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Chapter 1 Overview





Thanks for using AC70 series sensorless vector control AC drive produced by Veichi Electric co.,ltd. This manual introduces 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

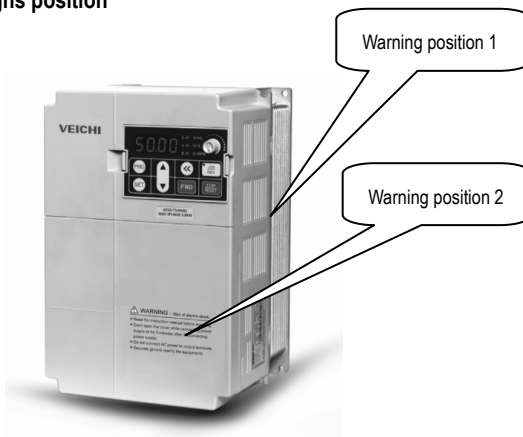
Pls do totally understand this part before using the AC drive.

Warning signs and meanings

This manual has used below 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 AC drive and other machine system damage |

Warning signs position



Drawing 1: Warning positions on crust of AC70 series AC drive



Operation requirement

Only Professional trained person are allowed to operate the equipment such as installation, wiring, running, maintain and etc. "Professional trained person" in this manual means the workers on this product must experience professional skill train, must be familiar with installation, wiring, running and maintain and can rightly deal with emergency cases in use.



Safety guidance

Safety regulations and warning signs come for your security. They are measures to prevent the operator and machine system from damage. Please carefully read this manual before using and strictly observe the 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


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

● Transport and store regulation


| | |
|---|--|
|  Warn | <ul style="list-style-type: none"> ● Correct transport, store, installation and careful operation an maintenance are important for AC drive safe operation. |
|  Caution | <ul style="list-style-type: none"> ● In transport and store process, make sure the AC drive 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°C. |

● Installation and wiring regulation


| | |
|--|--|
|  Warn | <ul style="list-style-type: none"> ● Only professional trained person can operate it. ● Power wire, motor wire and control wire should be all connected firmly. Earth must be reliable and earth resistance must be lower than 10Ω. ● Before opening the AC drive, please disconnect all related equipment power supply and make sure the mains DC voltage is in safe range and operate after 5mins. ● Human body electrostatic will damage inner sensitive components seriously. Before operation, please follow ESD measures. Otherwise, there is danger of AC drive damage. ● AC drive 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. |
|--|--|

| | |
|---|--|
| | <ul style="list-style-type: none"> ● 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). |
|  Caution | <ul style="list-style-type: none"> ● The power supply cable and motor cable specifications must satisfy all conditions in table 3-7 3-8 . |


● Run regulation

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

● Maintenance regulation

| | |
|--|--|
|  Warn | <ul style="list-style-type: none"> ● 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. ● Any defective components must be changed in time. ● Before opening the AC drive 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

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

1.2 Technical Specification

| Tech. Specification | Items | Description |
|-------------------------|---|---|
| Power Input | Voltage, frequency | single phase 220V, 3 phase, 220V,380V, 660V and 1140V |
| | Allowable fluctuations | Voltage: $\leq \pm 15\%$; frequency $\pm 5\%$ Distortion of voltage to confirm to IEC61800-2 |
| | Closing striking current | less than rated current |
| | Power Factor | ≥ 0.94 (integrated DC reactor) |
| | Efficiency | $\geq 96\%$ |
| Power Output | Output Voltage | 3 Phase, 0~Input voltage, tolerance less than 5% in standard rating condition |
| | Frequency Control Range | G type: 0 to 400Hz, P type: 0-400Hz, Z type: 0-400Hz, L type: 0-400Hz, H type: 0-3000Hz. |
| | Output frequency accuracy | $\pm 5\%$ of maximum frequency |
| | Overload Tolerance | Z type: 150% rated current for 60 sec, 180% rated current for 30 sec, 250% rated current for instantaneous G, H, L type model: 150% of rated output current for 60 sec, 180% of rated current for 10s, 2 00% of rated current for instantaneous P type: 120% rated current 60 sec, 150% rated current for instantaneous |
| Key Control performance | Motor Control Mode | Open loop sensorless vector control without PG, V/F control |
| | Control system | Optimized Space Vector PWM Modulation |
| | Carrier frequency | 0.6~15kHz, Randomly-modulated carrier |
| | Speed control range | OLV without PG with rated load: 1:100, |
| | Stable speed control accuracy | OLV without PG: less than 1% rated synchronous speed |
| | Torque response | OLV without PG control mode: $\leq 20\text{ms}$ |
| | Frequency Accuracy (Temperature Fluctuation) | Digital inputs: maximum $\times \pm 0.01\%$ Analog inputs: maximum $\times \pm 0.2\%$ |
| | Frequency Setting Resolution | Digital inputs: 0.01 Hz Analog inputs: 0.5% of maximum output frequency |
| Standard Function | DC Braking | Starting Frequency: 0.00 to 50.00Hz, Braking Time: 0.0 to 60.0s Braking current: 0.0 to 150% rated current |
| | Torque boost | Auto torque boost: 0.0% to 100% Manual torque boost: 0.0% to 25% |

| | | |
|---------------------|--|--|
| | V/F curve | 5 kinds curve programmable setting: 1 user setting, 1 of linear characteristic torque curve setting. 3 kinds derating torque setting(1.5 power, 1.7 power, 2.0 Power curve) |
| | Accel / Decel. curve | Two kinds curve: line Accel/Decel, S curve Accel/Decel. 4 Accel/Decel time unit is 0.1s, maximum time 6500.0s |
| | Rated output voltage | Power voltage compensation is available, setting range from 50 to 100%(rated voltage), the output voltage can't over than input |
| | AVR(Auto Voltage Regulation | automatic voltage regulation for keeping output voltage stable when fluctuation of grid |
| | Auto energy saving running | Optimized the output voltage according the load to achieve energy saving |
| | Auto current limit | Auto current limit during running mode to avoid trip occurs frequently |
| | Momentary Power Loss with no stop running function | To achieve continuous running with regenerative energy and DC bus voltage regulation when momentary power loss |
| | Standard Function | PID control, Carrier frequency adjustable, current limiter, Speed Search, Momentary Power Loss restart, 8 Step Speed (max), 3-wire Sequence, Slip Compensation, Frequency Jump, Upper/lower Limits for Frequency Reference, DC Injection Braking at Start and Stop, Energy Saving Control, Modbus Comm RS485, Fault Restart, job function, Cooling Fan on/off Switch, timing stop, high pulse output, programmable auto running, swing frequency, counter, frequency arriving detect and frequency lever detect. |
| | Frequency Setting Methods | Keypad digital setting, potentiometer of keypad, analog voltage terminal VS1, analog voltage terminal VS2, analog current terminal AS, RS485 communication and multiple terminal, main and auxiliary composition setting. |
| | Feedback Input Channel | voltage terminal VS1, VS2, current terminal AS, communication , and pulse input PUL |
| | Running command channel | keypad given, external terminal given, communication given |
| | Input command signal | Start, Stop, FEW/Reverse, Job, Multiple speed, free stop, Reset, Accel/Decel time, Frequency set point channel, External fault |
| | Output signal | 2 Photo coupler relays: 2 (24 V, up to 50 mA) 1 Contact relays: 1 (250 Vac/up to 1 A, 30 Vdc/up to 1 A) 0-10V output, 4 to 20mA output Frequency pulse output |
| Protection function | | Overvoltage, under voltage, current limit, over current, overload, electric thermal relay, overheat, Stall prevention, parameter lock |

| | | |
|-------------------|-------------------------------|---|
| keypad Display | LED Display | One line digit-segments LED display to monitor 1 running status Double line digit-segment display to monitor 1 running status |
| | Parameters copy | upload and download parameter code to achieve easy copy |
| | Monitor Function | Output frequency, Frequency set point, Out current, Output voltage, motor speed, PID feedback value, PID given setting, IGBT module temperature, I/O terminal status. |
| | Alarms | Overvoltage, under voltage, over current, short circuit, phase loss, over load, over heat, stall prevention, current limit, parameter lock damage, running status at present alarm, past trip alarm |
| | | |
| Environment | Installation Site | Indoor, Altitude should less than 1000m, Free corrosive gases and direct sunlight |
| | Running Temperature, humidity | -10~+40°C (wall mounting), 20% to 95% RH (No condensation) |
| | Vibration | Less than 0.5g when frequency less than 20Hz |
| | Storage Temperature | -25—+65°C |
| | Installation mode | Wall-mounted mode, floor stand cabinet install |
| | Protection Degree | IP20 |
| | Cooling Method | Forced air-cooling |

Table 1: Technical Specification

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 AC drive. 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



Chart 2-1: AC70 series AC drive nameplate

Model explanation

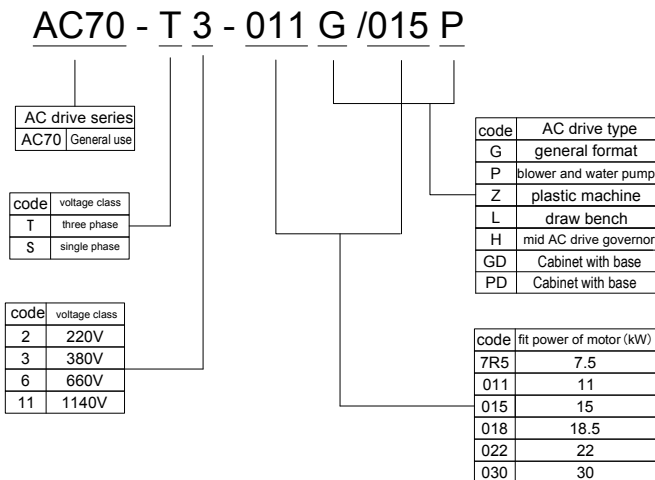


Chart 2-2: AC70series AC drive nameplate meaning and naming rules

2.3 Rated Output Current



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

Chapter 3: Installation and Wiring


3.1 Safety Precautions

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

Cautions in use

| | |
|---|---|
|  Warn | <ul style="list-style-type: none"> ● While install the AC drive in the closed cabinet, please build in cooling fan, air-conditioner or other cooling equipment to ensure the temperature at the air-in port below 40℃. So that the AC drive can work safely and reliably. |
|  Important | <ul style="list-style-type: none"> ● While installing, please use cloth or paper cover the AC drive to prevent metal dust, oil, water and others. And remove it carefully after working. ● While operation, please follow the ESD regulations. Otherwise, the AC drive may be damaged. ● While multi AC drives are installed in the same cabinet, enough space must be left for cooling fan. ● AC drive can not work over rated range. Otherwise, the AC drive may be damaged. ● While transporting the AC drive, please hold the firm case. If only hold the pre-cover, there is danger of AC drive main body falling, injury or AC drive damage. |

Cautions in use motor

| | |
|--|--|
|  Important | <ul style="list-style-type: none"> ● Different motor has different max allowable running speed. Motor can not run over the max allowable running speed. ● While AC drive 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 AC drive. ● While constant speed machinery runs at inconstant speed, there maybe sympathetic vibration. Please install vibration-proof rubber under motor rack or use jumping frequency control function. ● While using AC drive or working frequency power supply to drive, the torque characteristic are different. Please do confirm the torque characteristic of the equipment connected. ● The rated current of shift gear motor is different from that of standard motor. Please confirm it and choose the right AC drive. Moreover, please do switch the pole while the AC drive input current is 0. Otherwise it may bring AC drive protection or damage. ● The rated current of diving motor is higher than that of standard motor, please confirm it and choose the right AC drive. ● While the wire between motor and AC drive 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 AC drive is long. |
|--|--|

3.2 Treatment for AC drive after Longtime Store

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

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

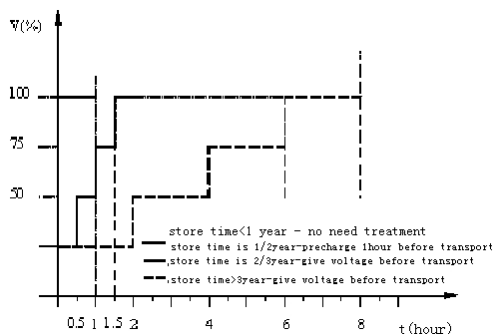


Chart 3-1: treatment for AC drive after longtime store

3.3 AC drive Stable Running Environment

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

| Environment | Requirement |
|--------------------------|---|
| Install place | Indoor without direct sunshine |
| Install temperature | -10 ~ +40℃ |
| Store temperature | -20 ~ +60℃ |
| Humidity | <95%RH, no condensation |
| Surrounding | <p>Please install the AC drive in place as follows:</p> <ul style="list-style-type: none"> ● Place without oil mist, corrosive gases, flammable gas, dust or etc. ● Place without metal dust, oil, water or etc into AC drive (please do not install AC drive on flammable material such as food and etc). ● Place without radioactive material or flammable material. ● Place without poisonous gases or liquid. ● Place with very little salification erosion. ● Place without direct sunshine. |
| Altitude | <1000m |
| Vibration | <p><10~20Hz:9.8m/s²</p> <p><20~55Hz:5.9m/s²</p> |
| Installation and cooling | <ul style="list-style-type: none"> ● AC drive can not be installed horizontally must be installed vertically. ● Please independently install high heating equipments such as braking resistor and etc which can not be installed in the same cabinet with AC drive, installed at the air-in port of the AC drive is strictly prohibited. |

Table 3-1:AC70 series AC drive running environment condition

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

- Derate according to the chart while over temperature limit.

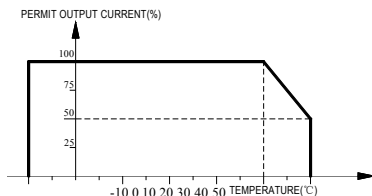


Chart 3-2: AC70 series AC drive derating curve while over temperature

- Derate according to the chart while over altitude limit.

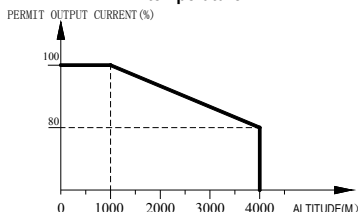




Chart 3-3: AC70 series AC drive derating curve while over permit altitude

3.4 EMI Protection

The AC drive 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 AC drive can work safely without fault. Please install the AC drive 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 AC drive earth terminal or the protective area of control system.
- Ensure that all equipments connected to the AC drive 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 90° 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 AC drive, 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 AC drive power input terminal as possible. Meantime, the filter must earth reliably as the AC drive.
- Build noise filters at the output side to reduce radio interference and inductive disturbance. The noise filter must be as close to the AC drive output terminal as possible. Meantime, the filter must earth reliably as the AC drive.

- Anytime, control circuit wire should be shielded cable.
- Add zero phase reactor in power supply wire near AC drive input terminal and add zero phase reactor in the motor wire near AC drive output terminal to reduce electromagnetic interference to the AC drive 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 | <ul style="list-style-type: none"> ● In order to avoid electric shock, earthing cable should be the size as electric equipment technique standard required and cable length should be as short as possible. Otherwise, AC drive leakage current will cause unstable potential of the earthing terminal which is far from the earthing point, and electric shock accident will happen frequently. ● Earth terminal must be earthing. Earth resistance must be below 10Ω. Otherwise, there is danger of death. |
|  Important | <ul style="list-style-type: none"> ● Please do not share earth cable with welder or other big current/pulse power equipment. Otherwise, AC drive will act abnormally. ● While multi AC drives are used at the same time, please do not wind the earth wire to loop-type. Otherwise, AC drive will act abnormally. |

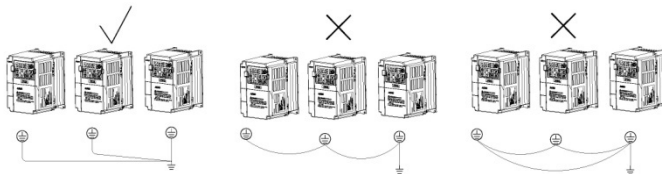


Chart 3-4: multi AC70 series AC drives united earthing

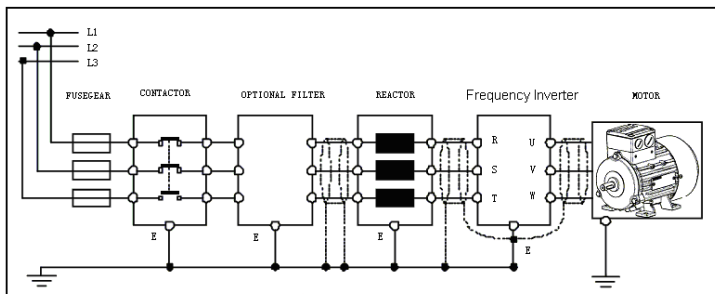


Chart 3-5: AC70 series AC drive system earthing

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

- Shield of AC drive power cable, motor cable, control cable Cable

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

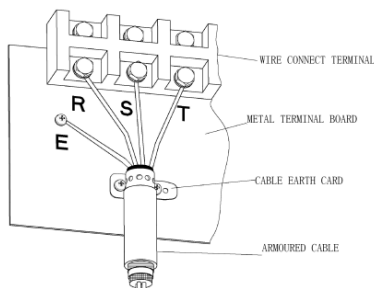


Chart 3-6: Cable earth card for cables earthing

- Corresponding relationship between AC drive/motor cable length and carrier frequency.

While cable distance between AC drive 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 AC drive output current will increase, that will cause AC drive over-current trip. The current detection accuracy and running stability will be impacted. Please follow as below table 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 | 0.7~15kHz | 0.7~8kHz | 0.7~4kHz | 0.7~2kHz |

Table 3-2: Corresponding relationship between AC drive/motor cable length and carrier frequency

3.5 Machinery Installation

Installation notice and related requirement

- AC70 AC drive components

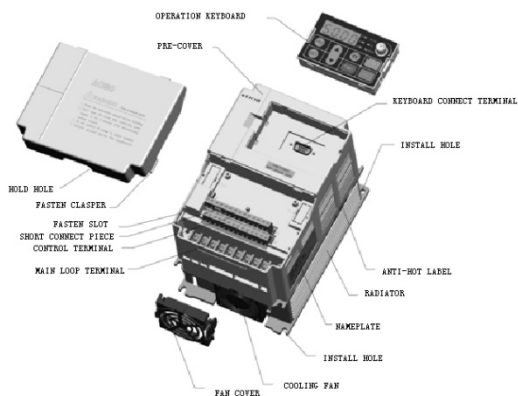


Chart 3-7: AC70 series AC drive components

- Installation direction

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

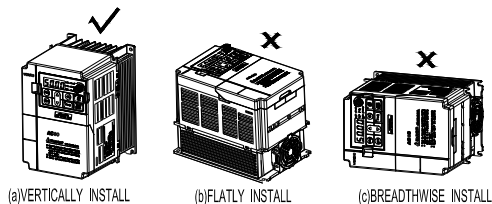


Chart 3-8: AC70 series AC drive installation direction

- Installation space

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

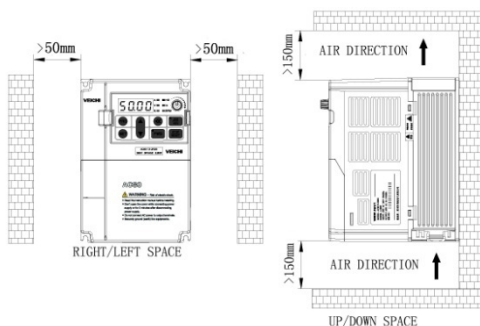


Chart 3-9: Single AC70 series AC drive installation space

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

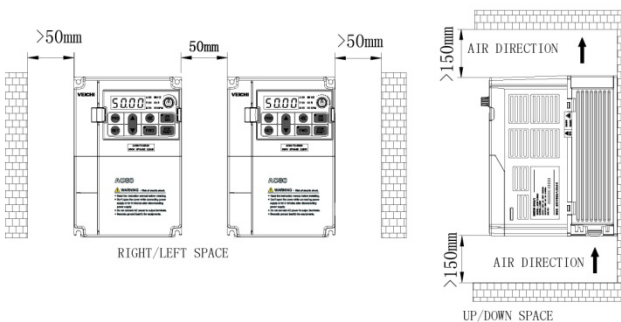
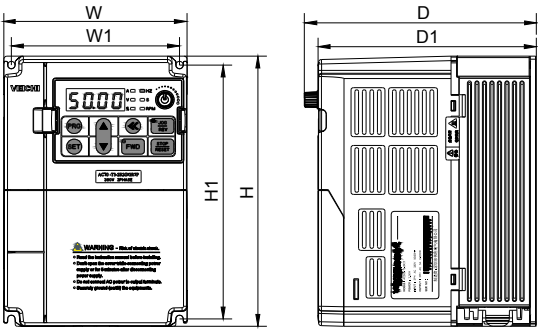
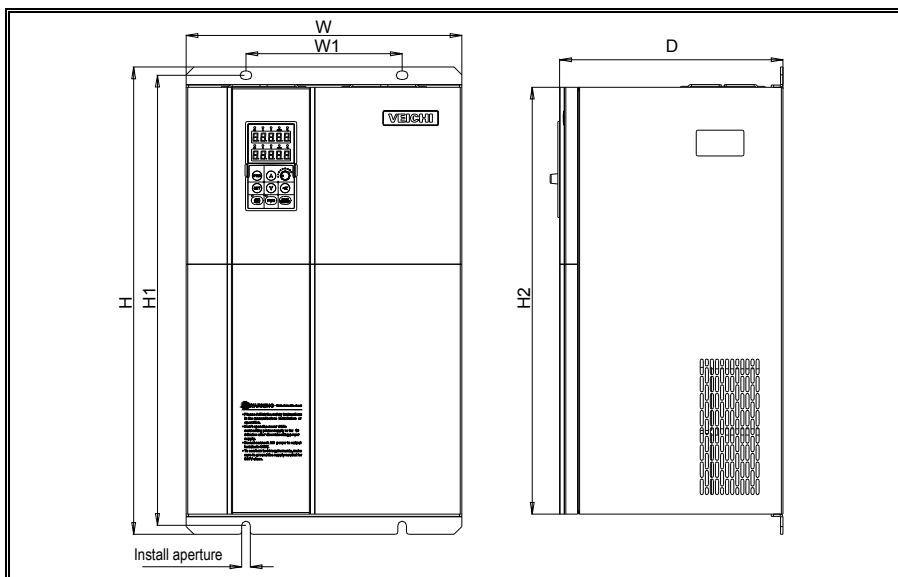


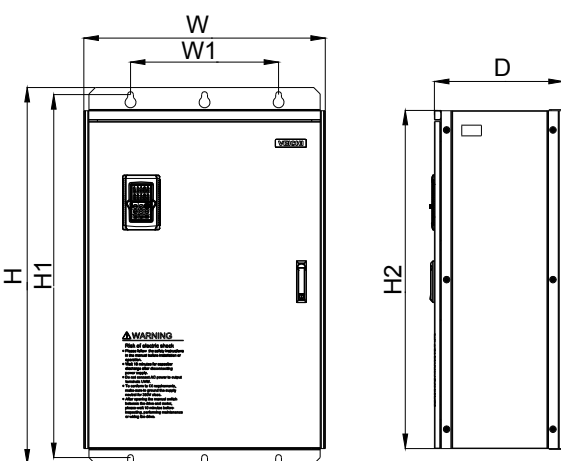
Chart 3-10: Multi AC70 series AC drives paratactic installation space requirement

Dimension of AC drive and Keyboard

|  | | | | | | | |
|---|---------------|-----|-------|-----|--------------|-----|------------------|
| AC drive model | AC drive size | | | | Install size | | Install aperture |
| | W | H | D | D1 | W1 | H1 | |
| AC70-S2-R40G | 122 | 182 | 154.5 | 145 | 112 | 171 | φ5 |
| AC70-S2-R75G | | | | | | | |
| AC70-S2-1R5G | | | | | | | |
| AC70-S2-2R2G | 159 | 246 | 157.5 | 148 | 147.2 | 236 | φ5.5 |
| AC70-S2-004G | | | | | | | |
| AC70-S2-5R5G | | | | | | | |
| AC70-T3-R75G/1R5P | 122 | 182 | 154.5 | 145 | 112 | 171 | φ5 |
| AC70-T3-1R5G/2R2P | | | | | | | |
| AC70-T3-2R2G/004P | | | | | | | |
| AC70-T3-004G/5R5P | 159 | 246 | 157.5 | 148 | 147.2 | 236 | φ5.5 |
| AC70-T3-5R5G/7R5P | | | | | | | |
| AC70-T3-7R5G/011P | 195 | 291 | 167.5 | 158 | 179 | 275 | φ7 |
| AC70-T3-011G/015P | | | | | | | |
| AC70-T3-015G/018P (plastic cover machine) | 230 | 330 | 200 | 190 | 208 | 315 | Φ7 |
| AC70-T3-018G/022P (plastic cover machine) | | | | | | | |
| AC70-T3-022G/030P (plastic cover machine) | | | | | | | |



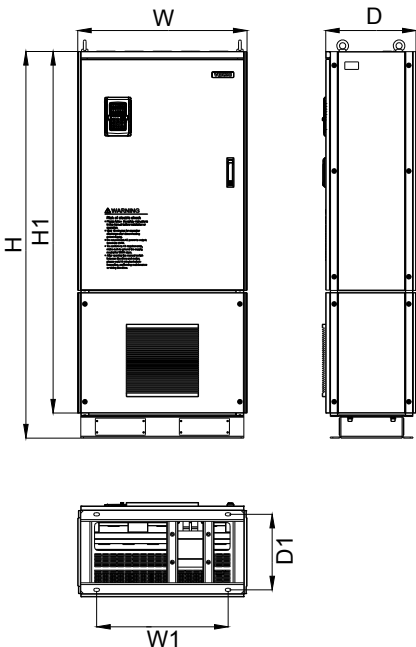
| AC drive model | AC drive size | | | | Install size | | Install aperture |
|--|---------------|-----|-----|-----|--------------|-------|------------------|
| | W | H | D | H2 | W1 | H1 | |
| AC70-T3-015G/018P (steel cover machine) | 235 | 345 | 200 | 311 | 160 | 331.5 | φ7 |
| AC70-T3-018G/022P (steel cover machine) | | | | | | | |
| AC70-T3-022G/030P (steel cover machine) | 255 | 410 | 225 | 370 | 180 | 395 | φ7 |
| AC70-T3-030G/037P | | | | | | | |
| AC70-T3-037G/045P | 305 | 570 | 260 | 522 | 180 | 550 | φ9 |
| AC70-T3-045G/055P | | | | | | | |
| AC70-T3-055G/075P | | | | | | | |
| AC70-T3-075G/093P | 380 | 620 | 290 | 564 | 240 | 595 | φ11 |
| AC70-T3-093G/110P | | | | | | | |
| AC70-T3-110G/132P | | | | | | | |



The technical drawing shows the front and side views of the AC70 VC Control AC Drive. The front view shows a rectangular unit with a control panel on the left and a warning label in the center. Dimensions W and W1 are shown for the width, and H and H1 for the height. The side view shows the depth of the unit, with dimensions D and H2 indicated.

| AC drive model | AC drive size | | | | Install size | | Install aperture |
|-------------------|---------------|------|-----|------|--------------|------|------------------|
| | W | H | D | H2 | W1 | H1 | |
| AC70-T3-132G/160P | 500 | 780 | 340 | 708 | 350 | 755 | φ11 |
| AC70-T3-160G/185P | 650 | 1060 | 400 | 950 | 400 | 1023 | φ16 |
| AC70-T3-185G/200P | | | | | | | |
| AC70-T3-200G/220P | | | | | | | |
| AC70-T3-220G/250P | 750 | 1170 | 400 | 1050 | 460 | 1128 | φ18 |
| AC70-T3-250G/280P | | | | | | | |
| AC70-T3-280G/315P | | | | | | | |
| AC70-T3-315G/355P | 850 | 1280 | 450 | 1150 | 550 | 1236 | φ20 |
| AC70-T3-355G/400P | | | | | | | |
| AC70-T3-400G/450P | | | | | | | |

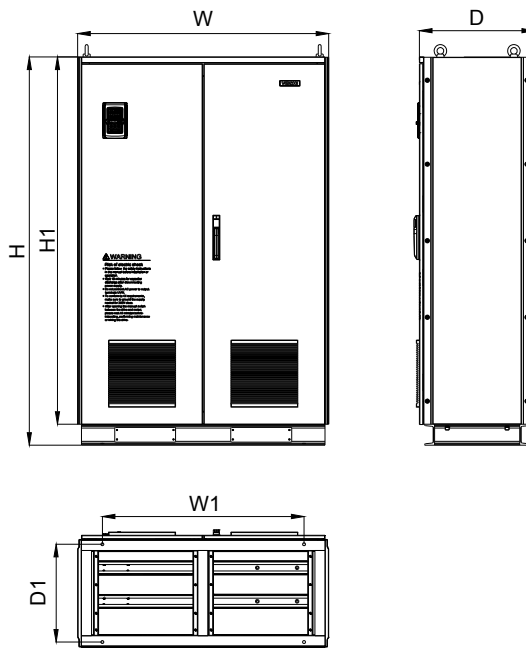
NOTE: Without build-in dc reactor



The technical drawings show the AC drive from three perspectives: front, side, and top. The front view shows a vertical rectangular unit with a control panel at the top and a cooling fan at the bottom. Dimensions W (width) and H (height) are indicated. The side view shows the depth of the unit, with dimension D (depth) indicated. The top view shows the internal components and the mounting flange, with dimensions W1 (width) and D1 (depth) indicated.

| AC drive model | AC drive size | | | | Install size | | Install aperture |
|---------------------|---------------|------|-----|------|--------------|-----|------------------|
| | W | H | D | H1 | W1 | D1 | |
| AC70-T3-160GD/185PD | 650 | 1600 | 400 | 1500 | 492 | 332 | φ14 |
| AC70-T3-185GD/200PD | | | | | | | |
| AC70-T3-200GD/220PD | | | | | | | |
| AC70-T3-220GD/250PD | 750 | 1700 | 400 | 1600 | 582 | 332 | φ14 |
| AC70-T3-250GD/280PD | | | | | | | |
| AC70-T3-280GD/315PD | | | | | | | |
| AC70-T3-315GD/355PD | 850 | 1800 | 450 | 1700 | 622 | 382 | φ14 |
| AC70-T3-355GD/400PD | | | | | | | |
| AC70-T3-400GD/450PD | | | | | | | |

NOTE: With build-in dc reactor



| AC drive model | AC drive size | | | | Install size | | Install aperture |
|-------------------|---------------|------|-----|------|--------------|-----|------------------|
| | W | H | D | H1 | W1 | D1 | |
| AC70-T3-450G/500P | 1200 | 1850 | 550 | 1750 | 960 | 466 | φ14 |
| AC70-T3-500G/560P | | | | | | | |
| AC70-T3-560G/630P | | | | | | | |

Table 3-3:AC70 series AC drive dimension

Keyboard dimension

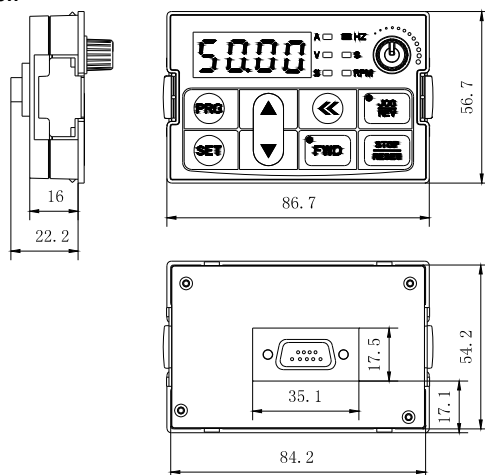


Chart 3-11:AC70 series AC drive 1 line LED keyboard dimension

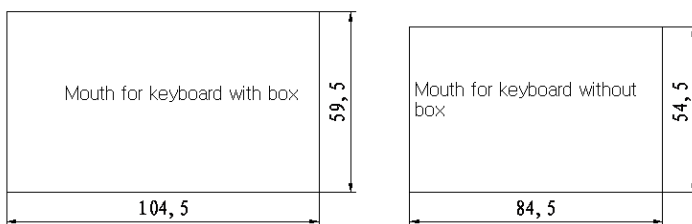


Chart 3-12:AC70 series AC drive mouth for 1 line LED keyboard dimension

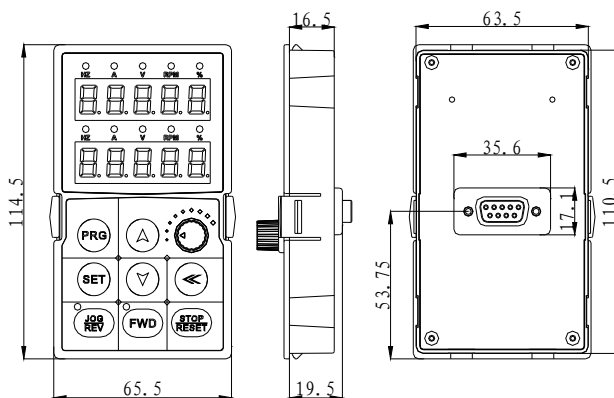


Chart 3-13:AC70 series AC drive 2 line LED keyboard

dimension

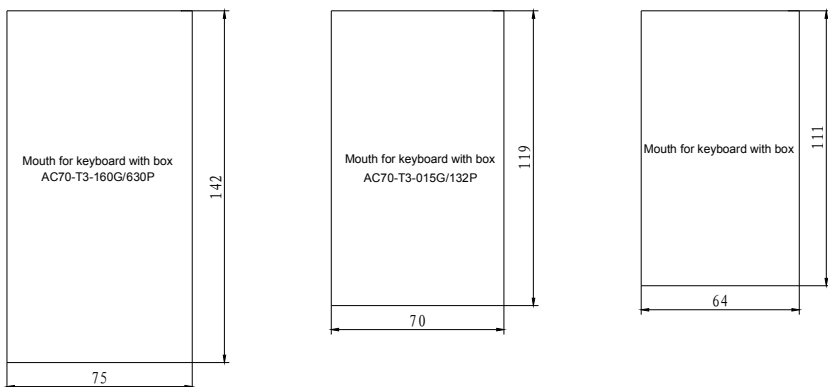
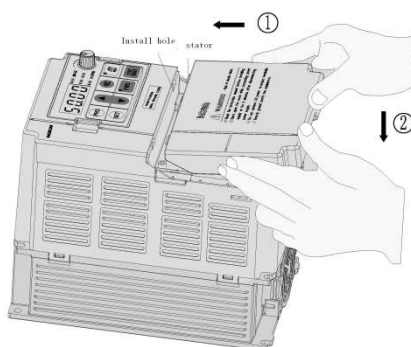


Chart 3-14:AC70 series AC drive mouth for 2 line LED keyboard dimension Note: LCD keyboard total same size as LED keyboard.

Dismantle and install tail-hood

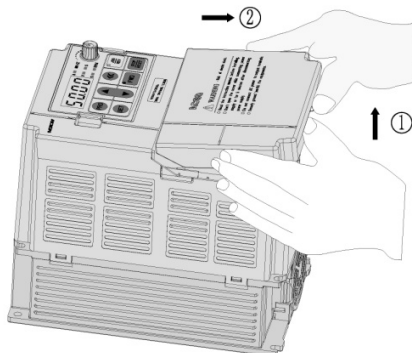
Installation: First the tail-hood upwardly inclines around 15 degrees and inserts the top fixed flat into the fixed hole in the front cover. Then slightly press the tail-hood downward. While your hear "Ka", it means that the tail-hood is into the place.

Chart 3-15:AC70 series AC drive tail-hood installation

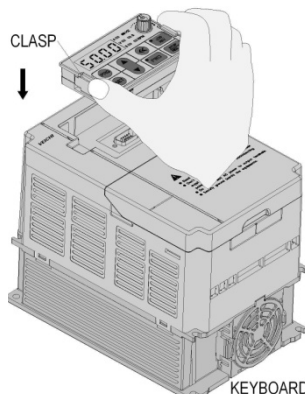


Dismantlement: At the tail of the AC drive, there is a special dismantlement hole design. Put your finger into the hole, upwardly pull the cover with a little force until the buckle between the tail-hood and the crust tear off, and then remove the tail-hood down.

