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# Manual

Version V1.0

## AC90 Tension Control Frequency Inverter

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VEICHI

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# Foreword

Thanks for using AC90 tension control frequency inverter produced by Shenzhen Veichi Electric Co.,Ltd..

AC90 tension control frequency inverter is is a special high-performance vector tension control inverter developed by our company recently. It adopts advanced torque mode open loop tension control technology. It is not only an international leader in motor control performance, it also combines tension control industry characteristics, which further strengthened the product reliability, stability and ease of debugging, can to better meet the demand in the field of tension control.

This product is to keep constant tension by the output torque control and automatic roll diameter calculation. The system does not need to install a tension sensor, no need to feedback of the external signal of the current position, or the tension. It is able to complete the tension control even without need to install speed feedback rotary encoder in most applications.

To meet the needs of different customers, the product provides two basic control modes. Control modes including:

1: Speed control mode

Inverter controls the speed of the motor by controlling the output frequency. The output torque of the motor is decided by the load side, but will be limited in the maximum output torque. It is applicable to all types of speed purposes.

2: Torque control mode

The target of the inverter is to control the motor output torque. The motor speed is decided by the load side, but will be limited in the setting frequency. In this mode, the user can set the tension value, and make tension open-loop control coming true through the inverter diameter calculation function.

In tension open-loop control, roll diameter calculation is a very important part. Inverter has three roll diameter calculation methods:

A: Linear speed method.

$$v = k * \omega * r$$

$v$ means linear speed of traction side; $\omega$ means The angular velocity of the rotation of the motor; $k$ means mechanical reduction ratio; $r$ means winding roll diameter.

B: Thickness calculation method.

Accumulate the diameter according to the material thickness and cycles of the roll rotation to gain the roll diameter.

C: Time calculation method

Time integral method needs the time from empty roll to full roll, torque for empty roll and torque for full roll. Inverter will increase torque giving value according to the change of the roll diameter and time.

AC90 tension control inverter can completely replace the torque motors, DC motors, tension controller and be independent tension control system, which makes the control system more concise, easier to maintain and with better tension control performance. It is suitable for application to paper, paper processing, printing and dyeing, packaging, wire and cable, optical fiber cable, adhesive tapes, textile, leather, metal foil processing, fibers, rubber and other industries.

# Contents

# Chapter 1 Overview

Thanks for using AC90 tension control frequency inverter produced by Shenzhen 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

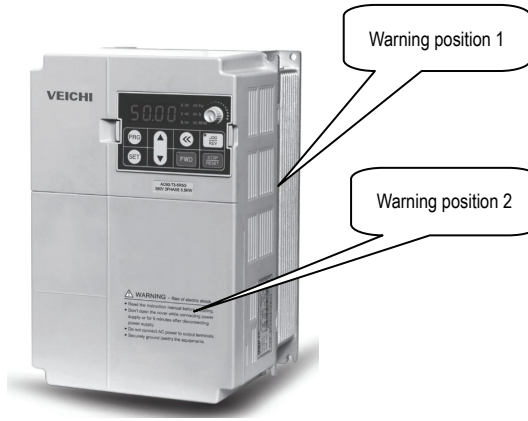
Pls do totally understand this part before using the inverter.

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

### Warning signs position




**Drawing 1：Warning positions on crust of AC90 series inverter**

## Operation requirement

Only Professonal trained person are allowed to operate the equipment such as installation, wiring, running, maintain and etc. “Professonal 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 carefylly read this manual before using and strictly observe the refulations 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**

| | |
|---|---|
|  | ● 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.<br>● Only qualified personnels are allowed to operate the equipment.this product. Before using, the operator must be familiar with all safety specifications and operation regulatons in this manual. Safe and stable work of the product is based on right operation and maintenance.<br>● Do not wire while the power is conneted. 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. |
|  | ● Away from children and public.<br>● Only used in application fields as maker stated. No use in equipments related to special fields such as emergency, succor, ship, medical treatment, avigation, nuclear and etc.<br>● Unauthorized alteration or use of accessories which are not sold or recommended by the maker may cause faults. |
|  | ● Please make sure this manual is in the final user’hand before using.<br>● Before installation and debugging pls carefully read and totally understand these safety regulation and warning signs. |

● **Transport and store regulation**

| | |
|---|---|
|  | ●Correct transport, store, installation and careful operation an maintenance are important for inverter safe operation. |
|  | ● 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**

| | |
|---|---|
|  | ● Only professional trained person can operate it.<br>● Power wire, motor wire and control wire should be all connected firmly. Earth must be reliable and earth resistance must be lower than 10Ω.<br>● 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.<br>● Human body electrostatic will damage inner sensitive components seriously. Before operation, please follow ESD measures. Otherwise, there is danger of iverter damage.<br>● 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.<br>● 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). |
|  | ● The power supply cable and motor cable specifications must satisfy all conditions in table **3-7 3-8** . |

● **Run regulation**

| | |
|---|---|
|  | ● Inverter runs at high voltage. So dangerous voltage is in some components inevitably.<br>● 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 fense and so on. |

● **Maintenance regulation**

| | |
|---|---|
|  | ● Only Shenzhen 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.<br>● Any defective components must be changed in time.<br>● 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. |

● **Dismantlement and disposal regulation**

| | |
|---|---|
|  | ● Packing case can be reused. Please keep them and reuse or send back to maker.<br>● Dismantled metal components are retractable and can be reused.<br>● Some components such as electrolytic capacitor are harmful to environment. Please dispose accronding to environmental protection departments. |

## 1.2 Technic criterion

| Items | | Criterion |
|---|---|---|
| Power input | Voltage,frequency | Single phase220V 50/60Hz<br>Three phase380V 50/60Hz Three phase220V 50/60Hz<br>Three phase660V 50/60Hz Three phase1140V 50/60Hz |
| | Allowable fluctuations | Voltage:320V～440V; voltage unbalance rate:<3%;<br>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, inaccurancy<5% |
| | Output frequency range | 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 | VC without PG, VC with PG, V/F without PG, V/F with PG |
| | Modulate mode | Optimized SVPWM mode |
| | Carrier frequency | 0.6～15.0kHz,randomized carrier-wave |
| | Speed range | VC without PG: rated load 1:100<br>VC with PG: rated load 1:1000 |
| | Steady speed accuracy | VC without PG: ≤1% rated synchronized speed<br>VC with PG: ≤0.02% rated synchronized speed |
| | Starting torque | Flux VC without PG: when 0.5Hz, 180% rated torque<br>Flux VC with PG: when 0Hz, 200% rated torque |
| | Torque response | Flux VC without PG: ≤20ms<br>Flux VC with PG: ≤10ms |
| Product basic functions | Tension control | Tension setting calculation;Tension tape calculation |
| | Roll diameter calculation | Linear speed calculation method;Thickness calculation method; Time integral calculation method |
| | Torque control | Torque setting calculation; Torque ACC/DEC time; Torque compensation; Speed limit |
| | Speed control | Frequency setting; ACC/DEC time setting; Run direction setting; Speed setting; Torque setting |
| | Motor parameter study | Rotate auto studay; Static auto studay |
| | Auto voltage adjust | Auto keep stable output voltage while the net voltage waves |
| | Auto energy saving run | Auto output best voltage according to actual load need to save energy |
| | Auto limit current | Auto limit current in running to prevent |

| | | | |
|---|---|---|---|
| | Frequency set channels | Keyboard digital set, keyboard potentionmeter, analog voltage terminal VS1/VS2, analog current terminal AS, communication given and multi channels terminal selection, master-slave channels combination. | |
| | Feedback input channel | Voltage terminal VS1/VS2, current terminal AS, communication given, pulse input PUL. | |
| | Running command channel | Operation panel given, external terminal given, communication 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 | One relay output, two collector output, 0～10V output,4～20mA output,frequency pulse output. | |
| Protection function | | Overvoltage, undervoltage, current limit, overcurrent, overload, electric thermalrelay, overheat, overvoltage stall, data protection. | |
| Keyboard display | LED display | Single file 4 digital tube display | Can monitor one state variable |
| | | Two file 4 digital tube display | 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, input/output terminal condition. | |
| | Fault alarm | Ouve-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 ≤1000m,no corrosive air or direct sunshine | |
| | Temperature, humidity | -10 ～ +40℃(hanging type)<br>-10 ～ +45℃(cabinet type)<br>20%—90%RH(no condensation) | |
| | Vibration | Under 20Hz≤0.5g | |
| | Store temperatue | -25—+65℃ | |
| | Installation | Hanging type, cabinet type | |
| | Protection | IP20 | |
| | Cooling mode | Forced cooling | |

**Table 1-1: Technic criterion**

# Chapter 2 Before Use

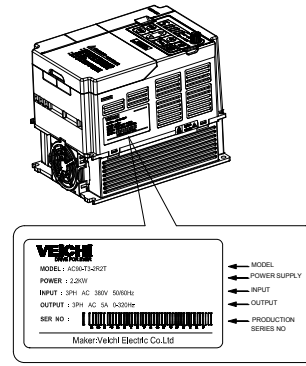
## 2.1 Purchase inspection

Pls check whether any package is damaged while receiving the product you ordered. If the package is ok, pls open it and check the inverter. If damage caused in transport, it is not duty of Veichi company.But please contact Veichi or the transport company immediately.

After checking the product, please also check if the model is the one you ordered.The model of the product is on the nameplate “MODEL”column. If the model is not in accordance with your need, please contact the agent or the sales departments in our company.

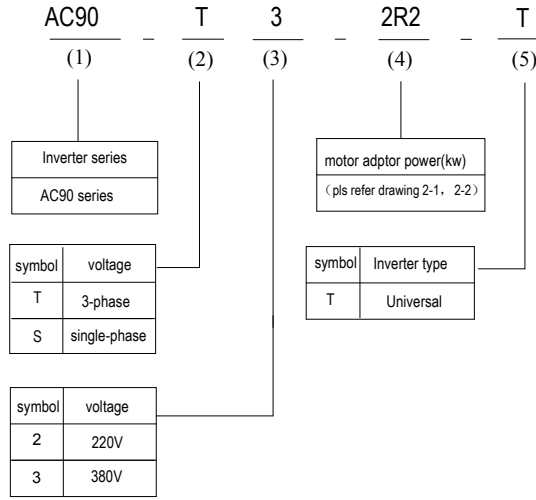
## 2.2 Nameplate

### Nameplate position and content




**Drawing2-1：AC90 series inverter nameplate position**

### Model explainatio




**Drawing 2-2：AC90 series inverter nameplate meaning and naming rules**

## 2.3 Standard models and rated parameters

### Single phase 220V

| Model | Max adaptive motor | Rated current | Model | Max adaptive motor | Rated current |
|---|---|---|---|---|---|
| AC90-S2-R40T | 0.4kW | 2.5A | AC90-S2-1R5T | 1.5kW | 7A |
| AC90-S2-R75T | 0.75kW | 4A | AC90-S2-2R2T | 2.2kW | 10A |

**Table 2-1：AC90 single phase 220V series inverter models and rated parameters**

### Three phase 380V

| Model | Max adaptive motor | Rated current | Model | Max adaptive motor | Rated current |
|---|---|---|---|---|---|
| AC90-T3-R75T | 0.75kW | 2.5A | AC90-T3-110T | 110kW | 210A |
| AC90-T3-1R5T | 1.5kW | 3.7A | AC90-T3-132T | 132kW | 250A |
| AC90-T3-2R2T | 2.2kW | 5A | AC90-T3-160T | 160kW | 310A |
| AC90-T3-004T | 4kW | 10A | AC90-T3-185T | 185kW | 340A |
| AC90-T3-5R5T | 5.5kW | 13A | AC90-T3-200T | 200kW | 380A |
| AC90-T3-7R5T | 7.5kW | 17A | AC90-T3-220T | 220kW | 415A |
| AC90-T3-011T | 11kW | 25A | AC90-T3-250T | 250kW | 470A |
| AC90-T3-015T | 15kW | 32A | AC90-T3-280T | 280kW | 510A |
| AC90-T3-018T | 18.5kW | 38A | AC90-T3-315T | 315kW | 600A |
| AC90-T3-022T | 22kW | 45A | AC90-T3-355T | 355kW | 670A |
| AC90-T3-030T | 30kW | 60A | AC90-T3-400T | 400kW | 750A |
| AC90-T3-037T | 37kW | 75A | AC90-T3-450T | 450kW | 800A |
| AC90-BT3-045T | 45kW | 90A | AC90-T3-500T | 500kW | 860A |
| AC90-T3-055T | 55kW | 110A | AC90-T3-560T | 560kW | 990A |
| AC90-T3-075T | 75kW | 150A | AC90-T3-630T | 630kW | 1100A |
| AC90-T3-090T | 90kW | 180A | AC90-T3-700T | 700kW | 1260A |

**Table 2-2：AC90 three phase 380V series inverter models and rated parameters**

# Chapter 3 Installation and Wiring

## 3.1 Safety Precautions

This chapter explains the warnings for safe use and stable running of the product.

### Cautions in use

| | |
|---|---|
| Warn | ●While stall the inverter in the closed cabinet, please build in cooling fan, air-condition or other cooling equipments to ensure the temperature at the air-in port below 40℃. So that the inverter can work safely and reliably. |
| Important | ●While installing, please use cloth or paper cover the inverter to prevent metal dust, oil, water and others.And remove it carefully after working.<br>●While operation, please follow the ESD regulations. Otherwise, the inverter may be damaged.<br>●While multi inverters are installed in the same cabinet, enlugh space must be left for cooling fan.<br>●Inverter can not work over rated range.Otherwise, the inverter may be damaged.<br>●While transporting the inverter, please hold the firm case. If only hold the pre-cover, there is danger of inverter main body falling, injury or inverter damage. |

### Cautions in use motor

| | |
|---|---|
| Important | ●Different motor has different max allowable running speed. Motor can not run over the max allowable running speed.<br>●While inverter is running at low speed, the motor auto-cool effect is seriously worse. If motor runs at low speed for long time, it will be damaged for overheat. If needed, please use special motor for inverter.<br>●While constant speed machinery runs at unconstant speed, there maybe sympathetic vibration. Please install vibration-proof rubber under motor rack or use jumping frequency control function.<br>●While using frequency inverter or working frequency power supply to drive, the torque characteristic are different. Please do confirm the torque characteristic of the equipment connected.<br>●The rated current of shift gear motor is different from that of standard motor. Please confirm it and choose the right frequency inverter. Moreover, please do switch the pole while the inverter input current is 0. Otherwise it may bring inverter protection or damage.<br>●The rated current of diving motor is higher than that of standard motor, please confirm it and choose the right inverter.<br>●While the wire between motor and inverter is long, the max torque of the motor will reduce for voltage drop. So please use thick cable while the distance between the motor and the inverter is long. |

## 3.2 Treatment for inverter after longtime store

If the inverter store time is over one year, you must precharge the aluminium capacitor in the inverter again and install the inverter after the aluminium capacitor characteristic recovering. For the specific method, please follow the grads in belowing chart and give corresponding proportional voltage for every grad more than 30 mins while the inverter is no-load.

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


**Chart 3-1: treatment for inverter after longtime store**

## 3.3 Inverter stable running environment

Installation environment is very important to the best use of this product for long time. Pls install this product in the enviorment as the following chart requirement.

| Environment | Requirement |
|---|---|
| Install place | Indoor without direct sunshine |
| Install temperature | -10 ～ +40℃（hanging type）<br>-10 ～ +45℃（cabinet type） |
| Store temperature | -20 ～ +60℃ |
| Humidity | <95%RH, no condensation |
| Surrounding | Please install the inverter in place as follows:<br>● Place without oil mist, corrosive gases, flammable gase, dust or etc.<br>● Place without metal dust, oil, water or etc into inverter (please do not install inverter on flammable material such as food and etc).<br>● Place without radioactive material or flammable material.<br>● Place without poisonous gases or liquid.<br>● Place with very little salification erosion.<br>● Place whihout direct sunshine. |
| Altitude | <1000m |
| Vibration | <10～20Hz:9.8m/s$^2$<br><20～55Hz:5.9m/s$^2$ |
| Installation and cooling | ● Inverter can not be installed horizontally must be installed vertically.<br>● Please independently install high heating equipments such as braking resistor and etc which can not be installed in the same cabinet with inverter, installed at the air-in port of the inverter is strictly prohibited. |

**Chart 3-1:AC90 series inverter running environment condition**

- In order to improve the product stability, pls do not use the inverter where temperature changes sharply. While using in closed space such as control cabinet, please use cooling fan or air-condition to cool inverter to avoid temperature over limit range. Please also prevent inverter from freeze, too low temperature may cause components freeze fault.
- Derate according to the chart while over temperature limit.

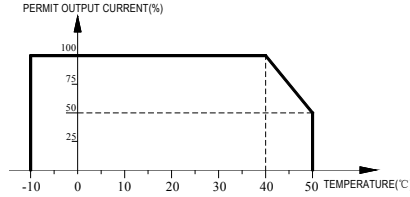



**Chart 3-2:AC90 series inverter derating surve while over permit temperature temperature**

- Derate according to the chart while over altitude limit.

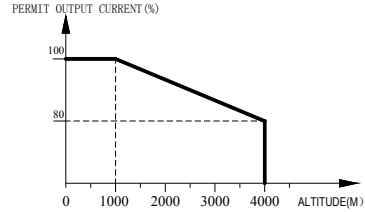



**Chart 3-3:AC90 series inverter derating surve while over permit altitude**

## 3.4 EMI Protection

The inverter is designed to be used in industrial environment with strong electromagnetic interference. Generally speaking, if the installation quality is good, it is ensured that the inverter can work safely without fault. Please install the inverter according to the following rules to ensure stable running and avoid electromagnetic interference impact.

- Ensure that all equipments in the cabinet have been connected reliably to the common 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 case to the inverter earth terminal or the protective area of control system.
- Ensure that all equipments connected to the inverter have been reliably connected to the same earth net or Y-type earth point with thick and short cable.
- The conductor has better to be flat and with multi core, what has lower resistance at high frequency.
- The cutting terminal should be as soigne as possible. Unshielded wire section must be as short as possible.
- In control cable wiring, it should be as far from the power supply cable and motor cable as possible. And independent cable trough should be used. While the control cable must cross to the power supply cable or motor cable, it should be 90º vertical cross.
- Ensure that the contactor in the cabinet has wave surge suppresser. Or'R-C'damping circuit is connected to the winding of AC contactor. Voltage dependent resistor corresponding to the winding voltage is used. And freewheel diode or components such as voltage dependent resistor corresponding to the winding voltage are connected to DC contactor. It is very important while contactor, controlled by output relay of inverter, acts frequently.
- Cable connected to motor should be shielded cable or armoured cable. The two barriers are earthed reliably by cable grounding card.
- Build noise filters at the input side to reduce electromagnetic interference from other equipments at the power grid side. The noise filter should be as close to the inverter power input terminal as possible. Meantime, the filter must earth reliably as the inverter.

- Build noise filters at the output side to reduce radio interference and inductive disturbance. The noise filter must be as close to the inverter output terminal as possible. Meantime, the filter must earth reliably as the inverter.
- Anytime, control circuit wire should be shielded cable.
- Add zero phase reactor in power supply wire near inverter input terminal and add zero phase reactor in the motor wire near inverter output terminal to reduce electromagnetic interference to the inverter efficiently.
- Earthing Right and reliable earthing is the basic condition of safe and reliable running of the product. For right earthing, please read the following notice carefully.

| | |
|---|---|
| Warn | ●In order to avoid electric shock, earthing cable should be the size as electric equipment technic standard required and cable length should be as short as possible. Otherwise, inverter leakage current will cause unstable potential of the earthing terminal which is far from the earthing point, and electric shock accident will happen frequently.<br>●Earth terminal must be earthing. Earth resistance must be below 10Ω. Otherwise, there is danger of death. |
| Important | ● Please do not share earth cable with welder or other big current/pulse power equipment. Otherwise, inverter will act abnormally.<br>●While multi inverters are used at the same time, please do not wind the earth wire to loop-type. Otherwise, inverter will act abnormally. |

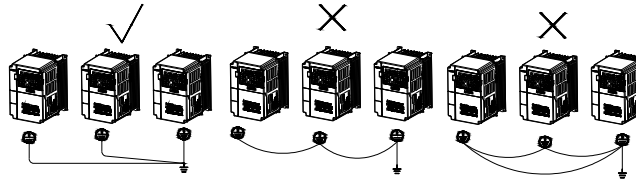


**Chart 3-4: multi AC90 series inverters united earthing**

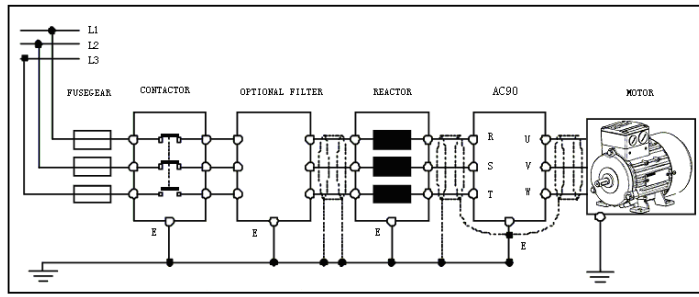



**Chart 3-5：AC90 series inverter system earthing**

Remark: motor must earth as close as possible. Motor case can not be connected to the inner earth terminal of the inverter. It also can not share the earth net with the control system.

Shield of inverter power cable, motor cable, control cable Cable

Shielding layer (reticulate/armoured) should be winded reliably by cable earth card and fix to inverter earth piece by bolt. Please refer to the following chart.

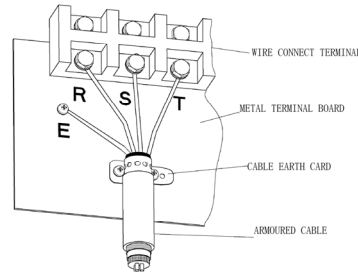



**Chart 3-6：Cable earth card for cables earthing**

●Corresponding relationship between inverter/motor cable length and carrier frequency.

While cable distance between inverter and motor is long (especially low frequency output), cable voltage drop will make motor torque reduce. Further more, cable HF leakage current will increase. Then inverter output current will increase, that will cause inverter over-current trip. The current detection accuracy and running stability will be impacted. Please follow as below chart to adjust carrier frequency according to the cable length. While the cable distance is over 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 | 0.6~16kHz | 0.6~8kHz | 0.6~4kHz | 0.6~2kHz |

**Chart 3-2：Corresponding relationship between inverter/motor cable length and carrier frequency**

## 3.5 Machinery installation

### Installation notice and related requirement

● AC90 inverter components

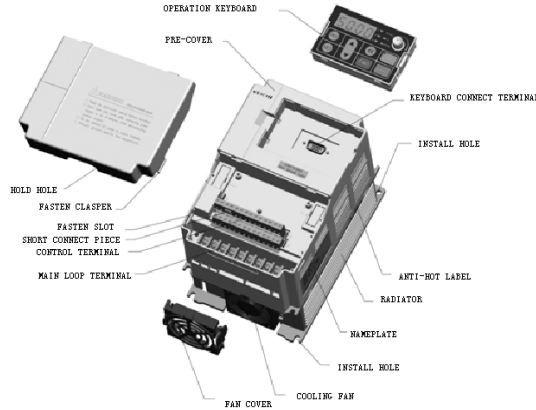



**Chart 3-7：AC90 series inverter components**

● Installation direction

To prevent inverter cooling effect reducing, please do install the inverter vertically.

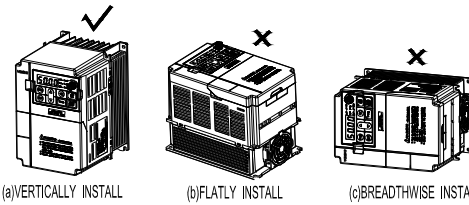



**Chart 3-8：AC90 series inverter installation direction**

● 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.

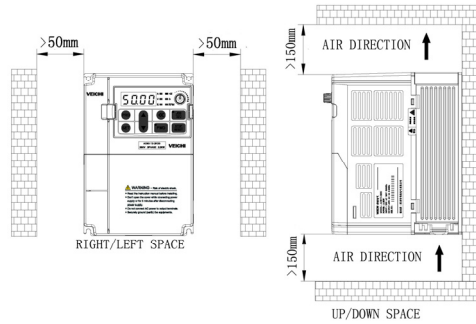



**Chart 3-9：Single AC90 series inverter installation space**

Multi inverters paratactic installation: while installing multi inverters in cabinet, please ensure installation space as follows.

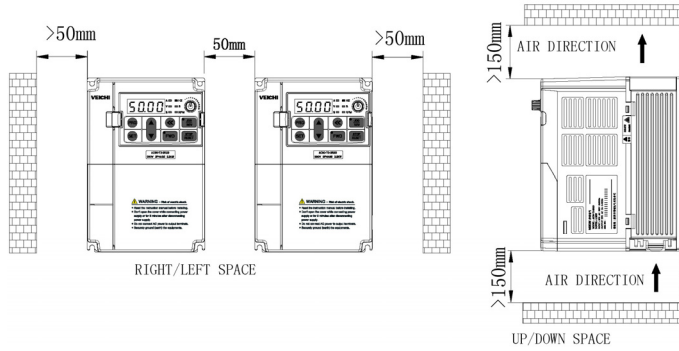
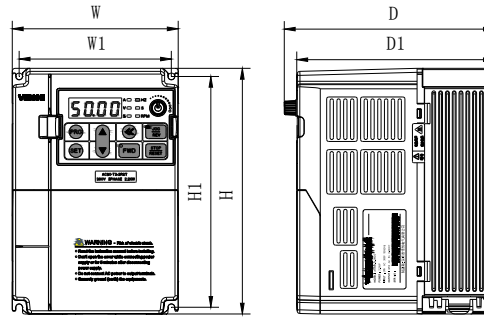
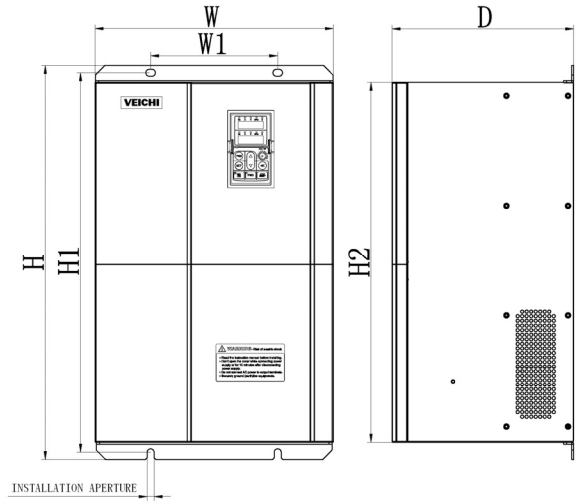



**Chart 3-10: Multi AC90 series inverters paratactic installation space requirement**

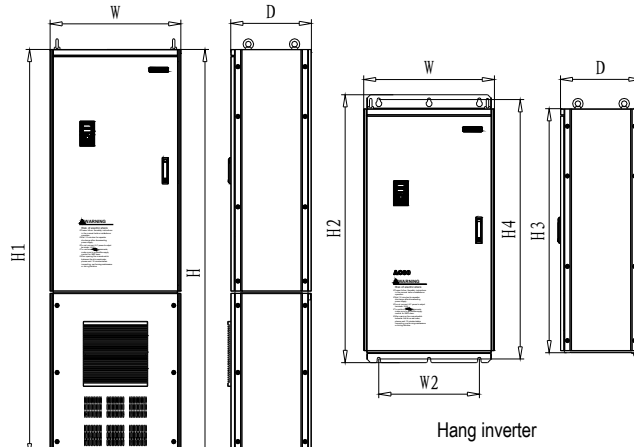
## Dimension of inverter and keyboard




| MODEL | W | W1 | H | H1 | D | D1 | INSTALLATION APERTURE |
|---|---|---|---|---|---|---|---|
| AC90-S2-R40T | 122 | 112 | 182 | 171 | 154.5 | 145 | ϕ5 |
| AC90-S2-R75T | | | | | | | |
| AC90-S2-1R5T | | | | | | | |
| AC90-S2-2R2T | 159 | 147.2 | 246 | 236 | 157.5 | 148 | ϕ5.5 |
| AC90-T3-R75T | 122 | 112 | 182 | 171 | 154.5 | 145 | ϕ5 |
| AC90-T3-1R5T | | | | | | | |
| AC90-T3-2R2T | | | | | | | |
| AC90-T3-004T | 159 | 147.2 | 246 | 236 | 157.5 | 148 | ϕ5.5 |
| AC90-T3-5R5T | | | | | | | |
| AC90-T3-7R5T | 195 | 179 | 291 | 275 | 167.5 | 158 | ϕ7 |
| AC90-T3-011T | | | | | | | |

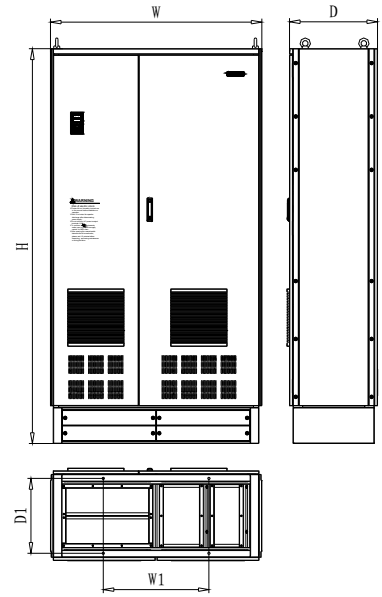



| MODEL | W | W1 | H | H1 | H2 | D | INSTALLATION APERTURE |
|---|---|---|---|---|---|---|---|
| AC90-T3-015T | 255 | 160 | 434 | 418 | 390 | 224 | ϕ7 |
| AC90-T3-018T | | | | | | | |
| AC90-T3-022T | 285 | 200 | 493 | 473 | 445 | 265 | ϕ9 |
| AC90-T3-030T | | | | | | | |
| AC90-T3-037T | 375 | 200 | 620 | 597 | 567 | 286 | ϕ11 |
| AC90-T3-045T | | | | | | | |
| AC90-T3-055T | | | | | | | |
| AC90-T3-075T | 466 | 300 | 760 | 735 | 700 | 320 | ϕ11 |
| AC90-T3-090T | | | | | | | |




Hang inverter

| MODEL | W | W1 | W2 | H | H1 | H2 | H3 | H4 | D | D1 | installation aperture of cabinet inverter | installation aperture of hang inverter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AC90-T3-132T | 590 | 350 | 430 | 1800 | 1600 | 1160 | 1050 | 1123 | 400 | 320 | ϕ11 | ϕ14 |
| AC90-T3-160T | | | | | | | | | | | | |
| AC90-T3-185T | | | | | | | | | | | | |
| AC90-T3-200T | 650 | 420 | 500 | 2200 | 2000 | 1318 | 1200 | 1276 | 400 | 321 | ϕ13 | ϕ16 |
| AC90-T3-220T | | | | | | | | | | | | |
| AC90-T3-250T | 750 | 400 | 600 | 2200 | 2000 | 1325 | 1200 | 1278 | 400 | 320 | ϕ13 | ϕ18 |
| AC90-T3-280T | | | | | | | | | | | | |




| MODEL | W | W1 | H | D1 | D | INSTALLATION APERTURE |
|---|---|---|---|---|---|---|
| AC90-T3-315T | 800 | 400 | 2200 | 361 | 450 | ϕ13 |
| AC90-T3-355T | | | | | | |
| AC90-T3-400T | 1200 | 600 | 2200 | 417 | 550 | ϕ13 |
| AC90-T3-450T | | | | | | |
| AC90-T3-500T | | | | | | |
| AC90-T3-560T | | | | | | |

**Chart 3-3：AC90 series inverter dimension**

## Keyboard dimension

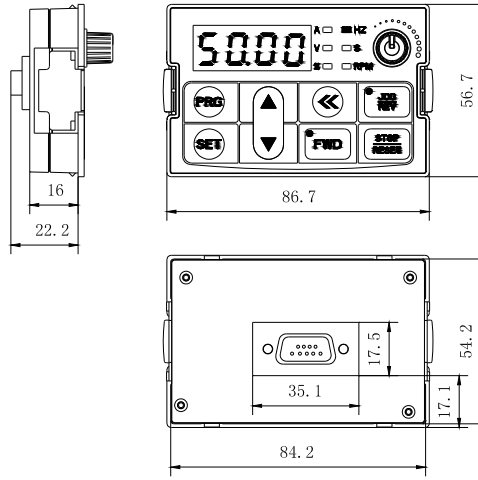



**Chart 3-11:AC90 series inverter 1 line LED keyboard dimension**

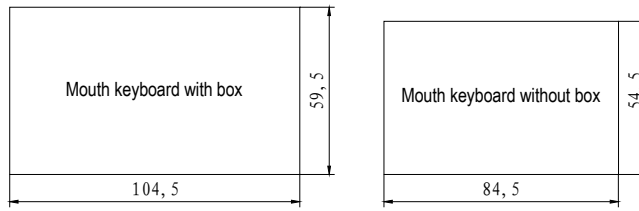



**Chart 3-12:AC90 series inverter mouth for 1 line LED keyboard dimension**

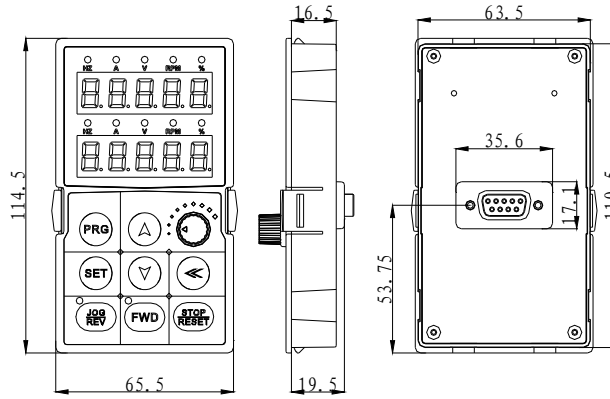



**Chart 3-13:AC90 series inverter 2 line LED keyboard dimension**

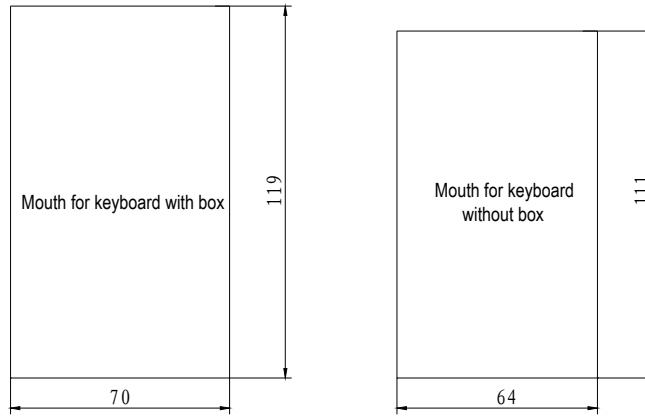
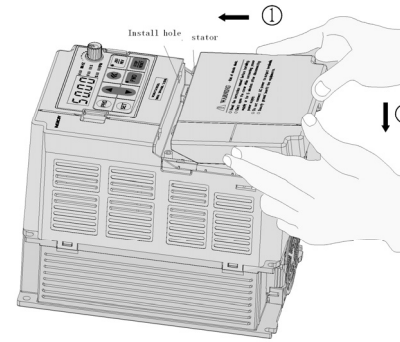



**Chart 3-14:AC90 series inverter mouth for 2 line LED keyboard dimension**

## Dismantle and install tail-hood

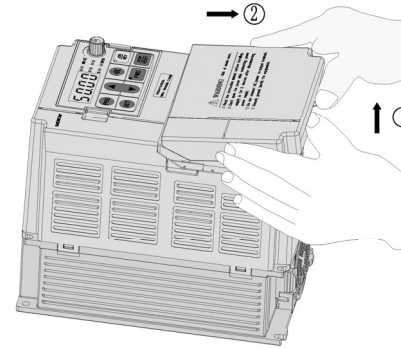
Installation: First the tail-hood upwardly inclines around 15 degrees and inserts the top fixed flat into the fixed hole in the front cover. Then slightly press the tail-hood downward. While your hear "Ka", it means that the tail-hood is into the place.

**Chart 3-13:AC90 series inverter tail-hood installation**




Dismantlement: At the tail of the frequency inverter, there is a special dismantlement hole design. Put your finger into the hole, upwardly pull the cover with a little force until the buckle between the tail-hood and the crust tear off, and then remove the tail-hood down.

**Chart 3-14:AC90 series inverter tail-hood ismantlement**



### Dismantle and install keyboard

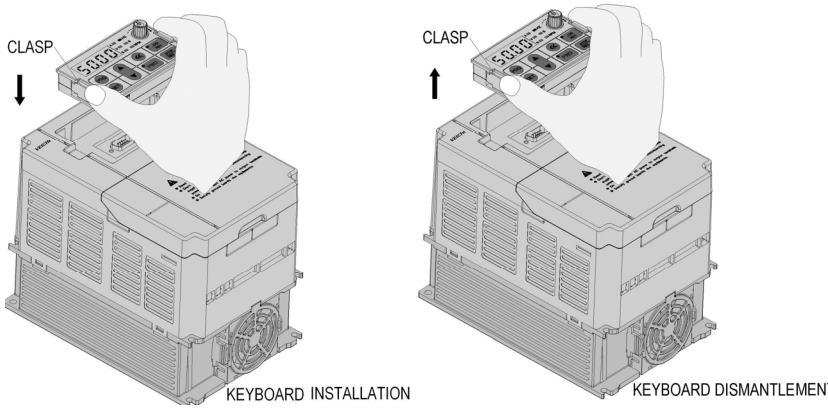



**Chart 3-15:AC90 series inverter keyboard installation and dismantlement**

## 3.6 Electric installation

This chapter explains the regulations that users have to obey to ensure safe use, best performance and reliable running.

### Safety attention

| | |
|---|---|
| Warn | ● Must earth reliably while inverter is running. Otherwise there is danger of casualty and unstable inverter performance.<br>● To ensure safe running, only trained professional person can do installation and wiring job.<br>● No operation under power connected state. Otherwise there is danger of electric shock even death.<br>● Before operation, please cut all related equipments power, ensure that the main circuit DC current has droped to safe range. And please operate after 5 mins. |
| Caution | ● Control cable, power cable and motor cable must be separated. They can not be in the same cable trough or cable rack.<br>● This equipment can only be used as the maker states. Please consult Veichi while using in special case. |
| Important | ● No insulation test for the inverter or the related cable by HV insulation test equipment.<br>● If the inverter or the peripheral equipment (filer, reactor and etc) needs insulation test, firstly 500V megohmmeter should be used to test the insulation resistance which should not be lower than 4MΩ. |

## Standard diagram

● Standard diagram

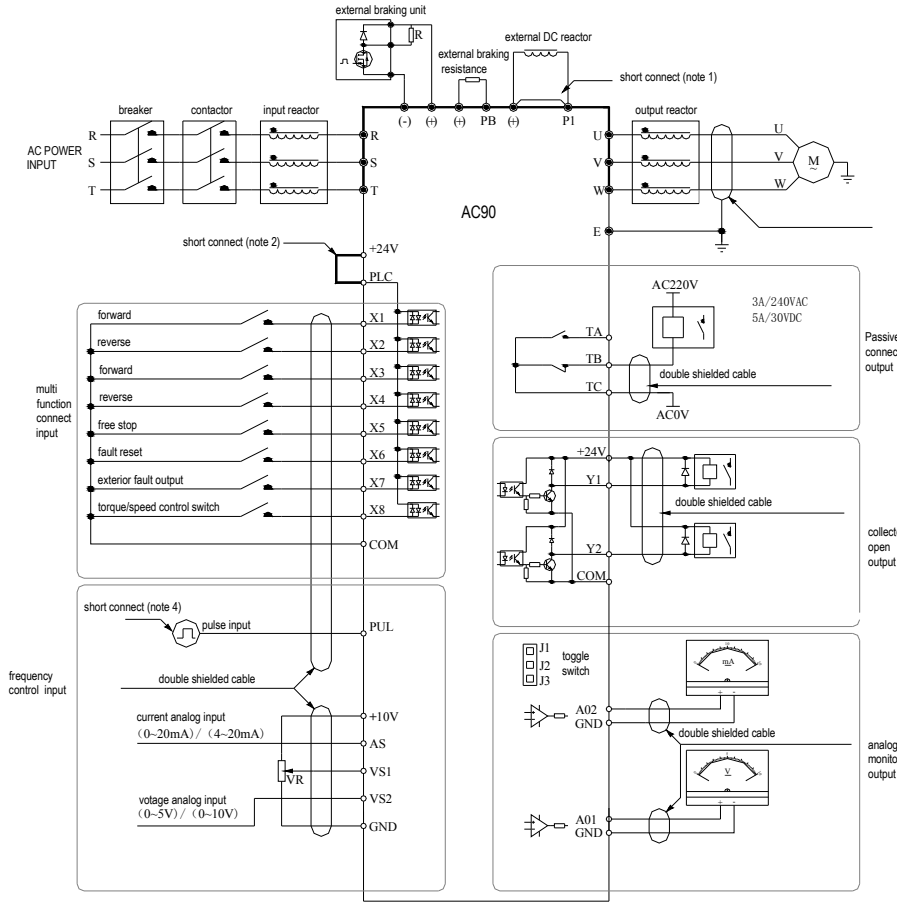



**Chart 3-16：AC90 series inverter standard diagram**

Note: 1.While install DC reactor, be sure to dismantle the short connector between terminal P1 and （+）.

2.NPN or PNP transistor signal can be selected as input of multi-function input terminal（X1~X8）. Inverter built-in power supply (+24V terminal) or external power supply (PLC terminal) can be choosed as bias voltage. Factory setting '+24V' short connect with 'PLC'.

3. Analog monitor output is special output of meters such as frequency meter, current meter, voltage meter and etc. It can not be used for control operations such as feedback control.

