set: 0.00%

F3.02	VS upper limit	Setting range: 0.00-10.00V	Factory 10.00V	set:
F3.03	VS upper limit corresponding setting	Setting range: -100.00-100.00%	Factory 100.00%	set:
F3.04	VS filter time	Setting range: 0.00-6.000s	Factory 0.100s	set:
F3.05	VS zero point loop voltage	Setting range: 0.00~10.00V	Factory 0.00V	set:

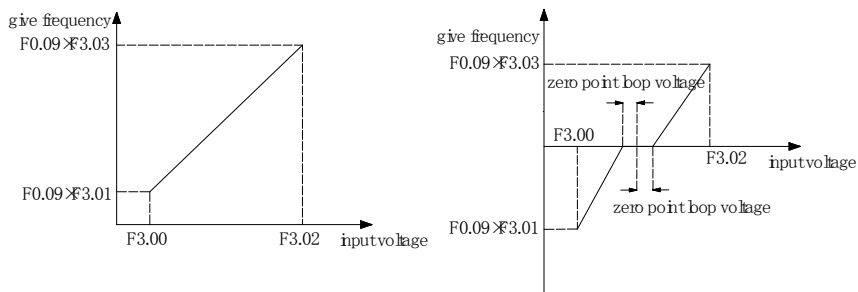
VS Lowest limit: It defines signal accepted by analog input terminal (**VS**), Inverter deal voltage lower than this value as lower limit.

VS lower limit corresponding setting: It defines ratio of VS lower limit.

VS upper limit: It defines signal accepted by analog input terminal (**VS**). Inverter deal voltage higher than this value as higher limit.

VS upper limit corresponding setting: It defines ratio of VS upper limit.

VS filter time: It is (**VS**) input analog signal filter time to eliminate disturb signal. The longer filter time is, the stronger anti-disturb force is. The shorter filter time is, the weaker anti-disturb force is. But respond speed will be quicker.



Analog frequency show

Note: While the frequency given source is set VS given, the frequency given can be set negative value, and if corresponding with [F0.16] "000" digit selecting frequency to control direction, the bipolar control can be carried out.

F3.06	AI(VS) lower limit	Setting range: 0.00-10.00V	Factory 0.00V	set:
F3.07	AI(VS) lower limit corresponding setting	Setting range: 0.00-100.00%	Factory 0.00%	set:
F3.08	AI(VS) upper limit	Setting range: 0.00-10.00V	Factory 10.00V	set:

F3.09	AI(VS) upper limit corresponding setting	Setting range: 0.00-100.00%	Factory 100.00%	set:
F3.10	AI filter time	Setting range: 0.00-10.00s	Factory 0.010s	set:
F3.11	AS lower limit	Setting range: 0.00-20.00mA	Factory 4.00mA	set:
F3.12	AS lower limit corresponding setting	Setting range: 0.00-100.00%	Factory 0.00%	set:
F3.13	AS upper limit	Setting range: 0.00-20.00mA	Factory 20.00mA	set:
F3.14	AS upper limit corresponding setting	Setting range: 0.00-100.00%	Factory 100.00%	set:
F3.15	AS filter time	Setting range: 0.00-10.00s	Factory 0.010s	set:
F3.16	AI(AS) lower limit	Setting range: 0.00-20.00mA	Factory 4.00mA	set:
F3.17	AI(AS) lower limit corresponding setting	Setting range: 0.00-100.00%	Factory 0.00%	set:
F3.18	AI(AS) upper limit	Setting range: 0.00-20.00mA	Factory 20.00mA	set:
F3.19	AI(AS) upper limit corresponding setting	Setting range: 0.00-100.00%	Factory 100.00%	set:

See VS explain. AI (VS) indicates setting when the AI terminal input voltage analog,AI (AS) indicates setting when the AI terminal input current analog.

F3.20	VS terminal function selection (Used as X)	Setting range: 0~63	Factory set: 0
F3.21	VS high level setting	Setting range: 0.00-100.00%	Factory 70.00% set:
F3.22	VS low level setting	Setting range: 0.00-100.00%	Factory 30.00% set:
F3.23	AI terminal function selection (Used as X)	Setting range: 0~63	Factory set: 0
F3.24	AI high level setting	Setting range: 0.00-100.00%	Factory 70.00% set:
F3.25	AI low level setting	Setting range: 0.00-100.00%	Factory 30.00% set:
F3.26	AS terminal function selection (Used as X)	Setting range: 0~63	Factory set: 0
F3.27	AS high level setting	Setting range: 0.00-100.00%	Factory 70.00% set:
F3.28	AS low level setting	Setting range: 0.00-100.00%	Factory 30.00% set:

VS(AI,AS) terminal function selection has the same function to X1~X7 in the control board, and can be used as the multi function digital input.Details refer to **[F2.00~F2.06]**.

VS(AI,AS) high level setting:High level when the port sampling value no less than the setting value.

VS(AI,AS) low level setting:Low level when the port sampling value no more than the setting value.

After adjusting the VS port sampling value by the curve,0.00-10.00V corresponds to 0~100.00%.
After adjusting the AS port sampling value by the curve,0.00-20.00mA corresponds to 0~100.00%.
If AI is used as the voltage input, 0.00-10.00V corresponds to 0~100.00%.
If AI is used as the current input,0.00-20.00mA corresponds to 0~100.00%.

F3.29	Valid state set when analog used as terminal	Setting range:0000~0111	Factory default: 0000
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LED 0 digit: VS

0: low level
1: high level

LED 00 digit: AI

0: low level
1: high level

LED 000 digit: AS

0: low level
1: high level

LED 0000 digit: reserved

F3.30	Analog input curve selection	Setting range: 0000~0222	Factory default: 0000
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LED "0" digit: VS

LED"00" digit: AI (Select voltage/current input by the switch in the control board)

LED "000" digit: AS

0: straight line By default, usually two points straight line, please refer to the above "Analog given frequency schematic

1: curve 1 Multi-point stitches, see function code **[F3.32-F3.39]** description

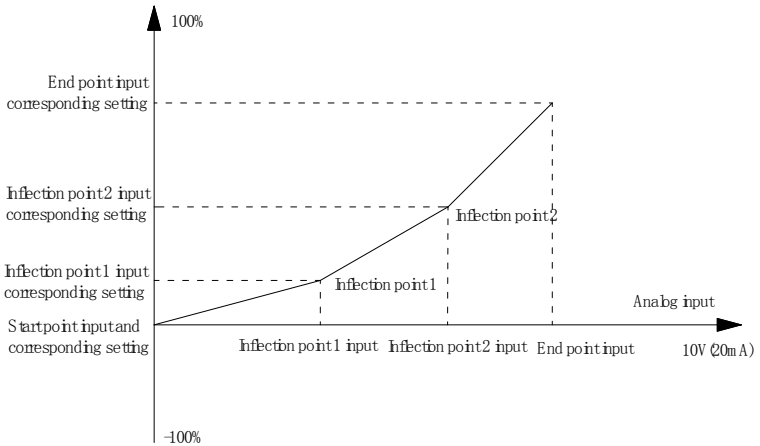
2: curve 2 Multi-point stitches, see function code **[F3.40-F3.47]** description

F3.31	Reserved		
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F3.32	Curve 1 lower limit	Setting range: 0.00-10.00V	Factory default: 0.00V
F3.33	Curve 1 lower limit corresponding setting	Setting range: 0.00-100.00%	Factory default: 0.00%
F3.34	Curve 1 inflection point 1 input voltage	Setting range: 0.00-10.00V	Factory default: 3.00V
F3.35	Curve 1 inflection point 1 corresponding setting	Setting range: 0.00-100.00%	Factory default: 30.00%
F3.36	Curve 1 inflection point 2 input voltage	Setting range: 0.00-10.00V	Factory default: 6.00V
F3.37	Curve 1 inflection point 2 corresponding setting	Setting range: 0.00-100.00%	Factory default: 60.00%
F3.38	Curve 1 upper limit	Setting range: 0.00-10.00V	Factory default: 10.00V

F3.39	Curve 1 upper limit corresponding setting	Setting range: 0.00-100.00%	Factory default: 100.00%
F3.40	Curve 2 lower limit	Setting range: 0.00-10.00V	Factory default: 0.00V
F3.41	Curve 2 lower limit corresponding setting	Setting range: 0.00-100.00%	Factory default: 0.00%
F3.42	Curve 2 inflection point 1 input voltage	Setting range: 0.00-10.00V	Factory default: 3.00V
F3.43	Curve 2 inflection point 1 corresponding setting	Setting range: 0.00-100.00%	Factory default: 30.00%
F3.44	Curve 2 inflection point 2 input voltage	Setting range: 0.00-10.00V	Factory default: 6.00V
F3.45	Curve 2 inflection point 2 corresponding setting	Setting range: 0.00-100.00%	Factory default: 60.00%
F3.46	Curve 2 upper limit	Setting range: 0.00-10.00V	Factory default: 10.00V
F3.47	Curve 2 upper limit corresponding setting	Setting range: 0.00-100.00%	Factory default: 100.00%

Curves 1 and curve 2 can be set with two inflection points, a straight line is divided into three sections, and each slope may not be the same, to achieve a more flexible correspondence, as shown below:



If Curve 1 or Curve 2 A is selected by AS or AI (AS), current should be converted to voltage, current and voltage settings are stating twice relations, 4mA corresponds to 2V, 20mA corresponds to 10V. **Note: [F3.32, F3.34, F3.36, F3.38] and [F3.40, F3.42, F3.44, F3.46] showed the input voltage value should be in an increasing mode.**

F3.48~ F3.52	Reserved
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F3.53	AO output signal selection	Setting range: 0000~0032	Factory set: 0000
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LED"0"digit:

0: 0-10V

1: 4.00-20.00mA

2: 0.00-20.00mA

LED"00"digit:

0: 0-10V

1: 4.00-20.00mA

2: 0.00-20.00mA

3: FM Frequency pulse output

Select AO1,AO2 terminal output signal individually,voltage output or current output;AO2 can be also selected pulse output.





Note: After output mode is selected by parameter. J1, J2, J3 ON/OFF mode need to select according the following ways:

1. If pulse output, J1 ON.

2. If 0.00-20.00mA or 4.00-20.00mA output, J2 ON.

3. If 0-10V output, J3 ON.

Factory setting is 0-10V output for both hardware and software. If need change, please change both hardware and software.

Switch terminal	Selection position	Legend	function
	J1		0-50kHz frequency output
	J2		0-20mA current output 4-20mA current output
	J3		0-10V voltage output

F3.54	A01 output selection	Setting range: 0-18	Factory default: 0
F3.55	A02 output selection		Factory default: 1

Used for setting inverter monitor value corresponding to multifunction terminal (**AO1**), (**AO2**) output signal.

(AO1) output signal is decided by "0"digit of **[F3.53]**.

(AO2) output signal is decided by "00"digit of **[F3.53]**.

Setting	Monitor value	Function	AO min output	AO max output
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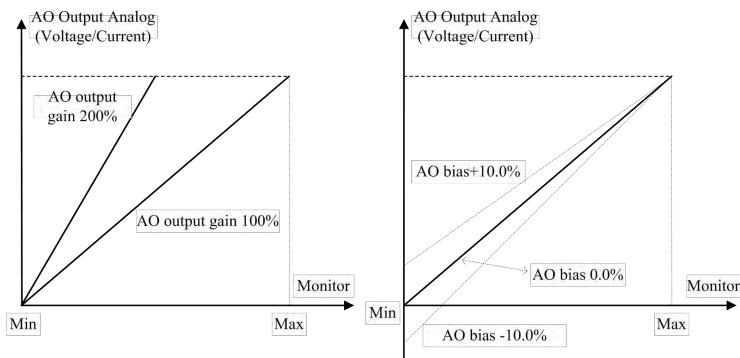
0	Give frequency	Corresponding to current give frequency	Min output corresponding to 0.00Hz	Max output corresponding to max frequency
1	Output frequency	Corresponding to current output frequency	Min output corresponding to 0.00Hz	Max output corresponding to max frequency
2	Output current	Corresponding to current output current	Min output corresponding to 0.00A	Max output corresponding to 2 times of rated current
3	Input voltage	Corresponding to current input voltage	Min output corresponding to 0V	Max output corresponding to rated voltage
4	Output voltage	Corresponding to current output voltage	Min output corresponding to	Max output corresponding to 2 times of rated voltage
5	Machine speed	Corresponding to current machine speed	Min output corresponding to 0 speed	Max output corresponding to speed corresponding to max frequency
6	Given torque	Corresponding to current output torque	Min output corresponding to 0.00% torque	Max output corresponding to 200% torque
7	Output torque	Corresponding to current output torque	Min output corresponding to 0.00% torque	Max output corresponding to 200% torque
8	PID given	Corresponding to current PID given	Min output corresponding to 0.00% PID given	Max output corresponding to 100% PID given
9	PID feedback	Corresponding to current PID feedback	Min output corresponding to 0.00% PID feedback	Max output corresponding to 100% PID feedback
10	Output power	Corresponding to current output power	Min output corresponding to 0 power	Max output corresponding to rated output power
11	Bus voltage	Corresponding to current input voltage	Min output corresponding to 0V	Max output corresponding to 2 times rated DC voltage ²
12	VS input	Corresponding to current VS input	Min output corresponding to VS input lower limit	Max output corresponding to VS input upper limit
13	AI input	Corresponding to current AI input	Min output corresponding to AI input lower limit	Max output corresponding to AI input upper limit
14	AS input	Corresponding to current AS input	Min output corresponding to AS input lower limit	Max output corresponding to AS input upper limit
15	PUL input	Corresponding to current PUL input	Min output corresponding to PUL input lower limit	Max output corresponding to PUL input upper limit

16	Module temperature 1	Corresponding to current module temperature 1	Min output corresponding to 0 degree module temperature 1	Max output corresponding to module temperature 1 is 100 degree
17	Module temperature 2	Corresponding to current module temperature 2	Min output corresponding to 0 degree module temperature 2	Max output corresponding to module temperature 2 is 100 degree
18	RS485 given	AO1 address 0X3021/0X2021 AO2 address 0X3022/0X2022	Min output corresponding to 0	Max output corresponding to 1000

F3.56	A01 output gain	Setting range: 25.0-200.0%	Factory default: 100.0%
F3.57	A01 output signal bias	Setting range: -10.0-10.0%	Factory default: 0.0%
F3.58	AO1 output filter	Setting range: 0.000-6.000s	Factory default: 0.010s

A01 output gain: It is used for adjusting AO1 terminal output analog value.

A01 output signal bias: It is used for adjusting AO1 terminal 0 point of output signal.



Note: AO1 output terminal includes voltage output and current output. Please select K2, when used as 0-10V output; Please select K1, when used as 0-20mA output. All is used as 0-10V output in factory default hardware setting.

AO1 output filter: It is **AO1** output analog signal filter ability to eliminate disturb signal. The longer filter time is, the stronger anti-disturb force is. The shorter filter time is, the weaker anti-disturb force is. But respond speed will be quicker.

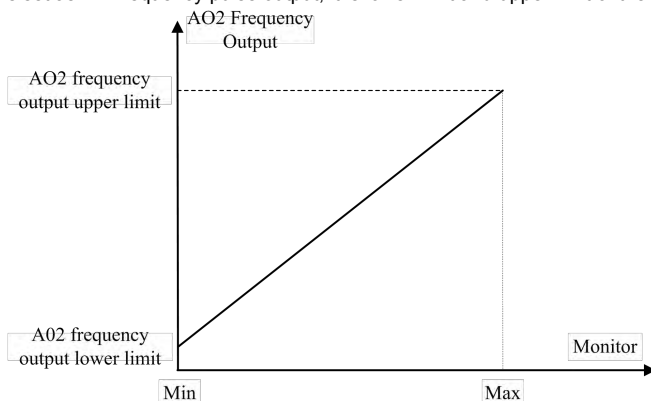
F3.59	A02 output gain	Setting range: 25.0-200.0%	Factory set: 100.0%
F3.60	A02 output signal bias	Setting range: -100.0-100.0%	Factory set: 0.0%
F3.61	AO2 output filter	Setting range: 0.000-6.000s	Factory default: 0.010s

See AO1 parameters.

F3.62	A02FM frequency output Lowest limit	Setting range: 0.00-100.00kHz	Factory default :0.20kHz
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F3.63	A02FM frequency output upper limit	Setting range: 0.00-100.00kHz	Factory default:50.00kHz
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While AO2 is set as FM frequency pulse output, it is lower limit and upper limit of the signal.



F3.64~F3.79	Reserved
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9.5 Keyboard and display parameters

F4.00	Parameter and key lock selections	Setting range: 0-3	Factory set: 0
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0: Unlock Parameter and keyboard lock function invalid.

1: Parameter lock Lock all function parameter settings, can not modify (except theF0.08,can be modified by UP/DW key). Can not enter into the parameter setting.Select the monitor by shift key. All buttons in the keypad are unlocked.

2: Parameter and key lock (except FWD/STOP/JOG) Lock all parameter settings, can not enter into the parameter setting interface and select the monitor.Can not modify. And lock all keys on keyboard except **FWD/STOP/JOG**.

3: All parameter and key lock Lock all parameter settings, can not modify. And lock all keys on keyboard except PRG.

Note:

- 1. 2 lines keypad unlock method:** Press “PRG” and 1st line show “Code”.And use the “UP”-“DOWN” key to move to 2nd line,then enter password(F4.01-user password) and press “SET” to unlock the keypad.
- 2. Single line keypad unlock method:** Press “PRG” and show “Code”. Press “SET” then enter password(F4.01-user password) and press “SET” again and will be clear!
- 3. User password is a parameter which purpose is to protect the inverter from tampering at will.In order to avoid bring inconvenience, please keep it confidential!**

F4.01	User password	Setting range: 0-9999	Factory set: 0
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It used to set user password. While **[F4.00]** is (not 0) lock state, need input this password to unlock. Factory set is 0.Please keep it confidential.

F4.02~F4.03	Reserved
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F4.04	LCD keypad language selection	Setting range: 0-1	Factory set: 0
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Select the LCD keypad language. Only valid when using the LCD keypad.

0: Chinese

LCD keypad language is Chinese.

1: English

LCD keypad language is English.

F4.05	Function parameter copy	Setting range: 0-2	Factory set: 0
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Set the function parameter copy. Change to 0 automatically after finishing copy.

0: No operation

1: Send machine parameters to keyboard and save Copy F0~FF parameter group to keypad and save.

2: Send parameters saved by keyboard to machine Download the data saved in the keypad to inverter.

Note:

1. Keyboard will not send stored parameters to inverter when inverter is running or in fault state or no data stored in keyboard.
2. When sending data to keyboard, if keyboard is out of inverter, it will not finish copy operation, and needs to retry it.
3. When sending data to inverter, if keyboard is out of inverter, it will not finish download operation and needs to retry it.
4. When sending data to keyboard, current state of inverter will not be remain. And all keys are invalid when sending data to inverter.
5. If it displays E.CEP, operation of copy parameter will be interrupted and needing to retry it. Press PRG button to return monitor menu.
6. When software is not compatible, it shows E.EDI, and will not send data to inverter.

F4.06	Keypad special function selections	Setting range: 0000-1111	Factory set: 0000
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LED 0 digit: DIE monitor on

0: Off Monitor display C-XX group. Press PRG to enter.

1: On Monitor display C-XX, D-XX, E-XX. Press PRG to enter into C-XX group, and press PRG again to enter D-XX and E-XX switch.

LED 00 digit: no keyboard potentiometer lock sampling value

0: Off Potentiometer value is sampled by DSP, and change to "0" if the keypad is pulled out.

1: On Potentiometer value is sampled by keypad, and transmit to DSP by communication. The value is unchanged if the keypad is pulled out.

LED 000 digit: reserved

LED 0000 digit: reserved

F4.07	REV/JOG selections	Setting range: 0-1	Factory set: 0
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Used to select the function of REV/JOG key.

0: REV While keyboard control, press this button, inverter reverse run. Key REV/JOG not light.

1: JOG While keyboard control, press this button, inverter JOG. Key REV/JOG light.

F4.08	STOP key function range	Setting range: 0~2	Factory set: 1
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0: non keypad control is invalid While under non keypad control mode, the stop key in the keypad can not be used to stop.

1: non keypad control stop by stop mode While under non keypad control mode, the stop key in the keypad can be used as STOP key to stop.

2: non keypad control free stop While under non keypad control mode, the stop key in the keypad can be used as STOP key to free stop.

Note: While valid to terminal order or communication order, inverter is in stop lock state after press STOP key under terminal control or RS485 control. If inverter needs to restart, stop order needs to be given by selected order channel to unlock stop state firstly.

F4.09	UP/DOWN key modification selections	Setting range: 0000-0212	Factory set: 0011
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LED “0” digit: keyboard UN/DOWN key modify selection

0: Invalid UP/DOWN key can not modify parameters.

1: Modify frequency setting by key board numbers (F0.08) UP/DOWN key can modify parameters [F0.08].

2: Modify PID given setting by key board numbers (Fb.01) UP/DOWN key can modify parameters [Fb.01].

LED “00” digit: keyboard UP/DOWN key store selection

0: No save after power down

1: Save after power down

It is used to select whether save the parameter modified by UP/DOWN key while power cut.

LED “000” digit: operation limit

0: Operation stop for adjusting

1: Adjusting only in operation, stop for holding

2: Adjusting in operation, stop for clearing

LED “0000” digit: reserved

F4.10	Keyboard potentiometer lowest limit	Setting range: 0.00-5.00V	Factory set: 0.50V
F4.11	Keyboard potentiometer lowest limit corresponding setting	Setting range: 0.00-100.00%	Factory set: 0.00%
F4.12	Keyboard potentiometer upper limit	Setting range: 0.00-5.00V	Factory set: 4.50V
F4.13	Keyboard potentiometer upper limit corresponding setting	Setting range: 0.00-100.00%	Factory set: 100.00%

Keyboard potentiometer lowest limit: It defines the lower limit of the signal given by potentiometer. Inverter treat the voltage lower than this value as the lower limit signal.

Keyboard potentiometer lowest limit corresponding setting: It sets ratio of keyboard potentiometer lower limit.

Keyboard potentiometer upper limit: It defines the upper limit of the signal given by potentiometer. Inverter treat the voltage higher than this value as the lower limit signal.

Keyboard potentiometer upper limit corresponding setting: It set ratio of keyboard potentiometer upper limit.

F4.14	The display content of the first line while run	Setting range: 0000-6969	Factory set: 1101
F4.15	The display content of the first line while run	Setting range: 0000-6969	Factory set: 0402
F4.16	The display content of the first line while stop	Setting range: 0000-6969	Factory set: 1100
F4.17	The display content of the first line while stop	Setting range: 0000-6969	Factory set: 0402

The display content of the first line while run: Set monitor content showed in the first line of LED while running. The content can be modified by "SET" key while running. Not save modification while power cut. Default to display LED "0" digit setting after power on.

The display content of the first line while stop: Set monitor content showed in the upper line of LED while stop. The content can be modified by "SET" key while stop. Not save modification while power cut. Default to display LED "0" digit setting after power on.

The content LED "0" digit to "0000" digit setting is the same to C monitor number

F4.18	The display content of the second line while run	Setting range: 0000-6969	Factory set: 0402
F4.19	The display content of the second line while run	Setting range: 0000-6969	Factory set: 1210
F4.20	The display content of the second line while stop	Setting range: 0000-6969	Factory set: 0402
F4.21	The display content of the second line while stop	Setting range: 0000-6969	Factory set: 1210

Only valid for keyboard with 2 line LED. Details refer to **[F4.14-F4.17]**.

F4.22	Keyboard display selections	Setting range: 0000-1111	Factory set: 0000
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LED “0” digit: output frequency selection

0: Aim frequency Display the aim frequency of current control motor

1: Actual frequency Display the output frequency of inverter

LED“00” digit: Reserved**LED“000” digit: Power display dimension** To correct the output frequency of C-10.Can select the unit of the power

0: Power display ratio (%) Display the ratio of output power,100% corresponds with the rated motor power.

1: Power display Kilowatt (KW) Display the actual power

LED“0000” digit: reserved

F4.23	Reserved
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F4.24	Rotate speed display coefficient	Setting range: 0.0-500.0%	Factory set: 100.0%
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It sets the display coefficient of keyboard monitor item “machine speed” .100% is corresponding to motor rated speed.

F4.25	Power display coefficient	Setting range: 0.0-500.0%	Factory set: 100.0%
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F4.26	Alarm selection 1	Setting range: 0000~0001	Factory set: 0
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LED “0” digit: E.EEP fault (EEPROM store fault)

0: Alarm and free stop

1: Alarm and continue operation

LED “00” digit: reserved**LED “000” digit: reserved****LED“0000” digit: reserved**

F4.27	Reserved
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F4.28	Fan control	Setting range: 0-2	Factory default: 1
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Select fan run mode.

0: Fan run after electrify No matter temperature of module is high or not, fan runs when inverter power on.

1: Fan stop related to temperature Work when running. When inverter stops, fan runs when module temperature is over 50 degree and stops 30 seconds after module temperature is lower than standard. When inverter runs, fan runs after 1s.

2: Fan stop when machine stop, run related to temperature When inverter runs, fan runs when module temperature is over 50 degree and stops 30seconds after module temperature is lower than standard. When inverter stops, fan stops after 30s.

Note: This function can prolong fan life.

F4.29	dynamic braking enabled	Setting range: 0~1	Factory default: 0
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Used for the motor dynamic braking enabled

0: OFF Inverter doesn't dynamic braking to control the motor, no matter the bus voltage.

1: ON Inverter dynamic braking to control the motor, while the bus voltage is over the dynamic braking act voltage.

F4.30	dynamic braking operation voltage	Setting range: 115.0-140.0%	Factory default : 120.0%
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dynamic braking operation voltage: Inverter dynamic braking begins when DC bus voltage rises and exceeds [F4.30]. It is only valid for inverter with inner braking parts. Inverters under AC200-T3-018G have built-in braking parts. AC200-S2-3R7G and inverters under than that with 220V input have built-in braking parts. All inverters do not have braking resistance. If need dynamic braking, please use optional resistance.

Note: When use the dynamic braking function, please turn off the overvoltage suppression function, otherwise overvoltage suppression is possible to suppress the rise of the bus voltage, thus the brake operation point can't be reached.

F4.31	Reserved
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F4.32	PWM Carrier frequency	Setting range: 0.7-16.0kHz	Factory default: model set
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It is used to set IGBT frequency. Please set this parameter when adjusting electromagnetic noise and reducing leakage current. This feature is mainly used to improve noise and vibration during operation of the inverter. At higher carrier frequency of the current wave, the motor noise would be small. It is suitable for locations that need mute environment when run in high carrier frequency, but at the same time the main parts switch loss and the heat are heavy while the efficiency would be reduced. In the meantime, radio disturbance is heavy. And the other problem is that capacitance leak current would increase, and if there is leak protection, there may be mistake action or over current. When run in low carrier frequency, the case will be totally different. Different motors would have different carrier frequency responses. The best carrier frequency comes with adjustment based on actual case. The bigger the capacity, the smaller the carrier frequency should be. The Company reserves the right to limit maximum carrier frequency.

Carrier frequency	Motor noise	Electric disturbance	Radiator temperature
low	big	Small	low
↓	↓	↓	↓
high	small	big	high

Note: We advice ratio of carrier frequency to max frequency not lower than 36. If work under low frequency long time, we advice reduce carrier frequency to reduce the dead area time impact.

Attention: when carrier frequency is higher than the factory default, the rated power would reduce 5% every time when carrier frequency adds 1 KHz.

F4.33	PWM control mode	Setting range: 0000-1111	Factory default: 1111
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LED “0” digit: carrier temperature associated settings**0: associated module temperature is invalid****1: associated module temperature is valid**

When module temperature is too high, the frequency inverter reduces carrier frequency automatically, which can reduce switch loss and avoid frequent alarm for over heat.