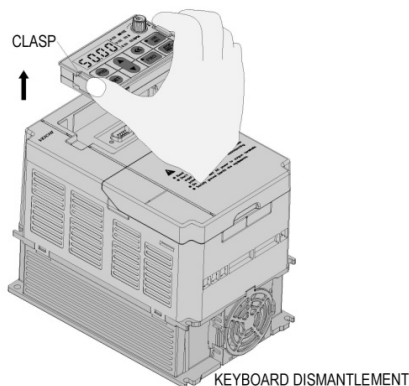
Chart 3-16:AC70 series AC drive tail-hood dismantlement



Dismantlement and installation of keyboard



KEYBOARD INSTALLATION





KEYBOARD DISMANTLEMENT

Chart 3-17: AC70 series AC drive 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 precaution

| | |
|---|--|
|  <p>Warn</p> | <ul style="list-style-type: none"> ● Must earth reliably while AC drive is running. Otherwise there is danger of casualty and unstable AC drive performance. ● To ensure safe running, only trained professional person can do installation and wiring job. ● No operation under power connected state. Otherwise there is danger of electric shock even death. ● Before operation, please cut all related equipments power, ensure that the main circuit DC current has dropped to safe range. And please operate after 5 mins. |
|  <p>Caution</p> | <ul style="list-style-type: none"> ● Control cable, power cable and motor cable must be separated. They can not be in the same cable trough or cable rack. ● This equipment can only be used as the maker states. Please consult Veichi while using in special case. |
| <p>Important</p> | <ul style="list-style-type: none"> ● No insulation test for the AC drive or the related cable by HV insulation test equipment. ● If the AC drive 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

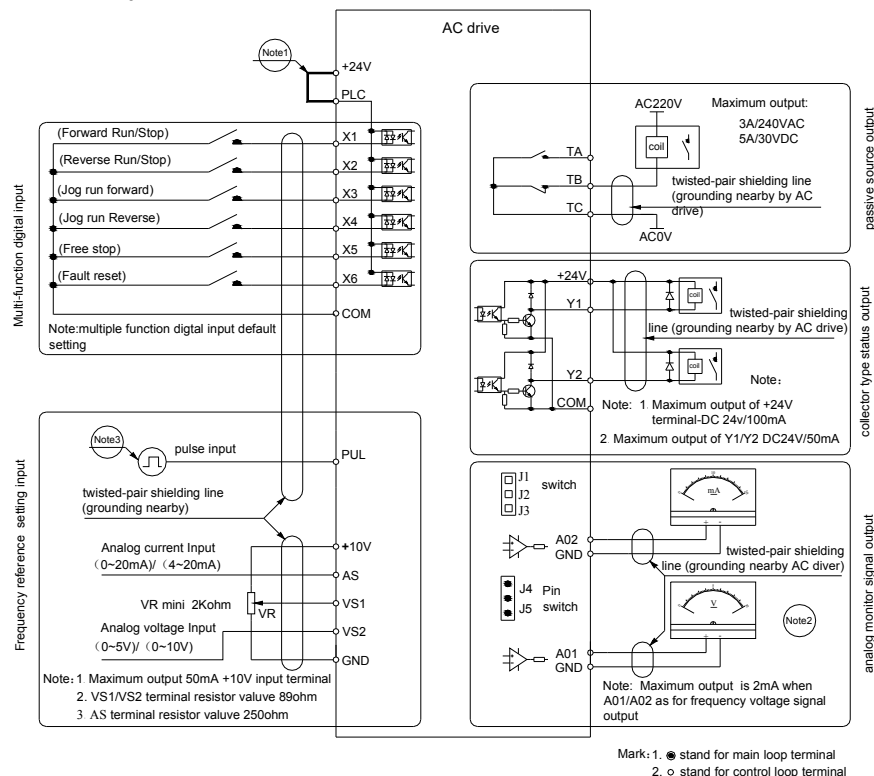


Chart 3-18:AC70 series AC drive standard diagram

- Note: 1.NPN or PNP transistor signal can be selected as input of multi-function input terminal (X1~X6) . AC drive built-in power supply (+24V terminal) or external power supply (PLC terminal) can be chosen as bias voltage. Factory setting '+24V' short connect with 'PLC'.
2. 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.
3. 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 program. | DC24V/50mA |
| TA/TB/TC | Passive connector output, can set the action-object by program. | 3A/240VAC 5A/30VDC |

Table 3-4:AC70 series AC drive auxiliary terminals output capacity

● Switch terminals connection function specification











| Switch terminal | Optional position | Picture example | Function specification |
|--|-------------------|--|---|
|  (K2) | J1 |  | (AO2) 0.0~50kHz open collect pole pulse frequency output |
| | J2 |  | (AO2) 0~20mA current output or 4~20mA current output |
| | J3 |  | (AO2) 0~10V voltage output |
|  (K1) | J4 |  J4 connect | (AO1) 0~10V voltage output |
| | J5 |  J5 connect | (AO1) 0~20mA current output or 4~20mA current output |
|  (K3) | J6 |  J6 connect | RS485 communication initial port connect matching resistor 120 Ω |
| | J7 |  J7 connect | Matching resistor disconnect |

Table 3-5:AC70 series AC drive switch terminal connection function specification

Main circuit wiring

● Main circuit wiring

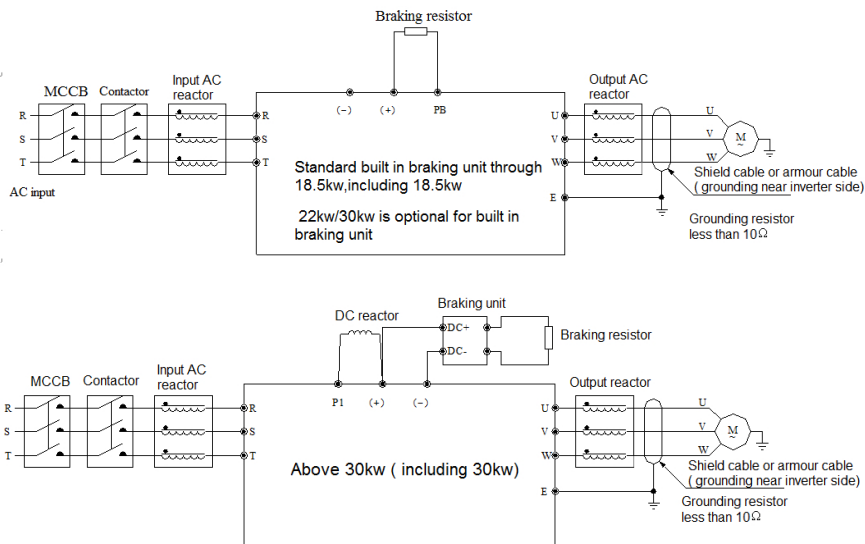


Chart 3-19: AC70 AC drive main circuit wiring

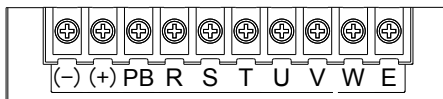
Note: 1, Fuse, dc reactor, braking unit, braking resistor, input actor, input filter, output reactor, output filter are optional parts, please refer to "peripheral equipment".

2, P1 terminal and (+) short connect. If need add dc reactor, please take away the short connect part between P1 and (+).

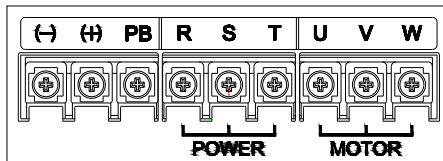
Main circuit terminals

● Main circuit terminals array and definition

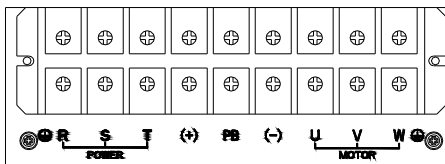
Arrangement sequence of main circuit terminal with 18.5kW or less power (15 ~ 18.5KW for steel cover machine)



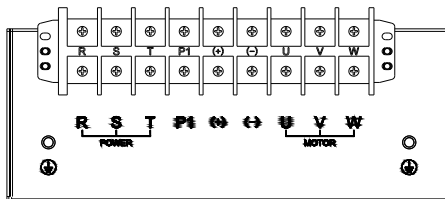
Arrangement sequence of main circuit terminal with 15-22KW (15~22KW for plastic cover machine)



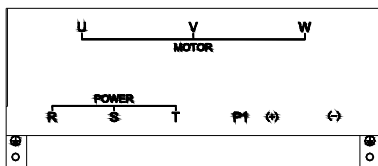
Arrangement sequence of main circuit terminal with 22~30kW (standard machine without PB terminal) (22KW for steel cover machine)



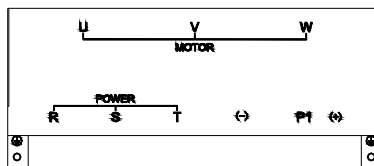
Arrangement sequence of main circuit terminal with 37~110kW



Arrangement sequence of main circuit terminal with 132kW:



Arrangement sequence of main circuit terminal with 160~560kW



| Terminal | Name | |
|----------|-----------------------------|--|
| (-) | 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 | AC drive input terminal | Used to connect 3-phase AC power supply. |
| S | | |
| T | | |
| U | AC drive output terminal | Used to connect the motor. |
| V | | |
| W | | |
| ⊕ | Earth | Earth terminal, earth resistance<10 OHM |
| E | | |

Table 3-6:AC70 series AC drive main circuit terminals array and

● 3-phase 380V machine main circuit wiring

| Model | Main circuit terminals screw specifications | Suggested fixed moment (N·m) | Suggested Copper-core cable specification mm ² (AWG) |
|---|---|------------------------------|---|
| AC70-T3-R75G/1R5P | M4 | 1.2~1.5 | 1.5mm ² (14) |
| AC70-T3-1R5G/2R2P | M4 | 1.2~1.5 | 2.5mm ² (12) |
| AC70-T3-2R2G/004P | M4 | 1.2~1.5 | 2.5mm ² (12) |
| AC70-T3-004G/5R5P | M4 | 1.2~1.5 | 4mm ² (10) |
| AC70-T3-5R5G/7R5P | M4 | 1.2~1.5 | 6mm ² (9) |
| AC70-T3-7R5G/011P | M5 | 2~2.5 | 6mm ² (9) |
| AC70-T3-011G/015P | M5 | 2~2.5 | 10mm ² (7) |
| AC70-T3-015G/018P | M6 | 4~6 | 10mm ² (7) |
| AC70-T3-018G/022P | M6 | 4~6 | 16mm ² (5) |
| AC70-T3-022G/030P | M8 | 8~10 | 16mm ² (5) |
| AC70-T3-030G/037P | M8 | 8~10 | 25mm ² (3) |
| AC70-T3-037G/045P | M8 | 8~10 | 25mm ² (3) |
| AC70-T3-045G/055P | M8 | 8~10 | 35mm ² (2) |
| AC70-T3-055G/075P | M10 | 11~13 | 35mm ² (2) |
| AC70-T3-075G/093P | M10 | 11~13 | 50mm ² (1) |
| AC70-T3-093G/110P | M10 | 11~13 | 50mm ² (1/0) |
| AC70-T3-110G/132P | M10 | 11~13 | 70mm ² (2/0) |
| AC70-T3-132G/160P | M10 | 11~13 | 95mm ² (3/0) |
| AC70-T3-160G/185P | M12 | 14~16 | 95mm ² (4/0) |
| AC70-T3-185G/200P | M12 | 14~16 | 120mm ² |
| AC70-T3-200G/220P | M12 | 14~16 | 150mm ² |
| AC70-T3-220G/250P | M12 | 14~16 | 150mm ² |
| AC70-T3-250G/280P | M12 | 14~16 | 185mm ² |
| AC70-T3-280G/315P | M12 | 14~16 | 185mm ² |
| AC70-T3-315G/355P | M16 | 20~23 | 240mm ² |
| AC70-T3-355G/400P | M16 | 20~23 | 240mm ² |
| AC70-T3-400G/450P | M16 | 20~23 | 300mm ² |
| AC70-T3-450G/500P | M16 | 20~23 | 400mm ² |
| AC70-T3-500G/560P | M16 | 20~23 | 400mm ² |
| AC70-T3-560G/630P | M16 | 20~23 | 500mm ² |
| Note: Here we suggest to use copper joins as mains electric connectors of machine over 185KW. Pls refer the cut section area above. | | | |

Table 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 (AWG) |
|--------------|---|------------------------------|---|
| AC70-S2-R40G | M4 | 1.2~1.5 | 1.5mm ² (14) |
| AC70-S2-R75G | M4 | 1.2~1.5 | 2.5mm ² (12) |
| AC70-S2-1R5G | M4 | 1.2~1.5 | 2.5mm ² (12) |
| AC70-S2-2R2G | M4 | 1.2~1.5 | 4mm ² (10) |

Table 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 |
|-------------------|-------------------------|-----------------------|------------|--------------|---------------|
| AC70-T3-R75G/1R5P | 10A | 10A | ----- | NFI-005 | NFO-010 |
| AC70-T3-1R5G/2R2P | 10A | 10A | ----- | NFI-005 | NFO-010 |
| AC70-T3-2R2G/004P | 16A | 15A | ----- | NFI-010 | NFO-010 |
| AC70-T3-004G/5R5P | 16A | 20A | ----- | NFI-010 | NFO-010 |
| AC70-T3-5R5G/7R5P | 25A | 20A | ----- | NFI-020 | NFO-020 |
| AC70-T3-7R5G/011P | 25A | 30A | ----- | NFI-020 | NFO-020 |
| AC70-T3-011G/015P | 32A | 40A | ----- | NFI-036 | NFO-036 |
| AC70-T3-015G/018P | 40A | 50A | ----- | NFI-036 | NFO-036 |
| AC70-T3-018G/022P | 50A | 60A | ----- | NFI-050 | NFO-050 |
| AC70-T3-022G/030P | 50A | 75A | DCL-50 | NFI-050 | NFO-050 |
| AC70-T3-030G/037P | 63A | 100A | DCL-80 | NFI-080 | NFO-080 |
| AC70-T3-037G/045P | 80A | 125A | DCL-100 | NFI-100 | NFO-100 |
| AC70-T3-045G/055P | 100A | 150A | DCL-110 | NFI-100 | NFO-100 |
| AC70-T3-055G/075P | 125A | 175A | DCL-125 | NFI-150 | NFO-150 |
| AC70-T3-075G/093P | 160A | 200A | DCL-150 | NFI-150 | NFO-150 |
| AC70-T3-093G/110P | 220A | 250A | DCL-200 | NFI-200 | NFO-300 |
| AC70-T3-110G/132P | 220A | 300A | DCL-200 | NFI-200 | NFO-300 |
| AC70-T3-132G/160P | 250A | 400A | DCL-300 | NFI-300 | NFO-300 |
| AC70-T3-160G/185P | 300A | 500A | DCL-300 | NFI-300 | NFO-300 |
| AC70-T3-185G/200P | 400A | 600A | DCL-400 | NFI-400 | NFO-400 |
| AC70-T3-200G/220P | 400A | 700A | DCL-400 | NFI-400 | NFO-400 |
| AC70-T3-220G/250P | 630A | 800A | DCL-500 | NFI-600 | NFO-600 |
| AC70-T3-250G/280P | 630A | 1000A | DCL-600 | NFI-600 | NFO-600 |
| AC70-T3-280G/315P | 630A | 1200A | DCL-600 | NFI-600 | NFO-600 |
| AC70-T3-315G/355P | 630A | 1200A | DCL-800 | ----- | ----- |
| AC70-T3-355G/400P | 800A | 1400A | DCL-800 | ----- | ----- |
| AC70-T3-400G/450P | 1000A | 1600A | DCL-1000 | ----- | ----- |
| AC70-T3-450G/500P | 1000A | 2000A | DCL-1000 | ----- | ----- |

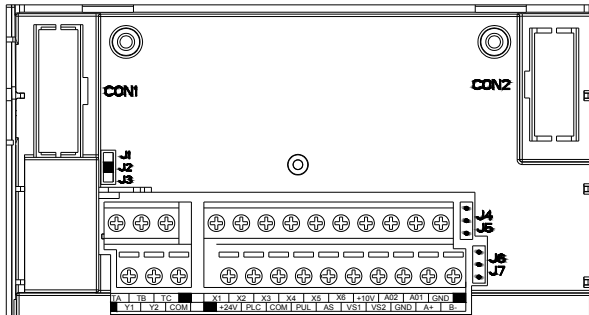
| | | | | | |
|-------------------|-------|-------|----------|-------|-------|
| AC70-T3-500G/560P | 1000A | 2000A | DCL-1200 | ----- | ----- |
| AC70-T3-560G/630P | ----- | 2000A | DCL-1200 | ----- | ----- |

Note: For DC reactor, input filter, output filter and other components specification details and circuit mode, please refer chapter 7 "peripheral equipments and options"

Table 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. 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. 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 | Build-in photoelectric converter can set the action-object by program. Input condition: Max DC30V/8mA. Note: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 | |
| | X3 | Multi-function contact input 3 | |
| | X4 | Multi-function contact input 4 | |
| | X5 | Multi-function contact input 5 | |
| | X6 | Multi-function contact input 6 | |
| | PLC | Multi-function contact input common terminal | |
| Pulse input | PUL | Pulse input | Pulse range:0.0~50.00kHz. Factory setting is collector open output (R80,R82 transfer to R81,R83 can be active input) |

| | | | |
|-------------------------------|------|--|---|
| Analog output | A01 | Analog output 1 | Can set the action and object by program. Physical type of output signal: 0~10VDC. 0~20mA, 4~20mA. It can be selected by parameter [F-62] and J4,J5 (see table 3-5) |
| | A02 | Analog output 2 | Can set the action-object by program. Physical type of output signal: 0~10VDC. 0~20mA, 4~20mA, It can be selected by parameter [F-62] and J1 J2 J3 (see table 3-5) |
| Analog input | AS | Current analog input | As AC drive control signal or feedback signal, can set the act range and response speed by program. VS1/VS2 resistance:100KΩ; 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- | |

Table 3-10:AC70 series AC drive 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 | M2.5 | 0.4~0.6 | 0.75 | Shielded cable |

Table 3-11:Control loop terminal wiring specification

Braking unit (braking resistance) connection

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

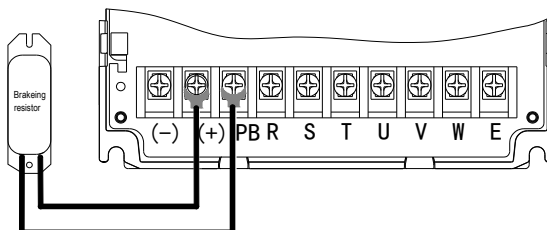


Fig 3-20: AC70 Series AC drive Brake resistance wiring of machine with 18.5KW or less power

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

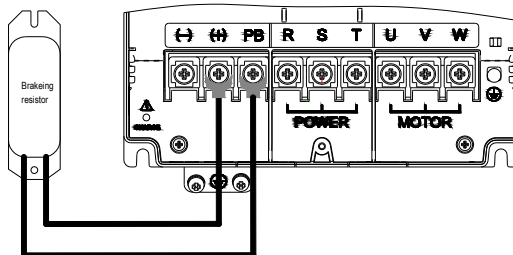


Fig 3-21: AC70 Series AC drive Brake resistance wiring of machine with 15-22KW (for plastic cover machine)

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

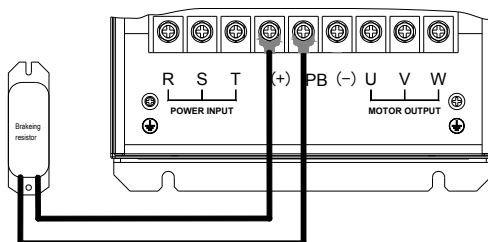


Fig 3-22: AC70 Series AC drive Brake resistance wiring of machine with 22KW and 30KW(built-in brake is optional) (22KW for steel cover machine)

- Brake resistance wiring of machine with 37KW or above

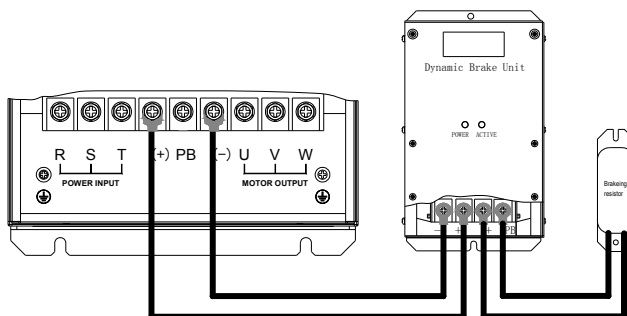


Fig 3-23: AC70 Series AC drive Brake resistance wiring of machine with 37KW or above

- 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 AC drive specification and the rated parameter of braking unit. If any problem, please consult customer service department of Veichi Electric Com., Ltd.

| Three-phase 380V | | | |
|-------------------|------------------------------|---------------------|--------------------|
| Motor power(kW) | Resistance value(Ω) | Resistance power(W) | Braking torque (%) |
| 0.75 kW | 750 Ω | 150W | 100% |
| 1.5 kW | 400 Ω | 300W | 100% |
| 2.2 kW | 250 Ω | 400W | 100% |
| 4.0 kW | 150 Ω | 500W | 100% |
| 5.5 Kw | 100 Ω | 600W | 100% |
| 7.5 kW | 75 Ω | 780W | 100% |
| 11 kW | 50 Ω | 1,200W | 100% |
| 15 kW | 40 Ω | 1,500W | 100% |
| 18.5 kW | 32 Ω | 2,000W | 100% |
| 22 kW | 28 Ω | 2,200W | 100% |
| 30 kW | 24 Ω | 3,000W | 100% |
| 37 kW | 20 Ω | 3,700W | 100% |
| 45 kW | 16 Ω | 4,500W | 100% |
| 55 kW | 13 Ω | 5,500W | 100% |
| 75 kW | 9 Ω | 7,500W | 100% |
| 90 kW | 6.8 Ω | 9,300W | 100% |
| 110 kW | 6.2 Ω | 11,000W | 100% |
| 132 kW | 4.7 Ω | 13,000W | 100% |
| 160 kW | 3.9 Ω | 15,000W | 100% |
| 185 kW | 3.3 Ω | 17,000W | 100% |
| 200 kW | 3 Ω | 18,500W | 100% |
| 220 kW | 2.7 Ω | 20,000W | 100% |
| 250 kW | 2.4 Ω | 22,500W | 100% |
| 280 kW | 2 Ω | 25,500W | 100% |
| 315 kW | 1.8 Ω | 30,000W | 100% |
| 355 kW | 1.5 Ω | 33,000W | 100% |
| 400 kW | 1.2 Ω | 42,000W | 100% |
| 450 kW | 1.2 Ω | 42,000W | 100% |
| 500 kW | 1 Ω | 42,000W | 100% |
| 560 kW | 1 Ω | 50,000W | 100% |
| Single-phase 220V | | | |
| Motor power(kW) | Resistance value(Ω) | Resistance power(W) | Braking moment (%) |
| 0.4 kW | 400 Ω | 100W | 100% |
| 0.75 kW | 200 Ω | 120W | 100% |
| 1.5 kW | 100 Ω | 300W | 100% |
| 2.2 kW | 75 Ω | 300W | 100% |

Table 3-12: Suggested braking resistance specification parameters of AC70 series AC drive

- Build-in braking unit max braking performance

Braking unit of AC70 series product with low power can be selected according to the suggested braking resistance specification parameters in table 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 table, the range of which can not be over in use. Otherwise the equipment maybe destroyed. If any problem, please consult Veichi Electric Com., Ltd customer service department.

| Three-phase 380V | | | |
|-------------------|-------------|---------------------|----------------|
| AC drive model | Motor power | Max braking current | Min resistance |
| AC70-T3-R75G/1R5P | 0.75 kW | 3.5A | 200Ω |
| AC70-T3-1R5G/2R2P | 1.5 kW | 3.5A | 200Ω |
| AC70-T3-2R2G/004P | 2.2 kW | 7A | 100Ω |
| AC70-T3-004G/5R5P | 4 kW | 10A | 75Ω |
| AC70-T3-5R5G/7R5P | 5.5 kW | 10A | 75Ω |
| AC70-T3-7R5G/011P | 7.5 kW | 14A | 50Ω |
| AC70-T3-011G/015P | 11 kW | 17A | 40Ω |
| AC70-T3-015G/018P | 15 kW | 23A | 30Ω |
| AC70-T3-018G/022P | 18.5 kW | 28A | 25Ω |
| AC70-T3-022G/030P | 22 kW | 30A (optional) | 24Ω(optional) |
| AC70-T3-030G/037P | 30 kW | 35A (optional) | 22Ω(optional) |
| Single-phase 220V | | | |
| AC drive model | Motor power | Max braking current | Min resistance |
| AC70-S2-R40G | 0.4 kW | 3.8A | 100Ω |
| AC70-S2-R75G | 0.75 kW | 3.8A | 100Ω |
| AC70-S2-1R5G | 1.5 kW | 6.5A | 60Ω |
| AC70-S2-2R2G | 2.2 kW | 10.5A | 40Ω |

Table 3-13: AC70 series AC drive build-in braking unit max braking power

Multi-function contact input connection

● NPN transistor connection mode

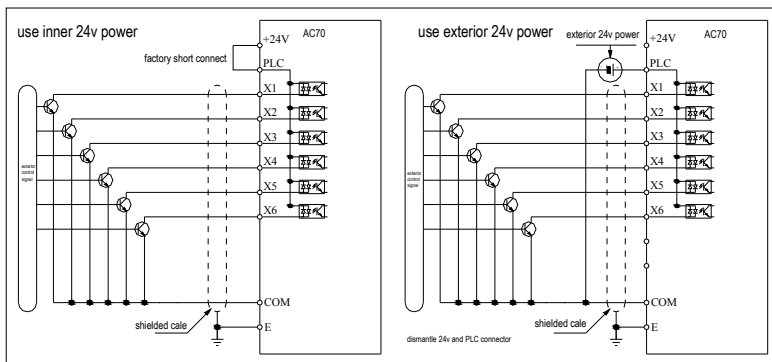


Chart 3-24: NPN transistor digital input signal connection mode

● PNP transistor connection mode

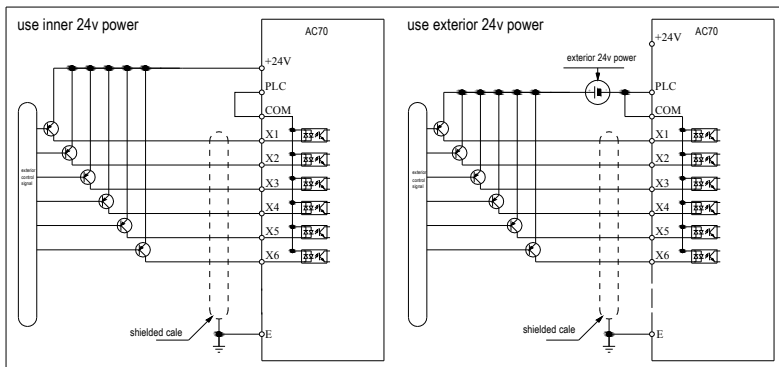


Chart 3-25 PNP transistor digital input signal connection mode

Digital output signal connection

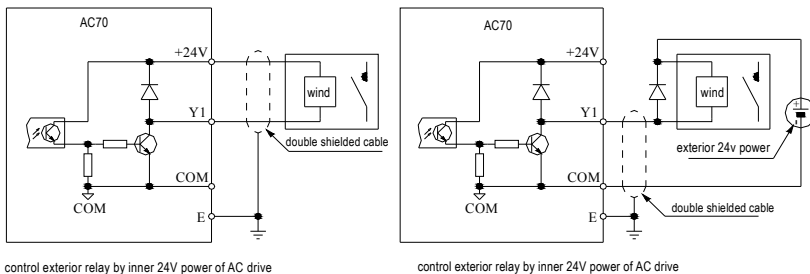


Chart 3-26: AC70 series AC drive digital output signal connection mode

Analog output signal connection

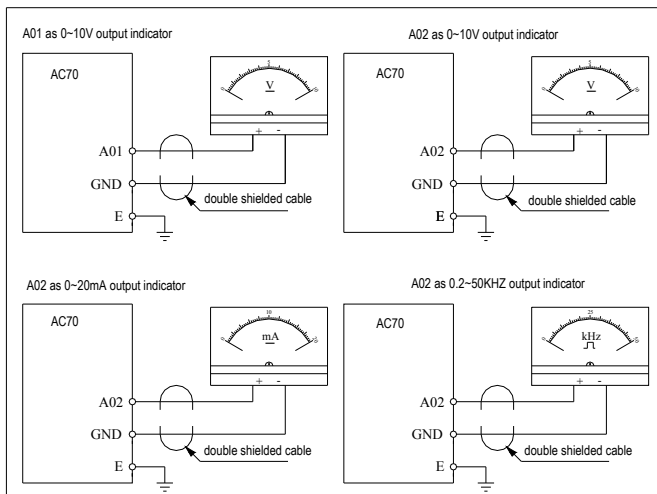


Chart 3-27: AC70 series AC drive analog output signal connection

mode Connection of pulse input signal

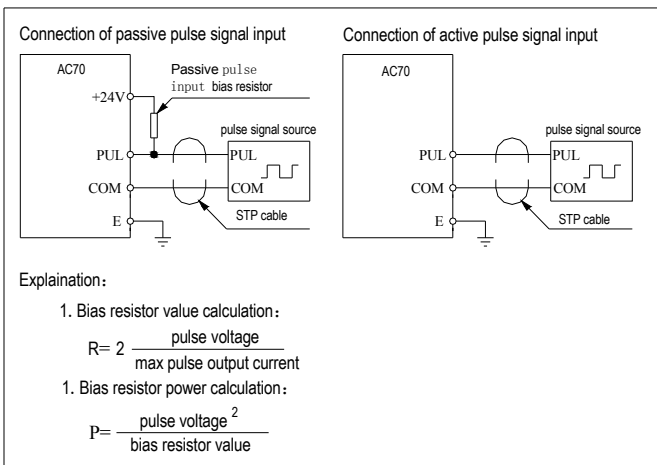


Chart 3-28: Pulse input signal connection mode of AC70 series AC drive

Standby control system

AC drive is composed of semiconductor, passive electronic component and driving part. All of them have useful time, which means these parts may happen characteristic change or out of use in normal working environment. And it will cause product fault. To avoid production stop led by the fault, we suggest preparing standby control system when using the AC drive.

Chart 3-29 is a standby control system for manual switch to power supply driving motor at AC drive 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 AC drive system can be chose to use according the actual requirement and environment.

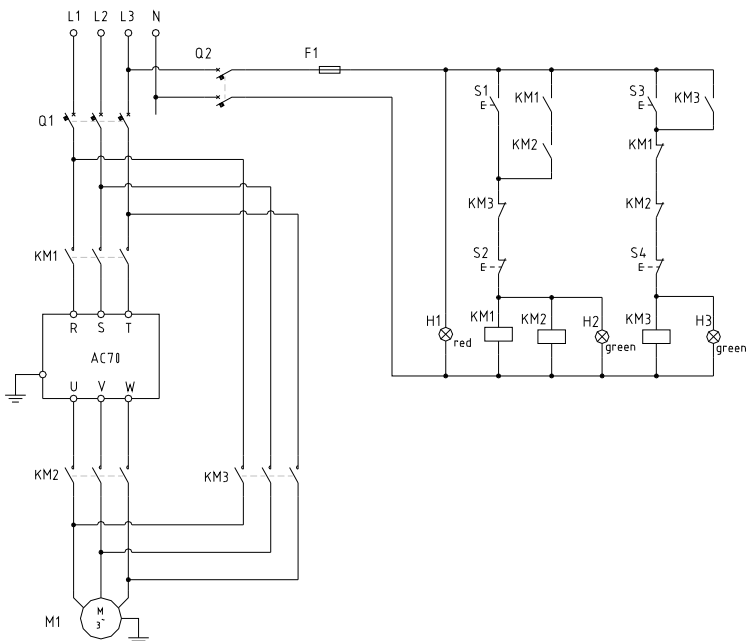





Chart 3-29: Standby control system of power supply directly driving mode

Chapter 4: Basic Operation and Trial Run

4.1 Safety Precautions

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

4.2 Keyboard Layout and Functions Specification

● Keyboard appearance



● Key function

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

● Indicator light meanings

| Name | | State | Meaning |
|--------------------------|---------|-------|--|
| Unit indicator light | Hz | Spark | Digital display given frequency. |
| | 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 | AC drive is forward rotating. |
| | FWD | Spark | AC drive is reverse rotating. |
| | FWD | Off | AC drive 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

●LED keyboard stamp explain:

| Stamp | Explain |
|---|--|
|  | AC drive stop |
|  | FWD |
|  | REV |
|  | JOG |
|  | REV second stamp |
|  | Remind press  key |
|  | Remind press  key |
|  | Cursor can up or remind up |
|  | Cursor can down or remind down |
|  | It flashing means fault |
|  | Arrowhead direction |
|  | Terminal not connect |
|  | Terminal connect |
|  | Two relay output: one on, another off |

4.3 Basic Operation

4.3.1 Menu Structure and Operation

AC70 series AC drive parameter setting adopts 3 groups of menus which can be checked and modified easily. Three menus are basic parameter, external terminal parameter and special function parameters. Operation method:

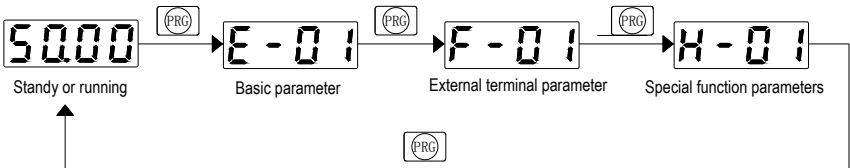


Chart 4-1: FWD/REV and 3 groups of menus switch operation

Note: One line display and dual line display keypad has the same operation process and operation method.

4.3.2 State Display Switching

The LED display kinds of monitor parameters of AC70 series AC drive in running or stop mode. User can uses [E-06, E-07] to select specific monitor parameters in one line display keypad, also can uses [E-06, E-07] to select upper line display and lower line display contents in two line display keypad.

User can uses SET and shift key to see specific monitor parameter in one-way circulation in one line display keypad or in two line display keypad. Please refer to following operation flow chart.

1. One line display keyboard cycle switching display.

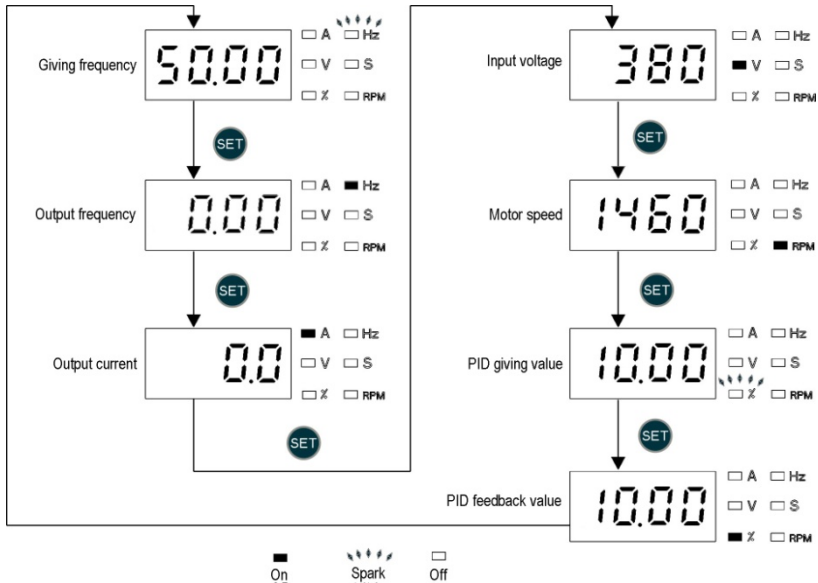
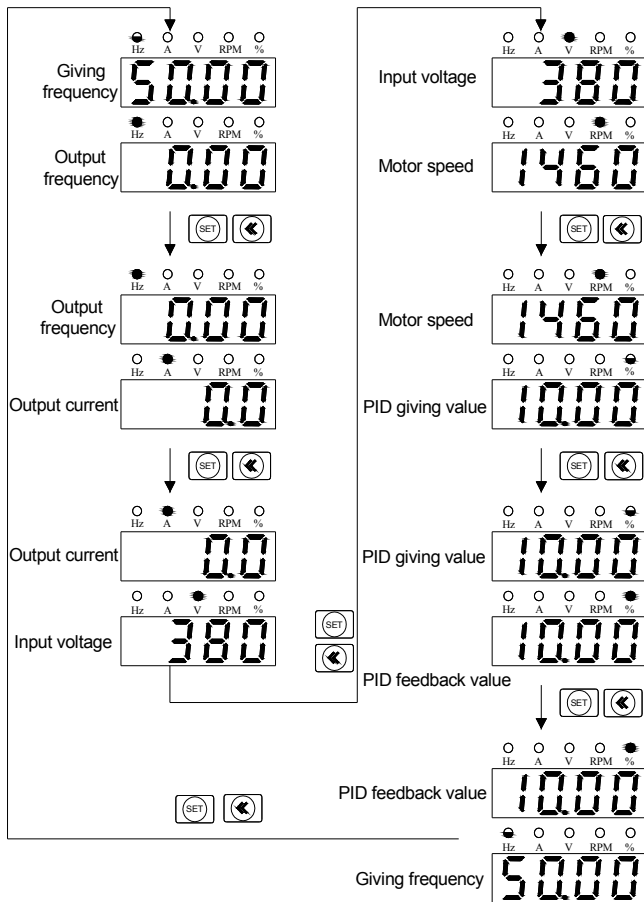


Chart 4-2: One line display keyboard cycle display

2. Dual line keypad cycle switching display monitor parameters operation flow chart.



● On ● Spark ○ Off

- [SET] Change first line parameter by cycle
 [Left Arrow] Change second line parameter by cycle

Chart 4-3: Dual line display keypad cycle display

4.3.3 Parameter Setting Mode

AC70 series AC drive best performance is based on parameter right setting. Here take [F-08] as a sample to show how to set parameter for both small keyboard and big keyboard.