4. 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. | As frequency,voltage signal, max output 2mA |
| +24V | 24V auxiliary power supply output,constitutes loop with COM. | 100mA |
| Y1/Y2 | Collector open circuit output can set the action-object by programme. | DC24V/50mA |
| TA/TB/TC | Passive connector output can set the action-object by programme. | 3A/240VAC<br>5A/30VDC |

**Chart 3-4：AC90 series inverter auxiliary terminals output capacity**

● Switch terminals connection function specification

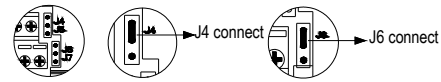
| Switch terminal | Selectable position | Picture example | Function specification |
|---|---|---|---|
|  | J1 |  | 0.2--50kHz frequency output |
| | J2 |  | 0--20mA current output<br>4--20mA current output |
| | J3 |  | 0--10V voltage output |
|  | J4 J6 |  | Exterior track signal J4 J6 |
| | J5 J7 |  | Out track selection J4 J6 (with PG card ) Inner track selection J5 J7 (without PG card) |

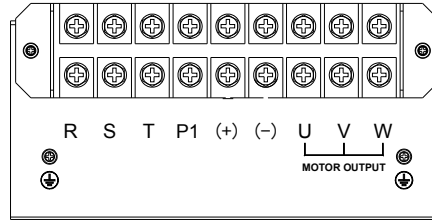
**Chart 3-5：AC90 series inverter switch terminal connection function specification**

## Main circuit terminals

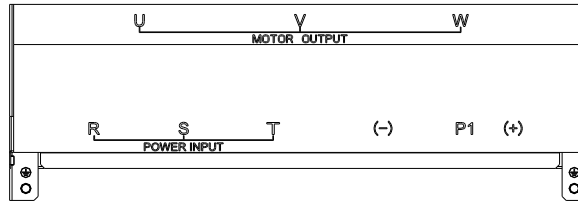
● Main circuit terminals array and definition

Power under 18.5kW main circuit terminals array:


Power under 22~110kW main circuit terminals array:




Power under 132~560kW main circuit terminals array:




| Terminal | Name | Function definition |
|---|---|---|
| (-) | DC power terminal | DC power output, (-) means DC bus cathode, (+) means DC bus anode, used for external braking unit. |
| (+) | | |
| (+) | Braking resistance terminal | Used for external braking resistance to realize quick stop. |
| PB | | |
| 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 | | |
| ⏚ | Earth | Earth terminal, earth resistance<10 OHM |
| E | | |

**Chart 3-6:AC90 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 $mm^2$ |
|---|---|---|---|
| AC90-T3-R75T | M4 | 1.2--1.5 | 1.5mm2(14) |
| AC90-T3-1R5T | M4 | 1.2--1.5 | 2.5mm2(12) |
| AC90-T3-2R2T | M4 | 1.2--1.5 | 2.5mm2(12) |
| AC90-T3-004T | M4 | 1.2--1.5 | 4mm2(10) |
| AC90-T3-5R5T | M4 | 1.2--1.5 | 6mm2(9) |
| AC90-T3-7R5T | M5 | 2--2.5 | 6mm2(9) |
| AC90-T3-011T | M5 | 2--2.5 | 10mm2(7) |
| AC90-T3-015T | M6 | 4--6 | 10mm2(7) |
| AC90-T3-018T | M6 | 4--6 | 16mm2(5) |
| AC90-T3-022T | M8 | 8--10 | 16mm2(5) |
| AC90-T3-030T | M8 | 8--10 | 25mm2(3) |
| AC90-T3-037T | M8 | 8--10 | 25mm2(3) |
| AC90-T3-045T | M8 | 8--10 | 35mm2(2) |
| AC90-T3-055T | M10 | 11--13 | 35mm2(2) |
| AC90-T3-075T | M10 | 11--13 | 50mm2(1) |
| AC90-T3-090T | M10 | 11--13 | 50mm2(1/0) |
| AC90-T3-110T | M10 | 11--13 | 70mm2(2/0) |
| AC90-T3-132T | M10 | 11--13 | 95mm2(3/0) |
| AC90-T3-160T | M12 | 14--16 | 95mm2(4/0) |
| AC90-T3-185T | M12 | 14--16 | 120mm2 |
| AC90-T3-200T | M14 | 17--20 | 150mm2 |
| AC90-T3-220T | M14 | 17--20 | 150mm2 |
| AC90-T3-250T | M16 | 20--23 | 185mm2 |
| AC90-T3-280T | M16 | 20--23 | 185mm2 |
| AC90-T3-315T | M16 | 20--23 | 240mm2 |
| AC90-T3-355T | M16 | 20--23 | 240mm2 |
| AC90-T3-400T | M16 | 20--23 | 300mm2 |
| AC90-T3-450T | M16 | 20--23 | 400mm2 |
| AC90-T3-500T | M16 | 20--23 | 400mm2 |
| AC90-T3-560T | M16 | 20--23 | 500mm2 |
| Note: Here we suggest to use copper joins as mains electric connectors of machine over 185KW. Pls refer the cut section area above. | | | |

**Chart 3-7: Suggested cable diameter and fixed moment 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 $mm^2$ |
|---|---|---|---|
| AC90-S2-R40T | M4 | 1.2--1.5 | 1.5mm2(14) |
| AC90-S2-R75T | M4 | 1.2--1.5 | 2.5mm2(12) |
| AC90-S2-1R5T | M4 | 1.2--1.5 | 2.5mm2(12) |
| AC90-S2-2R2T | M4 | 1.2--1.5 | 4mm2(10) |

**Chart 3-8: Suggested cable diameter and fixed moment single-phase 220V machine main circuit**

● Suggested main circuit components specification

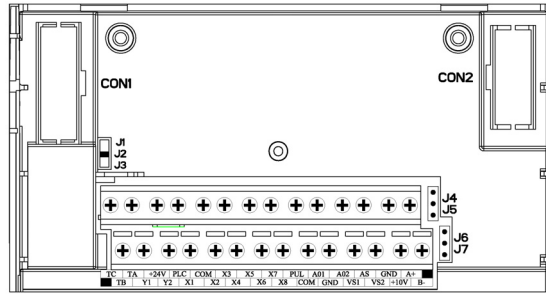
| Model | Contactor specification | Breaker specification | DC reactor | Input filter | Output filter |
|---|---|---|---|---|---|
| AC90-T3-R75T | 10A | 10A | ------ | NFI-005 | NFO-010 |
| AC90-T3-1R5T | 10A | 10A | ------ | NFI-005 | NFO-010 |
| AC90-T3-2R2T | 16A | 15A | ------ | NFI-010 | NFO-010 |
| AC90-T3-004T | 16A | 20A | ------ | NFI-010 | NFO-010 |
| AC90-T3-5R5T | 25A | 20A | ------ | NFI-020 | NFO-020 |
| AC90-T3-7R5T | 25A | 30A | ------ | NFI-020 | NFO-020 |
| AC90-T3-011T | 32A | 40A | ------ | NFI-036 | NFO-036 |
| AC90-T3-015T | 40A | 50A | ------ | NFI-036 | NFO-036 |
| AC90-T3-018T | 50A | 60A | ------ | NFI-050 | NFO-050 |
| AC90-T3-022T | 50A | 75A | DCL-50 | NFI-050 | NFO-050 |
| AC90-T3-030T | 63A | 100A | DCL-80 | NFI-080 | NFO-080 |
| AC90-T3-037T | 80A | 125A | DCL-100 | NFI-100 | NFO-100 |
| AC90-T3-045T | 100A | 150A | DCL-110 | NFI-100 | NFO-100 |
| AC90-T3-055T | 125A | 175A | DCL-125 | NFI-150 | NFO-150 |
| AC90-T3-075T | 160A | 200A | DCL-150 | NFI-150 | NFO-150 |
| AC90-T3-090T | 220A | 250A | DCL-200 | NFI-200 | NFO-300 |
| AC90-T3-110T | 220A | 300A | DCL-200 | NFI-200 | NFO-300 |
| AC90-T3-132T | 250A | 400A | DCL-300 | NFI-300 | NFO-300 |
| AC90-T3-160T | 300A | 500A | DCL-300 | NFI-300 | NFO-300 |
| AC90-T3-185T | 400A | 600A | DCL-400 | NFI-400 | NFO-400 |
| AC90-T3-200T | 400A | 700A | DCL-400 | NFI-400 | NFO-400 |
| AC90-T3-220T | 630A | 800A | DCL-500 | NFI-600 | NFO-600 |
| AC90-T3-250T | 630A | 1000A | DCL-600 | NFI-600 | NFO-600 |
| AC90-T3-280T | 630A | 1200A | DCL-600 | NFI-600 | NFO-600 |
| AC90-T3-315T | 630A | 1200A | DCL-800 | ------ | ------ |
| AC90-T3-355T | 800A | 1400A | DCL-800 | ------ | ------ |
| AC90-T3-400T | 1000A | 1600A | DCL-1000 | ------ | ------ |

| | | | | | |
|---|---|---|---|---|---|
| AC90-T3-450T | 1000A | 2000A | DCL-1000 | ------ | ------ |
| AC90-T3-500T | 1000A | 2000A | DCL-1200 | ------ | ------ |
| AC90-T3-560T | ------ | 2000A | DCL-1200 | ------ | ------ |
| Note: For DC reactor, input filter, output filter and other components specification details and circuit mode, please refer chapter 7 “peripheral equipments and options”. | | | | | |

**Chart 3-9: Suggested mains fittings for 3-phase 380V machine**

## Control loop terminals

● Control loop terminals array




| Sort | Terminal | Name | Function definition |
|---|---|---|---|
| Passive connection output | TA | Normally-open contact | Can set the action-object by programme.<br>Max contact capacity:3A/240VAC 5A/30VDC |
| | TB | Normally-closed contact | |
| | TC | Common contact | |
| State output | Y1 | Collector open output 1 | Can set the action-object by programme.<br>Max contact capacity:DC30V/50mA |
| | Y2 | Collector open output 2 | |
| Auxiliary power supply | +24V | Auxiliary power output + | Max output: 24VDC/100mA. |
| | COM | Auxiliary power output - | |
| Multi-function contact input | X1 | Multi-function contact input 1 (forward) | Build-in photoelectric converter can set the action-object by programme.<br>Input condition: Max DC30V/8mA.<br>Note:<br>Factory setting is common-collector characteristic input. If need common-emitter characteristic input, Please remove the short connector between“+24V”and “PLC”, then use the short connector to connect “PLC” and “COM”. |
| | X2 | Multi-function contact input 2 (reverse) | |
| | X3 | Multi-function contact input 3（forward jog） | |
| | X4 | Multi-function contact input 4（reverse jog） | |
| | X5 | Multi-function contact input 5（free stop） | |
| | X6 | Multi-function contact input 6（fault reset） | |

| | | | |
|---|---|---|---|
| | X7 | Multi-function contact input 7（exterior fault input） | |
| | X8 | Multi-function contact input8（torque/speed control switch） | |
| | PLC | Multi-function contact input common terminal | |
| Pulse input | PUL | Pulse input | Pulse range:0.0～50.00kHz |
| Analog output | A01 | Analog output 1 | Can set the action and object by programme. Physical type of output signal: 0~10VDC. |
| | A02 | Analog output 2 | Can set the action-object by programme. Physical type of output signal:0～10V 0～20mA 4～0mA frequency pulse output, selectable by parameter [F3.26] or switch J1 J2 J3 (Details in chart 3-5) |
| Analog input | AS | Current analog input | As inverter control signal or feedback signal, can set the act range and response speed by programme? VS1/VS2 resistance:89KΩ; AS resistance: 250Ω. |
| | VS1 | Voltage analog input 1 | |
| | VS2 | Voltage analog input 2 | |
| Signal auxiliary power supply | +10V | Signal auxiliary power supply terminal | Max output 10VDC/50mA |
| | GND | Signal auxiliary power supply terminal | Common auxiliary power of analog output, analog input signal. |
| Communication terminal | A+ | Communication terminal A+ | RS485 communication port |
| | B- | Communication terminal B- | |

**Chart 3-10：AC90 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 VS1 VS2 AS | M2.5 | 0.4~0.6 | 0.75 | Twisted-pair shielded cable |
| +24V COM Y1 Y2 TA TB TC PLC PUL X1 X2 X3 X4 X5 X6 X7 X8 | M2.5 | 0.4~0.6 | 0.75 | Shielded cable |

**Chart 3-11：Control loop terminal wiring specification**

## Braking unit (braking resistance) connection

● Braking resistance connection of machine below 18.5KW

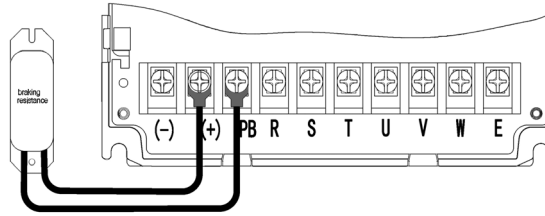



**Chart 3-17: Braking resistance connection of AC90 series inverter below 18.5KW**

● Braking unit connection of machine above 22KW

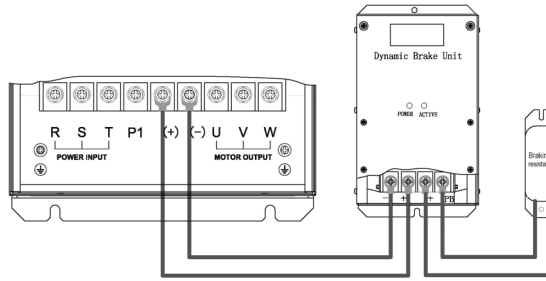



**Chart 3-18: Braking resistance connection of AC90 series inverter above 22KW**

● Suggested braking resistance specification parameters

Braking resistance value and power in the chart are decided according to common inertia load and intermittent braking mode. While used in large inertia occasion or long time frequent brake occasion, please 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 company.

| Three-phase 380V | | | |
|---|---|---|---|
| Motor power(kW) | Resistance value(Ω) | Resistance power(kW) | Braking moment (%) |
| 0.75 kW | 750Ω | 150W | 100% |
| 1.5 kW | 400Ω | 300W | 100% |
| 2.2 kW | 250Ω | 400W | 100% |
| 4.0 kW | 150Ω | 500W | 100% |
| 5.5 Kw | 100Ω | 600W | 100% |
| 7.5 kW | 75Ω | 780W | 100% |
| 11 kW | 50Ω | 1,200W | 100% |
| 15 kW | 40Ω | 1,500W | 100% |
| 18.5 kW | 32Ω | 2,000W | 100% |
| 22 kW | 28Ω | 2,200W | 100% |
| 30 kW | 24Ω | 3,000W | 100% |

| | | | |
|---|---|---|---|
| 37 kW | 20Ω | 3,700W | 100% |
| 45 kW | 16Ω | 4,500W | 100% |
| 55 kW | 13Ω | 5,500W | 100% |
| 75 kW | 9Ω | 7,500W | 100% |
| 90 kW | 6.8Ω | 9,300W | 100% |
| 110 kW | 6.2Ω | 11,000W | 100% |
| 132 kW | 4.7Ω | 13,000W | 100% |
| 160 kW | 3.9Ω | 15,000W | 100% |
| 185 kW | 3.3Ω | 17,000W | 100% |
| 200 kW | 3Ω | 18,500W | 100% |
| 220 kW | 2.7Ω | 20,000W | 100% |
| 250 kW | 2.4Ω | 22,500W | 100% |
| 280 kW | 2Ω | 25,500W | 100% |
| 315 kW | 1.8Ω | 30,000W | 100% |
| 355 kW | 1.5Ω | 33,000W | 100% |
| 400 kW | 1.2Ω | 42,000W | 100% |
| 450 kW | 1.2Ω | 42,000W | 100% |
| 500 kW | 1Ω | 42,000W | 100% |
| 560 kW | 1Ω | 50,000W | 100% |
| Single-phase 220V | | | |
| Motor power(kW) | Resistance value(Ω) | 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 AC90 series inverter**

● Build-in braking unit max braking performance

Braking unit of AC90 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 brake occasion, the moment maybe should be increased. The max braking power is showed in the following chart, the range of which can not be over in use. Otherwise the equipment maybe destroyed. If any problem, please consult Shenzhen Veichi electric company customer serive department.

| Three-phase380V | | | |
|---|---|---|---|
| Inverter model | Motor power | Max braking current | Min resistance |
| AC90-T3-R75T | 0.75 kW | 3.5A | 200Ω |
| AC90-T3-1R5T | 1.5 kW | 3.5A | 200Ω |
| AC90-T3-2R2T | 2.2 kW | 7A | 100Ω |
| AC90-T3-004T | 4 kW | 10A | 75Ω |
| AC90-T3-5R5T | 5.5 Kw | 10A | 75Ω |
| AC90-T3-7R5T | 7.5 kW | 14A | 50Ω |
| AC90-T3-011T | 11 kW | 17A | 40Ω |
| AC90-T3-015T | 15 kW | 23A | 30Ω |
| AC90-T3-018T | 18.5 kW | 28A | 25Ω |
| Single-phase 220V | | | |
| Inverter model | Motor power | Max braking current | Min resistance |
| AC90-S2-R40T | 0.4 kW | 3.8A | 100Ω |
| AC90-S2-R75T | 0.75 kW | 3.8A | 100Ω |
| AC90-S2-1R5T | 1.5 kW | 6.5A | 60Ω |
| AC90-S2-2R2T | 2.2 kW | 10.5A | 40Ω |

**Chart 3-13:AC90 series inverter build-in braking unit max braking power**

## Multi-function contact input connection

● NPN transistor connection mode

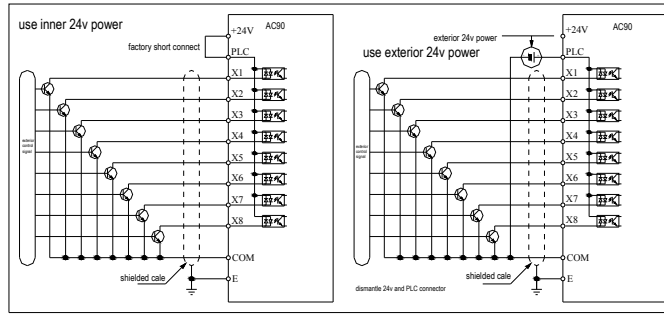



**Chart 3-21: NPN transistor digital input signal connection mode**

● NPN transistor connection mode

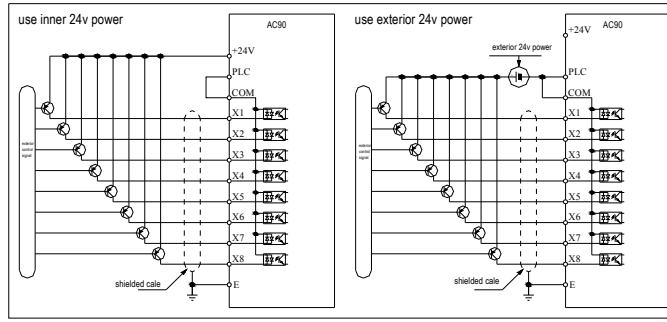



**Chart 3-22: NPN transistor digital input signal connection mode**

**Digital output signal connection**

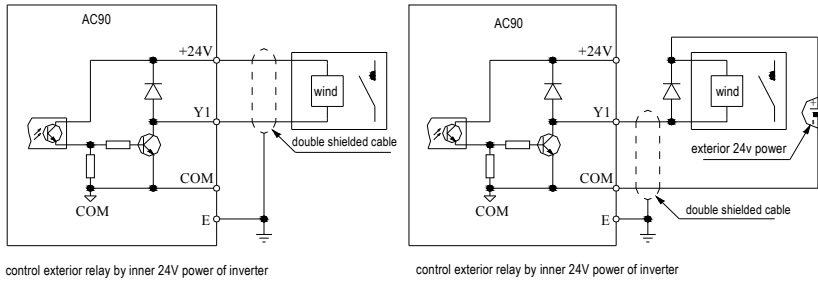



**Chart 3-23:AC90 series inverter digital output signal connection mode**

## Analog output signal connection

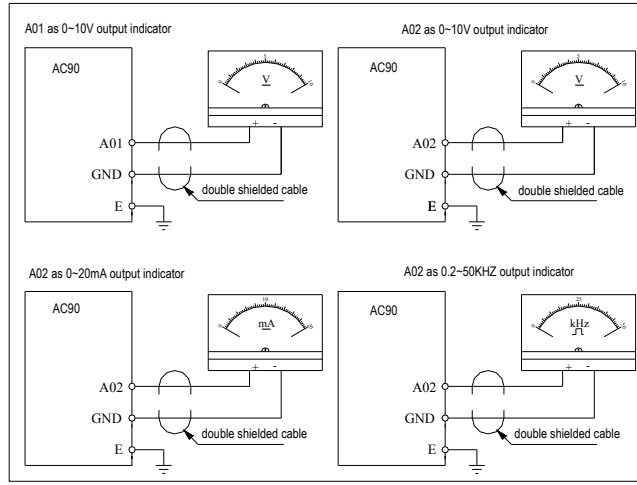



**Chart 3-24:AC90 series inverter analot output signal connection mode**

## Connection of pulse input signal

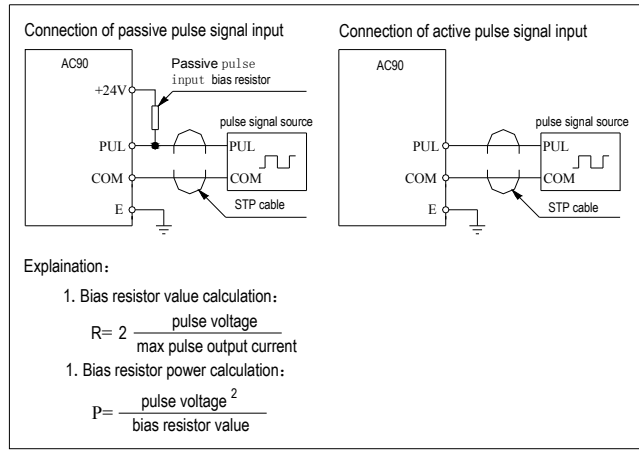



**Chart 3-25: Pulse input signal connection mode of AC90 series inverter**

## Standby control system

Frequency inverter is composed of semiconductor, passive electronic component and driving part. All of them have useful time, what means these parts may happen characteristic change or out of use while in normal working environment. And it will cause product fault. To avoid production stopping led by the fault, we suggest to prepare standby control system while use the inverter.

Chart3-23 is a standby control system for manual switch to power supply driving motor at inverter fault. 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 the actual requirement and environment.

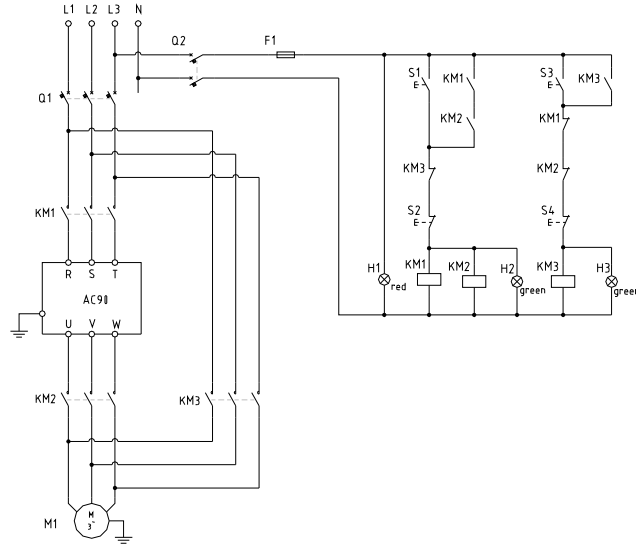



**Chart 3-24: Standby control system of power supply directly driving mode**

# Chapter 4 Basic Operation and Trial Run

## 4.1 Safety Precautions

| | |
|---|---|
| Danger | ● No wiring while power supply is connected.Otherwise there is danger of electric shock. |
| Warn | ● No operation while the cover is open.Otherwise, there is danger of electric shock.<br>● Please ensure reliable earth. Otherwise, there is danger of electric shock and fire.<br>● Before wiring please cut power supply of allrelated equipments and ensure main DC voltage in safe range. And please do operation after 5 mins.<br>● Only professional trained person is allowed to operate this product.<br>● Please do not dismantle the inverter cover while it is electrified. Otherwise, there is danger of electric shock.<br>● Please do not touch the printed circuit board of the inverter while it is electrified. Otherwise, there is danger of electric shock.<br>● Please ensure reliable mains cableconnection. If the mains cable is loose, thereis danger of fire caused by joint overheat.<br>● Before electrifying, please check the power voltage again. Wrong power voltage can cause fault or damage the inverter, even cause fire.<br>● Please do not install inverter on flammable material or attach flammable material to the inverter. Before electrifying, please clear the surroundings. |
| Important | ● While operation, please follow the ESD regulations. Otherwise, the inverter maybe damaged.<br>● 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.<br>● 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.<br>● 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.<br>● Unprofessional person can not operate, install, wiring, debug and maintain.<br>● 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 |
|---|---|---|
| PRG | 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. |
| SET | 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， given torque or magnetic powder cluth given torque while at standby or condition monitoring state （While given frequency, PID, given torque or magnetic powder cluth given torque are set by keyboard and [F4.04]） |
| ≪ | Shift key | Select digit of function no modified by up/down key； Select parameter digits modified by up/dowm key. Change LED monitoring items while standby or running. |
| FWD | 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 REV | Jog/reverse key | This key function can be defined by parameter [F4.02]. 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 | Stop/reset key | Machine stops if press it while run/stop is controlled by keyboard. Its efficiency range is defined via function no [F4.03]. Inverter resets if press it in fault state (no reset if fault is not solved). |
| | Keyboard potentionmeter | 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 | Digital display given requency. |
| | Hz | On | Digital display output frequency. |
| | A | On | Digital display actual output current. |
| | V | On | Digital display input voltage. |
| | V | Spark | Digital display output voltage. |
| | S | On | Time unit is second. |
| | S | Spark | Time unit is ms, min, or h. |
| | RPM | On | Digital display motor speed. |
| | % | Spark | Digital display given PID. |
| | % | On | Digital display PID feedback. |
| 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 |  | C |  | O |  |
| 1 |  | D |  | P |  |
| 2 |  | E |  | Q |  |
| 3 |  | F |  | R |  |
| 4 |  | G |  | S |  |
| 5 |  | H |  | T |  |
| 6 |  | I |  | U |  |
| 7 |  | J |  | V |  |
| 8 |  | K |  | W |  |
| 9 |  | L |  | X | No display |
| A |  | M |  | Y |  |
| B |  | N |  | Z | No display |

**Chart 4-2：Number and character table**

● **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.

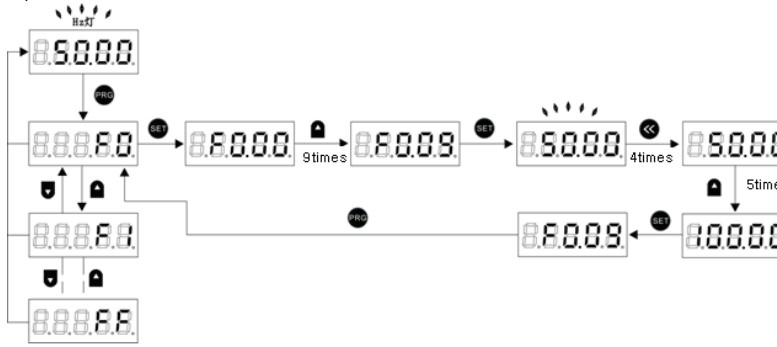



**Chart 4-1: Basic LED operation**

## 4.3 Basic operation

● **Parameter initialization**

After setting F0.19=1， parameter initialization is finished. Operation details as follows:

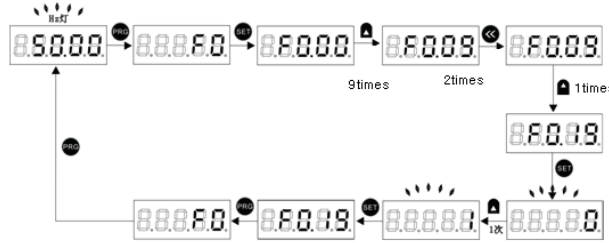



**Chart 4-2: Parameter initialization**

● **Core control mode selections**

Four core control mode selections：

0: VC without PG

1: V/F without PG

2: VC with PG

3: V/F with PG

Here we set F0.00=0（VC without PG control）as an example to introduce it

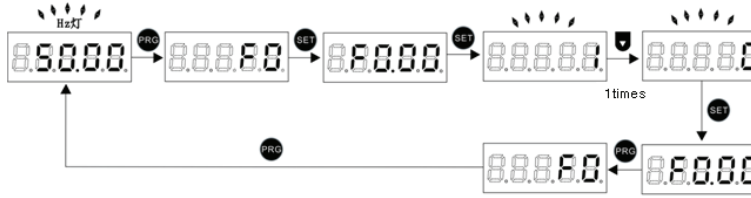



**Chart 4-3: Core control mode selections**

● **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:

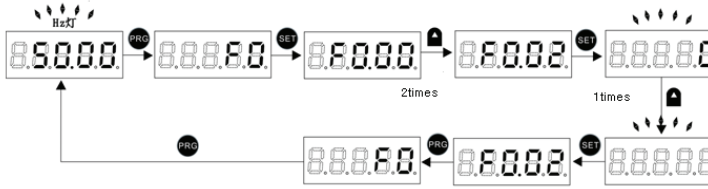



**Chart 4-4: Run command instructions**

It introducs 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 requency command instruction selections. Please refer to chapter 9 for details. Here we set F0.03=1(keyboard potentionmeter give frequency) as an example:

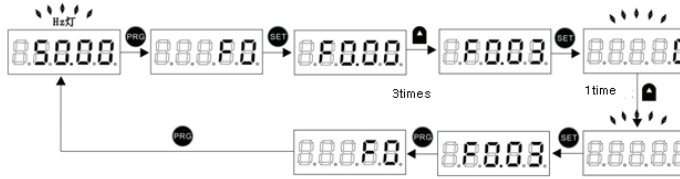



**Chart 4-5: Frequency command instructions**

● **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 Fa.00=2(speed track and start-up) as an example:

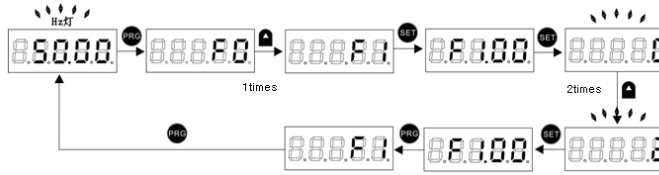



**Chart 4-6: Start-up mode selections**

● **Stop mode selections**

Three stop modes: 0: deceleration stop, 1: free stop, 2: all range DC braking stop. Here we set F1.07=1(all range DC braking stop) as an example:

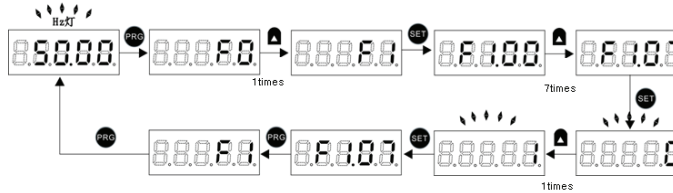



**Chart 4-7: Stop mode selections**

● **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:

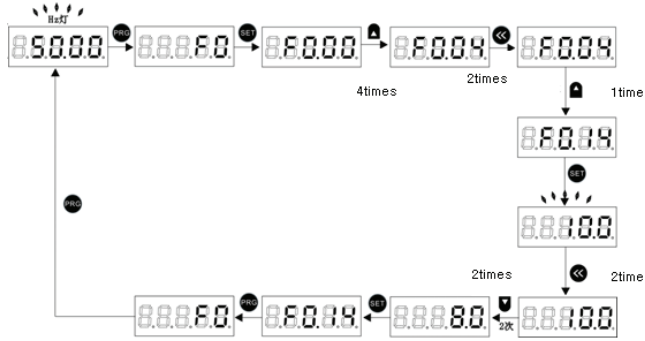



**Chart 4-8: Acceleration/deceleration time selections**

● **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:

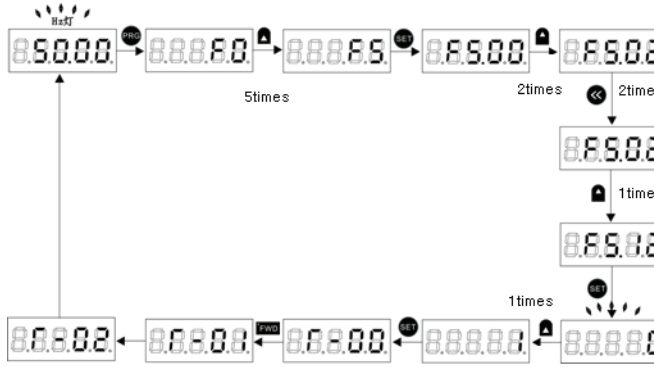



**Chart 4-9: Motor parameter setting**

● **Parameter copy function selection**

Set F4.05=1, send inverter parameter to keyboard and save:

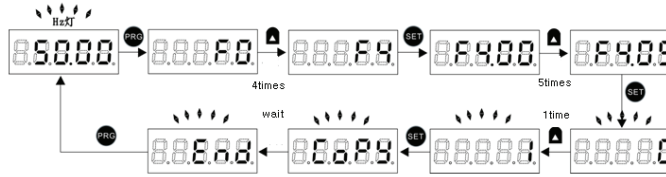



**Chart 4-10: Send inverter parameter to keyboard and save**

Set F4.05=2, send keyboard parameter to inverter:

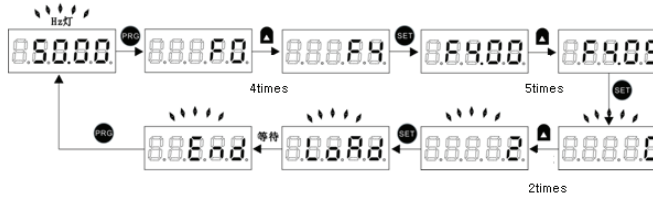



**Chart 4-11: Send keyboard parameter to inverter and save**

- **Run monitoring setting**

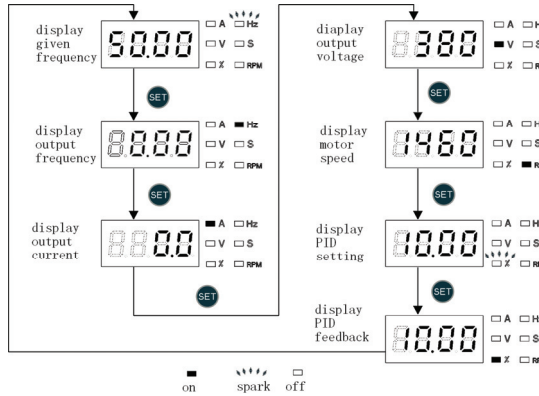



**Chart 4-12: Run monitoring setting**

## 4．4 Trial run

● **Trial run debugging guide**

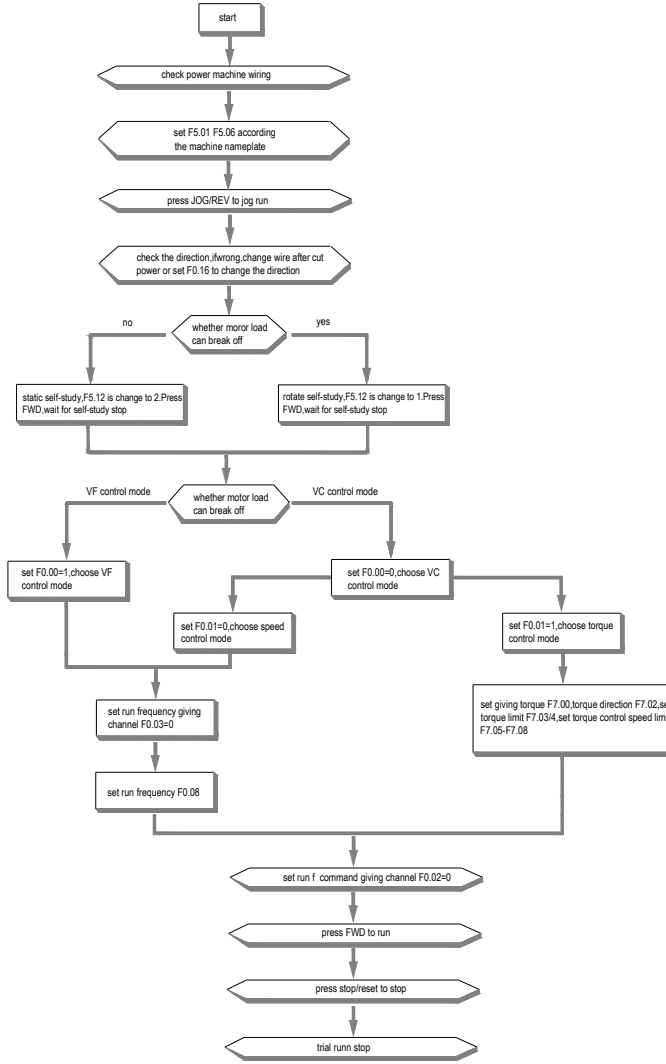



**Chart 4-13: Trial run**

● **Parameter self-tuning seletion**

Motor parameter self-tuning

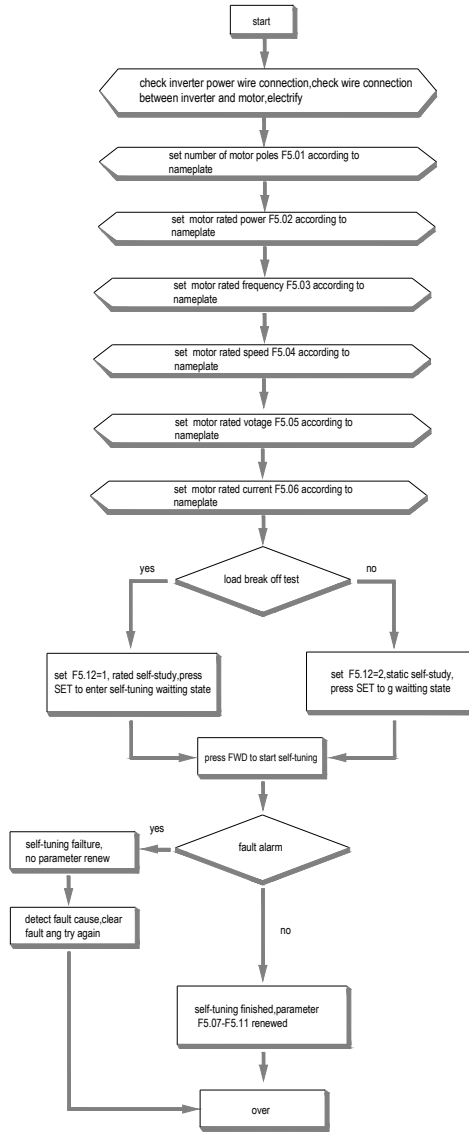



**Chart 4-14: Parameter self-tuning selections**

● **Frequency giving flow**

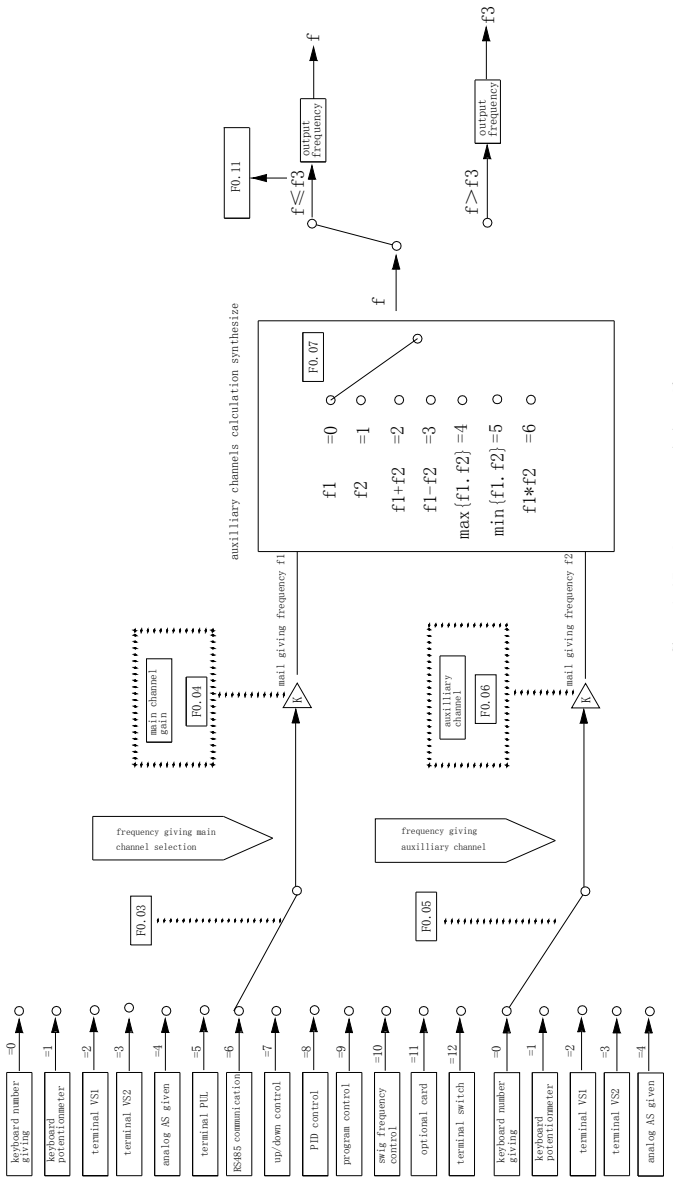



Chart4-15: frequency giving flow

● **Torque giving flow**

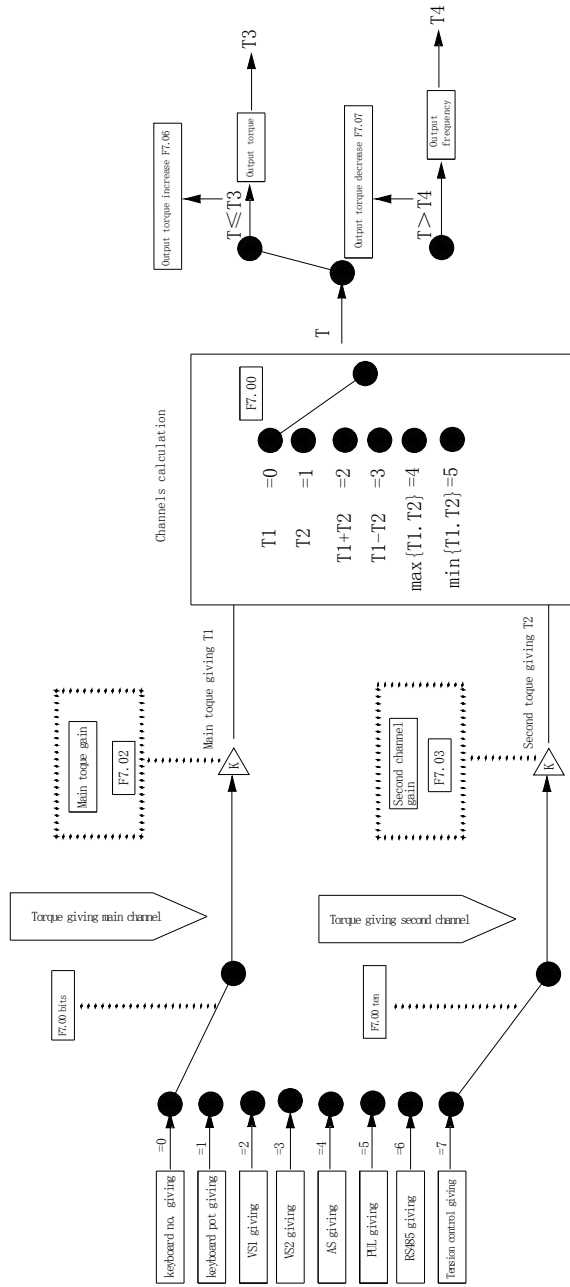



Chart4-16: Torque giving flow

● **Start/stop control flow**

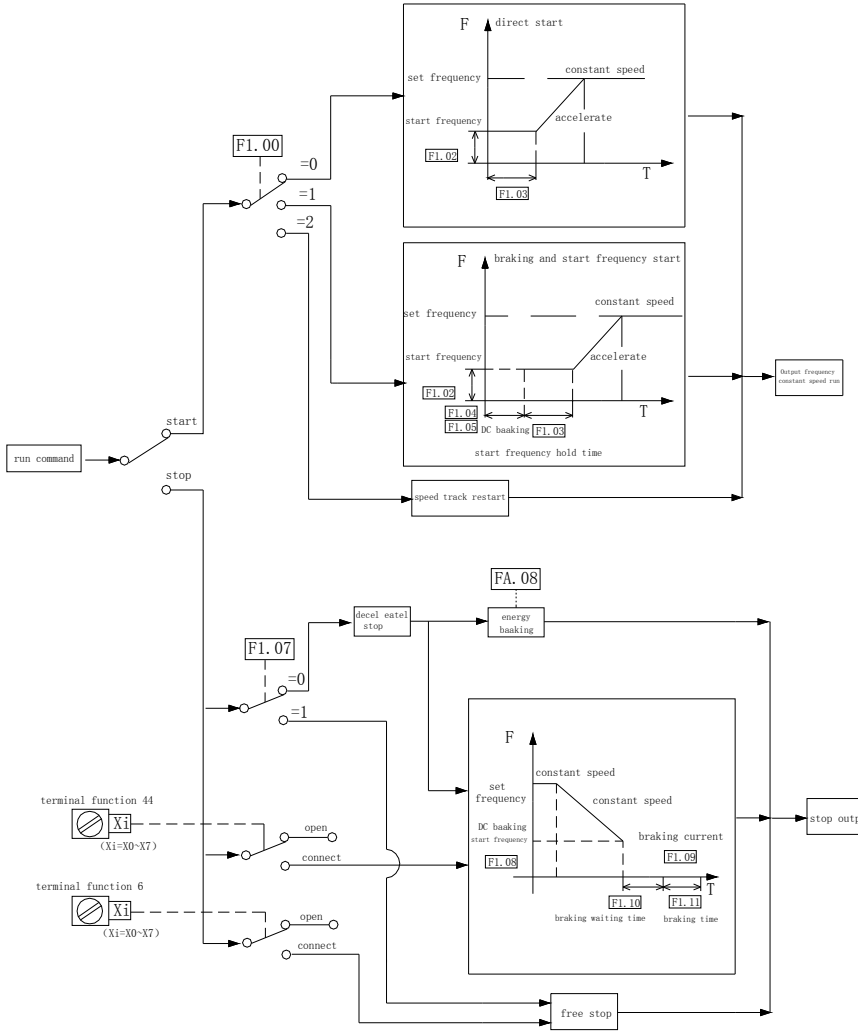



**Chart 4-17: Start/stop control flow**

● **Open-loop VC control（speed mode）**

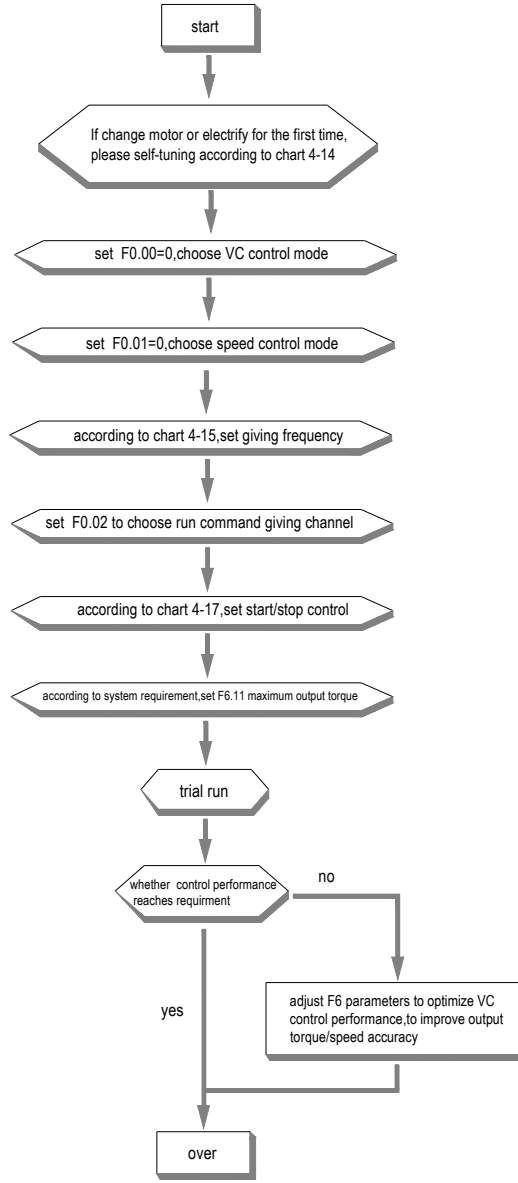



**Chart 4-18: Open-loop VC control**

● **Open-loop VC control（torque mode）**

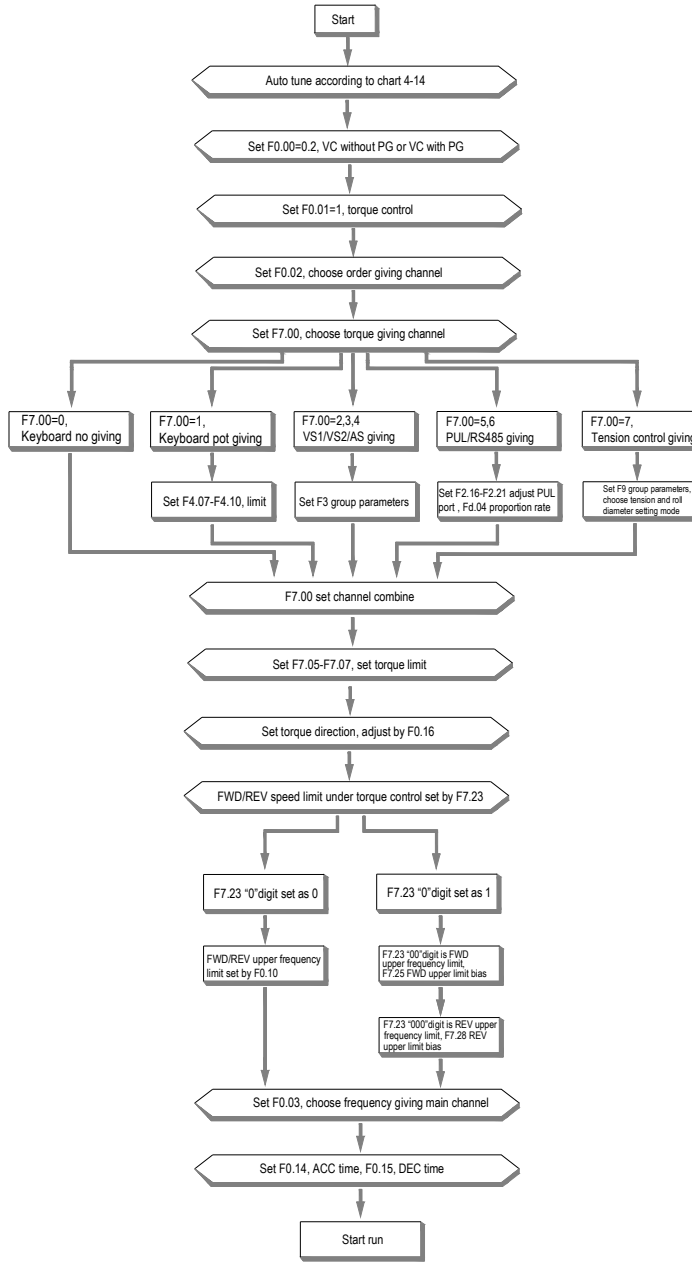



**Chart 4-19: Torque control**

● **Open-loop /closed loop VC control（Tension setting of torque mode tension control）**


**Chart 4-20: Tention setting under torque control mode**

● **Open-loop /closed loop VC control（Roll diameter setting of torque mode tension control）**


**Chart 4-21：Roll diameter setting of torque mode tension control**

# Chapter 5 Fault Diagnoses and Processing

This chapter explains the display contant 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 | While inverter detect fault, the state likes this:<br>● Keyboard display character showing fault content.<br>● Inverter stops output. Motor free slide stops.<br>● While function F2.22/F2.23 is set as 3(output fault), Y1/Y2 terminals output valid open-collector digital output.<br>● While function F2.24 is 3(fault output), TA-TC terminals output open passive digital output.<br>● While there is fault as OL, OC, SC, OV, UL2, if FA.15 is not 0, the inverter will restart automatically after FA.16 setting time. |
| External fault | 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. |