LED “00” digit: associated settings of carrier output frequency**0: associated frequency output temperature is invalid****1: associated frequency output temperature is valid**

When carrier frequency is related to frequency output, it can automatic adjust carrier frequency according to frequency output, which can improve the low frequency performance and high frequency mute effect.

LED “000” digit: random PWM valid**0: banned:** Noise frequency is fixed.

1: valid: This mode allows the inverter output voltage harmonic spectrum evenly distributes over a wide frequency range, which can effectively suppress electrical noise and mechanical vibration.

LED “0000”: PWM modulation mode select PWM mode

0: Only use the three-phase modulation

1: Switch automatically between two phase and three phase modulation

F4.34~F4.37	Reserved
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9.6 Motor parameters

F5.00	Motor selection	Setting range: 0~1	Factory set: 0
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Motor selection: Only read the parameter, indicating the current motor type. Decided by [F0.00] motor control mode.

0: Asynchronous motor (AM)

1: Synchronous motor (PM)

F5.01	Motor poles	Setting range: 2-98	Factory set: 4
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Set the poles of the motor. Set it according to nameplate.

F5.02	Motor rated power	Setting range: 0.1-1000.0kW	Factory set: model set
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Set it according to nameplate based on unit of 0.1kw. While motor rated power setting is changed, inverter will automatic adjust [F5.03-F5.11] to default. If self-study, [F5.07-F5.11] will automatic change according to the result of self study. If need high accuracy control, It must self study after right [F5.01-F5.06] setting.

F5.03	Motor rated frequency	Setting range: 0.01Hz-max frequency	Factory set: model set
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Set it according to nameplate.

F5.04	Motor rated speed	Setting range: 1-6500rpm	Factory set: model set
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Set it according to nameplate.

F5.05	Motor rated voltage	Setting range: 1-1500V	Factory set: model set
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Set it according to nameplate.

F5.06	Motor rated current	Setting range: 0.1-3000.0A	Factory set: model set
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Set it according to nameplate.

F5.07	Motor no-load current	Setting range: 0.01-650.00A	Factory set: model set
F5.08	Motor stator resistance	Setting range: 0.01-50.00%	Factory set: model set
F5.09	Motor rotor resistance	Setting range: 0.01~50.00%	Factory set: model set
F5.10	Motor stator&rotor inductance	Setting range:0.01~50.00%	Factory set: model set
F5.11	Motor stator&rotor mutual inductance	Setting range: 0.1-2000.0%	Factory set: model set

Asynchronous motor model parameters.[F5.07~F5.11]will adjust automatically while set [F5.20]parameter self-study.No self-study if the accurate motor parameter is known, and then input the parameters manually.

F5.12	Synchronous machine stator resistance	Setting range: 0.01-50.00%	Factory default: Model set
F5.13	Synchronous machine d-axis inductance	Setting range: 0.01mH-400.00%	Factory default: Model set
F5.14	Synchronous machine q-axis inductance	Setting range: 0.01mH-400.00%	Factory default: Model set
F5.15	Synchronous machine back electromotive force	Setting range: 1V-1500V	Factory default: Model set

PMSM model parameters, of which the back electromotive force represents the voltage measured between lines when the motor rotor speed is set to the rated frequency speed; motor model parameters will automatically identify and modify in the motor parameter self-tuning. Wherein, [F5.15] will be recognized only in a rotating auto-tuning.

F5.16	Synchronous machine encoder installation angle	Setting range: 0.0° -360.0°	Factory default: Model set
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When synchronous machines are running VC with PG (F0.00 = 7), this parameter is required to detect the magnetic pole position of the rotor. This parameter can be automatically identified and modified during the rotating auto-tuning, and generally it does not need adjustment.

F5.17~F5.19	Reserved		
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F5.20	Parameters self-adjustment selections	Setting range: 0-2	Factory set: 0
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0: No operation Set as default without self study.

1: Rotary type self-study Before self adjustment, [F5.01-F5.06] of asynchronous motor which is controlled must be set as right value. While self adjustment, firstly, asynchronous motor at static state, it automatic detects motor stator resistance, motor rotor resistance, motor stator&rotor inductance. Then the asynchronous motor at rotate state, it automatic detects motor no-load current, motor stator&rotor mutual inductance. All results will be auto wrote in the corresponding code and renewed while adjustment is over. After parameter setting, press FWD key to start self study, keyboard LED display “t-01”. Motor automatic stop while self adjustment is over. Inverter return to standby state.

2: Resting type self-study Before self adjustment, [F5.01-F5.06] of motor which is controlled must be set as right value. While self adjustment, motor at static state, it automatic detects motor stator resistance, motor rotor resistance, motor stator&rotor inductance. All results will be auto wrote in the corresponding code and renewed while adjustment is over. After parameter setting, press FWD key to start self study, keyboard LED display “t-02”. FWD indicator is off while self adjustment is over. Inverter return to standby state.

Note: [F5.20] is automatic set as 0 after self adjustment.

Attention:

1. Before set ting [F5.20] as 1 –self study, unload the motor firstly.
2. In some occasions (such as can not unload), if it is not convenient to rotary self-study, static self study is also OK.
3. If user know the right parameter. User can set [F5.01-F5.11] directly.
4. Ensure stop state before starting self study, otherwise, self study can not be normal.
5. While [F5.20] is 1, if there is over voltage or over current in self study process, ACC/DEC time [F0.14, F0.15] can be prolonged.
6. If self study is not successful, alarm E.tE1 fault.

F5.21	Synchronous machine poles searching function	Setting range: 0000~0012	Factory default: 0010
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LED “0” digit: closed-loop vector

- 0: OFF
- 1: ON
- 2: On, only operate firstly when electrify

LED “00” digit: open-loop vector

- 0: OFF
- 1: ON
- 2: ON, only operate firstly when electrify

While synchronous motor control is valid, the initial position of the motor rotor can be obtained when starting by the poles searching function. Under the closed-loop VC control, if the motor coder has not self-study the initial position, then the start initial position can be obtained by this function. Under open-loop control, obtaining the initial position guarantees the motor has a big force and no REV running while starting.

For synchronous closed-loop control using ABZ coder, the motor poles is unknown before detecting Z pulse. Hence, it is suggested to turn on the poles searching function to guarantee the stable start process and no REV running.

F5.22~F5.29	Reserved
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F5.30	Speed feedback or encoder type	Setting range: 0000-1111	Factory default: 0000
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LED “0” digit: encoder type: set encoder type according to the encoders actually selected.

0: Normal ABZ encoder

1: Rotary encoder

LED “00” digit: encoder direction: When motor speed direction and encoder speed direction is inconsistent, switch direction by setting the parameter.

0: same direction;

1: opposite direction

LED “000” digit: disconnection detection: when the break detection is turned on, the inverter would report encoder failure and stop when encoder disconnection is found.

0: OFF

1: ON

LED “0000” digit: Z pulse correction enabled

0: OFF

1: ON

F5.31	ABZ encoder lines	Setting range: 0-10000	Factory default: 1024
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ABZ encoder lines: used to set output pulse of speed feedback sensor every cycle; please set correctly according to the sensor specification.

F5.32	PG line-break detection time	Setting range: 0.100-60.000s	Factory default: 2.000s
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PG line-break detection time: used to confirm sensor disconnection delay time when the sensor break detection setting is valid; set 0sec as the off function of line-break detection.

F5.33	Rotary encoder poles	Setting range: 2-128	Factory default: 2
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Rotary encoder poles: Set according to actual selection of rotary encoder, usually 2-pole resolver

F5.34	Encoder transmission ratio numerator	Setting range: 1~32767	Factory default: 1
F5.35	Encoder transmission ratio denominator	Setting range: 1~32767	Factory default: 1

If the motor encoder is not installed in the motor shaft, it could obtain the motor speed and position indirectly through the transmission setting to achieve closed-loop VC function. The premise is that the motor shaft and encoder is rigid connection. While under synchronous motor controls, the encoder lines converted to motor shaft could not be much less.

F5.36	First-order filter of encoder speed inspection	Setting range: 0.0-100.0ms	Factory default : 1.0ms
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Promote the filter time properly if the motor encoder feedback noise is too big, but prolonging the filtering time will decrease system response performance. In some occasions with higher requirements on response performance, if the filter time is too long, it will lead to system oscillation.

F5.37-F5.49	Reserved
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9.7 VC control parameter

F6.00	ASR proportional gain 1	Setting range: 0.01-100.00	Factory set: 10.00
F6.01	ASR integral time 1	Setting range: 0.000-6.000	Factory set: 0.500
F6.02	ASR filter time1	Setting range: 0.0-0.100.0ms	Factory set: 0.0ms
F6.03	ASR switch frequency 1	Setting range: 0.00-max frequency	Factory set: 0.00Hz
F6.04	ASR proportional gain 2	Setting range: 0.01-100.00	Factory set: 10.00
F6.05	ASR integral time 2	Setting range: 0.000-6.000	Factory set: 0.500
F6.06	ASR filter time 2	Setting range: 0.0-0.100.0ms	Factory set: 0.0ms
F6.07	ASR switch frequency 2	Setting range: 0.00-max frequency	Factory set: 5.00Hz

ASR proportional gain and ASR integral time adjustment: System response will be quicker by increase proportional gain. But if proportional gain is too big, there is surge easily. System response will be quicker by decreasing integral time. But if integral time is too short, there is surge easily. Usually, adjust proportional gain firstly, then adjust integral time.

Note: If ASR proportional gain is too big and ASR integral time is too small, over voltage maybe caused while system start to high speed quickly (without extra braking resistance or braking unit). It is caused by reborn energy feedback and can be avoided by adjust ASR proportional gain bigger and ASR integral time smaller.

ASR proportional gain and ASR integral time adjustment at high/low speed: Set ASR switch frequency [F6.03] and [F6.07] while it has quick response requirement for load at high/low speed.

Usually increase proportional gain and decrease integral time to improve response at low frequency running. Usually adjust as this: Set right [F6.03] and [F6.07]. The first group of ASR parameter is valid while output frequency is under switch frequency 1 [F6.04]. The second group of ASR parameter is valid while output frequency is between switch frequency 1 [F6.03] and switch frequency 2 [F6.07]. Parameter linearly transits from switch frequency 1 [F6.03] to switch frequency 2 [F6.07] pro rate. Adjust ASR proportional gain 2[F6.04] and ASR integral time2 [F6.05] at low speed to ensure no surge and good response. Adjust ASR proportional gain 1 [F6.00] and ASR integral time 1[F6.01] at high speed to ensure no surge and good response.

While the switch frequency1[F6.03] is set 0, just use the first group ASR parameter.

F6.14	Electric motor torque limit	Setting range: 0.0~250.0%	Factory default: 180.0%
F6.15	Power generation torque limit	Setting range: 0.0~250.0%	Factory default: 180.0%

Set the motor torque output upper limit,.Ratio corresponds to the motor rated torque, asynchronous machine, synchronous machine open-loop, closed-loop VC valid. The torque output of the motor is also limited by the inverter output current limit **[FA.01]** and the output power **[F6.27]**. Details refer to the code specification

F6.10	Electrical loop D-axis proportional gain	Setting range: 0.001-4.000	Factory default : 1.000
F6.11	Electrical loop D-axis integral gain	Setting range: 0.001-4.000	Factory default : 1.000
F6.12	Electrical loop Q-axis proportional gain	Setting range: 0.001-4.000	Factory default : 1.000
F6.13	Electrical loop Q-axis integral gain	Setting range: 0.001-4.000	Factory default : 1.000

Set the PI parameters under AM/PM VC control. While under VC control, if there is instability like speed surge or current surge, the respective gain may be appropriately reduced to realize stability; at the same time, increasing gain helps to improve motor dynamic response.

F6.15	Vector control motor slip compensation	Setting range: 0.0-250.0%	Factory default : 100.0%
F6.16	Vector control generator slip compensation	Setting range: 0.0-250.0%	Factory default : 100.0%

The PM VC control is valid. While under open-loop VC control, the slip compensation coefficient is used to adjust the motor speed stabilization accuracy. When the motor speed is lower than the set value with load, the motor speed is increased, and vice versa.

While under closed loop VC control, this value is used to adjust the output torque of the motor and the output current of the linearity.When the motor is with rated load and the motor current is larger than the nameplate rated standard deviation,if it is larger then reduce the value,and if it is too small then increase the value

F6.18	position compensation control	Setting range:0~1	Factory default: 0
F6.19	Compensation gain	Setting range:0.0~250.0%	Factory default: 10.0%
F6.20	Compensation limit	Setting range:0.0~100.0%	Factory default: 0.1%
F6.21	Compensation effective range	Setting range:0.0~100.0%	Factory default: 10.0%

Closed-loop VC control is valid.It can achieve zero servo function at zero speed,and in zero speed operation it can increase the rigidity of the motor. After the compensation control is enabled, the compensation gain is used to adjust the extent of the compensation.The compensation limit is used for limiting compensation extent, relative to the maximum output frequency and valid within the compensation range of frequency.

F6.22	Over excitation braking gain	Setting range: 0.0-500.0%	Factory default: 100.0%
F6.23	Over excitation braking amplitude limit	Setting range: 0.0~250.0%	Factory default: 100.0%

AM VC control is valid.,The over excitation function can realize much more quickly DEC control and no over-voltage. The higher over excitation is, the faster response is. Braking limit corresponds to motor rated excitation,the greater limit is, the better braking effect is. However, the excessive limit will make the motor temperature rise when DEC.Only in good heat radiation condition ,this value can be properly increased .

F6.24	Vector control energy saving function	Setting range: 0~1	Factory default: 0
F6.25	Energy saving control gain	Setting range: 0.0~80.0%	Factory default: 50.0%
F6.26	Energy saving control low-pass filter	Setting range: 0.000~6.000s	Factory default: 0.010s

PM VC control is valid.While under energy saving operation,it can decrease the output current automatically by analyzing the torque output,to reduce the motor heating loss to save energy.

F6.27	Motor constant power area power limit	Setting range: 0.0-250%	Factory set: 150.0%
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While under VC control,it can control the output power of motor shaft.If the motor runs at low/middle speed, the motor output power is lower.At this time,the motor torque is limited by the motor/generator torque[F6.08~F6.09].If the motor runs at high speed or above the rated speed,the output power is limited by [F6.27],and the output torque decrease inversely with the speed.

F6.28	Motor weak magnetic current upper limit	Setting range: 0.0-250.0%	Factory set: 60.0%
F6.29	Motor weak magnetic feed forward gain	Setting range: 0.0-200.0%	Factory set: 0.0%
F6.30	Motor weak magnetic gain	Setting range: 0.0-500.0%	Factory set: 100.0%

While under AM/PM VC control, if the motor speed is above the rated speed, or the bus voltage is lower and the running speed is near the rated speed ,the inverter need to control the motor under the weak magnetic control, so that the motor can track speed setting.

[F6.28] is set to the upper limit of demagnetizing current,and be valid to PM motor.Compared to the motor rated current, too big weak magnetic current will make the motor demagnetize irreversibly. Mostly weak magnetic current can guarantee that the motor does not demagnetize irreversibly within motor rated current ; [F6.29 ~ F6.30] set the weak magnetic control parameters. When there is instability phenomenon in the weak magnetic process, adjust this parameters group for debugging.

F6.31	Reserved
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F6.32	MTPA gain	Setting range: 0.0-400.0%	Factory default: 100.0%
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F6.33	MTPA filter time	Setting range: 0.0-100.0ms	Factory default: 1.0ms
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MTPA function is optimizing the PMSM excitation strategies to achieve Max motor output / motor current; when the permanent magnet motor D, Q-axis inductance difference is large, adjust **[F6.32]** can significantly change the motor current under same load; adjust **[F6.33]** can improve the stability of the motor running.

F6.34	Reserved
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F6.35	Low frequency pull in current	Setting range: 0.0~100.0%	Factory default: 10.0%
F6.36	High frequency pull in current	Setting range: 0.0~100.0%	Factory default: 10.0%
F6.37	Frequency of current pulled in	Setting range: 0.0~100.0%	Factory default: 10.0%

PM open-loop VC control is valid. The current is relative to motor rated current and frequency is relative to the max output frequency. The pulled in current is mainly used to promote the load ability in low frequency. The pull-in current frequency **[F6.37]** as high frequency distinguish threshold, if low frequency load is larger, the pull-in the current should be promote properly, but too large current will affect the efficiency of the motor. The actual use should be set up according to the load situation.

F6.38-F6.69	Reserved
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9.8 Torque control parameters

F7.00	Torque/Speed control	Setting range: 0-1	Factory default: 0
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0:Speed control

1:Torque control Valid under VC control

F7.01	Torque given channel selection	Setting range: 0-7	Factory default: 0
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Using a relative value for torque setting; 100.0% corresponds to motor rated torque; Setting range from 0% to 200.0%, indicating that the inverter torque is 2 times the maximum rated torque.

0: Keyboard number given: by the function code **[F7.02]** given.

1: Keyboard potentiometer setting: set by the keyboard potentiometer analog.

2: VS: set by the VS terminal analog voltage input.

3: AI: set by the AI terminal analog voltage or current input, voltage or current input can be selected via the control panel switch.

4: AS: set by AS terminal current analog input.

5: PUL: set by PUL terminal high-speed pulse.

6:RS485 communication given: set by the RS485 serial communication; communication address 0x3005 / 0x2005.

7: Option card

F7.02	Torque keyboard number setting	Setting range: 0-100.0%	Factory default: 0.0%
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When the function code **[F7.01] = 0**, the torque setting point is given by the function code **[F7.02]**.

F7.03	Torque input lower limit	Setting range: 0.00-100.00%	Factory default: 0.00%
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F7.04	Lower limit corresponding setting	Setting range : -200.00-200.00%	Factory default: 0.00%
F7.05	Torque input upper limit	Setting range: 0.00-100.00%	Factory default : 100.00%
F7.06	Upper limit corresponding setting	Setting range : -200.00-200.00%	Factory default : 100.00%
F7.07	Given first-order filter time	Setting range: 0.000-6.000s	Factory default: 0.100s

The value of torque given channel is linearized by [F7.03~F7.06] to get the torque given value.

Given first-order filter time: Filter the torque given value to make the given torque change smoothly.

F7.08	Output torque upper limit	Setting range: 0-200.0%	Factory default : 150.0%
F7.09	Output torque lower limit	Setting range: 0-200.0%	Factory default: 0%

Output torque upper limit: set the upper limit of output torque;

Output torque lower limit: set the lower limit of output torque;

F7.10	Torque control FWD speed limit selecting	Setting range: 0-7	Factory default: 0
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Used to set the Max FWD operating frequency limit of inverter in torque control mode; In torque control mode, if the load torque is less than the output torque of the motor, the motor speed will go up, and in order to prevent emergence such as mechanical systems stall accidents, the Max motor speed must be limited in torque control mode.

0: Keyboard number given: by the function code [F7.12] given.

1: Keyboard potentiometer setting×F7.12: set by the keyboard potentiometer analog.

2: VS × F7.12: set by the VS terminal analog voltage input.

3: AI × F7.12: set by the AI terminal analog voltage or current input, voltage or current input can be selected via the control panel switch.

4: AS × F7.12: set by AS terminal current analog input.

5: PUL × F7.12: set by PUL terminal high-speed pulse.

6:RS485 communication given×F7.12: set by the RS485 serial communication; communication address 0x3006 / 0x2006.

7: Option card x F7.12

Note: 100% corresponds to the max output frequency.

F7.11	Torque control REV speed limit selecting	Setting range: 0-7	Factory default: 0
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0: Keyboard number given: by the function code [F7.13] given.

1: Keyboard potentiometer setting×F7.13: set by the keyboard potentiometer analog.

2: VS × F7.13: set by the VS terminal analog voltage input.

3: AI × F7.13: set by the AI terminal analog voltage or current input, voltage or current input can be selected via the control panel switch.

4: AS × F7.13: set by AS terminal current analog input.

5: PUL × F7.13: set by PUL terminal high-speed pulse.

6:RS485 communication given×F7.13: set by the RS485 serial communication; communication address 0x3007 / 0x2007.

7: Option card x F7.13

Note: 100% corresponds to the max output frequency.

F7.12	Torque control FWD Max speed limit selecting	Setting range: 0.0-100.0%	Factory default: 100.0%
F7.13	Torque control REV Max speed limit selecting	Setting range: 0.0-100.0%	Factory default: 100.0%

When the function code [F7.10], [F7.11] is set to 0, the Max speed limit would be set by [F7.12], [F7.13]. And protect in case of initial debugging torque function default 100.0% as the seldom speed setting.

F7.14	Reserved
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9.9 V/F control parameters

F8.00	V/F curve selection	Setting range:0-11	Factory set: 0
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V/F curve selection: used to select the V/F curve types to meet different load requirements.

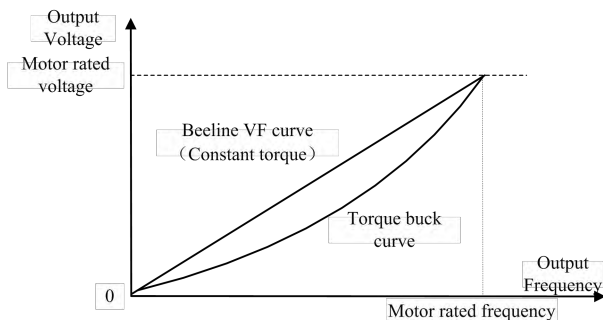
0: Beeline

1-9: 1.1-1.9 respectively VF power curve, as shown below;

10: VF square curve;

11: custom VF curve; see [F8.01-F8.10];

VF default linear curve for most common situations; multi-idempotent curve and square VF curve are generally used for VF fans or pumps to reduce the high-frequency current to achieve energy

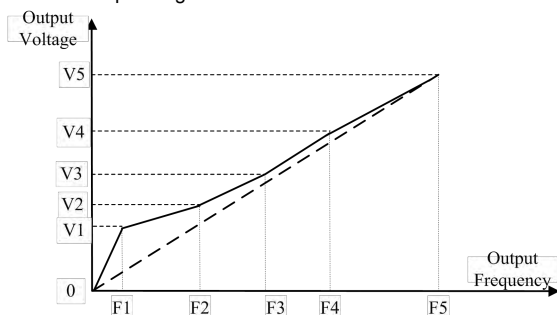


savings.

F8.01	Self-setting voltage V1	Setting range: 0.0-100.0%	Factory set: 3.0%
F8.02	Self-setting frequency F1	Setting range: 0.00-max frequency	Factory set: 1.00Hz
F8.03	Self-setting voltage V2	Setting range: 0.0-100.0%	Factory set: 28.0%
F8.04	Self-setting frequency F2	Setting range: 0.00-max frequency	Factory set: 10.00Hz

F8.05	Self-setting voltage V3	Setting range: 0.0-100.0%	Factory set: 55.0%
F8.06	Self-setting frequency F3	Setting range: 0.00-max frequency	Factory set: 25.00Hz
F8.07	Self-setting voltage V4	Setting range: 0.0-100.0%	Factory set: 78.0%
F8.08	Self-setting frequency F4	Setting range: 0.00-max frequency	Factory set: 37.50Hz
F8.09	Self-setting voltage V5	Setting range: 0.0-100.0%	Factory set: 100.0%
F8.10	Self-setting frequency F5	Setting range: 0.00-max frequency	Factory set: 50.00Hz

Self-setting V/F curve: User sets the 1st/2nd/3rd/4th/5th voltage ratio of V/F curve corresponding to F1/F2/F3/F4/F5 frequency based on rated output voltage 100%. User sets the 1st/2nd/3rd/4th/5th frequency of V/F curve corresponding to V1/V2/V3/V4/V5.



Must meet: $0 \leq F1 \leq F2 \leq F3 \leq F4 \leq F5 \leq \text{max frequency}$, $0 \leq V1 \leq V2 \leq V3 \leq V4 \leq V5 \leq 100.0\%$
V1, V2, V3, V4, V5 is based on motor rated voltage.

F8.11	Output voltage percentage	Setting range: 25.0-120.0%	Factory set: 100.0%
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Output voltage adjustment coefficient adjusts output voltage of inverter to meet different V/F requirement.

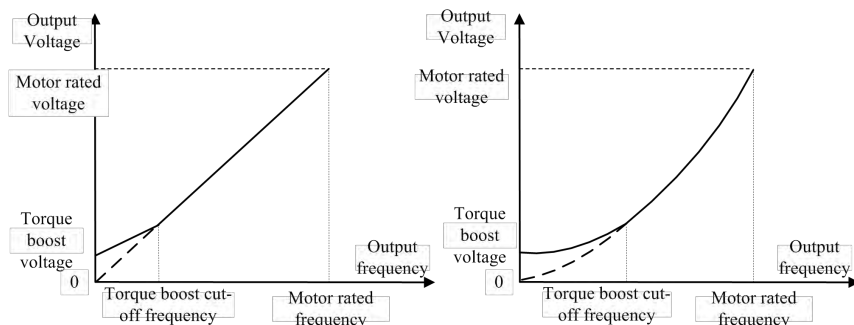
F8.12	Torque boost	Setting range: 0.0-30.0%	Factory set: 0.0%
F8.13	Torque boost cut-off frequency	Setting range: 0.0-100.0%	Factory set: 100.0%

Torque boost:Automatically torque boost while [F8.12] is set 0,and compensate the output voltage automatically according to the load.Fixed torque boost while [F8.12] is set other values. Improve low frequency torque trait by voltage compensation. Please set it rightly. If too high, motor maybe happens over excitation at low frequency running, over heat while long time, even over current protection or can not start normally.

Note: while [F8.00] is "1 custom v/f curve", [F8.12] is invalid,and inverter will running with

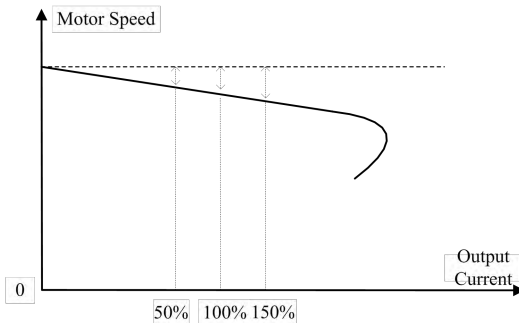
the custom V/F curve,

Torque boost cut-off frequency: Set torque improve valid range. While output frequency is over this value, torque improving function stops. 100% is corresponding to motor rated frequency.



F8.14	slip compensation gain	Setting range:0.0-200.0%	Factory set:100.0%
F8.15	Slip compensation limit	Setting range:0.0-300.0%	Factory set:100.0%
F8.16	Slip compensation filter time	Setting range:0.000-6.000s	Factory set:0.200s

It makes inverter output frequency self adjust within a setting range according motor load change to compensate slip frequency to make motor keep constant speed. It effectively relieves the impact of load change to motor speed.



If it is used with the automatic torque boost function, the low frequency trait can be promoted obviously. 100.0% slip frequency compensation corresponds to the motor rated slip; it may cause the motor speed exceeds setting value when the compensation value is set too large. Hence, [F8.15] setting need to be limited. Slip compensation filter time is to filter the slip compensation to eliminate disturb signal. The longer filter time is, the stronger anti-disturb force is. The shorter filter time is, the weaker anti-disturb force is. But respond speed will be quicker.

F8.17	Surge suppression gain	Setting range: 0.0-900.0%	Factory set: 100.0%
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While the motor control mode F0.00=0 or 1, it is easily to appear motor current instability and motor speed oscillation phenomenon in medium and high power occasions, which is a combination of electrical and mechanical effects of low-frequency resonance. It is possible to suppress the low frequency resonance by adjusting the [F8.17], but excessive suppression gain may lead to additional stability problems.

F8.18	Reserved
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F8.19	Auto energy saving control	Setting range: 0-1	Factory set: 0
F8.20	Energy saving frequency lower limit	Setting range: 0.0-50.0Hz	Factory set: 15.00Hz
F8.21	Energy saving voltage lower limit	Setting range: 0.0-100.0%	Factory set: 50.0%
F8.22	Energy saving voltage regulation rate	Setting range: 0~0.200V/MS	Factory set:0.010V/MS
F8.23	Energy saving voltage recovery rate	Setting range: 0~0.200V/MS	Factory set:0.200V/MS

Auto energy save selection: Under the condition of light load, the motor can adjust the output voltage automatically after entering the constant speed to promote the efficiency to save energy.