1, Small keyboard set mode

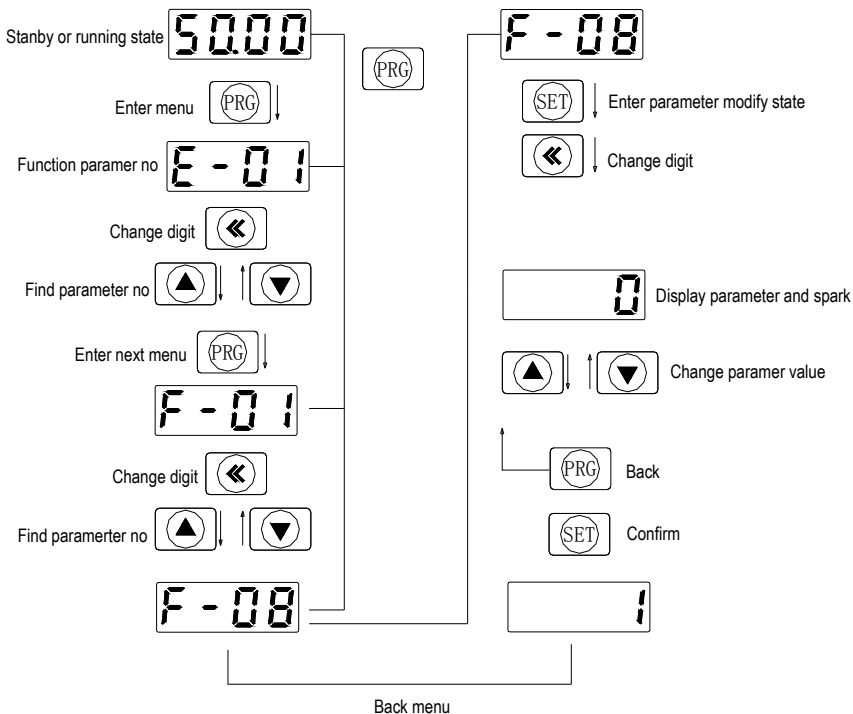


Chart 4-4: Small keyboard parameter set

2, Big keyboard set mode

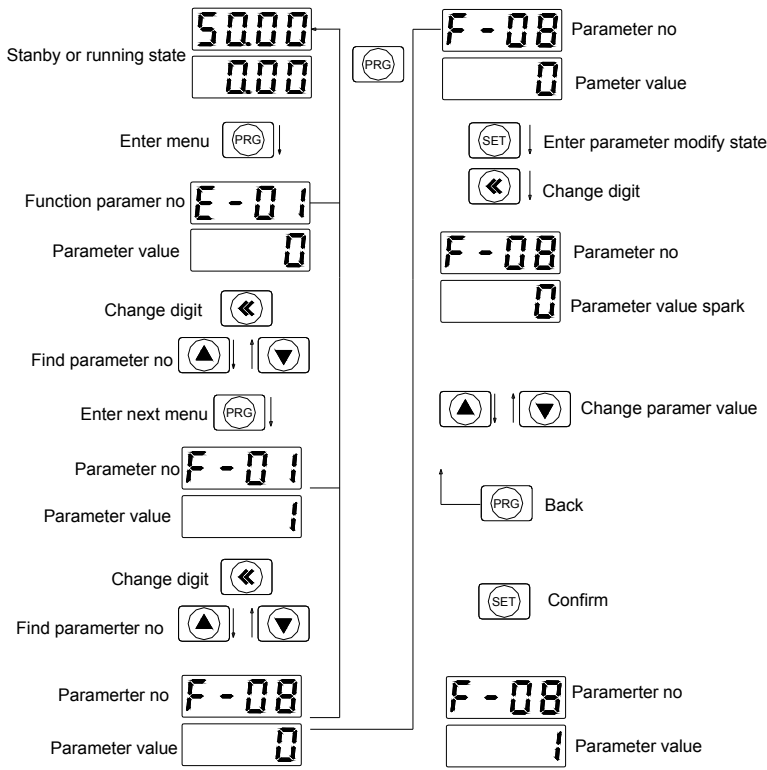


Chart 4-5: Big keyboard parameter set

4.4. Trial Run

● Trial run commissioning guide

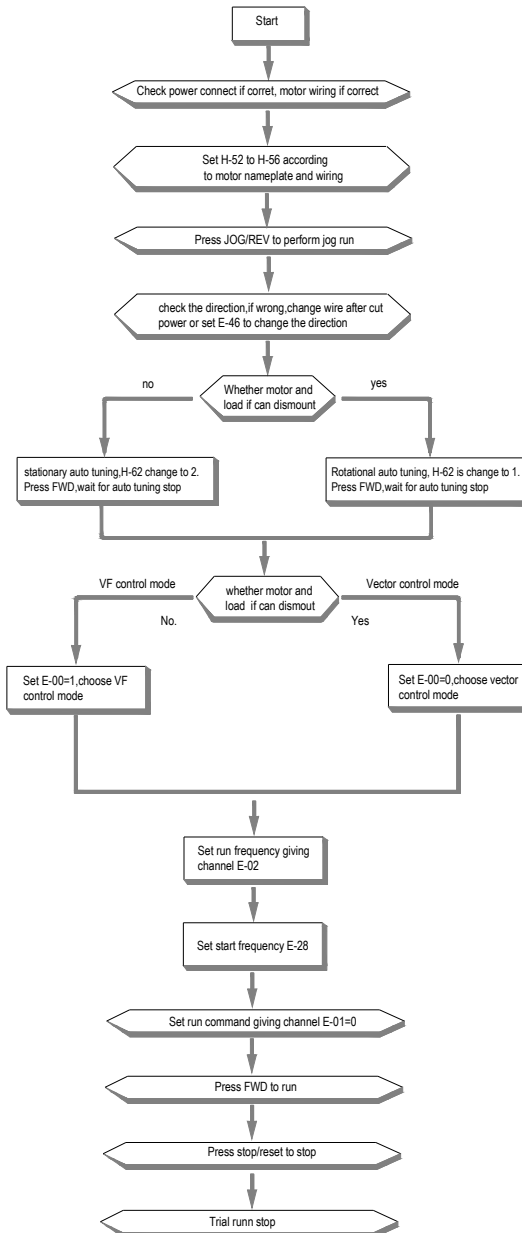


Chart 4-6: Trial run

● Parameter auto-tuning selection

Motor parameter auto-tuning

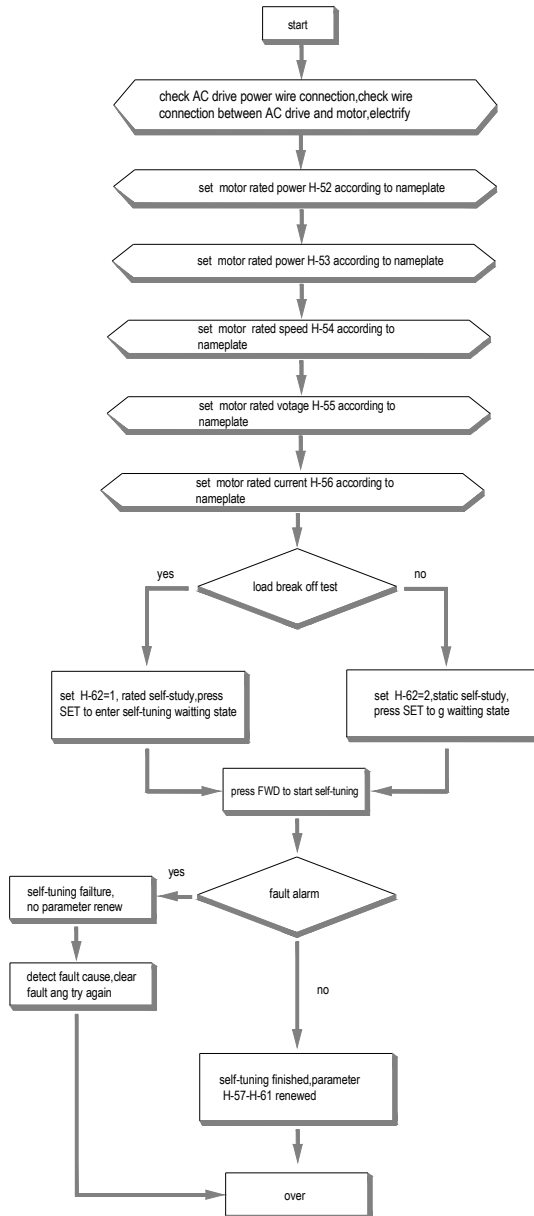


Chart 4-7: Parameter self-tuning selections

● Frequency giving flow

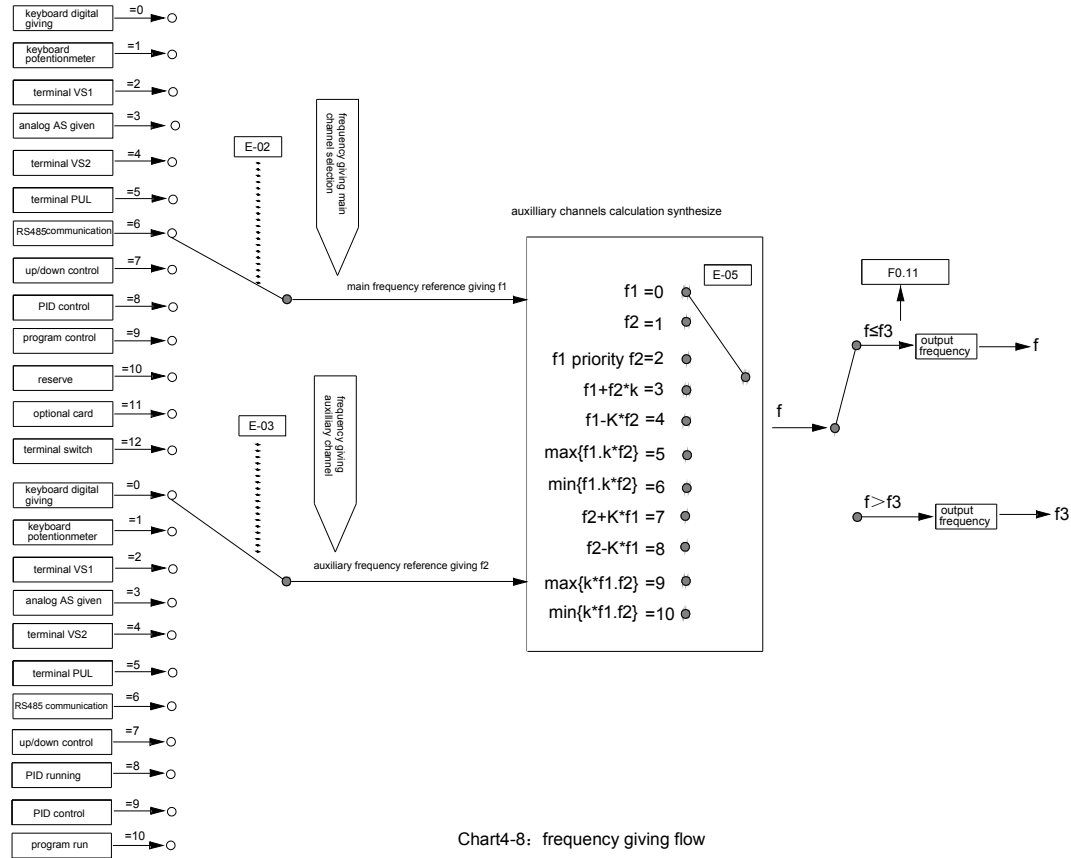


Chart4-8: frequency giving flow

● Start/stop control flow

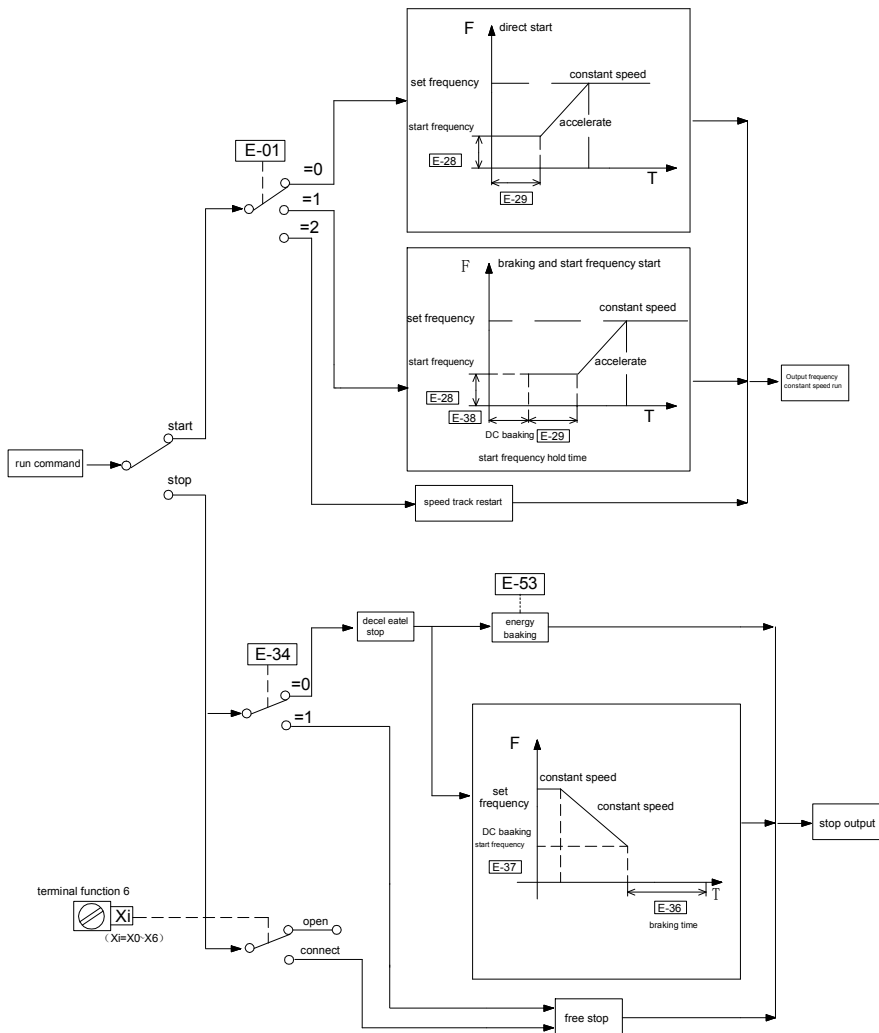


Chart 4-9: Start/stop control flow

● Open-loop VC control （speed mode）

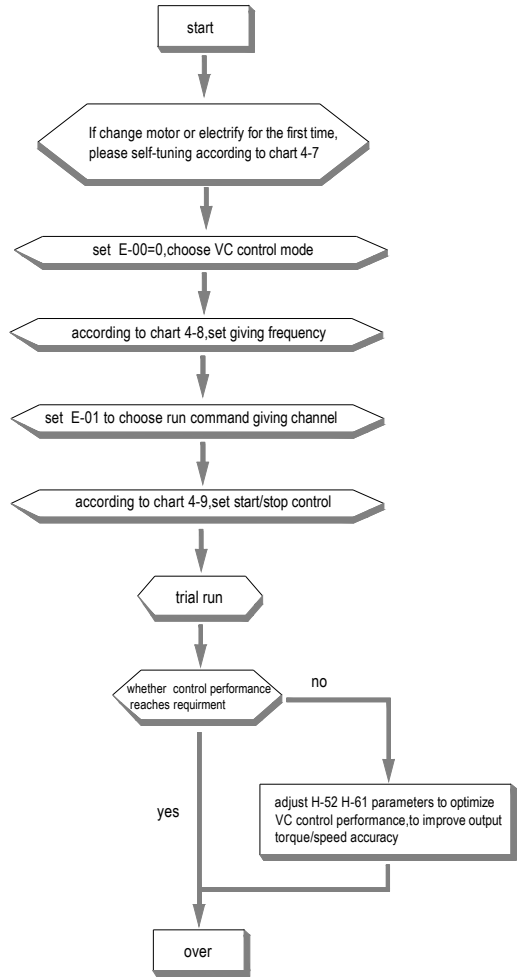


Chart 4-10: Open-loop VC control

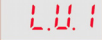




Chapter 5: Fault Diagnoses and Processing








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


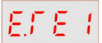
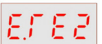







5.1 Fault Types

| Type | AC drive action while fault happens |
|-----------------|---|
| Equipment fault | <p>While AC drive detection fault, the state likes this:</p> <ul style="list-style-type: none"> ● Keyboard display character showing fault content. ● AC drive stops output. Motor stops free slide. ● While function F-31/F-32 is set as 1(fault output), Y1/Y2 terminals output valid open collector digital output. ● While function F-30 is 1(fault output), TA-TC terminals output open passive digital output. ● While there is fault as OL, OC, SC, OV, UL2, if [E-43] is not 0, the AC drive will automatically restart after E-44 setting time. |
| External fault | <p>In certain application occasions, external related equipments fault signals are considered in the AC drive control system as usage of monitoring, protection or switch control. At this time, if one multi function terminal is defied as "external fault", the AC drive stops output alarm signal.</p> |

5.2 Fault Information and Details

| Keyboard display | Fault code | Fault type | Possible causes | Treatment |
|---|------------|-----------------------------|---|---|
|  | L.U.1 | Too low voltage while stop | <ul style="list-style-type: none"> ● Power supply is too low ● Voltage detection circuit is abnormal | <ul style="list-style-type: none"> ● Check input power, clear fault. ● Seek support from factory. |
|  | E.LU2 | Too low voltage in run | <ul style="list-style-type: none"> ● Power supply is too low ● Power capacitance is too small, or there is big impact current in the power grid. ● Inner DC main contactor is not connect well | <ul style="list-style-type: none"> ● Check input power, clear fault. ● Improve power supply. ● Seek support from factory. |
|  | E.oU1 | Accel. over-voltage | <ul style="list-style-type: none"> ● Power voltage fluctuation over limit. ● Start when motor is running . | <ul style="list-style-type: none"> ● Detect power voltage and clear fault. ● Restart motor until it completely stop. Set E-30 as 1 or 2. |
|  | E.oU2 | Decel. over-voltage | <ul style="list-style-type: none"> ● Deceleration time is too short. ● Load potential energy or inertia is too large. ● Power voltage fluctuation over limit. | <ul style="list-style-type: none"> ● Prolong Deceleration time. ● Reduce load inertia or improve AC drive capacitance or add braking unit. ● Detect power voltage and clear fault. |
|  | E.oU3 | Constant speed over-voltage | <ul style="list-style-type: none"> ● Power voltage fluctuation over limit. | <ul style="list-style-type: none"> ● Detect power voltage and clear fault. ● Install input reactor. |

| | | | | |
|---|-------|-----------------------------|---|---|
|  | E.oU4 | Over-voltage while stop | <ul style="list-style-type: none"> ● Power voltage fluctuation over limit. | <ul style="list-style-type: none"> ● Check input power,clear fault. ● Seek support from factory. |
|  | E.oC1 | Accel. over-current | <ul style="list-style-type: none"> ● Acceleration time is too short. ● Start running motor. ● V/F curve setting is not suitable.Or torque boost too high. ● AC drive capacitance is too small. | <ul style="list-style-type: none"> ● Prolong acc time. ● Restart motor until it totally stop.Set E-30 as 1or2. ● Reset V/F curve or torque boost value. ● Select AC drive with right capacitance. |
|  | E.oC2 | Decel. over-current | <ul style="list-style-type: none"> ● Deceleration time is too short. ● Load potential energy or inertia is too large. ● Power voltage fluctuation over limit. | <ul style="list-style-type: none"> ● Prolong Deceleration time. ● Connect external braking resistance or braking unit. ● Select AC drive with right capacitance. |
|  | E.oC3 | Constant speed over-current | <ul style="list-style-type: none"> ● Sudden load change. ● Power grid voltage is too low. | <ul style="list-style-type: none"> ● Check load change and clear it. ● Check input power,clear fault. |
|  | E.oL1 | Motor over-load | <ul style="list-style-type: none"> ● V/F curve setting is not suitable. Or torque boost too high. ● Power grid voltage is too low. ● incorrect overload protection setting. ● Locked-rotor run or too heavy load. ● Universal motor long time low speed run. | <ul style="list-style-type: none"> ● Reset V/F curve or torque boost value. ● Check input power,clear fault. ● Unreasonable H-56 setting. ● Adjust load or select AC drive with right capacitance. ● If need long time low speed run,please choose special motor for AC drive. |
|  | E.oL2 | AC drive over-load | <ul style="list-style-type: none"> ● Load is too heavy. ● Acceleration time is too short. ● Start running motor. ● V/F curve setting is not suitable.Or torque boost too high. | <ul style="list-style-type: none"> ● Select AC drive with right capacitance. ● Prolong acceleration time ● Restart motor until it totally stop.Set E-30 as 1or2. ● Reset V/F curve or torque boost value. |
|  | E. SC | System abnormality | <ul style="list-style-type: none"> ● Acceleration time is too short. ● Short circuit between AC drive output phases or earth. ● Module is damaged. ● Electromagnetic disturb. | <ul style="list-style-type: none"> ● Prolong acceleration time. ● Check periphery equipments and restart after fault cleared. ● Seek support from factory. ● Check system wiring, |

| | | | | |
|---|-------|--------------------------------|--|--|
| | | | | earth, shield and deal as required. |
|  | E.oH | AC drive over-heat | <ul style="list-style-type: none"> ● Temperature is too high. ● Air channel is blocked. ● Fan connection parts is loose. ● Fan is damaged. ● Temperature detection circuit fault | <ul style="list-style-type: none"> ● Make the environment meeting the requirement. ● Clear the air channel. ● Check and re-connect the wire ● Change the same new fan. ● Seek support from factory. |
|  | E.TE1 | Motor static detection fault | <ul style="list-style-type: none"> ● Detection overtime ● Perform static detection while motor is running. ● Capacitance difference is too big between motor and AC drive. ● Motor parameter setting mistake. | <ul style="list-style-type: none"> ● Check motor connection wire. ● Detect after motor stop totally. ● Change AC drive model. ● Reset parameter according to nameplate. |
|  | E.TE2 | Motor rotation detection fault | <ul style="list-style-type: none"> ● Detect while motor is running. ● Detect with load. ● Detection overtime ● Capacitance difference is too big between motor and AC drive. ● Motor parameter setting mistake. | <ul style="list-style-type: none"> ● Detect after motor stop totally. ● Re-detect without load. ● Check motor connection wire. ● Change AC drive model. ● Reset parameter according to nameplate. |
|  | 93SE | Memory fault | <ul style="list-style-type: none"> ● Electromagnetic disturb in memory period. ● EEPROM damage. | <ul style="list-style-type: none"> ● re-input and save. ● Seek support from factory. |
|  | LIFE | Reserved | | <ul style="list-style-type: none"> ● Seek support from factory. |
|  | ERR1 | Input phase missing | <ul style="list-style-type: none"> ● 3 input phase missing | <ul style="list-style-type: none"> ● Check 3phase input power and phase. ● Check 3phase input power wiring. |
|  | ERR2 | Output phase missing | <ul style="list-style-type: none"> ● 3 phase output of AC drive missing connection with motor. | <ul style="list-style-type: none"> ● Check wire between AC drive and motor, earth and motor insulation. |
|  | ERR3 | Current detection fault | <ul style="list-style-type: none"> ● Detect circuit fault. ● Phase imbalance | <ul style="list-style-type: none"> ● Seek for technique support. ● Check motor and wiring. |
|  | ERR4 | AC drive external fault | <ul style="list-style-type: none"> ● Peripheral equipment fault protection. | <ul style="list-style-type: none"> ● Check peripheral equipment. |
|  | ERR5 | Swing frequency fault | <ul style="list-style-type: none"> ● User not set right swing frequency running parameter. | <ul style="list-style-type: none"> ● Set parameter again. |








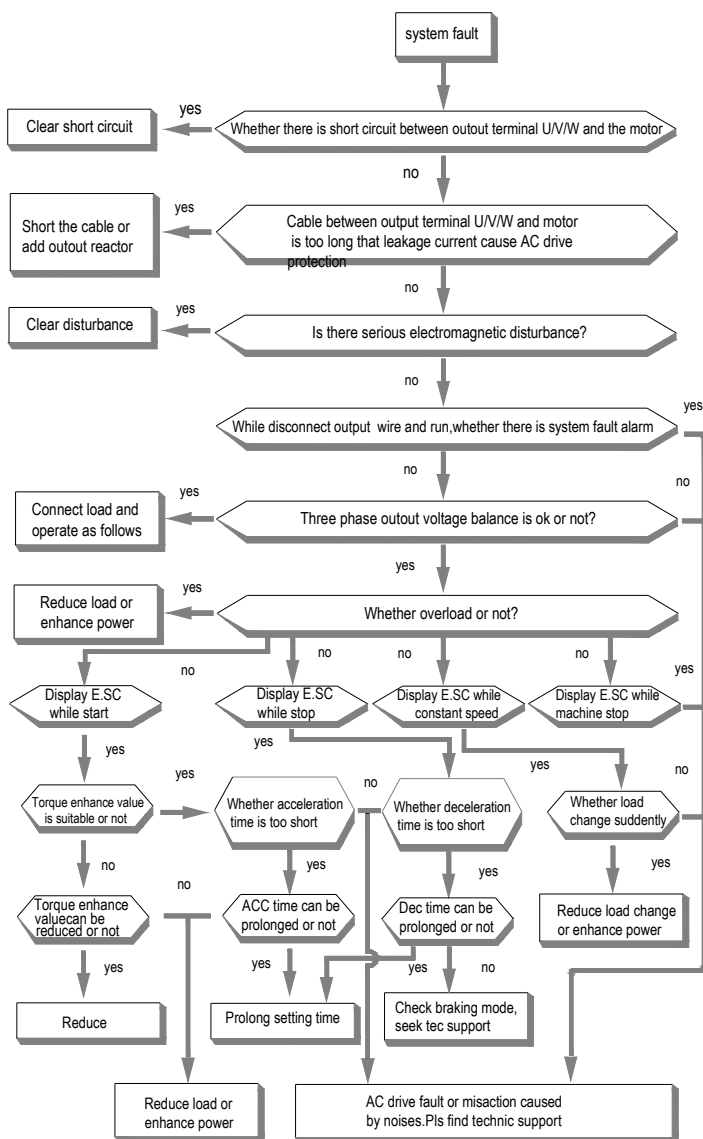
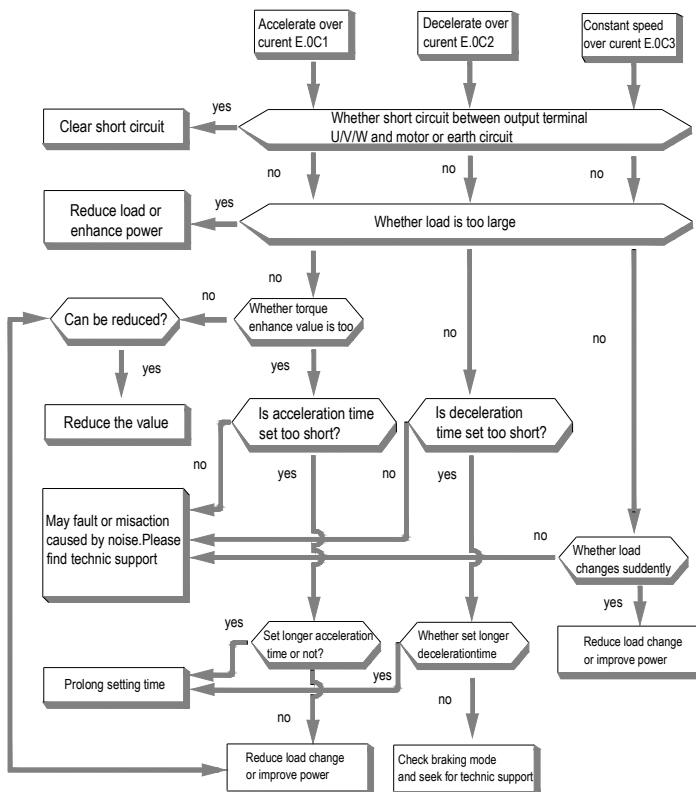
| | | | | |
|---|-------|---------------------------|---|---|
|  | ERR6 | Keyboard connect fault | <ul style="list-style-type: none"> ● Keyboard wire fault. ● Keyboard component damage. | <ul style="list-style-type: none"> ● Check keyboard wire ● Seek support from factory. |
|  | E.CPE | Parameter copy fault | <ul style="list-style-type: none"> ● Parameter copy communication is fault. ● Copy keyboard is not match the AC drive. | <ul style="list-style-type: none"> ● Check wire. ● Select the specified external keyboard model. |
|  | E.CE | RS485 communication fault | <ul style="list-style-type: none"> ● Baud rate not right. ● Communication connection not right. ● Communication format not right. | <ul style="list-style-type: none"> ● Set right Baud rate ● Check communication wiring ● Check Communication format |
|  | SEn | Feedback sensor fault | <ul style="list-style-type: none"> ● Alarm while PID analog value feedback signal is small than [H-28]. ● PID feedback wire problem. ● Feedback sensor problem. ● Feedback input circuit problem. | <ul style="list-style-type: none"> ● Confirm sensor state, change it if problem ● Check wiring. ● Adjust feedback channel signal |
|  | E.PAn | Keyboard connect fault | <ul style="list-style-type: none"> ● Keyboard wire fault. ● Keyboard component damage. | <ul style="list-style-type: none"> ● Check keyboard wire ● Seek support from factory. |
|  | E.EF | AC drive external fault | <ul style="list-style-type: none"> ● Peripheral equipment fault protection. | <ul style="list-style-type: none"> ● Check peripheral equipment. |
|  | E.PAn | Keyboard connect fault | <ul style="list-style-type: none"> ● Keyboard wire fault. ● Keyboard component damage. | <ul style="list-style-type: none"> ● Check keyboard wire ● Seek support from factory. |

Chart 5-1: Fault information and details

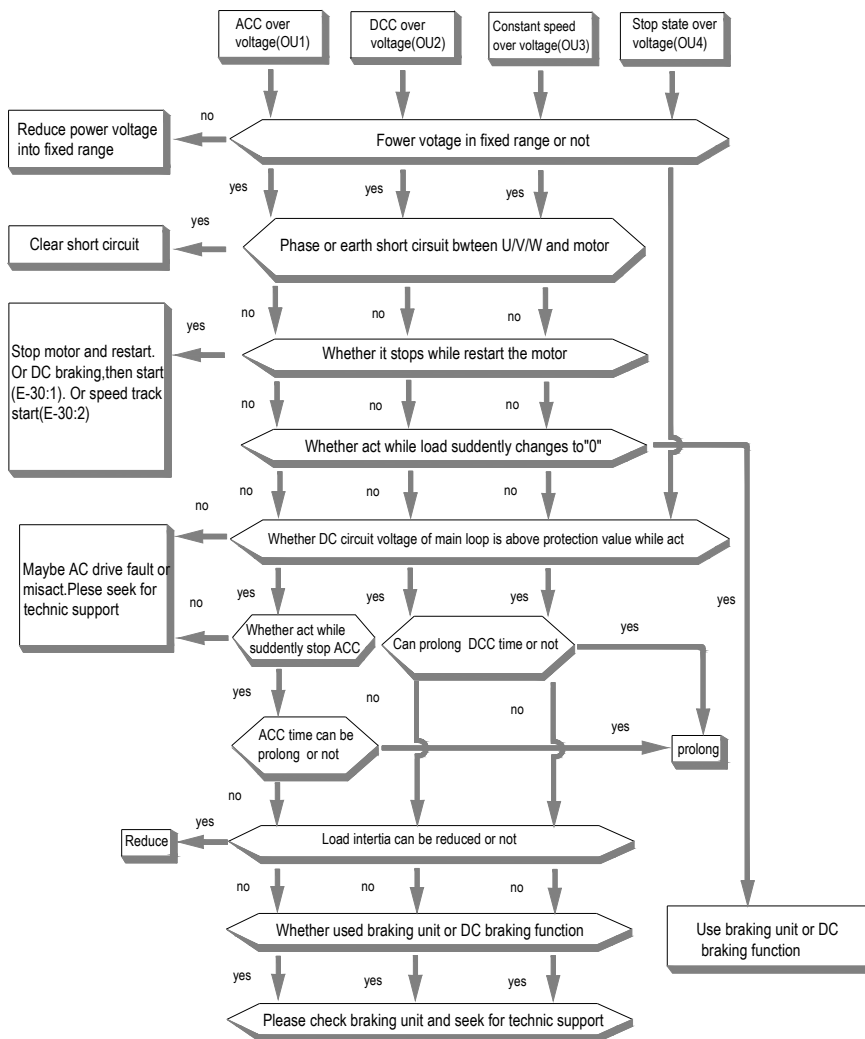
5.3 Fault Diagnoses Process

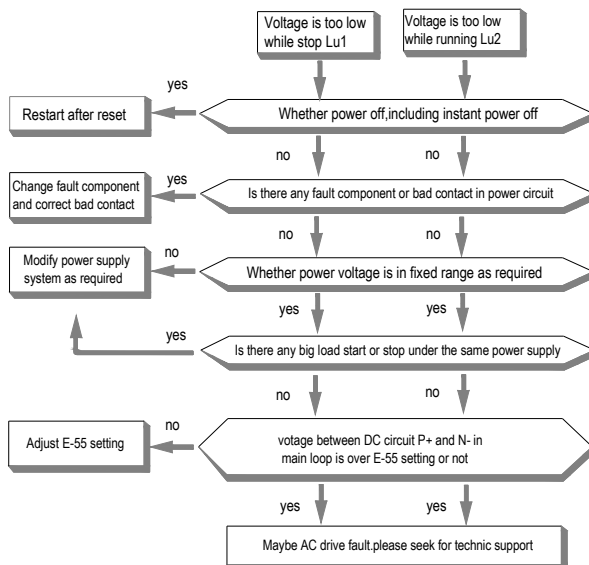
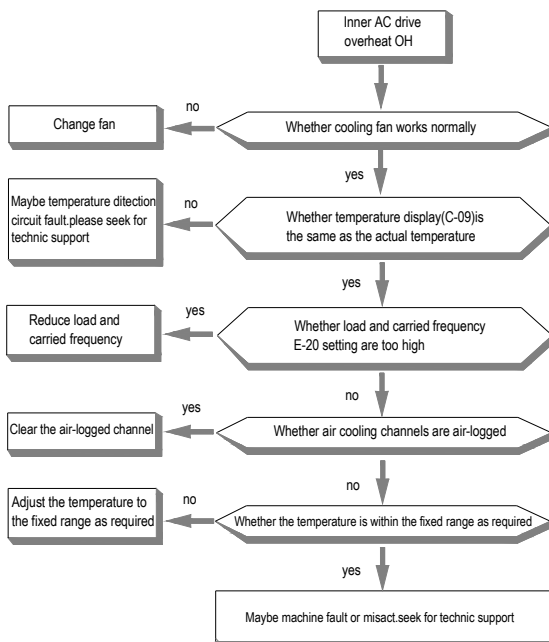
System fault diagnoses process



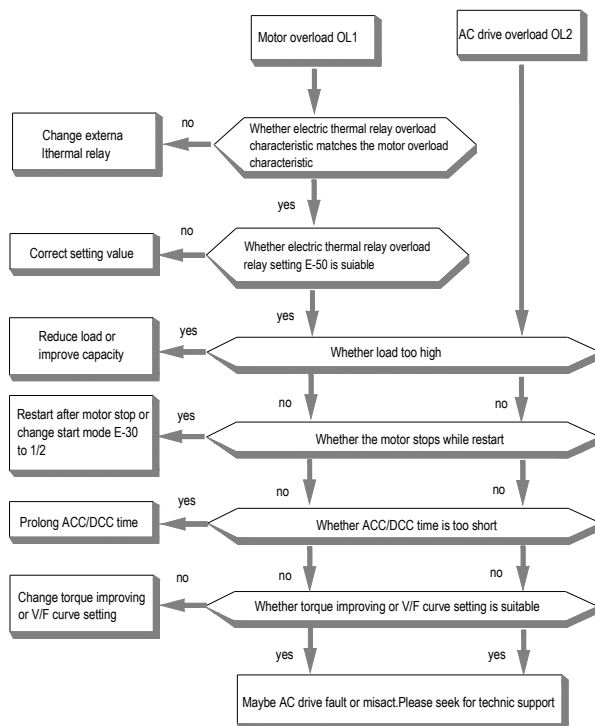
Over current diagnoses process

Over voltage diagnoses process

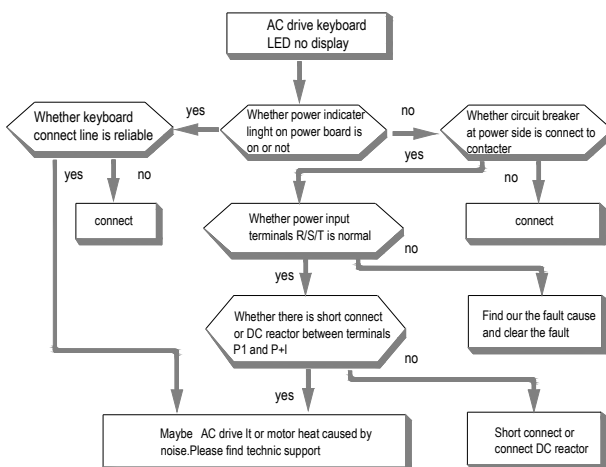


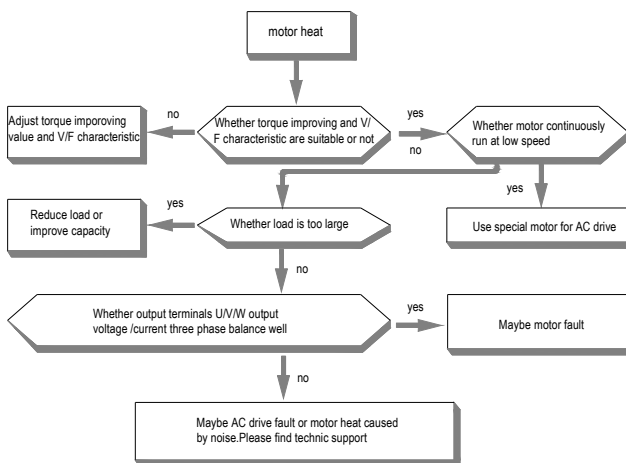
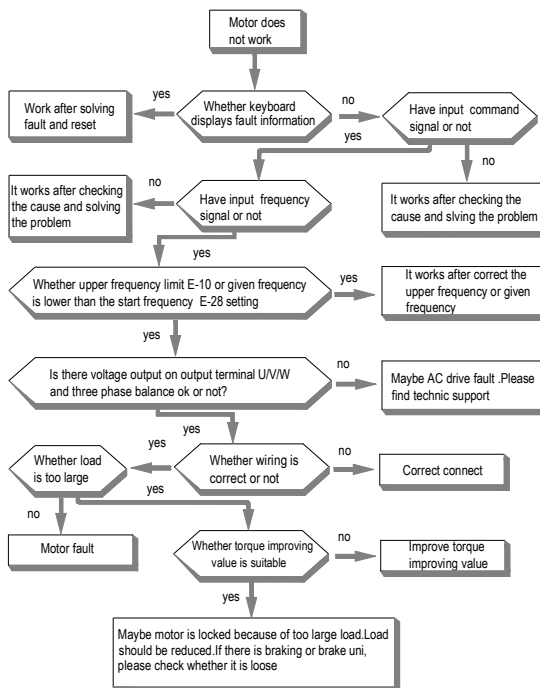
Supply voltage is too low**Inner AC drive over heat**

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.

| | |
|---|---|
|  Danger | <ul style="list-style-type: none"> ● No operation under power connected state. Otherwise there is danger of electric shock death. ● Before operation, please cut all related equipments power, ensure that the main circuit DC current has dropped to safe range. And please operate after 5 mins. |
|  Warn | <ul style="list-style-type: none"> ● No operation while cover/panel is dismantled. Otherwise there is danger of electric shock death. ● Do not dismantle the cover or PCB under power connected state. Otherwise there is danger of electric shock death. ● Only professional person can maintain or change fittings. Otherwise there is danger. ● Do not wear loose clothes while install, debug, maintain. Rated protective tools and safeguard should be adopted. ● Tighten screw according to named moment. If main circuit wire connection is loose, there is danger of overheat fire. ● Machine and motor earth must be reliable. Otherwise there is danger of electric shock if touches the cover. |
| Important | <ul style="list-style-type: none"> ● While operation, please follow the ESD regulations. Otherwise the AC drive maybe damaged. ● Do not change the circuit or structure of the AC drive. Otherwise the AC drive maybe damaged. ● Please confirm the rotate direction while no-load. Wrong direction can bring body injury or huge wealth loss. ● Do not use damaged machine. Otherwise there is danger of accident. |

6.2 Overhaul

AC drive is composed by semi-conductive component, 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 shorter while under cases as below.

High temperature, high altitude;

Start and stop frequently;

AC power supply or load fluctuates badly;

With bad wave or impact;

With dust, metal dust, salt, vitriol, chlorine;

Bad store condition;

● Daily checking

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

| 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 AC drive 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 rotate block. |
| 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 AC drive and have 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 operation, please cut all related equipments power, ensure that the main circuit DC current has dropped to safe range. And please operate after 5 mins.

● 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 body | Check insulated resistance; Check circumstance. | Tighten and change bad component; Clear and improve circumstance |
| Electric connection | <ul style="list-style-type: none"> ● Check whether the wire and connector color changes, whether there is disrepair , crack color change or aging in insulated layer. ● Check whether the connect terminals are damaged or loose. ● Earth checking. | <ul style="list-style-type: none"> ● Change bad wire. ● Fasten terminals and change bad terminals. ● Measure earth resistance and fasten earth terminals. |
| Mechanical connection | <ul style="list-style-type: none"> ● Check if there is abnormal vibration or noise or something is loose. | <ul style="list-style-type: none"> ● Tighten, lubricate and change the bad machine components. |
| semi-conductive component | <ul style="list-style-type: none"> ● Check whether there is dust or rubbish. ● If there is obvious out change? | <ul style="list-style-type: none"> ● Clear ● Change damaged component |
| Electrolytic capacitor | <ul style="list-style-type: none"> ● Whether there is liquid leak, color change, or creak? Whether there is safety valve outcrop, inflation, creak or liquid leak. | <ul style="list-style-type: none"> ● Change damaged component |
| Peripheral equipment | <ul style="list-style-type: none"> ● Peripheral equipment outlook and insulation checking. | <ul style="list-style-type: none"> ● Clear and change damaged component |
| PCB | <ul style="list-style-type: none"> ● Bad smell, color change, bad rust and connector checking. | <ul style="list-style-type: none"> ● Fasten connector ● Clear PCB ● Change bad PCB |
| Cooling system | <ul style="list-style-type: none"> ● Check whether the fan is damaged or blocked up. ● Whether rubbish and dust is stucked to the heat sink . ● Is air inlet/outlet blocked? Or is there something sticking to the inlet/outlet. | <ul style="list-style-type: none"> ● Clear ● Change damaged component |
| Keyboard | <ul style="list-style-type: none"> ● Whether is it damaged? Check whether display is complete. | <ul style="list-style-type: none"> ● Change damaged component |
| Motor | <ul style="list-style-type: none"> ● Check if there is abnormal vibration or noise. | <ul style="list-style-type: none"> ● Tighten machine and electric connection and lubricate the machine components. |



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

6.3 Maintenance

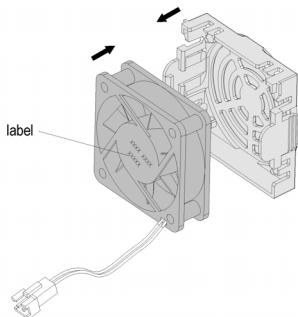
All equipments and components have useful lifetime. Right maintenance can prolong the lifetime. But it can not avoid damage. Please change the components before their lifetime over.