## 5.2 Fault information and details

| Keyboard display | Fault code | Fault type | Possible causes | Treatment |
|---|---|---|---|---|
|  | L.U.1 | Too low while stop | ● Power supply is too low<br>● Voltage detection circuit is abnormal | ● Check input power, eliminate fault.<br>● Seek support from factory. |
|  | E.LU2 | Too low voltage in run | ● Power supply is too low<br>● Power capacitance is too small, or there is big impact current in the power grid.<br>● Inner DC main contactor is not closed. | ● Check input input power, eliminate fault.<br>● Improve power-supply system.<br>● Seek support from factory. |
|  | E.oU1 | Acc over-voltage | ● Power voltage fluctuation over limit.<br>● Start running motor . | ● Detect power voltage and eliminate fault.<br>● Restart motor until it totally stop.Set F1.00 as 1or 2. |
|  | E.oU2 | Dec over-voltage | ● Deceleration time is too short.<br>● Load potential energy or inertia is too large.<br>● Power voltage fluctuation over limit. | ● Prolong deceleration time properly.<br>● Reduce load inertia or improve inverter capacitance or add braking unit.<br>● Detect input power and clear fault. |

| | | | | |
|---|---|---|---|---|
|  | E.oU3 | Constant speedover-voltage | ● Power voltage fluctuation over limit. | ● Detect input power voltage and eliminate fault.<br>● Install input reactor. |
|  | E.oU4 | Over-voltage while stop | ● Power voltage fluctuation over limit. | ● Check input power, eliminate fault.<br>● Seek support from factory. |
|  | E.oC1 | Acc over-current | ● Acceleration time is too short.<br>● Start running motor.<br>● V/F curve setting is not suitable.Or torque boost too high.<br>● Inverter capacitance is too small. | ● Prolong acc time.<br>● Restart motor until it totally stop.Set F1.00 as 1or 2.<br>● Reset V/F curve or torque boost value.<br>● Select inverter with right capacitance. |
|  | E.oC2 | Dec over-current | ● Deceleration time is too short.<br>● Load potential energy or inertia is too large.<br>● Power voltage fluctuation over limit. | ● Prolong deceleration time.<br>● Connect external braking resistance or braking unit.<br>● Select inverter with right capacitance. |
|  | E.oC3 | Constant speedover-current | ● Sudden load change.<br>● Power grid voltage is too low. | ● Check load change and eliminate it.<br>● Check input power, eliminate fault. |
|  | E.oL1 | Motor over-load | ● V/F curve setting is not suitable.Or torque boost too high.<br>● Power grid voltage is too low.<br>● Unright overload protection setting.<br>● Locked-rotor run or too heavy load.<br>● Universal motor long time low speed run. | ● Reset V/F curve or torque boost value.<br>● Check input power, eliminate fault.<br>● Unreasonable F5.06 setting.<br>● Adjust load or select inverter with right capacitance.<br>● If need long low-speed operation, please choose special motor for inverter. |
|  | E.oL2 | Inverter over-load | ● Load is too heavy.<br>● Acceleration time is too short.<br>● Start running motor.<br>● V/F curve setting is not suitable.Or torque boost too high. | ● Select inverter with right capacitance.<br>● Prolong acceleration time<br>● Restart motor util it totally stop. Set F1.00 as 1or2.<br>● Reset V/F curve or torque boost value. |
|  | E. SC | System abnormality | ● Acceleration time is too short.<br>● Short circuit between | ● Prolong acceleration time properly.<br>● Check periphery equipments |

| | | | | |
|---|---|---|---|---|
| | | | inverter output phases or earth.<br>● Module is damaged.<br>● Electromagnetic disturb. | and restart afrer fault eliminating.<br>● Seek support from factory.<br>● Check system wiring, earth, shield and deal as required. |
|  | E.oH1 | Inverter over-heat | ● Temperature is too high.<br>● Air channel is blocked.<br>● Fan connection parts is loose.<br>● Fan is damaged.<br>● Temperature detection circuit fault | ● Make the environment meet the requirement.<br>● Clear the air channel.<br>● Check and reconnect the wire<br>● Change the same new fan.<br>● Seek support from factory. |
|  | E.oH2 | Rectifier over-heat | ● Temperature is too high.<br>● Air channel is blocked.<br>● Fan connection parts is loose.<br>● Fan is damaged.<br>● Temperature detection circuit fault | ● Make the environment meeting the requirement.<br>● Clear the air channel.<br>● Check and reconnect the wire.<br>● Change the same new fan.<br>● Seek support from factory. |
|  | E.Fb1 | PID feedback over upper limit | ● PID feedback breaks.<br>● PID feedback channels parameter is set wrongly.<br>● Analog feedback channel is abnormal. | ● Check PID feedback wire.<br>● Check the PID feedback channel parameter setting.<br>● Seek support from factory. |
|  | E.Fb2 | PID feedback over lower limit | ● PID feedback breaks.<br>● PID feedback channels parameter is set wrongly.<br>● Analog feedback channel is abnormal. | ● Check PID feedback signal wire.<br>● Check the PID feedback channel parameter setting.<br>● Seek support from factory. |
|  | E.TE1 | Motorstatic detection fault | ● Detection overtime<br>● Start static detection while motor is running.<br>● Capacitance difference is too big between motor and inverter.<br>● Motor parameter setting mistake. | ● Check motor connection wire.<br>● Detect after motor stopping totally.<br>● Change inverter model.<br>● Reset parameter according to nameplate. |
|  | E.TE2 | Moror rotation detection fault | ● Detect while motor is running.<br>● Detect with load.<br>● Detection overtime<br>● Capacitance difference is too big between motor and inverter.<br>● Motor parameter setting mistake. | ● Detect after motor stop totally.<br>● Re-detect without load.<br>● Check motor connection wire.<br>● Change inverter model.<br>● Reset parameter according to nameplate. |

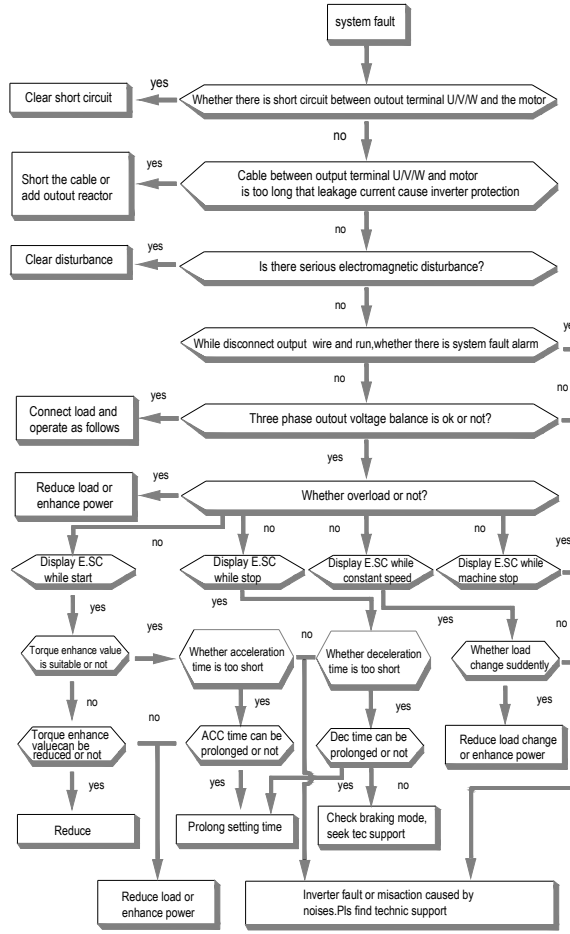
| | | | | |
|---|---|---|---|---|
|  | E.EEP | Memory fault | ● Electromagnetic disturb in memory period.<br>● EEPROM damage. | ● resume load and save.<br>● Seek support from factory. |
|  | LIFE | Reserved | ● | ● Seek support from factory. |
|  | E.ILF | Input side open phase | ● 3-phase input power open phase. | ● Check 3-phase power supply and the phase.<br>● Check 3-phase power supply wiring. |
|  | E.oLF | Ouput side open phase | ● 3-phase output power open phase | ● Check 3-phase output voltage and current.<br>● Check wiring. |
|  | E.Gnd | Output earth | ● Output earth terminal short circuit. | ● Check wiring and insulation. |
|  | E.HAL | Current detection fault | ● Detect circuit fault.<br>● Phase imbalance | ● Seek for technic support.<br>● Check motor and wiring. |
|  | E. EF | Inverter external fault | ● Peripheral equipment fault protection. | ● Check peripheral equipment. |
|  | E.PAn | Keyboard connect fault | ● Keyboard wire fault.<br>● Keyboard component damage. | ● Check keyboard wire.<br>● Seek support from factory. |
|  | E. CE | Rs485commu nication fault | ● Unsuitable baud rate setting.<br>● Communication wire breaks.<br>● Communication format does not match upper machine. | ● Set suitable baud rate setting.<br>● Check communication wire.<br>● Set right communication format. |
|  | E.CPE | Parameter copy fault | ● Parameter copy communication is fault.<br>● Copy keyboard is not match the inverter. | ● Check wire.<br>● Select the specified external keyboard model. |
|  | E.ECF | Extend card connection fault | ● Communication between extend card and frequency inverter overtime.<br>● Extend card does not match frequency inverter. | ● Check connector, and re-insert wire.<br>● Choose the named card. |
|  | E.PG | PG card connection abnormal | ● PG card and inverter connection failure | ● Check the connection |

| | | | | |
|---|---|---|---|---|
| E.P id | E.PID | PID feedback failure | ● PID feedback upper limit of disconnection alarm is improper<br>● PID feedback lower limit of disconnection alarm is improper<br>● PID feedback wiring unreliable<br>● Sensor with feedback failure<br>● Feedback input loop failure | ● Confirm the sensor state, if broken, change it.<br>● Repair the wiring.<br>● Confirm the setting value of [Fb.16] and [Fb.17]. |

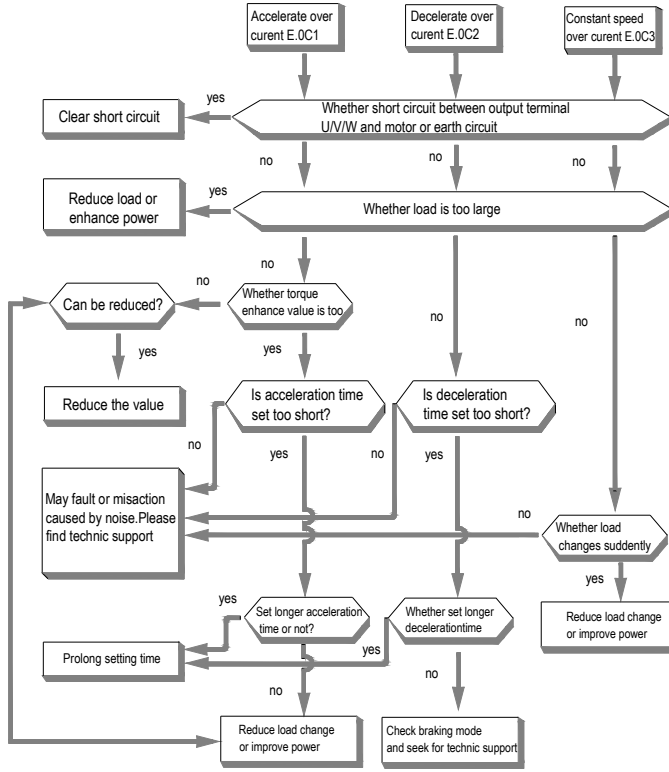
**Chart 5-1: Fault information and details**

## 5.3 Fault diagnoses process

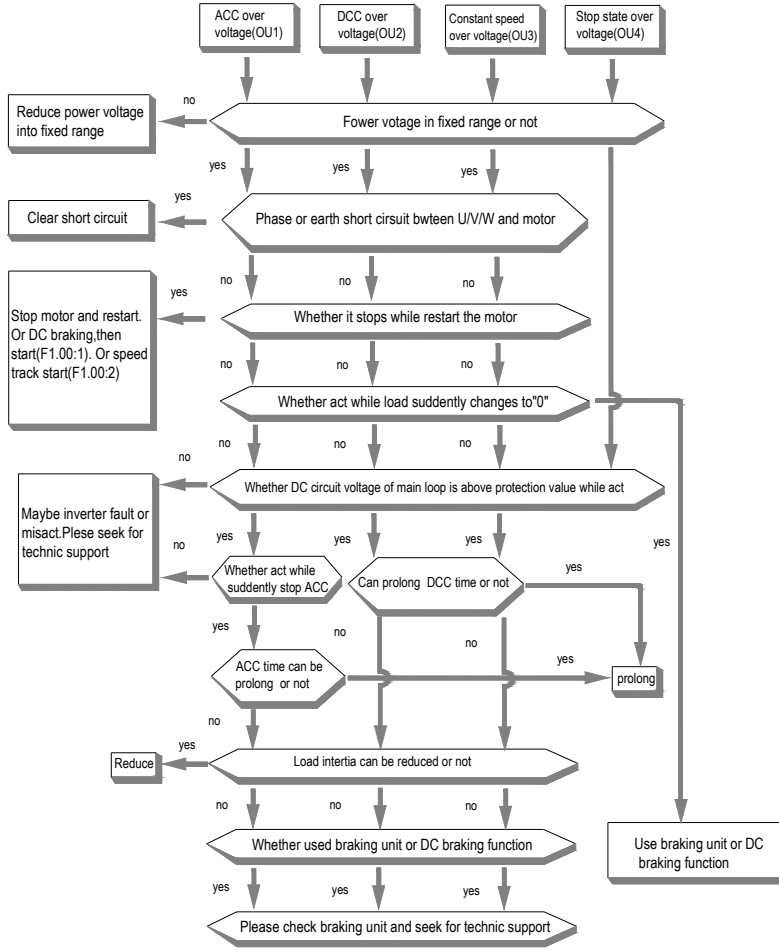
### System fault diagnoses process



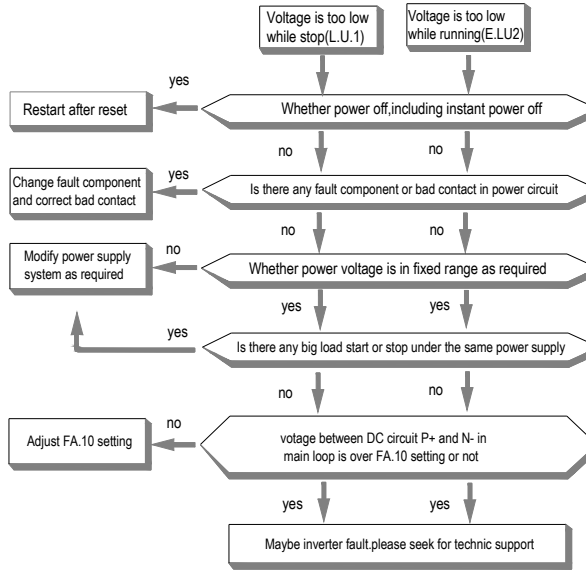
## Over current diagnoses process



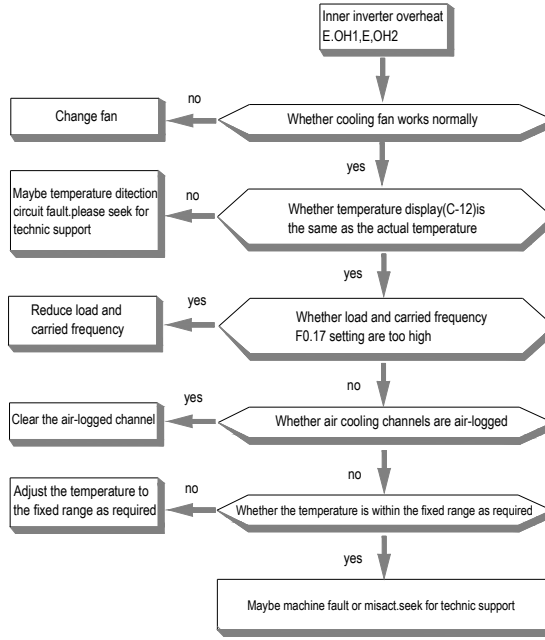
## Over voltage diagnoses process



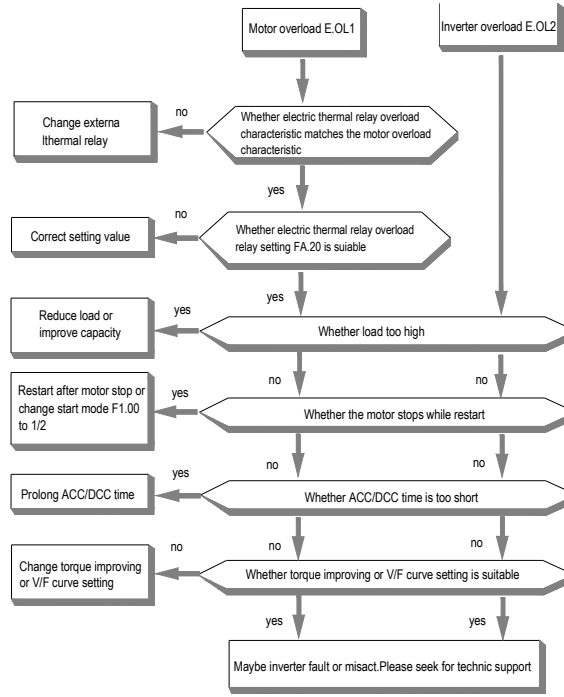
## Supply voltage is too low



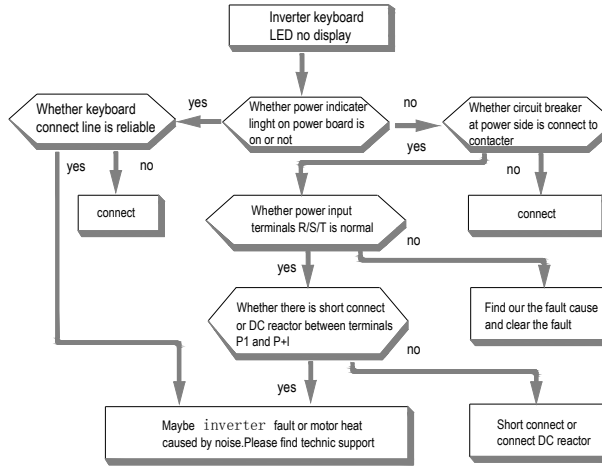

## Inner inverter over heat



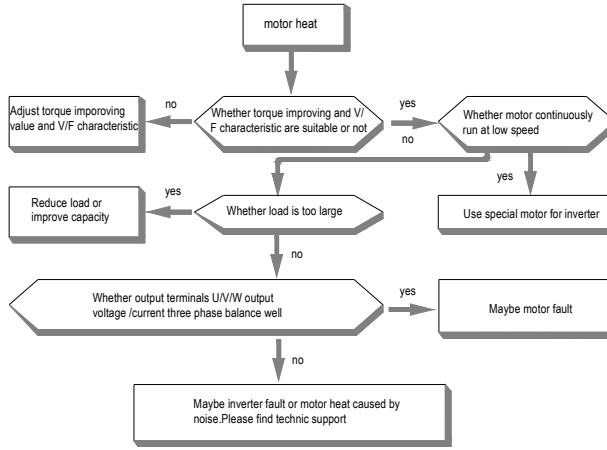
## Over load



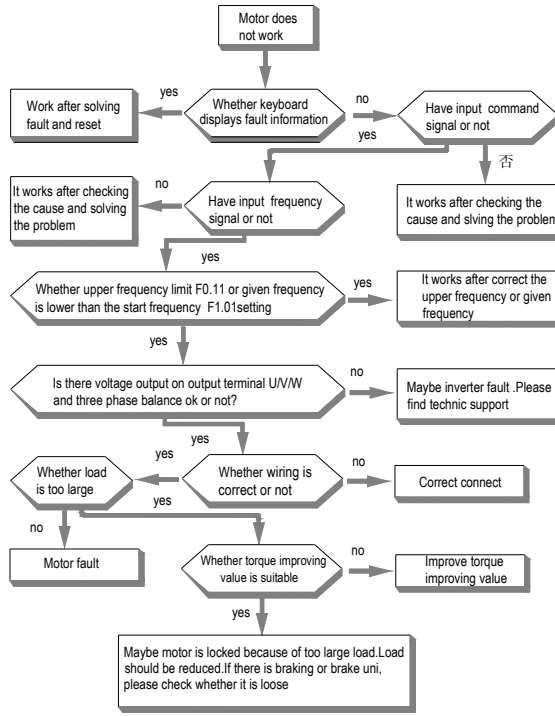

## No display



## 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.

| | |
|---|---|
|  | ● No operation under power connected state. Otherwise, there is danger of electric shock even death.<br>● Before operation, please cut all related equipments power, ensure that the main circuit DC current has droped to safe range. And please operate after 5 mins. |
|  | ● No operation while cover/panel is dismantled. Otherwise there is danger of electric shock even death.<br>● Do not dismantle the cover or PCB under power connected state. Otherwise there is danger of electric shock death.<br>● Only professional person can maintain or change fittings. Otherwise, there is danger.<br>●Do not wear loose clothes when install, debug, maintain. Related protective tools and safeguard should be adopted.<br>● Tighten screw according to named torque. If main circuit wire connection is loose, there is danger of overheat fire.<br>● Machine and motor earth must be reliable. Otherwise, there is danger of electric shock if touch the cover. |
|  | ● While operation, please follow the ESD regulations. Otherwise, the inverter maybe damaged.<br>● Do not change the circuit or structure of the inverter. Otherwise, the inverter maybe damaged.<br>● Please confirm the rotate direction while no-load. Wrong direction can bring body injury or huge wealth loss.<br>● 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 fluctuant 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;<br>Check circumstance. | Tighten and change bad component;<br>Clear and improve circumstance. |
| Electric connection | ● Check whether the wire and connector color changes, whether there is disrepair, crack color change or aging in insulated layer.<br>● Check whether the connect terminals are frayed, damaged or loose.<br>● Earth checking. | ● Change bad wire.<br>● Fasten terminals and change bad terminals.<br>● Measure earth resistance and fasten earth terminals. |
| Mechanical connection | ● Check if there is abnormal vibration or noise or something is loose. | ●Tighten, lubricate and change the bad components. |
| semi-conductive component | ● Check whether there is dust or rubbish.<br>● If there is obvious out change? | ● Clean operation environment<br>● Change damaged component |
| Electrolytic capacitor | ● Whether there is liquid leak, color change or crack. Whether the safety valve outcrop, inflation, creak or liquid leak. | ● Change damaged component |

| | | |
|---|---|---|
| Peripheral equipment | ● Peripheral equipment outlook and insulation checking. | ● Clear and change damaged component. |
| PCB | ● Peculiar smell color change, bad rust and connector checking. | ● Fasten connector.<br>● Clear PCB.<br>● Change damaged PCB. |
| Cooling system | ● Check whether the fan is damaged or blocked up.<br>● Whether rubbish and dust is sticked to the heatsink.<br>● Is air inlet/outlet blocked? Or is there something sticking to the inlet/outlet. | ●Clean operation environment.<br>● Change damaged component. |
| Keyboard | ● Whether it is damaged. Check whether display is complete. | ● Change damaged component. |
| Motor | ● Check if there is abnormal vibration or noise. | ● Tighten machine and electric connection and lubricate the machine components. |

Warn

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 droped to safe range. And please operate after 5 mins.

## 6.3 Maintenance

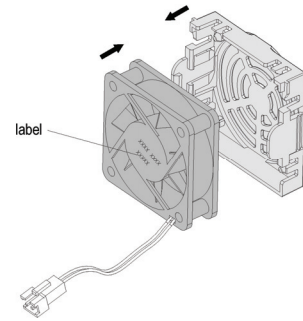
All equipments and components have useful life. Right maintenance can prolong the lifetime. But it can not avoid damage. Please change the components before their lifetime over.

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

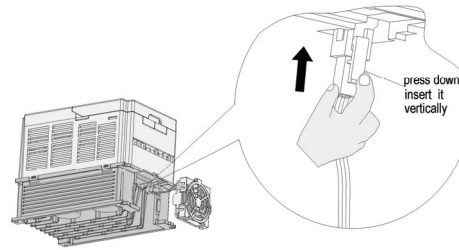
● **Fan**

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.

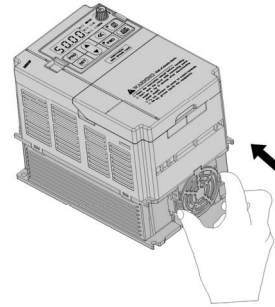
● **Fan change method:**



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

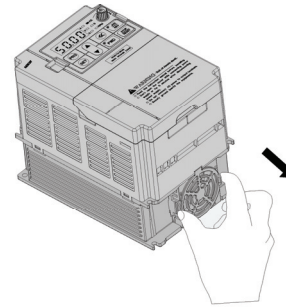



2. Press the elastic clip of the fan by finger toward the inner side and insert the leading terminal of the fan vertically by a little strength.

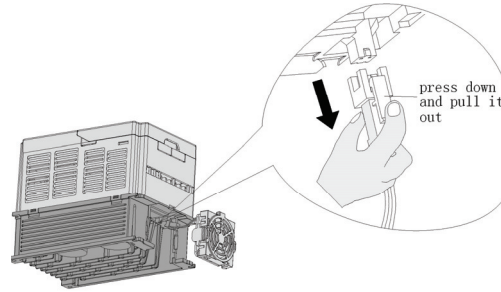


3. Insert the two elastic clips of the fan cover vertically into the fan installation slots.

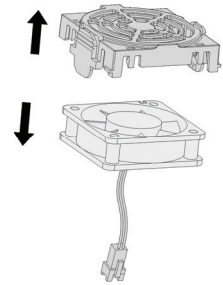
- **Fan dismantlement：**



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.

Warn

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 droped 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 Shenzhen 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.

| | |
|---|---|
| Danger | ● No operation under power connected state. Otherwise, there is danger of electric shock.<br>●Before operation, please cut all related equipments power, ensure that the main circuit DC current has droped to safe range. And please operate after 5 mins. |
| Warn | ●No operation while cover/panel is dismantled. Otherwise, there is danger of electric shock.<br>●Do not dismantle the cover or PCB under power connected state. Otherwise, there is danger of electric shock.<br>●Only professional person can install, debug or maintain the peripheral equipments and options. Otherwise, there is danger.<br>●Do not ware loose clothes when install, debug, maintain. Rated protective tools and safeguard should be adopted.<br>●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.<br>●Tighten screw according to named torque. If main circuit wire connection is loose, there is danger of overheat fire.<br>● Earth of the peripheral equipments and options must be reliable to prevent human body injury. |
| Important | ●While operation, please follow the ESD regulations. Otherwise, the inverter maybe damaged.<br>●Do not cut the power supply while the inverter is outputting voltage. Otherwise, the inverter maybedamaged. |

## 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 ultraharmonics 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 ouput 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 absorbable unit | Restrain surge voltage while main loop switch components act. |
|  | Winding surge absorbable unit | Restrain surge voltage when the AC contactor acts. |

## 7.3 The use of peripheral equipments

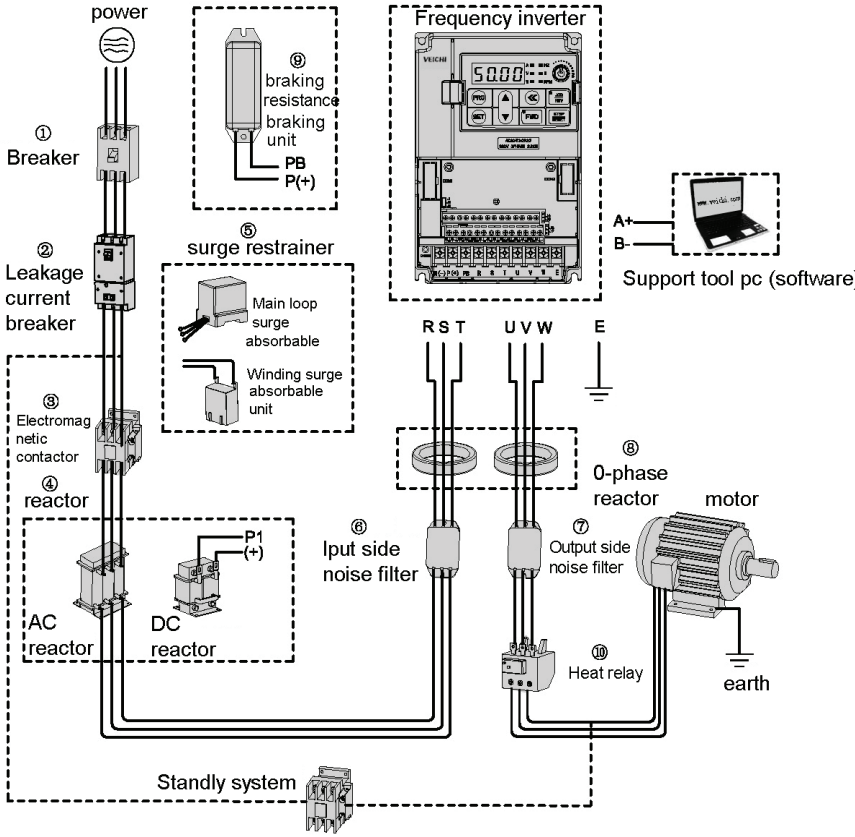



**Chart 7-1: Peripheral equipments connetion fig**

**Note：**

**① Wiring breaker**

To ensure wiring safe, protect power system and prevent malfunction impact other equipments 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.

Caution 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.

Warn 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;

MI/RFI filter.

To protect human body and inverter, pleast 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 carring 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 ultraharmonics 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.

The DC reactor, whose parameters are designed only for individual odd harmonic, is built inside AC90 series (90KW above). If user has higher requirement on other harmonic restraint, please connect the external DC reactor (The DC reactor is built inside AC90 series frequency inverter. At the same time, the external DC reactor connetion terminal is fetched out. They are in series structure). 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.20] 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 hig.

**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.20] 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 two 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.

# Chapter 9 Function Parameter specifications

## 9.1 Basic parameters

| F0.00 | Control way | Setting range: 0-3 | Factory set: 0 |
|---|---|---|---|

**0: VC without PG** means vector control mode without speed sensor. It is used for all variable speed control. Please set this mode while need high accurate speed control.

Under this mode, even no motor feedback signal, torque cans response quickly. The motor can gain large torque even at low running speed.

**1: V/F without PG** control voltage/frequency ratio all can change speed. It is especially suitable for one frequency drive multi-motor application. It improves the current speed control system.

This mode is used for all speed control system while quick response and right speed control are unnecessary, or motor not clear or can't self study.

**2: VC with PG** means vector control mode with speed sensor. This mode is used for all speed control system that torque response is quick and needs high performance torque control. It can be for high accurate speed control to 0 speeds. To receive motor speed feedback signal, please use optional PG card.

It is mainly used for application requires strict control performance, such as: high accurate speed control system, high accurate torque control, simple servo control and so on.

**3: V/F with PG** can be used for simple speed feedback control. Please set this mode when need slow respond, but right speed control, especially occasions that PG feedback does not install on motor spindle, or occasions that motor not clear or can't self study.

**Note: 1. PG: usually means photoelectricity inspects speed pulse encoder. While use other speed inspect card, other sensor can be used for speed feedback.**

**2. While choose 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.**

**3. Rightly setting VC control parameters to ensure good stabile and dynamic control performance. For VC control parameter setting and adjustment, please refer to details of F6 parameter groups.**

**4. While choose 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 rating bigger or 1 rating smaller than the motor. Otherwise, it will descend the control performance. Or the drive system can't run normally.**

**5. While choose VC with PG or V/F with PG control, must rightly set [F5.15--F5.17] parameters.**

**6. While choose V/F control mode must rightly set V/F control parameters F8.**

| F0.01 | Control mode | Setting range: 0-1 | Factory set: 1 |
|---|---|---|---|

**0: Speed mode.** Frequency control motor speed by control output frequency to control system speed.

Under vector control way, take speed precision control as aim to improve the motor features. For heavy load, the inverter output is controlled by the vector operation, so as to enhance the torque to change the output torque of the motor. For lighter loads, the inverter will quickly reduce output in order to ensure that the motor speed.

The inverter drives motor as ACC/DEC time setting to start. While accelerate to start, it ensures the fixed torque of the motor, at the same time ensures a smooth deceleration of motor torque while slow down.

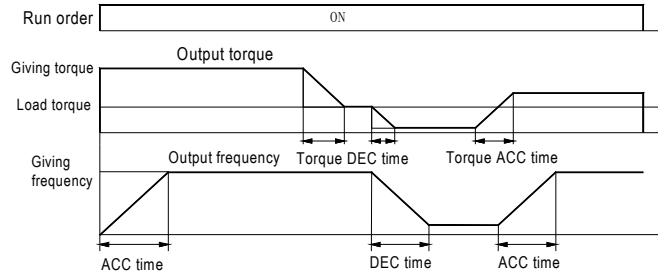
The motor speed is determined by the inverter output frequency; Inverter maximum output torque is determined by the **[F6.11]**. Under speed control, the giving frequency settings and adjustments see parameters **[F0.03 to F0.07]**.

Under vector control and speed control mode, response speed of the inverter to the external load changes can be improved by adjusting the ASR (speed loop), see parameter **[F6.00 to F6.10]**.

**1: Torque mode.** Inverter takes the motor output torque as control objectives, and applies tension control needs occasions. Under torque control, the inverter output frequency is determined by the set torque and load torque. If the set torque is greater than the load torque, motor speed will increase; if the set torque is less than the load torque, motor speed will decrease.

Torque control is effective only when set as vector control without PG or with PG.

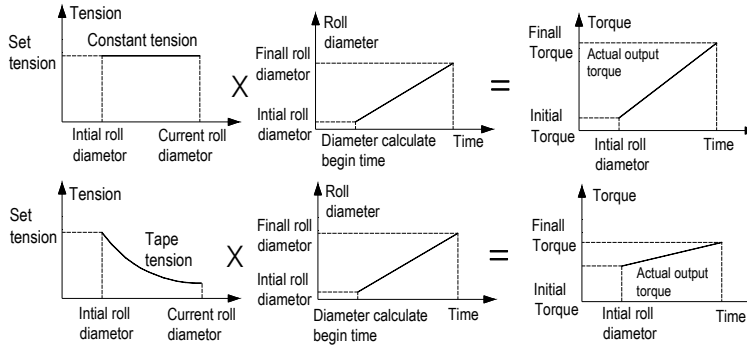
While take motor torque as the control aim, the F7 group parameters are valid. Torque giving set by the parameter **[F7.00 to F7.03].** Under this mode, the frequency set channel is still valid, and used to limit the maximum speed of motor. While set torque is greater than the load resistance torque, motor speed will rise to set frequency as set acceleration time **[F0.14]**, and limit at the set frequency value. Right acceleration time settings can effectively relieve the impact to the stretch material while motor speed rises. However, while the load resistance torque is greater than the set torque, the inverter make the motor quickly reduce the speed without the deceleration time impact; While the resistive torque and setting torque in balance, the inverter will allow motor steady speed running. Right set frequency to prevent the motor coaster phenomenon.




Relationship between torque and speed under

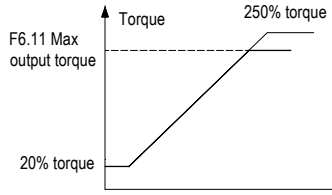
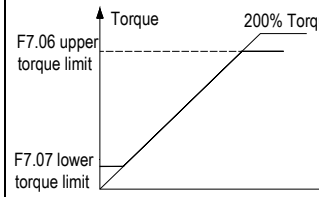
Tension control what is torque control aimed at set giving tension, is one function of torque control. No need tension sensor under this mode.

When the material tension is the control aim, the F7.00 is set to 7, then the the F9 parameter group is valid. The inverter can automatically calculate the output torque of the motor via paramerters such as giving tension, roll diameter and mechanical drive ratio, suitable for the occasion needs tension control. Roll diameter is important parameter which must be gain under tension control. Roll diameter calculation method of the inverter includes the linear speed calculation, the thickness calculation, and time calculation. It can also receive analog signals, communications number given to get the current roll diameter. Detials see parameters **[F9.11]**. You can use a variety of given mode for tension settings. While tension taper can be set to make it keeps tight-in-easy-out in the process of winding to ensure that rolling molding, detailed parameters **[F9.01 to F9.06]**.




Tension control under torque control mode

**Control mode:** Choose right control mode base on need.The different features as below:

| Control mode | 0: Speed mode | 1: Torque mode |
|---|---|---|
| Frequency and torque | Output frequency range:0-upper limit frequency Output frequency is controlled by giving frequency. Output torque equal to load torque. | Output frequency range:0-upper limit frequency Output frequency is not only limitedby giving frequency, but also the load torque. While the out torque is bigger than the giving torque, frequency will reduce. Otherwise, the frequency is milited by the giving frequency. |
| Torque range |  Torque range under speed mode |  Torque range under torque mode |
| Features and application | Take motor speed as aim, quick repond to load and keep stable speed. It is suitable where need exact speed. | Take motor output torque as aim; keep stable speed while with multi roll diameter calculation functions. It can be for constant tension and with tape winding and unwinding. |

| F0.02 | Run command channel | Setting range: 0-3 | Factory set: 0 |
|---|---|---|---|

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 **[F4.02]** set as "0" and jog while **[F4.02]** set as "1". Please refer to details of **[F4.02]**.

**1: Terminal control** Factory default as two line mode 1 control mode. Under two line mode 1, inverter run, stop and direction is controlled by whether "FWD" or "REV" set for **[F2.00-F2.07]** "multi function input terminal" connects to control board terminal (COM) or not. "FWD" and "REV" definition refer to **[F2.00-F2.07]**. While under other control mode, run, stop and direction refer to **[F2.12]**.

**2: RS485 communication control** Inverter run, stop and direction is controlled by the signal received by RS485 communication terminal. Details refer to FD communication control parameter group and appendix 2: RS485 communication protocol.

**3: Optional card** Inverter run, stop and direction is controlled by the signal received by optional card input signal. For the optional card installation, parameter setting and soon, 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 [F4.03]. 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 give main channel selection | Setting range: 0-12 | Factory set: 0 |
|---|---|---|---|

It is used to select frequency given gain channel. The main and assistant channels relationship can be defined by parameter **[F0.07]**.

**0: Keyboard number setting** Given frequency of the main channel is given and modified by **[F0.08]** keyboard numbers setting frequency. While parameter **[F4.04]** LED "0" digit "keyboard up/down key modification selection" is set as "1", no matter inverter is run or stop, **[F0.08]** setting value can be quickly modified by keyboard up/down key directly. Whether store the value modified by the shortcut key is decided by **[F4.04]** LED "00"digit.

**1: Keyboard potentiometer given** Main channel given frequency is given and modified by keyboard potentiometer. Please refer to **[F4.07-F4.10]** details for the relationship between keyboard potentiometer and frequency.

**2: Terminal VS1 voltage analog** Main channel given frequency is given and modified by **(VS1)** input analog. Please refer to **[F3.00-F3.04]** details for the relationship between input analog filter time and frequency.

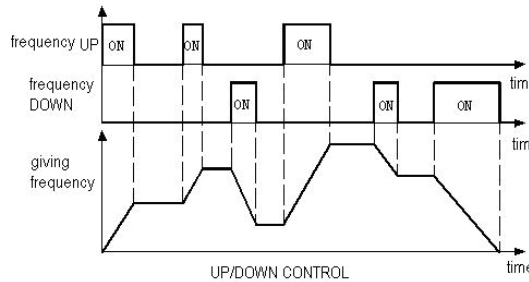
**3: Terminal VS2 voltage analog** Main channel given frequency is given and modified by **(VS2)** input analog. Please refer to **[F3.05-F3.09]** details for the relationship between input analog filter time and frequency.

**4: Terminal AS current analog** Main channel given frequency is given and modified by **(AS)** input analog. Please refer to **[F3.10-F3.14]** details for the relationship between input analog filter time and frequency.

**5: Terminal pulse signal** Main channel given frequency is given and modified by **(PUL)** input pulse signal. Please refer to **[F2.16-F2.21]** details for the relationship between input pulse signal and frequency.

**6:RS485 communication port:** Main channel given frequency is given and modified by the signal accepted by RS485 communication port **(A+)** and **(B-)**. Please refer to Fd communication control parameter groups and appendix 2: RS485 communication protocol details.

**7: UP/DOWN control** Main channel given frequency is given and modified by if UP terminal is connected to DOWN terminal or not, what is set by multi-function terminals **(X1-X8)**. Anyone of the **(X1-X8)** terminals can be defined as UP and DOWN. Please refer to **[F2.00-F2.07]** details. UP, DOWN store and clear mode after adjustment can be set by **[F2.22]**. Please refer to **[F2.22]** details. ACC AND DEC of UP/DOWN control running given frequency is set by **[F2.23]**. UP/DOWN variation frequency can be cleared to 0 at any time by "UP/DOWN clear 0" terminal. Details see **[F2.00-F2.07]**.




**8: PID control given**This channel is selected for PID closed loop control system. PID control is the control mode makes feedback the same as the target. Refer to PID control parameters "Fb".

Under this mode, while **[F4.04]** LED "0" digit is set as 3 by keyboard UP/DOWN key; **[Fb.01]** can be modified by UP/DOWN key. Whether save the modification is decided by **[F4.04]** LED "00" digit.

PID control state and trait are changed by multifunction terminals. Details refer to **[F2.00-F2.07]**.

**9: Program control (PLC) given** Main channel 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 **[F0.07]** LED "00" digit is 0, frequency control direction is invalid. While **[F0.16]** is set as 2—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 control be 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-F2.07]**.

**10: Reserved**

**11: Optional card** Main channel given frequency is controlled by input signal by optional card. For optional card installation, parameter setting please refers to user manual.

**12: Terminal switch** Frequency setting main channel is selected by frequency selection terminal which can be defined by any multi function terminal. See **[F2.00-F2.07]** please. Relation table between terminal state and frequency setting channel:

| Frequency setting selection terminal 4 | Frequency setting selection terminal 3 | Frequency setting selection terminal 2 | Frequency setting selection terminal 1 | Frequency setting channel |
|---|---|---|---|---|
| OFF | OFF | OFF | OFF | Keyboard number give |
| OFF | OFF | OFF | ON | Keyboard potentiometer give |
| OFF | OFF | ON | OFF | Voltage analog VS1 give |
| OFF | OFF | ON | ON | Voltage analog VS2 give |
| OFF | ON | OFF | OFF | Voltage analog AS give |
| OFF | ON | OFF | ON | Terminal pulse PUL give |
| OFF | ON | ON | OFF | RS48 communication give |
| OFF | ON | ON | ON | UP/DOWN control |
| ON | OFF | OFF | OFF | PI control give |
| ON | OFF | OFF | ON | PLC give |
| ON | OFF | ON | OFF | Reserved |
| ON | OFF | ON | ON | Optional card |

Combination details refer to multistep speed time order of "FC" parameter.

**Note: valid combination of frequency selection terminal is 0-11(algorism). Frequency inverter will output 0.00Hz if not within this range. "OFF"in the table means invalid. "ON" means valid.**

| F0.04 | Main channel gain | Setting range: 0.000-5.000 | Factory setting: 1.000 |
|---|---|---|---|

It is used to magnify or reduce the main channel input signal, can adjust given frequency of main channel at prorate.

| F0.05 | Frequency give auxiliary channel selection | Setting range: 0-6 | Factory setting: 1 |
|---|---|---|---|

It is used to select auxiliary channel for frequency given, directly control or impact output frequency of frequency inverter. Relationship between main channel and auxiliary channel can be defined by **[F0.07]**.

**0: Keyboard number setting** Given frequency of auxiliary channel is given and modified by **[F0.08]** keyboard number set frequency. While **[F4.04]** LED "0" digit is set as 1 by UP/DOWM key, **[F0.08]** can be quick modified by UP/DOWN key whether frequency inverter is running or stop.Whether save is decided by **[F4.04]** LED "00" digit.

**1: Keyboard potentiometer** Given frequency of auxiliary channel is given and modified by potentiometer.Detail refer to **[F4.07-F4.10]**.

**2:Terminal VS1 voltage analog** Given frequency of auxiliary channel is given and modified by control terminal **(VS1)**. Input analog.Detail refers to **[F3.00-F3.04]**.

**3:Terminal VS2 voltage analog** Given frequency of auxiliary channel is given and modified by control terminal (**VS2**).input analog.Detail refer to **[F3.05-F3.09]**.

**4:Terminal AS current analog** Given frequency of auxiliary channel is given and modified by control terminal **(AS)**.input analog.Detail refer to **[F3.10-F3.14]**.

**5:Terminal pulse signal** Given frequency of auxiliary channel is given and modified by control terminal **(PUL)**.input analog.Detail refer to **[F2.16-F2.21]**.

**6: RS485 communication** Given frequency of auxiliary channel is given and modified by signal accepted by RS485 communication port **(A+)** and **(B-)** input analog.Detail refer to Fd communication control parameter group and appendix 2: RS485 communication protocol.

| | | | |
|---|---|---|---|
| F0.06 | Auxiliary channel gain | Setting range: 0.000-5.000 | Factory set: 1.000 |

It is used to magnify or reduce the main channel input signal, can adjust given frequency of main channel at prorate.

| | | | |
|---|---|---|---|
| F0.07 | Frequency give channels combinations mode | Setting range: 0000-0016 | Factory set: 0000 |

**LED "0" digit: ombination mode selection** It is used to select the combination of the main input channel and the auxiliary input channel of the give frequency.

**0: Main channel valid** Only main channel **[F0.03]** is valid, auxiliary channel **[F0.05]** is invalid.

**1: Auxiliary channel valid** Only auxiliary channel **[F0.05]** is valid, main channel **[F0.03]** is invalid.

**2: Main+auxiliary** The sum of main channel **[F0.03]** adds auxiliary channel **[F0.05]** is the output frequency of the inverter.

**3: Main-auxiliary** The result of main channel **[F0.03]** minus auxiliary channel **[F0.05]** is the output frequency of the inverter.

**4: MAX {main, auxiliary}** The bigger one of main channel **[F0.03]** and auxiliary channel **[F0.05]** is the output frequency of the inverter.

**5: MIN {main, auxiliary}** The smaller one of main channel **[F0.03]** and auxiliary channel **[F0.05]** is the output frequency of the inverter.

**6: Main*auxiliary** Given frequency of main channel **[F0.03]** multiply certain percent which is percent of given frequency of auxiliary channel **[F0.05]** responding to max frequency **[F0.09]**.The result is output frequency of the frequency inverter.

**LED "00" digit: frequency control direction selection** It is used to select whether permit negative frequency change the running direction of the frequency inverter while the result is negative.

**0: invalid** If result is negative, frequency inverter output 0.00Hz.

**1: valid** If result is negative, frequency inverter change running direction and output relative frequency.

**LED "000" digit: reserved**

**LED "0000" digit: reserved**

**Note: 1. While main*auxiliary, frequency only count positive value. While any channel frequency is negative, count as 0.00Hz, frequency inverter output 0.00Hz.**

**2. Can't main+auxiliary while JOG and multi step speed running.**

**3. While rotate direction selection [F0.16] is set as REV forbid, whatever frequency control direction selection is set, frequency inverter outputs 0.00Hz frequency if count result is negative.**

**Note: Given frequency synthesized by main channel and auxiliary channel also limited by upper limit frequency**

**and lowest limit frequency.**

| | | | |
|---|---|---|---|
| F0.08 | Keyboard number set frequency | Setting range: 0-upper limitation | Factory set: 50.00Hz |

While frequency give channel is keyboard numbers, it is used to set and modify frequency. If **[F4.04]** LED "0" digit is 1, the up/down key can modify the parameter value. Where save the modify after power off is decided by **[F4.04]** LED "00"digit.

| | | | |
|---|---|---|---|
| F0.09 | Max frequency output | Setting range: 0.00-320.00Hz | Factory set: 50.00Hz |
| F0.10 | Upper limitation source selection | Setting range: 0-6 | Factory set: 0 |
| F0.11 | Number give upper limitation | Setting range: Lowest limitation-max output frequency | Factory set: 50.00Hz |
| F0.12 | Lowest limitation | Setting range: 0.00-upper limitation | Factory set: 0.00Hz |
| F0.13 | Lowest limitation run mode | Setting range: 0-1 | Factory set: 1 |

**Max frequency output:** The max frequency the frequency inverter permit to set. While **[F1.13]** 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. It is the max output frequency limitation set according to the machinery max rotate speed.

**0: Number give** Upper limitation set by **[F0.11]**. Max setting is small or equal to max frequency **[F0.09]**. Min setting is bigger or equal to min frequency **[F0.12]**.

**1: Keyboard potentiometer** Upper limitation set by keyboard potentiometer.

**2: Terminal VS1 voltage analog** Upper limitation set by VS1 input analog.

**3: Terminal VS2 voltage analog** Upper limitation set by VS2 input analog.

**4: Terminal AS current analog** Upper limitation set by AS input analog.

**5: Terminal pulse signal** Upper limitation set by PUL input pulse frequency.

**6: RS485 communication** Upper limitation set by RS485 communication (H3004/H2004).Max set not over max frequency **[F0.09]**. Min set not lower than **[F0.12]**. Details refer to Fd communication control parameter group and appendix 2: RS485 communication protocol.