0: OFF

1: ON

Energy saving frequency lower limit: When output frequency is lower than this value, auto energy save function will exit.

Energy saving voltage lower limit: While automatically saving energy running, the lower limit of the voltage can reduce. 100.0% is corresponding to the current output voltage corresponding to the output frequency without saving energy.

Energy saving voltage regulation rate: The rate of voltage regulation during the process of energy saving.

Energy saving voltage recovery rate: The rate of voltage recovery to the normal voltage while exit the energy saving process.

Note: Enter energy saving only at constant speed running, hence this function is not suitable to be used in occasions where the given frequency changes frequently.

F8.24~F8.29	Reserved
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F8.30	Output voltage source of voltage-frequency separation	Setting range: 0~8	Factory set:0
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While **[F0.00]=8**, this function code set the output voltage command source; under voltage-frequency separation mode, the output voltage command 200.0% corresponds to the motor rated voltage **[F5.05]** and the output frequency command is set by channel A, B frequency source. Details refer to **[F0.03]**, **[F0.04]**, **[F0.06]**.

0: Function code F8.31 given

1: Keyboard potentiometer setting: set by the keyboard potentiometer

- 2: **VS**: set by the VS terminal analog voltage input.
- 3: **AI**: set by the AI terminal analog voltage or current input, voltage or current input can be selected via the control panel switch.
- 4: **AS** : set by AS terminal current analog input.
- 5: **PUL** : set by PUL terminal high-speed pulse.
- 6: **PID output given** : set by PID output
- 7: **RS485 communication given**: set by the RS485 serial communication; communication address 0x300A / 0x200A.
- 8: **Option card**

F8.31	Output voltage of voltage-frequency separation number setting	Setting range: 0.0~100.0%	Factory set:0
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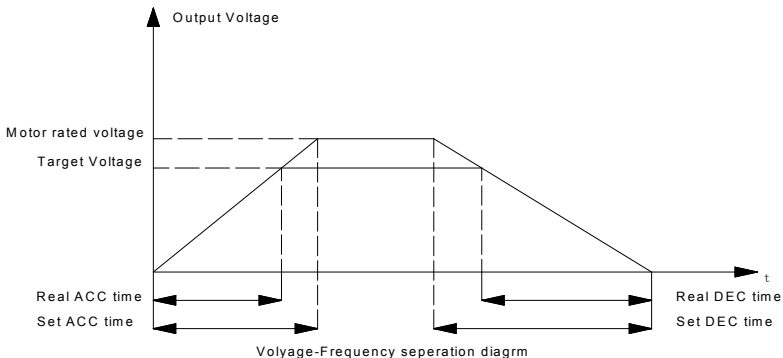
Output voltage of voltage-frequency separation number setting: While [F8.30]=0, it decides the voltage source given.100.0% corresponds to the motor rated voltage.

F8.32	Output voltage of voltage -frequency separation ACC time	Setting range:0.00-100.00s	Factory set: 10.00
F8.33	Output voltage of voltage -frequency separation DEC time	Setting range:0.00-100.00s	Factory set: 10.00

Output voltage of voltage -frequency separation ACC time: The time voltage ACC from 0 to motor rated value.

Output voltage of voltage -frequency separation DEC time: The time voltage DEC from the rated value to 0.

F8.34	Voltage-frequency separation stop model	Setting range: 0-1	Factory set: 0
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This function code set the stop mode of voltage-frequency separation .

0: Output voltage and frequency ACC/DEC no interaction

1: Output voltage down to 0V, then output frequency start to decrease

Note:

1. While [F8.34]=0,frequency and voltage DEC at the same time,but stop according to the frequency set time.
2. While FWD/REV switching,the output voltage DEC to 0 firstly and then the output frequency DEC to 0 and change the direction.

F8.35~F8.38	Reserved
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9.10 Malfunction and protection parameters

FA.00	OC suppression function	Setting range: 0~1	Factory default: 0
FA.01	OC suppression point	Setting range: 0.0-300.0%	Factory default : 160.0%
FA.02	OC suppression gain	Setting range: 0.0-500.0%	Factory default : 100.0%

OC suppression function:The OC suppression function can monitor the real-time load current, and automatically limit it below the set of OC suppression point, to prevent the fault trip caused by excessive current.To some large inertia or sharp changing load, the function is especially valid..

0: Suppression valid

1: ACC/DEC valid, constant speed invalid

OC suppression point: Set current limit level(By stopping ACC/DEC or decreasing/ increasing output frequency to control the output current).

OC suppression gain: Adjust the response speed of OC suppression.

Note: Using this function might prolong ACC/DEC time.During the process of inverter start/ stop , if in the case of high current,the output frequency will not ACC/DEC to the given frequency as expected d,which shows that the limiting function,..At that time, please reduce the load or adjust relevant parameters.

FA.03	Current hardware protection settings	Setting range: 0000-0221	Factory set: 0001
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LED “0” digit: cycle-by-cycle current limit: cycle-by-cycle current limit can limit current rise to a certain extent by hardware protection so that the current does not exceed the protection value of the inverter and avoid skipping flow fault shutdown.

0: Close

1: Open

LED “00” digit: OC protection disturbing suppression While this function is valid, invert will judge the E. OC alarm intelligently to eliminate the disturbance, and only make the alarm to the real fault signal. This function may delay the alarm time, and please use it cautiously.

0: Off

1: First grade disturbing suppression

2: Second grade disturbing suppression

LED “000” digit: SC protection First grade disturbing suppression While this function is valid, invert will judge the E. SC alarm intelligently to eliminate the disturbance, and only make the alarm to the real fault signal. This function may delay the alarm time, and please use it cautiously.

0: Off

1: First grade disturbing suppression

2: Second grade disturbing suppression

LED “0000” digit: Reserved

FA.04	Reserved		
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FA.05	Bus over voltage hardware protection	Setting range: 0-1	Factory set: 0
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Protect the rise of the bus voltage by hardware, which is a kind of backup and supplement to the software protection to improve the reliability of the equipment.

0: OFF

1: ON

FA.06	Bus over voltage suppression protection	Setting range: 0000-0012	Factory set: 0012
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LED “0” digit: Over voltage suppression control

0: Prohibited

1: Valid in DEC

2: Valid both in ACC/DEC

Select whether DEC OV suppression is valid :If this function is valid, when bus voltage reaches or exceeds [FA.07] when inverter DEC running, the inverter will slow down or stop DEC, thus ensuring there's no OV protection due to high bus voltage.

Select whether ACC OV suppression is valid :If this function is valid, when bus voltage reaches or exceeds [FA.07] when inverter ACC running, the inverter will automatically adjust the operating frequency and suppress the bus voltage from increasing, thus ensuring there's no OV protection due to high bus voltage. This function is special valid to eccentric load.

LED “00” digit: Overexcitation control

0: Off

1: On

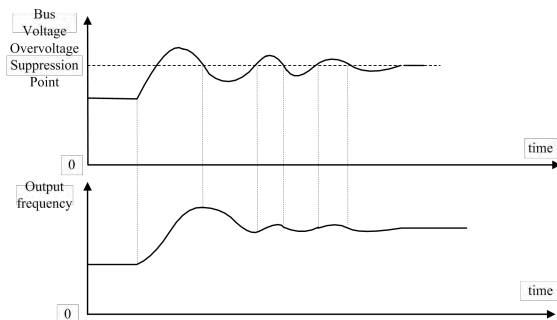
LED “000” digit: Reserved

LED “0000” digit: Reserved

FA.07	Bus over voltage suppression point	Setting range: 110.0-150.0%	Factory default : 128.0%
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FA.08	Bus over voltage suppression gain	Setting range: 0.0-500.0%	Factory default : 100.0%
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When bus voltage reaches or exceeds **[FA.07]** when inverter running, the inverter will automatically adjust the operating frequency and suppress the bus voltage from increasing, thus ensuring there's no OV protection due to high bus voltage. Adjusting **[FA.08]** can promote OV suppression effect; set **[FA.08] = 0**: cut-off OV suppression function and OV suppression is valid for any motor control mode.



FA.09	Bus under voltage suppression function	Setting range: 0~1	Factory default: 0
FA.10	Bus under voltage suppression point	Setting range: 60.0-90.0%	Factory default: 80.0%
FA.11	Bus under voltage suppression gain	Setting range: 0.0-500.0%	Factory default : 100.0%

When bus voltage reaches or lower than **[FA.10]** when inverter running, the inverter will automatically adjust the operating frequency and suppress the bus voltage from decreasing, thus ensuring there's no LV protection due to low bus voltage. Adjusting **[FA.11]** can promote LV suppression effect; set **[FA.09] = 0**: cut-off LV suppression function and LV suppression is valid for any motor control mode.

FA.12	Bus under-voltage protection point	Setting range:60.0-90.0%	Factory default : 60.0%
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Bus under-voltage protection point:This parameter specifies the lower voltage allowed by bus voltage during operation, for some low power occasions, appropriate under-voltage protection level can be reduced to ensure the normal working of the inverter.

Note: When the grid voltage is too low, the motor output torque will decrease. For constant power load and constant torque load, low grid voltage will increase the frequency converter input and output current, thereby reducing the reliability of the inverter operation.

FA.13	Reserved
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FA.14	Power-to-ground short-circuit detection	Setting range: 0-1	Factory default: 0
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Power-to-ground short-circuit detection detects the motor insulation when power on. If the motor insulation damage is shorted to ground, the inverter will detect and report a short to ground fault.

0: Close

1: Open

Note: Operate this function while electrify, there is voltage output in UVW terminal. Pay attention to your safety.

FA.15	Phase loss protection	Setting range: 0000-0021	Factory default: 0011
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LED “0” digit: output phase protection: Motor drive connected occurrence will be reported missing output phase fault E.OLF.

0: Close

1: Open

LED “00” digit: input phase protection: Occurrence of a grid phase inverter will report missing input phase failure E.ILF.

0: Off

1: Open the alarm

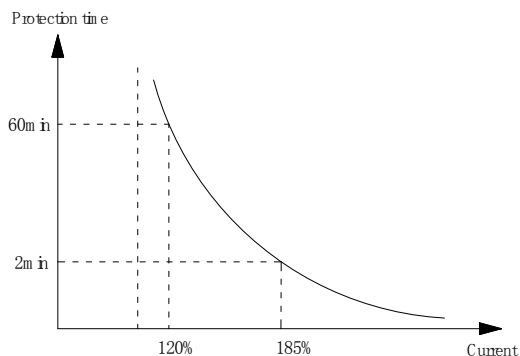
2: Open the fault

LED “000” digit: Reserved

LED “0000” digit: Reserved

FA.16	Motor overload protection curve coefficient	Setting range: 0.0-250.0%	Factory default : 100.0%
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Long term motor overload would produce serious heat, **[FA.16]** sets the coefficient of load motor overload protection or thermal protection; the motor overload protection and motor current curve was inverse, protection curve when FA.16 = 100.0% is shown as follows:



The current entering protection curve = $(\text{the real motor current} / \text{oL protection coefficient}) \times 110\%$

So increasing **[FA.16]** can improve motor overload; overload pre alarm coefficient can be set by **[FA.16]**, when the motor had reached the degree of overload factor **[FA.16]** setting, the inverter outputs alarm by terminal, for details please see Y terminal function.

Note:When a inverter parallel with several motors in operation, th the thermal relay protection function will have no use, in order to effectively protect the motor, please install the thermal protection relay at the end of each motor.

FA.17	Load pre alarm detection setting	Setting range: 0000~1414	Factory default: 0000
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LED “0” digit: Detection selection (protection 1)

0: Not detected

1: Detected load is too large

2: Detected load is too large only at constant speed

3: Insufficient load detected

4: Insufficient load only at constant speed

LED “00” digit: Alarm selection

0: Alarm and continue operation

1: Fault protection and free stop

LED “000” digit: Detection selection (protection 2)

0: Not detected

1: Detected load is too large

2: Detected load is too large only at constant speed

3: Insufficient load detected

4: Insufficient load only at constant speed

LED “0000” digit: Alarm selection

0: Alarm and continue operation

1: Fault protection and free stop

FA.18	Load pre alarm detection level 1	Setting range: 0.0~200.0%	Factory default: 130.0%
FA.19	Load pre alarm detection time 1	Setting range: 0.0~60.0s	Factory default: 5.0s
FA.20	Load pre alarm detection level 2	Setting range: 0.0~200.0%	Factory default: 30.0%
FA.21	Load pre alarm detection time 2	Setting range: 0.0~60.0s	Factory default: 5.0s

Under VF control mode ,the output current of the motor will be used as the load pre alarm judgment value, and100% corresponds to the motor rated current; under VC control mode, output torque of the motor is used as load pre alarm judgment value, and 100% corresponds motor rated output torque.The load pre alarm judgment value in the detection time **[FA.19/ FA.21]** is compared with the detection threshold **[FA.17] [FA.18/FA.20]**,and make corresponding action according to

[FA.17] to make pre alarm through the terminal output.Details refer to Y terminal function.

FA.22	Reserved
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FA.23	Protection action when speed slip is too large	Setting range: 0000-0012	Factory default: 0000
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LED “0” digit: Detection selection

0: Not detected

1: Detected at constant speed

2: Detecting

LED “00” digit: Alarm selection

0: Free stop and report fault

1: Alarm and continue operation

LED “000” digit: Reserved

LED “0000” digit: Reserved

FA.24	detection threshold when speed slip is too large	Setting range: 0.0-60.0%	Factory default: 10.0%
FA.25	detection time when speed slip is too large	Setting range:0.0-60.0s	Factory default: 2.0s

Under VC control,if the speed feedback value and speed setting bias are more than detection threshold [FA.24] during the detection time [FA.25], inverter judges that the detection bias is too large and operate according to [FA.23].Speed bias detection threshold 100% corresponds to max frequency..

FA.26	Rapid protection action	Setting range: 0000-0012	Factory default: 0000
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LED “0” digit: Detection selection

0: Not detected

1: Detected at constant speed

2: Detecting

LED “00” digit: Alarm selection

0: Free stop and report fault

1: Alarm and continue operation

LED “000” digit: Reserved

LED “0000” digit: Reserved

FA.27	Rapid detection threshold	Setting range: 0.0~150.0%	Factory default: 110.0%
FA.28	Rapid detection time	Setting range:0.000~2.000s	Factory default: 0.010s

Under VC control, if the speed feedback value is more than detection threshold [FA.27] during the detection time [FA.28], inverter judges that the speed abnormal and operate according to [FA.26]. Speed bias detection threshold 100% corresponds to max frequency..

FA.29~FA.36	Reserved
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FA.37	Malfunction auto-reset times	Setting range: 0-5	Factory default: 0
FA.38	Malfunction auto-reset interval	Setting range: 0.1-100.0s	Factory default: 1.0s

Malfunction auto-reset times:

0: Off No automatic reset function; manual reset.

1-5: On 1-5 is the automatic reset times;

The inverter would fail or stop during operation due to load fluctuations, voltage fluctuations and other factors. At this time in order to ensure continuity of system operation, automatic resets of inverter for overload, over current, system abnormalities, over voltage, under voltage faults are allowed. The inverter would restart by speed tracking in the process of self recovery. If the inverter can't restart within the set times, stop output for fault protection; Fault recovery times can be set up to five times, after 10 minutes running the fault recovery times would be re-recorded and the times before is automatically cleared. Consecutive failures of restarting might cause harm, so the proposed fault recovery time is 1;

Output terminal can be selected to act or not act in automatic reset process. Details refer to [F2.45-F2.47].

Malfunction auto-reset interval: It defines waiting time before resetting after fault.

Note: 1. Only valid for fault of OL, OC, system abnormal, under voltage. Not valid for other faults.

2. Can't reset before dealing with malfunction.

Attention: Please use this function carefully in occasions that can't start with load, or that needs alarm immediately when there's no output.

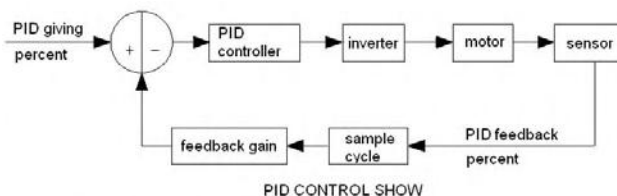
FA.39	Fault diagnose information	See fault code list	--
FA.40	Fault type	See fault code list	--
FA.41	Fault running frequency	0.00-max frequency	--
FA.42	Fault output voltage	0-1500V	--
FA.43	Fault output current	0.1-2000.0A	--
FA.44	Fault bus voltage	0-3000V	--
FA.45	Fault module temperature	0-100℃	--
FA.46	Fault inverter status	LED "0" digit: run direction 0: FWD 1: REV LED "00" digit: run status	--

		0: stop 1: steady speed 2: ACC 3: DEC LED"000"digit: Reserved LED"0000"digit: Reserved	
FA.47	Fault input terminal status	See input terminal chart	--
FA.48	Fault output terminal status	See output terminal chart	--
FA.49	The last malfunction types	See fault code list	--
FA.50	The last malfunction running frequency	0.00-max frequency	--
FA.51	The last malfunction output voltage	0-1500V	--
FA.52	The last malfunction output current	0.1-2000.0A	--
FA.53	The last malfunction bus voltage	0-3000V	--
FA.54	The last malfunction module temperature	0-100°C	--
FA.55	The last machine state	LED "0" digit: Running direction 0: FWD 1: REV LED "00" digit: Running status 0: Stop 1: Constant speed 2: ACC 3: DEC LED "000" digit: Reserved LED "0000" digit: Reserved	
FA.56	The last malfunction input terminal state	See input terminal chart	--
FA.57	The last malfunction output terminal state	See output terminal chart	--
FA.58	The first two malfunction types	See fault code list	--
FA.59	The first three malfunction types	See fault code list	--

Note: Malfunction records can be cleared by [F0.19]. See [F0.19] details.

9.11 PID parameters

PID control is used for process control mode normal. For the aim of that the object which be controlled is stabilized as the PID given, it adjusts inverter output frequency to form passive feedback PID adjustment by series of proportional, integral, differential calculation by difference between the feedback of that be controlled and the inverter PID given.



Fb.00	PID give signal source	Setting range: 0-8	Factory set: 0
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Use to set the input channel of PID controller given signal.

0: Keyboard number given PID Decided by **[Fb.01]** setting.

1: Keyboard potentiometer setting: set by the keyboard potentiometer

2: VS: set by the VS terminal analog voltage input.

3: AI: set by the AI terminal analog voltage or current input, voltage or current input can be selected via the control panel switch.

4: AS : set by AS terminal current analog input.

5: PUL : set by PUL terminal high-speed pulse.

6: RS485 communication given: set by the RS485 serial communication; communication address 0x3008 / 0x2008.

7: Option card: set by option card. Details refer to option card specification.

8: Terminal selection PID giving is selected by multifunction input terminal combine which is set by **[F2.00-F2.06]**.

Terminal switch table:

Terminal 3	Terminal 2	Terminal 1	PID giving terminal switch selection
OFF	OFF	OFF	Keyboard number give PID
OFF	OFF	ON	Keyboard potentiometer
OFF	ON	OFF	Terminal VS voltage analog
OFF	ON	ON	Terminal AI analog
ON	OFF	OFF	Terminal AS current analog
ON	OFF	ON	Terminal PUL pulse signal
ON	ON	OFF	RS485 communication
ON	ON	ON	Optional card

Any doubt please see "FC" parameter group which is about multispeed time sequence.

Fb.01	Keyboard number PID given/feedback	Setting range: 0.00-100.0%	Factory set: 50.0%
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This function is valid only when **[Fb.00]/[Fb.03]** is set as keyboard number given/feedback. After this parameter is changed, PID given in monitor object is modified automatically at the same time.

If **[Fb.09]** LED "0" is set as 2, this value can be modified by UP/DW key. Whether save the modification is decided by **[F4.09]** LED "00" digit.

Fb.02	PID given changing time	Setting range:0.00-60.00	Factory set:1.00s
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PID given changing time: the ratio of PID given changing time from 0.0% to 100.0% .While PID given changes,PID given changes in linear line by the given time to reduce the bad influence of given surge.

Fb.03	PID feedback signal source	Setting range:0-9	Factory set:2
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Use to set the input channel of PID controller given signal.

0: Keyboard number given PID Decided by **[Fb.01]** setting.

1: Keyboard potentiometer setting: set by the keyboard potentiometer

2: VS: set by the VS terminal analog voltage input.

3: AI: set by the AI terminal analog voltage or current input, voltage or current input can be selected via the control panel switch.

4: AS : set by AS terminal current analog input.

5: PUL : set by PUL terminal high-speed pulse.

6: RS485 communication given: set by the RS485 serial communication; communication address 0x3009 / 0x2009.

7: Option card: set by option card. Details refer to option card specification.

8: Terminal selection PID giving is selected by multifunction input terminal combine which is set by **[F2.00-F2.06]**.

Terminal switch table:

Terminal 3	Terminal 2	Terminal 1	PID giving terminal switch selection
OFF	OFF	OFF	Keyboard number give PID
OFF	OFF	ON	Keyboard potentiometer
OFF	ON	OFF	Terminal VS voltage analog
OFF	ON	ON	Terminal AI analog
ON	OFF	OFF	Terminal AS current analog
ON	OFF	ON	Terminal PUL pulse signal
ON	ON	OFF	RS485 communication
ON	ON	ON	Optional card

Any doubt please see "FC" parameter group which is about multispeed time sequence.

Fb.04	Feedback signal filter time	Setting range: 0.000-6.000s	Factory set: 0.010s
Fb.05	Feedback signal gain	Setting range: 0.00-10.00	Factory set: 1.00
Fb.06	Given and feedback range	Setting range: 0-100.0	Factory set: 100.0

Feedback signal filter time: Filter the feedback signal to eliminate to the disturb. The longer filter time is, the stronger anti-disturb force is, but the slower feedback response is.

Feedback signal gain: It is used to linearize the feedback input signal.

Given and feedback range: PID given and feedback don't have the unit to adjust the PID given (C-08) and PID feedback display(C-09).PID given and feedback 100.0% corresponds with the given and feedback range[Fb.06].For example,[Fb.06]is set 80.0,if the PID given 50.0%, and then PID given display C-08 is 40.0.

Fb.07	PID control selection	Setting range: 0000-1111	Factory set: 0000
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LED "0" digit: feedback trait selection

0: Positive trait. It is suitable for occasions where PID feedback is bigger than PID given and requires reduce output frequency PID to balance PID. Such as constant pressure water supply, gas supply, take-up tension control.

1: Negative trait. It is suitable for occasions where PID feedback is bigger than PID given and requires raise output frequency PID to balance PID. Such as constant temperature control, pay-off tension control.

LED “00” digit: Reserved

LED “000” digit: Reserved

LED “0000” digit: Differential adjustment properties

0 : Differential of deviation

1 : Differential of feedback

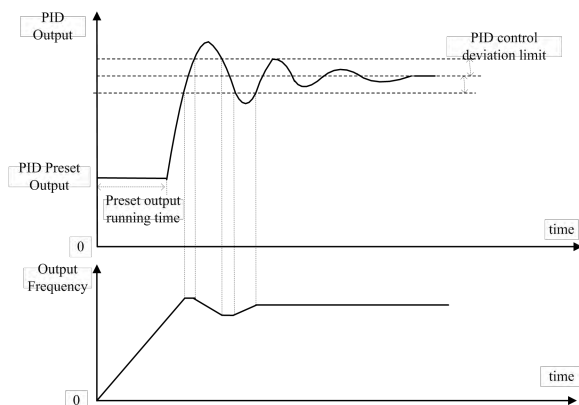
Fb.08	PID preset output	Setting range: 0.00-100.0%	Factory set: 100.0%
Fb.09	PID preset output running time	Setting range: 0.0-6500.0s	Factory set: 0.0s

While it defines as PID start running, frequency ACC to PID pre-set output [**Fb.08**] according to ACC time 1. After setting [**Fb.09**] time, it runs as PID closed loop trait.

Note:When PID is used for frequency source given, [F0.03 = 8] preset outputs 100.0% corresponding maximum output frequency; when PID is used for the frequency voltage separation and outputs voltage source; [F8.30 = 5] preset outputs 100.0% corresponding motor rated voltage.

Fb.10	PID control deviation limit	Setting range: 0.00-100.0%	Factory default: 0.0%
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The max deviation allowed by PID feedback to PID given. When feedback is in this range, PID adjustment stops. Output does not change; the reasonable use of the feature helps coordinate the contradiction between system output accuracy and stability.



Fb.11	Proportion gain: P1	Setting range: 0.000-9.999	Factory set: 0.100
Fb.12	Integral time: I1	Setting range: 0.0-600.0s	Factory set: 1.0s

Fb.13	Differential coefficient : D1	Setting range: 0.000-6.000s	Factory set: 0.000s
Fb.14	Proportion gain: P2	Setting range: 0.000-9.999	Factory set: 0.100
Fb.15	Integral time: I2	Setting range: 0.0-600.0s	Factory set: 1.0s
Fb.16	Differential coefficient : D2	Setting range: 0.000-6.000s	Factory set: 0.000s

The parameter value controlled by PID should be set according to the actual characteristics of the system. PID parameters group 1 (Fb.11~Fb.13) and PID parameters group 2(Fb.14~Fb.16) ,are selected by the switch conditions [Fb.17] set.

Proportion gain P: It decides the impact of P act to bias. Response is quicker while gain is bigger. But there will be surge while it is too big.

Integral time I: It decides the size of effect of I act. The impact is stronger while the I is bigger.

Differential coefficient D: Decide the impact of change rate of PIN controller to bias or feedback signal. According to the change trend to adjust to suppression the change of feedback signal.

Fb.17	PID parameter switching condition	Setting range: 0~2	Factory set:0
Fb.18	Low value of switching deviation	Setting range: 0.0-100.0%	Factory set: 20.0%
Fb.19	High value of switching deviation	Setting range: 0.0-100.0%	Factory set: 80.0%

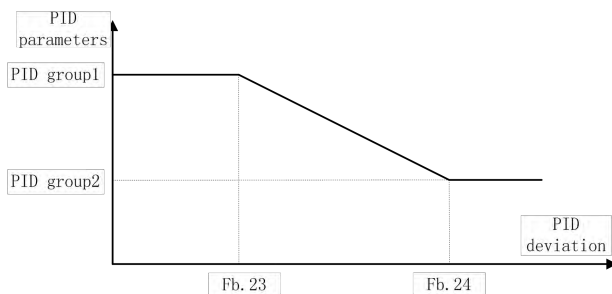
In some occasions, just one group of PID adjusting parameters can not meet the requirement of the process ,hence different PID parameters group need to be adopted in different occasions.

PID parameter switching condition

0: Not switch PID parameters select the group 1 (Fb.11~Fb.13)

1: Use DI terminal to switch Multi function terminal selection is set 23 (PID parameters switch).While this terminal is invalid, select PID group 1 (Fb.11~Fb.13);while this terminal is valid,select group 2(Fb.14~Fb.16).

2: Switch according to deviation While the deviation absolute value of PID given and feedback is less than [Fb.18], select group 1;while the deviation absolute value of PID given and feedback is more than [Fb.19], select group 2;while the deviation absolute value of PID given and feedback is between [Fb.18] and [Fb.19], select the linear interpolation value of the 2 groups,which is as follows;



Fb.20	Reserved
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Fb.21	Differential limit	Setting range: 0.0-100.0%	Factory set: 5.0%
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[Fb.21] differential limit is used to set PID differential output range. In PID controller, the differential effect is sensitive, and easy to make the system oscillation. Usually, limit the PID differential range within a small scale.