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

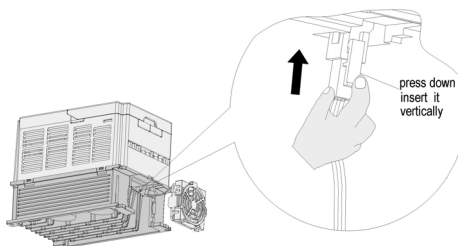
- Fan

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

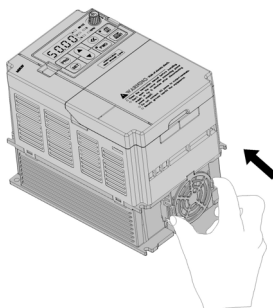
- Fan change method:



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

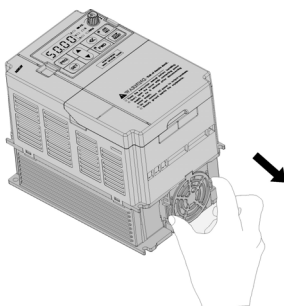


2, Press the elastic clip of the fan by finger toward the inner side and insert the leading terminal of the fan vertically by a little strength.

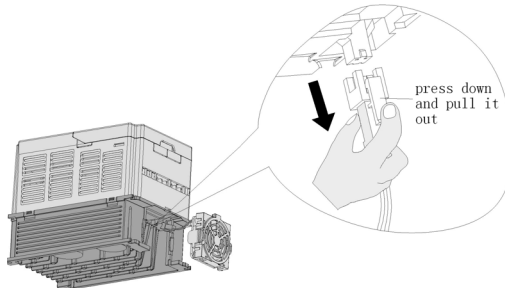


3, Insert the two elastic clips of the fan cover vertically into the fan installation slots.

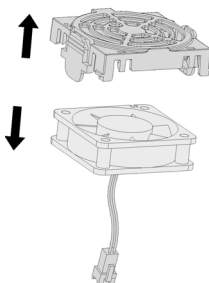
● Fan dismantlement:



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



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



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



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

2, While the AC drive is working, the heat sink temperature will be higher as the consumption. To prevent from scald, please do not touch the heat sink and do not change the fan until the temperature being safe.

3, To ensure the best performance of the AC drive, please use the original fan.



●Other components

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

Chapter 7: Peripheral Equipments and Options






7.1 Safety rules










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

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

7.2 Peripheral Equipments

Normal peripheral equipments are showed as below. 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 AC drive indeed and realize basic relay control. |
|  | AC input reactor | Improve power side factor and isolate the noise disturbance to the AC drive from the power side. |
|  | DC reactor | Restrained ultra harmonics and improve power factor. |

| | | |
|--|---------------------------------|--|
|  | Input side noise filter | Reduce AC drive disturbance to the power and reduce the power grid disturbance. |
|  | Braking resistor | Passive energy consume unit of electric braking. |
|  | Consumption braking unit | Electric braking control unit, controlling the braking resistance consume the regenerated electric power of the motor efficiently. |
|  | Output side noise filter | Reduce the output side wire electromagnetic disturbance. |
|  | Standby system | Standby system for AC drive malfunction. |
|  | Heat relay | Protect the motor while over load. |
|  | 0-phase reactor | Reduce electromagnetic disturbance of the AC drive (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 Use of Peripheral Equipments

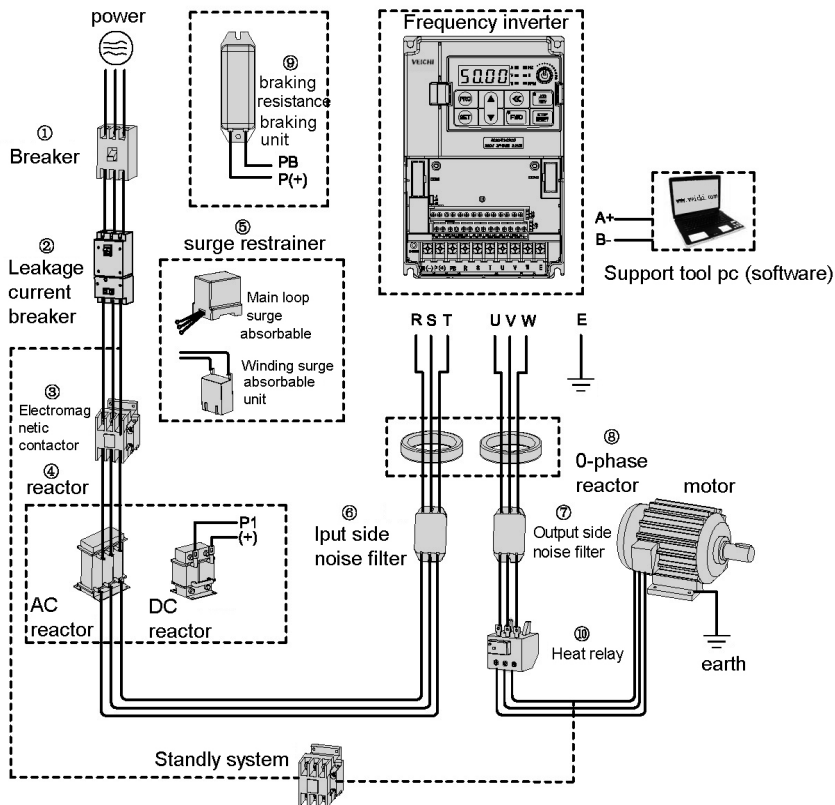


Chart 7-1:Peripheral equipments connection fig

Note:

Wiring breaker

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



: While choosing the breaker, the capacitance should be 1.5-2 times of the rated output current of the AC drive. Please compare the time characteristic and protective time to the AC drive (150% of the rated output current, one minute). Make sure there will be no skip.



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

Leakage current breaker

The AC drive 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 set AC drive 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 AC drive. The factors which impact leakage current are as below: Capacitance of AC drive Carrier frequency

Motor cable type and wire length

MI/RFI filter

To protect human body and AC drive, please choose leakage current breaker which can use AC/DC power and can face high frequency leakage current. There should be one leakage current breaker with more than 200mA sensitive current for every AC drive. If the AC drive outputs different wave, the high frequency leakage current can be higher, which will lead to breaker fault. In this case, please take below treatments:

Improve the sensitive current of the leakage current breaker

Reduce the carrier frequency of the AC drive

Electromagnetic contactor

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

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 high hypo harmonic current and improve power side factor;

Need to switch input phase capacitance;

AC drive is connected to large capacitance power transformer (600kVA above);

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

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

Surge restrainer

Surge restrainer is divided into 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 to restrain the surge voltage brought by switch components such as inductive load which is surrounding the AC drive (electromagnetic contactor, electromagnetic relay, electromagnetic valve, electromagnetic winding). Do not connect the surge restrainer to the output side of the AC drive. Otherwise the AC drive will be damaged. **Input side noise filter**
Rectifier bridge of the AC drive is uncontrolled rectifier bridge. And input current is discontinuous impulse current. So the harmonic current noise signal, which flows to power wire from the AC drive inner, may bring bad impact on the surrounding machines (radio, phone, non contact switch, sensor). This time, we suggest to install input side noise filter to lighten the noise into the power wire. Besides, it can also reduce noise from the power wire into the AC drive.



Caution: Please use the noise filter special for the AC drive and the connection wire between the filter and the AC drive should be as short as possible.

Output side noise filter

The AC drive outputs square wave with high-speed peak value voltage switch. So there is high-speed dv/dt converter 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 input-phase capacitance and the noise filter to the output circuit. Otherwise there is danger of damage to the AC drive.

0-phase reactor

0-phase reactor is used to reduce the electromagnetic inductive disturbance of the AC drive, 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.

Braking reactor or braking unit

Renewed power consumption unit, please see the sixth part of the chapter three "electric installation".

Heat relay

Please install the heat relay at the output side of the AC drive. When the motor enters into overload state, it will cut the power source to protect the motor. While using one AC drive to run one motor, there is no need to install heat relay. The motor overload protection current [E-49] of the frequency will work. While using one AC drive to run multi-motors or the motor is run directly by the power grid, please install heat relay between the frequency and the motor. While installing the heat relay, please design to cut the sequence control circuit of the MC at the main loop input side by the connection spot of the relay or design to input the heat relay action into the AC drive as the exterior malfunction. And please pay attention to the following tips to avoid heat relay fault and motor overheating at low speed.

Run at low speed

One AC drive run multi motors

Motor cable is very long

Detect malfunction mistakenly for carrier frequency is too high

Low speed and heat relay

In normal case, the heat relay is suitable for the universal motor. While using the AC drive to run the universal motor (standard motor), the motor current is 5-10% bigger, comparing with the commercial power supply. Besides, at low speed, even in the motor rated current range, the cooling capability of the fan driven by the motor axis will reduce, which will bring motor overheat. So please set the motor overheat protection current [E-49] in the AC drive to be valid.

Motor cable is very long

While the motor cable is very long and the carrier frequency is very high, impacted by the leakage current, the heat relay may fail. To avoid it, please reduce the carrier frequency or set higher detection value of the heat relay. Before enhancing the detection value, do confirm whether there is other cause for the motor overheat. Otherwise there is danger.

Chapter 8: Function Parameters Specification

8.1 Basic Parameters Specification

| | | | |
|------|--------------------------|-----------|------------|
| E-00 | control method selection | range:0-1 | Default: 1 |
|------|--------------------------|-----------|------------|

0: Open loop vector control without PG Also call sensorless vector control mode, are suitable for application one AC drive drive one motor which need high performance control requirement. It can achieve fast torque response, wide speed control range and high torque output even under low speed without motor feedback.

Note: It needs to perform motor auto tuning with configure motor parameters correctly before first time running with this control mode.

1: V/F control mode Adjusting the speed with V/F ratio, Use this mode for simple speed control and for multiple motor applications with low demands to dynamic response or speed accuracy. This control mode is also used when the motor parameters are unknown and Auto-Tuning cannot be performed. The speed control range is 1:40.

| | | | |
|------|---|-------------------|------------|
| E-01 | Running control command channel selection | Setting range:0-2 | Default: 0 |
|------|---|-------------------|------------|

Uses for selecting AC drive running, stop and running direction command input channel.

0: Operator keypad Running and stop of AC drive control by forward running key FWD, reverse running or Job key REV/JOG and stop key STOP/RESET of operator keypad. When **[E-08]** parameters set to 0, REV/JOG is defined for reverse running, when **[E-08]** parameter set to 1, REV/JOG is defined for JOG running.

1: External terminal control Running, stop and rotation direction of AC drive control by ON and OFF of FWD terminal or reverse terminal. Please refer to **[F-08]**.

2: RS485 Communications port control Running, stop and rotation direction of AC drive control by given signal of RS485 control port.

Note: STOP/RESET of keypad, reset command from control terminal or RS485 communication are all enabled when fault reset.

Tips: 1. The running direction of AC drive control is disabled by this command when programming control and (VS2) terminal input bipolar adjustment, direction control is valid.

2. STOP/RESET key function is programmable, it can be defined emergency stop button function when selecting external terminal control or RS495 control, refer to [F-07]; If use STOP/RESET button on keypad to stop AC drive when selecting external terminal control, AC drive will be stop and locked the external terminal command, it need to input external terminal stop command to unlock it, and then external terminal running command will be activated again. It is the same for RS485 communication control.

3. When selecting operator keypad control, direction control by external terminal takes is priority to control by keypad; it means that when reverse terminal and COM is on, if the direction command is changed by keypad, it will be keep the same original running direction after the terminal and COM is off.

| | | | |
|------|--|--------------------|------------|
| E-02 | Frequency reference given main channel selection | Setting range:0-12 | Default: 1 |
|------|--|--------------------|------------|

It is used for selecting main frequency reference given of AC drive, the frequency given will control or affect the output frequency of AC drive; terminal (VS2) analog voltage signal and program control channel also will control the running direction of AC drive directly.

0: Operator keypad digital Main frequency reference given by parameters **[E-16]** configuring: it is available to modify the **[E-16]** preset value via up/down arrow button on keypad when AC drive in running status or stop state.

1: Potentiometer of keypad Main frequency given is determined by potentiometer of keypad.

2: Terminal VS1 analog voltage 0-10V Main frequency given determined by control terminal VS1 analog input, Regarding the relationship between input analog and frequency, filter time of input analog, Please refer to parameters in detail **[F-41, F-42, F-43, F-56, F-57, F-58]** parameters

3: Terminal AS analog current signal 4-20mA Main frequency given is determined and modified by (AS) analog current input; Regarding the relationship between input analog and frequency, filter time of input analog, Please refer to parameters in detail [F-50, F-51, F-52, F-56, F-57, F-58].

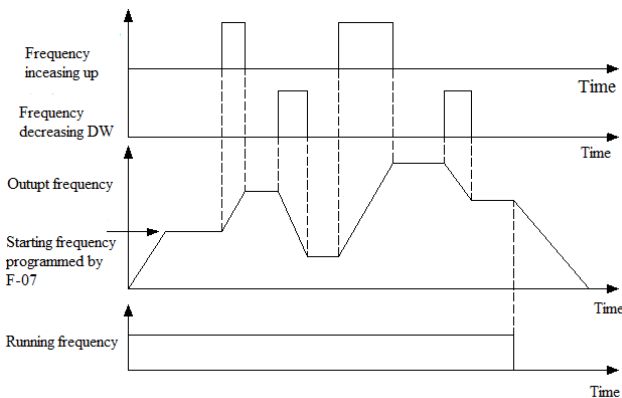
4: Terminal VS2 analog voltage -10-10V Main frequency given is determined and modified by control terminal VS2 analog input, Regarding the relationship between input analog and frequency, filter time of input analog, Please refer to parameters in detail [F-44, F-45, F-46, F-47, F-48, F-49, F-56F, -57, F-58].

5: Pulse train signal Main frequency given is determined and modified by control terminal (PUL) analog input, Regarding the relationship between input analog and frequency, please refer to parameters in detail [F-53, F-54, F-55, F-56, F-57, F-58].

6: RS485 communication port Main frequency given is determined by receiving signal of (A+) and (B-) of RS485 communication port.

7: Up and Down control Main frequency given is determined by increasing UP and decreasing (DOWN) terminal connecting or disconnecting(ON/OFF) with COM terminal; each of multi- terminal (X1-X6) can be programmed by frequency UP terminal and DOWN terminal, refer to [F-01-F-06] in detail; Initial frequency of up and down terminal control can be configured, please refer to parameter [F-07] LED ten digit option and [F-70].

The acceleration and deceleration time of UP and Down control running is determined by acceleration/ deceleration time 1 [E13-E-14] setting; The rate of speed change of Up and Down terminal is determined by acceleration/ deceleration time 2 [F-24-F-25] setting.



Up and down control diagram

8: General PID operation Select it use to set up general PID close loop control system. When it has been applied, the [H-16] present setting value can be modified by up and down arrow button of keypad.

9: Constant pressure PID control It can be used to set up constant pressure PID control (constant pressure water supply system etc) close loop system, the [H-16] present setting value can be modified by up and down arrow button of keypad.

10: Program running Main frequency given and rotation direction are configured by AC drive's inner simple PLC process control. Up to 8 steps speed control is available, more detail refer to [E-13, E-14, F-09-F-16, F-24-F-29, H-32-H-51].

Run and stop command of program running determined by present setting value of running control command selection.

When a step running time is set to 0, it means it will skip over this step when perform the program running. It is easy to set up the steps required of program running.

When [E-46] parameter is set to 2 for forbidding reverse running, AC drive will be run at 0 speed when arriving to a step which have been set to reverse running.

Program running and multi-step speed operation are designed to achieve AC drive variable-speed operation under a certain laws. Among the multi step operation, multi step speed switch over and rotation direction changing are achieved through the different combinations of external multi-step speed terminal with COM terminal ON and OFF. Multi step frequency, operation time, rotation direction can be defined by function parameters. Multi step speed control can be defined by each multi-function terminal, Please refer to [F-01-F-06] parameters.

11: Swing frequency run Output frequency periodically changes by pre-set decel & accel time. This function

is especially applicable to system which speed change vary with before and after the bobbin diameter in textile field.

12: Terminal selection The main frequency given channel programmed by terminal selection, refer to the parameter **[F-01-F-06]**

The relationship between terminal mode and frequency given channel as following table:

| Frequency given selection terminal 4 | Frequency given selection terminal 3 | Frequency given selection terminal 2 | Frequency given selection terminal 1 | Frequency given channel |
|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|-------------------------------|
| OFF | OFF | OFF | OFF | Operator keypad digital |
| OFF | OFF | OFF | ON | Potentiometer of keypad |
| OFF | OFF | ON | OFF | Terminal(VS1) voltage signal |
| OFF | OFF | ON | ON | Terminal (AS) current signal |
| OFF | ON | OFF | OFF | Terminal (VS2) voltage single |
| OFF | ON | OFF | ON | Terminal pulse train signal |
| OFF | ON | ON | OFF | RS485 communication port |
| OFF | ON | ON | ON | UP/Down control |
| ON | OFF | OFF | OFF | General PID operation |
| ON | OFF | OFF | ON | Constant pressure PID control |
| ON | OFF | ON | OFF | Program running |
| ON | OFF | ON | ON | Swing frequency run |

Tips: Frequency reference terminal valid combinations are 0-11(decimal), if not among this range, output frequency will be 0. The OFF of table stands for corresponding terminal with COM is disconnect, ON stands for corresponding terminal with COM is connect.

| | | | |
|------|---|------------|------------|
| E-03 | Frequency reference given auxiliary channel selection | Range:0-10 | Default: 0 |
|------|---|------------|------------|

Used for selecting frequency reference given auxiliary channel. The combination mode of auxiliary and main channel programmed by **[E-05]** parameters

0: Operator keypad digital given Auxiliary frequency given is set by up and down arrow key of keypad or parameters **[E-16]** configuring.

1: Potentiometer of keypad Auxiliary frequency given determined by potentiometer of keypad.

2: Terminal VS1 analog voltage 0-10V Auxiliary frequency given is determined and modified by control terminal VS1 analog input.

3: Terminal AS analog current signal 4-20mA Auxiliary frequency given is determined and modified by (AS) analog current input.

4: Terminal VS2 analog voltage -10-10V Auxiliary frequency given is determined and modified by control terminal VS2 analog input.

5: Pulse train signal Auxiliary frequency given is determined and modified by control terminal (PUL) analog input.

6: RS485 communication port Auxiliary frequency given is determined by receiving signal of (A+) and (B-) of RS485 communication port.

7: Up and Down control Auxiliary frequency given is determined by increasing UP and decreasing DOWN terminal connecting or disconnecting(ON/OFF) with COM terminal; each of multi- terminal (X1-X6) can be programmed by frequency UP terminal and DOWN terminal, refer to **[F-01-F-06]** in detail; Initial frequency of up and down terminal control can be configured, please refer to parameter **[F-07]** LED ten digit option and **[F-70]**.

8: General PID operation Selects it use to set up general PID close loop control system. When it has been applied, the **[H-16]** present setting value can be modified by up and down arrow button of keypad.

9: Constant pressure PID control It can be used to set up constant pressure PID control (constant pressure water supply system etc) close loop system, the **[H-16]** present setting value can be modified by up and down arrow

button of keypad.

10: Program running Main frequency given and rotation direction of AC drive are configured by AC drive's inner simple PLC process control. Up to 8 steps speed control is available, refer to [E-13, E-14, F-09-F-16, F-24-F-29, H-32-H-52]

Tips: Frequency main channel and frequency auxiliary channel can be set the same channel. In this case, the corresponding relationships between the frequency setting values and input signal are rather special, it need to consider the frequency main channel and auxiliary channel both characteristic at the same time. The combination of main and auxiliary frequency given still limited by upper frequency limit and lower frequency limit.

| | | | |
|------|--|-----------------|--------------|
| E-04 | Frequency reference given channel gain | Range:0.01-5.00 | Default:1.00 |
| E-05 | Frequency reference given channel combination mode | Range:0-10 | Default: 0 |

Frequency reference given channel gain: Uses to amplify or lessen the frequency input channel signal. Proportional regulating of frequency given both main and auxiliary channel is available.

Frequency given channel combination mode: Uses for selecting frequency given main channel and auxiliary channel combination. K stands for [E-04] setting value, MAX means takes the bigger among the both channel, MIN means takes the smaller among the both.

0:Main channel is valid, auxiliary channel is invalid.

1:Auxiliary channel valid, main channel invalid

2:Both channel non "0" value valid, main channel priority

3:Main channel + (K × auxiliary channel)

4:Main channel - (K × auxiliary channel)

5:MAX [main channel , (K × auxiliary channel)]

6:MIN [main channel , (K × auxiliary channel)]

7:Auxiliary channel + (K × main channel)

8:Auxiliary channel - (K × main channel)

9:MAX [(K × main channel), auxiliary channel]

10: MIN [(K × main channel), auxiliary channel]

Tips: 1. Terminal (VS2) will be quite special in the multi-channel combination case.

A. When (VS2) terminal don not activate the bipolarity adjustment and direct control function both ([F-48] set to 0), the combination mode determined [E-05] combination mode setting.

B. When (VS2) terminal activate the bipolarity adjustment and direction control function both ([F-48] set to 1), (VS2) terminal frequency given with bipolarity and frequency given in another channel implement signed arithmetic based on the combination mode selected, the absolute value is for frequency given, the signed determine the direction rotation of motor after calculation.

C. When (VS2) activate the bipolarity adjustment but no direction control. ([F-48] set to 2). (VS2) terminal frequency given with bipolarity and frequency given in another channel implement signed arithmetic based on the combination mode selected, the absolute value is for frequency given, the rotation direction depend on the[E-01] Running control command selection.

2. Swing frequency running, jog function and multi-step is disabled combine with auxiliary channel.

| | | | |
|------|-----------------------------|-----------|-----------|
| E-06 | Upper LED monitor selection | Range:0-7 | Default:0 |
| E-07 | Lower LED monitor selection | Rang:0-7 | Default:1 |

Uses to select the monitoring items displayed in two LED on the keyboard respectively. In the monitoring status, the upper LED monitoring item and the lower monitoring item can be modify directly via SET key and SHIFT key.

0: Frequency reference Given 1: Output frequency 2: Output current 3: Input voltage
4: Output voltage 5: Machine speed 6: PID given 7: PID feedback value

When there is only one LED on the keyboard, it is disable to modify the lower LED monitoring via the [E-07] and SHIFT key.

| | | | |
|------|--|-----------|------------|
| E-08 | REV/JOG key of keypad function selection | Range:0,1 | Default: 0 |
|------|--|-----------|------------|

Uses to select REV/JOG key of keypad function

0:Reverse This key is defined as reverse key (at this moment, keyboard functional indicator REV / JOG is not light). When the running control command selection is programmed as Operator keypad control, press this key, AC drive will perform reverse running.

1: Jog This key is defined as jog running key (at this moment, keyboard functional indicator REV / JOG is light). When the running control command selection is programmed as operator keypad control, press this key, AC drive will perform job running.

| | | | |
|------|------------------------------------|--|-----------------|
| E-09 | Maximum frequency | Range:0.01-600.0Hz | Default:50.00Hz |
| E-10 | Upper limit frequency | Range: lower limit frequency-maximum frequency | Default:50.00Hz |
| E-11 | Lower limit frequency | Range: 0.00-Upper limit frequency | Default:0.00Hz |
| E-12 | Lower limit frequency running mode | Range:0,1 | Default:1 |

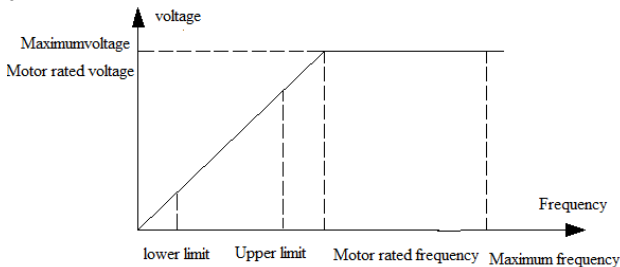
Maximum frequency: Maximum frequency of [E-09] is the maximum allowable output frequency of AC drive frequency, also is the reference point of acceleration and deceleration time setting.

Upper limit frequency: Output frequency upper limit value which is set base on the highest allowable speed of machine. When the frequency given is higher than upper limit value, the actual running frequency is upper limit frequency.

Lower limit frequency: Output frequency lower limit value of AC drive. When the frequency given is lower than lower limit value, the actual speed depend on the [E-12] setting.

Maximum frequency, upper limit frequency and lower limit frequency should be cautiously set base on the nameplate parameter of actual control motor and the need of the running conditions.

Except of upper limit frequency and lower limit frequency, the output frequency while AC drive running is limited by parameters setting of start-up frequency, free stop frequency, DC braking stop initial frequency, jump frequency and so on. The relationships between the maximum frequency, upper limit frequency and lower limit frequency is shown as the follow Fig.



Maximum frequency, upper limit frequency and lower limit frequency relationship. Fig.

Note: Lower limit frequency range is disabled for Jog function, only the upper limit frequency range is enable for Jog function.

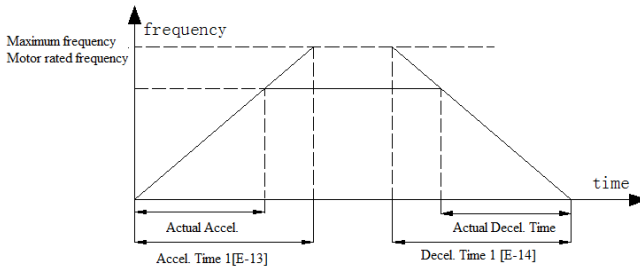
If the lower limit frequency operation mode [E-12] set to 0, the frequency given lower than the lower limit frequency, the AC drive would be run at 0.

If the lower limit frequency operation mode [E-12] set to 1, the frequency given lower than the lower limit frequency, the AC drive would be run at lower limit frequency.

| | | | |
|------|---------------------|-------------------|-----------|
| E-13 | Acceleration time 1 | Range:0.1-6500.0s | Default:※ |
| E-14 | Deceleration time 1 | Range:0.1-6500.0s | Default:※ |

Acceleration time 1: when[E-15]LED tens digit place to 1, it defined required time of out frequency accelerates from 0.00Hz to maximum frequency[E-09], when[E-15]tens bit place to 0, it defined required time of output frequency accelerates from 0.00Hz to motor rated frequency, refer to[E-15].

Deceleration time 1: when [E-15] tens digit place to 1, it defined required time of out frequency decelerates from maximum frequency [E-09] to 0.00Hz , when [E-15] tens bit place to 0, it defined required time of output frequency decelerates from motor rated frequency to 0.00Hz, refer to [E-15].



Accel./Decel. time diagram

- Note: 1.** In the general circumstance (no special specify), the acceleration/ deceleration time 1 is default setting. The acceleration time is only valid for normal acceleration running, not including the DC braking starting time and DC braking starting frequency holding time. The deceleration time only for normal deceleration running, not includes DC braking stop time.
- 2.** If activate the equidistant function, AC drive would be accelerate base on the accel. time 1, but decelerates based on equidistant stop decel. time setting. Refer to [E-15].
- 3.** If need apply other accel. & decel. time group, should be configure by control terminals setting, in the program running case, the accel./decel. time 1 is defined for first accel./decel. time, other 3 groups of accel./decel time setting is available, refer to [F-24-F-29]
- 4.** Jog acceleration and deceleration time are programmed by [E-26, E27]separately.

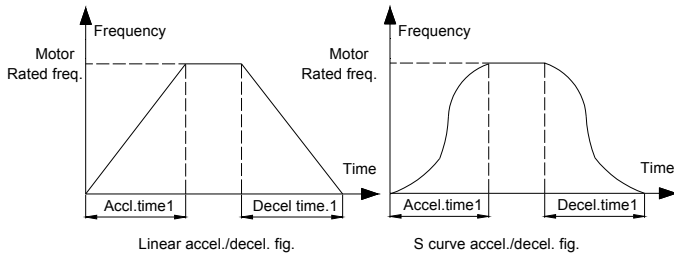
| | | | |
|------|----------------------------|-----------------|--------------|
| E-15 | Accel/decel mode selection | Range:0000-0111 | Default:0000 |
|------|----------------------------|-----------------|--------------|

LED unit digit: accelerate /decelerate mode.

AC70 series sensorless vector provide 2 kinds accelerate /decelerate mode, both kinds is enable during normal start, stop, forward and reverse running, accelerate, decelerate process.

0: linear accelerate Suitable for general load.

1: S curve S curve type accelerate/decelerate curve are designed for reducing noise and vibration, reduce starting and stopping shock or decreasing torque required during low speed, accelerate in short time required during high speed.ect during accelerate and decelerate process if need.



LED tens digit: Accelerate/decelerate time datum point.

0: Motor rated frequency Accelerate and decelerated time base on [H-53] motor rated frequency parameters setting.

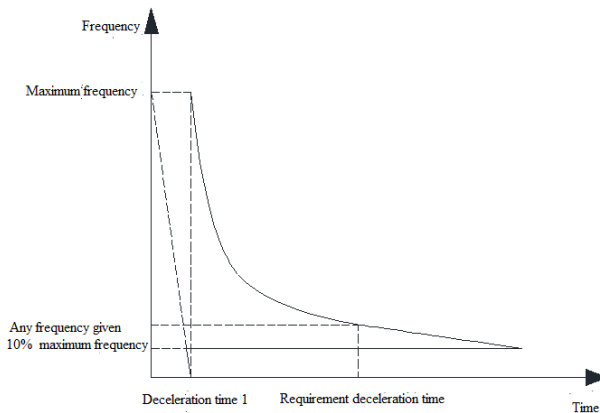
1: Maximum frequency Accelerate and decelerated time base on [H-09] maximum frequency setting.

LED hundreds digit: Equidistant stop function

0: Disable

1: Enable

Equidistant stop function: Takes the maximum frequency deceleration time as datum line, the AC drive stop rotation running turns as same as the maximum frequency stop rotation turns after AC drive performed stop command with any frequency. For example, the maximum frequency is 60Hz, deceleration time is 1s. If the maximum frequency decelerate stop rotation turns is 5, so the stop rotation turns also is 5 with 40Hz frequency given. The deceleration time of equidistant stop during difference frequency given change as following curve diagram show.



Equidistance deceleration time schematic diagram

Note: 1. This function is disabled when the frequency given less than 10% of maximum frequency, the AC drive decelerate based on the deceleration time, it will not performed the equidistant function when the frequency given less than 10% of maximum frequency.

2. The overvoltage and over current suppression occurs when the deceleration time is too short, the actual of deceleration time will be longer, and the equidistant function can't be performed.

LED Thousands digit:

0: Disable

1: Enable

| | | | |
|------|---|--|-----------------|
| E-16 | Frequency reference given by digital keypad | Range: lower limit frequency-upper limit frequency | Default:50.00Hz |
|------|---|--|-----------------|

It uses to set or modify frequency reference when the frequency given channel is set to operator keypad digital given.

Shortcut setting is available as well, changing the frequency reference via up/down arrow key of operator keypad when AC drive running or in standby mode.

| | | | |
|------|----------------|------------------|------------|
| E-17 | V/F curve mode | Range:0-4 | Default: 0 |
| E-18 | Torque boost | Range:0.0%-25.0% | Default: ※ |

V/F curve mode: Uses to select V/F curve mode to meet various of load characteristic requirement. AC70 vector control AC drive provides 4 kinds of fixed V/F curve and one kind of user defined V/F curve. Constant torque curve is optional for general load and descend torque curve is optional for square torque load such as water pumps and fans load.etc.

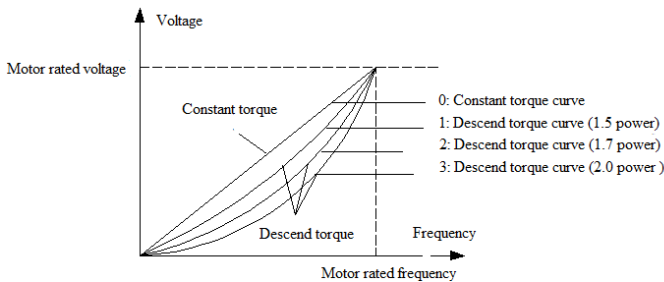
0: Constant torque curve

1: Descend torque curve(1.5 power curve)

2: Descend torque curve(1.7 Power curve)

3: Descend torque curve(2.0 Square curve)

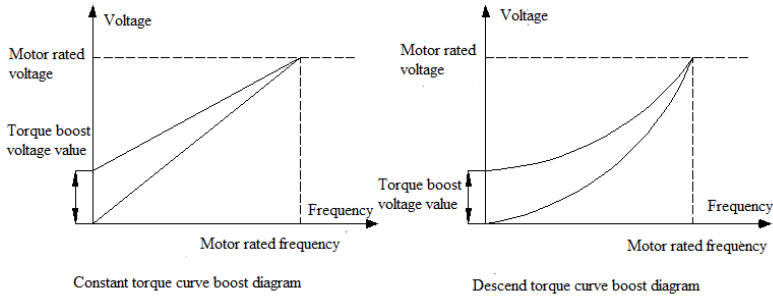
4: User define curve :AC drive runs base on user defined V/F curve.[E-18] function is disable, User can program appropriate V/F curves according to the load characteristic, for details please refer to[H-01-H-10].



V/F curve diagram

Torque boost: When [E-00] is set to 1(V/F control mode), it is used to enhanced torque output under low frequency running through output voltage boost compensation, when [E-00] is set to 0 (OLV control without PG), the torque boost improvement follows vector control mode.[E-18]setting parameters is disable.

Torque boost value selecting should be according to load inertia. If the boost value is too big, will result in motor overexcited running, and motor over heat easily, even worst, AC drive will occurs over current fault protection, or can't start AC drive properly.



| | | | |
|------|-------------|------------|------------|
| E-19 | Filter time | 0.01-99.99 | Default: ※ |
|------|-------------|------------|------------|

This function mainly used to torque boost in OLV control mode. The value setting is smaller, the response of torque boost is faster, the fluctuation of current is bigger, suitable for sudden changing load application; vice versa, the filter time setting is bigger, the response of torque boost is slower, the fluctuation of current is smaller, suitable for constant load application.

| | | | |
|------|-------------------|----------------------|------------|
| E-20 | Carrier frequency | Range:0.7KHz-15.0KHz | default: ※ |
|------|-------------------|----------------------|------------|

This function mainly used to improve the noise emitting and vibration possibility occurs during AC drive operation. The waveform of current will be good when the carrier frequency is bigger, the noise of motor is smaller. It is very suitable for application that silent required, but in this case, but the switching loss of main component is bigger, the temperature rise, efficiency reduces, and output power is smaller. Meanwhile, the radio interference will be bigger, the leakage of capacitor also increases when run in high carrier frequency, that will result in malfunction of residual leakage protector which if have installed, over current will be possibility occurs as well. When frequency carrier is low, it is contrary to the phenomenon mentioned above.

The response of difference motors to carrier frequency is different. The best carrier frequency should be adjust to gain according actual application site. But the carrier frequency should be set smaller for bigger capacity motor.

Veichi reserve the right to restrict biggest carrier frequency.

| Carrier frequency | Motor noise | Electrical interference | Switching loss |
|-------------------|-------------------|-------------------------|----------------|
| 0.7KHz | big ↑ small | small ↓ big | small |
| 8.0KHz | | | ↓ |
| 15.0KHz | | | big |

Below 4KW: When the carrier frequency is 6 KHz, rated current is the maximum output current.

5.5KW-22KW: When the carrier frequency is 3 KHz, rated current is the maximum output current.

30KW-75KW: When the carrier frequency is 2 KHz, rated current is the maximum output current.

Above 93KW: When the carrier frequency is 1.5 KHz, rated current is the maximum output current.

Note: In order to obtain better control characteristics, the ratio of the carrier frequency to maximum frequency of the AC drive should not less than 36. If AC drive works long-term in low frequency, suggest to reduce the carrier frequency to reduce the impact of the dead zone time.

| | | | |
|------|------------------------|-----------------|---------------|
| E-21 | Carrier characteristic | Range:0000-1211 | Default: 1010 |
|------|------------------------|-----------------|---------------|

LED unit Digit: Associate of carrier frequency and output frequency configure.

0: Output frequency associate is disabled.

1: Output frequency associate is enabled.

When the associate of carrier frequency of output frequency is enable, the AC drive will adjust the carrier frequency automatically according the output frequency, this function can improve the torque performance in low speed, if combine with torque boost function will make performance better in low speed.

LED tens digit: Associate of carrier frequency and module temperature configure.

0: Module temperature associate is valid.

1: Module temperature associate is invalid.

AC drive will reduce the carrier frequency when the temperature of AC drive rise, this function can reduce the switching loss to prevent over heat fault occurs.

LED hundreds digit: PWM mode selection

0: Fixed PWM mode The noise frequency of motor is fixed.

1: Random PWM mode 1 This mode enables the harmonic spectrum of AC drive output voltage evenly distributing in a wide frequency range to inhibit the electrical noise and vibration effectively, carrier frequency is 2.0KHz.

2: Random PWM mode 2 As the same as above mention, but carrier frequency is 2.5KHz.

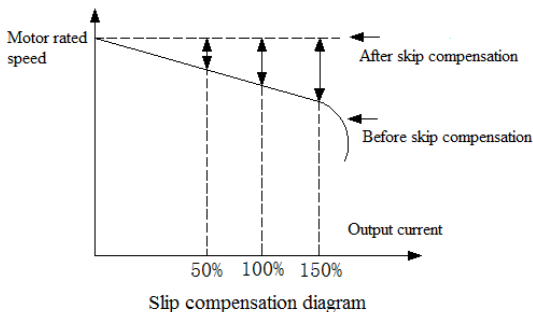
LED thousands digit: Inhibition of shock.

0: Inhibition of shock is disabled.

1: Inhibition of shock is enabled.

| | | | |
|------|-----------------------|---------------|---------------|
| E-22 | V/F slip compensation | Range:0%-200% | Default: 100% |
|------|-----------------------|---------------|---------------|

This function enables output frequency of AC drive automatically regulate with the load of motor changing. This can compensate slip frequency of motor dynamically, it enables the motor maintaining a constant rotation speed to reduce the load changing impacts on the motor speed effectively.



If cooperate with auto torque boost function, the torque performance in low frequency characteristic of AC drive will be significantly improved. The value of slip frequency compensation should be set base on motor rated slip, should not set the value of compensation too large.

| | | | |
|------|------------------------------|------------------|---------------|
| E-23 | Energy saving mode selection | Range: 0000-0011 | Default: 1000 |
|------|------------------------------|------------------|---------------|

LED unit digit: Auto energy saving selection

0: disable

1: enable

During running process, AC drive can automatic calculate the best output voltage to load according to the load condition for energy saving. Energy saving function works by reducing output voltage, enhancing the power factor and improve motor efficiency.

LED tens digit: V/F slip compensation

0: Disable

1: Enable

If only activate the slip compensation function in V/F control mode, this parameters used for selecting slip compensation function.