**Note: Relation between input analog or PUL pulse frequency and upper limit frequency: when input max valid value, upper limit frequency is max frequency [F0.09]. When input min valid value, upper limit frequency is 0.00Hz.**

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

**Lowest limitation:** It is the lowest limitation of output frequency. While given frequency is lower than this value, **[F0.13]** decides the run frequency.

**Lowest limitation run mode**

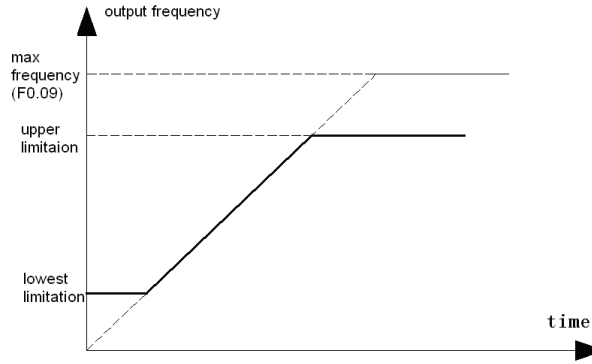
**0: Stop** When actual given frequency is lower than the lowest limitation, inverter run as 0.00Hz.

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

**Note: 1.While given upper limitation by analog or PUL pulse frequency, lowest limitation is invalid if upper limitation is lower than lowest limitation.**

**2. Max frequency, upper limitation and lowest limitation set carefully according to actual need please. Except upper limitation and lowest limitation, inverter is also limited by parameters set such as start**

**frequency, free stop frequency, stop DC brake start frequency, jump frequency and so on. Max frequency, upper limitation and lowest limitation relationship as below:**

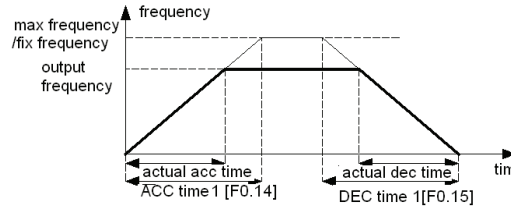



max frequency, upper limitation and lowest limitation relationship

| | | | |
|---|---|---|---|
| F0.14 | ACC time 1 | Setting range: 0.01-650.00s | Factory set: Accord model |
| F0.15 | DEC time 1 | Setting range: 0.01-650.00s | Factory set: Accord model |

**ACC time 1:** When **[F1.13]** LED "0"digit is 0, it means the time needed for output frequency accelerate from 0.00Hz to max frequency **[F0.09]**. When **[F1.13]** LED "0"digit is 1, it means the time needed for output frequency accelerate from 0.00Hz to 50.00Hz. Details refer to **[F1.13]**.

**DEC time 1:** When **[F1.13]** LED "0"digit is 0, it means the time needed for output frequency decelerate from max frequency **[F0.09]** to 0.00Hz. When **[F1.13]** LED "0"digit is 1, it means the time needed for output frequency decelerate from 50Hz to 0.00Hz. Details refer to **[F1.13]**.




ACC/DEC TIME

This frequency inverter can set 4 kinds of ACC/DEC time max. If need to select other ACC/DEC time group, it must to select by control terminal. Details refer to **[F2.00-F2.07]** and **[F1.18-F1.23]**.

ACC time is only valid for normal speed up process, not including start per-excite, start DC brake time and start frequency hold time. DEC time is only valid for normal speed doen process, not including stop DC brake time.

During process running, ACC/DEC time 1 is defined as first kind of ACC/DEC time. The other 3 kinds of ACC/DEC time details refer to **[F1.18-F1.23]** please.

JOG ACC/DEC time set by **[F1.33, F1.34]** alone.

| F0.16 | Rotate direction | Setting range: 0-2 | Factory set: 0 |
|---|---|---|---|

**0: Consistant** The actual run dirction is the came as required. Not adjust the current direction.

**1: Reverse** The actual run dirction is reverse to requirement. Adjust the current direction.

**2: Forbid reverse** While it is set as forbid, the reverse order of all runn order channels (operation board, exterior terminal, RS485 communication, optional card and program running) is invalid.

When frequency setting is negative (including that after combination), no matter what is **[F0.07]** LED "00" digit (frequency control dirction), the actual output frequency is limited as 0.00Hz.

**Note: While reset to factory set, this setting is not changed.**

**Attention: All reverse order is forbid. If give reverse order, the frequency inverter not run.**

| F0.17 | Carrier frequency | Setting range: 0.6-15.0kHz | Factory set: Accord model |
|---|---|---|---|

It is used to set IGBT frequency, adjust electromagnetic noise, reduce leakage current. It is suitable for location need mute when run in high carrier frequency, main parts loss heavy. Machine is heat heavy. Effect is reduced. And power out small. Maintime, radio disturbance is heavy. And capacitance leak current more, if there is leak protection, maybe there is mistake action or over current.

While run in low carrier frequency, the case will be totally different.The best carrier frequency comes with adjustment base on actual case. The bigger the capacity, the smaller the carrier frequency should be.

We reserve the right of the biggest carrier frequency limitation.

| Carrier frequency | noise | disturbance | Radiator temperature |
|---|---|---|---|
| low<br>↓<br>high | big<br>↓<br>small | Small<br>↓<br>big | Small<br>↓<br>big |

**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: while carrier frequency is higher than the factory set, the rated power reduce 5% if carrier frequency add 1kHz.**

| F0.18 | Carrier PWM frequency characteristic selection | Setting range: 0000-2111 | Factory set: 0000 |
|---|---|---|---|

**LED "0" digit:**

**0: Related to temperature**

**1: Not related to temperature**

While temperature is too high, frequency inverter reduces carrier frequency automatic. Can reduce loss and avoid frequent alarm for over heat.

**LED "00" digit:**

**0: Related to frequency output**

**1: Not related to frequency output**

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

**LED "000" digit:**

**0: Fixed PWM** Noise frequency is fixed.

**1: Random PWM** It can make humorous wave of output voltage distributes a wide range evenly to ruduce noise and

vibration.

**LED "0000": PWM wave mode**

**0: PWM mode 1** It output high quality sine wave while low speed to gain good low frequenc trait, low noise. It reduce parts on/off times to reduce loss while high speed. But the noise is big.

**1: PWM mode 2** It gains high quality current wave. Noise is small, but loss is big and termperature rise up high.

**2: PWM mode 3** It can reduce parts on/off times, reduce temperature rice up, but the noise is big.

| | | | |
|---|---|---|---|
| F0.19 | Parameter initialization | Setting range: 0-2 | Factory set: 0 |

0: Not act

1: Recover factory setting

2: Clear malfunction records Clear all **[FA.25-FA.44]** mistake history.

**Note: 1: Keyboard shows SRVE while recover factory setting. SRVE disappear while initialization finished.**

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

**3: If power off while recover factory setting. It can not finish. It need recover after power on again.**

| | | | |
|---|---|---|---|
| F0.20 | AVR function selection | Setting range: 0-2 | Factory set: 2 |

0: Invalid

1: All valid

2: invalid while ACC, valid while other state

AVR is output voltage auto adjust function. When it is invalid, output voltage changes according to input voltage. When it is valid, output voltage keeps as setting if min input voltage is bigger than the output voltage setting (rated voltage). But output voltage reduces as input voltage reduced if min input voltage is lower than the rated output voltage.

## 9.2 Run control parameter

| | | | |
|---|---|---|---|
| F1.00 | Start-up mode | Setting range: 0-2 | Factory set: 0 |
| F1.01 | Start pre-excitation time | Setting range: 0.00-60.00s | Factory set: Accord model |
| 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: 0.0% |
| F1.05 | Braking time before start | Setting range: 0.0-30.0s | 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 exterior 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 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.

| Control mode / Track mode | VC without PG | V/F without PG | VC with PG (PG input) | VC with PG (PUL input) | V/F with PG (PG input) | V/F with PG (PUL input) |
|---|---|---|---|---|---|---|
| Inner track | Valid | Valid | | Valid | | Valid |
| Out track | | | Valid | | Valid | |

**Start pre-excitation time:** It is used to set pre-excitation time for asynchonism motor while start. 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.

**Start frequency hold time:** How long the start frequency be hold.

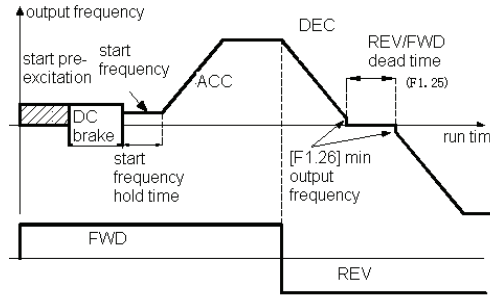
**Braking current before start:** It is the braking current that the inverter gives the motor while DC braking. It is based on the output rated current of the inverter. Only when **[F1.00]** is 1, there is DC braking while start.

**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 [F0.12], but limited by [F1.26] min output frequency. If setting is smaller then [F1.26], the output frequency is 0.00Hz.**

**Note: Under process of REV/FWD switch while normal running or process of frequency setting change while up/down running, frequency inverter starts from or reduces to min output frequency [F1.26] and than output 0.00Hz.**

**Note: In process of inverter start ACC, inverter output 0 when given frequency is small then starts frequency.**




START UP FIG

| F1.06 | Speed track waiting time | Setting range: 0.00-60.00s | Factory set: Accord model |
|---|---|---|---|

It is defined as the waiting time before speed tracking while receiving the run order. After this time, inverter runs to give frequency according to the frequency and direction detected out and the ACC/DEC time setting.

For big inertia load, prolong speed track waiting time to reduce the instant impact current.

| F1.07 | Stop mode | Setting range: 0-1 | Factory set: 0 |
|---|---|---|---|

**0: DEC to stop** ACC to 0.00Hz and stop output. While give frequency is small then stop DC braking start frequendy **[F1.08]**, inverter output frequency will change to 0. DC brake and stop work. Otherwise inverter wills DEC to min output

frequency and stop work.

For inverter with build in braking unit (under than AC90-T3-018T, braking resistance (optional) can be used. When DC bus voltage is over **[FA.08]** energy braking act voltage, inverter begins to carry out the energy braking act.

For inverter without build in braking unit (upper than AC90-T3-022T), braking unit and braking resistance can be selected. It is mainly used for occasion that need quick braking while stop.

**1: Free stop** Inverter stop output while receiving the stop order. Usually, it cooperates with exterior machine hold brake.

| | | | |
|---|---|---|---|
| F1.08 | Initial frequency of stop DC braking | Setting range: 0.00-50.00Hz | Factory set: 0.00Hz |
| F1.09 | Stop DC braking current | Setting range: 0.0-150.0% | Factory set: 0.0% |
| F1.10 | Waiting time of stop DC braking | Setting range: 0.0-60.0s | Factory set: 0.0s |
| F1.11 | 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.

**Stop DC braking current:** It is the current that inverter give motor while DC braking. It is based on the output rated current of the inverter. DC braking can afford 0 speed torque. It is uaually used for improve stop accuracy and quick stop. It can't be used for DEC braking for normal running.

**Waiting time of stop DC braking:** It is the time for waitting to DC braking while inverter DEC to initial frequency of stop DC braking and stop output.

**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.

| | |
|---|---|
| F1.12 | Reserved |

| | | | |
|---|---|---|---|
| F1.13 | ACC/DEC mode selections | Setting range: 0000-0011 | Factory set: 0000 |
| F1.14 | Start ACC rate of S curve | Setting range: 20.0%-100.0% | Factory set: 50.0% |
| F1.15 | Start DEC rate of S curve | Setting range: 20.0%-100.0% | Factory set: 50.0% |

**ACC/DEC mode selections**

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

**0: max frequency** Base is max frequency **[F0.09].**

**1: fixed frequency** Base is 50.00Hz.

**LED "00" digit: ACC/DEC mode**

**0: Beeline** Suitable for general used load.

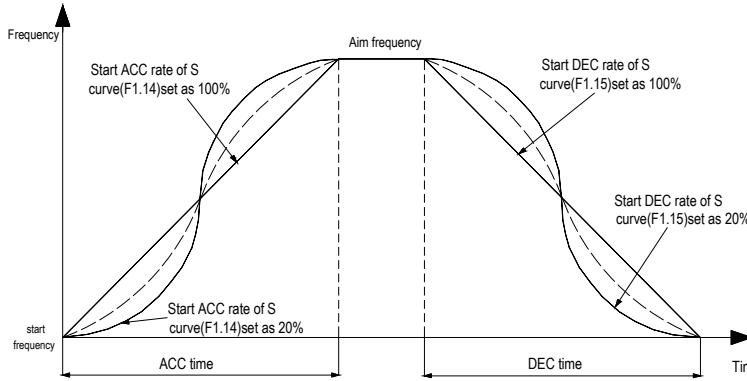
**1: S Curve** Suitable for load need reduce noise, vibration, impact or load need descend torque for low frequency and ACC short time for high frequency. If over current or over load while start, please increase **[F1.14]** setting.

**LED "000" digit: reserved**

**LED "0000" digit: reserved**

**Start ACC rate of S curve:** It is the rate while start ACC. The smaller the rate is, the ACC S surve is sharper. Othwise, The bigger the rate is, the ACC S surve is more like a beeline. If you want it ACC more smoothly, you can reduce the rate and prolong ACC time.

**Start DEC rate of S curve:** It is the rate while start DEC. The smaller the rate is, the DEC S surve is sharper. Othwise, The bigger the rate is, the ACC S surve is more like a beeline. If you want it DEC more smoothly, you can reduce the rate and prolong DEC time.




ACC/DEC curve

| | |
|---|---|
| F1.16-F1.17 | Reserved |

| | | | |
|---|---|---|---|
| F1.18 | ACC time 2 | Setting range: 0.00-650.00s | Factory set: 10.00s |
| F1.19 | DEC time 2 | Setting range: 0.00-650.00s | Factory set: 10.00s |
| F1.20 | ACC time 3 | Setting range: 0.00-650.00s | Factory set: 10.00s |
| F1.21 | DEC time 3 | Setting range: 0.00-650.00s | Factory set: 10.00s |
| F1.22 | ACC time 4 | Setting range: 0.00-650.00s | Factory set: 10.00s |
| F1.23 | DEC time 4 | Setting range: 0.00-650.00s | Factory set: 10.00s |

**ACC time 2/3/4:** When **[F1.13]** LED"0"digit is 0, it means the time need for output frequency ACC from 0.00Hz to max frequency **[F0.09]**. When **[F1.13]** LED"0"digit is 1, it means the time need for output frequency ACC from 0.00Hz to 50.00Hz. Details refer to **[F1.13]**.

**DEC time 2/3/4:** When **[F1.13]** LED "0"digit is 0, it means the time need for output frequency DEC from max frequency **[F0.09]** to 0.00Hz. When **[F1.13]** LED "0"digit is 1, it means the time need for output frequency DEC from 50.00Hz to 0.00Hz.

ACC/DEC time details refer to **[FC.31-FC.45]**.

JOG ACC/DEC time is set by **[F1.33, F1.34]**

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.

| | | | |
|---|---|---|---|
| F1.24 | Emergency stop DEC time | Setting range: 0.01-650.00s | Factory set: 10.00s |

Same as ACC/DEC time definition.

Emergency stop can be take effect by emergency stop terminal; details refer to **[F2.00-F2.07]**. While terminal control two line run, whether carry out the orginal run order is decided by **[2.13]** LED "00" digit. Details refer to **[F2.13]**.

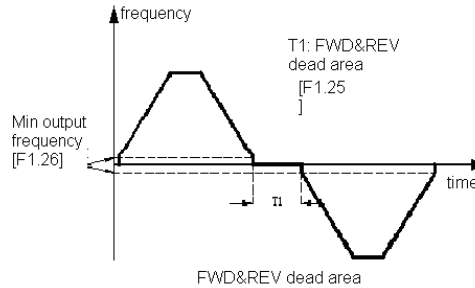
If **[FA.01]** "000" and "0000" digit is 1 emergency stop, the inverter wills DEC to stop according this time and alarm fault. Details refer to **[FA.01]**.

While multifunction terminal is set as emergency stop, refer to detail **[F2.29-F2.31]**.

| | | | |
|---|---|---|---|
| F1.25 | FWD&REV dead area | Setting range: 0.0-120.0s | Factory set: 0.0s |
| F1.26 | Min output frequency | Setting range: 0.00-60.00Hz | Factory set: 0.50Hz |

**FWD&REV dead area:** Waitting time at 0.0Hz while switch between FWD/REV. It sets for equipment with machine dead area while big inertia load and change direction.

**Min output frequency:** If lower than this frequency, inverter output 0.00Hz.




| | | | |
|---|---|---|---|
| F1.27 | 0 speed hold torque | Setting range: 0.0-150.0% | Factory set: Accord model |

Set output torque at 0 speeds.

| | | | |
|---|---|---|---|
| F1.28 | 0 speed torque keep time | Setting range: 0.0-500.0s | Factory set:5.0s |

It sets the torque keep time while running at 0 speed.Begin time while run frequency is 0Hz. Inverter stop output while 0 speed torque keep time arrives.

Right set this time can save energy effectively while protect motor

| | | | |
|---|---|---|---|
| F1.29 | Power off restart action selection | Setting range: 0-1 | Factory set: 0 |
| F1.30 | Power off restart waiting time | Setting range: 0.00-650.00s | Factory set: 0.50s |

**Power off restart action 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.

While exterior terminal control, run as **[F1.31]** setting.

**1: Valid** If inverter is at run state before power off, it start automatically after **[F1.30]** waiting time. While waiting, it does not accept any orders. But if stop order, it will not restart.

**Note: It can make machine automatic re-start while power recovers. Please use it carefully.**

**Power off restart waiting time:** While **[F1.29]** is valid, inverter restarts after **[F1.30]** waiting time.

| | | | |
|---|---|---|---|
| F1.31 | Terminal running protection selection | Setting range :0000-0011 | Factory set: 0011 |

**LED "0" digit: while electrify**

**0: Terminal running order invalid while electrify** Terminal controls stop firstly, then start.

**1: Terminal running order valid while electrify** Terminal controls start directly.

**LED "00" digit: while switch the run order give channel**

**0: invalid** Terminal controls stop firstly, then start.

**1: valid** Terminal controls start directly.

| | | | |
|---|---|---|---|
| F1.32 | JOG running frequency setting | Setting range: 0.00-Max frequency | Factory set: 5.00Hz |
| F1.33 | JOG ACC time | Setting range: 0.00-650.00s | Factory set: 10.00s |
| F1.34 | JOG DEC time | Setting range: 0.00-650.00s | Factory set: 10.00s |

**JOG running frequency setting:** Set output frequency while JOG.

**JOG ACC time:** When **[F1.13]** LED"0"digit is 0, it means the time need for output frequency ACC from 0.00Hz to max frequency **[F0.09]**. When **[F1.13]** LED"0"digit is 1, it means the time need for output frequency ACC from 0.00Hz to 50.00Hz. Details see **[F1.13]**.

**JOG DEC time:** When **[F1.13]** LED "0"digit is 0, it means the time need for output frequency DEC from max frequency **[F0.09]** to 0.00Hz. When **[F1.13]** LED "0"digit is 1, it means the time need for output frequency DEC from 50.00Hz to 0.00Hz.

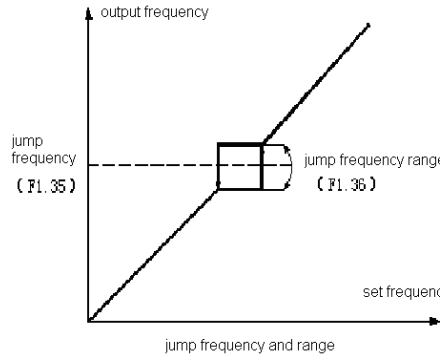
**Note: JOG run frequency set is only limited by [F0.09]. While JOG frequency setting is bigger then [F0.11] upper limitation, actual JOG output frequency is limited by upper limitation. Only terminal JOG priority is not limited by run orger channels. Other JOG orders have priority only while the channel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

| | | | |
|---|---|---|---|
| F1.35 | Jump frequency | Setting range: 0.00-Max frequency | Factory set: 0.00Hz |
| F1.36 | Jump frequency range | Setting range: 0.00-Max frequency | Factory set: 0.00Hz |

**Jump frequency:** While running, the frequency avoid running.

**Jump frequency range:** The up/down frequency range of **[F1.35]** avoid running.

It can be used for output frequency to avoid machine load resonance point.




**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: 0-57 | 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:56 |
| F2.07 | Multifunction input terminal 8(X8) | | Factory set:57 |

Multifunction terminal (X1-X8) function can be defined by **[F2.00-F2.07]**. And trait and filter time can be defined by [**F2.08-F2.11]**. Setting and function table:

| setting | setting | setting | setting |
|---|---|---|---|
| 0 | No function( can choose again) | 29 | PID give switch 2 |
| 1 | FWD | 30 | PID give switch 3 |
| 2 | REV | 31 | PLC pause |
| 3 | 3 line run control(Xi) | 32 | PLC restart |
| 4 | FWD JOG | 33 | Swing frequency in |
| 5 | REV JOG | 34 | Swing frequency pause |
| 6 | Free stop | 35 | Swing frequency seset |
| 7 | Emergency stop | 36 | Frequency channel switch terminal 1 |
| 8 | Fault reset | 37 | Frequency channel switch terminal 2 |
| 9 | Out fault input | 38 | Frequency channel switch terminal 3 |
| 10 | Frequency (UP) | 39 | Frequency channel switch terminal 4 |
| 11 | Freuqncy (DW) | 40 | Timer touch terminal |
| 12 | (UP/DW clear ) | 41 | Timer clear terminal |
| 13 | Reserved | 42 | Counter clock input terminal |
| 14 | Reserved | 43 | Counter clear terminal |
| 15 | Multi steps terminal 1 | 44 | DC brake order |
| 16 | Multi steps terminal 2 | 45 | Pre-excitation order terminal |
| 17 | Multi steps terminal 3 | 46 | Reserved |
| 18 | Multi steps terminal 4 | 47 | Start magnetic particle clutch function |
| 19 | ACC/DEC time selection terminal 1 | 48 | PID parameter switch terminal 1 |
| 20 | ACC/DEC time selection terminal 2 | 49 | PID parameter switch terminal 2 |
| 21 | ACC/DEC pause | 50 | Initial roll diameter setting terminal 1 |
| 22 | PID control cancel | 51 | Initial roll diameter setting terminal 2 |
| 23 | PID control pause | 52 | Linear speed selection terminal |
| 24 | PID trait switch | 53 | Material thickness selection terminal |
| 25 | PID give switch 1 | 54 | Full roll diameter selection terminal |
| 26 | PID give switch 2 | 55 | Empty to full roll time selection terminal |
| 27 | PID give switch 3 | 56 | Roll diameter reset terminal |
| 28 | PID give switch 1 | 57 | Roll diameter calculation pause |

**0: No function** This terminal invalid.

**1: FWD** While run order is given by terminal, and **[F2.12]** is set as 2 lines 1, and terminal is valid, inverter will FWD. Other control mode refers to **[F2.12]**.

**2: REV** While run oder is given by terminal, and **[F2.12]** is set as 2 lines 1, and terminal is valid, inverter will REV. Other control mode refers to **[F2.12]**.

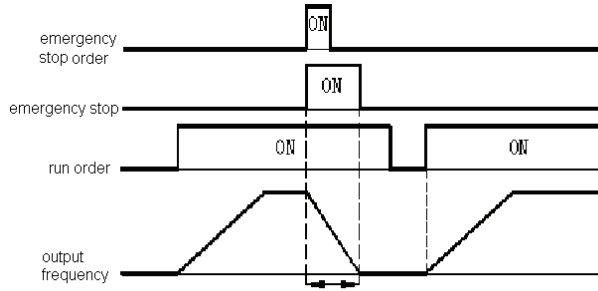
**3: 3 lines run control (Xi)** While run oder is given by terminal, and **[F2.12]** is set as 3 lines 1/2, it is 3 lines run control (Xi). Details refer to **[F2.12]**.

**4: FWD JOG**

**5: REV JOG**

**6: Free stop** 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 **[F2.13]** 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 **[F1.24]** DEC time seting. Details refer to **[F1.24]**. It can not run again before totally stopping. While **[F1.07]** 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 **[F2.13]**. Not recover original order under keyboard, RS485, optional card and terminal 3 line control mode. If need start inverter, please input order again.




emengency stop fig

**Note: While use emergency stop function, please set right [F1.24] DEC time or work with energy brake function. Otherwise over-voltage fault maybe happen.**

**8: Fault reset** It decides whether reset fault while alarm. Whether recover orginal order after fault reset is decided by **[F2.13]**.

**9: Out fault input** Inverter stop output while accept exterior fault input signal by it. Motor free run and display malfunction information E.EF.

**10: Frequency (UP)**

**11: Frequency (DW)**

Only valid while **[F0.03]** is set as 7. Details refer to **[F0.03]**.

**12: (UP/DW clear)** Only valid while **[F0.03]** is set as 7. Details refer to **[F0.03]**.

**13: Reserved**

**14: Reserved**

**15: Multi steps terminal 1**

**16: Multi steps terminal 2**

**17: Multi steps terminal 3**

**18: Multi steps terminal 4**

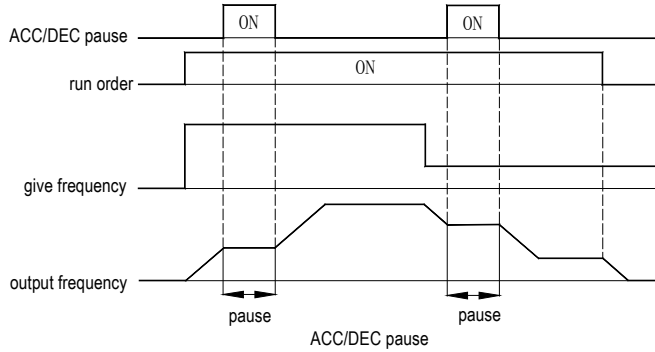
See parameter details of multi steps and FC group of PLC.

**19: ACC/DEC time selection terminal 1**

**20: ACC/DEC time selection terminal 2**

ACC/DEC time selection terminal 1 is defaulted as valid while not set paremeter and terminal invalid. Details see **[F1.18-F1.23]**.

**21: ACC/DEC pause** In ACC/DEC process, if it is valid, inverter stops ACC/DEC and keeps the speed. It is only valid while inverter is running. It is invalid for DEC stop.




**22: 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 gives 0.00Hz. While this terminal is invalid, PID re-count frequency given of main channel.

**23: PID control pauses** While PID given and this terminal is valid, it can make PID adjustment be invalid and keep frequency not change. PID re-counts frequency given of main channel.

**24: PID trait switch** While **[F0.03]** is set as 8 and this terminal is valid, **[Fb.05]** LED "0" digit-trait setting will be changed. PID output trait back to **[Fb.05]** LED "0" digit-trait setting.

**25: PID given switch 1**

**26: PID given switch 2**

**27: 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]**.

**28: PID given switch 1**

**29: PID given switch 2**

**30: PID given switch 3**

While PID controller feedback signal source **[Fb.02]** is set as 8, feedback signal source channel can be switched by this group of terminals. Details refer to **[Fb.02]**.

**31: PLC pause** While **[F0.03]** is 9, this valid signal can make PLC pause and inverter output 0.00Hz. Inverer go on as before while this signal disappears. See parameter details of multi steps and FC group of PLC.

**32: 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.

**33: Swing frequency in** Under swing frequency control, while set as manual swing frequency in and this terminal is valid, swing frequency function is valid. And inverter begins swing frequency running. Details see **[FC.48-FC.54]**.

**34: Swing frequency pause** Under swing frequency control, while this terminal is valid, inverter keeps frequency not change and recover to swing frequency run after terminal order is cancelled. Details see **[FC.48-FC.54]**.

**35: Swing frequency seset** Under swing frequency control, while this terminal is valid, inverter back to center frequency and recover to swing frequency run after terminal order is cancelled. Details see **[FC.48-FC.54]**.

**36: Frequency channel switch terminal 1**

**37: Frequency channel switch terminal 2**

**38: Frequency channel switch terminal 3**

**39: Frequency channel switch terminal 4**

It is valid only when **[F0.03]** is set as 12. Main frequency input channel is selected by terminal. 4 terminals can be combined to 0-11 which is corresponding to frequency input channels 0-11 of **[F0.03]**. Details refer to **[F0.03]**.

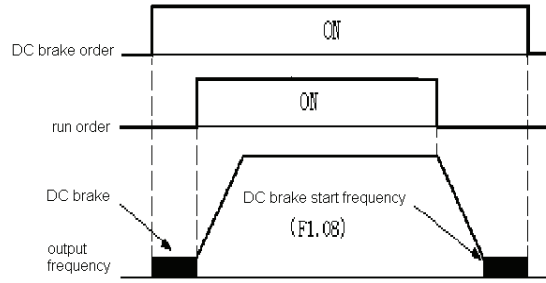
**40: Timer touch terminal** Closed is valid.Detail refer to **[F2.25-F2.26]**.

**41: Timer clear terminal** Closed is valid.Detail refer to **[F2.25-F2.26]**.

**42: Counter clock input terminal** Detail refer to **[F2.27-F2.28]**.

**43: Counter clear terminal** Closed is valid.Detail refer to **[F2.27-F2.28]**.

**44: DC brake order** At stop state, it can start DC brake function.Details refer to **[F1.09]**. If input run order or JOG order, DC braking will be stopped.




TERMINAL DC BRAKE

**45: Pre-excitation order terminal** At stop state, it can start pre-excitation function. If input run order or JOG order, pre-excitation order is cancelled.

**46: Reserved**

**47: Start magnetic particle clutch function** While it is valid, the inverter will start the magnetic particle clutch function. Details see **[F7.14-F7.17]**

**48: PID parameter switch terminal 1**

**49: PID parameter switch terminal 2**

**50: Initial roll diameter setting terminal 1** Two different terminals combination corresponds to different initial roll diameter only when parameter **[F9.14]** is set as "0"(terminal selection) in diameter calculation. Details see **[F9.15-F9.17]**.

**51: Initial roll diameter setting terminal 2** Two different terminals combination corresponds to different initial roll diameter only when parameter **[F9.14]** is set as "0"(terminal selection) in diameter calculation. Details see **[F9.15-F9.17].**

**52: Linear speed selection terminal** It is valid only when parameter **[F9.14]** is set as "1"(calculate by linear speed) in diameter calculation. This terminal can make the switch between linear speeds setting 1 and linear speed setting 2 coming ture. Details see **[F9.28-F9.29]**.

**53：Material thickness selection terminal** It is valid only when parameter **[F9.14]** is set as "2"(calculate by thickness) in diameter calculation. This terminal can make the switch between material thickness 1 and material thickness 2 coming ture. Details see **[F9.40-F9.41]**.

**54：Full roll diameter selection terminal** It is valid only when parameter **[F9.14]** is set as "3"(calculate by time) in diameter calculation. This terminal can make the switch between empty roll to full roll time 1 and full roll to empty roll time 2 coming ture. Details see **[F9.44-F9.45]**.

**55：Empty to full roll time selection terminal** It is valid only when parameter **[F9.14]** is set as "3"(calculate by time) in diameter calculation. This terminal can make the switch between empty roll to full roll time 1 and full roll to empty roll

time 2 coming ture. Details see **[F9.46-F9.47]**.

**56: Roll diameter reset terminal** In diameter calculation, set **[F9.18]** as "0" (roll diameter manual reset) and this parameter is valid, inverter will back the roll diameter to initial value.

**57: Roll diameter calculation pause** In diameter calculation, while this parameter is valid, inverter will stop roll diameter calculation.

| | | | |
|---|---|---|---|
| F2.08 | X1-X4 terminal trait selection | Setting range: 0000-1111 | Factory set: 0000 |
| F2.09 | X1-X4 input terminal filer time | Setting range: 0.000-60.000s | Factory set: 0.010s |

**X1-X4 terminal trait selections**

**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 termina**l

**0: On valid**

**1: Off valid**

**LED"0000"digit: X4terminal**

**0: On valid**

**1: Off valid**

**X1-X4 input terminal filer time:** When input terminal state changes, only if changed state keeps after filter time setting, it is considered as valid terminal state change. Otherwise, it keeps last state to effectively avoid misact caused by disturbance.

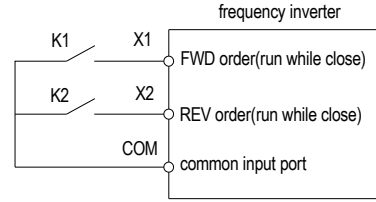
| | | | |
|---|---|---|---|
| F2.10 | X5-X8 terminal trait selection | Setting range: 0000-1111 | Factory set: 0000 |
| F2.11 | X5-X8 input terminal filer time | Setting range: 0.000-60.000s | Factory set: 0.010s |

Same as F2.08 and F2.09.

| | | | |
|---|---|---|---|
| F2.12 | Terminal control mode | Setting range: 0-3 | Factory set: 0 |

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

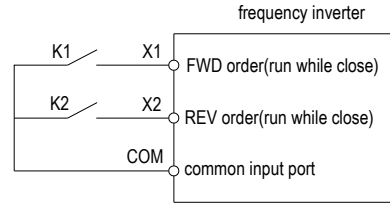
| K1 | K2 | run order |
|---|---|---|
| 0 | 0 | stop |
| 1 | 0 | FWD |
| 0 | 1 | REV |
| 1 | 1 | COM |




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.

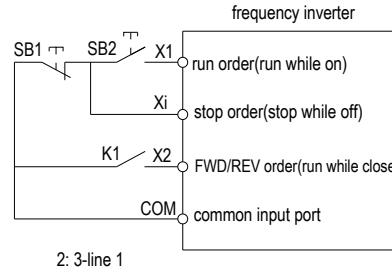
| K1 | K2 | run order |
|---|---|---|
| 0 | 0 | stop |
| 1 | 0 | FWD |
| 1 | 1 | REV |
| 0 | 1 | stop |




1: 2-line 2

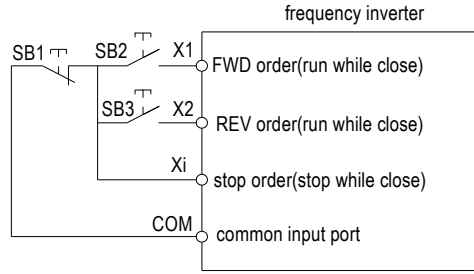
**2:3-line 1** Xi is stop run terminal. Run order is decided by FWD terminal X1. Direction is controlled by REV terminal X2. Xi is valid input.

| K1 | direction control |
|---|---|
| 0 | FWD |
| 1 | REV |




2: 3-line 1

**3:3-line 2** Xi is stop run terminal. Run order is decided by FWD terminal X1or 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)].**

| F2.13 | Terminal act mode | Setting range: 0000-0111 | Factory set: 0111 |
|---|---|---|---|

Only valid while **[F0.02]** is 1 and **[F2.12]** is set as 0 or 1.

**LED "0" digit: free stop terminal reset mode**

0: Reset to original order while invalid

1: Not reset to original order while invalid

**LED "00" digit: emergency stop terminal reset mode**

0: Reset to original order while invalid

1: Not reset to original order while invalid

**LED "000" digit: terminal run mode after fault reset**

0: Terminal control to power on directly

1: Terminal control to power on after stop

**LED "0000" digit: reserved**

**Note: 3 channels all can send reset signal to inverter while fault alarm. If it is terminal control mode, inverter can select whether carry out terminal order by these parameters while receiving reset signal of terminal or the other two channels.**

| | |
|---|---|
| F2.14-F2.15 | reserved |

| | | | |
|---|---|---|---|
| F2.16 | PUL input min frequency | Setting range: 0.00-50.00kHz | Factory set: 0.00kHz |
| F2.17 | PUL min frequency corresponding setting | Setting range: 0.00-100.00% | Factory set: 0.00% |
| F2.18 | PUL input max frequency | Setting range: 0.00-50.00kHz | Factory set: 50.00kHz |
| F2.19 | PUL max frequency corresponding setting | Setting range: 0.00-100.00% | Factory set: 100.00% |
| F2.20 | PUL filter time | Setting range: 0.00-10.00s | Factory set: 0.10s |
| F2.21 | PUL end frequency | Setting range: 0.000-50.000kHz | 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 disappears, the time of 0Hz pulse frequency judged by inverter is longer.

| | | | |
|---|---|---|---|
| F2.22 | UP/DW terminal frequency adjust selection | Setting range: 0-2 | Factory set: 0 |
| F2.23 | 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 give frequency.

| | |
|---|---|
| F2.24 | Reserved |

| | | | |
|---|---|---|---|
| F2.25 | Time unit for timer | Setting range: 0-2 | Factory set: 0 |
| F2.26 | 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 out timer touch terminal (select by **[F2.00-2.07]**).Time begins while receiving signal. While time arriving, corresponding output terminal (selected by **[F2.29-2.31**]) outputs 1s wide pulse signal. If out touch signal always at touching state, corresponding output terminal output one pulse signal every **[F2.26]** setting time. While touch terminal is invalid, timer keeps records and continues while touch terminal is valid again. Timer clear terminal can clear timer records anytime.

| | | | |
|---|---|---|---|
| F2.27 | Max value of counter | Setting range: 0-65000 | Factory set: 1000 |
| F2.28 | Setting value of counter | Setting range: 0-65000 | Factory set: 500 |

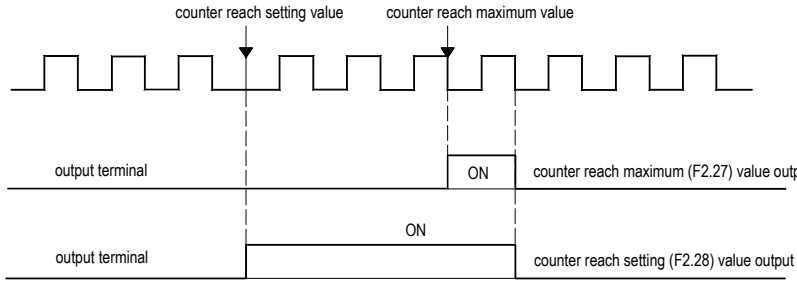
This parameter stipulates the counting action of the interior counter, clock terminal of the counter is selected by the parameter **[F2.00-F2.07]**.

**Max value of counter:** When the counter to the reach the count value of exterior clock reach **[F2.27]** the value of stipulation, in the corresponding output terminal(selected by **[F2.29-2.31]**) output a width to be equal to exterior clock periodic valid signal.

**Setting value of counter:** When the counter to the reach the count value of exterior clock reach **[F2.28]** the value of stipulation, in the corresponding output terminal(selected by **[F2.29-2.31]**) output valid signal、course the counter clear zero, abolishes this output valid signal.

Counter can be clear zero anytime by multifunction terminal **[F2.00-2.07]**.

The clock periodic requirement of the counter is greater than 10ms; the minimum pulse width is 5ms.




| | | | |
|---|---|---|---|
| F2.29 | Output terminal 1(Y1) | Setting range: 0-29 | Factory set: 1 |
| F2.30 | Output terminal 2(Y2) | | Factory set: 2 |
| F2.31 | Relay output terminal(TA-TB-TC) | | Factory set: 3 |

**0: No output**

**1: Running**

**2: REV**

**3: Fault trip alarm 1(alarm while fault self-recover)**

**4: Fault trip alarm 2(no alarm while fault self-recover)**

**5: Fault retry**

**6: Out fault stop**

**7: Under voltage** The frequency converter displays "E.LU1/2" for the voltage is excessively low, output signal.

**8: Finish ready for running**

**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 **[F2.32]**/**[F2.34]** setting, it outputs valid signal after **[F2.33]**/**[F2.35]** delay frequency. When output frequency is lower than test level, it outputs invalid signal after delay frequency. Details see **[F2.32-F2.35]**.

**11: Frequency arrive** Details see **[F2.36]**.

**12: Run as 0 speed**

**13: Upper frequency limit arrive**

**14: Lowest frequency limit arrive**

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

**16: Program running step finished**

**17:PID feedback over upper limit** While PID feedback arrive **[Fb.16]** and still over limit after **[Fb.14]** delay time, it output valid signal.

**18:PID feedback under lowest limit** While PID feedback arrive **[Fb.17]** and still over limit after **[Fb.14]** delay time, it output valid signal.

**19: PID feedback sensor wire break** Details see **[Fb.14-Fb.17]**.

**20: Reserved**

**21: Timer time arrive** Details see **[F2.25-F2.26]**.

**22: Counter arrive biggest value** Details see **[F2.27-F2.28]**.

**23: Counter arrive setting** Details see **[F2.27-F2.28]**.

**24: Energy braking** Details see **[FA.08]**.

**25: PG feedback break** Details see **[F5.15-F5.17]**.

**26: Emergency stop**

**27: Pre alarm output for over load** It output valid signal while output current arrive or over **[F2.37]** and after **[F2.38]** delay time.

**28: Pre alarm output for under load** It output valid signal while output current is smaller or equal to **[F2.39]** and after **[F2.40]** delay time.

**29: Roll diameter arrive output** While inverter calculates roll diameter under tension control mode, it outputs valid signal if the current diameter is bigger or equal to the max diamerter **[F9.12]**

**Note: Relay output terminal TA-TC on and TB-TC off is valid signal. Y1, Y2 output terminal with low level is combined to (+24V) terminal to output valid signal 24V power.**

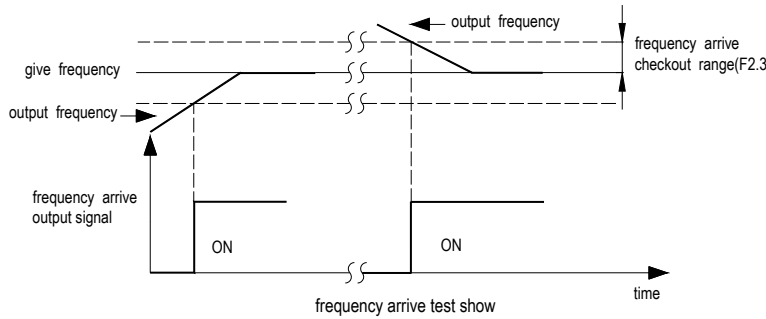
| | | | |
|---|---|---|---|
| F2.32 | Output frequency level 1(FDT1) | Setting range: 0.00- Max frequency | Factory set: 30.00Hz |
| F2.33 | FDT1 lag | Setting range: 0.00- Max frequency | Factory set: 0.00Hz |
| F2.34 | Output frequency level 2(FDT2) | Setting range: 0.00- Max frequency | Factory set: 50.00Hz |
| F2.35 | FDT2 lag | Setting range: 0.00- Max frequency | Factory set: 0.00Hz |

Used to set test level. While output arrives or higher than **[F2.32]**/**[F2.34]** setting, FDT 1/2 terminal outputs signal after

**[F2.33]**/**[F2.35]** delay frequency. While output arrives or lower than **[F2.32]**/**[F2.34]** setting, FDT 1/2 terminal stops output signal after **[F2.33]**/**[F2.35]** delay frequency.

| | | | |
|---|---|---|---|
| F2.36 | Speed arriving checkout range | Setting range: 0.00- Max frequency | Factory set: 0.00Hz |

While output frequency arrive or approach give frequency, output terminal Y1/Y2/TA-TB-TC output valid signal if it is selected as "give frequency arriving". This function can used to adjust test range offset.



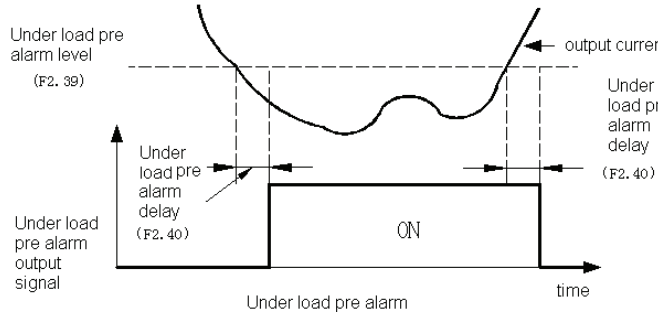

frequency arrive test show

| | | | |
|---|---|---|---|
| F2.37 | Over load pre alarm level | Setting range: 0.0-200.0% | Factory set: 180.0% |
| F2.38 | Over load pre alarm delay | Setting range: 0.0-100.0s | Factory set: 0.5s |

While output current is over **[F2.37]** setting continuously, the output terminal outputs valid signal after **[F2.38]** delay frequency. While output current is lower than **[F2.37]** setting, the output terminal outputs invalid signal after **[F2.38]** delay frequency.

| | | | |
|---|---|---|---|
| F2.39 | Under load pre alarm level | Setting range: 0.0-200.0% | Factory set: 30.0% |
| F2.40 | Under load pre alarm delay | Setting range: 0.0-100.0s | Factory set: 0.5s |

While output current is equal to or lower than **[F2.39]** setting, the output terminal outputs valid signal after **[F2.40]** delay frequency. While output current is higher than **[F2.39]** setting, the output terminal outputs invalid signal after **[F2.40]** delay frequency. 100.00% corresponding to motor rated current.




Under load pre alarm

## 9.4 Analog terminal functions

| | | | |
|---|---|---|---|
| F3.00 | VS1 Lowest limit | Setting range: 0.00-10.00V | Factory set: 0.00V |
| F3.01 | VS1 Lowest limit corresponding setting | Setting range: 0.00-100.00% | Factory set: 0.00% |
| F3.02 | VS1 upper limit | Setting range: 0.00-10.00V | Factory set: 10.00V |
| F3.03 | VS1 upper limit corresponding setting | Setting range: 0.00-100.00% | Factory set: 100.00% |
| F3.04 | VS1 filter time | Setting range: 0.00-10.00s | Factory set: 0.10s |

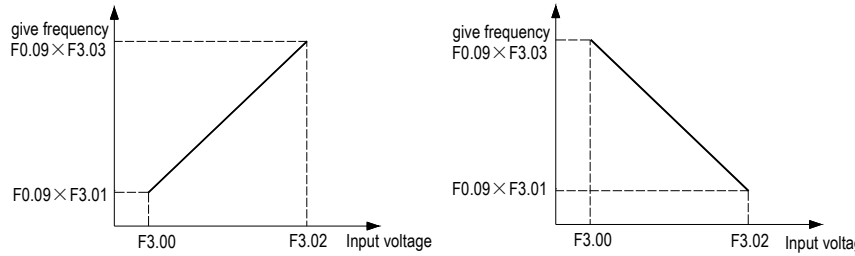
**VS1 Lowest limit:** It defines signal accepted by analog input terminal **(VS1)**, Inverter deal voltage lower than this value as lower limit.

**VS1 lower limit corresponding setting:** It defines ratio of VS1 lower limit.

**VS1 upper limit:** It defines signal accepted by analog input terminal **(VS1)**, Inverter deal voltage higher than this value as higher limit.

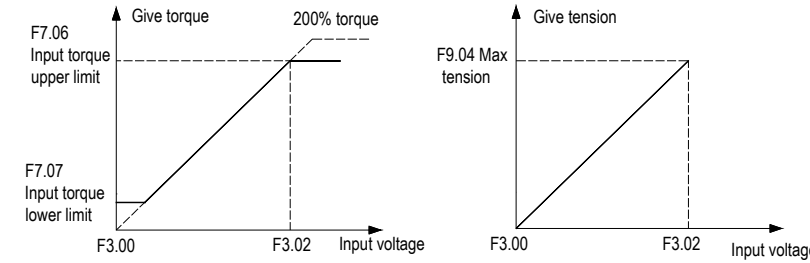
**VS1 upper limit corresponding setting:** It defines ratio of VS1 upper limit.