Fb.22	PID output upper limit	Setting range: 0.0-100.0%	Factory set: 100.0%
Fb.23	PID output lower limit	Setting range: -100.0-Fb.19	Factory set: 0.0%
Fb.24	PID output filter time	Setting range: 0.000-6.000s	Factory set: 0.0s

[Fb.22] sets the PID output upper limit; [Fb.23] sets the PID output lower limit.

[Fb.24] PID output filter time used to filter the PID output. It will weak the surge caused by PID output result, and decrease the closed-loop system response performance.

Fb.25	Detection time while feedback wire break	Setting range: 0.0-120.0s	Factory set: 1.0s
Fb.26	Act selections while feedback wire break	Setting range: 0-3	Factory set: 0
Fb.27	Wire break alarm upper limit	Setting range: 0.0-100.0%	Factory set: 100.0%
Fb.28	Wire break alarm lowest limit	Setting range: 0.0-100.0%	Factory set: 0.0%

While PID given frequency and inverter is running, if feedback signal which is bigger the **[Fb.27]** or smaller than **[Fb.28]** is detected out and keeps for **[Fb.25]** delay time, it is considered as sensor wire break.

Feedback wire-break action selections

0: Go on PID operation without alarm: no wire-break detection when invalid

1: Stop and alarm malfunction: When the inverter detects a sensor break, immediately block output, motor free stop and report E.PID fault.

2: Go on PID operation and output alarm signal: When the inverter detects a sensor break, still run by the PID regulation, but the keyboard displays E.PID fault and flashes.

3: Run the current frequency and output alarm signal: When the inverter detects a sensor break, maintain constant output frequency before the fault, but the keyboard displays E.PID fault and flashes.

Wire break alarm upper limit: Set the upper limit of PID sensor wire break detection. When feedback signal is over alarm upper limit for time **[Fb.25]**, it is considered as sensor wire break.

Wire break alarm lower limit: Set the lower limit of PID sensor wire break detection. When feedback signal is under alarm upper limit for time **[Fb.25]**, it is considered as sensor wire break.

Fb.29	PID suspend detection threshold	Setting range: 0.0-100.0%	Factory set: 0.0%
Fb.30	PID suspend detection time	Setting range: 0.0-600.0s	Factory set: 1.0s

While PID output is less than [Fb.29] and hold time up to [Fb.30], PID enters into pause state; is the output is more than this value and hold time up to Fb.30, PID exit the pause state. No suspend detection if this value is 0.

Fb.31	Reserved
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9.12 Multistep, PLC function and swing frequency parameters

FC.00	Step 1	Setting range: 0.00-max frequency	Factory set: 10.00Hz
FC.01	Step 2	Setting range: 0.00-max frequency	Factory set: 20.00 Hz
FC.02	Step 3	Setting range: 0.00-max frequency	Factory set: 30.00 Hz
FC.03	Step 4	Setting range: 0.00-max frequency	Factory set: 40.00 Hz
FC.04	Step 5	Setting range: 0.00-max frequency	Factory set: 50.00 Hz
FC.05	Step 6	Setting range: 0.00-max frequency	Factory set: 40.00 Hz
FC.06	Step 7	Setting range: 0.00-max frequency	Factory set: 30.00 Hz
FC.07	Step 8	Setting range: 0.00-max frequency	Factory set: 20.00 Hz
FC.08	Step 9	Setting range: 0.00-max frequency	Factory set: 10.00 Hz
FC.09	Step 10	Setting range: 0.00-max frequency	Factory set: 20.00 Hz
FC.10	Step 11	Setting range: 0.00-max frequency	Factory set: 30.00 Hz
FC.11	Step 12	Setting range: 0.00-max frequency	Factory set: 40.00 Hz
FC.12	Step 13	Setting range: 0.00-max frequency	Factory set: 50.00 Hz
FC.13	Step 14	Setting range: 0.00-max frequency	Factory set: 40.00 Hz
FC.14	Step 15	Setting range: 0.00-max frequency	Factory set: 30.00 Hz

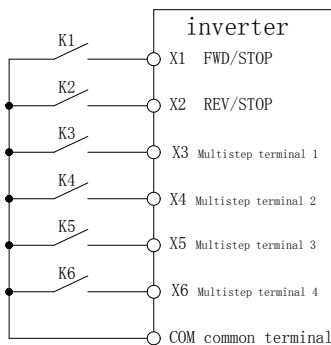
It sets run frequency of 15 steps in PLC and multistep control.

Multi steps control has priority only after JOG. While multi steps control, 4 multifunction input terminals are needed to set as control terminals. Set details refer to **[F2.00-F2.06]**.

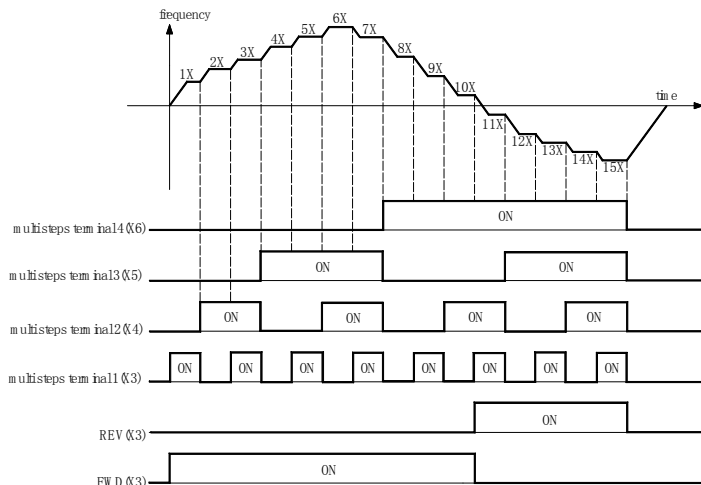
Inverter is running at which step is decided by the ON/OFF state of 4 control terminal and **COM**. Run and direction is controlled by run signal and direction given by **[F0.02]**. ACC/DEC time default is ACC/DEC time 1 **[F0.14]**, **[F0.15]**. Or select ACC/DEC time by ACC/DEC time selection terminal set by **[F2.00-F2.06]**.

Multi steps terminal 4	Multi steps terminal 3	Multi steps terminal 2	Multi steps terminal 1	terminal speed
OFF	OFF	OFF	ON	1X [FC.00]
OFF	OFF	ON	OFF	2X [FC.01]
OFF	OFF	ON	ON	3X [FC.02]
OFF	ON	OFF	OFF	4X [FC.03]

OFF	ON	OFF	ON	5X [FC.04]
OFF	ON	ON	OFF	6X [FC.05]
OFF	ON	ON	ON	7X [FC.06]
ON	OFF	OFF	OFF	8X [FC.07]
ON	OFF	OFF	ON	9X [FC.08]
ON	OFF	ON	OFF	10X [FC.09]
ON	OFF	ON	ON	11X [FC.10]
ON	ON	OFF	OFF	12X [FC.11]
ON	ON	OFF	ON	13X [FC.12]
ON	ON	ON	OFF	14X [FC.13]
ON	ON	ON	ON	15X [FC.14]



Terminal connection



MULTISTEP TIME ORDER

FC.15	PLC run mode selections	Setting range: 0000-2212	Factory set: 0000
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Select PLC running mode while program given.

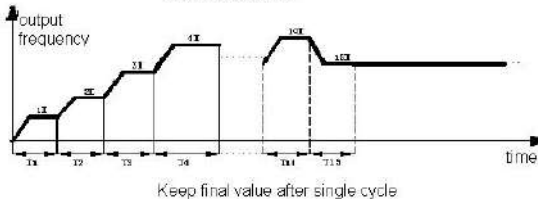
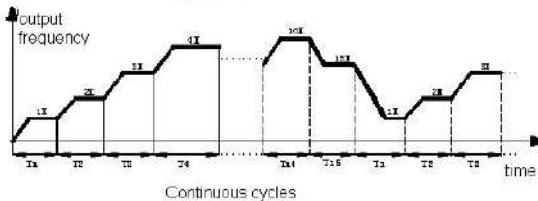
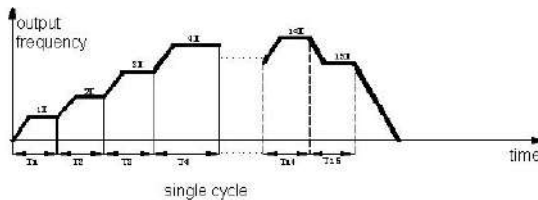
LED “0” digit: cycle mode

0: Stop after single cycle While receiving order, inverter run from the first step, time unit is set by [FC.15] LED “00” digit. Running time is set by [FC.16-FC.30]. Running direction and ACC/DEC time is selected by [FC.31-FC.45]. Turn to next step while run time is over, run time, direction, ACC/DEC time of every step can be set separately. Inverter output 0 Hz while finished 15 steps running. If one step running time is 0, it will skip this step.

1: Continuous cycles Inverter not stop and runs at the latest speed while finished 15 steps running. Time unit is set by [FC.15] LED “00” digit. Run time is set by [FC.16-FC.30]. Run direction and ACC/DEC time is selected by [FC.31-FC.45].

2: Keep final value after single cycle Inverter back to 1st step while finished 15 steps running. Time unit is set by [FC.15] LED “00” digit. Run time is set by [FC.16-FC.30]. Run direction and ACC/DEC time is selected by [FC.31-FC.45].

Note: PLC ACC/DEC time is set by [FC.31-FC.45] LED “00”, and not be affected by terminal selection.



LED“00”digit: Time unit

0: second

1: minute

2: hour

LED“000”digit: Power down save mode

0: no save

1: save

This parameter is defined as when the selection process is running, the inverter power whether to store the current state of the running program (running stages, the remaining time of this stage, deceleration and running direction , etc.). If you choose power down storage, the “000”digit of [FC.15] defines the way power is restored of the next running. To ensure sustainable state of inverter after power recovery, the parameter should be set as “1”.

LED“0000”digit: Start-up mode

0: Restart from the 1st step

1: Restart from the step where stop

2: Restart from the time when stop

Set restart mode while stop for some reasons (stop, fault, power off and so on).

Choosing 0: Restart from the 1st step

Choosing 1: Restart from the step when stop

Choosing 2: Continue from the time when stop

Note:Output frequency is limited by upper/lowest limitation. While frequency is lower then lowest limitation, it runs as [F0.13] lowest limitation mode.

FC.16	PLC 1st step running time	Setting range: 0.0-6500.0(s/m/h)	Factory set: 10.0
FC.17	PLC 2nd step running time	Setting range: 0.0-6500.0(s/m/h)	Factory set: 10.0
FC.18	PLC 3rd step running time	Setting range: 0.0-6500.0(s/m/h)	Factory set: 10.0
FC.19	PLC 4th step running time	Setting range: 0.0-6500.0(s/m/h)	Factory set: 10.0
FC.20	PLC 5th step running time	Setting range: 0.0-6500.0(s/m/h)	Factory set: 10.0
FC.21	PLC 6th step running time	Setting range: 0.0-6500.0(s/m/h)	Factory set: 10.0
FC.22	PLC 7th step running time	Setting range: 0.0-6500.0(s/m/h)	Factory set: 10.0
FC.23	PLC 8th step running time	Setting range: 0.0-6500.0(s/m/h)	Factory set: 10.0
FC.24	PLC 9th step running time	Setting range: 0.0-6500.0(s/m/h)	Factory set: 10.0
FC.25	PLC 10th step running time	Setting range: 0.0-6500.0(s/m/h)	Factory set: 10.0
FC.26	PLC 11th step running time	Setting range: 0.0-6500.0(s/m/h)	Factory set: 10.0
FC.27	PLC 12th step running time	Setting range: 0.0-6500.0(s/m/h)	Factory set: 10.0
FC.28	PLC 13th step running time	Setting range: 0.0-6500.0(s/m/h)	Factory set: 10.0
FC.29	PLC 14th step running time	Setting range: 0.0-6500.0(s/m/h)	Factory set: 10.0
FC.30	PLC 15th step running time	Setting range: 0.0-6500.0(s/m/h)	Factory set: 10.0

Set running time of every 15 steps. Time unit is decided by [FC.15] LED “00” digit setting.

FC.31	PLC 1st step direction and ADD/DEC time	Setting range: 0000-0031	Factory set: 0000
FC.32	PLC 2nd step direction and ADD/DEC time		Factory set: 0000
FC.33	PLC 3rd step direction and ADD/DEC time		Factory set: 0000
FC.34	PLC 4th step direction and ADD/DEC time		Factory set: 0000
FC.35	PLC 5th step direction and ADD/DEC time		Factory set: 0000
FC.36	PLC 6th step direction and ADD/DEC time		Factory set: 0000
FC.37	PLC 7th step direction and ADD/DEC time		Factory set: 0000
FC.38	PLC 8th step direction and ADD/DEC time		Factory set: 0000
FC.39	PLC 9th step direction and ADD/DEC time		Factory set: 0000
FC.40	PLC 10th step direction and ADD/DEC time		Factory set: 0000
FC.41	PLC 11th step direction and ADD/DEC time		Factory set: 0000
FC.42	PLC 12th step direction and ADD/DEC time		Factory set: 0000

FC.43	PLC 13th step direction and ADD/DEC time		Factory set: 0000
FC.44	PLC 14th step direction and ADD/DEC time		Factory set: 0000
FC.45	PLC 15th step direction and ADD/DEC time		Factory set: 0000

Set running direction and ACC/DEC time of every 15 step while program running.

LED “0” digit: this step run direction

0: FWD

1: REV

If **[F0.16]** LED “00” digit is 1 only the FWD command is allowed , and if setting is REV, inverter runs as 0.00Hz.

LED “00” digit: ACC/DEC time in this step

0: ACC/DEC time 1

1: ACC/DEC time 2

2: ACC/DEC time 3

4: ACC/DEC time 4

LED “000” digit: reserved

LED “0000” digit: reserved

FC.46-FC.48	Reserved
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FC.49	Swing frequency control	Setting range: 0-1	Factory default: 0
FC.50	Swing amplitude control	Setting range: 0-1	Factory default: 0
FC.51	Reserved		
FC.52	Swing frequency amplitude	Setting range: 0.0-100.0%	Factory default: 10.0%
FC.53	Jump frequency amplitude	Setting range: 0.0-50.0%	Factory default: 10.0%
FC.54	Swing frequency rising time	Setting range: 0.00-650.00s	Factory default: 5.00s
FC.55	Swing frequency falling time	Setting range: 0.00-650.00s	Factory default: 5.00s

The inverter changes output frequency periodically with a predetermined ACC/DEC time when swing frequency runs. This feature is especially useful in the textile industry system in which the speed changes according to the diameter of bobbin.

Swing center frequency comes from given frequency of main and auxiliary channel or the set frequency in multi-speed or PLC running; swing frequency would be automatically canceled in jog and closed-loop running. When PLC and swing frequency run simultaneously, switching between the PLC segment and swing frequency would fail; swing frequency begins after transiting from PLC deceleration phase to PLC set frequency; press PLC stage ACC/DEC time to decelerate when stop.

While using the swing frequency([FC.49] is valid),inverter ACC to swing center frequency according to ACC/DEC time, and then cycle run according to the swing frequency amplitude **[FC.52]**, startup frequency **[FC.53]**, swing frequency rising time **[FC.54]** and swing frequency falling time **[FC.55]** until the stop command by deceleration time.

swing frequency control This parameter defines whether use the swing frequency function

0: invalid

1: valid

swing amplitude control

0: Relative to center frequency: variable, swing amplitude AW changes with the center frequency, the rate of change, see [FC.52] definition.

1: Relative to max frequency: fixed, Amplitude AW is determined by the maximum frequency and [FC.52]

Swing frequency amplitude: This parameter defines the frequency amplitude when in swing frequency control.

Variable Swing: $AW = \text{center frequency} \times [FC.52]$

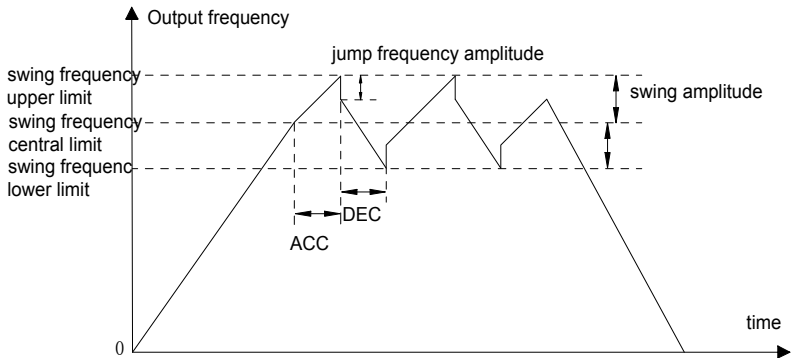
Fixed Swing: $AW = \text{maximum operating frequency [F0.09]} \times [FC.52]$

Jump swing frequency amplitude: used to set the jump frequency while set the swing frequency running.

Start up frequency= Swing frequency amplitude AW x [FC.53]

Swing frequency rising time: used to set the ACC time of swing frequency.

Swing frequency falling time: used to set the DEC time of swing frequency.



FC.56	Reserved
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9.13 Communication control function parameters

Fd.00	Main-slave machine	Setting range: 0000-011	Factory set: 0000
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Choose inverter as main machine or slave machine when Modbus communication or CAN communication. Details for Modbus, refer to Appendix 2: Modbus communication protocol.

LED “0” digit: Modbus Communication Main and Slave Selection

0: Slave machine Inverter is slave machine. Communication address is decided by [Fd.01]. Inverter receives order from main machine and decides whether to reply or not when writing operation according to [Fd.08] setting. Reply delay time is set by [Fd.05].

1: Main machine Inverter, as main machine, sends data to communication network by broadcast orders. All slave machines accept orders from main machine. The data sending of main machine is set by [Fd.09].

LED "00" digit: reserved

LED "000" digit: reserved

LED "0000" digit: reserved

Note:

1. when inverter is regarded as the main machine setting an network, all slave machines can only be connected to the network when using inverters of VEICHI; The main machine sends broadcast data by self-defined free protocol.
2. While connecting to CANopen expansion card communication, the parameters need to be set as follows:

[Fd.00] LED"0" digit =0: slave machine;

[Fd.01] Address set by selection sliding switch in expansion card;

[Fd.02] LED"0" digit=4: band rate 19200bps

[Fd.03] 0: Data format(N,8,1) no checkout,Data digit: 8, Stop digit: 1

Fd.01	485 communication address	Setting range: 1-247	Factory set: 1
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It set communication address while inverter is Modbus communication slave machine. If inverter is main machine, this parameter is no meaning. 0 is broadcast address.

Fd.02	Communication baud rate selections	Setting range: 0000-0065	Factory set: 0003
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LED "0" digit: Modbus communication baud rate: set the communication baud rate

0: 1200 bps

1: 2400 bps

2: 4800 bps

3: 9600 bps

4: 19200 bps

5: 38400 bps

LED "00" digit:Reserved

LED "000" digit:Reserved

LED "0000" digit:Reserved

Fd.03	Modbus data format	Setting range: 0-5	Factory set: 0
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0: (N, 8, 1) no checkout, Data digit: 8, Stop digit: 1

1: (E, 8, 1) even checkout, Data digit: 8, Stop digit: 1

2: (O, 8, 1) odd checkout, Data digit: 8, Stop digit: 1

3:(N,8,2) no checkout,Data digit:8, Stop digit:2

4:(E,8,2) even checkout,Data digit:8, Stop digit:2

5:(O,8,2) odd checkout,Data digit:8, Stop digit:2

Fd.04	Communication ratio setting	Setting range: 0.00-5.00	Factory set: 1.00
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The data in communication address 0x2000 or 0x3000 of upper machine multiply this parameter is communication giving of this machine. Upper machine communication order can be modified pro rate.

Fd.05	Modbus communication answer delay	Setting range: 0.1-100.0s	Factory set: 1.0s
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It defines the intermediate interval between sending data to the upper machine after the data is accepted. While inverter is Modbus communication slave machine, while delay time is shorter than system dealing time, real delay time is same as system dealing time. While delay time is longer than system dealing time, it has to delay while system dealing finished. It does not send data to upper machine until delay time arrive.

Fd.06	Modbus communication overtime fault time	Setting range: 0.1-100.0s	Factory set: 1.0s
Fd.07	Modbus communication fault act mode selections	Setting range: 0-3	Factory set: 1

Modbus communication overtime fault time: If the interval between one communication and next communication is over communication overtime, it is considered as communication break fault. **[Fd.07]** decides the act mode.

Modbus communication fault act mode selections

0: No checkout overtime fault No fault checkout. Inverter runs according to the last communication command.

1: Alarm and stop freely If it has not received next frame order or the communication order while the latest communication giving order is over **[Fd.06]** time setting, inverter alarms fault E.CE and stops.

2: Alarm, go on running While inverter running command is given by communication, if it has not received the new communication order while the latest communication giving order is over **[Fd.06]** time setting, inverter alarms **A.074** and runs according to the last order.

3: Forced stop Frequency inverter stop while communication giving order is over than **[Fd.06]** setting time and does not receive next frame order or other communication order.

Fd.08	Modbus transmission response	Setting range: 0-1	Factory set: 0
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The parameter chooses whether to respond when the upper machine sends a write command to the drive. If the upper computer needs the reply from the drive, the drive will occupy sharing communication bus; when doing communications control, the upper computer need to retain enough time to reply. If the upper computer does not need a reply message but only send commands to the drive, you can choose no respond to write operation to improve the utilization efficiency of the communication bus. This parameter is valid only for write operation, invalid for read operation.

0: write operation with response

1: write operation without response

Fd.09	Modbus main machine sending selections	Setting range: 0000-BBBB	Factory set: 0031
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Set the data that inverter sent the slave machines when inverter is main machine. All slaves will receive the command from the host when the main machine sends broadcast commands. The host can send four polling data, corresponding to the settings of LED "0" digit, "00" digit, "000" digit and "0000" digit. No data is transmitted when invalid.

LED "0" digit: 1st group of frame selection

0: Invalid

1: Main machine run command

2: Main machine given frequency

3: Main machine output frequency

4: Main machine upper limit frequency

5: Main machine given torque

6: Main machine output torque

7: Reserved

8: Reserved

9: Main machine given PID

A: Main machine feedback PID

B: Reserved

LED "00" digit: 2nd group of frame selection as above

LED "000" digit: 3rd group of frame selection as above

LED "0000" digit: 4th group of frame selection as above

Host broadcast data	Corresponding address and application accepted by Slaver
1: running command given	0x3001, Can be used as the data of running command given source 0x01:FWD run 0x02:REV run 0x03:FWD jog 0x04:REV jog 0x05:Stop command (Slave machine stops according stop mode)
2: Main machine given frequency	0x3000, can be used as communication given frequency
3: Main machine output frequency	0x3000, can be used as communication given frequency
4: Main machine upper limit frequency	0x3004, can be used as communication given frequency upper limit
5: Main machine given torque	0x3005, can be used as communication given torque
6: Main machine output torque	0x3005, can be used as communication given torque
7: Reserved	
8: Reserved	
9: Main machine given PID	0x3008, can be used as PID communication given
A: Main machine feedback PID	0x3009, can be used as PID communication given

Fd.10	RS485 communication port configuration	Setting range: 0-2	Factory default: 0
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RS485 communication port configuration

0: Modbus communication: general Modbus method

1: Serial port monitoring: monitoring inverter running state by upper machine.

2: Reserved

Fd.11- Fd.13	Reserved
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Fd.14	LAN 1st level address	Setting range: 0~9999	Factory default: 0
Fd.15	LAN 2nd level address	Setting range: 0~9999	Factory default: 0

[Fd.14],[Fd.15] is the address set by 433 wireless communication module.Details refer to 433 wireless communication module manual.

9.14 Inverter Fault Code List

Communication code	Fault display	Fault	Fault diagnose (FA.39)
0	--	No fault	
1	E. SC	Module fault	1. Falling edge trigger 2. SC low level
2	E. SC	Module fault	
3	E. SC	Module fault	
4	E.oC1	Over-current when ACC	1.Falling edge trigger OC 2.OC low level 3.SD lock
5	E.oC2	Over-current when DEC	1.Falling edge trigger OC 2.OC low level 3.SD lock
6	E.oC3	Over-current in stable speed	1.Falling edge trigger OC 2.OC low level 3.SD lock 11.Falling edge trigger OC (Stop) 12.OC low level (Stop) 13.SD lock (Stop)
7	E.oU1	Over-voltage when ACC	1.Hardware over-voltage 2.Software over-voltage
8	E.oU2	Over-voltage when DEC	1.Hardware over-voltage 2.Software over-voltage
9	E.oU3	Over-voltage in stable speed	1.Hardware over-voltage 2.Software over-voltage
10	E.LU2	Under voltage in bus	Bus under voltage at running
11	E.oL1	Motor Overload	

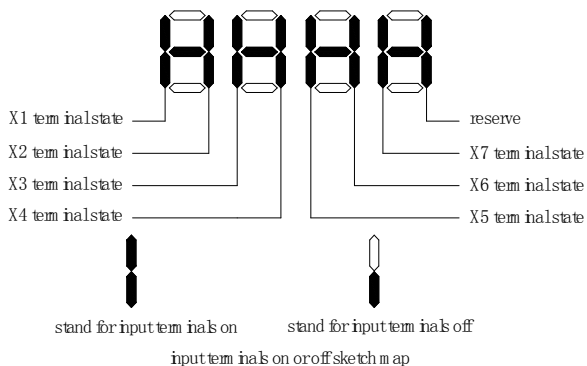
12	E.oL2	Inverter Overload	0: Caused by output current accumulation 3: Caused by CBC signal holding
13	E.iLF	Input phase loss	
14	E.oLF	Output phase loss	
15	E.oH2	Rectifier over-heat	
16	E.oH1	Inverter over-heat	
17	E. EF	External fault	
18	E. CE	Communication fault	
19	E.HAL	Current detection fault	1:Zero drift of U phase is too large 2:Zero drift of V phase is too large 4:Zero drift of W phase is too large(three haul is valid) 100:Sum of 3phase is not equal 0(three haul is valid) FU.27: Number of haul is wrong
20	E.TE1	Motor static self study	1:Current over limit 2: Current zero drift is abnormal 3:Motor impedance unbalance 4:Current oscillation 5:Study current over limit 10:Output voltage over limit 40:Study timeout 41:Parameter setting mistake 42:PG direction detection abnormal 50:Rotor resistance study abnormal
21	E.EEP	EEPROM fault	1:Write timeout 2:Read timeout 3:Successive read and write timeout
22	Reserved	Reserved	
23	E.BRU	Breaking unit fault	
24	Reserved	Reserved	
25	Reserved	Reserved	
26	E.CPE	Parameter copy abnormal	
27	E. PG	Expansion card connecting abnormal	
28	E.OU4	Over-voltage when stop	1:Hardware over-voltage 2:Software over-voltage
29	E.PID	PID break fault	
30	LIFE	Keypad can not recognize fault prompt	1:Change a keypad above KB20 2:Check the prompt code by C-36
31	E.IAE	Fail to study initial angle	

32	E.DEF	Speed deviation too large	See FA.23
33	E.SPD	Speed stall protection	See FA.26
34	E.LD1	Overload protection1	See FA.17 "0"digit
35	E.LD2	Overload protection2	See FA.17 "000"digit
36	E.CPU	CPU counter timeout	1:Main cycle timeout 2:1ms interrupt timeout 3:AD interrupt timeout

Pre alarm Code list

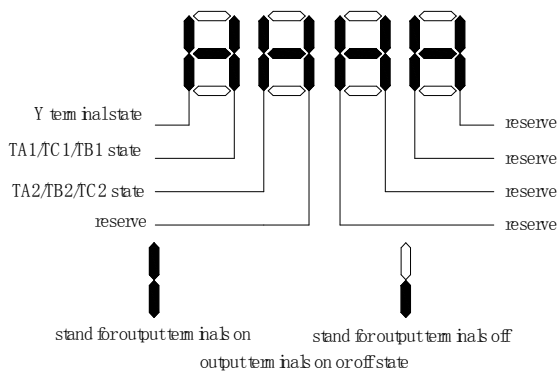
Communication code	Fault display	Fault name	Fault diagnose (FA.39)
65	A.LIF	Input phase loss	
66	A.PID	PID break fault	
67	A.LD1	Overload protection1	See FA.17 "0"digit
68	A.LD2	Overload protection2	See FA.17 "000"digit
69	A.EEP	EEPROM fault	
70	A.DEF	Speed deviation too large	See FA.23
71	A.SPD	Speed stall protection	See FA.26
72	A.072	lock pre alarm	
73	A.073	GPRS lock pre alarm	
74	A.074	485communication alarm	

Input Terminal on/off Diagram:



Tip: C-31 monitoring expansion input D0~D5 connection diagrams are the same as the diagram above, but only displaying the first six valid digits.