LED Hundreds digit: Reserve

LED Thousands digit: Over modulation

0: Over modulation allowed

1: Over modulation not allowed

| | | | |
|------|----------------------------------|---------------|-----------|
| E-24 | Voltage auto regulation function | Range:0,1,2,3 | Default:2 |
|------|----------------------------------|---------------|-----------|

0: Disable

1: Enable in full process

2: Disable only in deceleration

Output voltage auto regulation function that is AVR function. When AVR function disable, the output voltage change vary with input voltage. When the AVR enable, the output voltage will keep in setting value as long as the minimum of fluctuation input voltage bigger than output voltage setting (Motor rated voltage). When the power supply voltage less than rated output voltage, the output voltage will decrease follow with input voltage.

| | | | |
|------|-----------------------|--------------------------------|----------------|
| E-25 | Jog frequency | Range:0.50Hz-maximum frequency | Default:5.00Hz |
| E-26 | Jog acceleration time | Range:0.1-6500.0s | Default:2.0s |
| E-27 | Jog deceleration time | Range:0.1-6500.0s | Default:2.0s |

The jog frequency function has the highest control priority (terminal jog function). It means in any condition, when jog command is valid, the AC drive immediately run from the current running frequency to the jog frequency based on jog accelerates/decelerates time. The jog accelerates/decelerates time is defined as same as

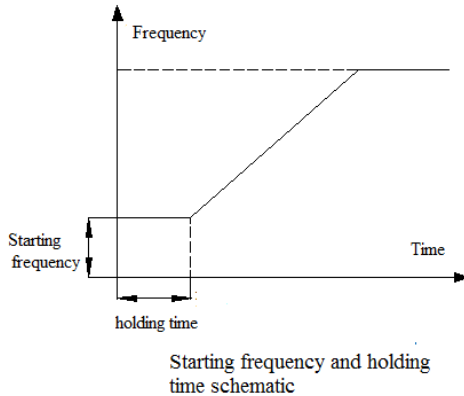
accelerates/decelerates time, which can be configured by the keyboard, control terminal or job function control command of RS485.

Note: The setting value of the jog running frequency is only limited by the upper limit frequency. Only the priority of job terminal control free from limitation of running control command channel. Other jog command have priority only under the same running control command channel, such as the keypad job command is enabled only in the operator keypad control running.

| | | | |
|------|------------------------------|----------------------|----------------|
| E-28 | Start frequency | Range:0.00-60.00Hz | Default:0.50Hz |
| E-29 | Start frequency holding time | Range time:0.0-20.0s | Default:0.0s |

Start frequency: The initial output frequency when AC drive starting. The large starting torque is available if the starting frequency is properly set. It can gain high impact when starting instantaneous for some load that has a bigger static friction force in static status. But it will result in a trip if the value is set to big.

Start frequency holding time: It means the AC drive keeps running time under starting frequency.



Note: The frequency output is 0 when the frequency given less than starting frequency during the acceleration process.

| | | | |
|------|-------------------------|-----------------|--------------|
| E-30 | Starting mode selection | Range:0000-1102 | Default:※000 |
|------|-------------------------|-----------------|--------------|

LED unit digit: Starting mode selection.

0: Starts from starting AC drive starts with [E-28] starting frequency given and [E-29] starting frequency holding time given. Applicable for application which has big static friction torque, light load inertia, Or suit to work together with machinery that equipped external mechanical braking. That is occasion where the shaft of motor can maintain still before start, but after motor stop.

1: DC braking first, and then start from starting frequency Perform DC braking function first with DC braking voltage [E-35] and DC braking time [E-38] to feed motor a center DC braking energy (Electromagnetic braking), and then starts with starting frequency. Applicable for occasion there are forward or reverse running of small inertia load in stop status.

2: Restart after speed searching AC drive try to detect the speed of a rotating motor shaft that is driven by external forces first and start the motor operation directly from the detected speed to frequency given according acceleration /deceleration time.

Note: During forward/reverse switching process in normal operation, and perform accel/decel process after frequency given modifying, both start from 0.0Hz or stop to 0.0Hz.

LED tens digit: Reserve

LED hundreds digit: Speed search direction

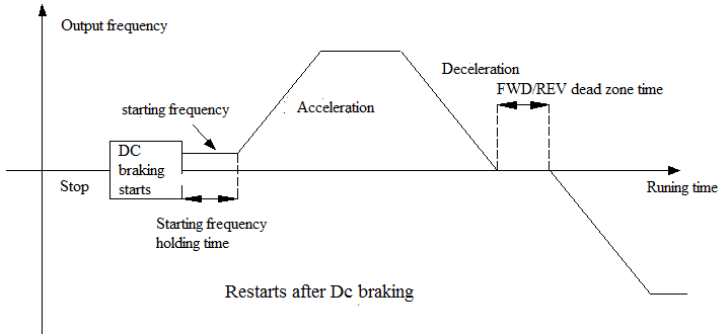
0: Speed search performs only in running direction

1: Bi-speed search performs

LED thousands digit: Speed search mode

0: Software speed search

1: Hardware speed search



| | | | |
|------|--------------------------------|-----------------|--------------|
| E-31 | Power off restart selection | Range:0,1 | Default:0 |
| E-32 | Power off restart waiting time | Range:0.0-10.0s | Default:0.5s |

Power off restart selection:

0: Disable AC drive runs must receive running command given after power off when Power on.

In operator keypad or RS485 communication control mode, the running command will be clear automatically when AC drive off.

In the external terminal control mode, the control command of FWD/REV terminal is valid, ignore any parameters setting of [E-31] when power on again after AC drive power off.

1: Enable If AC drive is running before power off, the AC drive starts automatically after waiting time [E-32] setting when power on again.

Note: The restart power off function enable AC drive operates automatically after power on again. There fore, there is huge contingency, please be cautious to apply this function ensure safety of person and equipment.

Power off restart waiting time: when the [E-31] setting is valid, AC drive starts operation after waiting time [E-32] when power on again.

The principles of this time setting is base on the factors such as the work resume preparation time of equipments which correlate with the AC drive after power on again.

| | | | |
|------|---------------------|--------------------|----------------|
| E-33 | Free stop frequency | Range:0.00-60.00Hz | Default:0.00Hz |
|------|---------------------|--------------------|----------------|

When AC drive receives the stop command under deceleration stop mode, it will decelerate to free stop frequency base on the deceleration time, and then lock output, motor stop freely.

Note: This function is valid in stop mode only, disable in Forward/Reverse process.

| | | | |
|------|-----------|------------|-----------|
| E-34 | Stop mode | Range :0,1 | Default:0 |
|------|-----------|------------|-----------|

0: Deceleration stop AC drive stop output after decelerate to free stop frequency according to deceleration time and deceleration mode given.

During the decelerate process, when the frequency given less than starting frequency of DC braking stop, the output frequency will jump to zero, and perform DC injection braking, after then stop working if the DC injection braking function is activated.

During the deceleration process, when the DC bus voltage over the [E-53] dynamic braking threshold voltage value, the AC drive will output pulse voltage base on dynamic braking ratio [E-54] setting for built in braking unit model

(through 15G/18.5P), able to connecting external braking resistor. For no built braking unit machine, can connect external braking unit.

This stop mode mainly used to application which need quick braking required.

1: Free stop After receiving the stop command, AC drive will block the output and motor will run to

stop freely. Generally coordinate external mechanical braking to achieve quick stop when this stop mode has been selecting.

| | | | |
|------|---|--------------------|--------------|
| E-35 | DC braking voltage | Range:0%-150% | Default:50% |
| E-36 | DC braking time when stop | Range:0.0-30.0s | Range:0.0s |
| E-37 | DC braking starting frequency when stop | Range:0.00-60.00Hz | Range:0.00Hz |
| E-38 | DC braking time when start | Range:0.0-10.0s | Range:0.0s |

DC braking voltage: The value of voltage which is injected to motor when executing DC braking function. The value of voltage benchmark against the input rated current of AC drive.

This function can output torque under zero speed. Generally, it uses to improve the stop accuracy and realize quick stop, but it can't be apply for normal deceleration. The AC drive will stop output once DC braking has been performed. If the DC raking current set to big, over current fault occurs easily during stop.

DC braking time when stop: DC braking current lasting time when AC drive stops, if the braking time is set to 0, it means the DC braking function is disabled.

DC braking starting frequency when stop It means when AC drive decelerated to this frequency, the AC drive will stop output, and perform the DC braking function. If the output frequency less than DC braking starting frequency when stop during running process, the AC drive will stop output, start DC braking function when receiving the stop command.

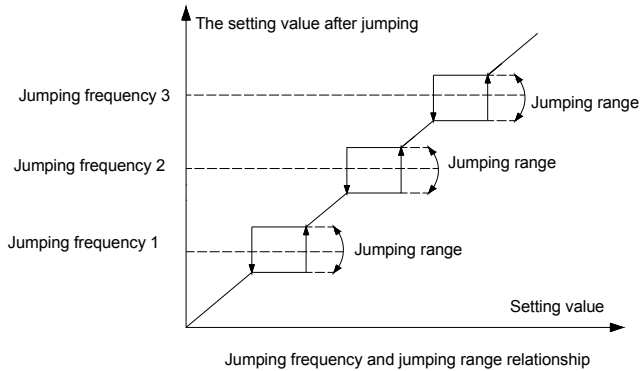
The AC drive will start DC braking, and the output frequency jump to zero if the frequency given less than DC braking staring frequency when stop during the deceleration process. The DC braking staring frequency when stop should be set smaller when there are no strictly requirement for stop. When the DC braking staring frequency when stop[E-37]parameters setting smaller than free stop frequency [E-33] setting, the AC drive will decelerate to free stop frequency, and then stop output execute DC braking.

DC braking time when start: It refer to DC braking voltage lasting time when stop. Only if [E-30] parameters unit digit set to 1, the DC braking function will be enabled. When the braking time set to 0.0s, not perform DC braking function

| | | | |
|------|----------------------|--------------------|----------------|
| E-39 | Jump frequency 1 | Range:0.00-600.0Hz | Default:0.00Hz |
| E-40 | Jump frequency 2 | Range:0.00-600.0Hz | Default:0.00Hz |
| E-41 | Jump frequency 3 | Range:0.00-600.0Hz | Default:0.00Hz |
| E-42 | Jump frequency range | Range:0.00-5.00Hz | Default:0.00Hz |

The Jump frequencies are frequency ranges at which the drive will not operate. The drive can be programmed with three separate Jump frequencies to avoid operating at speeds that cause resonance in driven machinery. If the frequency reference falls within a Jump frequency dead band, the drive will clamp the frequency reference just below the dead band and only accelerate past it when the frequency reference rises above the upper end of the dead band.

Jump frequency range: The frequency up and own jumping bias base on jump frequency



- Note:** 1. The output frequency still will pass the jumping range during acceleration or deceleration. Make sure the parameters don't overlap or inset setting.
 2. Jumping frequency is disabled for jog, multi-step speed and swing frequency.

| | | | |
|------|---------------------------------|-----------------|--------------|
| E-43 | Number of auto restart attempts | Range:0-3 | Default:0 |
| E-44 | Fault auto reset waiting time | Range:0.1-20.0s | Default:1.0s |

Number of automatic fault reset: 0: Disable, The auto reset function is disabled, reset only by manual.

1—3: Enable, 1-3 parameters used for defining the numbers of auto reset. (The maximum time of auto reset is enabled)

The AC drive may be trip to stop cause by fluctuation of grid and other accidents reason during operation. Auto reset for overload, over current, system abnormal, overvoltage, under voltage. etc fault occurs is allowable to restart AC drive operation ensure system working continuously. AC drive will restart with speed search restart mode during auto reset.

If the auto reset fails to restart during the setting give numbers, the fault protection will be activate, AC drive stop output. The maximum of auto reset number setting is 3, the reset numbers will be recount after AC drive running normally for 10 minutes, the record times clears automatically. Suggest configure number of auto reset to 1 times will be better.

The fault output terminal can be set disable or enable during fault auto reset process. Refer to [F-30,F-31,F-32] Fault auto reset waiting time: Uses for defining the waiting time from fault occurs to reset attempts.

Note: 1. This function only enable for overload, over current, system abnormal, over voltage, under voltage during running, disable for other fault happen.

2. Reset can't make if fault fail to solve, no reset for the temperature of AC drive over 70℃

Tips: Users must be cautious to consider the start characteristic of the mechanical devices in crane, lifting application. It should be cautious in using this function for application which can't start with load or the alarm will come out immediately when AC drive stop output.

| | | | |
|------|----------------------|-----------------|--------------|
| E-45 | Machine warm up time | Range:0.0-6500s | Default:0.0s |
|------|----------------------|-----------------|--------------|

AC drive enables command operation after machine warm up time, once power supply switch to AC drive. It displays count down in seconds after switch on.

| | | | |
|------|-----------------------------|-----------|-----------|
| E-46 | Running direction selection | Range:0-2 | Default:0 |
|------|-----------------------------|-----------|-----------|

0: Consistent with the default direction
 actual direction don't change.

Actual rotation direction is the same with the requirement. The

1: Opposite to the default direction Actual rotation direction is opposite to the requirement. The actual direction will be change.

2: Reverse running forbidden When this parameter is set as prohibition, all the reverse command from Running control command selection (operator keypad, external terminal, RS485 communication, bipolar VS2 and program running) are invalid.

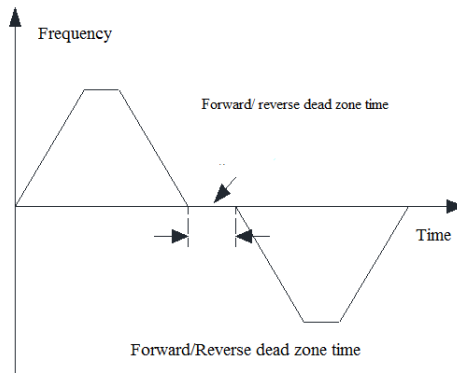
The setting will not be modified after the factory default setting.

Note: 1. When the reverse running forbidden is selected, when the bipolar control receiving the reverse frequency command, the AC drive will be operation with 0 speed, the case is the same, AC drive will be operate with 0 speed during program running control if there are some certain step speed reverse direction are set.

2. All reverse command will be auto turn to running command, running with forward direction.

| | | | |
|------|------------------------|-----------------|--------------|
| E-47 | FOR/REV dead zone time | Range:0.0-10.0s | Default:0.0s |
|------|------------------------|-----------------|--------------|

The function defined the transient waiting time from forward to reverse or from reverse to forward during 0Hz. FOR/REV dead zone time special designed for big inertia load application which has mechanical dead zone required.



| | | | |
|------|--------------------------------|-------------|-----------|
| E-48 | Cooling fans running selection | Range:0,1,2 | Default:※ |
|------|--------------------------------|-------------|-----------|

Uses select cooling fan running mode.

0: Fan runs when AC drive switch on. Cooling fan stop when under voltage condition, it runs when power supply is stable.

1: Relates with temperature during AC drive stop mode, fan runs when AC drive running

Fan stop or not is relate to temperature of module during stop mode, fan would operate when the temperature is above 45℃, stop when module temperature lower 40℃. Fan runs immediately when AC drive receives a run command.

2: Fan stop during AC drive stop mode, relates with temperature during AC drive running. Fan stop or not is related to temperature of module during AC drive running mode, fan runs when the temperature of module is above 45℃, stops when temperature of module is lower than 40℃. Fan stops always during AC drive stop mode.

Note: Use this function correctly enable extend fans working life.

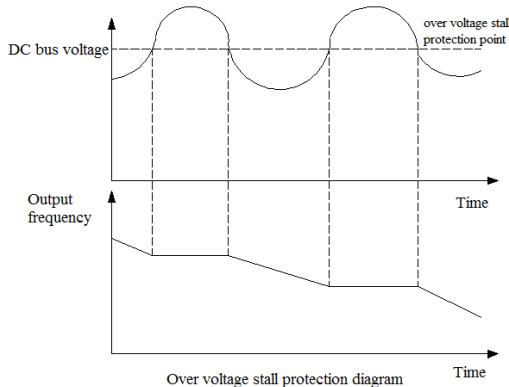
| | | | |
|------|------------------------------------|-----------------|--------------|
| E-49 | AC drive protecting mode selection | Range:0000-1111 | Default:0※11 |
|------|------------------------------------|-----------------|--------------|

LED unit digit: Overvoltage protecting selection during deceleration

0: Disable 1 Enable

During the AC drive deceleration, the energy generated by motor feedback to AC drive inside due to load inertia effect, which will cause the voltage of AC drive over the maximum voltage threshold. The over voltage protecting occurs if without any measure. When overvoltage protection is activated, the AC drive deceleration stops (output frequency stop descend) when detecting the DC bus voltage over[E-53]setting, deceleration only allow to continue until the DC bus voltage is lower than the protective value.

Note: It will cause the stop time from deceleration given to stop to be longer if the stall protection is active.



LED ten digit: Output phase missing protection

0: Disable 1: Enable

Used for detecting if output wiring missing when AC drive power on, if there are any output phase missing, the Err2 occurs, fault output terminal will be activated.

LED hundred digit: Input phase missing protection

0: Disable 1: Enable

AC drive performs phase missing detecting for 3 phase AC input, if any phase missing, Err1 will occurs, and stop output. Motor will carry out free stop, the fault output terminals will be activate.

LED thousand digit: AC drive overload, over heat protect mode selection.

0: Free stop 1: running with current limit

This parameter will determine the protection mode when overload, over heat occurs.

Free stop means that output of AC drive stop immediately, and active 'OL2' and 'OH' fault alarm.

The running with current limit is that AC drive running is based on output current limit. If the current over the current limit value, the output frequency will be decreased to reduce the load current. The output terminal [F-30-F-32] can be used to output pre-alarm signal when overload happens.

Current limit value during overvoltage and overheat=rated current ×100%

| | | | |
|------|---|----------------|------------|
| E-50 | Coefficient value of electronic thermal | Range:30%-120% | Default:0% |
|------|---|----------------|------------|

Motor will generate heat seriously in a long time overload running. This parameter is used to set coefficient of thermal relay of motor in AC drive. When the rated current of motor is equal to rated current of AC drive, the value can be set 100%, when the rated current of motor can't match the rated current of AC drive, this parameter value can be set for motor overheat protection properly.

The factory default setting of overload capacity of AC drive as follows:

G type: 150%× rated current for 1 minute.

F type: 120%× rated current for 1 minute.

The parameters setting value can follow below formula:

Coefficient value of electronic thermal=rated current/ rated output current of AC drive

Note: This function would fail when one AC drive drives multiple motors in parallel. Please install the thermal relay before motor input to protect motor effectively

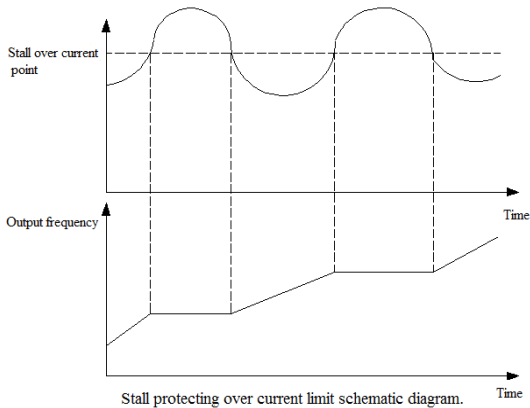
| | | | |
|------|--------------------------------------|-----------------|-------------------|
| E-51 | Stall protecting current limit value | Range:100%-250% | Default:160G/120P |
|------|--------------------------------------|-----------------|-------------------|

It is used to define the ratio of stall protection current limit to rated current motor.

G type default setting: 160%

P type default setting: 120%

Stalling protecting current limit function means that AC drive will limit load current automatically with in time monitoring during the acceleration, make it lower than the limit setting, (Stops acceleration or lower the output frequency to achieve the value of output current controlling), to protect big current occurs result in fault alarm trip. This function is suitable for application where has big inertia or load fluctuates severe particularly.



This parameters datum line is rated current of AC drive. It will extend acceleration time longer. It means the current limit function is activated if the frequency can't accelerate to set value or frequency given, but fluctuates in the fixed frequency range. Please reduce the load or adjust the some relevant parameters.

| | | | |
|------|---|-----------------|--------------|
| E-52 | Stall protecting DC bus voltage threshold | Range:105%-160% | Default:138% |
|------|---|-----------------|--------------|

This parameter is defined as the ratio of the stall protection DC bus voltage threshold to rated DC bus voltage of AC drive.

Rated AC drive DC bus voltage value=Rated input voltage of AC drive *1.414

It defines the over overvoltage stall protecting threshold during the deceleration time. While the DC side pumping voltage cause by decelerating exceeds this parameter settings, the AC drive will auto-prolong the deceleration time.

| | | | |
|------|---|------------------|---------------|
| E-53 | Dynamic braking and decelerating over voltage suppression threshold voltage | Range: 105%-160% | Default: 130% |
| E-54 | Ratio of dynamic braking | Range: 0%-100% | Default: 100% |

Decelerating overvoltage suppression threshold voltage: This value is enabled while [E-49] set to 1

Dynamic braking over voltage threshold voltage: The dynamic braking will be activate when the DC bus voltage rise over than rated voltage of AC drive [E-53] setting. The voltage of dynamic braking stop is lower 20V than

[E-53] setting, please make this setting cautiously.

This function is valid for AC drive which built in braking accessory only, AC70 series 22G/30 and 30G/37 both AC drives have braking accessory option, standard built in braking accessory through 15G/18P AC drive.

Please

select braking unit or braking accessory if need for other model.

Ratio of dynamic braking: This parameter defines the average of voltage which applied on the braking resistor when braking unit effecting. The voltage applied on the braking resistor is PWM wave, the duty cycle is equal to ratio of dynamic braking. The ratio bigger, energy release faster, the braking effects better, and the same time the more energy consumes on the braking resistor. Selecting the braking resistor value, power and braking effects should take comprehensive consideration to set this parameter.

| | | | |
|------|---------------------------------------|---------------|--------------|
| E-55 | DC bus under voltage protecting value | Range:60%-90% | Default: 65% |
|------|---------------------------------------|---------------|--------------|

This parameter defines the DC bus side lower limiter voltage while AC drive in normal working condition. It allow to set under voltage protecting levels lower to ensure AC drive normal working for power grid lower situation.

Note: The output torque will be reduced when the power grid voltage is low. For the constant power load and constant torque load application, the too low power grid voltage will increase input and output current, which will reduce the AC drive ruing reliability.

| | | | |
|-----------|---------|--|--|
| E-56-E-58 | Reserve | | |
|-----------|---------|--|--|

| | | | |
|------|-------------------------------------|--------------------|----------------|
| E-59 | Rotation speed display scale factor | Range:0.1-2000.0 % | Default:100.0% |
|------|-------------------------------------|--------------------|----------------|

It uses to set the display factor of keypad monitor, 100.0% correspond with motor rated speed. The upper limit machine speed is 65000 RPM.

| | | | |
|------|----------------------------------|----------------|--------------|
| E-60 | Ratio of AC drive output voltage | Range:50%-110% | Default:100% |
|------|----------------------------------|----------------|--------------|

Ratio of output voltage to rated voltage of AC drive. This function uses to coordinate the output voltage to meet various types of V/F characteristic requirement.

Output voltage of AC drive = rated voltage of AC drive × Ratio of AC drive output voltage

| | | | |
|------|------------------|-------------|-----------|
| E-61 | G/P type setting | Range:0 , 1 | Default:0 |
|------|------------------|-------------|-----------|

When reset the factory setting, this parameter setting values will not be changed.

0:G model, it is suitable for constant torque load.

1:P model, it is suitable for variable torque (such as fan, water pump load) .

The AC70 series AC drive adopts G/P in one mode. The power of the motor adaptability used in the constant torque load (G model) is lower one grade than that used in fan, water pump load (P model)

| | | | |
|------|-------------------------------------|-------------------|----------------|
| E-62 | Speed search stability keeping time | Range:0.20-10.00s | Default:0.600s |
|------|-------------------------------------|-------------------|----------------|

This parameter defines the time of AC drive try to run stably when AC drive detected the frequency point during speed search process. AC drive accelerates to frequency set point with acceleration time given.

For the big inertia load, extend the speed search stability keeping time can reduce the instantaneous impact current of speed search start.

| | | | |
|------|------------------------------|-----------|------------|
| E-63 | Parameters change protection | Range:0-2 | default: 0 |
|------|------------------------------|-----------|------------|

0: All the parameters changing allowed Except for the parameters only for inquiry, any other parameters can be changed (Note: Some parameters only can be changed in the stop state, some parameters can not be changed in any condition).

1: Only keyboard digital given parameter changing allowed Except for the keyboard digital given frequency and keyboard number PID given quantitative parameter, any other parameter don't allow changing.

2: All the parameters prohibit changing All the parameters of AC drive unchangeable; When users need to change the parameter, They have to change this parameter as 0 or 1.

| | | | |
|------|--------------------------|-----------|------------|
| E-64 | Parameter initialization | Range:0-4 | Default: 0 |
|------|--------------------------|-----------|------------|

0: Null

1: Restores to factory default setting value Function parameters will restore to factory default setting after performed parameters initialization.

2: Clear fault record All historical fault record will be cleared.

3: Transfer parameters of AC drive to keypad and save. Copy parameters saved of AC drive to keypad and preserve.

4: Transfer parameters saved of keypad to AC drive Download parameters of keypad to AC drive.

Note: During the AC drive running state, Parameters saved of keypad can't transfer to AC drive when in fault state or no parameters save in keypad.

2. If keypad is pulled out during transferring parameters of AC drive to keypad and saving process, this function will be fail. It need redo parameters copy.

3. If the first part of parameters has been modified, the latter part hasn't been changed when keypad is pulled out during transferring parameters copy of keypad to AC drive. This function need redo again.

4. The current running state of AC drive will not be stored in parameters of AC drive transfer to keypad operation. All keypad are null and invalid when transferring the parameters saved of keypad to AC drive.

5. When E.CPE (parameters copy abnormal) appears on the keypad in parameters copy operation, the copy is stopped at this moment. It need redo copy again with pressing PRG button return to monitor state.

6. The parameter saved of keypad can't be transfer to AC drive if the version is incompatible with E.EDI display.

Note: The current setting value of [E-46, E-61] will not be affected when performing the factory default restoring. The setting value 3 or 4 of [E-64] parameters will be set to 0 automatically after parameters copy.

| | | | |
|------|------------------|--------------|------------|
| E-65 | Factory password | Range:0-9999 | Default: 0 |
|------|------------------|--------------|------------|

Manufacturer inquiry parameters.

| | | | |
|------|-------------------|--|------------|
| E-66 | Information check | LED unit digit: 0: Null operation 1: State monitoring inquiry 2: Fault information inquiry LED ten digit: LCD display language 0: Chinese 1: English | Default: 0 |
|------|-------------------|--|------------|

LED unit digit:

0: Null operation

1: State monitoring inquiry

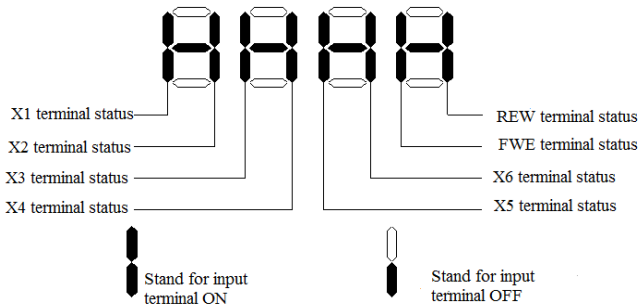
2: Fault information inquiry

0: Null operation

1: State monitoring inquiry Selects this function to enter monitoring menu (group C parameters) ,and inquire each state parameters of the AC drive. In the monitoring state, with long pressing (1 second) PRG key and enter directly the state of the group C parameters that is status of state monitoring inquiry.

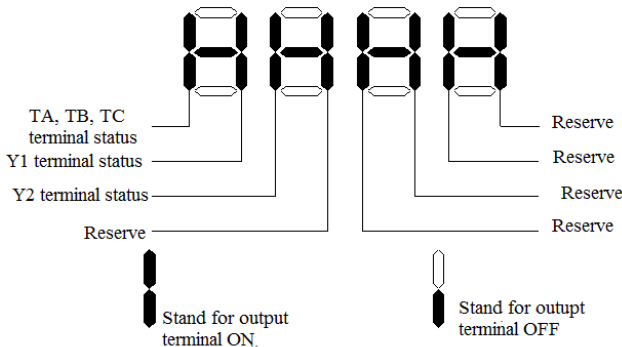
| Monitoring code | Content | Unit | Communication cod |
|-----------------|---|----------------------|-------------------|
| C-01 | Frequency reference given | 0.01Hz | C01H |
| C-02 | Output frequency | 0.01Hz | C02H |
| C-03 | Output current | 0.1A | C03H |
| C-04 | Input voltage | V | C04H |
| C-05 | Output voltage | V | C05H |
| C-06 | Machine speed | RPM | C06H |
| C-07 | PID given value | % | C07H |
| C-08 | PID feedback value | % | C08H |
| C-09 | Module temperature | ℃ | C09H |
| C-10 | Accumulative running time (the total timing of output frequency which large than 0Hz, 0Hz running and stop status timing is disabled) | Hour | C0AH |
| C-11 | Accumulative running timing after last power on | Minute | C0BH |
| C-12 | Output current percentage | % | C0CH |
| C-13 | Multi-Step operation remainder time percentage | % | C0DH |
| C-14 | Input terminals OFF/ON status | Refer to below table | C0EH |
| C-15 | Output terminals OFF/ON status | Refer to below table | C0FH |
| C-16 | Terminal VS1 input value | 0.1V | C10H |
| C-17 | Terminal AS input value | 0.1mA | C11H |
| C-18 | Terminal VS2 input value | 0.1V | C12H |
| C-19 | Terminal pulse input value | ※ | C13H |
| C-20 | Counter record | ※ | C14H |
| C-21 | DC bus voltage | V | C15H |
| C-22 | Analog output A01 | ※ | C16H |
| C-23 | Frequency/voltage/current outputA02 | ※ | C17H |
| C-24 | Reserve | -- | C18H |
| C-25 | AC drive rated power | kW | C19H |
| C-26 | AC drive rated voltage | V | C1AH |
| C-27 | AC drive rated current | 0.1A | C1BH |
| C-28 | Software version | ※ | C1CH |

Input terminal OFF/ON state schematic diagram



Input terminal OFF/ON status diagram

Output terminal OFF/ON status schematic diagram



Output terminal ON/OFF status diagram

2: Fault information inquiry

After inquiry setting, digital LED display below table information. Recycling shows is available via press up and down keys.

| Serial number | Definition | Remark | Communication code |
|---------------|---|---|--------------------|
| Er.01 | The latest fault information | Refer to fault information code to get more in detail | E01H |
| Er.02 | The cumulative running time before the latest fault | Units: hour | E02H |
| Er.03 | Output frequency while the latest fault | Units: Hz | E03H |
| Er.04 | DC bus voltage while the latest fault | Units: V | E04H |
| Er.05 | Output current while the latest fault | Units: A | E05H |
| Er.06 | Output voltage while the latest fault | Units: V | E06H |
| Er.07 | Module temperature while the latest fault | Units:℃ | E07H |

| | | | |
|-------|--|---|------|
| Er.08 | Running direction while the latest fault | 0.Forward 1.reverse | E08H |
| Er.09 | Running status while the latest fault | 0. Stop 1. Constant running 2. Acceleration 3. Deceleration | E09H |
| Er.10 | Protection status while the latest fault | 0. Normal 1. Only voltage amplitude limit 2. Only current amplitude limit 3. Both voltage and current amplitude limit | E0AH |
| Er.11 | Input terminal status while the latest fault | See above table | E0BH |
| Er.12 | Output terminal status while the latest fault | See above table | E0CH |
| Er.13 | The latest first fault information | | E0DH |
| Er.14 | The latest second fault information | | E0EH |
| Er.15 | The latest third fault Information | | E0FH |

Fault information code table:

| Serial number | Keyboard display content | Fault information |
|------------------|--------------------------|--|
| 0 | ---- | No fault |
| 1 | L.U.1 | The power supply is too low in stop (Don't record this fault in fault logging) |
| 2 | L.U.2 | The power supply is too low in running (Don't record this fault in fault logging) |
| 3 | o.U.1 | Overvoltage in acceleration |
| 4 | o.U.2 | Overvoltage in deceleration |
| 5 | o.U.3 | Overvoltage in constant speed |
| 6 | o.U.4 | Over voltage in stop |
| 7 | o.C.1 | Over current in acceleration |
| 8 | o.C.2 | Over current in deceleration |
| 9 | o.C.3 | Over current Constant speed |
| 10 | o.L.1 | Motor overload |
| 11 | o.L.2 | AC drive overload |
| 12 | Sc | System fault |
| 13 | o.H. | AC drive interior overheat |
| 14 | Sen | Feedback sensor fault (Don't record this fault in fault logging) |
| 15 | Err1 | Phase missing in input side |
| 16 | Err2 | Phase missing in output side |
| 17 | Err3 | Current detected fault (Don't record this fault in fault logging) |
| 18 | Err4 | AC drive external fault |
| 19 | Err5 | Swing frequency running parameter setting error |
| 20 | Err6 | Keypad communication fault (Don't record this fault in fault logging) |
| 21 | LIFE | Reserved (Seek to the technical support, don't record this fault in fault logging) |

| | | |
|----|---------|--|
| 22 | 93SE | Storage fault (Don't record this fault in fault logging) |
| 23 | E.TE1 | Stationary auto tuning fault (Don't record this fault in fault logging) |
| 24 | E.TE2 | Rational auto turning fault (Don't record this fault in fault logging) |
| 25 | Reserve | |
| 26 | E.CE | RS485 communication fault |
| 27 | E.PAn | Communication fault of keypad during power on (Don't record this fault in fault logging) |
| 28 | E.CPE | Parameters copy fault (Don't record this fault in fault logging) |

LED ten digit: LCD display language

0:Chinese

1:English

| | | | |
|------|------------------------------------|-----------------|--------------|
| E-67 | Interference suppression selection | Range:0000-1221 | Default:0001 |
|------|------------------------------------|-----------------|--------------|

LED unit digit: Overvoltage interference suppression

0: Disable

1: Enable When this function is activated, the AC drive will take intellectualized judge for over voltage fault, only respond for true fault signal, suppresses the interference. It may causes alarm delay, should be used with caution

LED ten digit: SC interference suppression

0: Disable

1: SC interference suppression 1 When this function is activated, the AC drive will take intellectualized judge for SC fault, only respond for true fault signal, suppresses the interference. It may causes alarm delay, should be used with caution.

2: SC interference suppression 2 It has strong SC interference suppression ability compare to SC interference suppression 1. It may causes alarm delay, should be used with caution.

LED hundred digit: over current interference suppression

0: Disable

1: Over current interference suppression 1 When this function is activated, the AC drive will take intellectualized judge for over current fault, only respond for true fault signal, suppresses the interference. It may causes alarm delay, should be used with caution.

2: Over current interference suppression 2 It has strong over current interference suppression ability compare to over current interference suppression 1. It may causes alarm delay, should be used with caution.

LED thousand digit: over current in deceleration suppression

0: Disable

1: Enable When this function is activated, the current limit function will be executed if over current occurs during the deceleration.

2: Enable frequency reduce for protecting over current. Selects this value for 2, if the output current achieve to [E-52] current threshold given setting, the AC drive will decelerate according to the [F-23] deceleration time given setting, when after the output current lower to [E-52] current threshold, AC drive will accelerate to frequency reference given according to [F-22] acceleration time given setting.

8.2 External Terminal Parameters

| | | | |
|------|-------------------------------|------------|------------|
| F-01 | Input signal selection 1(X1) | Range:0-28 | Default:27 |
| F-02 | Input signal selection2(X2) | Range:0-28 | Default:28 |
| F-03 | Input signal selection 3(X3) | Range:0-28 | Default:1 |
| F-04 | Input signal selection 4(X4) | Range:0-28 | Default:2 |
| F-05 | Input signal selection 5 (X5) | Range:0-28 | Default:3 |
| F-06 | Input signal selection 6(X6) | Range:0-28 | Default:4 |

Defines the control digital terminal function, it is enabled when short connecting ON with COM terminal.

| Setting value | Definition | Function description |
|---------------|---|---|
| 0 | Invalid(check optional is available) | This port is free |
| 1 | Forward jog operation | Jog command input port. Terminal jog commands have the highest priority. |
| 2 | Reverse jog operation | |
| 3 | Free stop | Free stop command input port |
| 4 | Fault reset | External reset command input port when fault |
| 5 | Multi steps speed control 1 | The multi steps speed commands input port, up to 8 steps speed control is available; The multi steps speed commands has priority only next to the jog command; |
| 6 | Multi steps speed control 2 | |
| 7 | Multi steps speed control 3 | |
| 8 | Multi steps speed control 4 | |
| 9 | UP/Down running frequency increasing UP | Realize the ascend, descend control function, enable when [E-02] or [E-03] is set as"7" ; |
| 10 | UP /Down running frequency decreasing DW | |
| 11 | Three wire operation control D (X) | Defines as D(X) in three line operation control, refer to parameters [F-08] . |
| 12 | PID control cancel | PID control is canceled when PID control operating, take PID given signal as frequency reference given, AC drive runs at this speed |
| 13 | External fault alarm | the input of external fault signal |
| 14 | Acceleration/deceleration time selection terminal 1 | Refer to the below fig. |
| 15 | Acceleration/deceleration time selection terminal 2 | |
| 16 | Frequency main channel selection terminal 1 | When [E-02] is selected for"12",Frequency given main channel control by terminal ; Four digital terminals will be combined to 0-11 controlling channels, separately corresponding to the [E-02] |
| 17 | Frequency main channel selection terminal 2 | |

| | | |
|----|--|---|
| 18 | Frequency main channel selection terminal 3 | 0-11 frequency input channels |
| 19 | Frequency main channel selection terminal 4 | |
| 20 | Program running pause | During the program running, this signal enable program running to pause. Output frequency will be 0 if this command is activated, continue to run base on running status before pause if pause signal disappears. |
| 21 | Program restart | During the program running, if this signal is valid, it enables the program running to restart, starts to run from first stage; |
| 22 | Timer trigger terminal | Start timer to start timing, refer to in detail [F-38]. |
| 23 | Timer reset terminal | Clear the records of the timer |
| 24 | Counter reset terminal | Clear the records of the counter |
| 25 | Counter clock input terminal | Refer to [F-39, F-40] |
| 26 | Only terminal control channel is enabled selection | Only terminal control channel is enabled, keypad and Rs485 command channel is invalid. |
| 27 | Forward running | Refer to forward running description in detail. |
| 28 | Reverse running | Refer to forward running description in detail. |

Acceleration/deceleration time selection reference list.

| Terminal 2 | Terminal 1 | Acceleration/deceleration time selection |
|------------|------------|---|
| OFF | OFF | Acceleration time 1 and deceleration time 1 |
| OFF | ON | Acceleration time 1 and deceleration time 2 |
| ON | OFF | Acceleration time 1 and deceleration time 3 |
| ON | ON | Acceleration time 1 and deceleration time 4 |

Short connect with (COM) is "ON", disconnection is "OFF"

Forward running description: As the running command given by terminal, and if [F-08] set as standard operation control, when this terminal is valid, AC drive runs in forward direction, refer to [F-08] parameters for other control mode function.

Reverse running description: As the running command given by terminal, and if [F-08] set as standard operation control, when this terminal is valid, AC drive runs in reverse direction, refer to [F-08] parameters for other control mode function.

| | | | |
|------|-------------------------------------|-----------------|--------------|
| F-07 | Input signal respond mode selection | Range:0000-1121 | Default:0001 |
|------|-------------------------------------|-----------------|--------------|

LED unit digit: Free stop terminal recover mode

0: Recover to original command with speed search function

1: Don't recover to original command

2: Recover to original command without speed search function, No speed search of this function need to set unit digit of [E-30] for 2 together.

LED ten digit: UP and DW terminal control starting frequency setting

0: Runs with UP/DW terminal adjusting without save the frequency record after power loss.

1: UP/DW terminal adjusting, save the frequency record after power off stop. AC drive will run to last stop moment frequency and then perform UP/DW adjusting. (Refer to [F-70] to Check or modify last stop moment frequency).

2: Runs to preset frequency [F-70] first, and then execute UP/DW adjusting.

LED hundred digit: STOP/RESE of keypad effective range selection.