**VS1 filter time:** It is **(VS1)** 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.




Anaiog give frequency show

Analog give torque and tension, the relationship:




VS1 analog give torque/tension figure

| | | | |
|---|---|---|---|
| F3.05 | VS2 Lowest limit | Setting range: 0.00-10.00V | Factory set: 0.00V |
| F3.06 | VS2 Lowest limit corresponding setting | Setting range: 0.00-100.00% | Factory set: 0.00% |
| F3.07 | VS2 upper limit | Setting range: 0.00-10.00V | Factory set: 10.00V |

| | | | |
|---|---|---|---|
| F3.08 | VS2 upper limit corresponding setting | Setting range: 0.00-100.00% | Factory set: 100.00% |
| F3.09 | VS2 filter time | Setting range: 0.00-10.00s | Factory set: 0.10s |
| F3.10 | AS Lowest limit | Setting range: 0.00-20.00mA | Factory set: 4.00mA |
| F3.11 | AS Lowest limit corresponding setting | Setting range: 0.00-100.00% | Factory set: 0.00% |
| F3.12 | AS upper limit | Setting range: 0.00-20.00mA | Factory set: 20.00mA |
| F3.13 | AS upper limit corresponding setting | Setting range: 0.00-100.00% | Factory set: 100.00% |
| F3.14 | AS filter time | Setting range: 0.00-10.00s | Factory set: 0.10s |

See VS1 explain.

| | |
|---|---|
| F3.15-F3.21 | Reserved |

| | | | |
|---|---|---|---|
| F3.22 | A01 output selections | Setting range: 0-17 | Factory set: 0 |
| F3.23 | A02 output selection | | Factory set:1 |

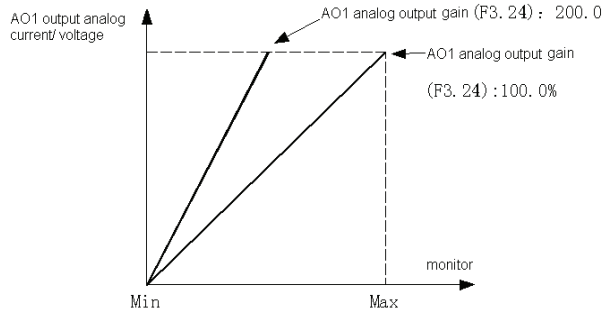
Used for setting inverter monitor corresponding to multifunction terminal **(AO1)**, **(AO2)** output signal.
**(AO1)** output signal is voltage signal 0-10V.
**(AO2)** output signal is decided by **[F3.26]**.

| Setting | monitor | Function | AO min output | AO max output |
|---|---|---|---|---|
| 0 | Set frequency | Corresponding to current give frequency | Min output corresponding to 0.00Hz | Max output corresponding to max frequency |
| 1 | running 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 voltage input voltage | Min output corresponding to 0V | Max output corresponding to 2 times of rated voltage |
| 4 | Output voltage | Corresponding to voltage output voltage | Min output corresponding to 0V | Max output corresponding to rated voltage |
| 5 | Run speed | Corresponding to machine speed which corresponding to the inverter outout | Min output is corresponding to 0RPM | Max output is corresponding to speed which is corresponding to max |
| 6 | Set torque | Corresponding to current inverter give 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 give | Corresponding to current PID give | Min output corresponding to 0.00% PID give | Max output corresponding to 100% PID give |
| 9 | PID feedback | Corresponding to current PID feedback | Min output corresponding to 0.00% PID feedback | Max output corresponding to 100% PID feedback |
| 10 | Set tension | Corresponding to current max tension setting of | 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 voltage2 |

| | | | | |
|---|---|---|---|---|
| 12 | Current roll diameter | Corresponding to current max diameter setting of | Min output corresponding to 0 meter | Max output corresponding to max diameter |
| 13 | VS2 input | Corresponding to current VS2 input | Min output corresponding to VS2 input lowest limit | Max output corresponding to VS2 input upper limit |
| 14 | Time per roll | Corresponding to time from empty to full roll | Min output corresponding to 0s | Max output corresponding to time from empty to full roll |
| 15 | Reserved | | | |
| 16 | VS1 input | Corresponding to current VS1 input | Min output corresponding to VS1 input lowest limit | Max output corresponding to VS1 input upper limit |
| 17 | VS2 input | Corresponding to current VS2 input | Min output corresponding to VS2 input lowest limit | Max output corresponding to VS2 input upper limit |
| 18 | AS input | Corresponding to current AS input | Min output corresponding to AS input lowest limit | Max output corresponding to AS input upper limit |
| 19 | PUL input | Corresponding to current PUL input | Min output corresponding to PUL input lowest limit | Max output corresponding to PUL input upper limit |

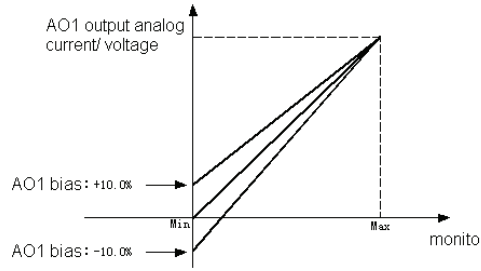
| | | | |
|---|---|---|---|
| F3.24 | A01 output gain | Setting range: 25.0-200.0% | Factory set: 100.0% |
| F3.25 | A01 output signal bias | Setting range: -10.0-10.0% | Factory set: 0.0% |

**A01 output gain:** It is used for adjust AO1 terminal output analog.




AO1 analog output and gain

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




AO1 analog output bias

| F3.26 | AO2 signal selection | Setting range: 0-3 | Factory set: 0 |
|---|---|---|---|

0: 0-10V

1: 4.00-20.00mA

2: 0.00-20.00mA

3: FM Frequency pulse output output lowest limit is decided by **[F3.29]**, upper limit is set by **[F3.30]**.

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

**1. If pulse output, J1 ON, J2, J3 OFF.**

**2. If 0.00-20.00mA or 4.00-20.00mA output, J2 ON, J1, J3 OFF.**

**3. If0-10V output, J1 ON, J2, J3 OFF.**

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

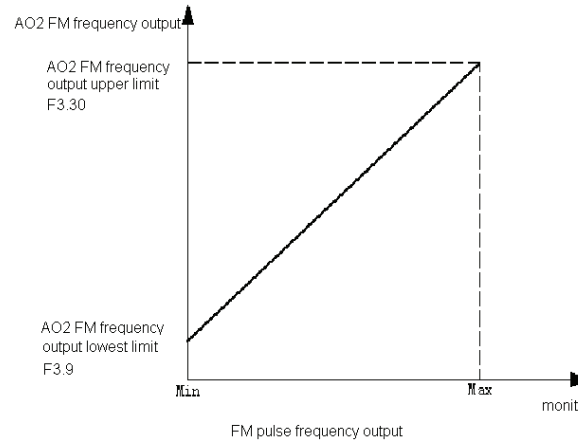
| Switch terminal | Selection position | cutline | function |
|---|---|---|---|
|  | J1 |  | 0.0-50kHz frequency output |
| | J2 |  | 0-20mA current output<br>4-20mA current output |
| | J3 |  | 0-10V voltage output |

| F3.27 | A02 output gain | Setting range: 25.0-200.0% | Factory set: 100.0% |
|---|---|---|---|
| F3.28 | A02 output signal bias | Setting range: -10.0-10.0% | Factory set: 0.0% |

Same as AO1 setting.

| F3.29 | A02FM frequency output Lowest limit | Setting range: 0.00-50.00kHz | Factory set: 0.20kHz |
|---|---|---|---|
| F3.30 | A02FM frequency output upper limit | Setting range: 0.00-50.00kHz | Factory set: 50.00kHz |

While AO2 is set as FM frequency pulse output, it is lower limit and upper limit of the signal.




## 9.5 Keyboard and display parameters

| | | | |
|---|---|---|---|
| F4.00 | Parameter and key lock selections | Setting range: 0-3 | Factory set: 0 |

**0: Unlock** Parameter and keyboard lock function invalid.
**1: Parameter lock** Lock all parameter settings, can not modify. Need input password set by **[F4.01]** to unlock.
**2: Parameter and key lock (except FWD/STOP/JOG)** Lock all parameter settings, can not modify. And lock all keys on keyboard except **FWD/STOP/JOG**.It mens that can only control inverter to start and stop by keyboard. Need input password set by **[F4.01]** to unlock.
**3: All parameter and key lock** Lock all parameter settings, can not modify. And lock all keys on keyboard except PRG.It mens that can not control inverter to act by keyboard. Need input password set by **[F4.01]** to unlock.
**Note: When [F4.00] is 2 or 3, press PRG key to enter password input interface. Can only enter function parameter interface be input right password.**

| | | | |
|---|---|---|---|
| F4.01 | User password | Setting range: 0-9999 | Factory set: 0 |

It used to set user password. While **[F4.00]** is (not 0) lock state, need input this password to unlock. Factory set is 0.

| | | | |
|---|---|---|---|
| F4.02 | REV/JOG selections | Setting range: 0-1 | Factory set: 0 |

**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.

| | | | |
|---|---|---|---|
| F4.03 | STOP key function range | Setting range: 0000-0011 | Factory set: 0000 |

**LED "0"digit: terminal control**
**0: invalid to terminal order** While terminal given signal, STOP key can not control to stop.
**1: valid to terminal order** While terminal given signal, STOP key can control to stop.
**LED"00"digit: communication control**
**0: invalid to communication order** While terminal given signal, STOP key can not control to stop.
**1: valid to communication order** While terminal given signal, STOP key can control to stop.

**LED "000" digit: reserved**

**LED "0000" digit: reserved**

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

| | | | |
|---|---|---|---|
| F4.04 | UP/DOWN key modification selections | Setting range: 0000-0014 | Factory set: 0011 |

**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: Reserved**

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

**4: Reserved**

**LED "00" digit: keyboard UN/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: reserved**

**LED "0000" digit: reserved**

| | | | |
|---|---|---|---|
| F4.05 | Function parameter copy | Setting range: 0-2 | Factory set: 0 |

0: No operation

1: Send machine parameters to keyboard and save

2: Send parameters saved by keyboard to machine

| | |
|---|---|
| F4.06 | Reserved |

| | | | |
|---|---|---|---|
| F4.07 | Keyboard potentiometer lowest limit | Setting range: 0.00-5.00V | Factory set: 0.50V |
| F4.08 | Keyboard potentiometer lowest limit corresponding setting | Setting range: 0.00-100.00% | Factory set: 0.00% |
| F4.09 | Keyboard potentiometer upper limit | Setting range: 0.00-5.00V | Factory set: 4.50V |
| F4.10 | 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 gived by potenmeter. 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 gived by potenmeter.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.

| | | | |
|---|---|---|---|
| F4.11 | Upper LED display content while run | Setting range: 0000-FFFF | Factory set: 3210 |
| F4.12 | Upper LED display content while stop | Setting range: 0000-FFFF | Factory set: 3210 |

**Upper LED display content while run:** Set monitor content showed in the upper 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.

**Upper LED display content 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.

**LED "0" digit to "0000" digit setting**

0: Given frequency 1: Output frequency 2: Output current 3: Input voltage
4: Output voltage 5: Machine speed 6: Set torque 7: Output torque
8: PID given value 9: PID feedback value A: Output power B: Bus voltage
C: Module temperature 1 D: Module temperature 2 E: ON/OFF state of input terminal X
F: ON/OFF state of input terminal Y

| | | | |
|---|---|---|---|
| F4.13 | Lower LED display content while run | Setting range: 0000-FFFF | Factory set: 3210 |
| F4.14 | Lowest LED display content while stop | Setting range: 0000-FFFF | Factory set: 3210 |

Only valid for keyboard with 2 line LED. Details refer to **[F4.11-F4.12]**.

It sets the display coefficient of keyboard monitor item "machine speed" .100% is corresponding to motor rated speed.

| | | | |
|---|---|---|---|
| F4.16 | LCD language | Setting range: 0000-1111 | Factory set: 0000 |

**LED "0" digit: LED display language**

0: Chinese

1: English

**LED"00" digit: output frequency selection**

0: Aim frequency

1: Actual frequency

**LED"000" digit: machine speed display selection**

0: Actual speed

1: Aim speed

**LED"0000" digit: reserved**

## 9.6 Motor parameters

| | |
|---|---|
| F5.00 | Reserved |

| | | | |
|---|---|---|---|
| F5.01 | Motor rate | Setting range: 2-48 | Factory set: 4 |

Set it according to nameplate.

| | | | |
|---|---|---|---|
| F5.02 | Motor rated power | Setting range: 0.4-1000.0kW | Factory set: Accord model |

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: Accord model |

Set it according to nameplate.

| | | | |
|---|---|---|---|
| F5.04 | Motor rated speed | Setting range: 0-65000rpm | Factory set: Accord model |

Set it according to nameplate.

| | | | |
|---|---|---|---|
| F5.05 | Motor rated voltage | Setting range: 0-1500V | Factory set: Accord model |

Set it according to nameplate.

| | | | |
|---|---|---|---|
| F5.06 | Motor rated current | Setting range: 0.1-2000.0A | Factory set: Accord model |

Set it according to nameplate.

| | | | |
|---|---|---|---|
| F5.07 | Motor no-load current | Setting range: 0.01-650.00A | Factory set: Accord model |

It set automatic while self study.

| | | | |
|---|---|---|---|
| F5.08 | Motor stator resistance | Setting range: 0.001-65.000 | Factory set: Accord model |

It set automatic while self study.

| | | | |
|---|---|---|---|
| F5.09 | Motor rotor resistance | Setting range: 0.001-65.000 | Factory set: Accord model |

It set automatic while self study.

| | | | |
|---|---|---|---|
| F5.10 | Motor stator&rotor inductance | Setting range: 0.1-6500.0mH | Factory set: Accord model |

It set automatic while self study.

| | | | |
|---|---|---|---|
| F5.11 | Motor stator&rotor mutual inductance | Setting range: 0.1-6500.0mH | Factory set: Accord model |

It set automatic while self study.

| | | | |
|---|---|---|---|
| F5.12 | Parameters self-adjustment selections | Setting range: 0-2 | Factory set: 0 |

**0: No operation** Set as default without self study.

**1: Rotary type self-study** Before self adjustment, **[F5.01-F5.06]** of asynchronic motor which is controlled must be set as right value. While self adjustment, firstly, asynchronic motor at static state, it automatic detects motor stator resistance, motor rotor resistance, motor stator&rotor inductance.Then the asynchronic motor at rotate state, it automatic detectes motor no-load current, motor stator&rotor mutual inductance. All results will be auto writted in **[F5.08]**, **[F5.09]**, **[F5.10]** and **[F5.07]**, **[F5.11]** 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 reback 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 writted in **[F5.08]**, **[F5.09]**, **[F5.10]** 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 reback to standby state.

**Note: [F5.12] is automatic set as 0 after self adjustment.**

**Attention: 1. Before set ting [F5.12] as 1 –self study, unload the motor firstly.**

**2. In some occasions (such as can not unload), if it can not self study or it is not high control**

**accuracy required, static self study or no self study is ok. If no self study, please do set right parameters [F5.01-F5.06]**

3. **If user know the right parameter. User can set [F5.01-F5.11] directly.**
4. **Ensure stop state before startting self study, otherwise, self study can not be normal.**
5. **While [F5.12] 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 static self study is not successful, alarm E.tE1 fault. If rotary self study is not successful, alarm E.tE2 fault.**

| | |
|---|---|
| F5.13-F5.14 | Reserved |

| | | | |
|---|---|---|---|
| F5.15 | PG selection | Setting range: 0000-1111 | Factory set: 0001 |
| F5.16 | PG pulse per loop | Setting range: 0-60000 | Factory set: 1024 |
| F5.17 | PG line-break inspection time | Setting range: 0.100-60.000s | Factory set: 2.000s |

**PG selection:**

**LED "0" digit: Input phase**

**0: 1-phasee input** Only feedback one of A and B and inspect motor speed.Not identify direction.

**1: 2-phase input** Feedback both A and B. Inspect both speed and direction.

**LED "00" digit: input phase adjustment**

While encoder A/B phase is converse, it can be adjusted by this parameter. No need to change the wire. Only valid while both phase are valid.

**0: same direction** Sensor phase is the same as motor phase, no meed adjust.

**1: reverse direction** Sensor phase is reverse to motor phase, meed adjust.

**LED "000" digit:**

**0: break inspection OFF** No line-break inspection.

**1: break inspection ON** While feedback signal of sensor disappears and after **[F5.17]** delay time, still no feedback signal is received. Inverter will alarm for PG line-break fault and stop output.Motor free stop.

**LED "0000" digit: PG feedback channel**

0: PG port

1: PUL port

**Note: Under closed loop mode, while feedback signal is 2 phase input and PG card feedback direction is reverse to motor output direction.Inverter can not run normally. Please adjust [F5.15] LED "00" digit setting.**

**PG pulse per loop:** Set according sensor specification.

**PG line-cut inspection time:** Set delay time for ensure sensor line break while sensor line-break inspection is valid.

## 9.7 VC control parameter

| | | | |
|---|---|---|---|
| F6.00 | ASR proportional gain 1 | Setting range: 0.00-1.00 | Factory set: Accord model |
| F6.01 | ASR integral time 1 | Setting range: 0.01-10.00s | Factory set: Accord model |
| F6.02 | ASR differential coefficient time 1 | Setting range: 0.0-100.0 | Factory set: 0.0 |
| F6.03 | ASR filter time1 | Setting range: 0.000-0.100s | Factory set: 0.005s |
| F6.04 | ASR switch frequency 1 | Setting range: 0.00-50.00Hz | Factory set: 5.00Hz |
| F6.05 | ASR proportional gain 2 | Setting range: 0.00-1.00 | Factory set: Accord model |
| F6.06 | ASR integral time 2 | Setting range: 0.01-10.00s | Factory set: Accord model |
| F6.07 | ASR differential coefficient time 2 | Setting range: 0.0-100.0s | Factory set: 0.0s |
| F6.08 | ASR filter time 2 | Setting range: 0.000-0.100s | Factory set: 0.001s |
| F6.09 | ASR switch frequency 2 | Setting range: 0.00-50.00Hz | Factory set: 10.00Hz |

**[F6.00-F6.09]** is only valid under VC control and PG V/F control. It changes speed response by set proportional gain P and integral timeI of speed adjustor.

**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 erborn 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 ASRswitch frequency **[F6.04]** and **[F6.09]** 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 **[F6.04]** and **[F6.09]**. The first group of ASR paremeter is valid while output frequency is under switch frequency 1 **[F6.04]**. The second group of ASR paremeter is valid while output frequency is between switch frequency 1 **[F6.04]** and switch frequency 2 **[F6.09]**. Parameter linearly transits from switch frequency 1 **[F6.04]** to switch frequency 2 **[F6.09]** prorate. Adjust ASR proportional gain 1 **[F6.00]** and ASR integral time 1 **[F6.01]** at low speed to ensure no surge and good response. Adjust ASR proportional gain 2 **[F6.05]** and ASR integral time 2 **[F6.06]** at high speed to ensure no surge and good response.

Usually, ASR differential coefficient time is not need to set.It is used to restrain suddent speed change. If it is too big, surge comes easily.

| | | | |
|---|---|---|---|
| F6.10 | VC control slip coefficient | Setting range: 10-250% | Factory set: 100% |

Used in occocation need quick response and high speed accuracy. Adjust this paramerter properly, the system response can be improved and stable speed error can be eliminated.

| | | | |
|---|---|---|---|
| F6.11 | Max output torque | Setting range: 20.0-200.0% | Factory set: 180.0% |

100.00% is corresponding to rated current.

| | | | |
|---|---|---|---|
| F6.12 | Constant power area torque compensation start frequency | Setting range: 100.0-500.0% | Factory set:120.0% |

| | | | |
|---|---|---|---|
| F6.13 | Constant power area torque compensation coefficient | Setting range: 0-100% | Factory set: 30% |

**Constant power area torque compensation start frequency:** Set start frequency of torque compensation in constant power area under VC control. 100.00% is corresponding to motor rated frequency.

**Constant power area torque compensation coefficient:** Set coefficient of torque compensation in constant power area. The coefficient is bigger, the compensation is bigger. While this function is on, it effectively helps to improve load capability at motor weak magnetic area.

| | | | |
|---|---|---|---|
| F6.14 | Constant power area limit start frequency | Setting range: 100.0%-500.0% | Factory set: 200.0% |
| F6.15 | Constant power area limit value | Setting range: 50-200% | Factory set: 120% |

**Constant power area limit start frequency:** Set to switch to start frequency of torque limitation in constant power area under VC control. 100.00% is corresponding to motor rated frequency.

**Constant power area limit value:** Set limitation of torque in constant power area. It can effectively anti motor stall at weak magnetic area by reduce this limitation properly.

| | | | |
|---|---|---|---|
| F6.16 | DEC over-excitation selection | Setting range: 0-1 | Factory set: 0 |
| F6.17 | DEC over-excitation current setting | Setting range: 50.0-200.0% | Factory set: 115.0% |
| F6.18 | DEC over-excitation gain | Setting range: 0.00-1.50 | Factory set: Accord model |

**DEC over-excitation selection:** 0: off; 1: on

**DEC over-excitation current setting:** It sets the excitation current while DEC over-excitation.

**DEC over-excitation current= motor rated current * DEC over-excitation current setting**

**DEC over-excitation gain:** It is used to adjust the excitation magnetic field building speed. This function can keep stable excitation flux. So that frequency inverter can quickly stop. The magnetic field need time to build up. If the gain is too big, it is easy to cause over current (E.OC).

**Note:** 1,It is easy cause over heat if use DEC over-excitation frequently. So we suggest to add right brake resistor if need quick stop/start frequently.2, Set right DEC time to avoid E.OU2 (over voltage). 3, If input run order while DEC over-excitation, it will ACC to setting frequency again.

## 9.8 Torque control parameter

| | | | |
|---|---|---|---|
| F7.00 | Torque give source selection | Setting range: 0000-0577 | Factory set: 0000 |

It used to select channel for torque given while torque control.

LED “0” digit: Main channel selection

0: Keyboard number given torque **[F7.01]** keyboard number give frequency give and modify main torque

1: Keyboard potentiometer given

2: VS1

3: VS2

4: AS

5: PUL

6: RS485 communication give

7: Tension control give

LED “00” digit: Second channel selection

0: Keyboard number given torque **[F7.01]** keyboard number give frequency give and modify main torque

1: Keyboard potentiometer given

2: VS1

3: VS2

4: AS

5: PUL

6: RS485 communication gives

7: Tension control gives

LED "000" digit: Main channel add second channel mode

0: MainX **[F7.02]** Main channel is valid, Main channel giving value is main channel giving value multiply torque give main channel gain **[F7.02]**

1: Second×**[F7.03]** Second channel is valid, Second channel giving value is second channel giving value multiply torque give second channel gain **[F7.03]**

2: MainX **[F7.02]**＋SecondX **[F7.03]** The result of main channel giving value multiply torque give main channel gain **[F7.02]** add the result of second channel giving value multiply torque give second channel gain **[F7.03]**. Then sum is the output torque of the inverter.

3: Main X **[F7.02]** －Second X **[F7.03]** The result of main channel giving value multiply torque give main channel gain **[F7.02]** minus the result of second channel giving value multiply torque give second channel gain **[F7.03]**. Then the result is the output torque of the inverter.

4: MAX{main X **[F7.02]**,second X **[F7.03]**} The bigger one of the result of main channel giving value multiply torque give main channel gain **[F7.02]** and the result of second channel giving value multiply torque give second channel gain **[F7.03]** is the output torque of the inverter.

5: MIN {main X **[F7.02]**,second X **[F7.03]**} The smaller one of the result of main channel giving value multiply torque give main channel gain **[F7.02]** and the result of second channel giving value multiply torque give second channel gain **[F7.03]** is the output torque of the inverter.

LED "0000" digit: Reserved

| | | | |
|---|---|---|---|
| F7.01 | Keyboard number give torque | Setting range: 0%-200.0% | Factory set: 100.0% |

Set torque given value by keyboard. While **[F4.04]** LED "0" digit is 2, the parameter can be modified by UP/DW key. Whether save modification is decided by **[F4.04]** LED "00" digit setting. It can adjust torque given value.

| | | | |
|---|---|---|---|
| F7.02 | Main torque give channel gain | Setting range:0-500.0% | Factory set: 100.0% |
| F7.03 | Second torque give channel gain | Setting range:0-500.0% | Factory set: 100.0% |

**Main torque give channel gain:** It is used to magnify or reduce the main channel torque by ratio.
**Second torque give channel gain:** It is used to magnify or reduce the second channel torque by ratio.

| | | | |
|---|---|---|---|
| F7.04 | Torque direction selection | Setting range: 0000-0011 | Factory set: 0000 |

**LED "0" digit:**

0: direction is FWD

1: direction is REV

**LED"00" digit:**

0: permit to change direction

1: forbid to change direction

**LED"000" digit: reserved**

**LED"0000" digit: reserved**

**Note: If load torque is bigger than motor output torque under torque control, motor run dirction maybe different to inverter torque output direction.**

| | | | |
|---|---|---|---|
| F7.05 | Output torque upper limit set selection | Setting range: 0-6 | Factory set: 0 |

**Output torque upper limit set selection:** Select the giving source of the output torque upper limit.

**0: Keyboard No give** Output torque upper limit set by **[F7.06]**; Max setting is smaller or equal to **[F7.06]**, Smallest setting is bigger or equal to **[F7.07]**.

**1: Keyboard potentiometer gives**

**2:VS1 give**

**3: VS2 give**

**4: AS give**

**5: PUL give**

**6: RS485 give**

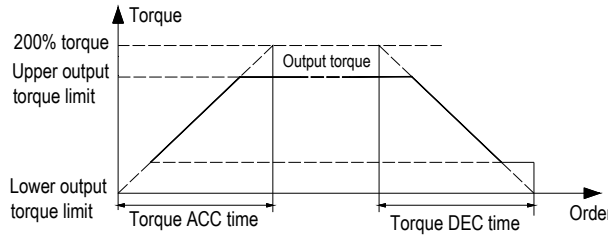
| | | | |
|---|---|---|---|
| F7.06 | Output torque upper limit | Setting range: Lowest limit of output torque - max output torque | Factory set:180.0% |
| F7.07 | Output torque lowest limit | Setting range: 0.0- upper limit of output torque | Factory set:1.0% |

| | |
|---|---|
| F7.08- F7.11 | Reserved |

| | | | |
|---|---|---|---|
| F7.12 | Torque ACC time | Setting range: 0.00-100.00s | Factory set: 0.5s |
| F7.13 | Torque DEC time | Setting range: 0.00-100.00s | Factory set: 0.5s |

**Torque ACC time:** Time of output torque from 0.0% up to 200.0% while torque control.

**Torque DEC time:** Time of output torque from 200.0% down to 0.0% while torque control.




Upper/lower torque limit and torque ACC/DEC time relationship

| | | | |
|---|---|---|---|
| F7.14 | FWD/REV dead time | Setting range: 0.00-650.00s | Factory set: 0.00s |

Waitting time at 0.0% torque while change torque direction.

| | | | |
|---|---|---|---|
| F7.15 | Static friction compensation | Setting range: 0-200.0% | Factory set: 0 |
| F7.16 | Static friction cutoff frequency | Setting range: 0.00-50.00Hz | Factory set: 10.00Hz |

**Static friction compensation:** It compensates the static friction while system starts up.
**Static friction cutoff frequency:** While unwinding frequency is bigger than this value. The static friction compensation is cancelled.

| | | | |
|---|---|---|---|
| F7.17 | Sliding friction compensation | Setting range: 0-200.0% | Factory set: 0 |

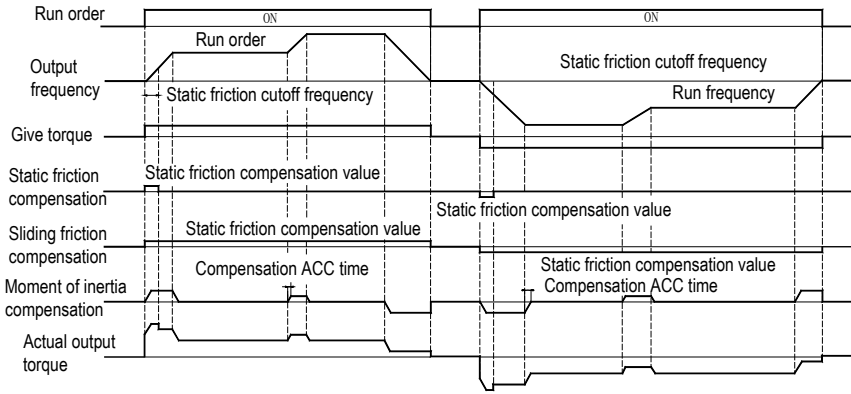
Sliding friction compensation: It compensates the sliding friction of the whole system in running. Increase this value to improve tension while material tension is not enough.

| | | | |
|---|---|---|---|
| F7.18 | Moment of inertia compensation | Setting range:0-200.0% | Factory set: 0 |
| F7.19 | Moment of inertia compensation input ACC time | Setting range:0.0-6000.0s | Factory set: 0 |
| F7.20 | Moment of inertia compensation input DEC time | Setting range:0.0-6000.0s | Factory set: 0 |

**Moment of inertia compensation:** This value is used to compensate the moment of inertia of rotating bodies, such as motor, transmission system, scrolls and others in acceleration. During deceleration, it compensates reverse torque to the system to ensure the tension balance in slow down process. The moment of inertia is direct ratio to the rotating body quality and rotation acceleration. Moment of inertia is greater when the system acceleration is greater. It is smaller when the system acceleration is smaller. In winding process, if material tension is not enough in acceleration,then increase this value, otherwise decrease the value.

**Moment of inertia compensation input ACC time:**Moment of inertia compensates time for ACC from 0.0% to 200.0%

**Moment of inertia compensation input DEC time:**Moment of inertia compensates time for DEC from 200.0% to 0.0%




output torque and compensation relationship

| | | | |
|---|---|---|---|
| F7.21 | Zero-speed torque keep selection in the torque control mode | Setting range:0000-0011 | Factory set:0010 |

**LED "0"digit:** Zero-speed torque keep set channel

0: Torque setting Motor output torque is setting torque while inverter running frequency is 0Hz

1: F1.27 setting Motor output torque is setting torque while inverter running frequency is **[F1.27]**

**LED "00"digit:** Zero-speed torque keeps time set

0: Zero-speed continue valid Inverter continually output torque at zero frequency and stop zero frequency torque only at stop or running frequency is bigger than 0Hz

1: Zero-speed valid in F1.28 time Inverter output torque time is controlled by **[F1.28]**

**LED "000"digit: Reserved**

**LED "00"digit: Reserved**

**Note: This parameter is valid only under torque control or tension open loop control under torque control**

**mode. Under speed mode, zero speed torque keep function is decided by [F1.27]-[F1.28]**

| | | | |
|---|---|---|---|
| F7.22 | Zero speed slip frequency settings | Setting range:0.0-5.00Hz | Factory set:1.00 |

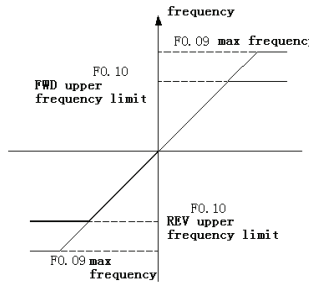
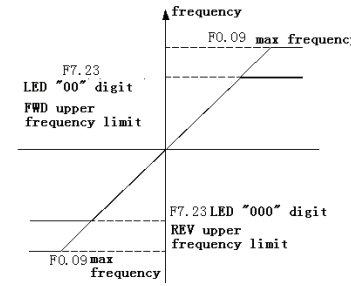
**Zero speed slip frequency settings:** Right setting can keep stable tension while motor is zero speed (stall)

**Zero speed torque= Zero speed slip frequency settings*giving torque**

While give torque is fixed, if this value increases, zero speed tension will increase. It will be more stable. If this value decreases, zero speed tension will decrease. It will be more not stable.

| | | | |
|---|---|---|---|
| F7.23 | Torque control upper frequency limit selection | Setting range:0000-2660 | Factory set: 0000 |

**Torque control upper frequency limit selective:** Torque control takes the motor torque as control aim. The frequency or speed increase or decrease is decided by the difference between the set torque and the load torque. However, in order to prevent stall, the output frequency limit is very necessary. Under torque mode, the inverter can be achieved to set torque and frequency limits separately. Torque is set by the torque give channel. Frequency limits set by the frequency give channel, but also limited by the upper frequency limit. This parameter is used to select the upper frequency limit give source under torque control.

| **Upper frequency limit selection under torque control** | **0: FWD/REV set by[F0.10]** | **1: FWD set by LED "00"digit<br>REV set by LED "000"digit** |
|---|---|---|
| Give frequency limit range |  |  |
| Feature | FWD/REV upper/lower limit all setby F0.10 | Set FWD upper/lower limit separately |

**LED "0" digit: Torque control upper frequency limit selection**

0: FWD/REV set by **[F0.11]**. Same as speed control

1: FWD set by LED "00"digit; REV set by LED "000"digit. Used where need set FWD upper/lower limit separately

**LED "00" digit: FWD upper frequency limit set**

0: Torque control FWD upper frequency limit No set (F7.24) + max frequency∗torque control FWD upper frequency limit bias.

1: Keyboard pot give +max frequency∗torque control FWD upper frequency limit bias.

2:VS1 give +max frequency∗torque control FWD upper frequency limit bias.

3:VS2 give +max frequency∗torque control FWD upper frequency limit bias.

4: AS give +max frequency∗torque control FWD upper frequency limit bias.

5: PUL give +max frequency∗torque control FWD upper frequency limit bias.

6:RS485 give +max frequency∗torque control FWD upper frequency limit bias.

**LED "000" digit: REV upper frequency limit set**

0: Torque control REV upper frequency limit No set (F7.26) + max frequency∗torque control REV upper frequency limit bias.

1: Keyboard pot give +max frequency∗torque control REV upper frequency limit bias.

2:VS1 give +max frequency∗torque control REV upper frequency limit bias.

3:VS2 give +max frequency∗torque control REV upper frequency limit bias.

4: AS give +max frequency∗torque control REV upper frequency limit bias.

5: PUL give +max frequency∗torque control REV upper frequency limit bias.

6:RS485 give +max frequency∗torque control REV upper frequency limit bias.

| | | | |
|---|---|---|---|
| F7.24 | Torque control FWD upper frequency limit No set | Setting range: Lower limit-Max output frequency | Factory set: 50.00 |
| F7.25 | Torque control FWD upper frequency limit bias | Setting range: 0.0-20.0% | Factory set:0.0 |

**Torque control FWD upper frequency limit No set:** It sets FWD speed limit under torque control.

**Torque control FWD upper frequency limit bias:** It adjusts FWD speed limit. After bias, FWD frequency under torque control is.

**FWD frequency under torque control= Torque control FWD upper frequency limit No set+(max frequency* Torque control FWD upper frequency limit bias)**

| | | | |
|---|---|---|---|
| F7.26 | Torque control REV upper frequency limit No set | Setting range: Lower limit-Max output frequency | Factory set: 50.00 |
| F7.27 | Torque control REV upper frequency limit bias | Setting range: 0.0-20.0% | Factory set:0.0 |

**Torque control REV upper frequency limit No set:** It sets REV speed limit under torque control.

**Torque control REV upper frequency limit bias:** It adjusts REV speed limit. After bias, FWD frequency under torque control is.

**REV frequency under torque control= Torque control REV upper frequency limit No set+(max frequency∗ Torque control REV upper frequency limit bias)**

| | | | |
|---|---|---|---|
| F7.28 | Upper frequency limit under small torque | Setting range: 0.00-50.00Hz | Factory set: 3.00Hz |

**Upper frequency limit under small torque:** It sets max output frequency under small torque output to keep stable speed.

| | | | |
|---|---|---|---|
| F7.29 | Small torque value threshold | Setting range: 0-200.0% （0:This function off） | Factory set: 0.0% |

Small torque value threshold: While give torque is smaller than this value, the inverter output frequency upper limit is

[F7.28]. It is main function is to keep stable speed under certain small torque.
While it is "0",inverter close this function and stop output. The motor is in free state.

| | | | |
|---|---|---|---|
| F7.30 | Magnetic powder brake current give channel | Setting range: 0000-4450 | Factory set: 0010H |

**LED "0" digit: main channel selection**

0: Keyboard give **[F7.31]** keyboard No set frequency give or modify

1: Keyboard pot give or modify

2: VS1 give or modify

3: VS2 give or modify

4: AS give or modify

**LED "00" digit: Second channel selection**

0: Keyboard give **[F7.31]** keyboard No set frequency give or modify

1: Keyboard pot give or modify

2: VS1 give or modify

3: VS2 give or modify

4: AS give or modify

**LED "000" digit: Main channel combines second channel**

0: Main× **[F7.32]**

1: Second×**[F7.33]**

2: Main×**[F7.32]**＋second×**[F7.33]**

3: Main×**[F7.32]**－second×**[F7.33]**

4: MAX {Main× **[F7.32]**, second×**[F7.33]**}

5: MIN {Main× **[F7.32]**, second×**[F7.33]**}

**LED "0000" digit: Reserved**

**Note: 1. Consider the radiator carefully while using this function.**

**2. Magnetic powder brake function has priority. It switches to magnetic powder brake state while the multi function terminal start magnetic powder brake function is valid.**

| | | | |
|---|---|---|---|
| F7.31 | Magnetic powder brake current keyboard No give | Setting range: 0-200.0% | Factory set: 100.0% |

**Magnetic powder brake current keyboard No give:** when the keyboard setting, it sets the brake torque give the magnetic powder by this parameter. If the parameters **[F4.04]** LED "0" digit set as "4", the value of the parameter can be modified through the keyboard up / down shortcuts. After modify the parameters, the frequency converter whether to save the modified value is decided by the **[F4.04]** LED "00"digit. F4. Ten settings of the 04 the LED decision.

| | | | |
|---|---|---|---|
| F7.32 | Magnetic powder brake main channel gain | Setting range: 0-500.0% | Factory set: 100.0% |
| F7.33 | Magnetic powder brake second channel gain | Setting range: 0-500.0% | Factory set: 100.0% |

**Magnetic powder brake main channel gain:** To zoom in or out of the main torque give channel signal of the powder

brake. It can adjust the main channel torque by rata.

**Magnetic powder brake second channel gain:** To zoom in or out of the second torque give channel signal of the powder brake. It can adjust the main channel torque by rata.

## 9.9 V/F control parameters

| | | | |
|---|---|---|---|
| F8.00 | V/F curve selection | Setting range:0-4 | Factory set: 0 |

0 beeline can be selected for general used load. Falling torque curve can be for fan and pump.

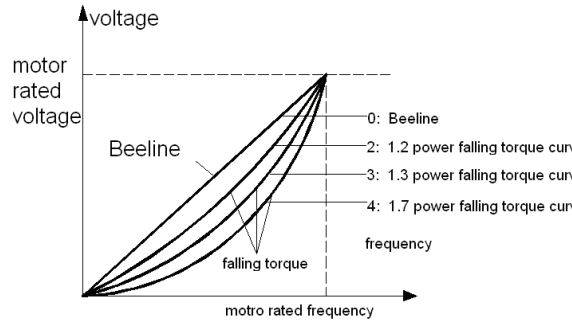
0: Beeline

1: User-defined V/F curve Details refer to **[F8.01-F8.10]**.

2: 1.3 power falling torque curve

3: 1.7 power falling torque curve

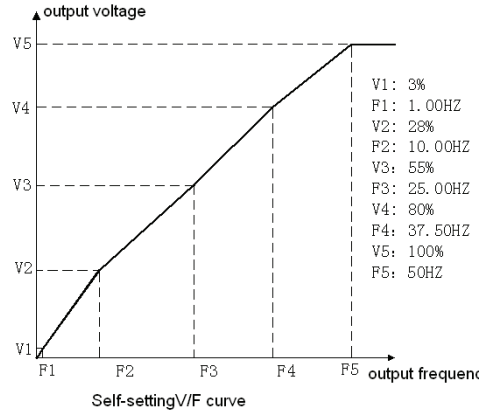
4: 2.0 power falling torque curve




V/F curve

| | | | |
|---|---|---|---|
| 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-settingV/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.



Self-settingV/F curve

Must meet:0≤F1≤F2≤F3≤F4≤F5≤max frequency；0≤V1≤V2≤V3≤V4≤V5≤100.0%

V1、V2、V3、V4、V5 is based on motor rated voltage.

| | | | |
|---|---|---|---|
| F8.11 | Output voltage percentage | Setting range: 25-100% | Factory set: 100% |

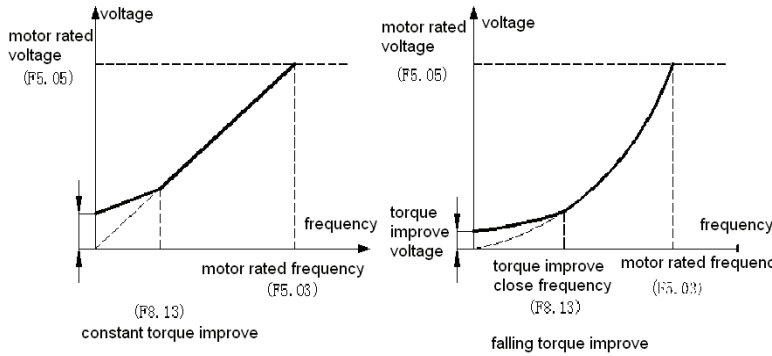
Output voltage adjustment coefficient adjusts output voltage of inverter to meet different V/F requirement.

| | | | |
|---|---|---|---|
| F8.12 | Torque improve | Setting range: 0.1-30.0% | Factory set: Accord model |
| F8.13 | Torque improve close frequency | Setting range: 0.0-100.0% | Factory set: 20.0% |

**Torque improve:** 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.

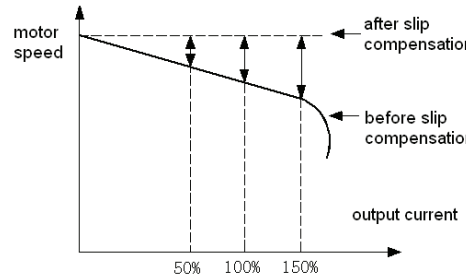
**Note: while [F8.00] is 1, [F8.12] is invalid.**

**Torque improve close 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 | V/F slip compensation | Setting range:0.0-200.0% | Factory set:0.0% |

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.




Slip frequency compensation

If compensation setting is too big, it maybe causes motor speed over settings.

| | | | |
|---|---|---|---|
| F8.15 | Auto energy save selection | Setting range: 0-1 | Factory set: 0 |
| F8.16 | Lowest frequency limit of energy save running | Setting range: 0.0-500.0% | Factory set: 25.0% |
| F8.17 | Energy save voltage down time | Setting range: 0.01-50.00s | Factory set: 10.00s |
| F8.18 | Energy save voltage lowest limit | Setting range: 20.0-100.0% | Factory set: 50.0% |

**Auto energy save selection:**

0: no auto energy save

1: auto energy save

**Lower frequency limit of energy save running:** While output frequency is lower than this value, auto energy save function will close. 100% is corresponding to motor rated frequency.

**Energy save voltage down time:** It is the time output voltage from rated voltage to 0V while meet auto energy save conditions.

**Energy save voltage lowest limit:** Set lowest limitation of voltage while energy save running. 100% is corresponding to motor rated frequency.

| | | | |
|---|---|---|---|
| F8.19 | ASR(VF) proportion gain1 | Setting range:0.0-100.00 | Factory set: 1.00 |
| F8.20 | ASR(VF) integral time 1 | Setting range:0.01-10.00s | Factory set: 0.50s |
| F8.21 | ASR(VF) filter time1 | Setting range:0.000-10.000s | Factory set: 0.005s |
| F8.22 | ASR(VF) switch frequency 1 | Setting range:0.00-50.00Hz | Factory set: 5.00Hz |
| F8.23 | ASR(VF) proportion gain 2 | Setting range:0.0-100.00 | Factory set: 1.00 |
| F8.24 | ASR(VF) integral time 2 | Setting range:0.01-10.00s | Factory set: 0.50s |
| F8.25 | ASR(VF) filter time 2 | Setting range:0.000-10.000s | Factory set: 0.100s |
| F8.26 | ASR(VF) switch frequency 2 | Setting range:0.00-50.00Hz | Factory set: 10.00Hz |

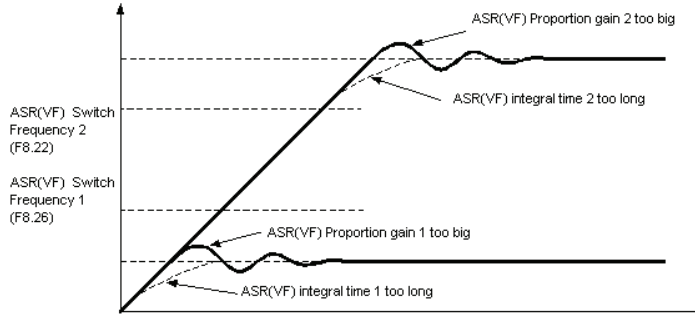
**[F8.19-F8.26]** is valid under V/F with PG mode. It changes the speed responde features by setting proportion gain P and integral time I of the speed adjuster.

**ASR (VF) proportion gain:** Make inverter respond quicker to load by adjust proportion gain bigger. But it is easy to cause vibration while proportion gain is too big. Make inverter respond slower to load by adjust proportion gain smaller. It is easy to reduce vibration while proportion gain is small.

**ASR (VF) integral time:** Respond to sudden changed load will be slower while integral time is long. But it is valid to reduce vibration. General speaking, the proportion gain is adjusted firstly (as big as possible based on no system vibration). Then adjust integral time to make system has quick respond without vibration.

**ASR (VF) filter time:** It is easy to be disturbed while PG card sampling. So it needs to filter.

**ASR proportion gain, integral time adjustment at high/low speed:** If system needs quick respond both at high and low speed, it can set ASR(VF)switch frequency **[F8.22]** and **[F8.26]** .




Relationship between Proportion gain and Integral time under PG V/F control

**Note: If proportion gain is too big and integral time is too short, the system may meets voltage fault after start to high speed at short time (no optional resistance and break unit). It can be avoided by adjust smaller proportion gain and longer integral time.**

| | | | |
|---|---|---|---|
| F8.27 | ASR(VF) slip limit | Setting range:0.0-500.0% | Factory set: 100.0% |

**It is used to limit the max slip frequency compensation. It can be properly bigger for high accuracy required or heavy load**

## 9.10 Tension control special parameters

| | | | |
|---|---|---|---|
| F9.00 | Tension setting selection | Setting range:0000-0566 | Factory set: 0000 |

**LED "0" digit: main channel selection**

0: Keyboard No give **[F9.03]** keyboard No set frequency to give or modify main channel tension

1: Keyboard pot give or modify

2: VS1 give or modify

3: VS2 give or modify

4: AS give or modify

5: PUL give or modify

6:RS485 give

**LED "00" digit: Second channel selection**

0: Keyboard give **[F7.01]** keyboard No set frequency give or modify.