Output Terminal on/off Diagram:



Tip: C-31 monitoring expansion output D0~D5 connection diagrams are the same as the diagram above, but only displaying the first six valid digits.

Chapter 10 Appendix

10.1 Appendix 1 Function Parameters Summary Table

“●”: Parameter can be changed in the running state.

“○”: Parameter can't be changed in the running state.

“×”: Parameter can be read only.

“—”: Factory setting parameter, only factory can set.

“※”: Parameter is related to the model.

Basic parameters

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
F0.00	Motor control mode	Asynchronous motor control mode: 0: V/F control 1: Reserved 2: Reserved 3: High-performance VC without PG 4: High-performance VC with PG Synchronous motor control mode: 5: Reserved 6: High-performance VC without PG 7: VC with PG Other control: 8: Voltage frequency differential output	0	○	0x000
F0.01	Reserved				0x001
F0.02	Run command channel	0: Keyboard control 1: Terminal control 2: RS485 communication control 3: Optional card	0	●	0x002
F0.03	Frequency given source channel A	0: Keyboard number given 1: Keyboard potentiometer given 2: Terminal VS voltage analog given 3: Terminal AI analog given 4: Terminal AS analog given	0	●	0x003
F0.04	Frequency given source channel B	5: Terminal pulse PUL given 6: RS485 communication given 7: UP/DW control	1	●	0x004

		8: PID control given 9: Program control (PLC) given 10: Optional card 11: Multi-steps speed given			
F0.05	Frequency channel B reference source	0: Max. output frequency as reference 1: A set frequency as reference	0	●	0x005
F0.06	Frequency given source selection	0: Channel A 1: Channel B 2: Channel A+Channel B 3: Channel A-Channel B 4: Max. value of Channel A and Channel B 5: Min. value of Channel A and Channel B	0	●	0x006
F0.07	Running command binding	LED"0"digit: keyboard command instruction binding LED"00"digit: terminal command instruction binding LED"000"digit: communication command instruction binding LED"0000"digit: optional card command instruction binding 0 : no binding 1 : keyboard number given frequency 2 : Keyboard potentiometer given 3 : Terminal VS voltage 4 : Terminal AI analog given analog given 5 : Terminal AS current analog given 6 : Terminal pulse PUL given 7: RS485 communication given 8 : Terminal UP/DW control 9 : PID control given A: Program control (PLC) given B: Optional card C: Multi-speed given D: Reserved	0000	●	0x007
F0.08	Keyboard number setting frequency	0~upper limit	50.00Hz	●	0x008
F0.09	Max frequency output	upper limit~600.00Hz	50.00Hz	○	0x009

F0.10	Upper limitation source selection	0: Upper limit frequency digital given 1: Keyboard potentiometer given 2: Terminal VS analog given 3: Terminal AI analog given 4: Terminal AS analog given 5: Terminal pulse PUL given	0	●	0x00A
F0.11	Upper frequency limit digital setting	Lower frequency ~max frequency	50.00Hz	●	0x00B
F0.12	Lower frequency limit	0.00 ~ frequency upper limit	0.00Hz	●	0x00C
F0.13	Lower frequency limit running mode	0: Stop output, enter into pause running state 1: Run at lower frequency limit	1	○	0x00D
F0.14	ACC time 1	0.01-650.00s	Model set	※	0x00E
F0.15	DEC time 1	0.01-650.00s	Model set	※	0x00F
F0.16	Rotary direction selection	LED“0”digit: running direction take the opposite 0: Direction unchanged 1: Direction take the opposite LED“00”digit: running direction prohibited 0: Forward and reverse commands are allowed 1: Only forward command is allowed 2: Only reverse commands are allowed LED“000”digit: frequency control direction selection 0: Invalid 1: Valid LED“0000”digit: reserved	0000	○	0x010
F0.17	Reserved				0x011
F0.18	Reserved				0x012

F0.19	Parameter initialization	0: No action 1: Restore factory default (not restoring motor parameters) 2: Restore factory default (restoring motor parameters) 3: Clear malfunction records Remaining value: no operation	0	●	0x013
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Run control parameters

NO.	Function description	Range of settings and definition	Factory setting	Feature	Addresses
F1.00	Start-up mode running	0: Start by start frequency 1: Braking first then start by start frequency 2: Speed tracking, judge direction then start	0	○	0x100
F1.01	Start pre-excitation time	0.00~60.00s	0.00s	○	0x101
F1.02	Start frequency	0.00~60.00Hz	0.50Hz	○	0x102
F1.03	Start frequency hold time	0.0~50.0s	0.0s	○	0x103
F1.04	Braking current before start	0.0~150.0%	60.0%	○	0x104
F1.05	Braking time before start	0.0~60.0s	0.0s	○	0x105
F1.06	Speed tracking speed	0.00~60.00s	0.50s	○	0x106
F1.07	Speed tracking stop delay	0.00~60.00s	1.00s	○	0x107
F1.08	Reserved				0x108
F1.09	Reserved				0x109
F1.10	Stop mode	0: DEC stop 1: Free stop	0	●	0x10A
F1.11	DC braking initial frequency	0.00~50.00Hz	1.00Hz	○	0x10B
F1.12	DC braking current	0.0~150.0%	60.0%		0x10C
F1.13	Reserved				0x10D
F1.14	DC braking holding time	0.0~60.0s	0.0s	○	0x10E
F1.15	Stop detection frequency	0.00~50.00Hz	0.50Hz	●	0x10F

F1.16	ACC/DEC selection	LED "0" digit: time base selection 0: max frequency 1: fixed frequency 50Hz 2: set frequency LED "00" digit: S ACC/DEC selection 0: Beeline ACC/DEC 1: S Curve ACC/DEC LED "000" digit: reserved	0010	○	0x110
F1.17	ACC start S curve time	0.00~10.00	0.10s	○	0x111
F1.18	ACC finish S curve time	0.00~10.00	0.10s	○	0x112
F1.19	DEC start S curve time	0.00~10.00	0.10s	○	0x113
F1.20	DEC finish S curve time	0.00~10.00	0.10s	○	0x114
F1.21	ACC time 2	0.01~650.00s	10.00s	●	0x115
F1.22	DEC time 2	0.01~650.00s	10.00s	●	0x116
F1.23	ACC time 3	0.01~650.00s	10.00s	●	0x117
F1.24	DEC time 3	0.01~650.00s	10.00s	●	0x118
F1.25	ACC time 4	0.01~650.00s	10.00s	●	0x119
F1.26	DEC time 4	0.01~650.00s	10.00s	●	0x11A
F1.27	Emergency stop	0.01~650.00s	1.00s	●	0x11B
F1.28	FWD&REV dead time	0.0~120.0s	0.0s	○	0x11C
F1.29	Zero speed torque frequency threshold	0.00~10.00Hz	0.50Hz	●	0x11D
F1.30	Zero speed torque coefficient	0.0~150.0%	60.0%	●	0x11E
F1.31	Zero speed torque holding time	0.0~6000.0s If set 6000.0s, always hold without time limit.	0	●	0x11F
F1.32	Reserved				0x120
F1.33	Reserved				0x121
F1.34	Reserved				0x122
F1.35	Power off restart action selection	0: Invalid 1: Valid	0	○	0x123
F1.36	Power off restart	0.00~60.00s	0.50s	○	0x124
F1.37	Reserved				0x125
F1.38	JOG running frequency setting	0.00-Max frequency	5.00Hz	●	0x126

F1.39	JOG ACC time	0.01~650.00s	10.00s	●	0x127
F1.40	JOG DEC time	0.01~650.00s	10.00s	●	0x128
F1.41	Jump frequency 1	0.00-Max frequency	0.00Hz	●	0x129
F1.42	Jump frequency	0.00-Max frequency	0.00Hz	●	0x12A
F1.43	Jump frequency 2	0.00-Max frequency	0.00Hz	●	0x12B
F1.44	Jump frequency	0.00-Max frequency	0.00Hz	●	0x12C

Quantum Digital Terminal Parameter Group

NO.	Function description	Range of settings and definition	Factory setting	Feature	Addresses
F2.00	Multifunction input terminal 1(X1)	0: No function 1: FWD 2: REV 3: 3-line running control (Xi) 4: FWD JOG 5: REV JOG	1	○	0x200
F2.01	Multifunction input terminal 2(X2)	6: Free stop 7: Emergency stop 8: Malfunction reset 9: External fault input 10: Frequency UP 11: Frequency DW 12: UP/DW clear 13: Switch channel A to channel B	2	○	0x201
F2.02	Multifunction input terminal 3(X3)	14: Frequency channel combination switch to A 15: Frequency channel combination switch to B	4	○	0x202
F2.03	Multifunction input terminal 4(X4)	16: Multispeed terminal 1 17: Multispeed terminal 2 18: Multispeed terminal 3 19: Multispeed terminal 4 20: PID control cancel 21: PID control pause 22: PID characteristic switch 23: PID gain switch 24: PID given switch 1	5	○	0x203

F2.04	Multifunction input terminal 5(X5)	25: PID given switch 2 26: PID given switch 3 27: PID feedback switch 1 28: PID feedback switch 2 29: PID feedback switch 3 30: PLC pause 31: PLC restart 32: ACC/DEC time choose terminal 1	6	○	0x204
F2.05	Multifunction input terminal 6(X6)	33: ACC/DEC time choose terminal 2 34: ACC/DEC pause 35: Swing frequency input 36: Swing frequency pause 37: Swing frequency reset 38: Reserved 39: Reserved 40: Timer trigger terminal 41: Timer clear zero terminal	8	○	0x205
F2.06	Multifunction input terminal 7(X7/PUL)	42: Timer clock input terminal 43: Counter clear terminal 44: DC braking order 45: Pre excitation order terminals 46: Motor selection terminal 47: Reserved 48: Command channel switch to keyboard 49: Command channel switch to terminal 50: Command channel switch to communication	10	○	0x206
F2.07	Reserved	51: Command channel switch to expansion card 52: Operation prohibited 53: Forward prohibited 54: Reverse prohibited 55: Reserved 56: Reserved 57: Reserved 58: Reserved 59: Reserved 60: Speed torque control switch 61: Position control switch	0	○	0x207

F2.08	X1-X4 terminal feature selection	0: On valid 1: Off valid LED "0" digit: X1 terminal LED "00" digit: X2 terminal LED "000" digit: X3 terminal LED "0000" digit: X4terminal	0000	•	0x208
F2.09	X5-X7 terminal feature selection	0: On valid 1: Off valid LED "0" digit: X5 terminal LED "00" digit: X6 terminal LED "000" digit: X7 terminal LED "0000" digit::reserved	0000	•	0x209
F2.10	X1 valid detected delay	0.000-6.000S	0.010	•	0x20A
F2.11	X1 invalid detected delay	0.000-6.000S	0.010	•	0x20B
F2.12	X2 valid detected delay	0.000-6.000S	0.010	•	0x20C
F2.13	X2 invalid detected delay	0.000-6.000S	0.010	•	0x20D
F2.14	X3 valid detected delay	0.000-6.000S	0.010	•	0x20E
F2.15	X3 invalid detected delay	0.000-6.000S	0.010	•	0x20F
F2.16	X4 valid detected delay	0.000-6.000S	0.010	•	0x210
F2.17	X4 invalid detected delay	0.000-6.000S	0.010	•	0x211
F2.18	X5 valid detected delay	0.000-6.000S	0.010	•	0x212
F2.19	X5 invalid detected delay	0.000-6.000S	0.010	•	0x213
F2.20	X6 valid detected delay	0.000-6.000S	0.010	•	0x214
F2.21	X6 invalid detected delay	0.000-6.000S	0.010	•	0x215
F2.22	X7 valid detected delay	0.000-6.000S	0.010	•	0x216
F2.23	X7 invalid detected delay	0.000-6.000S	0.010	•	0x217
F2.24	Reserved				0x218
F2.25	Reserved				0x219

F2.26	Terminal control running mode	0: 2-line 1 1: 2-line 2 2: 3-line 1 3: 3-line 2	0	○	0x21A
F2.27	Terminal operate protection	0: OFF 1:ON LED "0" digit: Terminal operate protection when abnormal exit LED "00" digit: Jog terminal operate protection when abnormal exit LED "000" digit: Operate protection when command channel switch to terminal LED "0000" digit: reserved	0111	○	0x21B
F2.28	Reserved			○	0x21C
F2.29	Reserved			○	0x21D
F2.30	PUL input min frequency	0.00-50.00kHz	0.00kHz	●	0x21E
F2.31	PUL min frequency corresponding setting	0.00-100.00%	0.00%	●	0x21F
F2.32	PUL input max frequency	0.00-50.00kHz	50.00kHz	●	0x220
F2.33	PUL max frequency corresponding setting	0.00-100.00%	100.00%	●	0x221
F2.34	PUL filter time	0.000s-9.000s	0.100s	●	0x222
F2.35	PUL cut-off frequency	0.000-1.000kHz	0.010kHz	●	0x223
F2.36	UP/DW terminal frequency control mode	0: Off electricity storage 1: Off electricity does not storage 2: Valid in running, clear zero at stop	0	○	0x224
F2.37	ACC/DEC speed of UP/DW terminal frequency	0.01-50.00Hz/s	0.50Hz/s	●	0x225
F2.38	Reserved				0x226
F2.39	Timer time of unit	0: Second 1: Minute 2: Hour	0	●	0x227
F2.40	Timer setting value	0-65000	0	●	0x228
F2.41	Counter max value	0-65000	1000	●	0x229

F2.42	Counter setting value	0-65000	500	•	0x22A
F2.43	Reserved				0x22B
F2.44	Output terminal polarity selection	0: Positive 1: Negative LED "0" digit: Terminal Y LED "00" digit: Relay output terminal 1 LED "000" digit: Relay output terminal 2 LED "0000" digit: reserved	0000	•	0x22C
F2.45	Output terminal 1	0: No output 1: FWD Running 2: REV Running 3: Fault trip alarm 1(alarm when fault self-recover) 4: Fault trip alarm 2(no alarm when fault self-recover) 5: Fault retrying 6: External fault stop 7: Under voltage	1	•	0x22D
F2.46	Relay output 1	8: Finish ready for running 9: Output frequency level test 1(FDT1) 10: Output frequency level test 2(FDT2) 11: Reaching given frequency 12: running at 0 speed 13: Reaching upper frequency limit 14: Reaching lower frequency limit 15: Program running circle period completed	4	•	0x22E
F2.47	Relay output 2	16: Program running speed completed 17: PID feedback exceeds upper limit 18: PID feedback under lower limit 19: PID feedback sensor wire break 20: Reserved 21: Timer time arrived	11	•	0x22F

		22: Counter reaching biggest value 23: Counter reaching setting value 24: Dynamic braking 25: PG feedback break 26: Emergency stop 27: Pre alarm output for over load 28: Pre alarm output for under load 29: Motor overload pre alarm 30: RS485 given 31: Reserved			
F2.48	Y1 output delay time	0.000-6.000s	0.010s	●	0x230
F2.49	Relay 1 output delay time	0.000-6.000s	0.010s	●	0x231
F2.50	Relay 2 output delay time	0.000-6.000s	0.010s	●	0x232
F2.51	Output frequency level 1 (FDT1)	0.00-Max frequency	30.00Hz	●	0x233
F2.52	FDT1 lag	0.00-Max frequency	1.00Hz	●	0x234
F2.53	Output frequency level 2 (FDT2)	0.00-Max frequency	50.00Hz	●	0x235
F2.54	FDT2 lag	0.00-Max frequency	1.00Hz	●	0x236
F2.55	Given frequency arriving checkout	0.00-50.00Hz	2.00Hz	●	0x237
F2.56	Reserved				0x238
F2.57	Reserved				0x239
F2.58	Reserved				0x23A
F2.59	Reserved				0x23B
F2.60	Virtual vX1 terminal function selection	See X terminal function input	0	○	0x23C
F2.61	Virtual vX2 terminal function selection		0	○	0x23D
F2.62	Virtual vX3 terminal function selection		0	○	0x23E
F2.63	Virtual vX4 terminal function selection		0	○	0x23F

F2.64	vX terminal valid state source	0: internal connection with virtual vYn 1: Connect with physical terminal Xn 2: function code setting valid or not LED "0" digit: virtual vX1	0000	●	0x240
F2.65	Virtual vX terminal function code setting valid state	0: invalid 1: valid LED "0" digit: virtual vX1 LED "00" digit: virtual vX2 LED "000" digit: virtual vX3 LED "0000" digit: virtual vX4	0000	●	0x241
F2.66	Virtual vY1 output selection	See Y terminal function output	0	●	0x242
F2.67	Virtual vY2 output selection		0	●	0x243
F2.68	Virtual vY3 output selection		0	●	0x244
F2.69	Virtual vY4 output selection		0	●	0x245
F2.70	vY1 output delay	0.0s~6.000s	0.010S	●	0x246
F2.71	vY2 output delay	0.0s~6.000s	0.010S	●	0x247
F2.72	vY3 output delay	0.0s~6.000s	0.010S	●	0x248
F2.73	vY4 output delay	0.0s~6.000s	0.010S	●	0x249
F2.74	Reserved				0x24A
F2.75	Terminal input extend(D0)	See X terminal function input See Y terminal function output	0	○	0x24B
F2.76	Terminal input extend(D1)		0	○	0x24C
F2.77	Terminal input extend(D2)		0	○	0x24D
F2.78	Terminal input extend(D3)		0	○	0x24E
F2.79	Terminal input extend(D4)		0	○	0x24F
F2.80	Terminal input extend(D5)		0	○	0x250
F2.81	D0-D2 terminal input and output selection	0: Input 1: Output LED "0" digit:D0 terminal LED "00" digit: D0 terminal LED "000" digit: D0 terminal LED "0000" digit: reserved	0000	●	0x251

F2.82	D3-D5 terminal input and output selection	0: Input 1: Output LED "0" digit: D3 terminal LED "00" digit: D4 terminal LED "000" digit: D5 terminal LED "0000" digit: reserved	0000	•	0x252
F2.83	D0-D2 terminal feature selection	0: ON valid 1: OFF valid LED "0" digit: D0 terminal LED "00" digit: D0 terminal LED "000" digit: D0 terminal LED "0000" digit: reserved	0000	•	0x253
F2.84	D3-D5 terminal feature selection	0: ON valid 1: OFF valid LED "0" digit: D3 terminal LED "00" digit: D4 terminal LED "000" digit: D5 terminal LED "0000" digit: reserved	0000	•	0x254
F2.85	D0-D5 extended board complex function selection	LED "0" digit: D0, D1 terminal 0: invalid 1: D0, D1 as general I/O 2: D0/D1 as CAN pins LED "00" digit: D2, D3, D4, D5 terminal 0: invalid 1: D2, D3, D4, D5 as general I/O 2: D3, D4, D5 as QEP pins 3: D2, D3, D4, D5 as SPI pins LED "000" digit: reserved	0000	•	0x255
F2.86	D0-D5 valid detection delay	0.000-6.000S	0.010S	•	0x256
F2.87	D0-D5 invalid detection delay	0.000-6.000S	0.010S	•	0x257
F2.88	D0-D5 output delay	0.000-6.000S	0.010S	•	0x258
F2.89- F2.98	Reserved				

Analog Terminal Parameter Group

NO.	Function description	Range of settings and definition	Factory setting	Feature	Address
F3.00	VS Lower limit	0.00-10.00V	0.00V	•	0x300
F3.01	VS Lower limit corresponding	-100.00-100.00%	0.00%	•	0x301
F3.02	VS upper limit	0.00-10.00V	10.00V	•	0x302

F3.03	VS upper limit corresponding	-100.00-100.00%	100.00	●	0x303
F3.04	VS filter time	0.00-6.00s	0.010s	●	0x304
F3.05	VS zero point loop voltage	0.00-10.00V	0.00V	●	0x305
F3.06	AI used as VS lower limit	0.00-10.00V	0.00V	●	0x306
F3.07	AI (VS)lower limit corresponding	0.00-100.00%	0.00%	●	0x307
F3.08	AI used as VS upper limit	0.00-10.00V	10.00V	●	0x308
F3.09	AI (VS)upper limit corresponding setting	0.00-100.00%	100.00 %	●	0x309
F3.10	AI filter time	0.00-6.00s	0.010s	●	0x30A
F3.11	AS lower limit	0.00-20.00mA	4.00mA	●	0x30B
F3.12	AS lower limit corresponding	0.00-100.00%	0.00%	●	0x30C
F3.13	AS upper limit	0.00-20.00mA	20.00m	●	0x30D
F3.14	AS upper limit corresponding setting	0.00-100.00%	100.00 %	●	0x30E
F3.15	AS filter time	0.000-6.000s	0.010s	●	0x30F
F3.16	AI used as AS lower limit	0.00-20.00mA	4.00mA	●	0x310
F3.17	AI (AS) lower limit corresponding	0.00-100.00%	0.00%	●	0x311
F3.18	AI used as AS lower limit	0.00-20.00mA	20.00m	●	0x312
F3.19	AI (AS) upper limit corresponding setting	0.00-100.00%	100.00 %	●	0x313
F3.20	Vs terminal function selection (used as X)	See X terminal function	0	○	0x314
F3.21	AI high level setting	0.00-100.00%	70.00%	●	0x315
F3.22	AI low level setting	0.00-100.00%	30.00%	●	0x316
F3.23	AI terminal function selection (used as X)	See X terminal function	0	○	0x317
F3.24	AI high level setting	0.00~100.00%	70.00%	●	0x318
F3.25	AI low level setting	0.00~100.00%	30.00%	●	0x319
F3.26	AS terminal function selection (as X)	See X terminal function	0	○	0x31A
F3.27	AS high level setting	0.00~100.00%	70.00%	●	0x31B

F3.28	AS low level setting	0.00~100.00%	30.00%	●	0x31C
F3.29	Valid state set when analog used as terminal	0: low level 1: high level LED 0 digit: VS LED 00 digit: AI LED 000 digit: AS LED 0000 digit: reserved	0000	●	0x31D
F3.30	Analog input curve selection	LED "0" digit: VS 0: Beeline (default) 1: curve 1 2: curve 2 LED "00" digit: AI (Select voltage or current input by wire jumper) LED "000" digit: AS LED "0000" digit: reserved	0000	●	0x31E
F3.31	Reserved				0x31F
F3.32	Curve 1 lower limit	0.00~10.00V	0.00V	●	0x320
F3.33	Curve 1 lower limit corresponding setting	0.00~100.00%	0.0%	●	0x321
F3.34	Curve 1 inflection point 1 input voltage	0.00~10.00V	3.00V	●	0x322
F3.35	Curve 1 inflection point 1	0.00~100.00%	30.00%	●	0x323
F3.36	Curve 1 inflection point 2 input voltage	0.00~10.00V	6.00V	●	0x324
F3.37	Curve 1 inflection point 2	0.00~100.00%	60.00%	●	0x325
F3.38	Curve 1 upper limit	0.00~10.00V	10.0V	●	0x326
F3.39	Curve 1 upper limit corresponding	0.00~100.00%	100.00%	●	0x327
F3.40	Curve 2 lower limit	0.00~10.00V	0.00V	●	0x328
F3.41	Curve 2 lower limit corresponding setting	0.00~100.00%	0.00%	●	0x329
F3.42	Curve 2 inflection point 1 input voltage	0.00~10.00V	3.00V	●	0x32A
F3.43	Curve 2 inflection point 1	0.00~100.00%	30.00%	●	0x32B
F3.44	Curve 2 inflection point 2 input voltage	0.00~10.00V	6.00V	●	0x32C
F3.45	Curve 2 inflection point 2	0.00~100.00%	60.00%	●	0x32D
F3.46	Curve 2 upper limit	0.00~10.00V	10.00V	●	0x32E

F3.47	Curve 2 upper limit corresponding	0.00~100.00%	100.00 %	●	0x32F
F3.48	Reserved				0x330
F3.49	Reserved				0x331
F3.50	Reserved				0x332
F3.51	Reserved				0x333
F3.52	Reserved				0x334
F3.53	A0 output signal selection	LED “0” digit: A01 0: 0~10V 1: 4.00~20.00mA 2: 0.00~20.00mA LED “00” digit: A02 0: 0~10V 1: 4.00~20.00mA 2: 0.00~20.00mA 3: FM frequency pulse output LED “000” digit: reserved LED 0000 digit: reserved	0000	●	0x335
F3.54	A01 output selection	0: Given frequency 1: Output frequency 2: Output current 3: Input voltage 4: Output voltage 5: Machine speed 6: Given torque 7: Output torque 8: PID given value 9: PID feedback value 10: Output power 11: Bus voltage 12: VS input value 13: AI input value 14: AS input value 15: PUL input value 16: Module temperature 1 17: Module temperature 2 18: RS485 given	0	●	0x336
F3.55	A02 output selection	0: Given frequency 1: Output frequency 2: Output current 3: Input voltage 4: Output voltage 5: Machine speed 6: Given torque 7: Output torque 8: PID given value 9: PID feedback value 10: Output power 11: Bus voltage 12: VS input value 13: AI input value 14: AS input value 15: PUL input value 16: Module temperature 1 17: Module temperature 2 18: RS485 given	1	●	0x337
F3.56	A01 output gain	25.0~200.0%	100.0%	●	0x338
F3.57	A01 output signal	-10.0~10.0%	0.0%	●	0x339
F3.58	A01 output filter	0.000~6.000s	0.010s	●	0x33A
F3.59	A02 output gain	25.0~200.0%	100.0%	●	0x33B

F3.60	A02 analog output signal bias	-10.0%~10.0%	0.0%	●	0x33C
F3.61	A02 output filter	0.000~6.000s	0.010s	●	0x33D
F3.62	A02FM frequency output lower limit	0.00~100.00kHz	0.20kHz	●	0x33E
F3.63	A02FM frequency output upper limit	0.00~100.00kHz	50.00kHz	●	0x33F
F3.64 -F3.7	Reserved				

System Parameter Group

NO.	Function description	Range of settings and definition	Factory setting	Feature	Address
F4.00	Parameter and key lock selections	0: Not locked 1: Function parameter locked 2: Function parameter and key locked (except for RUN/STOP/JOG) 3: All function parameter and key locked	0	●	0x400
F4.01	User password	0~9999	0	●	0x401
F4.02	Reserved				0x402
F4.03	Reserved				0x403
F4.04	LCD keyboard language selection	0: Chinese 1: English	0	●	0x404
F4.05	Parameter copy	0: No function 1: Send inverter parameters to keyboard and save 2: Send parameters to keyboard and save Remaining value: no operation	0	○	0x405
F4.06	Keyboard special function selection	LED 0 digit: D/E monitor on 0: Off 1: On LED 00 digit: no keyboard potentiometer lock sampling value 0: Off 1: On LED 000 digit: reserved LED 0000 digit: reserved	0000	○	0x406