0: STOP/RESE key valid only when under keypad control

1: STOP/RESE key valid under any run command source. This function is suitable for using emergency stop in NOT keypad control mode.

Note: If selects to STOP/RESE key valid under any run command source, pressing the stop key of keypad, **AC drive** will be located in stop lock status when in terminal control or RS485 control mode. If want to using terminal or Rs485 running control channel command to restart **AC drive** running, you must sent stop command by given channel to unlock stop status first. **AC drive** enable to restart after stop status unlocking.

LED thousand digit: Terminal running mode selection after fault reset

0: Start AC drive running directly after power on in terminal control mode

1: Stop first and then start in terminal control mode

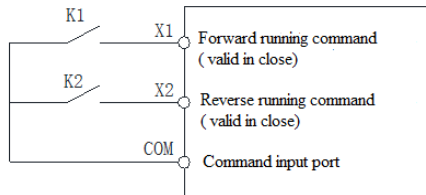
Note: When fault occurs of **AC drive**, reset valid signal can be sent by the all 3 running control command. If the **AC drive** adopts the terminal control mode, after **AC drive** reset by receiving terminal or the other two channels' reset signal, this parameter can be used to select whether to carry on the terminal running command.

| | | | |
|------|-------------------------------|-----------------|---------------|
| F-08 | Terminal running control mode | Range:0000-0005 | Default: 0000 |
|------|-------------------------------|-----------------|---------------|

LED unit digit: Terminal control mode selection

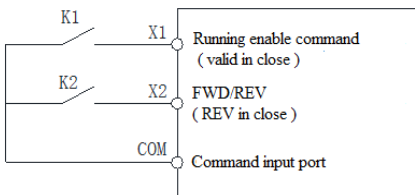
0: Standard running control mode Running and direction are bonded together. This 2 wire control mode is most commonly using. Uses X1 (forward running) and X2 (reverse running) terminals command to determine the Forward /Reverse running of motor. Refer to below fig.

| K1 | K2 | running command |
|----|----|-----------------|
| 0 | 0 | Stop |
| 1 | 0 | Forward |
| 0 | 1 | Reverse |
| 1 | 1 | Stop |

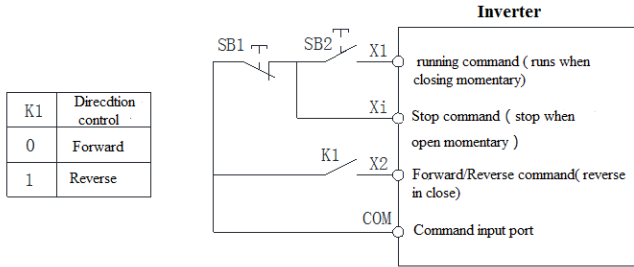


1: Two wire running control mode Running and direction are separated. Uses the forward running terminal X1 (forward running) to determine running control, reverse running terminal X2 (reverse running) to determine direction control. Refer to below fig.

| K1 | K2 | running command |
|----|----|-----------------|
| 0 | 0 | Stop |
| 1 | 0 | Forward |
| 1 | 1 | Reverse |
| 0 | 1 | Stop |

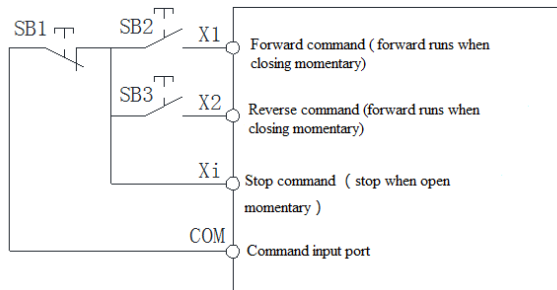


2. Three wire control mode 1 Three wire control terminal (Xi) is used for stop running terminal. Running command determined by forward running terminal X1 (forward running), direction determined by reverse running terminal X2 (reverse running). 3 wire running control terminal Xi is used for enable input.



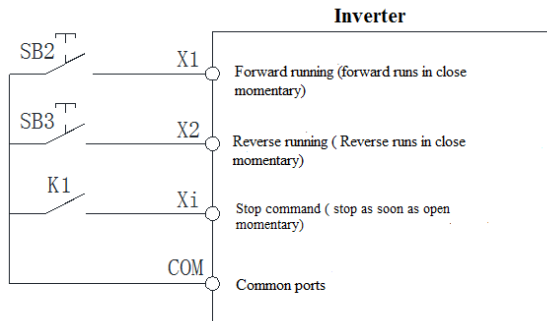
Tip: In 3 wire control mode 1 Fig, SB1 is a normal close stop button, SB2 is a normal open button. K1 is a direction selection switch; Xi is multi-function terminal (X1-X6) which have been programmed for 3 wire running control terminal.

3: 3 wire control mode 2 In this mode, 3 wire running control terminal (Xi) is used for stop running terminal, the running command is generated by forward running terminal X1(forward running) or reverse running terminal X2(reverse running), also control the direction at the same time.



Tip: In 3 wire control mode 2 Fig, SB1 is a normal close button, SB2 and SB3 both are normal open button and pulse edge is valid, uses for AC drive direction control.

4: 3 wire control mode 3 3wire running control terminal (X1) is used for running command given terminal, running in connecting ON, stop in disconnecting OFF. Rotation direction is determined by forward running terminal X1 (forward running) or reverse running terminal X2(reverse running). Every starting running with last time direction memorized

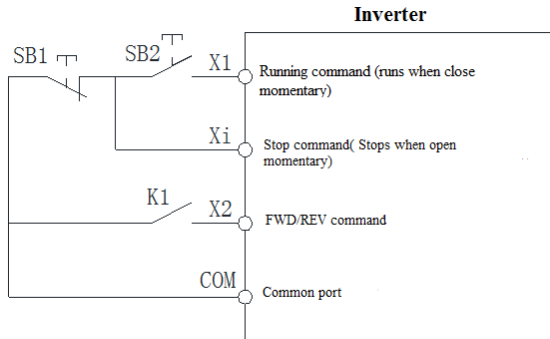


Tip: 1. SB2 and SB3 both are normal open button, and enable by pulse edge.

2. If need start motor in forward direction, press the K1 first, and press SB2 immediately.

3. If need start motor in reverse direction, press the K1 first, and press SB3 immediately.

5: 3 wire control mode 4 3 wire running control terminal (X1) uses for stop command terminal, running command is determined by forward running terminal X1 (forward running), direction is controlled by reverse running terminal X2(reverse running), and direction will be change after every Xi is activated. Every starts running based on last direction memorized. 3 wire running control terminal X1 for effective input.



Tip: SB1 is a normal stop button, SB2 is a normal open button. K1 used for running direction selection button. Xi is multi-function terminal (X1-X6) which have been programmed for 3 wire running control terminal.

LED ten digit: Reserve

LED hundred digit: Reserve

LED thousand: Reserve

| | | | |
|------|-------------------------|-----------------------------------|------------------|
| F-09 | 1 step speed setting 1X | Rang:0.00Hz-upper limit frequency | Default: 30.00Hz |
| F-10 | 2 step speed setting 2X | Rang:0.00Hz-upper limit frequency | Default:25.00Hz |
| F-11 | 3 step speed setting 3X | Rang:0.00Hz-upper limit frequency | Default: 40.00Hz |
| F-12 | 4 step speed setting 4X | Rang:0.00Hz-upper limit frequency | Default: 50.00Hz |
| F-13 | 5 step speed setting 5X | Rang:0.00Hz-upper limit frequency | Default: 50.00Hz |
| F-14 | 6 step speed setting 6X | Rang:0.00Hz-upper limit frequency | Default: 40.00Hz |
| F-15 | 7 step speed setting 7X | Rang:0.00Hz-upper limit frequency | Default: 25.00Hz |
| F-16 | 8 step speed setting 8X | Rang:0.00Hz-upper limit frequency | Default: 10.00Hz |

Uses for setting program running and multi-step speed running frequency separately.

Multi-step speed control has the priority only next to the jog function. If users choose the multi-step speed running mode, they need to set four multi-function input terminals as multi-step control terminal. ON/OFF between the four terminals and (COM) determine the running speed steps. Its running and direction is controlled by the running signal and direction given by the running control command channel **[E-01]**. And its acceleration, deceleration time is controlled by the acceleration, deceleration time 1 in default. Or specifies the particular acceleration, deceleration time by **[F-01]**-**[F-06]** parameters setting.

Swing frequency control need to configure the **[F-09]** and **[F-10]**, refer to **[H-51]**parameters for the requirement setting of **[F-09]** and **[F-10]**. AC drive will appear fault alarm "Err5" if wrong setting.

Tip 1. Multiple step speed running don't limited by lower limit frequency, but subject to upper limit frequency.

2. Output of program running is subject to limit by upper and lower limit AC drive will run with lower limit frequency when the frequency given less than lower limit frequency.

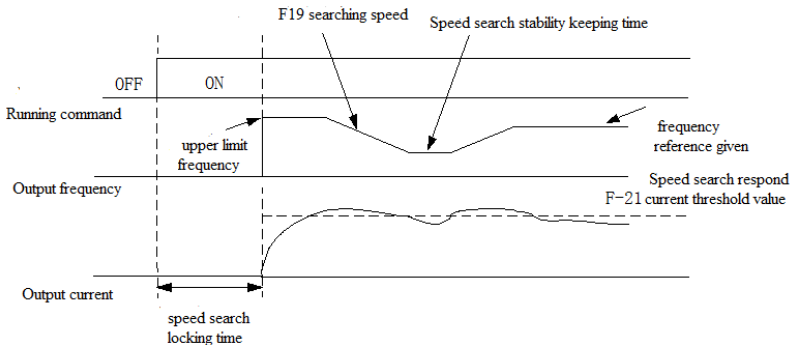
Short connecting with COM stands for ON, disconnecting for OFF

| Multi-step control terminal 4 | Multi-step control terminal 3 | Multi-step control terminal 2 | Multi-step control terminal 1 | Terminal Step Speed |
|----------------------------------|----------------------------------|----------------------------------|----------------------------------|---------------------------|
| OFF | OFF | OFF | ON | 1X |
| OFF | OFF | ON | OFF | 2X |
| OFF | OFF | ON | ON | 3X |
| OFF | ON | OFF | OFF | 4X |
| OFF | ON | OFF | ON | 5X |
| OFF | ON | ON | OFF | 6X |
| OFF | ON | ON | ON | 7X |
| ON | OFF | OFF | OFF | 8X |

| | |
|-----------|---------|
| F-17-F-18 | Reverse |
|-----------|---------|

| | | | |
|------|--|-------------------|----------------|
| F-19 | Speed search tracking speed | Range:0.1-10.0% | Default: 0.2% |
| F-20 | Voltage stores time | Range:0.10-10.00s | Default: 0.60s |
| F-21 | Speed search respond current threshold value | Range:10-200% | Default: 120% |

This group parameters will be use in software speed search mode. Software speed search will detect out the motor speed from current, and stores voltage based on [F-20] voltage stores time under upper limit frequency or given frequency. When the output current bigger than [F-21], AC drive will lower the output frequency with [F-19] speed search speed tracking. When the current lower than [F-21] and maintain [E-62] time setting, it judges the output frequency and motor speed is synchronous, will accelerate or decelerate to frequency reference given. Software speed search processing schematic as following tale:



Note: The motor may decelerate suddenly when drive a light load.

| | | | |
|------|--------------------------------------|-------------------|---------------|
| F-22 | Frequency reducing acceleration time | Range:0.1-6500.0s | Default: 2.0s |
| F-23 | Frequency reducing deceleration time | Range:0.1-6500.0s | Default: 0.3s |

Frequency reducing accel/decel. time: When parameters[E-67] is set to "2****", AC drive will reduce frequency

to protect over current occurs when load fluctuates suddenly. This parameter is used to define the acceleration /deceleration time of frequency reducing.

| | | | |
|------|---------------------|--------------------|------------|
| F-24 | Acceleration time 2 | Range: 0.1-6500.0s | Default: ※ |
| F-25 | Deceleration time 2 | Range: 0.1-6500.0s | Default: ※ |
| F-26 | Acceleration time 3 | Range: 0.1-6500.0s | Default: ※ |
| F-27 | Deceleration time 3 | Range: 0.1-6500.0s | Default: ※ |
| F-28 | Acceleration time 4 | Range: 0.1-6500.0s | Default: ※ |
| F-29 | Deceleration time 4 | Range: 0.1-6500.0s | Default: ※ |

Acceleration time 2/3/4: When the [E-15] LED ten digit is set to 0, this refers to requirement time of accelerate from 0.00Hz to maximum frequency [E-09]. When the [E-15] LED ten digit is set to 1, this refers to requirement time of accelerate from 0.00Hz to motor rated frequency [H-53]. Refers to [E-15] parameters in detail.

Deceleration time 2/3/4: When the [E-15] LED ten digit is set to 0, this refers to requirement time of decelerates from maximum frequency [E-09] to 0.00Hz. When the [E-15] LED ten digit is set to 1, this refers to the requirement time of decelerates from motor rated frequency [H-53] to 0.00Hz. Refers to [E-15] parameters in detail.

Note: 1. It need to program the acceleration, deceleration time 2 during in UP/DW control ruing, refers to [E-02] in detail.

2. It need to program the acceleration, deceleration time 2 during swing frequency control, refers to [H-65] parameters in detail.

3. In program running mode, defines acceleration/deceleration time from 2 to 4 separately. Definition of the acceleration /deceleration time is the same as Accel./Decel. time 1. The Accel./Decel time are configured by [H-35]-[H-49] parameters.

4. Acceleration/deceleration time of multi-step speed are programmed by [F-01]-[F-06]. The default setting is acceleration/ deceleration time 1.

| | | | |
|------|----------------------------------|-------------|------------|
| F-30 | Relay output terminal (TA,TB,TC) | Range: 0-22 | Default: 1 |
| F-31 | Output terminal Y1 | Range: 0-22 | Default: 4 |
| F-32 | Output terminal Y2 | Range: 0-22 | Default: 7 |

| Setting Value | Definition | Function description |
|---------------|--------------------------------|--|
| 0 | Zero frequency (standby state) | Output signal when AC drive is running and output frequency is 0 Hz, |
| 1 | Fault alarm 1 | Output signal when fault alarms happening (including OU, OL, SC, OC, OH, LUS, etc), enable output including fault reset auto period |
| 2 | Fault alarm 2 | Output signal when fault alarms happening (including OU,OL,SC,OC, OH,LUS, etc), disable during fault auto reset period. |
| 3 | Frequency arriving detection | When the output frequency is approaching or arriving to the frequency given bias range, outputs valid signal, otherwise output invalid signal. The bias range is determined by the parameter [F-33]. |
| 4 | Frequency level detection | When the output frequency over than frequency detecting level [F-34] setting, output valid signal after [F-35] relay time setting. When the output frequency lower than frequency detecting level, output a invalid signal after the same [F-35] relay time setting. |

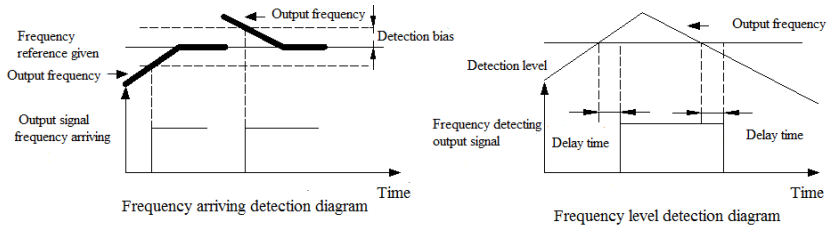
| | | |
|----|---|---|
| 5 | running statuses | Output signal when AC drive in running status. |
| 6 | Reverse running | Output signal when AC drive runs in reverse direction |
| 7 | Under voltage of AC drive | Output signal when AC drive shows "LU1/2" alarms due to under voltage |
| 8 | Overload pre-alarm | Outputs signal, when the output current of AC drive reach to [F-36] and [F-37] setting values, it outputs signal. |
| 9 | Output frequency reach upper limit frequency | Outputs signal, when the output frequency reach to upper limit frequency. |
| 10 | Output frequency reach lower limit frequency | Outputs signal, when the output frequency reach to lower limit frequency. |
| 11 | External fault stop | Outputs valid signal when AC drive stop resulted in by external fault alarm signal input. |
| 12 | Timer times up | When it is time up to the given setting time of timer of AC drive's inside. Outputs a 1 second width valid pulse signal. |
| 13 | Counter reach maximum values | When counter reach to maximum value, output terminal outputs a valid signal with width equal to external clock period. |
| 14 | Counter reach setting values | When the counter reach the setting values, output terminal outputs valid signal, and continue to count until achieve to maximum value. This valid signal will cancel when counter reset which cause by counted up to maximum value. |
| 15 | PID feedback upper limit alarm | Outputs signal when detecting PID feedback value reach to upper limit alarm value [H-26] . |
| 16 | PID feedback lower limit alarm | Outputs signal when detecting PID feedback value reach to lower limit alarm value [H-27] . |
| 17 | Sensor broken | When the feedback less then [H-28] setting value, the sensor is considered to broken during the detecting signal in PID control. It will output signal. |
| 18 | Program running cycle completed | When program finishes the cycle running, it output 500ms low level signal. |
| 19 | Program running step completed | When program finishes the step running, it outputs 500ms low level signal. |
| 20 | Dynamic braking processing | Outputs signal when perform dynamic braking. |
| 21 | Output terminal control by external | When selects this function, output terminal status can be changed by [H-79] setting. [H-79] value configured by RS485 communication, the binary 0,1, 2 are corresponding to relay output terminal, Y1, and Y2 terminal. |
| 22 | 22. Fault alarm 1. (Including fault auto reset period, including fault-LU1) | Output signal when fault alarms happening (including OU, OL, SC, OC, OH, LUS, etc), enable output including fault reset auto period |

Tip: The output terminal of relay TA-TC close, TB-TC open are considered to valid signal, low level output terminal Y1, Y2 combine with (+24) terminal output 24V power supply considered valid signal.

| | | | |
|------|---|---------------------|------------------|
| F-33 | Frequency arriving detect bias | Range: 0.00-50.00Hz | Default: 1.00 Hz |
| F-34 | Output frequency level detection | Range: 0.00-600.0Hz | Default:30.00 Hz |
| F-35 | Output frequency level detecting relay time | Range: 0.0-20.0s | Default: 0.0s |

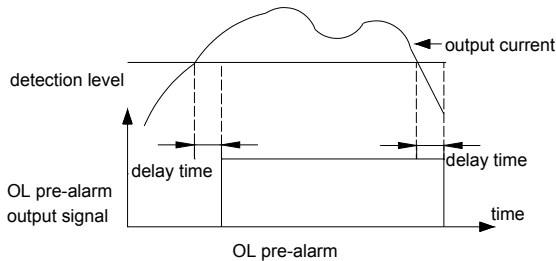
When output frequency approaches or close to frequency reference given value, output terminal outputs signal. [F-33] function uses to adjust the bias of the detection amplitude.

Output frequency level detection: Uses it to program the frequency detection level, when the output frequency high [F-34] setting value, output terminal will output signal after [F-35] setting relay time. When the output frequency low to than [F-34] setting value, output terminal will stop output signal after [F-35] setting relay time.



| | | | |
|------|-------------------------------|------------------|---------------|
| F-36 | Overload pre-alarm level | Range: 50%-200% | Default: 150% |
| F-37 | Overload pre-alarm delay time | Range: 0.0-20.0s | Range: 1.0s |

If the output current continues to be over the setting level of the parameter [F-36], after the delay time [F-37], the output terminal outputs valid signal. In the same way, when the output current is lower than the setting level of [F-36], after the delay time [F-37], the output terminal outputs invalid signal.



| | | | |
|------|---------------------|-----------------|-------------|
| F-38 | Timer setting value | Range: 1-65000s | Default: 1s |
|------|---------------------|-----------------|-------------|

This parameter is used to timing for the AC drive. The timer start-up is activated by the external trigger terminal of the timer (trigger terminal is selected by [F-01-F06]). Timing from receiving the external trigger signal, while reaching the timed time, it outputs a width is 1 second pulse signal by the corresponding output terminal.

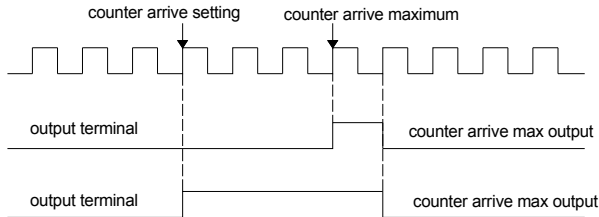
If the external trigger signal always locate trigger condition, the corresponding terminal outputs a pulse signal every [F-38] setting time.

| | | | |
|------|-----------------------|--------------------------------|---------------|
| F-39 | Counter maximum value | Range: 1-65000 | Default: 1000 |
| F-40 | Counter setting value | Range: 1-counter maximum value | Default: 100 |

This parameter stipulate the counting action of the interior counter, clock terminal of the counter is selected by the parameter **[F-01-F-06]**.

When the count value to the exterior clock reaches **[F-39]** setting value, in the corresponding output terminal, it outputs a valid signal with a width equal to exterior clock cycle. The output signal stops while the next count signal is input.

When the count value to the exterior clock reaches **[F-40]** setting value, in the corresponding output terminal, it outputs a valid signal. While it reached **[F-39]** and the counter clear to zero, this output valid signal abolishes. The clock cycle is required to be greater than 10 ms; And the minimum pulse width is 5ms.



| | | | |
|------|--|---------------------|----------------|
| F-41 | VS1 terminal input voltage lower limit | Range: 0.00V-[F-42] | Default: 0.50V |
| F-42 | VS1 terminal input voltage upper limit | Range:[F-41]-10.00V | Default: 9.50V |
| F-43 | VS1 terminal input voltage gain | Range: 0.01-5.00 | Default: 1.00 |

VS1 terminal input voltage lower limit This function defines the minimum signal of the analog input terminal (VS1) receiving. AC drive will automatically filter the voltage signal whose value is lower than this value.

VS1 terminal input voltage upper limit This function defines the maximum signal of the analog input terminal (VS1) receiving. AC drive will automatically filter the voltage signal whose value is higher than this value.

VS1 terminal input voltage gain This function is used to amplify or reduce the (VS1) terminal input analog value.

| | | | |
|------|---|-----------------------|----------------|
| F-44 | VS2 terminal input voltage lower limit | Range: -10.00V-[F-45] | Default: 0.50V |
| F-45 | VS2 terminal input voltage upper limit | Range: [F-44]-10.00V | Default: 9.50V |
| F-46 | VS2 terminal input voltage gain | Range: 0.01-5.00 | Default: 1.00 |
| F-47 | VS2 terminal input zero offset | Range: -1.00V-1.00V | Default: 0.00V |
| F-48 | VS2 terminal input bipolar adjust and direction control | Range: 0,1,2 | Default: 0 |

| | | | |
|------|---|--------------------|----------------|
| F-49 | VS2 terminal input bipolar control zero hysteresis band | Range: 0.00V-3.00V | Default: 0.20V |
|------|---|--------------------|----------------|

VS2 terminal input voltage lower limit This function defines the minimum signal which received by the analog input terminal (VS2). AC drive will automatically filters the voltage signal whose value is lower than this value.

VS2 terminal input voltage upper limit This function defines the maximum signal which received by the analog input terminal (VS2). AC drive will automatically filter the voltage signal whose value is higher than this value.

VS2 terminal input voltage gain S2 This function is used to amplify or reduce the (VS2) terminal analog value.

VS2 terminal input zero offset This function is used to adjust the (VS2) terminal zero point in the bipolar control mode; Its adjustment direction is opposite to the actual zero point. If the actual input voltage is +0.5V, at this moment, users should set the zero offset as -0.5V to let the voltage corresponding to the zero voltage (only valid when **[F-48]** is set as 1 or 2)

VS2 terminal input bipolar adjust and direction control

0: Bipolar adjust and direction control both invalid: the output frequency is determined by the input voltage of terminal (VS2).

1: Bipolar adjust and direction control both valid: the output frequency of AC drive is determined by the absolute value of amplitude of the input voltage of terminal (VS2). While output phase sequence (machine direction) is determined by the polar of the input voltage terminal (VS2), AC drive neglects its direction turning setting orders only except this order. When the voltage (VS2) > 0, AC drive outputs positive phase sequence, machine forward rotates. When voltage (VS2) < 0, AC drive outputs negative phase sequence, machine reverses.

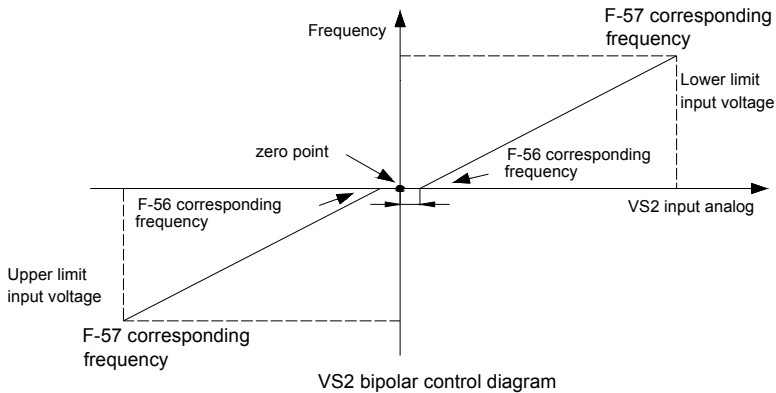
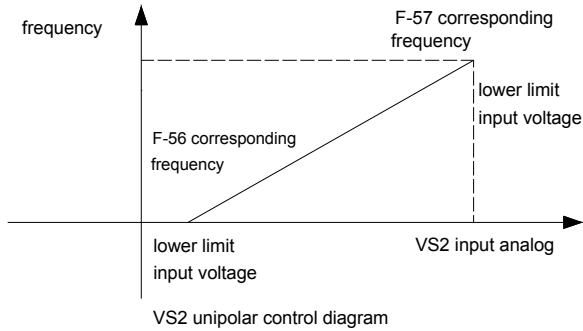
When the parameter **[E-46]** is set as 2 prohibit reverse, if (VS2) < 0, machine reverse, AC drive will operates as 0 frequency.

The Bipolar analog input signal (-10V ~ 0V ~ +10V) is stipulated as following: 0V ~ +10V step is corresponding to from **[F-56]** input frequency lower limit setting to **[F-57]** input frequency upper limit setting, forward running; 0V ~ -10V step is corresponding to from **[F-56]** input frequency lower limit setting to **[F-57]** input frequency upper limit setting, reverse running.

Tips: In two channels combination, bipolar signal will carry out signed calculation based on the combination mode selection. Negative voltage and frequency DW signal are negative signal. All other input signals of VS2 are positive signal. If calculation result is positive, the machine forward rotates. If the calculation result is negative, machine runs in reverse direction.

2. Bipolar adjust valid, direction control invalid: In two channels combination, it used to add or reduce frequency of another channel. It carries out signed calculation while combination. If the result is positive, machine runs according to **[E-01]** given direction. If the result is negative, the output frequency is '0'. Bipolar signal takes part in frequency calculation, do not change or decide the direction of the machine.

VS2 terminal input bipolar control zero hysteresis band This function is used in the bipolar control mode to adjust the (VS2) terminal zero point corresponding voltage range. If the zero point range is set as -1V ~ +1V, the hysteresis band should be set as 1V. (only valid when it is set as '1' of **[F-48]** parameter)



Tip: When (VS2) is used as PID given or feedback channel, the function of bipolar is invalid. At this moment, the usage of (VS2) terminal is the same with the (VS1) terminal. Namely, when (VS2) <0, AC drive think the input of this port is 0.

| | | | |
|------|---------------------------------------|----------------------|------------------|
| F-50 | AS terminal input current lower limit | Range: 0.00mA-[F-51] | Default: 4.20mA |
| F-51 | AS terminal input current upper limit | Range:[F-50]-20.00mA | Default: 19.50mA |
| F-52 | AS terminal input current gain | Range: 0.01-5.00 | Default: 1.00 |

AS terminal input current lower limit This function defines the minimum signal which received by the analog input terminal(AS), AC drive will automatically filters the current signal whose value is lower than this value; For example, if the factory setting of this value '4.00', 4.00-20.00mA input current is available.

AS terminal input current upper limit This function defines the maximum signal which received by the analog input terminal (AS), AC drive will automatically filters the current signal whose value is higher than this value.

AS terminal input current gain This function is used to amplify or reduce the (AS) terminal.

| | | | |
|------|-----------------------------------|----------------------|------------------|
| F-53 | Pulse input frequency lower limit | Range: 0.0KHz-[F-54] | Default: 0.0KHz |
| F-54 | Pulse input frequency upper limit | Range:[F-53]-50.0KHz | Default:10.0 KHz |
| F-55 | Pulse input frequency gain | Range: 0.01-5.00 | Default: 1.00 |

Terminal input frequency lower limit This function defines the minimum frequency received by the analog input terminal (PUL). AC drive will automatically filter the frequency whose value is lower than this value;

Terminal input frequency upper limit This function defines the maximum frequency received by the analog input terminal (PUL). AC drive will automatically filter the frequency whose value is higher than this value.

Terminal input frequency gain This function is used to amplify or reduce the (PUL) terminal input signal.

| | | | |
|------|--|---------------------------------|------------------|
| F-56 | Input lower limit correspond setting frequency | Rang: 0.00Hz-[F-57] | Default: 0.00Hz |
| F-57 | Input upper limit correspond setting frequency | Range: [F-56]-maximum frequency | Default: 50.00Hz |

These two parameters stipulate the corresponding relation between the external input analog value, upper/lower limit of the pulse signal and frequency.

| | | | |
|------|---------------------------------------|-----------------|--------------|
| F-58 | Input signal characteristic selection | Range:0000-1111 | Default:0000 |
|------|---------------------------------------|-----------------|--------------|

LED unit digit: VS1 input characteristic selection

0: Positive characteristic 1: Negative characteristic

LED ten digit: AS input characteristic selection

0: Positive characteristic 1: Negative characteristic

LED hundred digit: VS2 input characteristic selection

0: Positive characteristic 1: Negative characteristic

Tips: When (VS2) opens bipolar function ([F-48] is set as 1 or 2), this parameter is invalid.

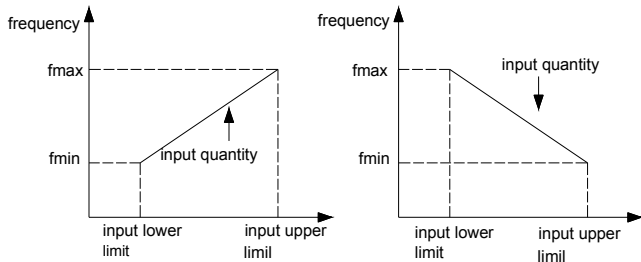
LED thousand digit: Pulse input characteristic selection

0: Positive characteristic 1: Negative characteristic

When in positive characteristic stage, lower limit of external analog input value and the pulse signal corresponds to [F-56], upper limit of exterior analog input value and the pulse signal corresponds to [F-57].

When in negative characteristic stage, lower limit of exterior analog input value and the pulse signal corresponds to [F-57], upper limit of exterior analog input value and the pulse signal corresponds to [F-56].

As shown in the Fig. [F-56] (fmin), the biggest analog input and the pulse signal corresponding frequency setting means their upper limit value corresponding frequency setting, As shown in the Fig. [F-57] (fmax).



Relationship between frequency setting and input quantity

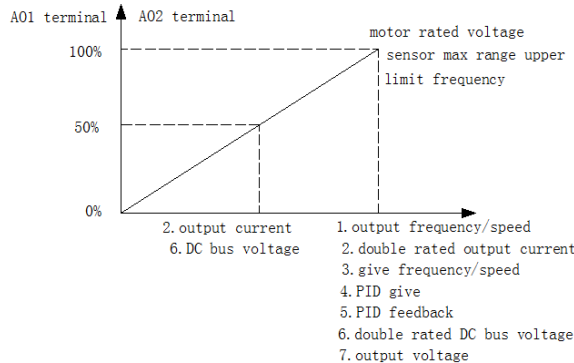
| | | | |
|------|---|-------------------|----------------|
| F-59 | Terminal analog input filtering time constant | Range: 0.01-5.00s | Default: 0.50s |
|------|---|-------------------|----------------|

This is defined as the size of the input analog quantity signal filtering, for the purpose of eliminating the interference signal. The longer filtering time is, the stronger anti-interfere ability is, but the respond speed slow down; The shorter filter time is, the weaker anti-interfere ability is, but the respond speed become faster;

| | | | |
|------|-------------------------------|------------|------------|
| F-60 | Output terminal(AO1)selection | Range: 0-7 | Default: 1 |
| F-61 | Output terminal(AO2)selection | Range:0-7 | Default: 3 |

Output signal (A01) and (A02) mode is programmed by [F-62]

- 0: Output signal disable
- 1: Output frequency/speed
- 2: Output current
- 3: Given frequency/speed reference
- 4: PID given value
- 5: PID feedback value
- 6: DC bus voltage
- 7: Output voltage



A01/A02 port and output quantity relationship

Tips: when (A02) port is frequency pulse output or 4-20mA output, '0%' corresponding output quantity is not zero.

| | | | |
|------|--------------------------------|------------------|---------------|
| F-62 | Analog output signal selection | Range: 0000-0023 | Default: 0003 |
|------|--------------------------------|------------------|---------------|

LED unit digit: A02 output signal mode selection

0: Frequency pulse train output default setting for 0.2KHz to 10.0KHz;

1: 0-20mA

2: 4-20mA

3: 0-10V

LED ten digit: A01 output signal mode selection

0: 0-10V

1: 0-20mA

2: 4-20mA

LED hundred digit: Reserve**LED thousand digit: Reserve**

Tip: After output mode selected by software configured, it also need to select by J1, J2, J3, J4, J5, terminals pin short connection. Refer to following for selecting in detail.

A02 selects for frequency pulse train output, need select J1 among J1, J2, J3 dial switching.

A02 selects for 0-20mA or 4-20mA output signal, need select J2 among J1, J2, J3 dial switching.

A02 selects for 0-10V output signal, need select J2 among J1, J2, J3 dial switching.

A01 selects for 0-20mA or 4-20mA output signal, need make J5 short connection, J4 disconnect.

A01 selects for 0-10V output signal, need make J4 short connection, J5 disconnect.

In the factory default setting of A01 and A02 output signal is 0-10V analog output. If need other output mode, please configure the software and hardware according requirement.

| | | | |
|------|------------------------|-----------------|---------------|
| F-63 | AO1 output signal gain | Range: 25%-200% | Default: 100% |
| F-64 | AO2 output signal gain | Range: 25%-200% | Default: 100% |

Used to adjust AO1 terminal output analog value and AO2 output signal value.

| | | | |
|------|-------------------------------|------------------|--------------|
| F-65 | AO1 output signal zero adjust | Range : -10%-10% | Default: 0.0 |
| F-66 | AO2 output signal zero adjust | Range : -10%-10% | Default: 0.0 |

Used to adjust the output signal zero point of (AO1) terminal and (AO2) terminal. It is invalid to adjust this value when (AO2) is frequency pulse output.

| | | | |
|------|--|---------------------|----------------|
| F-67 | Keypad potentiometer input lower limit voltage | Range: 0.00V-[F-68] | Default: 0.20V |
| F-68 | Keypad potentiometer input upper limit voltage | Range:[F-67]-5.50V | Default: 4.80V |
| F-69 | Keypad potentiometer gain | Range: 0.00-5.00 | Default: 1.00 |

Keypad potentiometer input voltage lower limit This function defines the minimum signal received by the keyboard potentiometer. AC drive will automatically filters the signal whose value is lower than this value; **Keypad potentiometer input voltage upper limit** This function defines the maximum signal received by the keyboard potentiometer. AC drive will automatically filters the signal whose value is upper than this value. **Keypad potentiometer gain** This function is used to amplify or reduce keyboard potentiometer input analog quantity. **Tips:** Keypad potentiometer input voltage upper limit is corresponding to frequency upper limit [E-10] , Keyboard potentiometer input voltage upper limit is corresponding to 0.00 Hz.

| | | | |
|------|-------------------------------------|---------------------------------|----------------|
| F-70 | UP/DW terminal preset frequency | Range: 0.00Hz-Maximum frequency | Default:0.00Hz |
| F-71 | UP/DW Power-off memorized frequency | Range: 0.00Hz-Maximum frequency | Default:0.00Hz |

The starting frequency output when AC drive runs in UP/DW control mode. It is enabled only [F-07] LED ten digit has been set for 1 or 2 .

When the [F-07] LED ten digit sets for 1, [F-71] parameters will memorize the last UP and DOWN control momentary frequency. User can review and modify the last stop momentary frequency via [F-71] in stop status.

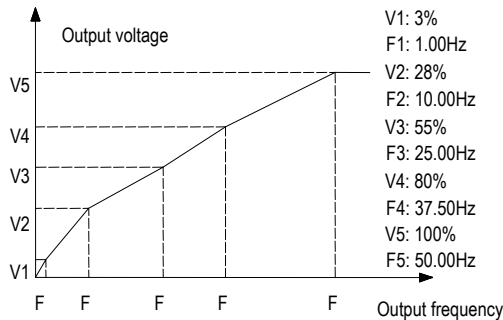
When the [F-07] LED ten digit sets for 2, the starting frequency can be preset via [F-70] parameters in UP/DW control.

8.3. Special Function Parameters

| | | | |
|------|---------------------------|--------------------------------|------------------|
| H-01 | User setting voltage V1 | Range: 0.0%-[H-03] | Default: 3.0% |
| H-02 | User setting frequency F1 | Range : 0.00Hz-[H-04] | Default:1.00Hz |
| H-03 | User setting voltage V2 | Range:[H-01-H-05] | Default: 28.0% |
| H-04 | User setting frequency F2 | Range:[H-02-H-06] | Default: 10.00Hz |
| H-05 | User setting voltage V3 | Range:[H-03-H-07] | Default: 55.0% |
| H-06 | User setting frequency F3 | Range:[H-04-H-08] | Default: 25.00Hz |
| H-07 | User setting voltage V4 | Range:[H-05-H-09] | Default: 80.0% |
| H-08 | User setting frequency F4 | Range:[H-06-H-10] | Default: 37.50Hz |
| H-09 | User setting voltage V5 | Range:[H-07]-100.0% | Default: 100.0% |
| H-10 | User setting frequency F5 | Range:[H-08]-maximum frequency | Default: 50.00Hz |

User define V/f curve:

User can define 1st, 2nd , 3rd , 4th , 5th point of V/f curve percentage for output voltage reference, corresponding to F1/F2/F3/F4/f frequency point separately. User also can define 1st, 2nd , 3rd , 4th , 5th of frequency point to correspond V1,V2, V3, V4, V5.



User defines V/f curve schematic

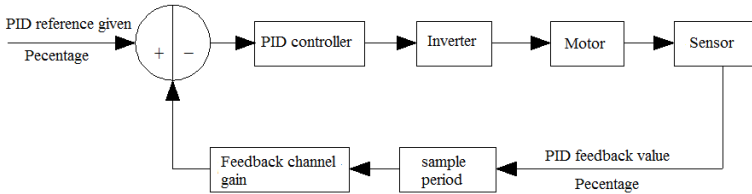
This parameter setting must satisfy the following conditions:

$0 \leq F1 \leq F2 \leq F3 \leq F4 \leq F5 \leq$ maximum frequency upper limit; $0 \leq V1 \leq V2 \leq V3 \leq V4 \leq V5 \leq 100\%$

V1, V2, V3, V4, V5 is base on the frequency rated output voltage

| | | | |
|------|---------------------------|-------------|------------|
| H-11 | PID output characteristic | Range: 0, 1 | Default: 0 |
|------|---------------------------|-------------|------------|

PID control is a common method used in the process control. The output frequency is adjusted via a series of proportion, integral, differential calculation of difference value between feedback value of controlled object and PID given value, make up a negative feedback PID adjustment to achieve a goal which controlled objected stabilizes on the PID given value.