1: Keyboard pot give or modify

2: VS1 give or modify

3: VS2 give or modify

4: AS give or modify

5: PUL give or modify

6:RS485 give

**LED "000" digit: Main channel combines second channel**

0: Main×**[F9.01]**

1: Second×**[F9.02]**

2: Main×**[F9.01]**＋second×**[F9.02]**

3: Main×**[F9.01]**－second×**[F9.02]**

4: MAX {Main×**[F9.01]**, second×**[F9.02]**}

5: MIN {Main×**[F9.01]**, second×**[F9.02]**}

**LED "000" digit: Reserved**

| | | | |
|---|---|---|---|
| F9.01 | Tension give main channel gain | Setting range:0-500.0% | Factory set: 100.0% |
| F9.02 | Tension give second channel gain | Setting range:0-500.0% | Factory set: 100.0% |

**Tension give main channel gain** zooms in or out tension values, adjust the main channel tension by ratio.

**Tension give second channel gain** zooms in or out tension values, adjust the second channel tension by ratio.

| | | | |
|---|---|---|---|
| F9.03 | Tension No setting | Setting range:0-30000N | Factory set: 0 |

While keyboard No give tension channel, it is used to set and modify keyboard No give tention.

| | | | |
|---|---|---|---|
| F9.04 | Max tension | Setting range:0-30000N | Factory set:0 |

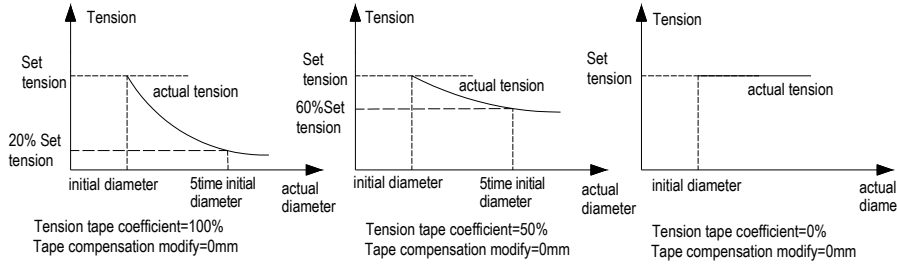
While keyboard No give tension channel, it is max tension inverter permit to set.

| | | | |
|---|---|---|---|
| F9.05 | Tension tape coefficient | Setting range:0.0-100.0% | Factory set:0.0% |

It is used to control winding material moulding under winding mode. In winding process, sometime tension needs reduce while roll diameter increase to make sure good winding moulding.

$$\text{output tension} = \text{set tension} \times \left\{ 1 - \text{tension tape} \times \left[ 1 - \frac{(\text{Initial diameter} + \text{Tape compensate modify})}{(\text{Actual diameter} + \text{Tape compensate modify})} \right] \right\}$$

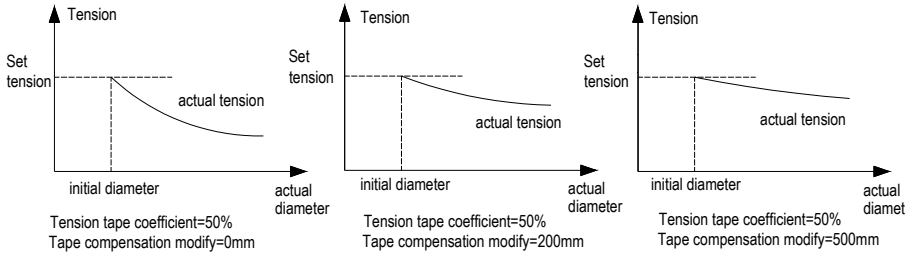
While the tape coefficient is bigger, tension will reduces quicker and quicker as the diameter increase in winding process. Otherwise, it will be different.While tension tape need adjust. It can be modified by **[F9.06]** tape compensation modify.




Tension tape show

| | | | |
|---|---|---|---|
| F9.06 | Tape compensation modify | Setting range:0-10000mm | Factory set: 0 |

It is tension tape control assistant parameter. Increase this value after settle down the tension tape can make output tension decrease slowly while roll diameter increase. Otherwise, decrease it can make output tension increase quickly while roll diameter increase.




Tape compensation modify

| | |
|---|---|
| F9.07- F9.08 | Reserved |

| | | | |
|---|---|---|---|
| F9.09 | Machine drive ratio | Setting range:0.01-300.00 | Factory set:1.00 |

Machine drive ratio: It means the deceleration ratio of the drive motor output speed and winding reel speed or unwinding reel speed.

**Machine drive ratio = motor output speed / winding reel speed**

It is very important in the tension control process. It must rightly set the machine drive ratio.

| | | | |
|---|---|---|---|
| F9.10 | Curl mode | Setting range:0-1 | Factory set:0 |

Select Curl mode to supply two shortcut for winding and unwinding

**0: Winding** Under winding tension control, tension direction is fixed to be winding tension direction, consistent to the run direction under speed control.

**1: Unwinding** Under unwinding control, tension direction is opposite to syterm control run direct. While no load, run direction also opposite to the normal unwinding direction.

| | | | |
|---|---|---|---|
| F9.11 | Roll diameter calculation selection | Setting range:0-8 | Factory set: 0 |

This parameter is used to select the roll diameter calculation method or the roll diameter input mode. In the process of winding, diameter calculation directly affects the inverter tension control. The reasonable roll diameter input ways helps to better control the tension.

0: Initial roll diameter, no calculate the inverter not counting the unwinding roll diameter, default for the initial roll diameter.

1: Line speed calculate inverter calculates roll diameter based on the line speed and the inverter output frequency. line speed source selection see **[F9.25]**. The advantage of this method is it has nothing to do with the material thickness and can get acceleration speed of system.

2: Calculate through the accumulative thickness Need to set the thickness of the material. The inverter calculates roll diameter according to cumulative calculation of the winding reel circle signal. While winding, it is increase gradually. Related functions see **[F9.36-F9.41]** accumulative thickness calculate roll diameter parameters.

3: Calculate through the time Need the full winding roll diameter and the time to arrive full roll. Inverter calculates the roll diameter of the middle time by the upper parameters. The method is suitable for the traction line speed constant and the winding max roll diameter fixed occasions. This feature provides two sets of switch parameters, see parameter **[F9.44-F9.48]**.

4: Keyboard potentiometer give winding roll diameter

5: VS1 give winding roll diameter, VS1 input analog filter details see **[F3.04]**

6: VS2 give winding roll diameter, VS1 input analog filter details see **[F3.04]**

7: AS give winding roll diameter, VS1 input analog filter details see **[F3.04]**

8: PUL give winding roll diameter, PUL max frequency is corresponding to max roll diameter.

**9: RS485 give winding roll diameter**

**Note: While analog give, the max analog input is linear relation with [F9.12] max roll diameter.**

| | | | |
|---|---|---|---|
| F9.12 | Max roll diameter | Setting range:1-10000mm | Factory set:500 |

**Max roll diameter**：Max roll diameter while winding, corresponding to the max input value while **[F9.11]** is analog input. And they are linear relationship.

While **[F9.11]** roll diameter resource is Line speed calculates, Calculate through the accumulative thickness or Calculate through the time, the result is limited by max roll diameter. It should be modified after calculate the max roll diameter.

| | | | |
|---|---|---|---|
| F9.13 | Reel diameter | Setting range:1-10000mm | Factory set:100 |

**Reel diameter:** The diameter while winding roll is empty. Inverter also takes it as the initial diameter and the lower diameter limit. It is very important to set the reel diameter rightly. If not right, as inverter takes it as lower roll diameter limit, tension control will meet problem while the roll diameter is lower than this value.

| | | | |
|---|---|---|---|
| F9.14 | Initial diameter resource selection | Setting range:0-5 | Factory set:0 |

It is used to select the initial diameter give mode.

0: Terminal select Select initial diameter by switch terminals. Details see **[F9.15-F9.17]**

1: Keyboard potentiometer give or modify
2: VS1 give or modify
3: VS2 give or modify
4: AS give or modify
5: PUL give or modify

| | | | |
|---|---|---|---|
| F9.15 | Initial diameter 1 | Setting range:1-10000mm | Factory set:100 |
| F9.16 | Initial diameter 2 | Setting range:1-10000mm | Factory set:100 |
| F9.17 | Initial diameter 3 | Setting range:1-10000mm | Factory set:100 |

While Initial diameter resource selection **[F9.14]** is set as "0(Terminal select)", it can be select "Initial diameter setting terminal" to define any terminals. Details see **[F2.00-F2.07]**; 3 groups of Initial diameter can be supplied by terminal switch. The relationship table is as below.

| Initial diameter set 1 | Initial diameter set 2 | Initial diameter |
|---|---|---|
| ON | OFF | Initial diameter 1 |
| OFF | ON | Initial diameter 2 |
| ON | ON | Initial diameter 3 |

**Note: while all terminals are OFF state, Initial diameter is reel diamerter [F9.13] setting. If need modify by RS485, set [F9.14] as "0" and not define terminal. Modify Initial diameter in [F9.13] address of upper machine.**

| | | | |
|---|---|---|---|
| F9.18 | Diameter reset selection | Setting range:0-1 | Factory set: 0 |

0: Manual reset Need define one terminal as "diameter reset terminal". While diameter reset terminal is valid, the roll diameter of the inverter reset to initial diameter.
1: Auto reset Inverter resets the roll diameter to initial value automaticly after stop.

| | | | |
|---|---|---|---|
| F9.19 | Diameter filter time | Setting range:0.1-100.0s | Factory set:1.0s |

It defines the filter time for roll diameter to clear outside disturbance to the roll diameter. The longer the time is, the stronger the anti-disturb ability is. Roll diameter change respond speed will be weaker. The shorter the time is, the weaker the anti-disturb ability is. Roll diameter change respond speed will be quicker.
Under tension control, if torque wave is obivious, diameter filter time can be increased properly to prevent the torque wave for diameter calculate not stable.

| | | | |
|---|---|---|---|
| F9.20 | Current roll diameter | Setting range:1-10000mm | Factory set: * |

This parameter can monitor the current roll diameter in real time. It can be compared to the actual diameter while debugging. The current roll diameter can be adjusted by this parameter.

| | | | |
|---|---|---|---|
| F9.21 | Roll diameter calculate end frequency | Setting range:0.00-50.00Hz | Factory set:10.00 |

Set the lowest frequency where begin to calculate the roll diameter. While the output frequency is lower this value, frequency inverter stop roll diameter calculate. Right setting can prevent big error of roll diameter calculate at low speed.

| | | | |
|---|---|---|---|
| F9.22 | Diameter reset delay | Setting range:0-6000s | Factory set:10 |

It is used to clear the diaeter calculate error at start. Right setting can prevent the calculate error at beginning of winding.

| | |
|---|---|
| F9.23-F9.24 | Reserved |

**Linear calculate**

| | | | |
|---|---|---|---|
| F9.25 | Linear input resource | Setting range:0-6 | Factory set:0 |

It is valid only while **[F9.11]** is set as "1"

0: F9.28/F9.29 terminal selection Select traction linear value by terminal switch , details see**[F9.28-F9.29]**

1: Keyboard potentiometer gives and modifies

2: VS1 give and modify

3: VS2 give and modify

4: AS give and modify

5: PUL give and modify

6: PUL*[(F9.31)* π /(F9.32)] While the traction roller adopts photoelectric switch to detect speed, it calculates traction roller speed by the photoelectric switch frequency, traction roller diameter and pulse per cycle. The formula is:

**Traction linear speed=PUL* traction roller diameter * π / pulse per cycle**

7:RS485 give and modify

**Note: While using linear calculate in winding, it must gain right traction linear speed.The normal way is sending output frequency of the inverter who drives traction motor to winding inverter to gain run frequency of traction.**

| | | | |
|---|---|---|---|
| F9.26 | Max linear speed | Setting range:0.0-6500.0m/Min | Factory set:1000.0 |

Max linear speed of traction. While the linear resource is analog input, the analog input max value and max linear speed are linear corresponding relationship.

| | | | |
|---|---|---|---|
| F9.27 | Min linear speed of diameter calculate | Setting range:0.0-6500.0m/Min | Factory set:200.0 |

Set the lowest linear speed where begin to calculate roll diameter. While inverter detect the linear speed is lower than this value, inverter stop calculate. Right setting can prevent error at low speed. While setting linear calculate, this parameter and the end frequency both are valid. The bigger value is the lowest value where stop calculate.

| | | | |
|---|---|---|---|
| F9.28 | Linear speed setting 1 | Setting range:0.0-6500.0m/Min | Factory set:1000.0 |
| F9.29 | Linear speed setting 2 | Setting range:0.0-6500.0m/Min | Factory set:1000.0 |

While **[F9.25]** Linear input resource is 0: F9.28/F9.29 terminal selection. It can select linear speed selection terminal and define any terminals, details see **[F2.00-F2.07]**. Set traction linear speed by terminal switch can bring two group traction linear speed. Relationship table as below:

| Linear speed selection terminal | linear speed setting |
|---|---|
| OFF | Linear speed setting 1 |
| ON | Linear speed setting 2 |

| | | | |
|---|---|---|---|
| F9.30 | Current linear speed | Setting range:0.0-6500.0m/Min | Factory set:* |

Monitor the current linear speed in real time.

| | | | |
|---|---|---|---|
| F9.31 | Traction roller diameter | Setting range:0.0-1000.0mm | Factory set:100.0mm |
| F9.32 | Traction roller pulse per cycle | Setting range:1-60000 | Factory set:* |

While **[F9.25]** Linear input resource is 6, inverter gains traction linear speed by detection traction roller pulse signal. It needs traction roller pulse per cycle and traction roller diameter.
Traction roller pulse per cycle: Nos of pulse per cycle of the traction roll in winding process.

| | |
|---|---|
| F9.33 -F9.35 | Reserved |

**Thickness calculate:**

| | | | |
|---|---|---|---|
| F9.36 | Pulse per cycle | Setting range:1-60000 | Factory set:1 |
| F9.37 | Cycles per layer | Setting range:1-10000 | Factory set:1 |

While roll diameter calculation selection **[F9.11]** is 2, **[F9.36-F9.41]** are valid. PUL port is pulse input port default.
Inverter calculates the thickness by pulse from PUL port.
**Pulse per cycle:** Pulse is coming from one cycle in winding process.
**Cycles per layer:** Cycles which are needed for one layer of winding roll finish.

| | | | |
|---|---|---|---|
| F9.38 | Max thickness | Setting range:0.01-100.00mm | Factory set:1.00 |

Max thickness of material permit. While thickness is analog input, max analog input corresponds to the max thickness. And they are linear relationship.

| | | | |
|---|---|---|---|
| F9.39 | Material thickness set resource | Setting range:0-5 | Factory set: 0 |

It is used to select material thickness gain mode:
0: F9.40/F9.41 terminal select Select material thickness by terminals switch. details see **[F9.40-F9.41]**.
1: Keyboard potentiometer gives and modifies the material thickness.
2: VS1 gives and modifies the material thickness.
3: VS2 gives and modifies the material thickness.
4: AS gives and modifies the material thickness.
5: PUL gives and modifies the material thickness.

6: RS485 gives and modifies the material thickness.

| | | | |
|---|---|---|---|
| F9.40 | Material thickness 1 | Setting range:0.01-100.00mm | Factory set:0.01mm |
| F9.41 | Material thickness 2 | Setting range:0.01-100.00mm | Factory set:0.01mm |

While Material thickness set resource 【**F9.39**】 is "0",It can select "material thickness selection terminal" to define any terminals. Details see 【**F2.00-F2.07**】 Set thickness by terminal switch can bring two group traction linear speed. Relationship table as below:

| Material thickness selection terminal | Material thickness |
|---|---|
| OFF | Material thickness 1 |
| ON | Material thickness 2 |

| | |
|---|---|
| F9.42 | Reserved |
| F9.43 | Reserved |

**Time calculate:**

| | | | |
|---|---|---|---|
| F9.44 | Full roll diameter 1 | Setting range:1-10000mm | Factory set:500 |
| F9.45 | Full roll diameter 2 | Setting range:1-10000mm | Factory set:500 |

While roll diameter calculation selection **[F9.11]** is 3, **[F9.44-F9.48]** are valid. It can set full roll diameter by terminal switch.It can select "full roll diameter selection terminal" to define any terminals. Details see **[F2.00-F2.07]** Set full roll diameter by terminal switch can bring two group full roll diameter. Relationship table as below:

| Full roll diameter selection | Full roll diameter |
|---|---|
| OFF | Full roll diameter 1 |
| ON | Full roll diameter 2 |

| | | | |
|---|---|---|---|
| F9.46 | Empty to full roll time 1 | Setting range:0-65000s | Factory set:3600 |
| F9.47 | Empty to full roll time 2 | Setting range:0-65000s | Factory set:7200 |

It sets the time from empty roll to full roll. It can set empty to full roll time by terminal switch.It can select "empty to full roll time selection terminal" to define any terminals. Details see **[F2.00-F2.07]**. Set empty to full roll time by terminal switch can bring two groups empty to full roll time. Relationship table as below:

| Empty to full roll time selection | Empty to full roll time |
|---|---|
| OFF | Empty to full roll time 1 |
| ON | Empty to full roll time 2 |

| | | | |
|---|---|---|---|
| F9.48 | Current time | Refer range:0-65000s | Factory set:* |

It is used to monitor winding run time in real time.

| | |
|---|---|
| F9.49-F9.51 | Reserved |

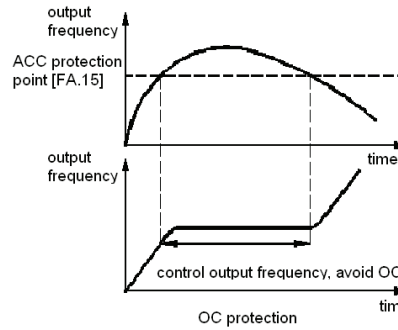
## 9.11 Malfunction and protection parameters

| FA.00 | Protection functionselection 1 | Setting range: 0000-0111 | Factory set: 0001 |
|---|---|---|---|

**LED "0"digit: ACC OC protection selection**

**0: Invalid**

**1: Valid** While inverter output frequency is over **[FA.15]** setting, inverter enters OC protection state, prolong ACC time and not continue ACC until frequency back to **[FA.15]** setting.




**LED"00"digit: DEC OC protection selection**

While inverter output frequency is over **[FA.16]** setting, inverter enters OC protection state, prolong DEC time and not continue DEC until frequency back to **[FA.16]** setting.

0: Invalid

1: Valid

**LED"000"digit: current limit selection while running**

While inverter output frequency is over **[FA.17]** setting, inverter enters current limit state, reduce output frequency according to **[FA.18]** ACC/DEC time setting and not continue ACC according to **[FA.18]** ACC/DEC time setting until frequency back to **[FA.17]** setting.

0: Invalid

1: Valid

**LED"0000"digit: reserved**

| FA.01 | Protection function selection 2 | Setting range: 0000-3212 | Factory set: 0001 |
|---|---|---|---|

**LED "0"digi: DEC OV protection selection**

**0: Invalid**

**1: rating 1 OV protection** Stonger OV protection. Bus voltage wave is small while protection.

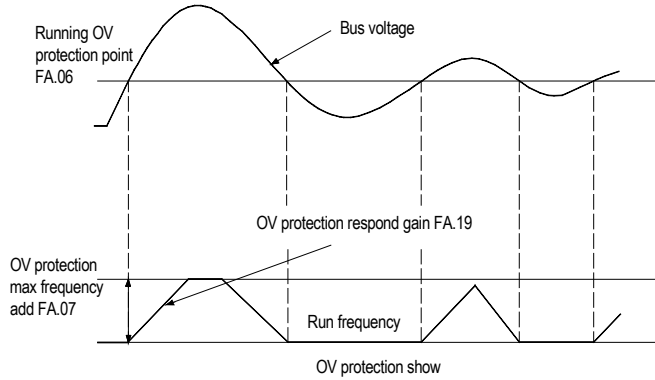
**2: rating 2 OV protection** Stongest OV protection. Bus voltage wave is big while protection.

While it is valid and bus voltage is reach or over **[FA.05]**, inverter will stop DEC.

**LED"00"digit: Protection selection for OV in ACC or constant speed**

**0: Invalid**

1: Valid While bus voltage is reach or over **[FA.06]**, inverter will adjust frequency to protect. It is valid specially for eccentric load




**Note:Set right［FA.07］and［FA.19］parameters while using the OV protection.**

**LED"000"digit: inverter OL act** Set protection mode while over load.

**0: emergency stop output and alarm** While OL protection action is caused by too big output current of inverter, inverter stops output. Motor freely stop. And inverter alarm fault E.oL2.

**1: emergency stop and alarm** While OL protection action is caused by too big output current of inverter, inverter stops. Motor DEC stop. And inverter alarm fault E.oL2.

**2: limit current and run** While OL protection action is caused by too big output current of inverter, inverter switches to current limited run. Inverter makes output current be limited within rated current by reduce output frequency actively.

**LED "0000" digit: motor OL act**

**0: emergency stop output and alarm** While OL protection action is caused by too big output current of motor, inverter stops output. Motor freely stop. And inverter alarm fault E.oL1.

**1: emergency stop and alarm** While OL protection action is caused by too big output current of motor, inverter stops. Motor DEC stop. And inverter alarm fault E.oL1.

**2: limit current and run** While OL protection action is caused by too big output current of motor, inverter switches to current limited run. Inverter makes output current be limited within rated current by reduce output frequency actively.

**3: motor OL protection off**

**Note: If "emergency stop and alarm" is selected while inverter or motor OL, inverter will do like this:**

**1: After enter emergency stop state; inverter does not accept any orders including fault reset order until emergency stop state end.**

**2: In emergency stop process, fault signal is output immediately while multi function output terminal is set as fault jump alarm 1. Fault signal is output after inverter DEC finished while multi function output terminal is set as fault jump alarm 2.**

**3: In emergency stop process, Keyboard LED displays fault information.**

| FA.02 | Protection function selection 3 | Setting range: 0000-1112 | Factory set: 0110 |
|---|---|---|---|

**LED "0"digit: inverter OH protection selection**

**0: emergency stop output and alarm** While OH protection action is caused by too high temperature of inverter, inverter stops output. Motor freely stop. And inverter alarm fault E.OH1.

**1: emergency stop and alarm** While OH protection action is caused by too high temperature of inverter, inverter stops. Motor DEC stop. And inverter alarm fault E.OH1.

**2: limit current and run** While OH protection action is caused by too big output current of inverter, inverter switches to

current limited run. Inverter reduces current by reduce output frequency actively. Temperature be limited within70℃

**LED"00"digit: input phase lack protection selection**

**0: Invalid**

**1: Valid** Stop inverter output and alarm fault E.ILF while detect input phase lack.

**LED"000"digit: output phase lack protection selection**

**0: Invalid**

**1: Valid** Stop inverter output and alarm fault E.oLF while detect output phase lack.

**LED"0000"digit: reserved**

| | | | |
|---|---|---|---|
| FA.03 | Protection function selection 4 | Setting range: 0000-0011 | Factory set: 0000 |

**LED "0"digit: SC protection selection**

**0: Invalid**

**1: Valid.** Inverter judges E.SC alarm and removes distrubabce, only alarm for real fault signal. This function maybe delay alarm time. Please ust it carefully.

**LED"00"digit: OC protection selection**

**0: Invalid**

**1: Valid** Inverter judges OC alarm and remove distrubabce, only alarm for real fault signal. This function maybe delay alarm time. Please ust it carefully.

**LED"000"digit: reserved**

**LED"0000"digit: reserved**

| | | | |
|---|---|---|---|
| FA.04 | Fan control | Setting range: 0-2 | Factory set: 1 |

Select fan run mode.

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

**1: Fan stop related to temperature** Work while running. While inverter stops, fan runs while module temperature is over 50 degree and stops 30 seconds after module temperature is lower then standard. While inverter runs, fan runs.

**2: Fan stop while machine stop, run related to temperature** While inverter runs, fan runs while module temperature is over 50 degree and stops 30seconds after module temperature is lower then standard. While inverter is stops, fan stops.

**Note: This function can prolong fan life.**

| | | | |
|---|---|---|---|
| FA.05 | DEC OV protection | Setting range:110-150% | Factory set:120% |
| FA.06 | Running OV protection point | Setting range:100-150% | Factory set:115% |

**Inverter DC bus rated voltage=inverter input rated voltage*1.414**

**DEC OV protection:** Set OV protection point while DEC. Only valid while **[FA.01]** LED "0" digit is 1.

**Running OV protection point:** Set OV protection point while ACC or running at constant speed. Only valid while **[FA.01]** LED "0" digit is 1.

| | | | |
|---|---|---|---|
| FA.07 | OV protection max frequency add | Setting range: 0-50.00Hz | Factory set:2.00Hz |

**OV protection max frequency add:** Frequency inverter usually adds frequency to restrain the temperature rise while bus voltage is higher than **[FA.06]**. It limits the frequency adding range.

**Note: 1, Increase this value can better restrain, but if too big, the speed maybe shakeing. 2, If the bus voltage**

**increase quickly and even not stop increase while adding frequency, then should increase [FA.19] to improve the protection respond speed.**

| | | | |
|---|---|---|---|
| FA.08 | Energy braking act voltage | Setting range: 115.0-140.0% | Factory set: 120.0% |

**Energy braking act voltage:** Inverter energy braking begins while DC bus voltage rise up and over rated.Voltage **[FA.08]** setting. Voltage is DC20V lower than **[FA.08]** setting while energy braking stops. Please set it carefully.
It is only valid for inverter with inner braking parts. Inverters under AC90-T3-018T have build in braking parts. AC90-S2-3R7T and inverters under than that with 220V input have built in braking parts. All inverters do not have resistances. If need energy braking, please use optional resistance.
**Note: If use energy braking, please close OV protection function. What mens set [FA.01] LED "0"digit and "00" digit as 0. Energy braking only be valid in running, invalid while stop.**

| | |
|---|---|
| FA.09 | Reserved |

| | | | |
|---|---|---|---|
| FA.10 | Bus under-voltage protection | Setting range:50.0-100.0% | Factory set:60.0% |

It sets the lowest voltage limitation of DC side while inverter works normally. In location with lower grid, under-voltage protection level can be reduced to keep inverter work normally.
**Note: Too low grid voltage reduces inverter reliability.**

| | | | |
|---|---|---|---|
| FA.11 | Speed fall act voltage at sudden power down | Setting range: 0-200% | Factory set: 20% |
| FA.12 | Main circuit aim voltage at sudden power down | Setting range: 0-200% | Factory set: 90% |
| FA.13 | Speed fall gain at sudden power down | Setting range: 0.01-10.00 | Factory set: 2.00 |
| FA.14 | Speed back waiting time at sudden power down | Setting range: 0.1-100.0s | Factory set: 2.0s |

Inverter reduces output frequency and compensates voltage by feedback energy while sudden power down.
While input voltage is lower than **[FA.11]**, inverter begins DEC. Bus voltage rise up back. While voltage back to **[FA.12]**, it stop DEC. Inverter run at stable speed for **[FA.14]** time and ACC to frequency setting.
**[FA.13]** is DEC time gain. Voltage rises up more quickly while it is bigger. It is suitable for small inertia load. Voltage rises up more slowly while it is smaller. It is suitable for big inertia load.

| | | | |
|---|---|---|---|
| FA.15 | ACC OC protection point | Setting range: 100-250% | Factory set: 160% |
| FA.16 | DEC OC protection point | Setting range: 100-250% | Factory set: 160% |
| FA.17 | Current limit level while running | Setting range: 100-250% | Factory set: 160% |
| FA.18 | Current limit frequency ACC/DEC time while running | Setting range: 0.00-650.00s | Factory set: 10.00s |

OC protection poing=inverter output current/inverter ratted current. 100% is rated current.
**ACC OC protection point**
**DEC OC protection point**
**Current limit level while running**

**Current limit frequency ACC/DEC time while running**

| | | | |
|---|---|---|---|
| FA.19 | OV protection respond gain | Setting range: 0-10.0 | Factory set: 0.2 |

**OV protection responds gain**: It track and adjust while OV protection process. The frequency inverter adjusts the frequency adding according to the bus voltage increasing rate and actual bus voltage. Increasing the respond gain can improve the respond speed. But it makes the speed shake.

| | |
|---|---|
| FA.20 | Reserved |

| | | | |
|---|---|---|---|
| FA.21 | Motor overload protective coefficients | Setting range: 20.0-250.0% | Factory set: 100.0% |

While motor overload for long time, it will over heat. This parameter is used to set coefficients of the frequency inverter relay protection to the motor.

**Motor OL protection coefficients =motor protection coefficients / motor rated coefficients**

**While one inverter for multi-motor, this function does not work. To protect motor, please install heat protection relay at every motor input terminal.**

| | | | |
|---|---|---|---|
| FA.22 | Malfunction auto-reset times | Setting range: 0-5 | Factory set: 0 |
| FA.23 | Malfunction auto-reset interval | Setting range: 0.1-100.0s | Factory set:1.0s |

**Malfunction auto-reset times:**

**0: Off** No automatic reset function.

**1-5: On** 1-5 is times of automatic reset after fault.

Output terminal can be selected to act or not act in automatic reset process. Details refer to **[F2.29-F2.31]**.

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

**Note: 1. This function is only valid for fault of OL, OC, system abnormity, under voltage. Not valid for other faults.**

**2. Can not reset before dealing with malfunction.**

**Attention: Please use this function carefully in occasions that can not start with load, or that needs alarm immediately while inverter no output.**

| | |
|---|---|
| FA.24 | Reserved |

| | | | |
|---|---|---|---|
| FA.25 | Malfunction types | Please see malfunction code table | -- |
| FA.26 | Malfunction running frequency | 0.00-max frequency | -- |
| FA.27 | Malfunction output voltage | 0-1500V | -- |
| FA.28 | Malfunction output current | 0.1-2000.0A | -- |
| FA.29 | Malfunction bus voltage | 0-3000V | -- |
| FA.30 | Malfunction module temperature | 0-100℃ | -- |
| FA.31 | Malfunction machine | LED “0” digit: run direction | -- |

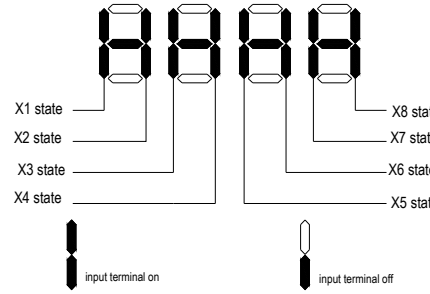
| | | | |
|---|---|---|---|
| | state | 0: REV<br>1: REV<br>LED “00” digit: run state<br>0:stop<br>1:stable speed<br>2:ACC<br>3:DEC<br>LED “000” digit: reserved<br>LED “0000” digit: reserved | |
| FA.32 | Malfunction input terminal state | See input terminal chart | -- |
| FA.33 | Malfunction output terminal state | See input terminal chart | -- |
| FA.34 | The last 1 malfunction types | Please see malfunction code table | -- |
| FA.35 | The last 1 malfunction running frequency | 0.00-max frequency | -- |
| FA.36 | The last 1 malfunction output voltage | 0-1500V | -- |
| FA.37 | The last 1 malfunction output current | 0.1-2000.0A | -- |
| FA.38 | The last 1 malfunction bus voltage | 0-3000V | -- |
| FA.39 | The last 1 malfunction module temperature | 0-100℃ | -- |
| FA.40 | The last 1 machine state | LED “0” digit:run direction<br>0: REV<br>1: REV<br>LED “00” digit:run state<br>0:stop<br>1:stable speed<br>2:ACC<br>3:DEC<br>LED “000” digit:reserved<br>LED “0000” digit:reserved | -- |
| FA.41 | The last 1 malfunction input terminal state | See input terminal chart | -- |
| FA.42 | The last 1 malfunction output terminal state | See input terminal chart | -- |
| FA.43 | The last 2 malfunction types | Please see malfunction code table | -- |
| FA.44 | The last 3 malfunction types | Please see malfunction code table | -- |

**Note: Malfunction records can be cleared by [F0.19]. See [F0.19] details.**

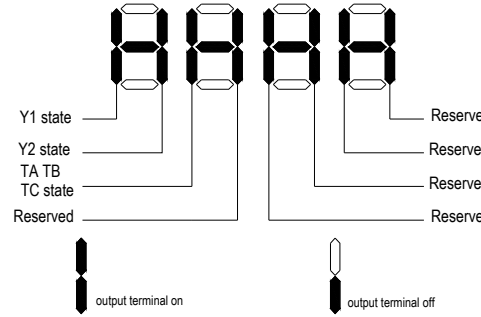
## 9.12 Machine malfunction code table

| Communication code | Malfunction code | Malfunction LED code | Malfunction name |
|---|---|---|---|
| 0 | -- | -- | No fault |
| 1 | L.U.1 |  | Under-voltage at stop |
| 2 | E.LU2 |  | Under-voltage while running |
| 3 | E.oU1 |  | Over-voltage while ADD |
| 4 | E.oU2 |  | Over-voltage while DEC |
| 5 | E.oU3 |  | Over-voltage at constant speed |
| 6 | E.oU4 |  | Over-voltage at stop |
| 7 | E.oC1 |  | Over-current while ADD |
| 8 | E.oC2 |  | Over-current while DEC |
| 9 | E.oC3 |  | Over-current at constant speed |
| 10 | E.oL1 |  | Motor overload |
| 11 | E.oL2 |  | Frequency inverter overload |
| 12 | E. SC |  | System abnormal |
| 13 | E.oH1 |  | Inverter overheat |
| 14 | E.oH2 |  | Rectifier bridge overheat |
| 15 | E.tE1 |  | Motor detect malfunction at static state |
| 16 | E.tE2 |  | Motor detect malfunction circularly |
| 17 | E.EEP |  | Store malfunction |
| 18 | L IFE |  | Reserved |
| 19 | E.ILF |  | Input side phase lack |
| 20 | E.oLF |  | Output side phase lack |
| 21 | E.GnD |  | Output earth |
| 22 | E.HAL |  | Current detection fault |
| 23 | E. EF |  | Exterior fault |
| 24 | E.PAn |  | Keyboard connection fault |
| 25 | E. CE |  | Rs485 communication fault |
| 26 | E.CPE |  | Parameter copy fault |
| 27 | E.ECF |  | Optional card connection fault |
| 28 | E. PG |  | PG card connection fault |
| 29 | E.PID |  | PID feedback wire connection fault |
| 30 | E.EDI |  | Copoy software not compatible |

**Input terminal on/off show diagram:**

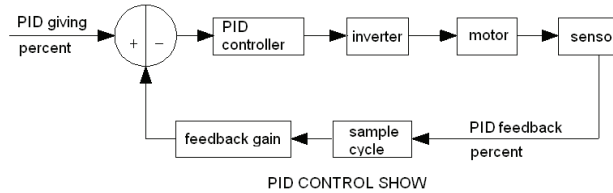



**Output terminal on/off show diagram:**




## 9.13 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.




PID CONTROL SHOW

| | | | |
|---|---|---|---|
| Fb.00 | PID give signal source | Setting range: 0-8 | Factory set: 0 |

Use to set the input channel of PID controller given signal.

0: Keyboard number given PID Decided by **[Fb.01]** setting.

1: Keyboard potentiometer

2: Terminal VS1 voltage analog

3: Terminal VS2 voltage analog

4: Terminal AS current analog

5: Terminal PUL pulse signal

6: RS485 communication

7: Optional card

8: Terminal selection PID giving is selected by multifunction input terminal combine which is set by **[F2.00-F2.07]**.

**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 VS1 voltage analog |
| OFF | ON | ON | Terminal VS2 voltage 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 |

| Fb.01 | Keyboard number give PID | Setting range: 0.00-100.0% | Factory set: 50.0% |
|---|---|---|---|

This function is valid only when **[Fb.00]/[Fb.02]** is set as keyboard mumber given/feedback. It is based on feedback signal max range **[Fb.04]**. After this parameter is changed, PID given in monitor object is modified automatical at the same time.

If **[Fb.04]** LED "0" is set as 3, this value can be modified by UP/DW key. Whether save the modification is decided by **[F4.04]** LED "00" digit.

| Fb.02 | PID feedback signal source | Setting range:0-8 | Factory set:2 |
|---|---|---|---|

Set PID feedback signal input channel.

**0: Keyboard number given PID** PID feedback channel decided by **[Fb.01]**.

**1: Keyboard potentiometer**

**2: Terminal VS1 voltage analog**

**3: Terminal VS2 voltage analog**

**4: Terminal AS current analog**

**5: Terminal PUL pulse signal**

**6:RS485 communication** PID feedback channel decided by RS485.Communication address is H3009 or H2009.

**7: Optional card**

**8: Terminal selection** PID feedback channel decided by multifunction input terminal combination. Multifunction input terminal is set by **[F2.00-F2.07]**.

**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 VS1 voltage analog |
| OFF | ON | ON | Terminal VS2 voltage 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 |

**Note: PID controller given signal source and PID controller feedback signal source can not be the same channel. Otherwise PID can not work normally.**

| | | | |
|---|---|---|---|
| Fb.03 | Feedback signal gain | Setting range: 0.00-10.00 | Factory set: 1.00 |

It is used to magnify or reduce feedback channel input signal.

| | | | |
|---|---|---|---|
| Fb.04 | Feedback signal max measuring range | Setting range: 0-100.0 | Factory set: 100.0 |

It is used to revise the display data of PID given and PID feedback.

$$\text{Display data} = \frac{\text{give/feedback signal-lowest limit value for this channel}}{\text{highest limit value for this channel-lowest limit value for this channel}} \times \text{max sensor measuring range}$$

For example: Under pressure control, while it is set as sensor max measuring range, it displays actual pressure.
If VS1 is feedback signal input channel, while VS1 highest limit is 9V, lower limit is 0.5V, feedback voltage is 4.5V, and sensor measuring range is 20mpa.

**Display value = (4.5-0.5) × 20/(9-0.5) = 9.4mpa**

| | | | |
|---|---|---|---|
| Fb.05 | PID output trait selections | Setting range: 0000-0011 | Factory set: 0100 |

**LED "0" digit: feedback trait**

**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: PID direction adjustment**

0: REV forbid

1: REV permit

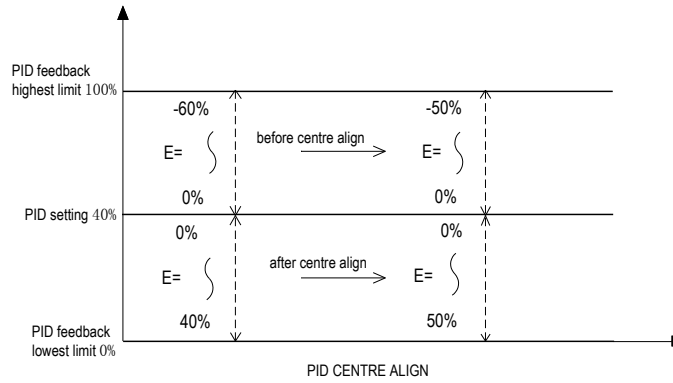
Inverter control output frequency after given signal and feedback signal calculation according to PID control mode setting while receiving the run oder. If REV forbid (**[F0.07]** LED "00"digit is 0 frequency control direction invalid or **[F0.16]** is 2 REV forbid), inverter outputs 0.00Hz. If REV permit, inverter will change output direction, motor REV.

**LED "000" digit: align**

While PID setting is not at the centre point of 50%, error range of PID feedback and PID setting is non-symmetry state.

**0: not centre align** Not correct error.

**1: centre align** Correct error.

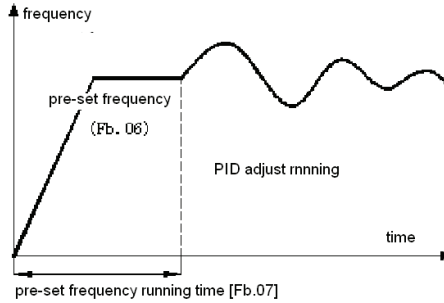



PID CENTRE ALIGN

**LED "0000" digit: reserved**

| | | | |
|---|---|---|---|
| Fb.06 | PID preset frequency | Setting range: 0.00-max frequency | Factory set: 50.00Hz |
| Fb.07 | PID preset frequency 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 frequency **[Fb.06]** according to ACC time 1. After setting **[Fb.07]** time, it runs as PID closed loop trait.




PID pre-set frequency running

| | | | |
|---|---|---|---|
| Fb.08 | Proportion gain: P | Setting range: 0.00-100.00 | Factory set: 1.00 |
| Fb.09 | Integral time: I | Setting range: 0.01-10.00s | Factory set: 0.10s |
| Fb.10 | Differential coefficient : D | Setting range: 0.00-10.00s | Factory set: 0.00s |

**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. Response is slower while gain is smaller.

**Integral time I:** It decides the size of effect of I act. Response is slower and control ability for out disturbance while I is big. Response is quicker while I is small. But there will be surge if it is too small.

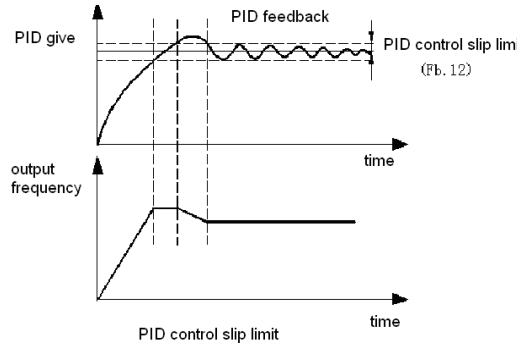
**Differential coefficient D:** While bias of PID feedback and PID given is changing, it adjusts change rate of output and bias pro rata. It is related to direction and size of bias change, not related to direction and size of bias itself. Use it carefully for it easily magnifies the disturbance.

| | | | |
|---|---|---|---|
| Fb.11 | Sample cycle | Setting range: 0.01-100.00s | Factory set: 0.10s |

It is only valid for PID feedback samply cycle. Response is quicker while cycle is smaller.

| | | | |
|---|---|---|---|
| Fb.12 | PID slip limit | Setting range: 0.0-100.0% | Factory set: 0.0% |

While feedback is in this range, PID adjustment stops. Output does not change.




| | |
|---|---|
| Fb.13 | Reserved |

| | | | |
|---|---|---|---|
| Fb.14 | Detection time while feedback wire break | Setting range: 0.0-6500.0s | Factory set: 1.0s |
| Fb.15 | Act selections while feedback wire break | Setting range: 0-3 | Factory set: 0 |
| Fb.16 | Wire break alarm upper limit | Setting range: 0.0-100.0% | Factory set: 100.0% |
| Fb.17 | 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.16]** or smaller than **[Fb.17]** is detected out and keeps for **[Fb.14]** delay time, it is considered as sensor wire break.

**Act selections while feedback wire break:**

0: Go on PID operation without alarm

1: Stop and alarm malfunction

2: Go on PID operation and output alarm signal

3: Run the current frequency and output alarm signal

**Wire break alarm upper limit:** Feedback signal is over alarm upper limit for time **[Fb.14]**, it is considered as sensor wire break.

**Wire break alarm lowest limit:** Feedback signal is under alarm upper limit for time **[Fb.14]**, it is considered as sensor wire break.

| | | | |
|---|---|---|---|
| Fb.18 | Stable pressure water-supplying dormancy system selections | Setting range: 0-1 | Factory set: 0 |
| Fb.19 | Start-up value | Setting range: 0.0-100.0% | Factory set: 0.0% |
| Fb.20 | Dormancy detection value coefficient | Setting range: 0.0-1.000 | Factory set: 0.900 |
| Fb.21 | Dormancy detection DEC time | Setting range: 0.0-6500.0s | Factory set: 30.0s |
| Fb.22 | Dormancy detection low point hold frequency | Setting range: 0.00-20.00Hz | Factory set: 10.00Hz |

**Stable pressure water-supplying dormancy system selections:** It sets whether use dormancy system while PID for stable pressure woter-supplying. While use, inverter start dormancy detection if PID feedback higher or equal to PID setting for a certain time. In dormancy detection process, if feedback is bigger than detection value, inverter reduces output frequency to **[Fb.22]** for a while. If PID feedback is still higher than detection value, inverter reduces output frequency to 0.00Hz, enter to dormancy state. In this process, if feedback is lower than detection value, dormancy detection is invalid. Inverter is back to PID adjustment state.

**0: Invalid**

**1: Valid**

**Start-up value:** While inverter enters dormancy system, PID feedback must be lower then start-up value. Otherwise inverter can not start. If start-up value is too high, it maybe causes inverter frequency start and stop. But if it is too low, it maybe causes under-pressure. It is defined as ratio of PID feedback to sensor max measuring range.

**Dormancy detection value coefficient:** In process that inverter enters dormancy system in mode of reducing output frequency, once PID feedback is lower dormancy detection value, inverter back to PID adjustment state. If it set as 1.000, system takes PID setting as exit value in frequency reduce state.Dormancy detection value is defined as the result of this value multiples PID given.

**Dormancy detection DEC time:** Set DEC time for invereter reducing frequency in dormancy detection process.

**Dormancy detection low point hold frequency:** Set frequency that inverter holds at the low point in dormancy detection process.

## 9.14 Multistep, PLC function and swing frequency parameters

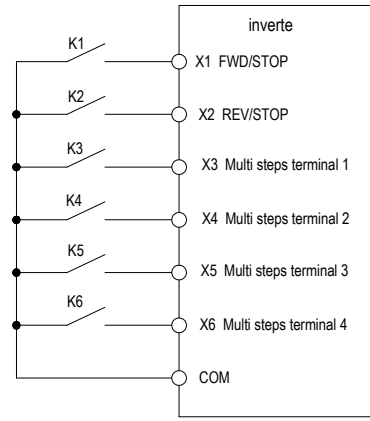
| | | | |
|---|---|---|---|
| FC.00 | Step 1 | Setting range: 0.00-320.00Hz | Factory set: 10.00Hz |
| FC.01 | Step 2 | Setting range: 0.00-320.00Hz | Factory set: 20.00 Hz |
| FC.02 | Step 3 | Setting range: 0.00-320.00Hz | Factory set: 30.00 Hz |
| FC.03 | Step 4 | Setting range: 0.00-320.00Hz | Factory set: 40.00 Hz |
| FC.04 | Step 5 | Setting range: 0.00-320.00Hz | Factory set: 50.00 Hz |
| FC.05 | Step 6 | Setting range: 0.00-320.00Hz | Factory set: 40.00 Hz |
| FC.06 | Step 7 | Setting range: 0.00-320.00Hz | Factory set: 30.00 Hz |
| FC.07 | Step 8 | Setting range: 0.00-320.00Hz | Factory set: 20.00 Hz |
| FC.08 | Step 9 | Setting range: 0.00-320.00Hz | Factory set: 10.00 Hz |
| FC.09 | Step 10 | Setting range: 0.00-320.00Hz | Factory set: 20.00 Hz |
| FC.10 | Step 11 | Setting range: 0.00-320.00Hz | Factory set: 30.00 Hz |
| FC.11 | Step 12 | Setting range: 0.00-320.00Hz | Factory set: 40.00 Hz |
| FC.12 | Step 13 | Setting range: 0.00-320.00Hz | Factory set: 50.00 Hz |
| FC.13 | Step 14 | Setting range: 0.00-320.00Hz | Factory set: 40.00 Hz |
| FC.14 | Step 15 | Setting range: 0.00-320.00Hz | Factory set: 30.00 Hz |

It sets run frequency of 15 steps in PLC and multistep control.

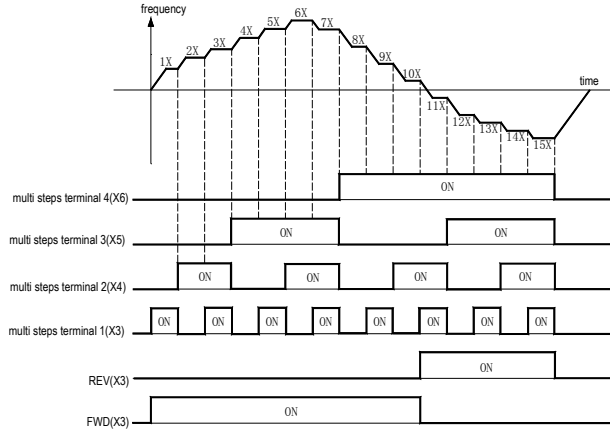
Mult steps control has priorty only after JOG. While multi steps control, 4 multifunction input terminals are needed to set as control terminals. Set details refer to **[F2.00-F2.07]**.