F4.07	REV/JOG selection	0: REV 1: JOG	0	○	0x407
F4.08	STOP key setting	0: Non-keyboard control mode is invalid 1: Non-keyboard control mode stop according to stop mode 2: Non-keyboard control mode stop according to free mode	1	○	0x408
F4.09	UP/DOWN key selection	LED "0" digit: keyboard UN/DOWN key modify selection 0: Invalid 1: Modify frequency setting by key board numbers F0.08 2: Modify PID give setting by key board numbers Fb.01 LED "00" digit: power down save 0: No save after frequency power down 1: Save after frequency power down LED "000" digit: action limit 0: Operation stop for adjusting 1: Adjusting only in operation, stop for holding 2: Adjusting in operation, stop for clearing LED "0000" digit: reserved	0011	○	0x409
F4.10	Keyboard potentiometer lower limit	0.00~5.00V	0.50V	●	0x40A
F4.11	Keyboard potentiometer lower limit corresponding setting	0.00~100.00%	0.00	●	0x40B
F4.12	Keyboard potentiometer upper limit	0.00~5.00V	4.50V	●	0x40C
F4.13	Keyboard potentiometer upper limit corresponding setting	0.00~100.00%	100.00	●	0x40D
F4.14	The display content of the first line in	LED "0" and "10" digit: display the first group	1101	●	0x40E

	running state	00~63 LED "100" and "1000" digit: display the second group 00~63			
F4.15	The display content of the first line in running state	LED "0" and "10" digit: display the third group 00~63 LED "100" and "1000" digit: display the fourth group 00~63	0402	•	0x40F
F4.16	The display content of the first line in stop state	LED "0" and "10" digit: display the first group 00~63 LED "100" and "1000" digit: display the second group 00~63	1100	•	0x410
F4.17	The display content of the first line in stop state	LED "0" and "10" digit: display the third group 00~63 LED "100" and "1000" digit: display the fourth group 00~63	0402	•	0x411
F4.18	The display content of the second line in running state	LED "0" and "10" digit: display the first group 00~63 LED "100" and "1000" digit: display the second group 00~63	0402	•	0x412
F4.19	The display content of the second line in running state	LED "0" and "10" digit: display the third group 00~63 LED "100" and "1000" digit: display the fourth group 00~63	1210	•	0x413
F4.20	The display content of the second line in stop state	LED "0" and "10" digit: display the first group 00~63 LED "100" and "1000" digit: display the second group 00~63	0402	•	0x414
F4.21	The display content of the second line in stop state	LED "0" and "10" digit: display the third group 00~63 LED "100" and "1000" digit: display the fourth group 00~63	1210	•	0x415

F4.22	Keyboard display item setting	LED "0" digit: output frequency selection 0: Aim frequency 1: Running frequency LED "00" digit: reserved LED "000" digit: power display dimension 0: Power display percentage (%) 1: Power display kilowatt (KW) LED"0000" digit: reserved	0000	•	0x416
F4.23	Reserved (debug monitor selection)	LED "0" digit: C-00~C-39 0: Normal 1: Debug LED"00" digit: C-40~69 0: No display 1: Normal 1: VF debug 2: VC debug 3: TUNE debug LED"000"digit: reserved LED"0000" digit: reserved	0000	•	0x417
F4.24	Rotate speed display coefficient	0.0~500.0%	100.0%	•	0x418
F4.25	Power display coefficient	0.0~500.0%	100.0%	•	0x419
F4.26	Alarm selection 1	LED "0" digit: E.EEP fault (EEPROM store fault) 0: Alarm and free stop 1: Alarm and continue operation LED "00" digit: reserved LED "000" digit: reserved LED"0000" digit: reserved	0000	•	0x41A
F4.27	Reserved				0x41B
F4.28	Fan control	0: After power up the fan runs 1: Stop associated with temperature, running is rotary 2: Running associated with temperature, stop while the fan stops	1	•	0x41C
F4.29	Dynamic braking enabled	0: Off 1: On	0	•	0x41D
F4.30	Dynamic braking voltage	115.0%~140.0%	125.0%	•	0x41E

F4.31	Dynamic braking utilization	0.0~100.0%	10.0%	●	0x41F
F4.32	PWM carrier frequency	0.7~16.0kHz	Model set	※	0x420
F4.33	PWM control mode	<p>LED “0” digit: carrier associated with temperature 0: Temperature independent 1: Temperature dependent</p> <p>LED “00” digit: carrier associated with output frequency 0: Independent of output frequency 1: Dependent on output frequency</p> <p>LED “000” digit: random PWM valid 0: Prohibited 1: Valid</p> <p>LED “0000” digit: PWM modulation mode 0: Only use three-phase modulation 1: Two-phase and three-phase modulation automatically switched</p>	1111	●	0x421
F4.34	Reserved				0x422
F4.35	Reserved				0x423
F4.36	Reserved				0x424
F4.37	Reserved				0x425

Motor Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
F5.00	Motor mode	0: Asynchronous motors (AM) 1: Permanent magnet synchronous	0	×	0x500

		motors (PM)			
F5.01	Number of motor poles	2~98	4	○	0x501
F5.02	Motor rated power	0.1~1000.0kW	Model set	※	0x502
F5.03	Motor rated frequency	0.01~max frequency	Model set	※	0x503
F5.04	Motor rated speed	1~65000rpm	Model set	※	0x504
F5.05	Motor rated voltage	1~1500V	Model set	※	0x505
F5.06	Motor rated current	0.1~3000.0A	Model set	※	0x506
F5.07	Asynchronous motor no-load current	0.1~3000.0A	Model set	※	0x507
F5.08	Asynchronous motor stator resistance	0.01~50.00%	Model set	※	0x508
F5.09	Asynchronous motor rotor resistance	0.01~50.00%	Model set	※	0x509
F5.10	Asynchronous motor stator leakage inductance	0.01~50.00%	Model set	※	0x50A
F5.11	Asynchronous motor stator inductance	0.1~2000.0%	Model set	※	0x50B
F5.12	synchronous motor stator resistance	0.01~50.00%	Model set	※	0x50C
F5.13	Synchronous machine d axis inductance	0.01~200.00%	Model set	※	0x50D
F5.14	Synchronous machine q axis inductance	0.01~200.00%	Model set	※	0x50E
F5.15	Synchronous machine back EMF	1~1500V	Model set	※	0x50F
F5.16	Synchronous machine encoder	0.0°~360.0°	Model set	※	0x510

	installation angle				
F5.17	Reserved				0x511
F5.18	Reserved				0x512
F5.19	Reserved				0x513
F5.20	Motor parameters self-adjustment selections	0: No operation 1: Rotary type self-study 2: Static type self-study 3: Reserved	0	○	0x514
F5.21	Synchronous machine poles searching function	LED “0” digit: closed-loop vector 0: OFF 1: ON 2: On, only operate firstly when electrify LED “00” digit: open-loop vector 0: OFF 1: ON 2: ON, only operate firstly when electrify	0010	○	0x515
F5.22	Reserved				0x516
F5.23	Reserved				0x517
F5.24	Reserved				0x518
F5.25	Reserved				0x519
F5.26	Reserved				0x51A
F5.27	Reserved				0x51B
F5.28	Reserved				0x51C
F5.29	Reserved				0x51D
F5.30	Speed feedback or encoder mode	LED “0” digit: encoder mode 0: Common ABZ encoder 1: Rotary encoder LED “00” digit: encoder direction 0: same direction 1: reverse direction LED “000” digit: wire break inspection 0: OFF 1: ON LED “0000” digit: Z pulse	0000	○	0x51E

		correction enabled 0: OFF 1: ON			
F5.31	ABZ encoder lines	0-10000	1024	○	0x51F
F5.32	wire break inspection time	0.100-60.000s	2.000s	●	0x520
F5.33	Rotary encoder poles	2~128	2	○	0x521
F5.34	Numerator of encoder transmission ratio	1~32767	1	○	0x522
F5.35	Denominator of encoder transmission ratio	1~32767	1	○	0x523
F5.36	First-order filter of encoder speed inspection	0.0~100.0ms	1.0ms	●	0x524
F5.37 -F5.4 9	Reserved				

Motor VC Parameter Group

F6.00	ASR(speed loop) proportional gain 1	0.01~100.00	10.00	●	0x600
F6.01	ASR integral time 1	0.000~6.000s	0.500s	●	0x601
F6.02	ASR filter time 1	0.0~100.0ms	0.0ms	●	0x602
F6.03	ASR switch frequency 1	0.00~Max frequency	0.00Hz	●	0x603
F6.04	ASR (speed loop) proportional gain 2	0.01~100.00	10.00	●	0x604
F6.05	ASR (speed loop) integral time 2	0.000~6.000s	0.500s	●	0x605
F6.06	ASR filter time 2	0.0~100.0ms	0.0ms	●	0x606
F6.07	ASR switch frequency 2	0.00~Max frequency	5.00Hz	●	0x607
F6.08	Electric motor torque limit	0.0~250.0%	180.0%	●	0x608
F6.09	Power generation torque limit	0.0~250.0%	180.0%	●	0x609

F6.10	Current loop D-axis proportional gain	0.001~4.000	1.000	•	0x60 A
F6.11	Current loop D-axis integral gain	0.001~4.000	1.000	•	0x60 B
F6.12	Current loop Q-axis proportional gain	0.001~4.000	1.000	•	0x60 C
F6.13	Current loop Q-axis integral gain	0.001~4.000	1.000	•	0x60 D
F6.14	Reserved				0x60 E
F6.15	Vector control motor slip compensation	0.0~250.0%	100.0%	•	0x60 F
F6.16	Vector control generator slip compensation	0.0~250.0%	100.0%	•	0x61 0
F6.17	Reserved				0x611
F6.18	Position compensation control	0:OFF 1:ON	0	•	0x61 2
F6.19	compensation gain	0.0~250.0%	10.0%	•	0x61 3
F6.20	compensation limit	0.0~100.0%	0.1%	•	0x61 4
F6.21	compensation effective range	0.0~100.0%	10.0%	•	0x61 5
F6.22	Over excitation braking gain	0.0~500.0%	100.0%	•	0x61 6
F6.23	Over excitation braking amplitude limit	0.0~250.0%	100.0%	•	0x61 7
F6.24	Vector control energy saving function	0:OFF 1:ON	0	•	0x61 8
F6.25	Energy saving control gain	0.0~80.0%	50.0%	•	0x61 9
F6.26	Energy saving control low-pass filter	0.000~6.000s	0.010s	•	0x61 A
F6.27	Motor constant power area power limit	0.0~250.0%	150.0%	•	0x61 B
F6.28	Motor weak magnetic current upper limit	0.0~250.0%	60.0%	•	0x61 C
F6.29	Motor weak magnetic feed forward gain	0.0~200.0%	0.0%	•	0x61 D
F6.30	Motor weak magnetic gain	0.0~500.0%	100.0%	•	0x61 E
F6.31	Reserved				0x61 F

F6.32	MTPA gain	0.0~400.0%	100.0%	•	0x62 0
F6.33	MTPA filter time	0.0~100.0ms	1.0ms	•	0x62 1
F6.34	Reserved				0x62 2
F6.35	Low frequency pull in current	0.0~100.0%	10.0%	•	0x62 3
F6.36	High frequency pull in current	0.0~100.0%	10.0%	•	0x62 5
F6.37	Frequency of current pulled in	0.0~100.0%	10.0%	•	0x62 5
F6.38 -F6.6 9	Reserved				

Torque Control Parameter

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
F7.00	Torque/Speed control	0:Speed control 1:Torque control	0	•	0x70 0
F7.01	Torque given channels selection	0: keyboard number given 1: Keyboard potentiometer setting 2: Analog VS 3: Analog AI 4: Analog AS 5: Pulse PUL 6: RS485 communication given 7: Optional card	0	•	0x70 1
F7.02	Torque keyboard number setting	0~100.0%	0.0%	•	0x70 2
F7.03	Torque input lower limit	0~100.00%	0.00%	•	0x70 3
F7.04	Lower limit corresponding setting	-200.00%~200.00%	0.00%	•	0x70 4
F7.05	Torque input upper limit	0~100.00%	100.00%	•	0x70 5
F7.06	Upper limit corresponding setting	-200.00%~200.00%	100.00%	•	0x70 6
F7.07	Given first-order filter time	0.000~6.000S	0.100S	•	0x70 7

F7.08	Output torque upper limit	0~200.0%	150.0%	●	0x708
F7.09	Output torque lower limit	0~200.0%	0%	●	0x709
F7.10	Torque control FWD speed limit selection	0: function code F7.12 setting 1: Keyboard potentiometer setting×F7.12 2: Analog VS×F7.12 3: Analog AI×F7.12 4: Analog AS×F7.12 5: Pulse PUL×F7.12 6: RS485 communication given×F7.12 7: Optional card×F7.12	0	●	0x70A
F7.11	Torque control REV speed limit selection	0: function code F7.13 setting 1: Keyboard potentiometer setting×F7.13 2: Analog VS×F7.13 3: Analog AI×F7.13 4: Analog AS×F7.13 5: Pulse PUL×F7.13 6: RS485 communication given×F7.13 7: Optional card×F7.13	0	●	0x70B
F7.12	Torque control FWD speed limit	0.0~100.0%	100.0%	●	0x70C
F7.13	Torque control REV speed limit	0.0~100.0%	100.0%	●	0x70D
F7.14	Reversed				0x70E

Motor V/F Control Parameter

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
F8.00	Linear VF curve selection	0: Beeline VF curve 1-9: 1.1-1.9 idempotent VF curve respectively 10: square VF curve 11: self-defined V/F curve	0	○	0x800
F8.01	Self-setting voltage V1	0.0~100.0%	3.0%	○	0x801
F8.02	Self-setting frequency F1	0.00-max frequency	1.00Hz	○	0x80

					2
F8.03	Self-setting voltage V2	0.0~100.0%	28.0%	○	0x80 3
F8.04	Self-setting frequency F2	0.00-max frequency	10.00Hz	○	0x80 4
F8.05	Self-setting voltage V3	0.0~100.0%	55.0%	○	0x80 5
F8.06	Self-setting frequency F3	0.00-max frequency	25.00Hz	○	0x80 6
F8.07	Self-setting voltage V4	0.0~100.0%	78.0%	○	0x80 7
F8.08	Self-setting frequency F4	0.00-max frequency	37.50Hz	○	0x80 8
F8.09	Self-setting voltage V5	0.0~100.0%	100.0%	○	0x80 9
F8.10	Self-setting frequency F5	0.00-max frequency	50.00Hz	○	0x80 A
F8.11	Output voltage percentage	25.0~120.0%	100.0%	○	0x80 B
F8.12	Torque boost	0.0~30.0%	0.0%	●	0x80 C
F8.13	Torque boost cut-off frequency	0.0~100.0%	100.0%	●	0x80 D
F8.14	Slip compensation gain	0.0~200.0%	100.0%	●	0x80 E
F8.15	Slip compensation limit	0.0~300.0%	100.0%	●	0x80 F
F8.16	Slip compensation filter time	0.000~6.000s	0.200s	●	0x81 0
F8.17	Surge suppression gain	0.0~900.0%	100.0%	●	0x81 1

F8.18	Reserved				0x81 2
F8.19	Auto energy saving control	0: Off 1: On	0	○	0x81 3
F8.20	Energy saving frequency lower limit	0.0~50.00Hz	15.00Hz	○	0x81 4
F8.21	Energy saving voltage lower limit	20.0~100.0%	50.0%	○	0x81 5
F8.22	Energy saving voltage regulation rate	0.000~0.200V/MS	0.010V/M S	●	0x81 6
F8.23	Energy saving voltage recovery rate	0.000~2.000V/MS	0.200V/M S	●	0x81 7
F8.24	Reserved				0x81 8
F8.25	Reserved				0x81 9
F8.26	Reserved				0x81 A
F8.27	Reserved				0x81 B
F8.28	Reserved				0x81 C
F8.29	Reserved				0x81 D
F8.30	Output voltage source of voltage-frequency separation	0: function code F8.31 setting given 1: Keyboard potentiometer given 2: Analog VS given 3: Analog AI given 4: Analog AS given 5: Pulse PUL given 6: PID output given 7:RS485 communication given 8: Optional card	0	●	0x81 E

F8.31	Output voltage of voltage-frequency separation number setting	0.0~100.0%	0.0%	●	0x81 F
F8.32	Output voltage of voltage-frequency separation ACC time	0.0~100.00s	10.00s	●	0x82 0
F8.33	Output voltage of voltage-frequency separation DEC time	0.0~100.00s	10.00s	●	0x82 1
F8.34	Voltage-frequency separation stop model	0: Output voltage and frequency ACC/DEC no interaction 1: Output voltage down to 0V, then output frequency start to decrease	0	●	0x82 2
F8.35-F 8.38	Reserved				

Protection and Malfunction Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
FA.00	OC suppression function	0: Suppression valid 1: ACC/DEC valid, constant speed invalid	0	●	0xA0 0
FA.01	OC suppression point	0.0 ~ 300.0%	160.0%	●	0xA0 1
FA.02	OC suppression gain	0.0 ~ 500.0%	100.0%	●	0xA0 2
FA.03	Current hardware protection settings	LED "0" digit: (CBC) 0: Off 1: On LED "00" digit: OC protection disturbing suppression 0: Off 1: First grade disturbing suppression 2: Second grade disturbing suppression	0001	○	0xA0 3

		LED “000” digit: SC protection First grade disturbing suppression 0: Off 1: First grade disturbing suppression 2: Second grade disturbing suppression LED “0000” digit: Reserved			
FA.04	Reserved				0xA0 4
FA.05	Bus over voltage hardware protection	0: Off 1: On	1	○	0xA0 5
FA.06	Bus over voltage suppression protection	LED “0” digit: Over voltage suppression control 0: Prohibited 1: Valid in DEC 2: Valid both in ACC/DEC LED “00” digit: Overexcitation control 0: Off 1: On LED “000” digit: Reserved LED “0000” digit: Reserved	0012	○	0xA0 6
FA.07	Bus over voltage suppression point	110.0 ~ 150.0%	128.0%	※	0xA0 7
FA.08	Bus over voltage suppression gain	0.0 ~ 500.0%	100.0%	●	0xA0 8
FA.09	Bus under voltage suppression function	0: Prohibited 1: Valid	0	○	0xA0 9
FA.10	Bus under voltage suppression point	60.0 ~ 90.0%	80.0%	※	0xA0 A
FA.11	Bus under voltage suppression gain	0.0 ~ 500.0%	100.0%	●	0xA0 B
FA.12	Bus under voltage protection point	60.0 ~ 90.0%	60.0%	※	0xA0 C

FA.13	Reserved				0xA0 D
FA.14	Short-circuit detection after power up to ground	0: Off 1: On	0	○	0xA0 E
FA.15	Loss phase protect	LED “0” digit: Output loss phase protection 0: Off 1: On LED “00” digit: Input loss phase protection 0: Off 1: Open the alarm 2: Open the fault LED “000” digit: Reserved LED “0000” digit: Reserved	0011	○	0xA0 F
FA.16	Motor overload protection curve coefficient	0.0~250.0%	100.0%	○	0xA1 0
FA.17	Load pre alarm detection setting	LED “0” digit: Detection selection (protection 1) 0: Not detected 1: Detected load is too large 2: Detected load is too large only at constant speed 3: Insufficient load detected 4: Insufficient load only at constant speed LED “00” digit: Alarm selection 0: Alarm and continue operation 1: Fault protection and free stop LED “000” digit: Detection selection (protection 2) 0: Not detected 1: Detected load is too large 2: Detected load is too large only at constant speed 3: Insufficient load detected 4: Insufficient load only at constant speed	0000	○	0xA1 1

		LED “0000” digit: Alarm selection 0: Alarm and continue operation 1: Fault protection and free stop			
FA.18	Load pre alarm detection level 1	0.0~200.0%	130.0%	○	0xA1 2
FA.19	Load pre alarm detection time 1	0.0~60.0s	5.0s	○	0xA1 3
FA.20	Load pre alarm detection level 2	0.0~200.0%	30.0%	○	0xA1 4
FA.21	Load pre alarm detection time 2	0.0~60.0s	5.0s	○	0xA1 5
FA.22	Reserved				0xA1 6
FA.23	Protection action when speed slip is too large	LED “0” digit: Detection selection 0: Not detected 1: Detected at constant speed 2: Detecting LED “00” digit: Alarm selection 0: Free stop and report fault 1: Alarm and continue operation LED “000” digit: Reserved LED “0000” digit: Reserved	0000	○	0xA1 7
FA.24	detection threshold when speed slip is too large	0.0~60.0%	10.0%	○	0xA1 8
FA.25	detection time when speed slip is too large	0.0~60.0s	2.0s	○	0xA1 9
FA.26	Rapid protection action	LED “0” digit: Detection selection 0: Not detected 1: Detected at constant speed 2: Detecting LED “00” digit: Alarm selection	0000	○	0xA1 A

		0: Free stop and report fault 1: Alarm and continue operation LED “000” digit: Reserved LED “0000” digit: Reserved			
FA.27	Rapid detection threshold	0.0~150.0%	110.0%	○	0xA1 B
FA.28	Rapid detection time	0.000~2.000s	0.010s	○	0xA1 C
FA.29	Reserved				0xA1 D
FA.30	Reserved				0xA1 E
FA.31	Reserved				0xA1 F
FA.32	Reserved				0xA2 0
FA.33	Reserved				0xA2 1
FA.34	Reserved				0xA2 2
FA.35	Reserved				0xA2 3
FA.36	Reserved				0xA2 4
FA.37	Malfunction self-recovery times	0~5	0	○	0xA2 5
FA.38	Malfunction self-recovery interval	0.1~100.0s	1.0s	○	0xA2 6
FA.39	Malfunction diagnosis information	See fault information code table	--	×	0xA2 7

FA.40	Malfunction types	See fault information code table	--	×	0xA2 8
FA.41	Malfunction running frequency	0.00~Max frequency	--	×	0xA2 9
FA.42	Malfunction output voltage	0~1500V	--	×	0xA2 A
FA.43	Malfunction output current	0.1~2000.0A	--	×	0xA2 B
FA.44	Malfunction bus voltage	0~3000V	--	×	0xA2 C
FA.45	Malfunction module temperature	0~100℃	--	×	0xA2 D
FA.46	Malfunction machine state	<p>LED “0” digit: Running direction 0: FWD 1: REV</p> <p>LED “00” digit: Running status 0: Stop 1: ACC 2: DEC 3: Constant speed</p> <p>LED “000” digit: Reserved LED “0000” digit: Reserved</p>	--	×	0xA2 E
FA.47	Malfunction input terminal status	See input terminal chart	--	×	0xA2 F
FA.48	Malfunction output terminal status	See output terminal chart	--	×	0xA3 0
FA.49	The last malfunction types	Please see malfunction code table	--	×	0xA3 1
FA.50	The last malfunction running frequency	0.00~Max frequency	--	×	0xA3 2
FA.51	The last malfunction output voltage	0~1500V	--	×	0xA3 3

FA.52	The last malfunction output current	0.1~2000.0A	--	×	0xA3 4
FA.53	The last malfunction bus voltage	0~3000V	--	×	0xA3 5
FA.54	The last malfunction module temperature	0~100℃	--	×	0xA3 6
FA.55	The last machine state	<p>LED “0” digit: Running direction 0: FWD 1: REV</p> <p>LED “00” digit: Running status 0: Stop 1: Constant speed 2: ACC 3: DEC</p> <p>LED “000” digit: Reserved LED “0000” digit: Reserved</p>	--	×	0xA3 7
FA.56	The last malfunction input terminal state	See input terminal chart	--	×	0xA3 8
FA.57	The last malfunction output terminal state	See output terminal chart	--	×	0xA3 9
FA.58	The first two malfunction types	Please see malfunction code table	--	×	0xA3 A
FA.59	The first three malfunction types	Please see malfunction code table	--	×	0xA3 B

PID Process Control Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
Fb.00	PID controller given signal source	0: Keyboard digit PID given 1: Keyboard potentiometer given 2 :Terminal VS voltage analog given 3: Terminal AI voltage and	0	•	0xB0 0

		current analog given 4: Terminal AS current analog given 5: Terminal pulse PUL given 6: RS485 communication given 7: Optional card 8: Terminal selection			
Fb.01	Keyboard digit PID given/feedback	0.00~100.0%	50.0%	•	0xB0 1
Fb.02	PID given changing time	0.00~60.00s	1.00s	•	0xB0 2
Fb.03	PID controller feedback signal source	0: Keyboard digit PID given 1: Keyboard potentiometer given 2 :Terminal VS voltage analog given 3: Terminal AI voltage and current analog given 4: Terminal AS current analog given 5: Terminal pulse PUL given 6: RS485 communication given 7: Optional card 8: Terminal selection	2	•	0xB0 3
Fb.04	Feedback signal filter time	0.000~6.000s	0.010s	•	0xB0 4
Fb.05	Feedback signal gain	0.00~10.00	1.00	•	0xB0 5
Fb.06	Given and feedback range	0~100.0	100.0	•	0xB0 6
Fb.07	PID control selection	LED “0”digit: Feedback feature selection 0: Positive feature 1: Negative feature LED “00”digit: Reserved LED “000”digit: Reserved LED “0000”digit: Differential adjustment properties 0 : Differential of deviation 1 : Differential of feedback	0100	•	0xB0 7

Fb.08	PID preset output	0.0~100.0%	100.0%	•	0xB0 8
Fb.09	PID preset output running time	0.0~6500.0s	0.0s	•	0xB0 9
Fb.10	PID control deviation limit	0.0~100.0%	0.0%	•	0xB0 A
Fb.11	Proportional gain P1	0.000~8.000	0.100	•	0xB0 B
Fb.12	Integral time I1	0.0~600.0s	1.0s	•	0xB0 C
Fb.13	Differential gain D1	0.000~6.000s	0.000s	•	0xB0 D
Fb.14	Proportional gain P2	0.000~8.000	0.100	•	0xB0 E
Fb.15	Integral time I2	0.0~600.0s	1.0s	•	0xB0 F
Fb.16	Differential gain D2	0.000~6.000s	0.000s	•	0xB1 0
Fb.17	PID parameter switching condition	0: Not switch 1: Use DI terminal to switch 2: Switch according to deviation	0	•	0xB1 1
Fb.18	Low value of switching deviation	0.0~100.0%	20.0%	•	0xB1 2
Fb.19	High value of switching deviation	0.0~100.0%	80.0%	•	0xB1 3
Fb.20	Reserved				0xB1 4
Fb.21	Differential limit	0.0~100.0%	5.0%	•	0xB1 5
Fb.22	PID output upper limit	0.0~100.0%	100.0%	•	0xB1 6
Fb.23	PID output lower limit	-100.0~Fb.19	0.0%	•	0xB1

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Fb.24	PID output filter time	0.000~6.000s	0.000s	•	0xB1 8
Fb.25	Feedback wire break detection time	0.0~120.0s	1.0s	•	0xB1 9
Fb.26	Feedback wire break action selection	0: Go on PID operation without alarm 1: Stop and alarm malfunction 2: Go on PID operation and output alarm signal 3: Run at the current frequency and output alarm signal	0	•	0xB1 A
Fb.27	Wire break alarm upper limit	0.0~100.0%	100.0%	•	0xB1 B
Fb.28	Wire break alarm lower limit	0.0~100.0%	0.0%	•	0xB1 C
Fb.29	Closed-loop suspend detection threshold	0.0~100.0%	0.0%	•	0xB1 D
Fb.30	Closed-loop suspend detection time	0.0~600.0s	1.0s	•	0xB1 E
Fb.31	Reserved				0xB1 F

Multi-Speed and PLC Function Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
FC.00	PLC Speed 1	0.00~Max frequency	10.00Hz	•	0xC0 0
FC.01	PLC Speed 2	0.00~Max frequency	20.00Hz	•	0xC0 1
FC.02	PLC Speed 3	0.00~Max frequency	30.00Hz	•	0xC0 2
FC.03	PLC Speed 4	0.00~Max frequency	40.00Hz	•	0xC0