PID control diagram

0: Positive characteristic Suitable for occasions where maintains the PID balance by reducing the AC drive output frequency while the PID feedback quantity is greater than PID given value. Such as apply in constant pressure water supply, gas supply and tension control of winding application.

1: Negative characteristic Suitable for occasions where maintains the PID balance by increasing the AC drive output frequency while the PID feedback value is greater than PID given value. Such as apply in central air-conditioning constant temperature control and tension control of unwinding.

While AC drive receiving the operation command, AC drive will automatically control output frequency after calculating for the given signal and feedback signal of the terminal according to the PID setting control mode.

While the PID controls to cancel the terminal connection, AC drive will convert the given signal to output frequency directly without PID control.

| | | | |
|------|-------------------------------------|------------|------------|
| H-12 | PID controller given signal sources | Range: 0-6 | Default: 1 |
|------|-------------------------------------|------------|------------|

- 0: Keypad potentiometer Given by the potentiometer of keypad analog signal.
- 1: PID keypad digital given Given value configured by **[H-16]** in general PID control
- 2: External terminal VS1 Given by the external terminal (VS1) (0V-10V) analog signal.
- 3: External terminal AS Given by the external terminal (AS) (4-20mA) analog signal.
- 4: External terminal VS2 Given by the external terminal (VS2) analog signal. (**[F-48]** can't be set for 1 or 2).
- 5: External pulse signal Given by the external terminal (PUL) pulse frequency signal.
- 6: RS485 interface Given by RS485 communication interface receiving signal.

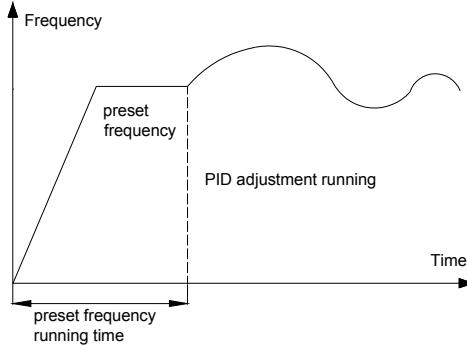
| | | | |
|------|---------------------------------------|------------|------------|
| H-13 | PID controller feedback signal source | Range: 0-3 | Default: 1 |
|------|---------------------------------------|------------|------------|

- 0. External terminal VS1 Set by the external terminal (VS1) (0V-10V) analog signal.
- 1. External terminal AS Set by the external terminal (AS) (4-20mA) analog signal.
- 2. External terminal VS2 (bipolar invalid) Set by the external terminal (VS2) analog signal. (**[F-48]** can't be set for 1 or 2).
- 3. External pulse signal Set by the external terminal (PUL) pulse frequency signal.

Note: PID controller given signal source and PID controller feedback source can't be set in the same channel, otherwise PID is disabled.

| | | | |
|------|-----------------------------------|---------------------------------|-----------------|
| H-14 | PID preset frequency | Range: 0.00Hz-maximum frequency | Default: 0.00Hz |
| H-15 | PID preset frequency running time | Range: 0.1-6500.0s | Default: 0.0s |

This function make AC drive accelerate to PID preset frequency [H-14] with acceleration time 1 after PI operation starts, and will keep running for PID preset frequency running time [H-15] given, and then executes the PID close loop operation.



PID preset frequency running time diagram

| | | | |
|------|--------------------------|--------------------|---------------|
| H-16 | PID keypad digital given | Range: 0.0%-100.0% | Default:50.0% |
|------|--------------------------|--------------------|---------------|

Only when [H-12] parameters is set for 1,this parameter is valid. Take the sensor maximum measuring range [H-18] as a benchmark. When this parameter is changed, PID given value of monitoring target will automatically synchronize change.

| | | | |
|------|------------------|------------------|---------------|
| H-17 | PID channel gain | Range: 0.01-5.00 | Default: 1.00 |
|------|------------------|------------------|---------------|

This function is used to amplify or reduce the input analog value of feedback channel

| | | | |
|------|--------------------------------|-----------------|---------------|
| H-18 | Sensor maximum measuring range | Range:1.0-100.0 | Default:100.0 |
|------|--------------------------------|-----------------|---------------|

This function is used to adjust the display data of PID given value and PID feedback value.

Actual LED display value= $\frac{\text{given (feedback) signal} - \text{lower input limit}}{\text{Upper input limit} - \text{lower input limit}} \times \text{sensor largest range}$

For example in pressure control, if it is set for sensor maximum pressure, the display value is actual pressure value. Assumes that take external terminal (VS1) for feedback single input channel, when VS1 upper limit voltage is 9V, the lower limit is 0.5V, the present feedback voltage is 4.5V, the maximum sensor measure range is 20mpa.

$$\text{LED display value} = (4.5 - 0.5) \times 20 / (9 - 0.5) = 9.4 \text{ mpa}$$

| | | | |
|------|--------------------------|-------------------|---------------|
| H-19 | Proportion gain P | Range: 0.1-100.0 | Default: 20.0 |
| H-20 | Integral time constant I | Range: 0.1-100.0s | Default: 2.0s |
| H-21 | Differential gain D | Range: 0.0-10.0 | Default: 0.0 |

Adjusting parameters in PID control function, these parameters should be set according to actual system characteristic in respectively.

Proportion gain P: This parameter determines the impact degree of Proportion gain P respond to deviations. When gain is large, it responds quickly, but would bring out oscillation. When gain is small, respond will delay.

Integral time constant I: It decides the size of respond effect for Integral time I. When the integral time is big, the respond is slow. In addition, anti-external interference is become weaker. If the integral time is small, the respond speed is quick. But oscillation would occur if it is set too small.

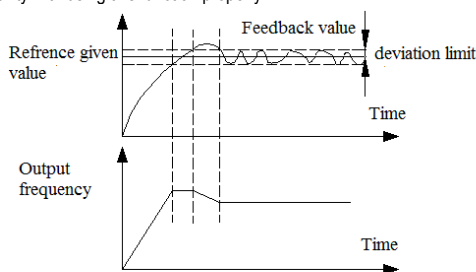
Differential gain D: When the deviation of PID feedback value and PID given value changes, The output and the change rate of deviation are proportionally adjusted. This adjustment is only related to the direction and size of the deviation change and has nothing to do with the direction and size of the deviation itself. While the feedback signal changes, differential adjustment is used to adjust according the change trend to restrain the change of feedback signal. Please be careful to use the differential adjustment. Because it will amplify the system interference, especially for a higher changing frequency interference.

| | | | |
|------|-----------------|--------------------|----------------|
| H-22 | Sampling period | Range: 0.01-60.00s | Default: 0.10s |
|------|-----------------|--------------------|----------------|

This parameter is only valid for the sampling period of feedback value. The regulator will calculates a time in every sampling period. The small sampling period, the quicker respond time.

| | | | |
|------|-----------------------------|-------------------|---------------|
| H-23 | PID control deviation limit | Range: 0.0%-20.0% | Default: 0.0% |
|------|-----------------------------|-------------------|---------------|

The maximum deviation allows for PID feedback value to PID given value. PID will be stop, keep output constant when the feedback value within this deviation range. It will coordinate the contradiction between the accuracy of system output and stability with using this function properly.



PID control deviation limit diagram

| | | | |
|------|--------------------------|--|----------------|
| H-24 | Starting threshold value | Range:0.0%-Sleep threshold value | Default:0.0% |
| H-25 | Sleep threshold value | Range: Starting threshold value-100.0% | Default:100.0% |

Starting threshold value: When AC drive goes into sleep mode, AC drive restarts should require PID feedback value less than starting threshold value setting. If the the starting threshold value is set too high, AC drive will start and stop frequently. If it set too low, it will cause pressure not enough. This parameter is defined as percentage of PID feedback value to sensor maximum measuring range account for.

Sleep threshold value: This parameter use as a standard value for adjusting system if go to sleep mode when no need working. It is that AC drive always standby for sleep detecting, if PID feedback value higher than or equal to PID given setting value is detected, and try to keep holding for a while in setting value around, AC drive will start sleep detecting. If the feedback value higher than sleep threshold value during the sleep detecting mode, AC drive will reduce the output frequency to lower limit frequency, and keep outputting lower limit frequency for a while, and then reduce to 0Hz, go into sleep mode. If feedback value lower to sleep threshold during above process, sleep detecting will be disable, go back to PID adjusting working. Smaller setting of this parameter, system will go to sleep mode easier. When it is set for 100.0%, the system will not go to sleep mode.

This parameter is defined as percentage of PID feedback value to sensor maximum measuring range account for. This function only is enabled in constant pressure PID control.

| | | | |
|------|-------------------------|---------------------------------------|-----------------|
| H-26 | Alarm upper limit value | Range: Alarm lower limit value-100.0% | Default: 100.0% |
| H-27 | Alarm lower limit value | Range: 0.0%-Alarm upper limit value | Default: 0.0% |

While PID feedback reaches or exceeds the setting value, if any output terminals **[F-30-F-32]** is set as 15, (PID feedback value upper limit alarming), it outputs alarm signal; This parameter is defined as percentage of the maximum measuring range of the sensor that the PID feedback value accounts for.

While PID feedback reaches or under the setting value, if any output terminals **[F-30-F-32]** is set as 16, (PID feedback quantity upper limit alarming), it outputs reaching signal; This parameter is defined as percentage of the largest range of the sensor that the PID feedback quantity accounts for.

This function only is enabled in constant pressure PID control.

| | | | |
|------|--|-------------------|---------------|
| H-28 | Sensor disconnection detection | Range: 0.0%-20.0% | Default: 0.0% |
| H-29 | Sensor disconnection alarm operation selection | Range: 0,1 | Default: 0 |

When the AC drive is in the PID control mode, this function is valid; If the detection feedback signal is less than **[H-28]**, the sensor is deemed to be open circuit. At this moment ,if any one of output terminal **[F-30-F-32]** is set as '17' (sensor disconnect), the output signal is valid; This parameter is defined as the percentage of the sensor maximum range that the feedback signal accounts for.

Sensor disconnection alarm running selection

0:Continuous operation

1:Close down

In the process of PID adjustment, while system detects sensor open circuit, this parameter is used to choose whether AC drive stop working. If choose working on ,AC drive will cancel closed-loop control, with PID given values as frequency output; If choose close down, when the system detects the alarm which is mentioned above, the AC drive will stop output and display the malfunction information immediately.

The feedback sensor malfunction is displayed as "SEn". When it detects the PID feedback quantity is greater than the setting of **[H-28]**, the feedback sensor fault is deemed to be vanish, and system restores PID closed-loop control.

| | | | |
|------|-----------------------|-------------------------------------|-----------------|
| H-30 | Upper limit threshold | Range: lower limit threshold-100.0% | Default: 100.0% |
| H-31 | Lower limit threshold | Range:0.0%-upper limit threshold | Default: 0.0% |

This parameter will limit PID given during upper limit threshold and lower limit threshold range. This parameters is defined the ratio of upper limit threshold, lower limit threshold to maximum measuring range. This function only is enabled in constant pressure PID control.

| | | | |
|------|----------------------|-----------|------------|
| H-32 | Program running mode | Range:0-5 | Default: 0 |
|------|----------------------|-----------|------------|

0. Single cycle running (time by second)

While receiving running instructions, the AC drive starts operation from the 1st step speed and direction.

The acceleration/deceleration time are selected by parameter **[H-35-H-42]**; Run time is up to parameter **[H-43-H-50]**; The time unit is second. While the first step time up, it shifts to the next step speed. The time, direction, acceleration/deceleration time of each step speed can be programmed; While finishing the 8th section speed running, AC drive will output "0" frequency. If one step running time is set to zero, it will skip over this step. 1. Continuous cycle running (time by second)

After the AC drive finishing 8th section speed running, return to the 1st step speed to begin to work for uninterrupted cycles. Running direction and acceleration/deceleration time are selected by the parameter **[H-35-H-42]**; Run time is set up by parameter **[H-43-H-50]**, the time unit is second.

2: single cycle, continuous running (time by second)

After finishing a single cycle running, the AC drive running don't stop. It works on at the final step speed whose running time is not zero. Running direction and acceleration/deceleration time are selected by the parameter **[H-35-H-42]**; Run time is set up by parameter **[H-43-H-50]**, the time unit is second.

3. Single cycle running (time by minute)

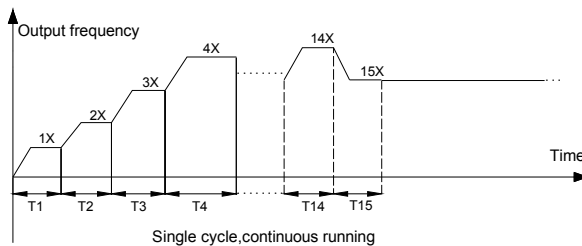
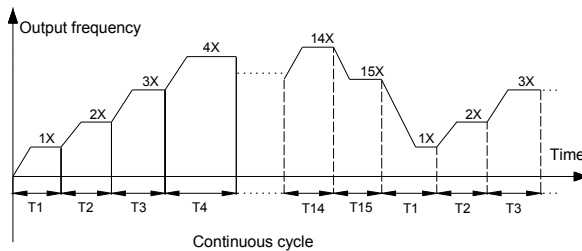
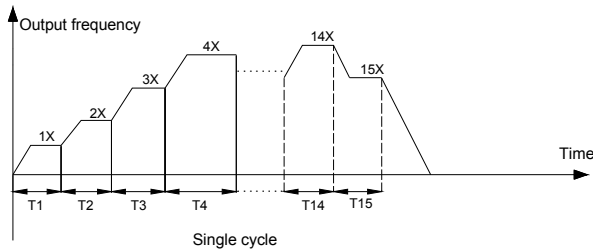
Direction and acceleration/deceleration time are selected by parameter **[H-35-H-42]**; Running time is set up by parameter **[H-43-H-50]**; The time unit is minute. The others are identical with mode '0'.

4: continuous cycle (time by minute)

Running direction and acceleration/deceleration time are selected by the parameter **[H-35-H-42]**; Running time is set up by parameter **[H-43-H-50]**; The time unit is minute; The others are identical with mode '1'.

5: Single cycle, continuous running (time by minute)

Running direction and acceleration/deceleration time are selected by the parameter **[H-35-H-42]**; Running time is set up by parameter **[H-50-H-50]**; The time unit is minute; The others are identical with mode "1"



| | | | |
|------|---|--------------|------------|
| H-33 | Program run breakpoint restore mode selection | Range: 0,1,2 | Default: 0 |
|------|---|--------------|------------|

0: Running at the first step speed

1: Continue to run with breakpoint running frequency and retiming.

2: Continue to run with the breakpoint running frequency and residual time.

This parameter defines the restart running mode after break off due to various reasons (stop, fault, power fail).

If select 0 mode, AC drive restarts running with first step speed.

If select 1 mode, AC drive restarts running from break of running step, and start timing.

If select 2 mode, AC drive restarts running from break of running step, and run with residual time after break off.

| | | | |
|------|---|------------|-----------|
| H-34 | Program running state power down memory selection | Range: 0,1 | Default:0 |
|------|---|------------|-----------|

0: NO power down memory

1: power down memory

This parameter defines if AC drive will memorize current program running status after power down in program running mode (running step, residual time of current step, acceleration/deceleration and running direction, etc). If select power down memory, and combine with **[H-33]** parameters can defines next restore program running mode when power on. It need to protect AC drive will continue running with before power off running status, this parameters should set to 1.

| | | | |
|------|---|------------|------------|
| H-35 | 1 step speed direction and accel/decel time | Range: 0-7 | Default: 0 |
| H-36 | 2 step speed direction and accel/decel time | Range: 0-7 | Default: 1 |
| H-37 | 3 step speed direction and accel/decel time | Range: 0-7 | Default: 2 |
| H-38 | 4 step speed direction and accel/decel time | Range: 0-7 | Default: 3 |
| H-39 | 5 step speed direction and accel/decel time | Range: 0-7 | Default: 4 |
| H-40 | 6 step speed direction and accel/decel time | Range: 0-7 | Default: 5 |
| H-41 | 7 step speed direction and accel/decel time | Range: 0-7 | Default: 6 |
| H-42 | 8 step speed direction and accel/decel time | Range: 0-7 | Default: 7 |

In the program running, use to set 8 steps rotation direction and acceleration /deceleration time respectively.

| Setting code | Description |
|--------------|--|
| 0 | Forward; Acceleration time 1/Deceleration time 1 |
| 1 | Forward; Acceleration time 2/Deceleration time 2 |
| 2 | Forward; Acceleration time 3/Deceleration time 3 |
| 3 | Forward; Acceleration time 4/Deceleration time 4 |
| 4 | Reverse; Acceleration time 1/Deceleration time 1 |
| 5 | Reverse; Acceleration time 1/Deceleration time 2 |

| | |
|---|--|
| 6 | Reverse; Acceleration time 1/Deceleration time 3 |
| 7 | Reverse; Acceleration time 1/Deceleration time 4 |

| | | | |
|------|------------------------------|-------------------|---------------|
| H-43 | 1 step speed running time T1 | Range: 0.0-6000.0 | Default: 10.0 |
| H-44 | 2 step speed running time T2 | Range: 0.0-6000.0 | Default: 10.0 |
| H-45 | 3 step speed running time T3 | Range: 0.0-6000.0 | Default: 10.0 |
| H-46 | 4 step speed running time T4 | Range: 0.0-6000.0 | Default: 10.0 |
| H-47 | 5 step speed running time T5 | Range: 0.0-6000.0 | Default: 10.0 |
| H-48 | 6 step speed running time T6 | Range: 0.0-6000.0 | Default: 10.0 |
| H-49 | 7 step speed running time T7 | Range: 0.0-6000.0 | Default: 10.0 |
| H-50 | 8 step speed running time T8 | Range: 0.0-6000.0 | Default: 10.0 |

Use to set 8 steps speed running time, unit of time is set by [H-32] parameters.

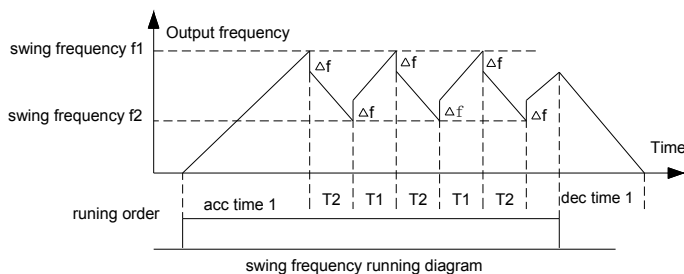
| | | | |
|------|--|----------------------|----------------|
| H-51 | Differential frequency Δf in swing frequency | Range:0.00Hz-20.00Hz | Default:2.00Hz |
|------|--|----------------------|----------------|

During the swing frequency operation, the FOR/REV switching function will be forbidden, running direction is programmed after stop only. f1 is the setting value of [F-09]; f2 is the setting value of [F-10]; Acceleration time T1 of the amplitude is the setting value of [F-24]; And the acceleration time T2 of the amplitude is the setting value of [F-25].

The acceleration/deceleration time in swing frequency running is defined by acceleration/deceleration time 1. When using the swing frequency running function, AC drive will run with the acceleration/deceleration time 1 to the f1 setting frequency, then begin swing frequency running. While stop, AC drive will run for acceleration/deceleration time 1 from the running frequency to stop. Acceleration/deceleration time of the amplitude is defined by acceleration/deceleration time 2. It is defined as the same as acceleration/deceleration time 1.

The parameter settings in the swing frequency running should satisfy the following formula request, otherwise display "Err5".

$$\begin{cases} f1 > f2 + \Delta f \\ f2 \geq 0.50\text{Hz} \\ 0 \leq \Delta f \leq 20.00\text{Hz} \end{cases}$$



| | | | |
|------|-----------------------|---------------------|------------------|
| H-52 | Motor rated power | Range: 0.4-1100.0KW | Default: ※ |
| H-53 | Motor rated frequency | Range: 0-600.00Hz | Default: 50.00Hz |

| | | | |
|------|-------------------------------|----------------------|------------|
| H-54 | Motor rated speed | Range: 0-18000RPM | Default: ※ |
| H-55 | Motor rated voltage | Range: 0-1500V | Default: ※ |
| H-56 | Motor rated current | Range: 0.1-1000.0A | Default: ※ |
| H-57 | Motor no load current | Range: 0.01-650.00A | Default: ※ |
| H-58 | Motor stator resistor | Range: 0.001-65.000Ω | Default: ※ |
| H-59 | Motor rotor resistor | Range: 0.001-65.000Ω | Default: ※ |
| H-60 | Motor stator inductance | Range: 0.1-6500.0mH | Default: ※ |
| H-61 | Motor rotor mutual inductance | Range: 0.1-6500.0mH | Default: ※ |

[H-52] uses to set motor rated power, unit is 0.1kw. Refer to motor nameplate to configure this parameter. AC drive will automatically select corresponding default value as [H-53-H-61] default value after every changing of this parameter. [H-57-H-61] parameters will be modified after motor auto tuning when highly accuracy motor control is required. The motor parameters [H-52-H-56] must be set properly before perform motor auto tuning.

| | | | |
|------|-----------------------------|-----------|------------|
| H-62 | Motor auto tuning selection | Range:0-2 | Default: 0 |
|------|-----------------------------|-----------|------------|

1. Null operation. No need perform motor parameters auto tuning.
2. Rotational motor auto tuning. Please make sure configure [H-52-H-56] parameters follow motor name plate correctly before perform motor auto tuning. After executing rotary motor auto tuning, motor will locate stationary state, it will measuring the stator resistor, rotor resistor and stator& rotor inductance of AC asynchronous motor first, and then motor will run, and perform no load current and mutual inductance of stator& rotor measure automatically, write the measured value to [H-57-H-61]. Motor parameters will be reset after auto tuning automatically.

Press the running key to start rotational auto tuning after parameters setting, 'T-02' will be show in the digital keypad during then running, motor will be stop after auto tuning finish, AC drive will restore ready status.

3. Stationary auto tuning Please make sure configure [H-52-H-56] parameters follow motor name plate correctly before perform motor auto tuning. After executing stationary motor auto tuning, motor will locate stationary state, it will measuring the stator resistor, rotor resistor and stator& rotor inductance of AC asynchronous motor first, and put the measured parameters to correspond parameters.

Press the running key to start rotational auto tuning after parameters setting, 'T-01' will be show in the digital keypad, motor will stop after auto tuning, and AC drive will restore to ready status.

Note: 1. Must disconnect load from motor before set [H-62] for 1 to execute rotational motor auto tuning. It is forbidden perform auto tuning with load.

2. For some application which not easy to execute rotational auto tuning (the motor can't dispatch from load) or no need high performance control for motor, please select stationary auto tuning or no need perform auto tuning. Please make sure configure [H-52-H-56] parameters with motor nameplate correctly.

4. Make sure motor should stand in stop state before execute the auto tuning, otherwise auto tuning can't carry out normally.

5. It will alarm E.TE1 fault if stationary auto tuning fails, it will alarm E.TE2 if rotational auto tuning fails.

| | | | |
|------|---|---------------|------------|
| H-63 | Motor magnetic saturation coefficient 1 | Range: 0-9999 | Default: ※ |
| H-64 | Motor magnetic saturation coefficient 2 | Range: 0-9999 | Default: ※ |
| H-65 | Motor magnetic saturation coefficient | Range: 0-9999 | Default: ※ |

[H-63-H-65] parameters use to adjusting the motor magnetic saturation in vector control mode, improve the motor overload capacity and rung stability.

| | | | |
|------|------------------------------|--------------|------------|
| H-66 | Linkage main station setting | Range: 0,1,2 | Default: 0 |
|------|------------------------------|--------------|------------|

0: Local machine configure as linkage slave station

1: Main station control mode 1. Sent frequency reference and running command of main AC drive to slave AC drive. 2: Main station control mode 2. Sent output frequency and running command of main AC drive to slave AC drive. When this frequency configure for main station, it has linking control function, enable to control other AC70 AC drive of network synchronous running.

| | | | |
|------|------------------------|--------------|------------|
| H-67 | Local AC drive address | Range: 1-247 | Default: 1 |
|------|------------------------|--------------|------------|

Uses to define communication address of local machine when it has been set for slave one. It makes no sense if it is set for main AC drive.

| | | | |
|------|-------------|----------------|------------|
| H-68 | Data format | Range: 0,1,2,3 | Default: 3 |
|------|-------------|----------------|------------|

0: (N,8,1), no check, data bit: 8, stop bit: 1

1: (E,8,1), even parity check, data bit: 8, stop bit: 1

2: (O,8,1), odd parity check, data bit: 8, stop bit: 1

3: (O,8,2), no check, data bit: 8, stop bit: 2

| | | | |
|------|-----------|------------|-----------|
| H-69 | Baud rate | Range:0- 5 | Default:3 |
|------|-----------|------------|-----------|

0:1200bps

1:2400bps

2:4800bps

3:9600bps

4:19200bps

5:38400bps

| | | | |
|------|---------------------------------------|-----------------|--------------|
| H-70 | Communication setting frequency ratio | Range:0.01-5.00 | Default:1.00 |
|------|---------------------------------------|-----------------|--------------|

Take frequency reference from upper controller multiply this parameter for this machine frequency reference. Modification with proportional scale for given frequency from upper controller is available.

| | | | |
|------|--------------------------------|-------------------|---------------|
| H-71 | Time of communication time out | Range:0.0-6500.0s | Default:10.0s |
|------|--------------------------------|-------------------|---------------|

If the interval time between a communication and the next communication exceeds communication overtime time, it is considered there is communication disconnection fault, malfunction disconnection action mode is decided by the [H-72].

| | | | |
|------|--|-----------|------------|
| H-72 | RS485 communication broken responding mode | Range:0-2 | Default: 1 |
|------|--|-----------|------------|

LED“0” digit: RS485 communication broken responding mode

0: giving alarm and free stop When the AC drive setting given communication command don't receive next frame command or any other communication command respond over [H-17] given time, AC drive will giving alarm and free stop .

1: No alarm and continue running AC drive don't make any fault detect, continue running with last communication

command .

2. No alarm but stop When the AC drive setting given communication command doesn't receive next frame command or any other communication command respond over [H-17] given time, AC drive stop running.

LED "00" digit: Communication write operation mode.

0: Reply for write operation

1: No reply for write operation

LED "000" digit: Reserve

LED "0000" digit: Reserve

Note: When AC drive has been set for main machine, don't perform RS485 communication broken checking.

| | | | |
|------|---------------|---------------------|-----------------|
| H-73 | Respond relay | Range: 0.000-1.000s | Default: 0.005s |
|------|---------------|---------------------|-----------------|

This parameter defines the intermediate interval time between the AC drive receiving the data and responding data back to the upper control. If the response delay time is shorter than the system handling time, the response time should according to the system; If the response delay time is longer than the system handling time, after system processing the data, it waits until the response delay time is up, then sends data to the upper controller.

| | | | |
|------|---|-------------------|---------------|
| H-74 | Instantaneous stop decel. respond voltage lower limit | Range: 0%-200% | Default: 20% |
| H-75 | Instantaneous stop decel. respond voltage upper limit | Range: 0%-200% | Default: 90% |
| H-76 | Instantaneous stop decel. gain | Range: 0.01-10.00 | Default: 2.00 |
| H-77 | Voltage recover stability time | Range: 0.0-100.0s | Default: 2.0s |

This function enable AC drive reducing the output frequency when power fails instantaneous or voltage lower suddenly, compensate voltage lowed with energy feedback from load, to maintain AC drive continue running in shortly.

When the input voltage lower to [H-74], AC drive will start to reduce speed and DC bus voltage rise. When the input voltage recovers to [H-75], speed reducing will stop. When the current speed keep stable running after [H-77] setting time, AC drive will accelerate to frequency reference given.

[H-76] is defines as deceleration gain, the bigger setting, the quicker voltage rising, which suitable for small inertia load. If this parameters is set for small, the voltage recovery rising slowly, which suitable for big inertia.

| | | | |
|------|---------------------------------|--------------------|-----------------|
| H-78 | Torque compensation upper limit | Range: 0.00-60.00% | Default: 50.00% |
|------|---------------------------------|--------------------|-----------------|

This parameters is valid only in vector control mode, uses for controlling the torque compensation upper limit. Take the rated AC drive voltage as reference benchmark for compensation voltage.

| | | | |
|------|---|---------------|------------|
| H-79 | Output terminal external control status | Range: 0-9999 | Default: 0 |
|------|---|---------------|------------|

| | | | |
|------|---------|--|--|
| H-80 | Reserve | | |
|------|---------|--|--|

Appendix 1: Appendix

9.1 Appendix 1: Function Code Simple List

“●”: Stand for this parameter can be modified in running mode.

“○”: Stand for this parameter can not be modified in running mode.

“×”: Stand for this parameter is read only, can't be modified.

“—”: Stand for factory authority parameters. Veichi setting is available

only. “※”: Stand for this parameter is related to AC drive model. **Basic function code group**

| Code function | Function name | Setting range and definition | Factory default | property | Refer to page | Communication code |
|---------------|---|--|-----------------|----------|---------------|--------------------|
| E-00 | Control method selection | 0: Open loop vector control without PG 1: V/F control mode | 1 | ○ | 69 | 100H |
| E-01 | Running control command channel selection | 0: Operator keypad 1: External terminal control 2: RS485 Communications port control | 0 | ○ | 69 | 101H |
| E-02 | Frequency reference given main channel selection | 0: Operator keypad digital given 1: Potentiometer of keypad 2: Terminal VS1 analog voltage 0-10V 3: Terminal AS analog current signal 4-20mA 4: Terminal VS2 analog voltage -10-10V 5: Pulse train signal 6: RS485 communication port 7: Up and Down control 8: General PID operation 9: Constant pressure PID control 10: Program running 11: Swing frequency run 12: Terminal selection: | 1 | ○ | 69 | 102H |
| E-03 | Frequency reference given auxiliary channel selection | 0: Operator keypad digital 1: Potentiometer of keypad 2: Terminal VS1 analog voltage 0-10V 3: Terminal AS analog current signal 4-20mA 4: Terminal VS2 analog voltage -10-10V 5: Pulse train signal 6: RS485 communication port 7: Up and Down control 8: General PID operation 9: Constant pressure PID control 10: Program running | 0 | ○ | 71 | 103H |

| | | | | | | |
|------|--|---|---------|---|----|------|
| E-04 | Frequency reference given channel gain | 0.01-5.00 | 1.00 | ○ | 72 | 104H |
| E-05 | Frequency reference given channel combination mode | 0: Main channel is valid, auxiliary channel is invalid. 1: Auxiliary channel valid, main channel invalid 2: Both channel is valid if non zero value, main channel priority 3: Main channel + $K \times$ auxiliary channel) 4: main channel - ($K \times$ auxiliary channel) 5: MAX [main channel , ($K \times$ auxiliary channel)] 6: MIN [main channel , ($K \times$ auxiliary channel)] 7: Auxiliary channel + ($K \times$ main channel) 8: Auxiliary channel - ($K \times$ main channel) 9: MAX [($K \times$ main channel), auxiliary channel] 10: MIN [($K \times$ main channel), auxiliary channel] | 0 | ○ | 72 | 105H |
| E-06 | Upper LED monitor selection | 0: Frequency Given 1: Output frequency 2: Output current 3: Input voltage | 0 | ● | 72 | 106H |
| E-07 | Lower LED monitor selection | 4: Output voltage 5: Machine speed 6: PID given given 7: PID feedback value | 1 | ● | 72 | 107H |
| E-08 | REV/JOG key of keypad function selection | 0: Reverse 1: Jog | 0 | ● | 73 | 108H |
| E-09 | Maximum frequency | 0.01-600.00Hz | 50.00Hz | ○ | 73 | 109H |
| E-10 | Upper limit frequency | lower limit frequency - maximum frequency | 50.00Hz | ● | 73 | 10AH |
| E-11 | Lower limit frequency | 0.00-Upper limit frequency | 0.00Hz | ● | 73 | 10BH |
| E-12 | Lower limit frequency running mode | 0: Stop 1: running with lower limit frequency | 1 | ● | 73 | 10CH |
| E-13 | Acceleration time 1 | 0.1-6500.0s | ※ | ● | 74 | 10DH |
| E-14 | Deceleration time 1 | 0.1-6500.0s | ※ | ● | 74 | 10EH |

| | | | | | | |
|------|---|--|---------|---|----|------|
| E-15 | Acceleration /deceleration mode selection | LED unit digit: decelerate /decelerate mode. 0: linear accelerate 1: S curve LED tens digit: Accelerate/decelerate time datum point. 0: Motor rated frequency 1: Maximum frequency LED hundreds digit: Equidistance stop function 0: Disable 1: Enable LED Thousands digit: 0: Disable 1: Enable | 0000 | ● | 74 | 10FH |
| E-16 | Frequency given by digital keypad | lower limit frequency - Upper limit frequency | 50.00Hz | ● | 76 | 110H |
| E-17 | V/F curve mode | 0: Constant torque curve 1: Descend torque curve(1.5 power curve) 2: Descend torque curve(1.7 Power curve) 3: Descend torque curve(2.0 Square curve) 4: User define curve | 0 | ○ | 76 | 111H |
| E-18 | Torque boost | 0.0%-25.0% | ※ | ● | 76 | 112H |
| E-19 | Filter time constant | 0.01-99.99 | ※ | ● | 77 | 113H |
| E-20 | Carrier frequency | 0.7KHz-15.0KHz | ※ | ● | 77 | 114H |
| E-21 | Carrier characteristic | LED unit Digit: Associate of carrier frequency and output frequency configure. 0: Output frequency associate is disabled. 1: Output frequency associate is enabled. LED tens digit: Associate of carrier frequency and module temperature configure. 0: Module temperature associate is disabled. 1: Module temperature associate is enabled. LED Hundreds digit: PWM mode selection 0: Fixed PWM mode 2: Random PWM mode 1 LED Thousands digit: Inhibition of shock 0: Inhibition of shock is disabled 1: Inhibition of shock is enabled | 1010 | ● | 77 | 115H |
| E-22 | V/F slip compensation | 0%-200% | 100% | ○ | 78 | 116H |

| | | | | | | |
|------|---|---|--------|---|----|------|
| E-23 | Energy saving mode selection | LED unit digit: Auto energy saving selection 0: disable 1: enable LED tens digit: V/F slip compensation 0: Disable 1: Enable LED hundreds digit: reserved LED thousands digit: Overmodulation 0: Overmodulation allow 1: Overmodulation not allow | 1000 | ○ | 78 | 117H |
| E-24 | Voltage auto regulation function | 0: Disable 1: Enable in full process 2: Disable only in deceleration | 2 | ● | 79 | 118H |
| E-25 | Jog frequency | 0.50Hz - upper limit frequency | 5.00Hz | ● | 79 | 119H |
| E-26 | Jog acceleration time | 0.1-6500.0s | 2.0s | ● | 79 | 11AH |
| E-27 | Jog deceleration time | 0.1-6500.0s | 2.0s | ● | 79 | 11BH |
| E-28 | Starting frequency | 0.00-60.00Hz | 0.50Hz | ○ | 79 | 11CH |
| E-29 | Starting frequency holding time | 0.0-20.0s | 0.0s | ○ | 79 | 11DH |
| E-30 | Starting mode selection | LED unit digit: Starting mode selection. 0: Starts from starting frequency 1: DC braking first, and then start from starting frequency 2: Restart after speed search LED tens digit: reserved LED Hundreds digit: Speed search direction 0: Speed search performs only in running direction 1: bi-direction speed search LED Thousands digit: Speed search mode 0: Software speed search 1: Hardware speed search | ※000 | ○ | 80 | 11EH |
| E-31 | Power off restart selection | 0: Disable 1: Enable | 0 | ● | 81 | 11FH |
| E-32 | Power off restart waiting time | 0.0-10.0s | 0.5s | ● | 81 | 120H |
| E-33 | Free stop frequency | 0.00-60.00Hz | 0.00Hz | ● | 81 | 121H |
| E-34 | Stop mode | 0: Deceleration stop 1: Free stop | 0 | ● | 81 | 122H |
| E-35 | DC braking current | 0-150% | 50% | ● | 82 | 123H |
| E-36 | DC braking time when stop | 0.0-30.0s | 0.0s | ● | 82 | 124H |
| E-37 | DC braking starting frequency when stop | 0.00-60.00Hz | 0.00Hz | ● | 82 | 125H |
| E-38 | DC braking time when | 0.0-10.0s | 0.0s | ● | 82 | 126H |

| | | | | | | |
|------|---|---|----------------|---|----|------|
| E-39 | Jump frequency 1 | 0.00-600.0Hz(Fmax) | 0.00Hz | ● | 82 | 127H |
| E-40 | Jump frequency 2 | 0.00-600.0Hz(Fmax) | 0.00Hz | ● | 82 | 128H |
| E-41 | Jump frequency 3 | 0.00-600.0Hz(Fmax) | 0.00Hz | ● | 82 | 129H |
| E-42 | Jump frequency range | 0.00-5.00Hz | 0.00Hz | ● | 82 | 12AH |
| E-43 | Number of auto restart attempts | 0: Disable 1-3: Enable | 0 | ● | 83 | 12BH |
| E-44 | Fault auto reset waiting time | 0.1-20.0s | 1.0s | ● | 83 | 12CH |
| E-45 | Machine warm up time | 0.0-6500s | 0.0s | ● | 83 | 12DH |
| E-46 | Running direction selection | 0: Consistent with the default direction 1: Opposite to the default direction 2: Reverse running forbidden. | 0 | ○ | 83 | 12EH |
| E-47 | FOR/REV dead zone time | 0.0-10.0s | 0.0s | ● | 84 | 12FH |
| E-48 | Cooling fans running selection | 0: Fan runs when switch on. 1: Fan runs or not relates with temperature during AC drive stop mode, fan runs when AC drive running. 2.Fan stop during AC drive stop mode, running if not relates with temperature during AC drive ruing | ※ | ● | 84 | 130H |
| E-49 | AC drive protecting mode selection | LED unit digit: Overvoltage protecting selection during deceleration 0: Disable 1 Enable LED ten digit: Output phase missing protection 0: Disable 1 Enable LED hundred digit: Input phase missing protection 0: Disable 1 Enable LED thousand digit: AC drive overload, over heat protect mode selection. 0: Free stop 1: Running with current limit | 0※11 | ● | 84 | 131H |
| E-50 | Coefficient value of electronic thermal | 30%-120% (disable for value less than 30) | 0% | ● | 85 | 132H |
| E-51 | Stall protecting current limit value | 100%-250% | 160 G 120 P | ● | 86 | 133H |
| E-52 | Stall protecting DC bus voltage threshold value | 105-160% | 138% | ● | 86 | 134H |
| E-53 | Dynamic braking and decelerating over voltage suppression threshold | 105-160% | 130% | ● | 86 | 135H |
| E-54 | Ratio of dynamic braking | 0-100% | 100% | ● | 86 | 136H |
| E-55 | DC bus under voltage protecting value | 60-90% | 65% | ● | 87 | 137H |
| E-56 | reserved | | | | 87 | 138H |

| | | | | | | |
|------|---------------------------------------|---|--------|---|----|------|
| E-57 | reserved | | | | 87 | 139H |
| E-58 | reserved | | | | 87 | 13AH |
| E-59 | Rotation speed display scale factor | 0.1-2000.0% | 100.0% | ● | 87 | 13BH |
| E-60 | Ratio of AC drive output voltage | 50-110% | 100% | ○ | 87 | 13CH |
| E-61 | G/P type setting | 0: G type 1: P type | 0 | ○ | 87 | 13DH |
| E-62 | Speed search stabilizing keeping time | 0.200-10.000s | 0.600s | ● | 87 | 13EH |
| E-63 | Parameters change protection | 0: All the parameters changing is allowed 1: Only keyboard digital given parameter changing allowed 2: All the parameters prohibit changing | 0 | ● | 88 | 13FH |
| E-64 | Parameter initialization | 0: Null 1: Restores to factory default setting value 2: Clear fault record 3: Transfer parameters of AC drive to keypad and save. 4: Transfer parameters saved of keypad to AC drive | 0 | ○ | 88 | 140H |
| E-65 | Factory password | 0-9999 | 0 | ● | 88 | 141H |
| E-66 | Information check | LED unit digit: 0: Null operation 1: State monitoring inquiry 2: Fault information inquiry LED ten digit: LCD display language 0:Chinese 1:English | 0 | ● | 88 | 142H |
| E-67 | Interference suppression selection | LED unit digit: Overvoltage interference suppression 0: Disable 1: Enable LED ten digital: SC interference suppression 0: Disable 1: SC interference suppression 1 2: SC interference suppression 2 LED hundred digital: over current interference suppression 0: Disable 1: Over current interference suppression 1 2: Over current interference suppression 2 LED thousand digital: over current in deceleration suppression 0: Disable 1: Enable 2: Enable frequency reducing for protecting over current. | 0001 | ● | 92 | 143H |