Inverter is running at which step is decides by the ON/OFF state of 4 control terminal and **COM**. Run and direction is controlled by run signal and direction gived 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-F2.07]**.

| 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




MULTI STEP TIME ORDER

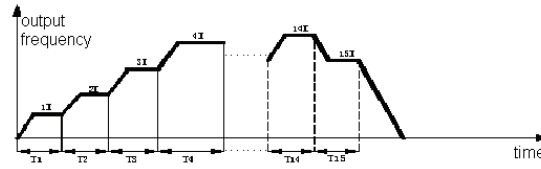
| FC.15 | PLC run mode selections | Setting range: 0000-2212 | Factory set: 0000 |
|---|---|---|---|

**LED "0" digit: cycle mode**

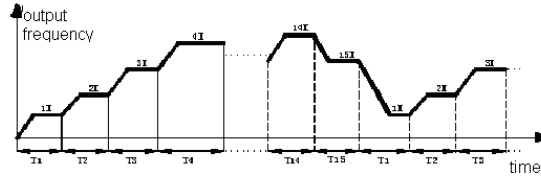
**0: Stop after single cycle** While receiving order, inverter run from the first step, time unit is set by **[FC.15]** LED "00" digit. Running time is set by **[FC.16-FC.30]**. Running direction and ACC/DEC time is selected by **[FC.31-FC.45]**. Turn to next step while run time is over, run time, direction, 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]**.

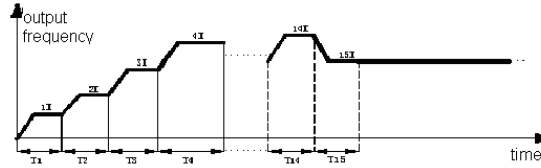
**2: Keep final value after single cycle** Inverter back to 1st step while finished 15 steps running. Time unit is set by **[FC.15]** LED "00" digit. Run time is set by **[FC.16-FC.30]**. Run direction and ACC/DEC time is selected by **[FC.31-FC.45]**




single cycle




Continuous cycles




Keep final value after single cycle

**LED"00"digit: Time unit**

**0: second**

**1: minute**

**2: hour**

**LED"000"digit: Power down save mode**

**0: no save**

**1: save**

Decide whether save running state while power down. If save, define recover mode by **[FC.15]** LED "0000" digit.If need continute the state before power off, this 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).

**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 step. 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 running.

**LED "0" digit: this step run direction**

**0: REV**

**1: REV**

If **[F0.07]** LED "00" digit is 0 or **[F0.16]** is 2, and this setting is 1 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 |

| | | | |
|---|---|---|---|
| FC.49 | Swing frequency control | Setting range: 0000-0111 | Factory set: 0000 |
| FC50 | Swing frequency pre-set | Setting range: 0.00-max frequency | Factory set: 0.00Hz |
| FC.51 | Pre-set frequency hold time | Setting range: 0.00-650.00s | Factory set: 0.00s |
| FC.52 | AW | Setting range: 0.0-100.0% | Factory set: 0.0% |

| | | | |
|---|---|---|---|
| FC.53 | Jumping frequency amplitude | Setting range: 0.0-50.0% | Factory set: 0.0% |
| FC.54 | Swing frequency ACC time | Setting range: 0.00-650.00s | Factory set: 5.00s |
| FC.55 | Swing frequency DEC time | Setting range: 0.00-650.00s | Factory set: 5.00s |

**Swing frequency control process:** ACC according ACC time to **[FC.49]** and wait time **[FC.50]**, run to swing centre frequency according ACC/DEC time, then run cycle as setting of **[FC.51]**,**[FC.52]**,**[FC.53]** and **[FC.54]**,DEC to stop according ACC/DEC time while receiving stop order.

**LED "0" digit: swing frequency control**

**0: invalid**

**1: valid**

**LED "00" digit: swing frequency get in mode**

**0: automatic** Run as frequency **[FC.49]** for time **[FC.50]** after start, and entry swing frequency running.

**1: manual** Run as frequency **[FC.49]** after start, and entry swing frequency running while multi function input terminal is valid. Exit and run as frequency **[FC.49]** while it is invalid.

**LED "000" digit: AW control**

**0: variable** AW is variable according the centre frequency.

**1: fixed** AW is decided by max frequency and **[FC.51]**.

**LED "0000" digit: reserved**

**Jumping frequency amplitude:** Set jumping frequency in swing frequency running.

**Jumping frequency = AW x [FC.51]**

**Swing frequency pre-set:** Set frequency before swing frequency running.

**Pre-set frequency hold time:** While **[FC.48]** LED "00" digit is 0, it used to set the pre-set frequency holding time befor swing frequency running. While manual swing frequency get in, it is invalid.

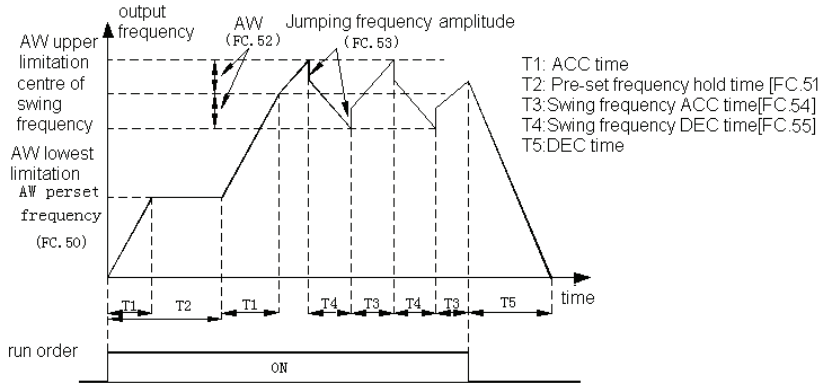
**AW:** Set frequency swing amplitude while swing frequency control.

**Variable AW: AW=centre frequency x [FC.51]**

**Fixed AW: AW=max frequency [F0.09] X [FC.51]**

**Swing frequency ACC time:**

**Swing frequency DEC time:**




SWING FREQUENCY RUNNING

## 9.15 Communication control function parameters

| | | | |
|---|---|---|---|
| Fd.00 | Main-slave machine | Setting range: 0-1 | Factory set: 0 |

Take inverter as main machine or slave machine while Modbus communication. Details for Modbus refer to Appendix 2:RS485 communication protocol.

**0: Slave machine** Inverter is slave machine. Communication address is decided by **[Fd.01]**. Inverter accepts order form main machine and reply or not while writing operation according **[Fd.08]** setting. Reply delay time is set by **[Fd.05]**.

**1: Main machine** Inverter, as main machine, sends data to communication net by broadcast orders. All slave machines accept orders from main machine. Mian machine sending data is set by **[Fd.09]**.

| | | | |
|---|---|---|---|
| Fd.01 | Machine add | Setting range: 1-247 | Factory set: 1 |

It set communication address while inverter is slave machine. If inverter is main machine, this parameter is no meaning. 0 is broadcast address.

| | | | |
|---|---|---|---|
| Fd.02 | Communication baud rate selections | Setting range: 0-5 | Factory set: 3 |

0:1200 bps
1:2400 bps
2:4800 bps
3:9600 bps
4:19200 bps
5:38400 bps

| | | | |
|---|---|---|---|
| Fd.03 | Data format | Setting range: 0-5 | Factory set: 0 |

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 |

The result of upper machine multiply this parameter is communication giving or feedback of this machine. Upper machine communication order can be modified pro rate.

| | | | |
|---|---|---|---|
| Fd.05 | Communication answer delay | Setting range: 0-500ms | Factory set: 0ms |

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 | Communication overtime fault time | Setting range: 0.1-100.0s | Factory set: 1.0s |
| Fd.07 | RS485 communication fault act mode selections | Setting range: 0-2 | Factory set: 1 |

**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.

**RS485 communication fault act mode selections**

**0: Alarm and stop freely** If it has not received next frame order or ther communication order while the latest communication giving order is over **[Fd.06]** time setting, inverter alarms fault E.CE and stops.

**1: Not alarm, go on run** Inverter does not inspect fault and always runs according the latest order.

**2: Stop without alarm** If it has not received next frame order or ther communication order while the latest Communication giving order is over **[Fd.06]** time setting.inverter will clear orders before and back to standby state.

| | | | |
|---|---|---|---|
| Fd.08 | Transmission response | Setting range:0-1 | Factory set: 0 |

It decides whether inverter responds while upper machine send write order.

**0: write operation with response**

**1: write operation without response**

| | | | |
|---|---|---|---|
| Fd.09 | Main machine sending selections | Setting range: 0000-AAAA | Factory set: 0031 |

Set the data that inverter sents the slave machines while inverter is main machine.

**LED "0" digit: 1st group of frame selection**

0: invalid

1: run order give

2: main machine give frequency

3: main machine output frequency

4: main machine max frequency

5: Reserved

6: main machine output torque

7: Reserved

8: Reserved

9: main machine give PID

A: main machine feedback PID

**LED "00" digit: 2nd group of frame selection**

**LED "000" digit: 3rd group of frame selection**

**LED "0000" digit: 4th group of frame selection**

# Chapter 10 Appendix

"●": 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 setting | Attribute | Reference page | Communication add |
|---|---|---|---|---|---|---|
| F0.00 | Control way | 0: VC without PG<br>1: V/F without PG<br>2: VC with PG<br>3: V/F with PG | 0 | ○ | 71 | 0x000 |
| F0.01 | Control mode | 0: Speed mode<br>1: Torque mode | 0 | ○ | 71 | 0x001 |
| F0.02 | Run command channel | 0: Keyboard control<br>1: Terminal control<br>2: RS485 communication control<br>3: Optional card | 0 | ○ | 73 | 0x002 |
| F0.03 | Frequency given main channel selection | 0: Keyboard number given<br>1: Keyboard potentiometer given<br>2: Terminal VS1 voltage analog given<br>3:Terminal VS2 voltage analog given<br>4: erminal AS current analog given<br>5: Terminal pulse signal given<br>6: RS485 communication port given<br>7: Ascend, descent control given<br>8: PID control given<br>9: Program control given<br>10: Reserved<br>11: Optional card given<br>12: Terminal selection | 0 | ○ | 74 | 0x003 |
| F0.04 | Main channel gain | 0.000-5.000 | 1.000 | ○ | 75 | 0x004 |
| F0.05 | Frequency given auxiliary channel selection | 0: Keyboard digital given<br>1: Keyboard potentiometer given<br>2 : Terminal VS1 voltage analog given<br>3: Terminal VS2 voltage analog given<br>4: Terminal AS current analog given<br>5: Terminal pulse signal given<br>6: RS485 communication port given | 1 | ○ | 75 | 0x005 |
| F0.06 | Auxiliary channel gain | 0.000-5.000 | 1.000 | ○ | 76 | 0x006 |

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|---|---|---|---|---|---|---|
| F0.07 | Frequency given channels combination mode | LED“0”digit:<br>0: Main channel valid<br>1: Auxiliary channel valid<br>2: Main + auxiliary<br>3: Main-auxiliary<br>4: MAX{ main, auxiliary }<br>5: MIN{ main, auxiliary }<br>6: Main*auxiliary<br>LED“10”digit:<br>0: Direction of frequency control is invalid<br>1: Direction of frequency control is invalid<br>LED“100”digit: Reserved<br>LED“1000”digit: Reserved | 0000 | ○ | 76 | 0x007 |
| F0.08 | Keyboard number setting frequency | 0-upper limit | 50.00 Hz | ● | 77 | 0x008 |
| F0.09 | Max frequency output | 0-320.00Hz | 50.00 Hz | ○ | 77 | 0x009 |
| F0.10 | Upper limitation source selection | 0: Upper limit frequency digital given<br>1: Keyboard potentiometer given<br>2 : Terminal VS1 voltage analog given<br>3: Terminal VS2 voltage analog given<br>4: Terminal AS current analog given<br>5: Terminal pulse signal<br>6: RS485 communication given | 0 | ○ | 77 | 0x00A |
| F0.11 | Upper limit frequency digital setting | Lower limit-max output frequency | 50.00 Hz | ○ | 77 | 0x00B |
| F0.12 | low limit frequency | 0-upper limit | 0.00 | ○ | 77 | 0x00C |
| F0.13 | low limit frequency running mode | 0: Stop<br>1: Run as lower frequency limitation | 1 | ○ | 77 | 0x00D |
| F0.14 | ACC time 1 | 0.01-650.00s | Accord model | ● | 78 | 0x00E |
| F0.15 | DEC time 1 | 0.01-650.00s | Accord model | ● | 78 | 0x00F |
| F0.16 | Rotate direction | 0: Consistent<br>1: Reverse<br>2: Reverse banned | 0 | ● | 79 | 0x010 |
| F0.17 | Carrier frequency | 0.6-15.0kHz | Accord model | ● | 79 | 0x011 |

| | | | | | | |
|---|---|---|---|---|---|---|
| F0.18 | Carrier frequency characteristic selection | LED“0”digit:<br>0: Related to temperature<br>1: Unrelated to temperature<br>LED“10”digit:<br>0: Related to frequency output<br>1: Unrelated to frequency output<br>LED“100”digit:<br>0: Fixed carrier<br>1: Random carrier<br>LED“1000”digit: PWM send wave mode<br>0: PWM mode 1<br>1: PWM mode 2<br>2: PWM mode 3 | 0000 | ● | 79 | 0x012 |
| F0.19 | Parameter initialization | 0: Not action<br>1: Recover factory setting<br>2: Clear malfunction records | 0 | ○ | 80 | 0x013 |
| F0.20 | AVR function selection | 0: invalid<br>1: all valid<br>2: valid in DEC only | 2 | ● | 80 | 0x014 |

**Run control parameters**

| NO. | Function description | Range of settings and definition | Factory setting | Attribute | Reference page | Communication add |
|---|---|---|---|---|---|---|
| F1.00 | Start-up mode running | 0: Start directly<br>1: Braking first then start by start frequency<br>2: Speed tracking , judge direction then start | 0 | ○ | 80 | 0x100 |
| F1.01 | Start pre-excitation time | 0.00-60.00s | Accord model | ● | 80 | 0x101 |
| F1.02 | Start frequency | 0.00-60.00Hz | 0.50Hz | ● | 80 | 0x102 |
| F1.03 | Start frequency hold time | 0.0-50.0s | 0.0s | ● | 80 | 0x103 |
| F1.04 | Braking current before starting | 0-150.0% | 0.0% | ● | 80 | 0x104 |
| F1.05 | Braking time before starting | 0.0-30.0s | 0.0s | ● | 80 | 0x105 |
| F1.06 | Speed tracking stability waiting time | 0.00-60.00s | Accord model | ● | 81 | 0x106 |
| F1.07 | Stop mode | 0: DEC to stop<br>1: Free stop | 0 | ● | 81 | 0x107 |
| F1.08 | DC braking initial frequency | 0.00-50.00Hz | 0.00Hz | ● | 82 | 0x108 |
| F1.09 | DC braking current | 0.0-150.0% | 0.0% | ● | 82 | 0x109 |

| | | | | | | |
|---|---|---|---|---|---|---|
| F1.10 | DC braking waiting time | 0.0-60.0s | 0.0s | ● | 82 | 0x10A |
| F1.11 | DC braking duration | 0.0-60.0s | 0.0s | ● | 82 | 0x10B |
| F1.12 | Reserved | | | | 82 | 0x10C |
| F1.13 | ACC/DEC mode selection | ACC/DEC mode selections<br>0: max frequency<br>1: fixed frequency<br>LED “00” digit: ACC/DEC mode<br>0: Beeline<br>1: S Curve<br>LED “000” digit: reserved<br>LED “0000” digit: reserved | 0000 | ○ | 82 | 0x10D |
| F1.14 | Start ACC rate of S curve | 20.0%-100.0% | 50.0% | ● | 82 | 0x10E |
| F1.15 | ACC slope increment of S curve | 0.0-500.0% | 50.0% | ● | 82 | 0x10F |
| F1.16 | Reserved | | | | 83 | 0x110 |
| F1.17 | Reserved | | | | 83 | 0x111 |
| F1.18 | ACC time 2 | 0.00-650.00s | 10.00s | ● | 83 | 0x112 |
| F1.19 | DEC time 2 | 0.00-650.00s | 10.00s | ● | 83 | 0x113 |
| F1.20 | ACC time 3 | 0.00-650.00s | 10.00s | ● | 83 | 0x114 |
| F1.21 | DEC time 3 | 0.00-650.00s | 10.00s | ● | 83 | 0x115 |
| F1.22 | ACC time 4 | 0.00-650.00s | 10.00s | ● | 83 | 0x116 |
| F1.23 | DEC time 4 | 0.00-650.00s | 10.00s | ● | 83 | 0x117 |
| F1.24 | Emergency stop DEC time | 0.01-650.00s | 10.00s | ● | 83 | 0x118 |
| F1.25 | FWD&REV dead time | 0.0-120.0s | 0.0s | ● | 84 | 0x119 |
| F1.26 | Min output frequency | 0.00-60.00Hz | 0.50Hz | ● | 84 | 0x11A |
| F1.27 | 0 speed hold torque | 0.0-150.0% | Accord model | ● | 84 | 0x11B |
| F1.28 | 0 speed torque keep time | 0.0-500.0s | 5.0s | ● | 84 | 0x11C |
| F1.29 | Power off restart action selection | 0: Invalid<br>1: Valid | 0 | ● | 84 | 0x11D |
| F1.30 | Power off restart waiting time | 0.00-650.00s | 0.50s | ● | 84 | 0x11E |

| | | | | | | |
|---|---|---|---|---|---|---|
| F1.31 | Terminal running protection selection | LED "0" digit: run command selection while electrify<br>0: Terminal running order invalid while electrify<br>1: Terminal running order valid while electrify<br>LED "10" digit: while switch the run command given channel<br>0: invalid<br>1: valid | 0011 | ● | 85 | 0x11F |
| F1.32 | JOG running frequency setting | 0.00-Max frequency | 5.00Hz | ● | 85 | 0x120 |
| F1.33 | JOG ACC time | 0.00-650.00s | 10.00s | ● | 85 | 0x121 |
| F1.34 | JOG DEC time | 0.00-650.00s | 10.00s | ● | 85 | 0x122 |
| F1.35 | Jump frequency | 0.00-Max frequency | 0.00Hz | ● | 85 | 0x123 |
| F1.36 | Jump frequency range | 0.00-Max frequency | 0.00Hz | ● | 85 | 0x124 |

**Quantum digital terminal functions**

| NO. | Function description | Range of settings and definition | Factory setting | Attribute | Reference page | Communication add |
|---|---|---|---|---|---|---|
| F2.00 | Multifunction input terminal 1(X1) | 0: No function<br>1: FWD<br>2: REV<br>3: 3-line running control<br>4: FWD JOG<br>5: REV JOG<br>6: Free stop<br>7: Emergency stop<br>8: Malfunction reset<br>9: Exterior fault input<br>10: Frequency UP<br>11: Frequency DW<br>12: UP/DW clear<br>13: Reserved<br>14: Reserved<br>15: Multistep terminal1<br>16: Multistep terminal 2<br>17: Multistep terminal 3<br>18: Multistep terminal 4<br>19: ACC/DEC time choose terminal 1<br>20: ACC/DEC time choose terminal 2<br>21: ACC/DEC pause<br>22: PID control cancel<br>23: PID control pause<br>24: PID characteristic switch | 1 | ● | 86 | 0x200 |
| F2.01 | Multifunction input terminal 2(X2) | | 2 | ● | 86 | 0x201 |
| F2.02 | Multifunction input terminal 3(X3) | | 4 | ● | 86 | 0x202 |
| F2.03 | Multifunction input terminal 4(X4) | | 5 | ● | 86 | 0x203 |

| | | | | | | |
|---|---|---|---|---|---|---|
| F2.04 | Multifunction input terminal 5(X5) | 25: PID given switch 1<br>26: PID given switch 2<br>27: PID given switch 3<br>28: PID feedback switch 1<br>29: PID feedback switch 2<br>30: PID feedback switch 3<br>31:PLC pause<br>32: PLC restart<br>33: Swing frequency into<br>34: Swing frequency pause<br>35: Swing frequency reset<br>36: Frequency channel change terminal 1<br>37: Frequency channel change terminal 2<br>38: Frequency channel change terminal 3<br>39: Frequency channel change terminal 4<br>40: Timer trigger terminal<br>41: Timer clear zero terminal<br>42: Timer clock input terminal<br>43: Counter clear terminal<br>44: DC braking order<br>45: Pre excitation order terminals<br>46: Reserved<br>47:Start magnetic particle clutch function<br>48: PID parameter switch terminal 1<br>49: PID parameter switch terminal 2<br>50:Initial roll diameter setting terminal 1<br>51:Initial roll diameter setting terminal 2<br>52: Linear speed selection terminal<br>53:Material thickness selection terminal<br>54:Full roll diameter selection terminal<br>55:Empty to full roll time selection terminal<br>56: Roll diameter reset terminal<br>57: Roll diameter calculation pause | 6 | ● | 86 | 0x204 |
| F2.05 | Multifunction input terminal 6(X6) | | 8 | ● | 86 | 0x205 |
| F2.06 | Multifunction input terminal 7(X7) | | 56 | ● | 86 | 0x206 |
| F2.07 | Multifunction input terminal 8(X8) | | 57 | ● | 86 | 0x207 |

| | | | | | | |
|---|---|---|---|---|---|---|
| F2.08 | X1-X4 terminal trait selection | LED “0” digit: X1 terminal<br>0: On valid<br>1: Off valid<br>LED “00” digit: X2 terminal<br>0: On valid<br>1: Off valid<br>LED “000” digit: X3 terminal<br>0: On valid<br>1: Off valid<br>LED “0000” digit: X4terminal<br>0: On valid<br>1: Off valid | 0000 | ● | 90 | 0x208 |
| F2.09 | X1-X4 input terminal filer time | 0.000-60.000s | 0.010s | ● | 90 | 0x209 |
| F2.10 | X5-X8 terminal trait selection | LED “0” digit: X5 terminal<br>0: On valid<br>1: Off valid<br>LED “00” digit: X6 terminal<br>0: On valid<br>1: Off valid<br>LED “000” digit: X7 terminal<br>0: On valid<br>1: Off valid<br>LED “0000” digit: X8 terminal<br>0: On valid<br>1: Off valid | 0000 | ● | 90 | 0x20A |
| F2.11 | X5-X8 input terminal filer time | 0.000-60.000s | 0.010s | ● | 90 | 0x20B |
| F2.12 | Terminal control mode | 0: 2-line 1<br>1: 2-line 2<br>2: 3-line 1<br>3: 3-line 2 | 0 | ○ | 90 | 0x20C |

| | | | | | | |
|---|---|---|---|---|---|---|
| F2.13 | Terminal action mode | LED “0” digit: free stop terminal reset mode<br>0: Reset to original order while invalid<br>1: Not reset to original order while invalid<br>LED “00” digit: emergency stop terminal reset mode<br>0: Reset to original order while disconnect<br>1: Not reset to original order while disconnect<br>LED “000” digit: terminal run mode after fault reset<br>0: Terminal control to power on directly<br>1: Terminal control to power on after stop<br>LED “0000” digit: reserved | 0111 | ● | 91 | 0x20D |
| F2.14 | Reserved | | | | 92 | 0x20E |
| F2.15 | Reserved | | | | 92 | 0x20F |
| F2.16 | PUL input min frequency | 0.0-50.00kHz | 0.00kHz | ● | 92 | 0x210 |
| F2.17 | PUL min frequency corresponding setting | 0.00-100.00% | 0.00% | ● | 92 | 0x211 |
| F2.18 | PUL input max frequency | 0.0-50.00kHz | 50.00 kHz | ● | 92 | 0x212 |
| F2.19 | PUL max frequency corresponding setting | 0-100.00% | 100.00% | ● | 92 | 0x213 |
| F2.20 | PUL filter time | 0.00s-10.00s | 0.10s | ● | 92 | 0x214 |
| F2.21 | PUL cut-off frequency | 0.000-50.000kHz | 0.010 kHz | ● | 92 | 0x215 |
| F2.22 | UP/DW terminal frequency adjust selection | 0:Off electricity storage<br>1:Off electricity does not storage<br>2:Valid in running, clear zero at stop | 0 | ● | 92 | 0x216 |
| F2.23 | UP/DW terminal frequency add/dec speed time | 0.01-50.00Hz/s | 0.50Hz/s | ● | 92 | 0x217 |
| F2.24 | Reserved | | | | 93 | 0x218 |
| F2.25 | Timer time of unit | 0: Second<br>1: Minute<br>2: Hour | 0 | ● | 93 | 0x219 |
| F2.26 | Timer setting | 0-65000 | 0 | ● | 93 | 0x21A |
| F2.27 | Counter max value | 0-65000 | 1000 | ● | 93 | 0x21B |

| | | | | | | |
|---|---|---|---|---|---|---|
| F2.28 | Counter setting value | 0-65000 | 500 | ● | 93 | 0x21C |
| F2.29 | Output terminal 1 （Y1） | 0: No output<br>1: Running<br>2: REV<br>3: Fault trip alarm 1(alarm while fault self-recover)<br>4: Fault trip alarm 2(no alarm while fault self-recover)<br>5: Fault retry<br>6: Out fault stop<br>7: Under voltage<br>8: Finish ready for running<br>9: Output frequency level test 1(FDT1)<br>10: Output frequency level test 2(FDT2)<br>11: Frequency arrive<br>12: running at 0 speed<br>13: Upper frequency limit arrive<br>14: Lower frequency limit arrive<br>15: Program running circle period finished<br>16: Program running step finished<br>17: PID feedback exceed upper limit<br>18: PID feedback under lower limit<br>19: PID feedback sensor wire break<br>20: Reserved<br>21: Timer time arrive<br>22: Counter arrive biggest value<br>23: Counter arrive setting<br>24: Energy braking<br>25: PG feedback break<br>26: Emergency stop<br>27: Pre alarm output for over load<br>28: Pre alarm output for under load<br>29: Roll diameter arrive output | 1 | ● | 93 | 0x21D |
| F2.30 | Output terminal 2 （Y2） | | 2 | ● | 93 | 0x21E |
| F2.31 | Relay output terminal（TA-TB-TC） | | 3 | ● | 93 | 0x21F |
| F2.32 | Output frequency level 1 （FDT1） | 0.00-Max frequency | 30.00Hz | ● | 94 | 0x220 |
| F2.33 | FDT1 lag | 0.00-Max frequency | 0.00Hz | ● | 94 | 0x221 |
| F2.34 | Output frequency level 2 （FDT2） | 0.00-Max frequency | 50.00Hz | ● | 94 | 0x222 |
| F2.35 | FDT2 lag | 0.00-Max frequency | 0.00Hz | ● | 94 | 0x223 |
| F2.36 | Speed arriving checkout range | 0.00-Max frequency | 0.00Hz | ● | 95 | 0x224 |
| F2.37 | Over load per alarm level | 0.0-200.0% | 180.0% | ● | 95 | 0x225 |

| | | | | | | |
|---|---|---|---|---|---|---|
| F2.38 | Over load per alarm delay | 0.0-100.0s | 0.5s | ● | 95 | 0x226 |
| F2.39 | Under load pre alarm level | 0.0-200.0% | 30.0% | ● | 95 | 0x227 |
| F2.40 | Under load pre alarm delay | 0.0-100.0s | 0.5s | ● | 95 | 0x228 |

**Modulus terminal functions**

| NO. | Function description | Range of settings and definition | Factory setting | Attribute | Reference page | Communication add |
|---|---|---|---|---|---|---|
| F3.00 | VS1 Lowest limit | 0.00V-10.00V | 0.00V | ● | 96 | 0x300 |
| F3.01 | VS1 Lowest limit corresponding setting | 0.00-100.00% | 0.00% | ● | 96 | 0x301 |
| F3.02 | VS1 upper limit | 0.00V-10.00V | 10.00V | ● | 96 | 0x302 |
| F3.03 | VS1 upper limit corresponding setting | 0.00-100.00% | 100.00% | ● | 96 | 0x303 |
| F3.04 | VS1 filter time | 0.00s-10.00s | 0.10s | ● | 96 | 0x304 |
| F3.05 | VS2 Lowest limit | 0.00V-10.00V | 0.00V | ● | 96 | 0x305 |
| F3.06 | VS2 Lowest limit corresponding setting | 0.00-100.00% | 0.00% | ● | 96 | 0x306 |
| F3.07 | VS2 upper limit | 0.00V-10.00V | 10.00V | ● | 96 | 0x307 |
| F3.08 | VS2 upper limit corresponding setting | 0.00-100.00% | 100.00% | ● | 97 | 0x308 |
| F3.09 | VS2 filter time | 0.00s-10.00s | 0.10s | ● | 97 | 0x309 |
| F3.10 | AS Lowest limit | 0.00-20.00mA | 4.00mA | ● | 97 | 0x30A |
| F3.11 | AS Lowest limit corresponding setting | 0.00-100.00% | 0.00% | ● | 97 | 0x30B |
| F3.12 | AS upper limit | 0.00-20.00mA | 20.00mA | ● | 97 | 0x30C |
| F3.13 | AS upper limit corresponding setting | 0-100.00% | 100.00% | ● | 97 | 0x30D |
| F3.14 | AS filter time | 0.00s-10.00s | 0.10s | ● | 97 | 0x30E |
| F3.15 | Reserved | | | ○ | 97 | 0x30F |
| F3.16 | Reserved | | | ○ | 97 | 0x310 |
| F3.17 | Reserved | | | ○ | 97 | 0x311 |
| F3.18 | Reserved | | | ○ | 97 | 0x312 |
| F3.19 | Reserved | | | ○ | 97 | 0x313 |
| F3.20 | Reserved | | | ○ | 97 | 0x314 |
| F3.21 | Reserved | | | ○ | 97 | 0x315 |

| | | | | | | |
|---|---|---|---|---|---|---|
| F3.22 | A01 output selection | 0: Set frequency<br>1: running frequency<br>2: Output current<br>3: Input voltage<br>4: Output voltage<br>5: Run speed<br>6: Set torque<br>7: Output torque<br>8: PID give<br>9: PID feedback<br>10: Set tension<br>11: Bus voltage<br>12: Current roll diameter<br>13: VS2 input<br>14: Time per roll<br>15: Reserved<br>16: VS1 input<br>17: VS2 input<br>18: AS input<br>19: PUL input | 0 | ● | 97 | 0x316 |
| F3.23 | A02 output selection | | 1 | ● | 97 | 0x317 |
| F3.24 | A01 output gain | 25.0~200.0% | 100.0% | ● | 98 | 0x318 |
| F3.25 | A01 output signal bias | -10.0~10.0% | 0.0% | ● | 98 | 0x319 |
| F3.26 | AO2 signal selection | 0: 0-10V<br>1: 4.00-20.00mA<br>2: 0.00-20.00mA<br>3: Frequency pulse output | 0 | ● | 99 | 0x31A |
| F3.27 | A02 output gain | 25.0~200.0% | 100.0% | ● | 99 | 0x31B |
| F3.28 | A02 output signal bias | -10.0~10.0% | 0.0% | ● | 99 | 0x31C |
| F3.29 | A02FM frequency output lower limit | 0.00k-50.00kHz | 0.20kHz | ● | 99 | 0x31D |
| F3.30 | A02FM frequency output upper limit | 0.00k-50.00kHz | 50.00 kHz | ● | 99 | 0x31E |

**Keyboard and display parameters**

| NO. | Function description | Range of settings and definition | Factory setting | Attribute | Reference page | Communication add |
|---|---|---|---|---|---|---|
| F4.00 | Parameter and key lock selections | 0: Unlock<br>1: Function parameter lock<br>2: Function parameter and key lock (except for RUN/STOP/JOG)<br>3: All function parameter and key lock | 0 | ● | 100 | 0x400 |
| F4.01 | User password | 0-9999 | 0 | ● | 100 | 0x401 |

| | | | | | | |
|---|---|---|---|---|---|---|
| F4.02 | REV/JOG selections | 0: REV<br>1: JOG | 0 | ● | 100 | 0x402 |
| F4.03 | STOP key function range | LED “0”digit: terminal control<br>0: invalid to terminal order<br>1: valid to terminal order<br>LED“00”digit: communication control<br>0: invalid to communication order<br>1: valid to communication order<br>LED “000” digit: reserved<br>LED “0000” digit: reserved | 0000 | ● | 100 | 0x403 |
| F4.04 | UP/DOWN key modification selections | LED “0” digit: keyboard UN/DOWN key modify selection<br>0: Invalid<br>1: Modify frequency setting by key board numbers（F0.08）<br>2: Reserved<br>3: Modify PID give setting by key board numbers（Fb.01）<br>4: Reserved<br>LED “00” digit: keyboard UN/DOWN key store selection<br>0: No save after power down<br>1: Save after power down<br>LED “000” digit: reserved<br>LED “0000” digit: reserved | 0011 | ● | 101 | 0x404 |
| F4.05 | Function parameter copy | 0: No operation<br>1: Send machine parameters to keyboard and save<br>2: Send parameters to keyboard and save | 0 | ○ | 101 | 0x405 |
| F4.06 | Reserved | | | | 101 | 0x406 |
| F4.07 | Keyboard potentiometer lowest limit | 0.00V-5.00V | 0.50V | ● | 101 | 0x407 |
| F4.08 | Keyboard potentiometer lowest limit corresponding setting | 0-100.00% | 0.00% | ● | 101 | 0x408 |
| F4.09 | Keyboard potentiometer upper limit | 0.00V-5.00V | 4.50V | ● | 101 | 0x409 |
| F4.10 | Keyboard potentiometer upper limit corresponding setting | 0-100.00% | 100.00% | ● | 101 | 0x40A |

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|---|---|---|---|---|---|---|
| F4.11 | The display content of the first line at the running state | LED“0”digit: display the first group<br>0: Given frequency<br>1: Output frequency<br>2: Output current<br>3: Input voltage<br>4: Output voltage<br>5: Machine speed<br>6: Reserved<br>7: Output torque<br>8: PID given value<br>9: PID feedback value<br>A: Output power<br>B: Bus voltage<br>C: Module temperature 1<br>D: Module temperature 2<br>E: ON/OFF state of input terminal X<br>F: ON/OFF state of input terminal Y<br>LED“10”digit: display the second group<br>LED“100”digit: display the third group<br>LED“1000” digit: display the fourth group | 3210 | ● | 101 | 0x40B |
| F4.12 | The display content of the first line at the stopped state | LED “0” digit: display the first group<br>LED“00”digit:display the second group<br>LED“000” digit: display the third group<br>LED“0000”digit:display the fourth group | 3210 | ● | 101 | 0x40C |
| F4.13 | The display content of the second line at the running state | LED “0” digit: display the first group<br>LED“00”digit:display the second group<br>LED“000” digit: display the third group<br>LED“0000”digit:display the fourth group | 3210 | ● | 102 | 0x40D |
| F4.14 | The display content of the second line at the stopped state | LED “0” digit: display the first group<br>LED“00”digit:display the second group<br>LED“000” digit: display the third group<br>LED“0000”digit:display the fourth group | 3210H | ● | 102 | 0x40E |
| F4.15 | Rotate speed display coefficient | 0.0-5000.0% | 100.0% | ● | 102 | 0x40F |

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|---|---|---|---|---|---|---|
| F4.16 | LCD language | LED “0” digit: LED display language<br>0: Chinese<br>1: English<br>LED“00” digit: output frequency selection<br>0: Aim frequency<br>1: Actual frequency<br>LED“000”digit: machine speed display selection<br>0: Aim speed<br>1: Actual speed<br>LED“0000” digit: reserved | 0000 | ● | 102 | 0x410 |

**Motor parameters**

| NO. | Function description | Range of settings and definition | Factory setting | Attribute | Reference page | Communication add |
|---|---|---|---|---|---|---|
| F5.00 | Reserved | | | ○ | 102 | 0x500 |
| F5.01 | Number of motor poles | 2-48 | 4 | ○ | 102 | 0x501 |
| F5.02 | Motor rated power | 0.4-1000.0KW | Accord model | ○ | 102 | 0x502 |
| F5.03 | Motor rated frequency | 0.01Hz-max frequency | Accord model | ○ | 102 | 0x503 |
| F5.04 | Motor rated speed | 0-65000rpm | Accord model | ○ | 103 | 0x504 |
| F5.05 | Motor rated voltage | 0-1500V | Accord model | ○ | 103 | 0x505 |
| F5.06 | Motor rated current | 0.1-2000.0A | Accord model | ○ | 103 | 0x506 |
| F5.07 | Motor no-load current | 0.01-650.00A | Accord model | ● | 103 | 0x507 |
| F5.08 | Motor stator resistance | 0.001-65.000 | Accord model | ● | 103 | 0x508 |
| F5.09 | Motor rotor resistance | 0.001-65.000 | Accord model | ● | 103 | 0x509 |
| F5.10 | Motor stator & rotor inductance | 0.1-6500.0mH | Accord model | ● | 103 | 0x50A |
| F5.11 | Motor stator & rotor mutual inductance | 0.1-6500.0mH | Accord model | ● | 103 | 0x50C |
| F5.12 | Motor parameters self-adjustment selections | 0: No operation<br>1: Rotary type self-study<br>2: Resting type self-study | 0 | ○ | 103 | 0x50D |
| F5.13 | Reserved | | | ○ | 104 | 0x50E |
| F5.14 | Reserved | | | | 104 | 0x50F |

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|---|---|---|---|---|---|---|
| F5.15 | PG selection | LED “0” digit:<br>0: 1-phasee input<br>1: 2-phase input<br>LED “00” digit:<br>0: same direction<br>1: reverse direction<br>LED “000” digit:<br>0: break inspection OFF<br>1: break inspection ON<br>LED“0000”digit:PG feedback channel<br>0: PG port | 0101 | ○ | 104 | 0x510 |
| F5.16 | Number of pulses per circle | 0-60000 | 1024 | ○ | 104 | 0x511 |
| F5.17 | PG break line inspection time | 0.100-60.000s | 2.000s | ● | 104 | 0x512 |

**VC control parameter**

| NO. | Function description | Range of settings and definition | Factory setting | Attribute | Reference page | Communication add |
|---|---|---|---|---|---|---|
| F6.00 | ASR proportional gain 1 | 0.00-1.00 | Accord model | ● | 105 | 0x600 |
| F6.01 | ASR integral time 1 | 0.01-10.00s | Accord model | ● | 105 | 0x601 |
| F6.02 | ASR differential time 1 | 0.0-100.0 | 0.0 | ● | 105 | 0x602 |
| F6.03 | ASR filter time1 | 0.000-0.100s | 0.005s | ● | 105 | 0x603 |
| F6.04 | ASR switch frequency 1 | 0.0Hz-50.0Hz | 5.00Hz | ● | 105 | 0x604 |
| F6.05 | ASR proportional gain 2 | 0.00-1.00 | Accord model | ● | 105 | 0x605 |
| F6.06 | ASR integral time 2 | 0.01-10.00s | Accord model | ● | 105 | 0x606 |
| F6.07 | ASR differential time 2 | 0.0-100.0 | 0.0 | ● | 105 | 0x607 |
| F6.08 | ASR filter time 2 | 0.000-0.100s | 0.001 | ● | 105 | 0x608 |
| F6.09 | ASR switch frequency 2 | 0.00-50.00Hz | 10.0Hz | ● | 105 | 0x609 |
| F6.10 | VC slip coefficient | 10-250% | 100% | ● | 105 | 0x60A |
| F6.11 | Max output torque | 20.0-200.0% | 180.0% | ● | 105 | 0x60B |
| F6.12 | Constant power area torque compensation start frequency | 100.0%-500.0% | 120% | ● | 105 | 0x60C |

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|---|---|---|---|---|---|---|
| F6.13 | Constant power area torque compensation coefficient | 0-100% | 30% | ● | 106 | 0x60D |
| F6.14 | Constant power area limit start frequency | 100.0%-500.0% | 200% | ● | 106 | 0x60E |
| F6.15 | Constant power area limit value | 50.0-200% | 120% | ● | 106 | 0x60F |
| F6.16 | DEC over-excitation selection | 0: off 1:on | 0 | ● | 106 | 0x610 |
| F6.17 | DEC over-excitation current setting | 50.0-200.0% | 115.0% | ● | 106 | 0x611 |
| F6.18 | DEC over-excitation gain | 0.00-1.50 | Accord model | ● | 106 | 0x612 |

**Torque control parameter**

| NO. | Function description | Range of settings and definition | Factory setting | Attribute | Reference page | Communication add |
|---|---|---|---|---|---|---|
| F7.00 | Torque give source selection | LED “0” digit: Main channel selection<br>0:Keyboard number given torque<br>1:Keyboard potentiometer given<br>2: VS1<br>3: VS2<br>4: AS<br>5: PUL<br>6: RS485 communication give<br>7: Tension control give<br>LED “00” digit: Second channel selection<br>0:Keyboard number given torque<br>1:Keyboard potentiometer given<br>2: VS1<br>3: VS2<br>4: AS<br>5: PUL<br>6: RS485 communication give<br>7: Tension control give<br>LED “000” digit: Main channel add second channel mode<br>0: Main×[F7.02]<br>1: Second×[F7.03]<br>2: Main×[F7.02]+Second×[F7.03]<br>3: Main×[F7.02] －Second×[F7.03]<br>4: MAX{main × [F7.02], second × [F7.03]}<br>5: MIN {main × [F7.02],second × [F7.03]}<br>LED “0000” digit: Reserved | 0000 | ○ | 106 | 0x700 |
| F7.01 | Keyboard number give torque | 0-200.0% | 100.0% | ● | 107 | 0x701 |
| F7.02 | Main torque give channel gain | 0-500.0% | 100.0% | ● | 107 | 0x702 |

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|---|---|---|---|---|---|---|
| F7.03 | Second torque give channel gain | 0-500.0% | 100.0% | ● | 107 | 0x703 |
| F7.04 | Torque direction selection | LED “0” digit:<br>0: direction is FWD<br>1: direction is REV<br>LED“00” digit:<br>0: permit to change direction<br>1: forbid to change direction | 0000 | ● | 107 | 0x704 |
| F7.05 | Output torque upper limit set selection | 0: Keyboard No give.<br>1: Keyboard potentiometer give<br>2:VS1 give<br>3: VS2 give<br>4: AS give<br>5:PUL give<br>6: RS485 give | 0 | ● | 108 | 0x705 |
| F7.06 | Output torque upper limit | 0.0-200.0% | 180.0% | ● | 108 | 0x706 |
| F7.07 | Output torque lowest limit | 0.0-200.0% | 1.0% | ● | 108 | 0x707 |
| F7.08 | Reserved | | | | 108 | 0x708 |
| F7.09 | Reserved | | | | 108 | 0x709 |
| F7.10 | Reserved | | | | 108 | 0x70A |
| F7.11 | Reserved | | | | 108 | 0x70B |
| F7.12 | Torque ACC time | 0.00-100.00s | 0.50 | ● | 108 | 0x70C |
| F7.13 | Torque DEC time | 0.00-100.00s | 0.50 | ● | 108 | 0x70D |
| F7.14 | FWD/REV dead time | 0.00-650.00 | 0.00 | ● | 108 | 0x70E |
| F7.15 | Static friction compensation | 0-200.0% | 0 | ● | 108 | 0x70F |
| F7.16 | Static friction cutoff frequency | 0.00-50.00Hz | 10.00Hz | ● | 108 | 0x710 |
| F7.17 | Sliding friction compensation | 0-200.0% | 0 | ● | 109 | 0x711 |
| F7.18 | Moment of inertia compensation | 0-200.0% | 0 | ● | 109 | 0x712 |
| F7.19 | Moment of inertia compensation input ACC time | 0.0-6000.0s | 0 | ● | 109 | 0x713 |
| F7.20 | Moment of inertia compensation input DEC time | 0.0-6000.0s | 0 | ● | 109 | 0x714 |

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|---|---|---|---|---|---|---|
| F7.21 | Zero-speed torque keep selection in the torque control mode | LED “0”digit: Zero-speed torque keep set channel<br>0: Torque setting<br>1: F1.27 setting<br>LED “00”digit: Zero-speed torque keep time set<br>0: Zero-speed continue valid<br>1: Zero-speed valid in F1.28 time<br>LED “000”digit: Reserved<br>LED “00”digit: Reserved | 0010 | ● | 109 | 0x715 |
| F7.22 | Zero speed slip frequency settings | 0.0-5.00Hz | 1.00 | ● | 110 | 0x716 |
| F7.23 | Torque control upper frequency limit selection | LED “0” digit: Torque control upper frequency limit selection<br>0:FWD/REV set by [F0.11].<br>1: FWD set by LED “00”digit; REV set by LED “000”digit.<br>LED “00” digit: FWD upper frequency limit set<br>0:Torque control FWD upper frequency limit No set (F7.24)<br>1:Keyboard pot give<br>2:VS1 give<br>3:VS2 give<br>4:AS give<br>5:PUL give<br>6:RS485 give<br>LED “000” digit: REV upper frequency limit set<br>0:Torque control REV upper frequency limit No set (F7.26<br>1:Keyboard pot give<br>2:VS1 give<br>3:VS2 give<br>4:AS give<br>5:PUL give<br>6:RS485 give) | 0000 | ○ | 110 | 0x717 |
| F7.24 | Torque control FWD upper frequency limit No set | Lower limit-Max output frequency | 50.00 | ○ | 111 | 0x718 |
| F7.25 | Torque control FWD upper frequency limit bias | 0.0-20.0% | 0.0 | ● | 111 | 0x719 |
| F7.26 | Torque control REV upper frequency limit No set | Lower limit-Max output frequency | 50.00 | ○ | 111 | 0x71A |
| F7.27 | Torque control REV upper frequency limit bias | 0.0-20.0% | 0.0 | ● | 111 | 0x71B |
| F7.28 | Upper frequency limit under small torque | 0.00-50.00Hz | 3.00Hz | ● | 111 | 0x71C |
| F7.29 | Small torque value threshold | 0-200.0%<br>0:This function off | 0.0% | ● | 111 | 0x71D |

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|---|---|---|---|---|---|---|
| F7.30 | Magnetic powder brake current give channel | LED “0” digit: main channel selection<br>0: Keyboard give<br>1: Keyboard pot give or modify<br>2: VS1 give or modify<br>3: VS2 give or modify<br>4: AS give or modify<br>LED “00” digit: Second channel selection<br>0: Keyboard give<br>1: Keyboard pot give or modify<br>2: VS1 give or modify<br>3: VS2 give or modify<br>4: AS give or modify<br>LED “000” digit: Main channel combines second channel<br>0: Main×[F7.32]<br>1: Second×[F7.33]<br>2: Main×[F7.32]＋second ×[F7.33]<br>3: Main×[F7.32]－second×[F7.33]<br>4: MAX{Main×[F7.32],second×[F7.33]}<br>5: MIN{ Main×[F7.32],second×[F7.33]}<br>LED “0000” digit: Reserved | 0010H | ● | 112 | 0x71E |
| F7.31 | Magnetic powder brake current keyboard No give | 0-200.0% | 100.0% | ● | 112 | 0x71F |
| F7.32 | Magnetic powder brake main channel gain | 0-500.0% | 100.0% | ● | 112 | 0x720 |
| F7.33 | Magnetic powder brake second channel gain | 0-500.0% | 100.0% | ● | 112 | 0x721 |