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FC.04	PLC Speed 5	0.00~Max frequency	50.00Hz	•	0xC0 4
FC.05	PLC Speed 6	0.00~Max frequency	40.00Hz	•	0xC0 5
FC.06	PLC Speed 7	0.00~Max frequency	30.00Hz	•	0xC0 6
FC.23	PLC Speed 8	0.00~Max frequency	20.00Hz	•	0xC0 7
FC.08	PLC Speed 9	0.00~Max frequency	10.00Hz	•	0xC0 8
FC.09	PLC Speed 10	0.00~Max frequency	20.00Hz	•	0xC0 9
FC.10	PLC Speed 11	0.00~Max frequency	30.00Hz	•	0xC0 A
FC.11	PLC Speed 12	0.00~Max frequency	40.00Hz	•	0xC0 B
FC.12	PLC Speed 13	0.00~Max frequency	50.00Hz	•	0xC0 C
FC.13	PLC Speed 14	0.00~Max frequency	40.00Hz	•	0xC0 D
FC.14	PLC Speed 15	0.00~Max frequency	30.00Hz	•	0xC0 E

FC.15	PLC running mode selection	<p>LED “0” digit: cycle mode 0: Stop after single cycle 1: Continuous cycles 2: Keep final value after single cycle</p> <p>LED “00” digit: Time unit 0: second 1: minute 2: hour</p> <p>LED “000” digit: Power down memory mode 0: not saved 1: save</p> <p>LED “0000” digit: Start-up mode 0: Restart from the 1st stage 1: Restart from the stop stage 2: Continue from the time when stop</p>	0000	•	0xC0 F
FC.16	PLC 1st Step running time	0.0~6500.0(s/m/h)	10.0	•	0xC1 0
FC.17	PLC 2nd Step running time	0.0~6500.0(s/m/h)	10.0	•	0xC1 1
FC.18	PLC 3rd Step running time	0.0~6500.0(s/m/h)	10.0	•	0xC1 2
FC.19	PLC 4th Step running time	0.0~6500.0(s/m/h)	10.0	•	0xC1 3
FC.20	PLC 5th Step running time	0.0~6500.0(s/m/h)	10.0	•	0xC1 4
FC.21	PLC 6th Step running time	0.0~6500.0(s/m/h)	10.0	•	0xC1 5
FC.22	PLC 7th Step running time	0.0~6500.0(s/m/h)	10.0	•	0xC1 6
FC.23	PLC 8th Step running time	0.0~6500.0(s/m/h)	10.0	•	0xC1 7
FC.24	PLC 9th Step running time	0.0~6500.0(s/m/h)	10.0	•	0xC1 8
FC.25	PLC 10th Step running time	0.0~6500.0(s/m/h)	10.0	•	0xC1

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FC.26	PLC 11th Step running time	0.0~6500.0(s/m/h)	10.0	•	0xC1 A
FC.27	PLC 12th Step running time	0.0~6500.0(s/m/h)	10.0	•	0xC1 B
FC.28	PLC 13th Step running time	0.0~6500.0(s/m/h)	10.0	•	0xC1 C
FC.29	PLC 14th Step running time	0.0~6500.0(s/m/h)	10.0	•	0xC1 D
FC.30	PLC 15th Step running time	0.0~6500.0(s/m/h)	10.0	•	0xC1 E
FC.31	PLC 1st Step direction and ADD/DEC time	LED "0" digit: this step run direction 0: FWD 1: REV LED "00" digit: ACC/DEC time in this step 0: ACC/DEC time 1 1: ACC/DEC time 2 2: ACC/DEC time 3 4: ACC/DEC time 4 LED "000" digit: reserved LED "0000" digit: reserved	0000	•	0xC1 F
FC.32	PLC 2nd Step direction and ADD/DEC time		0000	•	0xC2 0
FC.33	PLC 3rd Step direction and ADD/DEC time		0000	•	0xC2 1
FC.34	PLC 4th Step direction and ADD/DEC time		0000	•	0xC2 2
FC.35	PLC 5th Step direction and ADD/DEC time		0000	•	0xC2 3
FC.36	PLC 6th Step direction and ADD/DEC time		0000	•	0xC2 4
FC.37	PLC 7th Step direction and ADD/DEC time		0000	•	0xC2 5
FC.38	PLC 8th Step direction and ADD/DEC time		0000	•	0xC2 6
FC.39	PLC 9th Step direction and ADD/DEC time		0000	•	0xC2 7
FC.40	PLC 10th Step direction and ADD/DEC time		0000	•	0xC2 8

FC.41	PLC 11th Step direction and ADD/DEC time		0000	•	0xC29
FC.42	PLC 12th Step direction and ADD/DEC time		0000	•	0xC2A
FC.43	PLC 13th Step direction and ADD/DEC time		0000	•	0xC2B
FC.44	PLC 14th Step direction and ADD/DEC time		0000	•	0xC2C
FC.45	PLC 15th Step direction and ADD/DEC time		0000	•	0xC2D
FC.46	Reserved				0xC2E
FC.47	Reserved				0xC2F
FC.48	Reserved				0xC30
FC.49	Swing frequency control	0: invalid 1:valid	0	•	0xC31
FC.50	Swing frequency amplitude control	0:Relative to center frequency 1:Relative to max frequency	0	•	0xC32
FC.51	Reserved				0xC33
FC.52	Swing frequency amplitude	0.0~100.0%	10.0%	•	0xC34
FC.53	Jump frequency amplitude	0.0~50.0%	10.0%	•	0xC35
FC.54	Swing frequency rising time	0.00~650.00s	5.00s	•	0xC36
FC.55	Swing frequency falling time	0.00~650.00s	5.00s	•	0xC37
FC.56	Reserved				0xC38

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Communication Control Function Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
Fd.00	Main-slave machine selection	LED “0” digit: Modbus main-slave machine selection 0: Main machine 1: Slave machine LED “00” digit: reserved LED “000” digit: reserved LED “0000” digit: reserved	0000	<input type="radio"/>	0xD0 0
Fd.01	485 communication address	1~247	1	<input type="radio"/>	0xD0 1
Fd.02	Communication baud rate selection	LED “0” digit: 485 communication 0: 1200 bps 1: 2400 bps 2: 4800 bps 3: 9600 bps 4: 19200 bps 5: 38400 bps LED “00” digit: reserved LED “000” digit: reserved LED “0000” digit: reserved	0003	<input type="radio"/>	0xD0 2
Fd.03	Modbus data format	0: (N,8,1) no checkout, Data digit: 8, Stop digit: 1 1: (E,8,1) even checkout, Data digit: 8, Stop digit: 1 2: (O,8,1) odd checkout, Data digit: 8, Stop digit: 1 3: (N,8,2) no checkout, Data digit: 8, Stop digit: 2 4: (E,8,2) even checkout, Data digit: 8, Stop digit: 2 5: (O,8,2) odd checkout, Data digit: 8, Stop digit: 2	0	<input type="radio"/>	0xD0 3
Fd.04	Communication ratio setting	0.00~5.00	1.00	<input checked="" type="radio"/>	0xD0

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Fd.05	Modbus communication answer delay	0~500ms	0ms	•	0xD0 5
Fd.06	Modbus communication overtime fault time	0.1~100.0s	1.0s	•	0xD0 6
Fd.07	Modbus communication fault action mode selection	0: No checkout overtime fault 1: Alarm and stop freely 2: Alarm, go on running 3: Forced outage	0	•	0xD0 7
Fd.08	Modbus transmission response dispose	0: Write operation with response 1: Write operation without response	0	•	0xD0 8
Fd.09	Main machine sending selection	<p>LED“0”digit: the first group transmitting frame selection</p> <p>0: Invalid 1: Main machine run command 2: Main machine given frequency 3: Main machine output frequency 4: Main machine upper limit frequency 5: Main machine given torque 6: Main machine output torque 7: Torque control FWD speed limit 8: Torque control REV speed limit 9: Main machine given PID A: Main machine feedback PID B: Reserved</p> <p>LED ”00” digit: the second group transmitting frame selection</p> <p>Same as above</p> <p>LED “000” digit: the third group transmitting frame selection</p> <p>Same as above</p> <p>LED “0000” digit: the fourth group transmitting frame selection</p> <p>Same as above</p>	0031	•	0xD0 9

Fd.10	RS485 communication port configuration	0: Modbus communication 1: serial ports communication 2: reserved	0	●	0xD0A
Fd.11	Reserved				0xD0B
Fd.12	Reserved				0xD0C
Fd.13	Reserved				0xD0D
Fd.14	LAN 1st level address	Setting range: 0~9999	0	●	0xD0E
Fd.15	LAN 2nd level address	Setting range: 0~9999	0	●	0xD0F

Monitor Code

Access 'C' parameter group by pressing 'PRG' for more than 2s; check out the current state of inverter.

NO.	Function name	Range of settings and definition	Address
C-00	Given frequency	0.01Hz	2100H
C-01	Output frequency	0.01Hz	2101H
C-02	Output current	0.1A	2102H
C-03	Input voltage	0.1V	2103H
C-04	Output voltage	0.1V	2104H
C-05	Machine speed	1RPM	2105H
C-06	Given torque	0.1%	2106H
C-07	Output torque	0.1%	2107H
C-08	PID given value	0.1%	2108H
C-09	PID feedback value	0.1%	2109H
C-10	Output power	0.1%	210AH
C-11	Bus voltage	0.1V	210BH
C-12	Module temperature 1	0.1°C	210CH
C-13	Module temperature 2	0.1°C	210DH
C-14	Input terminal X on state	See input terminal diagram	210EH
C-15	Output terminal Y on state	See output terminal diagram	210FH
C-16	Analog VS input value	0.001V	2110H
C-17	Analog AI input value	0.001V/0.001mA	2111H
C-18	Analog AS input value	0.001mA	2112H
C-19	Impulse signal PUL input	0.001kHz	2113H
C-20	Analog output AO1	0.01V	2114H
C-21	Analog output AO2	0.01V/0.01mA/0.01kHz	2115H
C-22	Counting value of counter		2116H
C-23	Running time after electrifying	0.1h	2117H
C-24	Local accumulative running time	Hour	2118H
C-25	Inverter power class	kW	2119H
C-26	Inverter rated voltage	V	211AH
C-27	Inverter rated current	A	211BH
C-28	Software version		211CH
C-29	PG feedback frequency	0.01Hz	211DH

C-30	Extended terminal input state	See input terminal diagram	211EH
C-31	Extended terminal output state	See output terminal diagram	211FH
C-32	Reserved		2120H
C-33	Reserved		2121H
C-34	Reserved		2122H
C-35	Counted time of timer	sec/min/h	2123H
C-36	Fault pre alarm code		2124H
C-37	Total power consumption (low position)	1°	2125H
C-38	Total power consumption (high position)	10000°	2126H
C-39	Power factor angle	1°	2127H

10.2 Appendix 2: Modbus Communication Protocol

● Introduction

The AC200 series frequency inverter is equipped with the RS485 communication interface and the ModBus communication protocol of international standard is adopted for master-slave communication. Users can realize centralized control by PC/PLC, upper machine, master station frequency inverter etc (Setting of the frequency inverter control command, running frequency, relative function parameters modification, frequency inverter working state and malfunction information monitoring etc.) to adapt to specific application requirements.

● Application Methods

1. AC200 series frequency inverter is connected to “single host and multi slave machines” control network with RS485 master line. Slave machine do not response when host machine order with broadcast (slave machine address is 0).
2. AC200 only provides RS485 interface, asynchronous half-duplex. When the communication interface of the external equipment is RS232, RS232/RS485 converter should be added.
3. This ModBus serial communication protocol defines the asynchronous transfer information content and formats used in the serial communication, which can be divided into RUT and ASCII mode. AC100 is RTU (remote terminal unit) mode.

● Communication Frame Structure

Communication data format is as follows:

The byte composition: Including initiation bit, 8 data bit, check bit and stop bit.

Initiation Bit	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7	Bit8	Check bit	Stop bit
----------------	------	------	------	------	------	------	------	------	-----------	----------

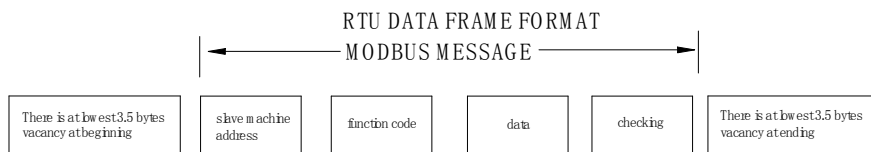
One frame message must be transmitted as a continued data flow, and if there is a interval over 1.5 byte before ending, the receiving equipment will clear the half-baked information. And the next byte will be considered as the address field of a new frame. Similarly, if the interval between a new frame start-up and the former frame is smaller than 3.5 byte time, the receiving equipment will consider that it is the continuation of former one frame. Since the jumbled frame, the final CRC checking value is incorrect, which would lead to the communication mistake.

Standard Structure of RTU Frame:

Frame Start	Transmission time of 3.5 bytes
Slave machine address	Communication address: 0~247 (decimal) (0 is the broadcast address)
Command code	03H: read slave machine parameter 06H: write slave machine parameter 08H: circuit auto-detection
Data area	parameter address, parameter number, parameter values
CRC CHK low-order	Detecting value: 16 bit CRC checking value
CRC CHK high-order	
Frame ending	transmission time of 3.5 bytes

In RTU mode, it always begins with transmission time pause gap of at least 3.5 bytes. The successive order of the following transmission data domains: slave machine address、operation command code, data and CRC checking word. Transmission byte of each domain is hexadecimal

0...9, A...F. Network equipment detects the network bus unceasingly, including the pause gap time. When receiving the first domain (address information), each network equipment would carry out decoding to judge whether the byte is sent to itself. When the final byte transmission is completed, there will be an at least 3.5 bytes transmission time pause gap to indicate that this frame is over. Then a new information transmission can start.



● Command Code and Communication Data Description

Command code: 03 H, read N words (Word), continuously read 20 words at most.

For example: The frequency inverter whose slave machine address is 01 H, memory initial address is 2100H [(C-00)], read continuously 3 words, then the structure of that frame is described as follows:

RTU host machine command information

START	Transmission time of 3.5 bytes
Slave machine address	01H
Command code	03H
Start address high-order	21H
Start address low-order	00H
Data number high-order	00H
Data number low-order	03H
CRC CHK low-order	0FH
CRC CHK high-order	F7H
END	Transmission time of 3.5 bytes

RTU Slave Machine Responding Information (normal)

START	Transmission time of 3.5 bytes
Slave machine address	01H
Command code	03H
Byte number low-order	06H
Data address 2100H high-order	13H
Data address 2100H low-order	88H
Data address 2101H high-order	00H
Data address 2101H low-order	00H
Data address 2102H high-order	00H
Data address 21021H low-order	00H
CRC CHK low-order	90H
CRC CHK high-order	A6H
END	Transmission time of 3.5 bytes

Slave Machine Responding Information (abnormal)

START	Transmission time of 3.5 bytes
Slave machine address	01H

Command code	83H
Error code	04H
CRC CHK low-order	40H
CRC CHK high-order	F3H
END	Transmission time of 3.5 bytes

Command code: 06H, write a word (Word)

Function: write a word data in the designated data address. It can be used to revise the frequency inverter parameters.

For instance: 5000 (1388 H) is written into the 3000H address of slave frequency inverter with address 1. Then the structure of this frame is described as follows:

RTU Host Machine Order Information

START	Transmission time of 3.5 bytes
Slave machine address	01H
Command code	06H
Write data address high-order	30H
Write data address low-order	00H
Data content high-order	13H
Data content low-order	88H
CRC CHK low-order	8BH
CRC CHK high-order	9CH
EBD	Transmission time of 3.5 bytes

RTU Slave Machine Responding Information (normal)

START	Transmission time of 3.5 bytes
Slave machine address	01H
Command code	06H
Write data address high-order	30H
Write data address low-order	00H
Data content high-order	13H
Data content low-order	88H
CRC CHK low-order	8BH
CRC CHK high-order	9CH
EBD	Transmission time of 3.5 bytes

RTU Slave Machine Responding Information (abnormal)

START	Transmission time of 3.5 bytes
Slave machine address	01H
Command code	86H
Error code	01H
CRC CHK low-order	83H
CRC CHK high-order	A0H
END	Transmission time of 3.5 bytes

Command code: 08H, circuit auto-detection

Function: Send back the responding information of slave machine which is identical with the host

machine command information. It is used to check whether the signal transmission between the host machine and slave machine is normal or not. The checking code and the data can be set freely.

RTU Host Machine Command Information

START	Transmission time of 3.5 bytes
Slave machine address	01H
Command code	08H
Detecting code high-order	00H
Detecting code low-order	00H
Data high-order	13H
Data low-order	88H
CRC CHK low-order	EDH
CRC CHK high-order	5DH
END	Transmission time of 3.5 bytes

RTU Slave Machine Responding Information (normal)

START	Transmission time of 3.5 bytes
Slave machine address	01H
Command code	08H
Detecting code high-order	00H
Detecting code low-order	00H
Data high-order	13H
Data low-order	88H
CRC CHK low-order	EDH
CRC CHK high-order	5DH
END	Transmission time of 3.5 bytes

RTU Slave Machine Responding Information (abnormal)

START	Transmission time of 3.5 bytes
slave machine address	01H
Command code	88H
Error code	03H
CRC CHK low-order	06H
CRC CHK high-order	01H
END	Transmission time of 3.5 bytes

Communication frame error check mode

The standard MODBUS serial network adopts two kinds of error check mode: odd/even checking which is used to check every character and CRC detecting which is used to check one frame data.

1. Odd-even Checking

Users can configure the controller with odd or even checking, or no checking, which will affect the setting of odd/even checking in every character.

If odd /even checking has been specified, "1" bit will be accounted to the bit number of each character (7 bits in ASCII mode, 8 bits in RTU). For instance, the RTU character frame contains the following 8 bits: 1 1 0 0 0 1 0 1

There are 4 bits with number "1". If using the even checking, odd/even checking bit of the frame will be 0, then there are still 4 bits with number "1". If using odd checking, odd/even checking bit of the frame will be 1, then there are 5 bits with number "1".

If odd/even checking has not been specified, there will be no checking bit during the transmission, and no checking detection. One additional stop bit will be filled into the character frame in transmission.

2. CRC-16 (cyclic redundancy checking)

When the RTU frame form in use; the frame has included the frame error detecting domain which calculates base on the CRC method. The CRC domain checks the content of the entire frame. The CRC domain is two bytes, containing binary values of 16 bits. It is added to the frame after calculated by the transmission equipment. The receiving equipment calculates CRC who receives frame again, and compares it with the value of the receiving CRC domain. If both CRC value are not equal, it means the transmission is wrong.

CRC is firstly stored in 0xFFFF. Then a program is used to process the continuous 6 or above bytes in the frame and the value of current registers. Only 8 Bit in every character is valid to CRC. Start bit, stop bit and parity check bit are invalid.

In the producing process of CRC, each 8 characters independently XOR with register content. The result moves to the lowest effective bit, and then the highest effective bit is filled by "1". LSB is extracted to be detected. If LSB is 1, the register independently XOR with the present value; If LSB is 0, XOR is not needed. This entire process needs to repeat for 8 times. After the last bit (the eighth bit) is accomplished, next 8 bits byte will independently XOR with register content. All the final bytes in the frame are CRC value after processing.

This CRC calculation method adopts the international standard CRC checking rule. Users can consult the relevant standard CRC operation when editing the CRC algorithm to compile required CRC calculation program.

Now here provide the user a simple CRC operation function (C language programming):

```
unsigned int crc_chk_value(unsigned char *data_value, unsigned char length)
{
    unsigned int crc_value=0xFFFF;
    int i;
    while(length--)
    {
        crc_value^=*data_value++;
        for(i=0;i<8;i++)
        {
            if(crc_value&0x0001)
            {
                crc_value=(crc_value>>1)^0xa001;
            }
            else
            {
                crc_value=crc_value>>1;
            }
        }
    }
}
```



```

return(crc_value);
}

```

●Communication Data Address Definition

This part is about the address definition of communication data, used to control the frequency inverter running and obtain the mode information and relevant function parameter setting of the frequency inverter.

(1)AC200 Series Function Parameter Address Expressing Rules

Take the frequency inverter function parameter serial numbers as the register address which are divided into the high byte and the low byte. The high byte represents the function parameter group serial numbers. The low byte represents the inner serial numbers of each function parameter group. All need to be changed to hexadecimal.

High byte definition of address domain:

Parameter Code No	Head Address of This Group Parameter
F0 basic parameter group	0x0000 (not saved in to EEPROM) 0x1000 (saved in to EEPROM)
F1 running control parameter group	0x0100 (not saved in to EEPROM) 0x1100 (saved in to EEPROM)
F2 quantum digital terminal parameter group	0x0200 (not saved in to EEPROM) 0x1200 (saved in to EEPROM)
F3 quantum analog terminal parameter group	0x0300 (not saved in to EEPROM) 0x1300 (saved in to EEPROM)
F4 keyboard and display parameter group	0x0400 (not saved in to EEPROM) 0x1400 (saved in to EEPROM)
F5 motor parameter group	0x0500 (not saved in to EEPROM) 0x1500 (saved in to EEPROM)
F6 VC control parameter group	0x0600 (not saved in to EEPROM) 0x1600 (saved in to EEPROM)
F7 torque control parameter	0x0700 (not saved in to EEPROM) 0x1700 (saved in to EEPROM)
F8 V/F control parameter group	0x0800 (not saved in to EEPROM) 0x1800 (saved in to EEPROM)
F9 reserved	0x0900 (not saved in to EEPROM) 0x1900 (saved in to EEPROM)
FA malfunction protection parameter group	0x0A00 (not saved in to EEPROM) 0x1A00 (saved in to EEPROM)
Fb PID control parameter group	0x0B00 (not saved in to EEPROM) 0x1B00 (saved in to EEPROM)
FC multi-speed. PLC function and swing frequency parameter group	0x0C00 (not saved in to EEPROM) 0x1C00 (saved in to EEPROM)
Fd communication control parameter group	0x0D00 (not saved in to EEPROM) 0x1D00 (saved in to EEPROM)
FE reserved	0x0E00 (not saved in to EEPROM) 0x1E00 (saved in to EEPROM)
FF reserved	0x0F00 (not saved in to EEPROM) 0x1F00 (saved in to EEPROM)

C monitor parameter group	0x2100
Communication control parameter group	0x3000 or 0x2000

Note: since it is inevitable that the parameters are frequently rewritten during the communication, the lifetime of EEPROM would be shortened if frequently stored. As for the users, some functions are unnecessary to store in the communication mode, only changing the value of RAM inner value can satisfy the required use. When AC200 communication protocol stipulates to use writing command (06 H), if the parameter function code address domain's highest digit is 0, it only write in the RAM of the frequency inverter, and power down without storage; if the parameter function code address high half digit is 1, it write in EEPROM, which means power off storage.

For instance, when rewriting the function parameter [F0.14], if not depositing to EEPROM, address expresses for 000EH; if depositing to EEPROM, address expresses for 100EH.

(2)Communication Control Parameter Group Address Specification:

Function Specification	Address Definition	Data Meaning Specification		R/W Characteristic
Communication Given Frequency	0x3000 or 0x2000	0~32000 is corresponding to 0.00Hz~320.00Hz		W/R
Communication Order Setting	0x3001 or 0x2001	0000H: No order		W/R
		0001H: FWD running		
		0002H: REV running		
		0003H: FWD jog		
		0004H: REV jog		
		0005H: speed-down stop		
		0006H: freely stop		
		0007H: malfunction reset		
		0008H: Running forbidden command		
0009H: Running allowed command				
State of Inverter	0x3002 or 0x2002	Bit0	0: stop 1: running	R
		Bit1	0: non-accelerating state 1: ACC	
		Bit2	0: non-decelerating 1: DEC	
		Bit3	0: Forward 1: REV	
		Bit4	0: normal 1: fault	
		Bit5	0: GPRS unlocked 1: GPRS locked	
		Bit6	0: non-warning 1: warning	
Frequency Inverter Fault Code	0x3003 or 0x2003	current inverter fault code (refer to fault code table)		R
Communication Given Upper Frequency	0x3004 or 0x2004	0~32000 is corresponding to 0.00Hz~320.00Hz		W/R
Communication Given Torque	0x3005 or 0x2005	0~1000 is corresponding to 0.0~100.0%		W/R

Setting			
Communication Given Max Frequency in Torque Control FWD	0x3006 or 0x2006	0~1000 is corresponding to 0.0~100.0%	W/R
Communication Given Max Frequency in Torque Control REV	0x3007 or 0x2007	0~1000 is corresponding to 0.0~100.0%	W/R
Communication Given PID Setting	0x3008 or 0x2008	0~1000 is corresponding to 0.0~100.0%	W/R
Communication Given PID Feedback	0x3009 or 0x2009	0~1000 is corresponding to 0.0~100.0%	W/R
Voltage Frequency separation voltage value setting	0x300A or 0x200A	0~1000 is corresponding to 0.0~100.0%	W/R
Fault and warning code reading	0x3010 or 0x2010	0-63 is the fault code 64- is the warning code	R
Output terminal state	0x3010 or 0x2010	External borrowing inverter output terminal BII0 -- Y BIT1 -- TA1-TB1-TC1; BIT2 -- TA2-TB2-TC2	R
AO1 output	0x3021 or 0x2021	0-10000 corresponds output 0-10V,0-20mA	R
AO2 output	0x3022 or 0x2022	0-10000 corresponds output 0-10V,0-20mA,0-50kHz	R

List of fault code meanings for abnormal response information from slave machine:

Fault Code	Meanings
1	Order code fault
2	Reserved
3	CRC checking fault
4	Illegal address
5	Illegal data
6	Unable to modify when running
7	Reserved
8	Inverter busy (EEPROM is storing)
9	Value over limit
10	Reserved parameters can't be modify
11	Number of Bytes wrong when reading

10.3 Appendix 3: PG card manual

1. Summarize

AC200 PG feedback card is mainly used for VC frequency inverter (AC200 series) feedback of motor speed and direction detection signal to achieve higher accuracy of motor speed and direction control. Please choose PG card according to the corresponded encoder.

2. Types and selections of PG card

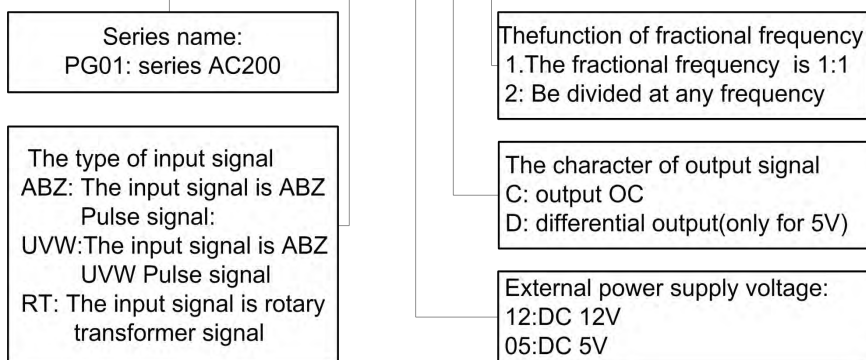
Products consist of incremental encoder PG and rotary transformer PG. Encoder input signal type and feedback card output signal type as follows;

Type	Support input signal type	Type of PG output signal;	Suitable motor type
Incremental encoder PG	1. Difference signal input 2. Open collector circuit input 3. Push-pull signal input	1. Open collector circuit input (frequency division / no division) 2. Difference signal output (frequency division / no division)	AM/PM
Rotary transformer PG	Rotary transformer signal input	None	AM/PM

3. Order model

Instructions of order model

PG01-ABZ-05-C 1



Ordering Notice

(1) Generally, the power supply of domestic encoder is 5V or 12V, and of aboard encoder is 5V. Please select appropriate power according to the encoder type.

(2) Resolution ratio, the number of output pulse per circle when encoder operates; Must meet the accuracy requirement of design and use. Please select the fractional frequency function according to the pulse signal receiving frequency.

(3) Select the PG card output signal receiving device according to the occasion requirement ,for example, monitoring equipment PLC choose output OC type. The other special equipment with anti interference demand could select differential output type.

Note:

(1) The recommended ordering model of incremental encoder PG card is PG01-ABZ-05-C1.Please refer to the ordering notice if you have the other requirements.