**V/F control parameters**

| NO | Function description | Range of settings and definition | Factory setting | Attribute | Reference page | Communication add |
|---|---|---|---|---|---|---|
| F8.00 | V/F curve selection | 0: Beeline<br>1: User-defined V/F curve<br>2: 1.3 power falling torque curve<br>3: 1.7 power falling torque curve<br>4: 2.0 power falling torque curve | 0 | ○ | 113 | 0x800 |
| F8.01 | Self-setting voltage V1 | 0.0%-100.0% | 3.0% | ○ | 113 | 0x801 |
| F8.02 | Self-setting frequency F1 | 0.00-max frequency | 1.00Hz | ○ | 113 | 0x802 |
| F8.03 | Self-setting voltage V2 | 0.0%-100.0% | 28.0% | ○ | 113 | 0x803 |
| F8.04 | Self-setting frequency F2 | 0.00-max frequency | 10.00Hz | ○ | 113 | 0x804 |
| F8.05 | Self-setting voltage V3 | 0.0%-100.0% | 55.0% | ○ | 113 | 0x805 |
| F8.06 | Self-setting frequency F3 | 0.00-max frequency | 25.00Hz | ○ | 113 | 0x806 |
| F8.07 | Self-setting voltage V4 | 0.0%-100.0% | 78.0% | ○ | 113 | 0x807 |
| F8.08 | Self-setting frequency F4 | 0.00-max frequency | 37.50Hz | ○ | 113 | 0x808 |
| F8.09 | Self-setting voltage V5 | 0.0%-100.0% | 100.0% | ○ | 113 | 0x809 |
| F8.10 | Self-setting frequency F5 | 0.00-max frequency | 50.00Hz | ○ | 113 | 0x80A |
| F8.11 | Output voltage percentage | 25-100% | 100% | ○ | 114 | 0x80B |
| F8.12 | Torque boost | 0.1%-30.0% | Accord model | ○ | 114 | 0x80C |
| F8.13 | Torque boost close | 0.0%-100.0% | 20.0% | ○ | 114 | 0x80D |
| F8.14 | V/F slip compensation | 0.0-200.0% | 0.0% | ● | 115 | 0x80E |
| F8.15 | Auto energy-saving selection | 0: no auto energy-saving<br>1: auto energy-saving | 0 | ● | 115 | 0x80F |
| F8.16 | Lower frequency limit of energy-saving operation | 0.0-500.0% | 25.0% | ● | 115 | 0x810 |
| F8.17 | Energy-saving voltage down time | 0.01-50.00s | 10.00s | ● | 115 | 0x811 |
| F8.18 | Energy-saving voltage lowest limit | 20.0-100.0% | 50.0% | ● | 115 | 0x812 |
| F8.19 | ASR(VF) proportion gain1 | 0.0-100.00 | 1.00 | ● | 115 | 0x813 |
| F8.20 | ASR(VF) integral time 1 | 0.01-10.00s | 0.50s | ● | 115 | 0x814 |
| F8.21 | ASR(VF) filter time1 | 0.000-10.000s | 0.005s | ● | 115 | 0x815 |
| F8.22 | ASR(VF) switch frequency 1 | 0.00-50.00Hz | 5.00Hz | ● | 115 | 0x816 |
| F8.23 | ASR(VF) proportion gain 2 | 0.0-100.00 | 1.00 | ● | 115 | 0x817 |

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|---|---|---|---|---|---|---|
| F8.24 | ASR(VF) integral time 2 | 0.01-10.00s | 0.50s | ● | 115 | 0x818 |
| F8.25 | ASR(VF) filter time 2 | 0.000-10.000s | 0.100s | ● | 115 | 0x819 |
| F8.26 | ASR(VF) switch frequency 2 | 0.00-50.00Hz | 10.00Hz | ● | 116 | 0x81A |
| F8.27 | ASR(VF) slip limit | 0.0-500.0% | 100.0% | ● | 116 | 0x81B |

**Tension control special parameters**

| NO | Function description | Range of settings and definition | Factory setting | Attribute | Reference page | Communication add |
|---|---|---|---|---|---|---|
| F9.00 | Tension setting selection | LED “0” digit: main channel selection<br>0: Keyboard No give<br>1: Keyboard pot give or modify<br>2: VS1 give or modify<br>3: VS2 give or modify<br>4: AS give or modify<br>5: PUL give or modify<br>6:RS485 give<br>LED “00” digit: Second channel selection<br>0: Keyboard give<br>1: Keyboard pot give or modify<br>2: VS1 give or modify<br>3: VS2 give or modify<br>4: AS give or modify<br>5: PUL give or modify<br>6:RS485 give<br>LED “000” digit: Main channel combines second channel<br>0: Main×[F9.01]<br>1: Second×[F9.02]<br>2: Main×[F9.01]＋second ×[F9.02]<br>3: Main×[F9.01]－second×[F9.02]<br>4: MAX{ Main×[F9.01],second×[F9.02]}<br>5: MIN{ Main×[F9.01],second×[F9.02]}<br>LED “000” digit: Reserved | 0000 | ● | 116 | 0x900 |
| F9.01 | Tension give main channel gain | 0-500.0% | 100.0% | ● | 117 | 0x901 |
| F9.02 | Tension give second channel gain | 0-500.0% | 100.0% | ● | 117 | 0x902 |
| F9.03 | Tension No setting | 0-30000N | 0 | ● | 117 | 0x903 |

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|---|---|---|---|---|---|---|
| F9.04 | Max tension | 0-30000N | 0 | ● | 117 | 0x904 |
| F9.05 | Tension tape coefficient | 0.0-100.0% | 0.0% | ● | 117 | 0x905 |
| F9.06 | Tape compensation modify | 0-10000mm | 0 | ● | 118 | 0x906 |
| F9.07 | Reserved | | | | 118 | 0x907 |
| F9.08 | Reserved | | | | 118 | 0x908 |
| F9.09 | Machine drive ratio | 0.01-300.00 | 1.00 | ● | 118 | 0x909 |
| F9.10 | Curl mode | 0: Winding (Roll diameter increase gradually)<br>1: Unwinding (Roll diameter decrease gradually) | 0 | ● | 118 | 0x90A |
| F9.11 | Roll diameter calculation selection | 0:Initial roll diameter, no calculate<br>1:Line speed calculate<br>2:Calculate through the accumulative thickness<br>3:Calculate through the time<br>4:Keyboard potentiometer give winding roll diameter<br>5:VS1 give winding roll diameter<br>6:VS2 give winding roll diameter<br>7: AS give winding roll diameter<br>8: PUL give winding roll diameter<br>9:RS485 give winding roll diameter | 0 | ● | 119 | 0x90B |
| F9.12 | Max roll diameter | 1-10000mm | 500 | ● | 119 | 0x90C |
| F9.13 | Reel diameter | 1-10000mm | 100 | ● | 119 | 0x90D |
| F9.14 | Initial diameter resource selection | 0: Terminal select<br>1: Keyboard potentiometer<br>2:VS1<br>3:VS2<br>4:AS<br>5:PUL | 0 | ● | 119 | 0x90E |
| F9.15 | Initial diameter 1 | 1-10000mm | 100 | ● | 120 | 0x90F |
| F9.16 | Initial diameter 2 | 1-10000mm | 100 | ● | 120 | 0x910 |
| F9.17 | Initial diameter 3 | 1-10000mm | 100 | ● | 120 | 0x911 |
| F9.18 | Diameter reset selection | 0: Manual reset 1: Auto reset | 0 | ● | 120 | 0x912 |
| F9.19 | Diameter filter time | 0.1-100.0s | 1.0s | ● | 120 | 0x913 |
| F9.20 | Current roll diameter | 1-10000mm | * | ● | 120 | 0x914 |
| F9.21 | Roll diameter calculate end frequency | 0.00-50.00Hz | 10.00 | ● | 120 | 0x915 |
| F9.22 | Diameter reset delay | 0-6000s | 10 | ● | 121 | 0x916 |

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|---|---|---|---|---|---|---|
| F9.23 | Reserved | | | | 121 | 0x917 |
| F9.24 | Reserved | | | | 121 | 0x918 |
| F9.25 | Linear input resource | 0:F9.28/F9.29 terminal selection<br>1: Keyboard potentiometer<br>2:VS1<br>3:VS2<br>4:AS<br>5:PUL(only for analog port use)<br>6:PUL*[F9.31]* π /[F9.32]<br>7:RS485 communication gives | 0 | ● | 121 | 0x919 |
| F9.26 | Max linear speed | 0.0-6500.0m/Min | 1000.0 | ● | 121 | 0x91A |
| F9.27 | Min linear speed of diameter calculate | 0.0-6500.0m/Min | 200.0 | ● | 121 | 0x91B |
| F9.28 | Linear speed setting 1 | 0.0-6500.0m/Min | 1000.0 | ● | 121 | 0x91C |
| F9.29 | Linear speed setting 2 | 0.0-6500.0m/Min | 1000.0 | ● | 121 | 0x91D |
| F9.30 | Current linear speed | 0.0-6500.0m/Min | * | ● | 122 | 0x91E |
| F9.31 | Traction roller diameter | 0.0-1000.0mm | 100.0 mm | ● | 122 | 0x91F |
| F9.32 | Traction roller pulse per cycle | 1-60000 | 1 | ● | 122 | 0x920 |
| F9.33 | Reserved | | | | 122 | 0x921 |
| F9.34 | Reserved | | | | 122 | 0x922 |
| F9.35 | Reserved | | | | 122 | 0x923 |
| F9.36 | Pulse per cycle | 1-60000 | 1 | ● | 122 | 0x924 |
| F9.37 | Cycles per layer | 1-10000 | 1 | ● | 122 | 0x925 |
| F9.38 | Max thickness | 0.01-100.00mm | 1.00 | ● | 122 | 0x926 |
| F9.39 | Material thickness set resource | 0: F9.40/ F9.41 terminal select<br>1: Keyboard potentiometer<br>2:VS1<br>3:VS2<br>4:AS<br>5:PUL<br>6:RS485 communication gives | 0 | ● | 122 | 0x927 |
| F9.40 | Material thickness 1 | 0.01-100.00mm | 0.01mm | ● | 123 | 0x928 |
| F9.41 | Material thickness 2 | 0.01-100.00mm | 0.01mm | ● | 123 | 0x929 |
| F9.42 | Reserved | | | | 123 | 0x92A |
| F9.43 | Reserved | | | | 123 | 0x92B |
| F9.44 | Full roll diameter 1 | 1-10000mm | 500 | ● | 123 | 0x92C |
| F9.45 | Full roll diameter 2 | 1-10000mm | 500 | ● | 123 | 0x92D |
| F9.46 | Empty to full roll time 1 | 0-65000s | 3600 | ● | 123 | 0x92E |

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|---|---|---|---|---|---|---|
| F9.47 | Empty to full roll time 2 | 0-65000s | 7200 | ● | 123 | 0x92F |
| F9.48 | Current time | 0-65000s | * | ● | 123 | 0x930 |
| F9.49 | Reserved | | | | 123 | 0x931 |
| F9.50 | Reserved | | | | 123 | 0x932 |
| F9.51 | Reserved | | | | 123 | 0x933 |

**Malfunction and protection parameters**

| NO. | Function description | Range of settings and definition | Factory setting | Attribute | Reference page | Communication add |
|---|---|---|---|---|---|---|
| FA.00 | Protection function selection 1 | LED “0”digit: ACC over-current protection selection<br>0: Invalid<br>1: Valid<br>LED“00”digit: DEC over-current protection selection<br>0: Invalid<br>1: Valid<br>LED“000”digit: current limit selection while running<br>0: Invalid<br>1: Valid<br>LED“0000”digit: reserved | 0001 | ● | 124 | 0xA00 |
| FA.01 | Protection function selection 2 | LED“0”digit:DEC over-voltage protection selection<br>0: Invalid<br>1: rating 1 over-voltage protection<br>2: rating 2 over-voltage protection<br>LED“00”digit: RUN over-voltage protection selection<br>0: Invalid<br>1: Valid<br>LED“000”digit: inverter over-load action selection<br>0: emergency stop output and alarm<br>1: emergency stop and alarm<br>2: limit current and run<br>LED “0000” digit: motor over-load act<br>0: emergency stop output and alarm<br>1: emergency stop and alarm<br>2: limit current and run<br>3: motor over-load protection off | 0001 | ● | 124 | 0xA01 |

| | | | | | | |
|---|---|---|---|---|---|---|
| FA.02 | Protection function selection 3 | LED “0”digit: inverter OH protection selection<br>0: emergency stop output and alarm<br>1: emergency stop and alarm<br>2: limit current and run<br>LED“00”digit: input phase lack protection selection<br>0: Invalid<br>1: Valid<br>LED“000”digit: output phase lack protection selection<br>0: Invalid<br>1: Valid<br>LED“0000”digit: reserved | 0110 | ● | 125 | 0xA02 |
| FA.03 | Protection function selection 4 | LED “0”digit: SC protection selection<br>0: Invalid<br>1: Valid<br>LED“00”digit: OC protection selection<br>0: Invalid<br>1: Valid<br>LED“000”digit: reserved<br>LED“0000”digit: reserved | 0000 | ● | 126 | 0xA03 |
| FA.04 | Fan control | 0: Fan runs after electrifying<br>1: Fan stop related to temperature and work while running<br>2: Fan stop while machine stop and run related to temperature | 1 | ● | 126 | 0xA04 |
| FA.05 | DEC over-voltage inhibition point | 110-150% | 120% | ● | 126 | 0xA05 |
| FA.06 | Running over-voltage inhibition point | 100-150% | 115% | ● | 126 | 0xA06 |
| FA.07 | OV protection max frequency add | 0-50.00Hz | 2.00Hz | ● | 126 | 0xA07 |
| FA.08 | Energy braking action voltage | 115.0%-140.0% | 120.0% | ● | 127 | 0xA08 |
| FA.09 | Reserved | | | ● | 127 | 0xA09 |
| FA.10 | Bus under-voltage protection | 50.0%-100.0% | 60.0% | ● | 127 | 0xA0A |
| FA.11 | Speed fall act voltage at sudden power down | 0-200% | 20% | ● | 127 | 0xA0B |
| FA.12 | Main circuit aim voltage at sudden power down | 0%-200% | 90% | ● | 127 | 0xA0C |
| FA.13 | Speed fall gain at sudden power down | 0.01-10.00 | 2.00 | ● | 127 | 0xA0D |

| | | | | | | |
|---|---|---|---|---|---|---|
| FA.14 | Speed back waiting time at sudden power down | 0.01-100.00s | 2.0s | ● | 127 | 0xA0E |
| FA.15 | ACC OC protection point | 100-250% | 160% | ● | 127 | 0xA0F |
| FA.16 | DEC OC protection point | 100-250% | 160% | ● | 127 | 0xA10 |
| FA.17 | Current limit level while running | 100-250% | 160% | ● | 127 | 0xA11 |
| FA.18 | Current limit frequency ACC/DEC time while running | 0.00-650.00s | 10.00s | ● | 127 | 0xA12 |
| FA.19 | OV protection respond gain | 0-10.0 | 0.2 | ○ | 128 | 0xA13 |
| FA.20 | Reserved | | | | 128 | 0xA14 |
| FA.21 | Motor overload protection current | 20.0%-120.0% | 100.0% | ● | 128 | 0xA15 |
| FA.22 | Malfunction recovery times | 0-5 | 0 | ● | 128 | 0xA16 |
| FA.23 | Malfunction auto-reset interval | 0.1-100.0s | 1.0s | ● | 128 | 0xA17 |
| FA.24 | Reserved | | | | 128 | 0xA18 |
| FA.25 | Malfunction types | Please see malfunction code table | -- | × | 128 | 0xA19 |
| FA.26 | Malfunction running frequency | 0.00-max frequency | -- | × | 128 | 0xA1A |
| FA.27 | Malfunction output voltage | 0-1500v | -- | × | 128 | 0xA1B |
| FA.28 | Malfunction output current | 0.1-100.0s | 1.0s | × | 128 | 0xA1C |
| FA.29 | Malfunction bus voltage | 0-3000V | -- | × | 128 | 0xA1D |
| FA.30 | Malfunction module temperature | 0-100℃ | -- | × | 128 | 0xA1E |
| FA.31 | Malfunction machine state | LED “0” digit: run direction<br>0: FWD<br>1: REV<br>LED “00” digit: run state<br>0: stop<br>1:stable speed<br>2: ACC<br>3: DEC<br>LED “000” digit: reserved<br>LED “0000” digit: reserved | -- | × | 128 | 0xA1F |
| FA.32 | Malfunction input terminal state | See input terminal chart | -- | × | 129 | 0xA20 |

| | | | | | | |
|---|---|---|---|---|---|---|
| FA.33 | Malfunction output terminal state | See input terminal chart | -- | × | 129 | 0xA21 |
| FA.34 | The last malfunction types | Please see malfunction code table | | × | 129 | 0xA22 |
| FA.35 | The last malfunction running frequency | 0.00-max frequency | -- | × | 129 | 0xA23 |
| FA.36 | The last malfunction output voltage | 0-1500v | -- | × | 129 | 0xA24 |
| FA.37 | The last malfunction output current | 0.0-2000.0A | -- | × | 129 | 0XA25 |
| FA.38 | The last malfunction bus voltage | 0-3000V | -- | × | 129 | 0XA26 |
| FA.39 | The last malfunction module temperature | 0-100℃ | -- | × | 129 | 0XA27 |
| FA.40 | The last machine state | LED “0” digit: run direction<br>0: FWD<br>1: REV<br>LED “00” digit: run state<br>0: stop<br>1: stable speed<br>2: ACC<br>3: DEC<br>LED “000” digit: reserved<br>LED “0000” digit: reserved | -- | × | 129 | 0xA28 |
| FA.41 | The last malfunction input terminal state | See input terminal chart | -- | × | 129 | 0xA29 |
| FA.42 | The last malfunction output terminal state | See input terminal chart | -- | × | 129 | 0Xa2A |
| FA.43 | The first two malfunction types | Please see malfunction code table | | × | 129 | 0xA2B |
| FA.44 | The first three malfunction types | Please see malfunction code table | | × | 129 | 0xA2C |

**PID process control parameters**

| NO. | Function description | Range of settings and definition | Factory setting | Attribute | Reference page | Communi cation add |
|---|---|---|---|---|---|---|
| Fb.00 | PID given signal source | 0: Keyboard number giving PID<br>1: Keyboard potentiometer<br>2 : Terminal VS1 voltage analog<br>3: Terminal VS2 voltage analog<br>4: Terminal AS current analog<br>5: Terminal PUL pulse signal<br>6: RS485 communication<br>7: Optional card | 0 | ○ | 131 | 0xB00 |
| Fb.01 | Keyboar digit given PID | 0.00-100.0 | 50.0% | ● | 132 | 0xB01 |
| Fb.02 | PID feedback signal source | 0: Keyboard digit PID given<br>1: Keyboard potentiometer given<br>2 :Terminal VS1 voltage analog given<br>3: Terminal VS2 voltage analog given<br>4: Terminal AS current analog given<br>5: Terminal PUL pulse signal given<br>6: RS485 communication given<br>7: Optional card | 2 | ○ | 132 | 0xB02 |
| Fb.03 | Feedback signal gain | 0.00-10.00 | 1.00 | ● | 133 | 0XB03 |
| Fb.04 | Feedback signal max measuring range | 0-100.0 | 100.0 | ● | 133 | 0xB04 |
| Fb.05 | PID control selection | LED “0”digit: feedback trait selection<br>0: Positive trait<br>1: Negative trait<br>LED “10”digit: PID adjust direction selection<br>0:reverse forbidden<br>1:reverse allowed<br>LED “100”digit: error of center-aligned selection<br>0:invalid<br>1: valid<br>LED “1000”digit:<br>the second PID valid range selection<br>0: terminal choice is valid<br>1:terminal choice and drop-in error range are valid | 0100 | ○ | 133 | 0xB05 |
| Fb.06 | PID preset frequency | 0.00-Max frequency | 50.00Hz | ● | 134 | 0xB06 |
| Fb.07 | PID preset frequency running time | 0.0-6500.0 | 0.0s | ● | 134 | 0xB07 |
| Fb.08 | Proportion gain P1 | 0.00-100.00 | 1.00 | ● | 134 | 0xB08 |
| Fb.09 | Integral time I1 | 0.01-10.00s | 0.10s | ● | 134 | 0xB09 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Fb.10 | Differential coefficient D1 | 0.00-10.00s | 0.00s | ● | 134 | 0xB0A |
| Fb.11 | Sample cycle | 0.01-100.00s | 0.10s | ● | 135 | 0xB0B |
| Fb.12 | PID control deviation limitation | 0.0-100.0% | 0.0% | ● | 135 | 0xB0C |
| Fb.13 | Reserved | 0.0-100.0% | | | 135 | 0xB0D |
| Fb.14 | Detection time while feedback wire break | 0.0-6500.0s | 1.0s | ● | 135 | 0xB0E |
| Fb.15 | Action selections while feedback wire break | 0: Go on PID operation without alarm<br>1: Stop and alarm malfunction<br>2: Go on PID operation and output alarm signal<br>3: Run at the current frequency and output alarm signal | 0 | ● | 135 | 0xB0F |
| Fb.16 | Wire break alarm upper limit | 0.0-100.0% | 100.0% | ● | 135 | 0xB10 |
| Fb.17 | Wire break alarm lower limit | 0.0-100.0% | 0.0% | ● | 135 | 0xB11 |
| Fb.18 | Constant pressure water supply sleep system selection | 0: Invalid<br>1: Valid | 0 | ● | 136 | 0xB12 |
| Fb.19 | Start-up threshold | 0.0-100.0% | 0.0% | ● | 136 | 0xB13 |
| Fb.20 | Dormancy threshold | 0.0-100.0% | 0.900 | ● | 136 | 0xB14 |
| Fb.21 | Dormancy sense DEC time | 0-6500.0s | 30.0s | ● | 136 | 0xB15 |
| Fb.22 | Stop sense low bit hold frequency | 0-20.00Hz | 10.00Hz | ● | 136 | 0xB16 |

**Multi-step, PLC function and swing frequency parameters**

| NO. | Function description | Range of settings and definition | Factory setting | Attribute | Reference page | Communication add |
|---|---|---|---|---|---|---|
| FC.00 | PLC Step 1 | 0.00-320.00Hz | 10.00Hz | ● | 136 | 0xC00 |
| FC.01 | PLC Step 2 | 0.00-320.00Hz | 20.00Hz | ● | 136 | 0xC01 |
| FC.02 | PLC Step 3 | 0.00-320.00Hz | 30.00Hz | ● | 136 | 0xC02 |
| FC.03 | PLC Step 4 | 0.00-320.00Hz | 40.00Hz | ● | 136 | 0xC03 |
| FC.04 | PLC Step 5 | 0.00-320.00Hz | 50.00Hz | ● | 136 | 0xC04 |
| FC.05 | PLC Step 6 | 0.00-320.00Hz | 40.00Hz | ● | 136 | 0xC05 |
| FC.06 | PLC Step 7 | 0.00-320.00Hz | 30.00Hz | ● | 136 | 0xC06 |
| FC.07 | PLC Step 8 | 0.00-320.00Hz | 20.00Hz | ● | 136 | 0xC07 |
| FC.08 | PLC Step 9 | 0.00-320.00Hz | 10.00Hz | ● | 136 | 0xC08 |
| FC.09 | PLC Step 10 | 0.00-320.00Hz | 20..00.H | ● | 136 | 0xC09 |
| FC.10 | PLC Step 11 | 0.00-320.00Hz | 30.00Hz | ● | 136 | 0xC0A |
| FC.11 | PLC Step 12 | 0.00-320.00Hz | 40.00Hz | ● | 136 | 0xC0B |
| FC.12 | PLC Step 13 | 0.00-320.00Hz | 50.00Hz | ● | 136 | 0xC0C |

| | | | | | | |
|---|---|---|---|---|---|---|
| FC.13 | PLC Step 14 | 0.00-320.00Hz | 40.00Hz | ● | 136 | 0xC0D |
| FC.14 | PLC Step 15 | 0.00-320.00Hz | 30.00Hz | ● | 136 | 0xC0E |
| FC.15 | PLC running Mode selection | LED“0”digit:<br>0: Stop after single cycle<br>1: Continuous cycles<br>2: Keep final value after single cycle<br>LED“10”digit: Time unit<br>0: second<br>1: minute<br>2: hour<br>LED“100”digit: Power down memory mode<br>0: no saved<br>1: save<br>LED“1000”digit:<br>Start-up mode<br>0: Restart from the 1st step<br>1: Restart from the stop stage<br>2: Continue from the time when stop<br>LED“0000”digit:<br>Start-up mode<br>0: Restart from the 1st step<br>1: Restart from the step where stop<br>2: Restart from the time when stop | 0000 | ● | 138 | 0xC0F |
| FC.16 | PLC 1st step running time | 0.0-6500.0(s/m/h) | 10.0 | ● | 139 | 0xC10 |
| FC.17 | PLC 2nd step running time | 0.0-6500.0(s/m/h) | 10.0 | ● | 139 | 0xC11 |
| FC.18 | PLC 3rd step running time | 0.0-6500.0(s/m/h) | 10.0 | ● | 139 | 0xC12 |
| FC.19 | PLC 4th step running time | 0.0-6500.0(s/m/h) | 10.0 | ● | 139 | 0xC13 |
| FC.20 | PLC 5th step running time | 0.0-6500.0(s/m/h) | 10.0 | ● | 139 | 0xC14 |
| FC.21 | PLC 6th step running time | 0.0-6500.0(s/m/h) | 10.0 | ● | 139 | 0xC15 |
| FC.22 | PLC 7th step running time | 0.0-6500.0(s/m/h) | 10.0 | ● | 139 | 0xC16 |
| FC.23 | PLC 8th step running time | 0.0-6500.0(s/m/h) | 10.0 | ● | 139 | 0xC17 |
| FC.24 | PLC 9th step running time | 0.0-6500.0(s/m/h) | 10.0 | ● | 140 | 0xC18 |

| | | | | | | |
|---|---|---|---|---|---|---|
| FC.25 | PLC 10th step running time | 0.0-6500.0(s/m/h) | 10.0 | ● | 140 | 0xC19 |
| FC.26 | PLC 11th step running time | 0.0-6500.0(s/m/h) | 10.0 | ● | 140 | 0xC1A |
| FC.27 | PLC 12th step running time | 0.0-6500.0(s/m/h) | 10.0 | ● | 140 | 0xC1B |
| FC.28 | PLC 13th step running time | 0.0-6500.0(s/m/h) | 10.0 | ● | 140 | 0xC1C |
| FC.29 | PLC 14th step running time | 0.0-6500.0(s/m/h) | 10.0 | ● | 140 | 0xC1D |
| FC.30 | PLC 15th step running time | 0.0-6500.0(s/m/h) | 10.0 | ● | 140 | 0xC1E |
| FC.31 | PLC 1st step direction and ADD/DEC time | LED “0” digit: this step run direction<br>0: FWD<br>1: REV<br>LED “00” digit: ACC/DEC time in this step<br>0: ACC/DEC time 1<br>1: ACC/DEC time 2<br>2: ACC/DEC time 3<br>4: ACC/DEC time 4<br>LED “000” digit: reserved<br>LED “0000” digit: reserved | 0000 | ● | 140 | 0xC1F |
| FC.32 | PLC 2nd step direction and ADD/DEC time | | 0000 | ● | 140 | 0xC20 |
| FC.33 | PLC 3rd step direction and ADD/DEC time | | 0000 | ● | 140 | 0xC21 |
| FC.34 | PLC 4th step direction and ADD/DEC time | | 0000 | ● | 140 | 0xC22 |
| FC.35 | PLC 5th step direction and ADD/DEC time | | 0000 | ● | 140 | 0xC23 |
| FC.36 | PLC 6th step direction and ADD/DEC time | | 0000 | ● | 140 | 0xC24 |
| FC.37 | PLC 7th step direction and ADD/DEC time | | 0000 | ● | 140 | 0xC25 |
| FC.38 | PLC 8th step direction and ADD/DEC time | | 0000 | ● | 140 | 0xC26 |
| FC.39 | PLC 9th step direction and ADD/DEC time | | 0000 | ● | 140 | 0xC27 |
| FC.40 | PLC 10th step direction and ADD/DEC time | | 0000 | ● | 140 | 0xC28 |
| FC.41 | PLC 11th step direction and ADD/DEC time | | 0000 | ● | 140 | 0xC29 |
| FC.42 | PLC 12th step direction and ADD/DEC time | | 0000 | ● | 140 | 0xC2A |
| FC.43 | PLC 13th step direction and ADD/DEC time | | 0000 | ● | 140 | 0xC2B |
| FC.44 | PLC 14th step direction and ADD/DEC time | | 0000 | ● | 140 | 0xC2C |

| | | | | | | |
|---|---|---|---|---|---|---|
| FC.45 | PLC 15th step direction and ADD/DEC time | | 0000 | ● | 140 | 0xC2D |
| FC.46 | Reserved | | | | 140 | 0xC2E |
| FC.47 | Reserved | | | | 140 | 0xC2F |
| FC.48 | Swing frequency control | LED "0" digit: swing frequency control<br>0: invalid<br>1:valid<br>LED "00" digit: swing frequency get in mode<br>0: Automatic<br>1: manual<br>LED "000" digit: AW control<br>0: variable<br>1: fixed<br>LED "0000" digit: reserved | 0000 | ○ | 140 | 0xC30 |
| FC.49 | Swing frequency pre-set | 0.0-max frequency | 0.00Hz | ● | 140 | 0xC31 |
| FC.50 | Pre-set frequency hold time | 0.00-650.00s | 0.00s | ● | 140 | 0xC32 |
| FC.51 | Swing frequency range | 0.0-100.0% | 0.0% | ● | 140 | 0xC33 |
| FC.52 | Jumping frequency amplitude | 0.0-50.0% | 0.0% | ● | 141 | 0xC34 |
| FC.53 | Swing frequency ACC time | 0.00-650.00s | 5.00s | ● | 141 | 0xC35 |
| FC.54 | Swing frequency DEC time | 0.00-650.00s | 5.00s | ● | 141 | 0xC36 |

**Communication control function parameters**

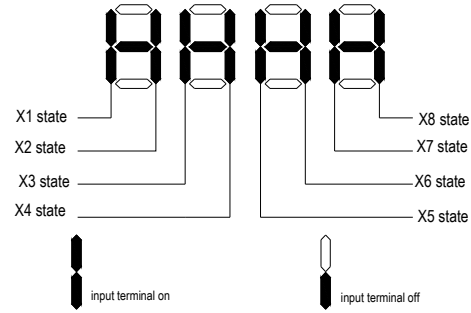
| NO. | Function description | Range of settings and definition | Factory setting | Attribute | Reference page | Communication add |
|---|---|---|---|---|---|---|
| Fd.00 | Main-slave machine selection | 0: Main machine<br>1: Slave machine | 0 | ○ | 142 | 0xD00 |
| Fd.01 | Machine add | 1-247 | 1 | ○ | 142 | 0xD01 |
| Fd.02 | Communication baud rate selection | 0: 1200 bps<br>1: 2400 bps<br>2: 4800 bps<br>3: 9600 bps<br>4: 19200 bps<br>5: 38400 bps | 3 | ○ | 142 | 0xD02 |
| Fd.03 | Data format | 0: (N,8,1) no checkout,<br>Data digit: 8,<br>Stop digit: 1 | 0 | ○ | 142 | 0xD03 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Fd.03 | Data format | 1: (E,8,1) even checkout,<br>Data digit: 8,<br>Stop digit: 1<br>2: (O,8,1) odd checkout,<br>Data digit: 8,<br>Stop digit: 1<br>3: (N,8,2) no checkout,<br>Data digit: 8,<br>Stop digit: 2<br>4: (E,8,2) even checkout,<br>Data digit: 8,<br>Stop digit: 2<br>5: (O,8,2) odd checkout,<br>Data digit: 8,<br>Stop digit: 2 | 0 | ○ | 142 | 0xD03 |
| Fd.04 | Communication ratio setting | 0.00-5.00 | 1.00 | ● | 142 | 0xD04 |
| Fd.05 | Communication answer delay | 0-500ms | 0 | ● | 142 | 0xD05 |
| Fd.06 | Communication overtime time | 0.1-100.0s | 1.0s | ● | 143 | 0xD06 |
| Fd.07 | RS485 communication fault action mode selection | 0: Alarm and stop freely<br>1: Not alarm, go on run<br>2: Stop without alarm | 1 | ● | 143 | 0xD07 |
| Fd.08 | Transmission response dispose | 0: Write operation with response<br>1: Write operation without response | 0 | ● | 143 | 0xD08 |
| Fd.09 | Main machine sending selection | LED“0”digit: the first group of transmit frame selection<br>0: Invalid<br>1: Run command given<br>2: Main machine given<br>3: Main machine output frequency<br>4: Main machine upper limit frequency<br>5: Main machine given torque<br>6: Main machine output torque<br>7: Reserved<br>8: Reserved<br>9: Main machine given PID<br>A: Main machine feedback PID<br>LED“10”digit: the second group of transmit frame selection Ditto<br>LED“100”digit: the third group of transmit frame selection Ditto<br>LED“1000”digit: the fourth group of transmit frame selection Ditto | 0031 | ● | 143 | 0xD09 |

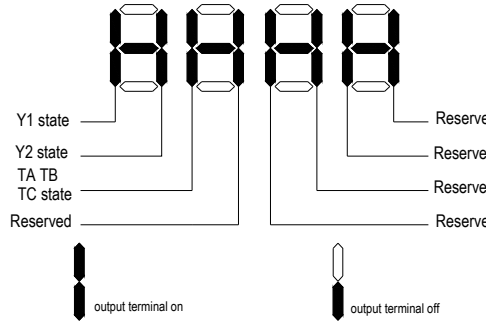
**Monitor code**

| NO. | Function name | Range of settings and definition | Communication add |
|---|---|---|---|
| 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 | RPM | 2105H |
| C-06 | Set torque | 0.1% | 2106H |
| C-07 | Output torque | 0.1% | 2107H |
| C-08 | PID given | 0.1% | 2108H |
| C-09 | PID feedback | 0.1% | 2109H |
| C-10 | Output power | 0.1% | 210AH |
| C-11 | Bus voltage | 0.1V | 210BH |
| C-12 | Module temperature 1 | 0.1℃ | 210CH |
| C-13 | Module temperature 2 | 0.1℃ | 210DH |
| C-14 | Input terminal X on-state | refer to diagram x | 210EH |
| C-15 | Output terminal Y on-state | refer to diagram x | 210FH |
| C-16 | Analog VS1 input | 0.001V | 2110H |
| C-17 | Analog VS2 input | 0.001V | 2111H |
| C-18 | Analog AS input | 0.001mA | 2112H |
| C-19 | Impulse single 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 electrify(of this time) | Hour | 2117H |
| C-24 | Local accumulative running time | 0.1h | 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 edition | | 211CH |
| C-29 | PG feedback frequency | 0.01Hz | 211DH |

★ **Input terminal on/off show diagram**




★ **Output terminal on/off show diagram**



# 10.2 Appendix 2: RS485 communication protocol

● **Communication protocol**

The AC90 series frequency inverter can select the RS485 communication interface. The ModBus communication protocol of international standard is adopted for master-slave communication. The consumer can carry out centralized control by PC/PLC, upper machine, main 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 the special application requirements.

● **Application styles**

1. AC90 series frequency inverter is connected to "single host and many slave machines" control network with RS232/RS485 master line. Slave machine do not response while main machine order with broadcast (while slave machine add is 0).
2. AC90 afford RS485 port only, asynchronous half-duplex. While the communication port of the external equipment is RS232, RS232/RS485 converter should be added.
3. This ModBus serial communication protocol defines asynchronous transfer information content and formats used in the serial communication, which can be divided into RUT and ASCII mode. AC90 is RTU（remote terminal unit） mode.

● **Communication frame structure**

Communication data format is as follows:

The byte composition: Include initiation bit, 8 data bit, check bit and stop bit.

| initiation bit | Bit1 | Bit2 | Bit3 | Bit4 | Bit5 | Bit6 | Bit7 | Bit8 | check bit | stop bit |
|---|---|---|---|---|---|---|---|---|---|---|

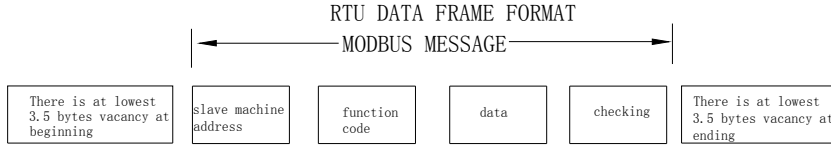
One frame message must be transmitted as a continued data flow, if there is a pause over1.5 byte before the end. The receiving equipment will clear the half-baked information. And the next byte will be considered as the address domain of a new frame. Similarly, if the interval between a new frame start-up and the former frame is smaller than 3.5 byte time, the receiving equipment will think that it is the former one frame continuation. Because of the jumbled frame, finally CRC checking value is incorrect, what leads to the communication mistake.

**RTU frame's standard structure:**

| Frame START | Transmission time of 3.5 bytes |
|---|---|
| Slave machine address | Communication address:<br>0～247（decimal）（0 is broadcast address） |
| Function code | 03H: read slave machine parameter<br>06H: write slave machine parameter<br>08H: circuit auto-detection |
| Data domain | parameter address, parameter number, parameter values |
| CRC CHK low-order | Detecting value: 16 bit CRC Detecting 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 bit. Transmission byte of each domain is sexadecimal 0...9; A...F. Network equipment detects the network bus unceasingly, including the pause gap time. While receiving the first domain (address information), each network equipment carries out decoding to judge whether the byte is sent to it. While 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 begin.




● **Command code and communication data description**

For example：The frequency inverter whose slave machine address is 01H, 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 | 03H |
| Error code | 04H |
| CRC CHK low-order | 21H |
| CRC CHK high-order | 33H |
| 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 slave machine responding information 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 regular 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 of data.

1. Odd-even checking

The users can configure the controller with odd or even checking, or no checking, what will determine how to set odd/even checking in every character.

If odd /even checking have been allocated, "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 allocated, 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（cycle redundant check）

While 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 has mistake.

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 8Bit in every character is valid to CRC. Start bit、stop bit and parity check bit are invalid.

In the process of CRC coming out, each 8 characters independently XOR with register content. The result moves to lowest effective bit, and then the highest effective bit is filled with "1". LSB is extracted to be detected. If LSB is 1, he register independently XOR with the preset value. If LSB is 0, don't need XOR. This entire process needs to repeat 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 processed.

This CRC operation method adopts the international standard CRC checking rule. Users can consult the relevant standard CRC operation while editing the CRC algorithm to compile out the CRC calculation program which is really meet the requirements.

Now here provide the user a simple CRC operation function (with 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 the address definition of communication data. It is used to control the frequency inverter running and fetch frequency inverter mode information and frequency inverter relevant function parameter setting.

(1)AC90 serial function parameter address express rules

Take frequency inverter function parameter serial numbers as register address which are divided into the high byte and the low byte two parts. The high byte expresses the function parameter group serial numbers. The low byte expresses the inner serial numbers of each function parameter group. All need to be changed to hexadecimal.

Address domain high byte definition:

| Parameter code no | Head add of this group of parameter |
|---|---|
| F0 basic function parameter | 0x0000（not save in to EEPROM）<br>0x1000（save in to EEPROM） |
| F1 running control parameter | 0x0100（not save in to EEPROM）<br>0x1100（save in to EEPROM） |
| F2 quantum digital terminal parameter | 0x0200（not save in to EEPROM）<br>0x1200（save in to EEPROM） |
| F3 quantum analog terminal parameter | 0x0300（not save in to EEPROM）<br>0x1300（save in to EEPROM） |
| F4 keyboard and display parameter | 0x0400（not save in to EEPROM）<br>0x1400（save in to EEPROM） |
| F5 motor parameter | 0x0500（not save in to EEPROM）<br>0x1500（save in to EEPROM） |
| F6 VC control parameter | 0x0600（not save in to EEPROM）<br>0x1600（save in to EEPROM） |
| F7 torque control parameter | 0x0700（not save in to EEPROM）<br>0x1700（save in to EEPROM） |
| F8 V/F control parameter | 0x0800（not save in to EEPROM）<br>0x1800（save in to EEPROM） |
| F9 plus function parameter | 0x0900（not save in to EEPROM）<br>0x1900（save in to EEPROM） |
| FA malfunction protection parameter | 0x0A00（not save in to EEPROM）<br>0x1A00（save in to EEPROM） |
| Fb PID control parameter | 0x0B00（not save in to EEPROM）<br>0x1B00（save in to EEPROM） |
| FC multistep and PLC parameter | 0x0C00（not save in to EEPROM）<br>0x1C00（save in to EEPROM） |
| Fd communication function parameter | 0x0D00（not save in to EEPROM）<br>0x1D00（save in to EEPROM） |
| FE reserved | 0x0E00（not save in to EEPROM）<br>0x1E00（save in to EEPROM） |
| FF reserved | 0x0F00（not save in to EEPROM）<br>0x1F00（save in to EEPROM） |
| C monitor parameter | 0x2100 |
| Communication control parameter | 0x3000 or 0x2000 |

Attention: because it is possible that the parameters are frequently rewrited exists in the communication, EEPROM are stored frequently. So its lifetime is cut down. As for the consumer, some function is unnecessary to store in the

communication mode, only changing the value of RAM inner can satisfy the usage requirement. As AC90 communication protocol stipulates to use writing order (06 H), if the parameter function code address domain highest digit is 0, merely it write in the frequency inverter RAM, power down without storage, if the parameter function code address high half digit is 1, it write in EEPROM, namely power off with storage.
For instance, rewriting the function parameter **[F0.14]**, not depositing to EEPROM, address expresses for 000EH, depositing to EEPROM, address expresses for 100EH.

**（2）Communication control parameter address specification:**

| Function declaration | Address definition | Data meaning specification | | | R/W characteristic |
|---|---|---|---|---|---|
| Communication given frequency | 0x3000 or 0x2000 | 0～40000 is corresponding to 0.00Hz～400.00Hz | | | W/R |
| Communication order setting | 0x3001 or 0x2001 | 0000H: No order | | | W |
| | | 0001H: FWD running | | | |
| | | 0002H: REV running | | | |
| | | 0003H: FWD jog | | | |
| | | 0004H: REV jog | | | |
| | | 0005H: speed-down stop | | | |
| | | 0006H: freely stop | | | |
| | | 0007H: malfunction reset | | | |
| Frequency inverter state | 0x3002 or 0x2002 | Bit0 | 0: stop | 1:running | R |
| | | Bit1 | 0: no ACC | 1: ACC | |
| | | Bit2 | 0: no DEC | 1: DEC | |
| | | Bit3 | 0: FWD | 1: REV | |
| | | Bit4 | 0:inverter normal | 1:inverter fault | |
| Frequency inverter fault code | 0x3003 or 0x2003 | current frequency inverter fault code（refer to fault code table） | | | R/W |
| Communication given upper frequency | 0x3004 or 0x2004 | 0～40000 is corresponding to 0.00Hz～400.00Hz | | | W |
| Communication given torque setting | 0x3005 or 0x2005 | 0～2000 is corresponding to 0.0～200.0% | | | W |
| Communication given max frequency in torque control FWD | 0x3006 or 0x2006 | 0～2000 is corresponding to 0.0～200.0% | | | W |
| Communication given max frequency in torque control REV | 0x3007 or 0x2007 | 0～2000 is corresponding to 0.0～200.0% | | | W |
| Communication given PID setting | 0x3008 or 0x2008 | 0～1000 is corresponding to 0.0～100.0% | | | W |
| Communication given PID feedback | 0x3009 or 0x2009 | 0～1000 is corresponding to 0.0～100.0% | | | W |

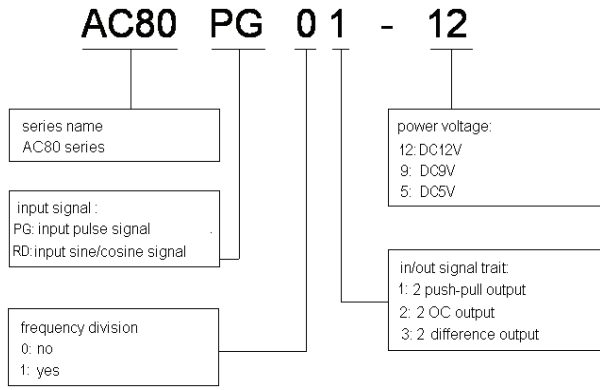
# 10.3 Appendix 3: PG card manual

## 1. Summarize

AC80PG feedback card is mainly used for VC frequency inverter feedback of motor speed and direction detection signal to achieve higher accuracy of motor speed and direction control.

## 2. Model and technical parameter

### 2.1 Model

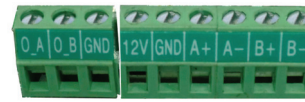



### 2.2 Parameters

| model | power | input signal trait | | output signal trait | |
|---|---|---|---|---|---|
| | | response frequency range | Input impedance | output frequency range | output current |
| AC80PG01-12<br>AC80PG02-12<br>AC80PG03-12 | 12V±5%<br>200mA | 0～80KHz | About 1kΩ | 0～80KHz<br>No frequency division | ≤100mA |

## 3. Terminal function

### 3.1 Main signal terminal function



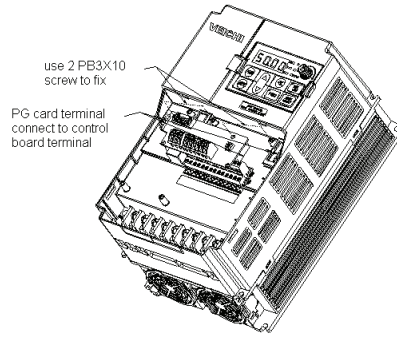

| Terminal name | Function |
|---|---|
| O_A | Push-pull output A signal |
| O_B | Push-pull output B signal |
| GND | Output signal power earth |
| +12V GND | +12V output power (power for encoder) |
| A+ | Difference input A+ signal |
| A- | Difference input A- signal |
| B+ | Difference input B+ signal |
| B- | Difference input B- signal |

### 3.2 Optional terminal function

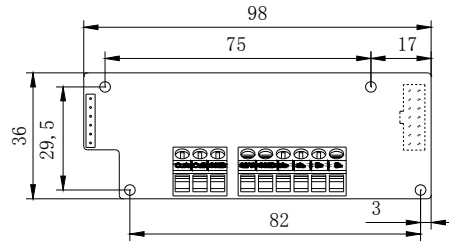
| Function name | Selected position | Picture | Function |
|---|---|---|---|
| Optional terminal for track signal channel | J4 J6 |  | Select J4 J6 for outside track (while using optional PG card) |
| | J5 J7 |  | Select J5 J7 for inner track |

## 4. Installation size

### 4.1 Installation show

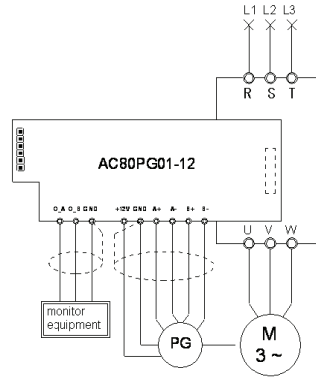



### 4.2 Installation size

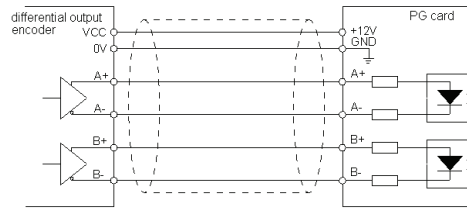


# 5. Electric connect and using

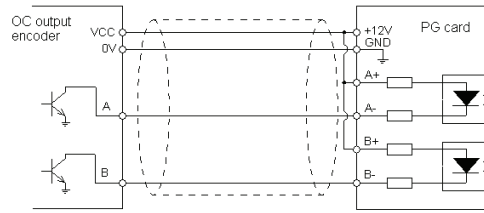
## 5.1 Whole machine wiring



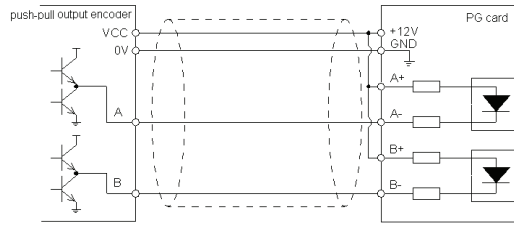

## 5.2 Application wiring




**5.2.1Differential output encoder wiring**




**5.2.2 OC output encoder wiring**




**5.2.3 Push-pull output encoder wiring**