(2) The recommended ordering model of rotary encoder PG card is PG01-RT.Please refer to the ordering notice if you have the other requirements.

4. Incremental encoder PG instruction

4.1 product technical parameter

Power	Characteristic of input			Characteristic of output	
	Input signal	Respond frequency range	Input resistance	Output frequency range	Output current
5V/12V±5% 200mA	A B Z	0~300KHz	About 1000Ω	1-open collector circuit output:0~80KHz 2-Difference signal output: 0~300KHz	≤100mA
	U V W	0~100KHz			

4.2 Terminals function instruction

Terminals array of incremental encoder as follows:



4.3 Main signal terminals function instruction

Terminal definition	Terminal name	Instruction
Power	5/12V	Support maximum current output 200mA
	PE	Ground
Common terminal	COM	Power earth
Output side of PG	OA+	Difference output A +signal(reused as A signal while open collector circuit output)
	OA-	Difference output A -signal
	OB+	Difference output B+ signal(reused as B signal while open collector circuit output)

	OB-	Difference output B-signal
	OZ+	Difference output Z+ signal
	OZ-	Difference output Z-signal
Input side of encoder	A+	Encoder difference A signal input(push-pull and open collector circuit output both compatible)
	A-	
	B+	Encoder difference B signal input(push-pull and open collector circuit output both compatible)
	B-	
	Z+	Encoder difference Z signal input(push-pull and open collector circuit output both compatible)
	Z-	
	U+	Encoder difference U signal input(push-pull and open collector circuit output both compatible)
	U-	
	V+	Encoder difference V signal input(push-pull and open collector circuit output both compatible)
	V-	
	W+	Encoder difference W signal input(push-pull and open collector circuit output both compatible)
	W-	


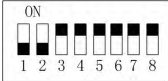
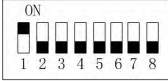

1. Input signals of A+,A-,B+,B- are two group orthogonal pulse. A group consists of opposite signals named A+ and A-. B group consists of opposite signals named B+ and B-.And both are orthogonal .Function is the same as open collector circuit and push-pull encoder.
2. Input terminal named Z+, Z- are zero position signals. Encoder will give one group of Z signals every circle.
3. Input signals named U+,U-,V+,V-,W+,W- are PM position detecting signals .Both of three groups have 120°angle.

Note: Terminals named OA+, OB- are reused as open collector circuit encoder input signals. But both used at the same time is forbidden

4.4 Switch terminals instruction

Switch terminals are 8 bits used as PG division frequency ratio. Ratio of division frequency is equal to 2 multiply binary system number what switch terminals stand for. When switch ON means invalid, expressed as"1", OFF means valid,expressed as "0". Examples as follows

Selection terminals when used as division frequency	CON4		$f_o=f_i$
			$f_o=f_i/2$

		 <p>ON</p> <p>1 2 3 4 5 6 7 8</p>	$f_o=f_i/4$
		 <p>ON</p> <p>1 2 3 4 5 6 7 8</p>	$f_o=f_i/6$
		...	
		 <p>ON</p> <p>1 2 3 4 5 6 7 8</p>	$f_o=f_i/508$
		 <p>ON</p> <p>1 2 3 4 5 6 7 8</p>	$f_o=f_i/510$

4.5 Related parameters

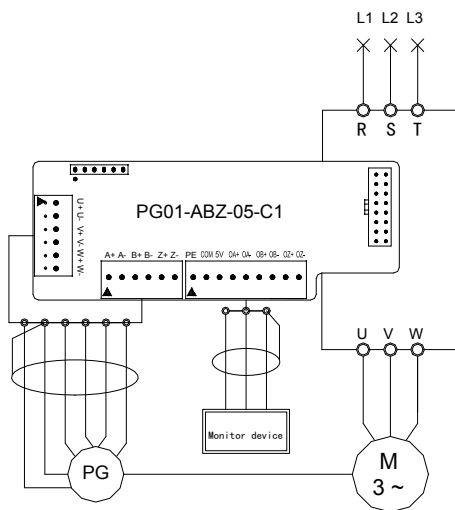
Please set parameters according to what you need. Related parameters as follows.

Function code	Name
F0.00	Control mode
F5.30	Speed feedback or encoder
F5.31	Numbers of pulse every

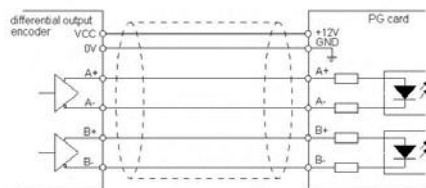
4.6 Note of connection

- 1, Signal cable should be separated from power cable, and parallel lines are forbidden.
- 2, Please select shielded cable used as signal wires in case of interference.
- 3, Encoder shielded cable should best connect to earth alone in case of interference.

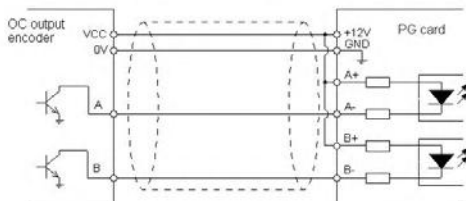
4.7 Wiring 1



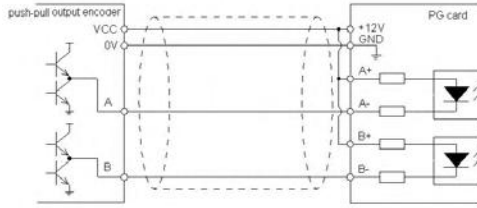
4.8 Application wiring



Differential output encoder wiring



OC output encoder wiring

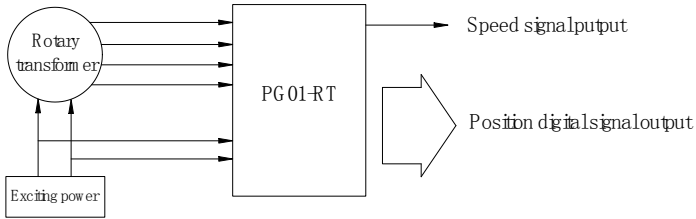


Push-pull output encoder wiring

5. Rotary transformer PG instruction

5.1 Function instruction

Output signals of rotary transformer are two phase orthogonal analog signals. Voltage of them is changing as sine and cosine curve following angle. Frequency is the same as exciting frequency



5.2 Instruction of terminals function

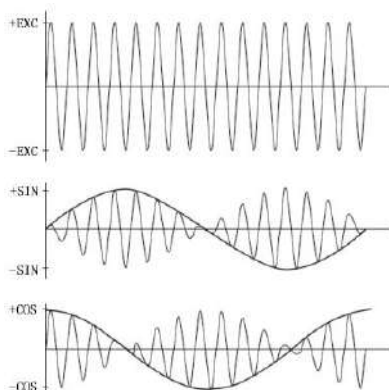
Terminals array of rotary transformer PG as follows:



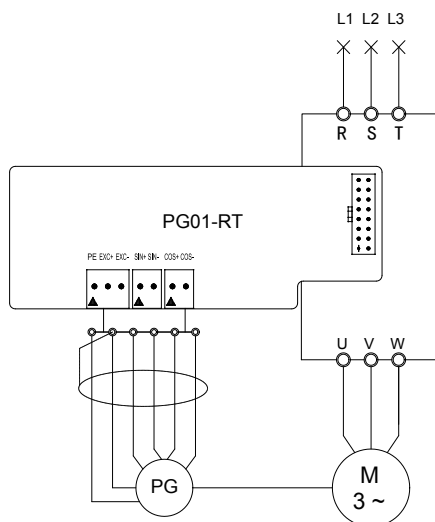
5.3 Main terminals instruction

Terminals definition	Terminals name	Instruction
output	PE	Earth
	EXC+	Driving source output
	EXC-	Driving source output
input	COS+	Cosine signals input
	COS-	
	SIN+	Sine signals input
	SIN-	

Waves below includes rotary transformer driving source, sine and cosine feedback. Enveloping lines of sine and cosine have the same frequency as exciting frequency



5.4 Wiring

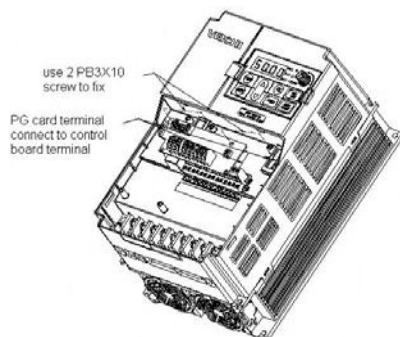


5.5 Note of connection

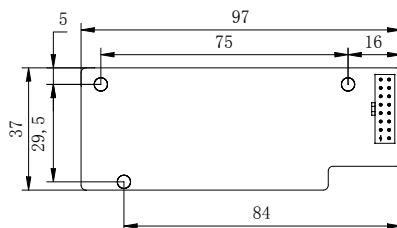
- 1, Signal cable should be separated from power cable, and parallel lines are forbidden
- 2, Please select shielded cable used as signal wires in case of interference .
- 3, Encoder shielded cable should best connect to earth (or the PE terminal of inverter) ,best single-ended earthing , in case of interference.

6. Installation size

6.1 Installation show



6.2 Installation size



10.4 Appendix 4: DP card manual

1. Profibus-DP card installation

Before installing please make sure switch off power supply, and wait until the power supply indicators LED is off. Profibus-DP card embed to inside of inverter, where under the removable cover. See Fig. 1-1.

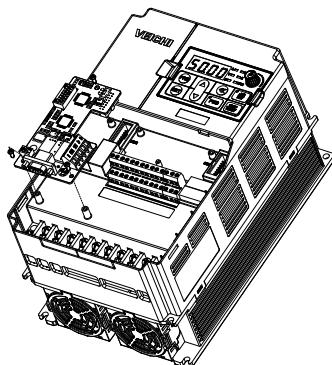


Fig.1-1 Profibus-DP card installation method

2. Profibus-DP card I/O describe

2.1 Product models describe

Product model	Product describe	Detail
ACDP03	AC200 standard Profibus-DP extension card	$5V \pm 5\%$ / specific interface
ACDP04	General Profibus-DP extension card	$24V \pm 10\%$ /out-sourcing connection line

2.2 Products connection schematic diagram

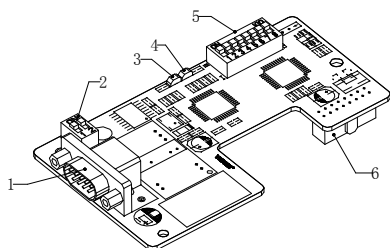


Fig. 2-1 ACDP03 connection

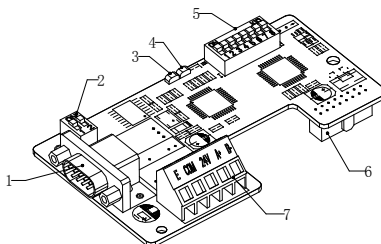


Fig. 2-2 ACDP04 connection

- 1: Profibus-DP connector
- 2: Inside terminal resistor selecting slide switch
- 3: Indicator LED D1
- 4: Indicator LED D2
- 5: Profibus-DP slaver address slide switch
- 6: Ports of ACDP03 communication with AC100

7: Ports of ACDP04 with Slaver equipment

3.Wiring

Profibus-DP adopts RS-485 physical transmission method. Please wiring with Profibus-DP standard cable to ensure communication system stable and reliable. The relationship of the transmission rate selecting of Profibus-DP standard cable between allowable maximum length as diagram showing:

Diagram Profibus-DP standard cable selecting transmission rate relationship with allowable maximum length

Bus speed rate	9.6	19.2	93.75	187.5	500	1500	6000	12000
cable A (m)	1200	1200	1200	1000	400	200	100	100
cable B (m)	1200	1200	1200	600	200	100	100	100

Profibus-DP standard connector, Fig 3-1.

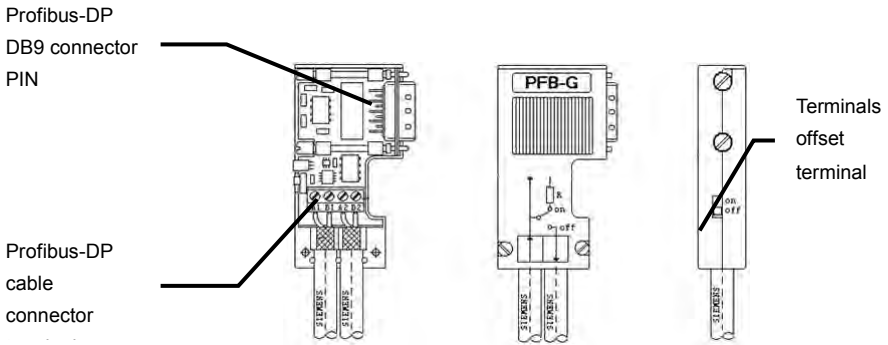


Fig 3-1, Profibus-DP standard connector

When configure PLC as Profibus-DP master, connect with 3 variable frequency inverter as slave devices as show Fig 3-2.



Fig 3-2 connection diagram

Note:

1. Please use multimeter to check PIN 3 (A data cable) of every connector of Profibus-DP connection is ON or not, and PIN 8 (B data cable) is ON or not. Place terminal offset resistor switch of both connecting connector to ON position (Or slide terminal switch of DP card for ON), Place terminal offset resistor switch of both connecting connector to OFF position (or slide terminal switch of DP card for OFF), please check resistor between data cable A and data cable B, it should be 110 Ω around.
2. Please make a good solution for anti interference. To avoid place cable of communication

parallel with power cable, ensure the cover of slave device and shield layer of communication cable share the same grounding. Ensure the E grounding terminal of DP card has good connecting with grounding terminals of VFD.

3. The maximum slots is 10, the setting number can't over this setting.
4. GSD document is available in the website: www.veichi.com

10.5 Appendix 5: LCD keyboard manual

1. Function characteristic

LCD keyboard is designed for user checking function parameters more directly. Language of LCD keyboard is Chinese, and is compatible with other LED keyboards designed by our company.

It can display two monitoring parameters at the same time when inverter stops or runs.

States of running, stop and fault all have vivid image that makes user to understand and remember states of inverter more conveniently.

It also has parameter copy and download functions, and can download parameters of same series inverter .It is convenient for user to change batch parameters

Potentiometer is also on the keyboard and used for changing given frequency

Note:

1. If special type inverter needs LCD keyboard, please contact with our company.
2. User must confirm that type of LCD keyboard and type of inverter are suited.

Software version of LCD	Type of inverters
KB10B	AC70
KB30B	AC80B
KB50B	AC80C
KB70B	AC100
KB90B	AC200

2. Monitor menu



Chart 1 (a) at stop state

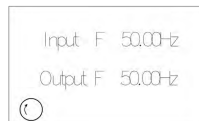


Chart1 (b) at FWD running state



Chart1 (c) at REV

running state

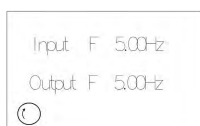


Chart1 (d) at JOG FWD state

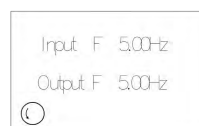


Chart1 (e) at JOG REV state

It can display two monitoring parameters and running or stop status every state of inverter, details refer to chart 1. User can select first -line monitoring parameters by **SET**, and select second-line monitoring parameters by **<<**. (Allowed to choose one of the fourth setting parameters) .

3. Shortcut menu



Chart 2 Shortcut menu

Please press **PRG** key long time to go into shortcut menu as chart 2. And user can check parameters by **▲** or **▼** key, pressing **PRG** or **SET** key to return back.

4. Parameters menu

(1) First level menu



Chart 3 first level menu



Chart 4 second level menu

Press **PRG** key into first level menu, and it can display three parameters. User can select anyone of them by press **▲** or **▼** key. Press **PRG** key to return back. Pressing **SET** key means selecting the item, and then return back.

(2) Second level menu

When using AC80 series in the first level menu, press **PRG** key to go into second level menu. When using AC60 series in main menu, press **PRG** key to go into menu. It displays first level menu items in first line, and displays second level menu items in second and third line. Position of cursor is factory default setting. Press **◀** key to replace items, Press **▲** or **▼** key to move cursor, Press **PRG** key to return, Pressing **SET** key means selecting the item, and then return back.

(3) Third level menu



Chart 5 (a) changing line



Chart 5 (b) data



Chart 5 (c)

group

After going into second level menu, press **PRG** key to go into third level menu. Third level menu includes three kinds, changing line, data and group.

Changing line: First line displays second level menu items, second and third line display third level menu items, and position of cursor is factory default setting, details refer to chart 5(a)

Press **◀** key to replace items

Press **▲** or **▼** to move cursor

Press **PRG** to return back

Press **SET** to select item, and then return back.

Data: First line displays second level menu items, and second line displays data, details refer to chart 5(b)

Press **◀** to replace items

Press **▲** or **▼** to increase or decrease data while pressing **◀**, Press **▲** or **▼** to increase or decrease data from lowest bit without pressing **◀**

Press **PRG** to return back.

Press **SET** to confirm modifying data, and then return back .

Group: First line displays second level menu items, second line displays group number, and third line displays third level menu items, details refer to chart 5(c)

Press **◀** to change another group, Press **▲** or **▼** to change items,

Press **PRG** key to return back.

Press **SET** to confirm modifying items, and then return back.

If pressing **▲** or **▼** cannot modify items in third level menu, and display "Read only" all that

remind user of parameter is not allowed to modify or when inverter is running ,modifying is forbidden

5. Fault



Chart 6 (a) fault



Chart 6 (b) fault reason

Fault: First line displays fault icon shiny, second line displays fault code and name, and third line reminds user of pressing [SET] to check fault reasons, details refer to chart 6(a). Press [SET] to go into fault reason. Press [STOP] to reset fault when fault has been cleared

Fault reason: First line displays fault icon, code and name shiny, other lines display reasons, details please refer to chart 6(b).If there up or down arrows, please press [▲] or [▼] to change another page to check reasons; Press [PRG] or [SET] to return back

6. Terminal state

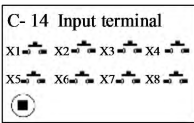


Chart 7 (a) input terminal

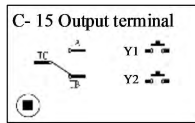


Chart 7 (b) output terminal

Input terminal: details please refer to chart (a), first line displays "Input terminal state",and second and third lines display the status of X1~X8 input terminal.

Output terminal: details please refer to char7 (b),first line displays "Output terminal state",and second and third lines display the status of relay and Y1/Y2 output terminal.

Note: If monitoring items are both terminal state in both lines, it will displays input terminal firstly.

7. Parameters copy



Chart 8 (a) copying



Chart 8 (b) copy complete



Chart 8 (c)

copy fault

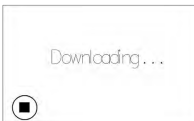


Chart 8 (d) download



Chart 8 (e) download complete



Chart 8 (f)

download fault

Parameter copy: details please refer to chart 8 (a),8(b),8(c)

Please set F4.05=1 and select item "sending to keyboard from inverter", and then press [SET] to enter the copy function.When it displays " copy is over", it means finishing copy operation details refer to chart 8(b).When it displays "copy fault" ,it means operation is failed, details please refer to

chart 8(c). Press **PRG** key to return .

Download: same as copy

Note: Inverters must be the same series, when downloading parameters

8. Self -tuning



Chart 9 (a) waiting



Chart9 (b) resting type self-tuning



Chart 9 (c) rotary type self-tuning



Chart 9(d) exciting magnetic detecting

Static self-tuning: steps as chart 9 (a),(b)and(d). Please set F5.12=2, and press **SET** key to go into motor detecting waiting menu, details refer to chart 9(a). Then press **FWD** key, and it will display “Static self-tuning”, details refer to 9(b), It displays “exiting detecting” when self-tuning is over, details refer to chart 9(d), then it will return back automatically.

Rotary self-tuning: steps as chart 9 (a), (c) and (d). Please set F5.12=1, and press **SET** key to go into motor detecting waiting menu, details refer to chart 9(a). Then press **FWD** key, and it will display resting self-tuning, details refer to 9(b), while resting self-tuning is over, it displays “rotary self-tuning”, details refer to chart9(c), After rotary self-tuning over, it displays “exiting detecting”, details refer to chart 9(d), then it will return back automatically.

9. Other menus



Chart 10 (a) keyboard locked



Chart10 (b) low voltage



Chart 10 (c) model of inverter

Keyboard locked: as chart 10(a). Keyboard will display locked menu when going into next menu, after user setting password and selecting parameter locked function. Please type correct password and then press **SET** key to go into next menu.

Low voltage: as chart10 (b). When input voltage is low, it will display this warning.

Model of inverter, as chart10(c). When power on, if communication is ok, it will display this menu, and if not, it will display keyboard connection fault.

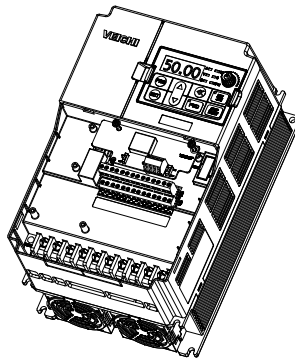
10.6 Appendix VI: CAN Card Manual

CANopen communication expansion card has the following characteristics:

- 1, support the heartbeat protocol, the master can use this function to query the device status;
- 2,there're 2 send PDO channels and 2 receive PDO channels supporting PDO synchronous transmission type;
- 3, SDO only supports expedited transfer mechanism with a maximum transmission of 4 bytes;
- 4, TPDO, RPDO, SDO and other communications objects COB-ID are associated with the device ID, set within the software without modification when using;
- 5, does not support emergency objects, electrical parameters of CANopen communication comply with international standards.

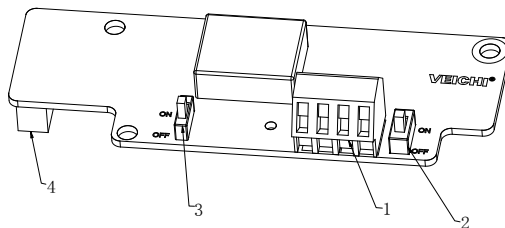
1. Installation of CANOPEN Card

CANOPEN card is embedded in the inverter and be sure to disconnect the power supply before installation. Installation is shown as below:



CANOPEN Card Installation Mode

2. CANOPEN Card Interface Specification



Product Interface

Mark 1: CANOPEN card interface terminal, from left to right CANG, PE, CANH, CANL;

Mark 2: The internal terminal resistor selection slide switch;

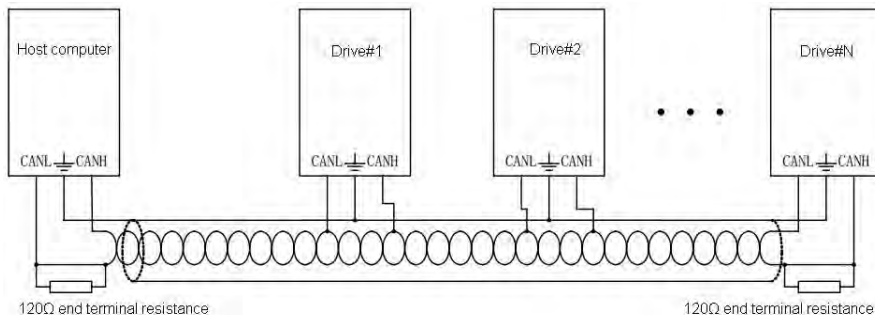
Mark 3: Connect to the inverter earth selection slide switch;

Mark 4: CANOPEN card and AC200 inverter interfaces;

3. CANOPEN Connection Mode

CANopen wiring mode of VEICHI inverter needs expansion card CAN01. Connector is the way of

terminal, and 120Ω termination resistor must be added at the beginning and the end of the whole serial network.; shielded twisted pair wire or special CAN communication lines should be used; wiring as shown below:



4. CANOPEN card control drive mode

the control of the drive through CANOPEN can be implemented according to the following steps (example. AC200).

- 1) wiring connection (reference CANopen wiring).
- 2) Set running command channel: drive parameter setting F0.02 = 3 (optional card).
- 3) Set frequency Source: drive parameter setting F0.03 = 10 (optional card).
- 4) Set the CANopen station: CANOPEN protocol can be set by the drive parameters Fd.11 = 0, Fd.12 set CANopen station number (range 1-127, 0 is the Disable CANopen slave function).
- 5) Set CANopen rate: the rate can be set via the LED "00" of CANopen drive parameters Fd.02.

CANOPEN communication control parameter group address description:

Function	Index	Sub index	Data specification	R/W features		
Communication given frequency	0x203 0	0x01	0~32000 Corresponding to 0.00Hz~320.00Hz	W/R		
	or 0x202 0					
Communication command setting	0x203 0 or 0x202 0	0x02	0000H: no order	W/R		
			0001H: FWD running			
			0002H: REV running			
			0003H: FWD JOG			
			0004H: REV JOG			
			0005H: DEC to stop			
			0006H: free stop			
			0007H: fault reset			
Inverter state	0x203 0	0x03	Bit0	0: stop	1:running	R
			Bit1	0: Not ACC	1: ACC	

			Bit2	0: Not DEC	1: DEC	
			Bit3	0: FWD	1: REV	
			Bit4	0:Normal	1:Fault	
			Bit5	0:GPRS	1:GPRS	
			Bit6	0: non-warning	1:warning	
Inverter fault code	0x203 0 or 0x202 0	0x04	Current fault code(see fault code list)			R
Communication given upper frequency limit	0x203 0 or 0x202 0	0x05	0~32000 corresponding to 0.00Hz~320.00Hz			W/R
Communication torque setting	0x203 0 or 0x202 0	0x06	0~1000 corresponding to 0.0~100.0%			W/R
Torque control FWD Max frequency limit	0x203 0 or 0x202 0	0x07	0~1000 corresponding to 0.0~100.0%			W/R
Torque control REV Max frequency limit	0x203 0 or 0x202 0	0x08	0~1000 corresponding to 0.0~100.0%			W/R
Communication given PID setting	0x203 0 or 0x202 0	0x09	0~1000 corresponding to 0.0~100.0%			W/R
Communication given PID feedback	0x203 0 or 0x202 0	0x0A	0~1000 corresponding to 0.0~100.0%			W/R
Voltage frequency differential voltage	0x203 0 or 0x202	0x0B	0~1000 corresponding to 0.0~100.0%			W/R

setting	0		
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5. CANopen Supporting Index List

Parameter index Group. member is regular corresponding; as follows:

Index = 2000H + Group

Sub index= member+1

Example: setting for F3.22.

Group -member

F3 (F3H) - 22(16H)

Index = 2000H + 03H = 2003H

Sub Index = 16H + 1H = 17H

AC200 corresponding parameters:

Function code	CanOpen Index and Sub-index
F0.00 --- F0.19	0x2000.0x01 --- 0x2000.0x14
F1.00 --- F1.44	0x2001.0x01 --- 0x2001.0x2D
F2.00 --- F2.98	0x2002.0x01 --- 0x2001.0x63
F3.00 --- F3.79	0x2003.0x01 --- 0x2003.0x50
F4.00 --- F4.37	0x2004.0x01 --- 0x2004.0x26
F5.00 --- F5.49	0x2005.0x01 --- 0x2005.0x32
F6.00 --- F6.69	0x2006.0x01 --- 0x2006.0x46
F7.00 --- F7.14	0x2007.0x01 --- 0x2007.0x0F
F8.00 --- F8.38	0x2008.0x01 --- 0x2008.0x27
F9.00 --- F9.79	0x2009.0x01 --- 0x2009.0x50
FA.00 --- FA.59	0x200A.0x01 --- 0x200A.0x3C
FB.00 --- FB.31	0x200B.0x01 --- 0x200B.0x20
FC.00 --- FC.56	0x200C.0x01 --- 0x200C.0x39
FD.00 --- FD.15	0x200D.0x01 --- 0x200D.0x10
C-01 --- C-39	0x2021.0x01 --- 0x2021.0x28
Communication control parameter	0x2030.0x01 --- 0x2030.0x0C