External terminal parameters

| Code function | Function name | Setting range and define | Factory default | property | Refer to page | Communication code |
|---------------|------------------------------------|--|-----------------|----------|---------------|--------------------|
| F-01 | Input signal selection 1 (X1) | 0: Invalid 1: Forward jog operation 2: Reverse jog operation 3: Free stop 4: Fault reset | 27 | ○ | 93 | 201H |
| F-02 | Input signal selection2 (X2) | 5: Multi steps speed control 1 6: Multi steps speed control 2 7: Multi steps speed control 3 8: Multi steps speed control 4 9: UP/Down running frequency increasing UP | 28 | ○ | 93 | 202H |
| F-03 | Input signal selection 3 (X3) | 10:UP/Down running frequency decreasing DW 11: Three wire operation control D (X) 12: PID control cancel 13: External fault alarm | 1 | ○ | 93 | 203H |
| F-04 | Input signal selection 4 (X4) | 14: Acceleration/deceleration time selection terminal 1. 15:Acceleration/deceleration time selection terminal 2 16: Frequency main channel selection terminal 1 | 2 | ○ | 93 | 204H |
| F-05 | Input signal selection 5 (X5) | 17: Frequency main channel selection terminal 2 18: Frequency main channel selection terminal 3 19: Frequency main channel selection terminal 4 | 3 | ○ | 93 | 205H |
| F-06 | Input signal selection 6 (X6) | 20: Program running pause 21: Program restart 22: Timer trigger terminal 23: Timer reset terminal 24: Counter reset terminal 25:Counter clock input terminal 26:Only terminal control channel is enabled selection 27: Forward running 28: Reverse running | 4 | ○ | 93 | 206H |

| | | | | | | |
|------|-------------------------------------|--|------|---|----|------|
| F-07 | Input signal respond mode selection | <p>LED unit digit: Free stop terminal recover mode</p> <p>0: Recover to original command with speed search function.</p> <p>1: Don't recover to original command after free stop terminal disconnecting.</p> <p>2: Recover to original command without speed search function.</p> <p>LED ten digit: UP and DW terminal control starting frequency setting</p> <p>0: Runs with UP/DW terminal adjusting without save the frequency record after power loss.</p> <p>1: Run to last stop moment frequency and then perform UP/DW adjusting.</p> <p>2: Runs to preset frequency[F-70] first, and then execute UP/DW adjusting.</p> <p>LED hundred digit: STOP/RESE of keypad effective range selection.</p> <p>0: STOP/RESE key valid only when under keypad control</p> <p>1: STOP/RESE key valid under any run command source</p> <p>LED thousand digit: Terminal running mode selection after fault reset</p> <p>0: Start AC drive running directly after power on in terminal control mode</p> <p>1: Stop first and then start in terminal control mode.</p> | 0001 | ○ | 94 | 207H |
|------|-------------------------------------|--|------|---|----|------|

| | | | | | | |
|------|--|--|---------|---|----|------|
| F-08 | Terminal running control mode | LED unit digit: Terminal control mode selection 0: Standard running control mode 1: 2wire running control mode 2: 2 wire control mode 1 3: 3 wire control mode 2 4: 3 wire control mode 3 5: 3 wire control mode 4 LED ten digit:reserved LED hundred digit:reserved LED thousand: reserved | 0000 | ○ | 95 | 208H |
| F-09 | 1 step speed setting 1X | 0.00Hz-upper limit frequency | 30.00Hz | ● | 97 | 209H |
| F-10 | 2 step speed setting 2X | | 25.00Hz | ● | 97 | 20AH |
| F-11 | 3 step speed setting 3X | | 40.00Hz | ● | 97 | 20BH |
| F-12 | 4 step speed setting 4X | | 50.00Hz | ● | 97 | 20CH |
| F-13 | 5 step speed setting 5X | | 50.00Hz | ● | 97 | 20DH |
| F-14 | 6 step speed setting 6X | | 40.00Hz | ● | 97 | 20EH |
| F-15 | 7 step speed setting 7X | | 25.00Hz | ● | 97 | 20FH |
| F-16 | 8 step speed setting 8X | | 10.00Hz | ● | 97 | 210H |
| F-17 | reserved | | | | 98 | 211H |
| F-18 | reserved | | | | 98 | 212H |
| F-19 | Speed search tracking speed | 0.1-10.0% | 0.2% | ○ | 98 | 213H |
| F-20 | Voltage stores time | 0.10S-10.00S | 0.60s | ○ | 98 | 214H |
| F-21 | Speed search respond current threshold value | 10%-200% | 120% | ○ | 98 | 215H |
| F-22 | Frequency reducing acceleration time | 0.1-6500.0s | 2.0s | ● | 98 | 216H |
| F-23 | Frequency reducing acceleration time | 0.1-6500.0s | 0.3s | ● | 98 | 217H |
| F-24 | Acceleration time 2 | 0.1-6500.0s | ※ | ● | 99 | 218H |
| F-25 | Deceleration time 2 | | ※ | ● | 99 | 219H |
| F-26 | Acceleration time 3 | | ※ | ● | 99 | 21AH |
| F-27 | Deceleration time 3 | | ※ | ● | 99 | 21BH |
| F-28 | Acceleration time 4 | | ※ | ● | 99 | 21CH |
| F-29 | Deceleration time 4 | | ※ | ● | 99 | 21DH |

| | | | | | | |
|------|---|--|---------|---|-----|------|
| F-30 | Relay output terminal (TA,TB,TC) | 0: Zero frequency (standby state) 1: Fault alarm 1. (Including fault auto reset period.) 2: Fault alarm 2. (Not includes fault auto reset period.) 3: Frequency arriving detection 4: Frequency level detection 5: Running statuses 6: Reverse running 7: Under voltage of AC drive 8: Overload pre-alarm 9: Output frequency reach upper limit frequency 10: Output frequency reach lower limit frequency 11. External fault stop 12. Timer times up | 1 | ● | 99 | 21EH |
| F-31 | Output terminal Y1 | 13. Counter reach maximum values 14. Counter reach setting values 15. PID feedback upper limit alarm 16. PID feedback lower limit alarm 17. Sensor broken 18.Program running cycle completed 19.Program running step completed 20:Dynamic braking processing | 4 | ● | 99 | 21FH |
| F-32 | Output terminal Y2 | 21: Output terminal control by external 22. Fault alarm 1. (Including fault auto reset period,inclusing fault-LU1) | 7 | ● | 99 | 220H |
| F-33 | Frequency arriving detect bias | 0.00-50.00Hz | 1.00Hz | ● | 101 | 221H |
| F-34 | Output frequency level detection | 0.00-600.0Hz | 30.00Hz | ● | 101 | 222H |
| F-35 | Output frequency level detecting relay time | 0.0-20.0s | 0.0s | ● | 101 | 223H |
| F-36 | Overload pre-alarm level | 50-200% | 150% | ● | 101 | 224H |
| F-37 | Overload pre-alarm delay time | 0.0-20.0s | 1.0s | ● | 101 | 225H |
| F-38 | Timer setting value | 1-65000s | 1s | ● | 101 | 226H |
| F-39 | Counter maximum value | 1-65000 | 1000 | ● | 102 | 227H |
| F-40 | Counter setting value | 1- Counter maximum value | 100 | ● | 102 | 228H |

| | | | | | | |
|------|---|---|----------|---|-----|------|
| F-41 | VS1 terminal input voltage lower limit | 0.00V- [F-42] | 0.50V | ● | 102 | 229H |
| F-42 | VS1 terminal input voltage upper limit | [F-41]-10.00V | 9.50V | ● | 102 | 22AH |
| F-43 | VS1 terminal input voltage gain | 0.01-5.00 | 1.00 | ● | 102 | 22BH |
| F-44 | VS2 terminal input voltage lower limit | -10.0V –[F-45] | 0.5V | ● | 102 | 22CH |
| F-45 | VS2 terminal input voltage upper limit | [F-44]-10.0V | 9.5V | ● | 102 | 22DH |
| F-46 | VS2 terminal input voltage gain | 0.01-5.00 | 1.00 | ● | 102 | 22EH |
| F-47 | VS2 terminal input voltage lower limit | -1.00V-1.00V | 0.00V | ● | 102 | 22FH |
| F-48 | VS2 terminal input bipolar adjust and direction control | 0: Bipolar adjust and direction control both invalid 1: Bipolar adjust and direction control both valid 2:Bipolar adjust valid, direction control invalid | 0 | ● | 102 | 230H |
| F-49 | VS2 terminal input bipolar control zero hysteresis band | 0.00V-3.00V | 0.20V | ● | 103 | 231H |
| F-50 | AS terminal input current lower limit | 0.00mA - [F-51] | 4.20mA | ● | 104 | 232H |
| F-51 | AS terminal input current upper limit | [F-50] - 20.0mA | 19.50mA | ● | 104 | 233H |
| F-52 | AS terminal input current gain | 0.01-5.00 | 1.00 | ● | 104 | 234H |
| F-53 | Pulse input frequency lower | 0.00KHz- [F-54] | 0.00KHz | ● | 105 | 235H |
| F-54 | Pulse input frequency upper limit | [F-53] - 50.00KHz | 10.00KHz | ● | 105 | 236H |
| F-55 | Pulse input frequency gain | 0.01-5.00 | 1.00 | ● | 105 | 237H |
| F-56 | Input lower limit correspond setting | 0.00Hz - [F-57] | 0.00Hz | ● | 105 | 238H |
| F-57 | Input upper limit correspond setting frequency | [F-56] - maximum frequency | 50.00Hz | ● | 105 | 239H |

| | | | | | | |
|------|---|---|------|---|-----|------|
| F-58 | Input signal characteristic selection | LED unit digit: VS1 input characteristic selection 0: Positive characteristic 1: Negative characteristic LED ten digit: AS input characteristic selection 0: Positive characteristic 1: Negative characteristic LED hundred digit: VS2 input characteristic selection 0: Positive characteristic 1: Negative characteristic LED thousand digit: Pulse input characteristic selection 0: Positive characteristic 1: Negative characteristic | 0000 | ● | 105 | 23AH |
| F-59 | Terminal analog input filtering time constant | 0.01-5.00 | 0.50 | ● | 106 | 23BH |
| F-60 | Output terminal (AO1) selection | 0: Output signal disable 1: Output frequency/speed 2: Output current 3: Given frequency/speed reference 4: PID given value 5: PID feedback value 6: DC bus voltage 7: Output voltage | 1 | ● | 106 | 23CH |
| F-61 | Output terminal (AO2) selection | | 3 | ● | 106 | 23DH |
| F-62 | Analog output signal selection | LED unit digit: AO2 output signal mode selection 0: Frequency pulse train output 1: 0-20mA 2: 4-20mA 3: 0-10V LED ten digit: AO1 output signal mode selection 0: 0-10V 1: 0-20mA 2: 4-20mA LED hundred digit: reserved LED thousand digit: reserved | 0003 | ● | 107 | 23EH |
| F-63 | AO1 output signal gain | 25%-200% | 100% | ● | 107 | 23FH |
| F-64 | AO2 output signal gain | 25%-200% | 100% | ● | 107 | 240H |
| F-65 | AO1 output signal zero adjust | -10.0%-10.0% | 0.0% | ● | 107 | 241H |
| F-66 | AO2 output signal zero adjust | -10.0%-10.0% | 0.0% | ● | 107 | 242H |

| | | | | | | |
|------|---|--------------------------------|--------|---|-----|------|
| F-67 | Keyboard potentiometer Input voltage lower limit | 0.00V - [F-68] | 0.20V | ● | 107 | 243H |
| F-68 | Keyboard potentiometer Input voltage upper limit | [F-67] - 5.50V | 4.80V | ● | 107 | 244H |
| F-69 | Keyboard potentiometer gain | 0.00-5.00 | 1.00 | ● | 107 | 245H |
| F-70 | UP/DW terminal preset frequency | 0.00Hz - upper limit frequency | 0.00Hz | ● | 108 | 246H |
| F-71 | UP/DW Power-off memorized frequency | 0.00Hz - upper limit frequency | 0.00Hz | ○ | 108 | 247H |

Special function parameters

| Code function | Function name | Setting range and define | Factory default | pr op er ty | Refe r to page | Comm unici on code |
|------------------|--|---|--------------------|----------------------|-------------------------|-----------------------------|
| H-01 | User setting voltage V1 | 0.0% -[H-03] | 3.0% | ○ | 108 | 301H |
| H-02 | User setting frequency F1 | 0.0Hz-[H-04] | 1.00Hz | ○ | 108 | 302H |
| H-03 | User setting voltage V2 | [H-01]-H-05] | 28.0% | ○ | 108 | 303H |
| H-04 | User setting frequency F2 | [H-02]-H-06] | 10.00Hz | ○ | 108 | 304H |
| H-05 | User setting voltage V3 | [H-03]-H-07] | 55.0% | ○ | 108 | 305H |
| H-06 | User setting frequency F3 | [H-04]-H-08] | 25.00Hz | ○ | 108 | 306H |
| H-07 | User setting voltage V4 | [H-05]-H-09] | 80.0% | ○ | 108 | 307H |
| H-08 | User setting frequency F4 | [H-06]-H-10] | 37.50Hz | ○ | 108 | 308H |
| H-09 | User setting voltage V5 | [H-07]-100.0% | 100.0% | ○ | 108 | 309H |
| H-10 | User setting frequency F5 | [H-08]-maximum frequency | 50.00Hz | ○ | 108 | 30AH |
| H-11 | PID output characteristic | 0: Positive characteristic 1: Negative characteristic | 0 | ○ | 109 | 30BH |
| H-12 | PID controller given signal sources | 0: Keypad potentiometer 1: PID keypad digital given 2: External terminal VS1:0-10V 3: External terminal AS: 4-20mA 4: External terminal VS2 5: External pulse signal 6: RS485 interface | 1 | ○ | 109 | 30CH |
| H-13 | PID controller feedback signal source | 0: External terminal VS1:0-10V 1: External terminal AS: 4-20mA 2: External terminal VS2 (bipolar invalid) 3: External pulse signal | 1 | ○ | 109 | 30DH |
| H-14 | PID preset frequency | 0.00Hz-upper limit frequency | 0.00Hz | ○ | 110 | 30EH |
| H-15 | PID preset frequency running time | 0.0-6500.0s | 0.0s | ● | 110 | 30FH |
| H-16 | PID keypad digital given | 0.0-100.0% | 50.0% | ● | 110 | 310H |
| H-17 | PID channel gain | 0.01-5.00 | 1.00 | ● | 110 | 311H |

| | | | | | | |
|------|---|---|--------|---|-----|------|
| H-18 | Sensor maximum measuring range | 1.0-100.0 | 100.0 | ● | 110 | 312H |
| H-19 | Proportion gain P | 0.1-100.0 | 20.0 | ● | 111 | 313H |
| H-20 | Integral time constant I | 0.1-100.0s | 2.0s | ● | 111 | 314H |
| H-21 | Differential gain D | 0.0-10.0 | 0.0 | ● | 111 | 315H |
| H-22 | Sampling period | 0.01-60.00s | 0.10s | ● | 111 | 316H |
| H-23 | PID control deviation limit | 0.0-20.0% | 0.0% | ● | 111 | 317H |
| H-24 | Starting threshold value | 0.0%-Sleep threshold value | 0.0% | ● | 111 | 318H |
| H-25 | Sleep threshold value | Starting threshold value-100.0% | 100.0% | ● | 111 | 319H |
| H-26 | Alarm upper limit value | Alarm lower limit value-100.0% | 100.0% | ● | 112 | 31AH |
| H-27 | Alarm lower limit value | 0.0%-Alarm upper limit value | 0.0% | ● | 112 | 31BH |
| H-28 | Sensor disconnection detection | 0.0-20.0% | 0.0% | ● | 112 | 31CH |
| H-29 | Sensor disconnection alarm operation selection | 0: continue running 1: Stop | 0 | ● | 112 | 31DH |
| H-30 | Upper limit threshold | lower limit threshold-100.0% | 100.0% | ● | 112 | 31EH |
| H-31 | Lower limit threshold | 0.0%-Upper limit threshold | 0.0% | ● | 112 | 31FH |
| H-32 | Program running mode | 0: Single cycle running (time by second) 1: Continuous cycle running 2: single cycle, continuous running (time by second) 3: Single cycle running (time by minute) 4: Continuous cycle (time by minute) 5: Single cycle, continuous running (time by minute) | 0 | ○ | 112 | 320H |
| H-33 | Program run breakpoint restore mode selection | 0: Running at the first step speed 1: Continue to run with breakpoint running frequency and retiming. 2: Continue to run with the breakpoint running frequency and residual time. | 0 | ○ | 114 | 321H |
| H-34 | Program running state power down memory selection | 0: NO power down memory 1: power down memory | 0 | ○ | 114 | 322H |
| H-35 | 1 step speed direction and accel/decel time | 0: Forward; Acceleration time 1/Deceleration time 1 | 0 | ● | 114 | 323H |
| H-36 | 2 step speed direction and accel/decel time | 1: Forward; Acceleration time 1/Deceleration time 2 | 1 | ● | 114 | 324H |
| H-37 | 3 step speed direction and accel/decel time | 2: Forward; Acceleration time 1/Deceleration time 3 | 2 | ● | 114 | 325H |
| H-38 | 4 step speed direction and accel/decel time | 3: Forward; Acceleration time 1/Deceleration time 4 | 3 | ● | 114 | 326H |
| H-39 | 5 step speed direction and accel/decel time | 4: Reverse; Acceleration time 1/Deceleration time 1 | 4 | ● | 114 | 327H |

| | | | | | | |
|------|--|---|---------|---|-----|------|
| H-40 | 6 step speed direction and accel/decel time | 5: Reverse; Acceleration time 1/Deceleration time 2 | 5 | ● | 114 | 328H |
| H-41 | 7 step speed direction and accel/decel time | 6: Reverse; Acceleration time 1/Deceleration time 3 | 6 | ● | 114 | 329H |
| H-42 | 8 step speed direction and accel/decel time | 7: Reverse; Acceleration time 1/Deceleration time 4 | 7 | ● | 114 | 32AH |
| H-43 | 1 step speed running time T1 | 0.0-6000s(min) | 10.0 | ● | 115 | 32BH |
| H-44 | 2 step speed running time T2 | | 10.0 | ● | 115 | 32CH |
| H-45 | 3 step speed running time T3 | | 10.0 | ● | 115 | 32DH |
| H-46 | 4 step speed running time T4 | | 10.0 | ● | 115 | 32EH |
| H-47 | 5 step speed running time T5 | | 10.0 | ● | 115 | 32FH |
| H-48 | 6 step speed running time T6 | | 10.0 | ● | 115 | 330H |
| H-49 | 7 step speed running time T7 | | 10.0 | ● | 115 | 331H |
| H-50 | 8 step speed running time T8 | | 10.0 | ● | 115 | 332H |
| H-51 | Differential frequency Δf in swing frequency | 0.00-20.00Hz | 2.00Hz | ● | 115 | 333H |
| H-52 | Motor rated power | 0.4-1100.0KW | ※ | ○ | 115 | 334H |
| H-53 | Motor rated frequency | 0.00-600.00Hz | 50.00Hz | ○ | 115 | 335H |
| H-54 | Motor rated speed | 0-18000RPM | ※ | ○ | 116 | 336H |
| H-55 | Motor rated voltage | 0-1500V | ※ | ○ | 116 | 337H |
| H-56 | Motor rated current | 0.1-1000.0A | ※ | ○ | 116 | 338H |
| H-57 | Motor no load current | 0.01-650.00A | ※ | ○ | 116 | 339H |
| H-58 | Motor stator resistor | 0.001-65.000Ω | ※ | ○ | 116 | 33AH |
| H-59 | Motor rotator resistor | 0.001-65.000Ω | ※ | ● | 116 | 33BH |
| H-60 | Motor stator inductance | 0.1-6500.0mH | ※ | ● | 116 | 33CH |
| H-61 | Motor rotator mutual inductance | 0.1-6500.0mH | ※ | ● | 116 | 33DH |
| H-62 | Motor auto tuning selection | 0: Null operation. 1: Rotational motor auto tuning. 2: Stationary auto tuning | 0 | ○ | 116 | 33EH |
| H-63 | Motor magnetic saturation coefficient 1 | 0-9999 | ※ | ● | 116 | 33FH |
| H-64 | Motor magnetic saturation coefficient 2 | 0-9999 | ※ | ● | 116 | 340H |

| | | | | | | |
|------|---|---|--------|---|-----|------|
| H-65 | Motor magnetic saturation coefficient 3 | 0-9999 | ※ | ● | 116 | 341H |
| H-66 | Linkage main station setting | 0: Local machine configure as linkage slave station 1: Main station control mode 1. 2: Main station control mode 2. | 0 | ● | 117 | 342H |
| H-67 | Local AC drive address | 1-247 | 1 | ● | 117 | 343H |
| H-68 | Data format | 0: No check (N,8,1) 1: Even parity check(E,8,1) 2: Odd parity check (O,8,1) 3: No check (N,8,2) | 3 | ○ | 117 | 344H |
| H-69 | Baud rate | 0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps | 3 | ○ | 117 | 345H |
| H-70 | Communication setting frequency ratio | 0.00-20.00 | 1.00 | ● | 117 | 346H |
| H-71 | Time of communication time out | 0.0-6500.0s | 10.0s | ● | 117 | 347H |
| H-72 | RS485 communication broken responding mode | LED“0” digit: RS485 communication broken responding mode 0: Give alarm and free stop 1: No alarm and continue running 2: No alarm but stop LED “00” digit: Communication write operation mode. 0: Reply for write operation 1: No reply for write operation LED “000” digit:: reserved LED “0000” digit: reserved | 0001 | ● | 117 | 348H |
| H-73 | Respond relay | 0.000-1.000s | 0.005s | ● | 118 | 349H |
| H-74 | Instantaneous stop decel. respond voltage lower limit | 0%-200% | 20% | ● | 118 | 34AH |
| H-75 | Instantaneous stop decel. respond voltage upper limit | 0%-200% | 90% | ● | 118 | 34BH |
| H-76 | Instantaneous stop decel. gain | 0.01-10.00 | 2.00 | ● | 118 | 34CH |
| H-77 | Voltage recover stability time | 0.0-100.0s | 2.0s | ● | 118 | 34DH |
| H-78 | Torque compensation upper limit | 0.00-60.00% | 50.00% | | 118 | 34EH |
| H-79 | Output terminal external control status | 0-9999 | 0 | ● | 118 | 34FH |
| H-80 | Reserved | | | | 118 | 350H |

Appendix 2: RS485 Communication Protocol

1 Communication Protocol

AC70 series AC drive can select the RS485 communication interface. The international standard ModBus communication protocol is adopted for master-slave communication. The consumer can carry out centralized control by PC/PLC, upper machine, main station AC drive etc (Setting of the AC drive control command, running frequency, relative function parameters modification, AC drive working state and malfunction information monitoring etc.. to adapt to the special application requirements.

2 Protocol Content

This ModBus protocol defines the information content and format of asynchronous transmission in series communication. It includes: host machine polling, broadcast and the format of slave machine response. Host machine data frame includes: slave machine address (or broadcast address), ask action code, data and fault check. Slave machine response is same structure: action check, back data and fault check. If slave machine meet fault while accept frame, or can't complete the action asked, fault information will be feed back to host machine.

3 Application Mode

AC70 series AC drive controls network for "single host machine and many slave machines" with RS232/RS485.

Remote RS485 communication needs shield cable and shield grounding.

For long distance communication, we suggest to open J6 and add 120 Ω resistance to prevent signal reflection.

4 Main Line Structure

1, Port mode: RS485 port

2, Transmission mode: Asynchronous series, half duplex transmission mode. At same time, one of the host machine and slave machine sends data, another receives data. Data is sent one by one frame as report form in asynchronous series communication.

3, Topological structure: One host machine with several slave machines. Range of slave machine address is 1 to 247. 0 is broadcast address. Every slave machine address is only one. It is the base of ModBus series communication.

5 Protocol Explain

AC70 series AC drive communication protocol is main-slave ModBus communication protocol of asynchronous series. In the net, only the host machine can set up protocol "inquire/ order". Slave machines can only respond to host machine. Host machine means PC, main AC drive, industrial control equipment or PLC...Slave machines are AC70 AC drive and other control equipments with same communication protocol. Host machine can communicate with only one slave machine or broadcast to all slave machines. Slave machine need feedback every "inquire/order" of host machine, but no need feedback broadcast.

5.1 Communication frame structure

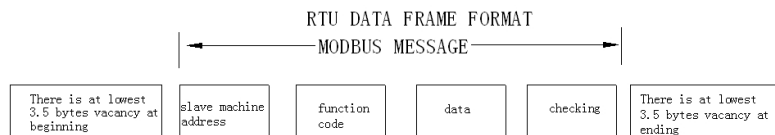
The ModBus protocol communication data format of AC70 series AC drive is RTU (remote terminal unit) mode.

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 | No check bit Even check bit Odd check | stop bit |
|----------------|------|------|------|------|------|------|------|------|---|----------|

In RTU mode, it always starts after at least 3.5 byte transmission time which is easy realized under Baud rate. And next data is: slave machine address, operation order code, data and CRC check. Every domain transmission is hexadecimal 0...9, A...F. Network equipment detects the network bus unceasingly, including the interval time. While receiving the first domain (address information, each network equipments carry out decoding to judge whether the byte is for itself. While the final byte transmission is completed, there will be at least 3.5 bytes transmission time interval to indicate that this frame is over. Then a new information' transmission can begin



One frame message must be transmitted as a continued data flow. If there is a pause over 1.5 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: 0~247(decimal)(0 is broadcast address) |
| Function code CMD | 03H: read slave machine parameter 06H: write slave machine parameter 08H: circuit auto-detection |
| Data domain DATA (N-1) ... DATA (0) | parameter address, parameter number, parameter values , |
| CRC CHK low-order | Detecting value: 16 bit CRC check value |
| CRC CHK high-order | |
| Frame ending | transmission time of 3.5 bytes |

5.2 Order code and communication data description

5.2.1 Order code: 03H, read N word (can continue reading 5 words at most)

For example: AC drive who is slave machine with address 01 H and memory initial address 0101H([E-01]) reads 3 words continuously. Then the structure of that frame is described as follows:

RTU host machine order information

| | |
|--------------------------|--------------------------------|
| START | Transmission time of 3.5 bytes |
| Slave machine address | 01H |
| Order code | 03H |
| Start address high-order | 01H |
| Start address low-order | 01H |
| Data number high-order | 00H |
| Data number low-order | 03H |
| CRC CHK low-order | 55H |
| 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 |
| Order code | 03H |
| Byte number low-order | 06H |
| Data address 0101H high-order | 00H |
| Data address 0101H low-order | 02H |
| Data address 0102H high-order | 00H |
| Data address 0102H low-order | 00H |
| Data address 0103H high-order | 00H |
| Data address 0103H low-order | 06H |
| CRC CHK low-order | D8H |
| CRC CHK high-order | B7H |
| END | Transmission time of 3.5 bytes |

RTU Slave machine responding information (abnormal)

| | |
|-----------------------|--------------------------------|
| START | Transmission time of 3.5 bytes |
| Slave machine address | 01H |
| Order code | 83H |
| Error code | 04H |
| CRC CHK low-order | 40H |
| CRC CHK high-order | F3H |
| END | Transmission time of 3.5 bytes |

5.2.2 Order code:06H, write a Word.

Function: write a word data in the designated data address. It can be used to revise the AC drive parameters. For example: 5000 (1388 H. is written into 0110H ([E-16]) address of slave AC drive with address 02H. 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 | 02H |
| Order code | 06H |
| Write data address high-order | 01H |
| Write data address low-order | 10H |
| Data content high-order | 13H |
| Data content low-order | 88H |
| CRC CHK low-order | 84H |
| CRC CHK high-order | 96H |
| END | Transmission time of 3.5 bytes |

RTU Slave machine responding information (normal)

| | |
|-------------------------------|--------------------------------|
| START | Transmission time of 3.5 bytes |
| Slave machine address | 02H |
| Order code | 06H |
| Write data address high-order | 01H |
| Write data address low-order | 10H |
| Data content high-order | 13H |
| Data content low-order | 88H |
| CRC CHK low-order | 84H |
| CRC CHK high-order | 96H |
| END | Transmission time of 3.5 bytes |

RTU Slave machine responding information (abnormal)

| | |
|-----------------------|--------------------------------|
| START | Transmission time of 3.5 bytes |
| Slave machine address | 02H |
| Order code | 86H |
| Error code | 01H |
| CRC CHK low-order | 73H |
| CRC CHK high-order | A0H |
| END | Transmission time of 3.5 bytes |

5.2.3 Order 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 |
| Order 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 |
| Order 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 |
| Order code | 88H |
| Error code | 03H |
| CRC CHK low-order | 06H |
| CRC CHK high-order | 01H |
| END | Transmission time of 3.5 bytes |

5.2.4 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 example, the RTU character frame contains the following 8 bits: 1 1 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 minimum effective digit. LSB is extracted to be detected. If LSB is 1, the register is independently XOR with the pre-set value. If LSB is 0, it is no XOR. This process needs to repeat 8 times. After the last bit (the eighth bit. is accomplished. Next 8 bits bytes 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 real CRC calculation program as required.

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);
}

```

5.2.5 Communication data address definition

It is used to control AC drive operation, get state information and parameter setting of AC drive.

(1.AC70 serial function parameter address express rules

Take AC drive 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 byte expresses the inner serial numbers of each function parameter group. All need to be changed to hexadecimal.

Address domain high byte definition:

x1xxH: basic parameter group (E group)

x2xxH: external terminal parameter group(F group)

x3xxH: dedicated function parameter group (H group).

xCxxH: monitoring parameter group (C group).

xExxH: fault information group (ER group).

Attention: due to possibility that the parameters are frequently rewritten exists in the communication, EEPROM are frequently stored. So its lifetime is cut down. As for the consumer, some function is unnecessarily to store in the communication mode, only require to changing the value of RAM inner, can satisfy the usage requirement. As AC70 communication protocol stipulates, when it use writing order (06 H), if the parameter function code address domain highest digit is 0, merely write in the AC drive RAM, power down without storing, if the parameter function code address high half digit is 1, write in EEPROM, namely power off with storing.

For example, rewriting the function parameter [E-16], not depositing to EEPROM, address expresses for 0110H, depositing to EEPROM, address expresses for 1110H.

Only write in the AC drive RAM, power down without storing.

| START | Transmission time of 3.5 bytes |
|-------------------------------|--------------------------------|
| Slave machine address | 02H |
| Order code | 06H |
| Write data address high-order | 01H |
| Write data address low-order | 10H |
| Data content high-order | 13H |
| Data content low-order | 88H |

| | |
|--------------------|--------------------------------|
| CRC CHK low-order | 84H |
| CRC CHK high-order | 96H |
| END | Transmission time of 3.5 bytes |

Write in EEPROM, power off with storing.

| | |
|-------------------------------|--------------------------------|
| START | Transmission time of 3.5 bytes |
| Slave machine address | 02H |
| Order code | 06H |
| Write data address high-order | 11H |
| Write data address low-order | 10H |
| Data content high-order | 13H |
| Data content low-order | 88H |
| CRC CHK low-order | 84H |
| CRC CHK high-order | 96H |
| END | Transmission time of 3.5 bytes |

(2) Other communication parameter address specification:

| Other communication parameter address specification: | | | | | |
|--|---------|--|------------|-----------|---|
| Function | Address | Explain | | R/W trait | |
| Communication give frequency | 3000H | Communication give frequency, power down without storing | | W/R | |
| Communication order setting | 3001H | 0000H: No command | | W | |
| | | 0001H: FWD | | | |
| | | 0002H: REV | | | |
| | | 0003H: Forwarder JOG | | | |
| | | 0004H: Reverse JOG | | | |
| | | 0005H: Decelerate to stop | | | |
| | | 0006H: Free stop | | | |
| | | 0007H: Fault recover | | | |
| AC drive state | 3002H | Bit0 | 0: Stop | 1:WORKING | R |
| | | Bit1 | 0: Not ACC | 1:ACC | |
| | | Bit2 | 0: Not DEC | 1:DEC | |
| | | Bit3 | 0: FWD | 1:REV | |
| | | Bit4 | 0: Normal | 1:Fault | |
| Fault code | 3003H | Fault code (See fault code table) | | R | |

Appendix 3: LCD Keyboard Manual

1 Function Characteristic

LCD keyboard is designed for user checking function parameters more directly. Language of LCD keyboard includes English and Chinese, and is compatible with other LED keyboard designed by our company. It can display two monitoring parameters at the same time when AC drive stops or runs. States of running, stop and fault all have vivid image that makes user to understand and remember states of AC drive more conveniently. It also has parameter copy and download functions, and can download parameters of same series AC drive .It is convenient for user to change batch parameters Potentiometer is also on the keyboard and used for changing given frequency

Note:

1. If special type AC drive needs LCD keyboard, please contact with our company.
2. User must confirm that type of LCD keyboard and type of AC drive are suited.

| Software version of LCD | Type of AC drives |
|-------------------------|-------------------|
| KB10B | AC70 |
| KB30B | AC80B |
| KB50B | AC80C |
| KB70B | AC100 |

2 Monitor Menu

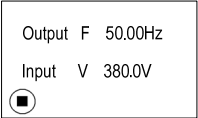


Chart 1 (a) at stop state

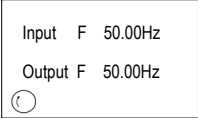


Chart1 (b) at FWD running state

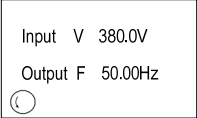


Chart1 (c) at REV running state

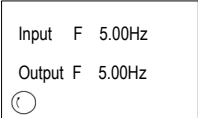


Chart1 (d) at JOG FWD state

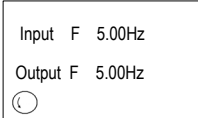


Chart1 (e) at JOG REV state

It can display two monitoring parameters and running or stop status every state of AC drive, details refer to chart 1. User can select first -line monitoring parameter **PRG** ,and select second-line monitoring parameter **SET** .

3 Monitoring Parameter Menu



Chart 2 Monitoring menu

Please press **PRG** key long time for 1s, then it will go into monitoring menu as chart 2.And user can check parameters by **▲** or **▼** key, pressing **PRG** or **SET** key to return back.

4 Parameters Menu

(1) First level menu (Reserve)

(2) Second level menu

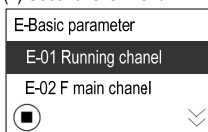


Chart 3(a) Basic parameter

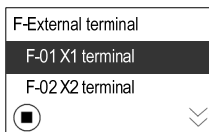


Chart 3(b) External terminal

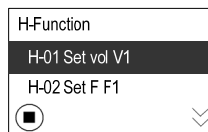


Chart 3(c) Function parameter

The second level menu include 3 part: Basic parameter, External terminal, Function parameter, as show in chart 3. Press **PRG** key and enter into 3(a). User can select anyone of them by press **▲** or **▼** key. Press **SET** key means selecting the item, And Press **PRG** key to move monitoring interface, Basic parameter, External terminal, Function parameter these 4 AC drive face circular by turn.

(3) Third level menu

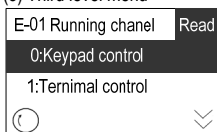


Chart 4 (a) changing line



Chart 4 (b) data

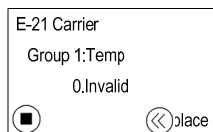


Chart 4 (c) group

After going into second level menu, press **PRG** key to go into third level menu. Third level menu includes three kinds, changing line, data and group.

Changing line: First line displays second level items, second and third line display third level items, and position of cursor is factory default setting, details refer to chart 4(a).

Press **◀** key to replace items,

Press **▲** or **▼** to move cursor,

Press **PRG** to return back,

Press **SET** to select item, and then return back.

Data: First line displays second level menu items, and second line displays data ,details refer to chart 4(b)

Press **◀** to replace items,

Press **▲** or **▼** to increase or decrease data while pressing **◀**, Press **▲** or **▼** to increase or decrease data from lowest bit without pressing **◀**,

Press **PRG** to return back.

Press **SET** to confirm modifying data, and then return back.

Group: First line displays second level menu items, second line displays group number, and third line displays third level menu items, details refer to chart 4(c)

Press **◀** to change another group, Press **▲** or **▼** to change items,

Press **PRG** key to return back.

Press **SET** to confirm modifying items, and then return back.

If pressing **▲** or **▼** cannot modify items in third level menu, and display "Read only" all that reminder user of parameter is no t allowed to modify or when AC drive is running ,modifying is forbidden

5 Fault

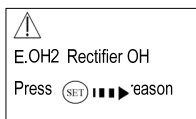


Chart 5 (a) fault

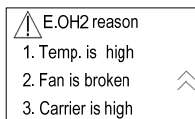


Chart 5 (b) fault reason

Fault: First line displays fault icon shining, second line displays fault code and name, and third line reminder user of pressing **SET** to check fault reasons, details refer to chart 5(a). Press **SET** to go into fault reason.

Press **STOP** **RESET** to reset fault when fault has been cleared

Fault reason: First line displays fault icon、code and name, other lines display reasons, details please refer to chart 5(b).If there up or down arrows, please press **▲** or **▼** to change another page to check reasons,

Press **PRG** or **SET** to return back

6 Terminal State

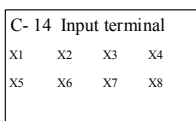


Chart 6 (a) input terminal

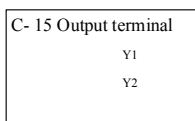


Chart 6 (b) output terminal

Input terminal: details please refer to chart 6(a)

Output terminal: details please refer to chart 6(b)

Note: If monitoring items are both terminal state in both lines, it will displays input terminal firstly.

7 Parameters Copy

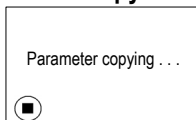


Chart7 (a) copying

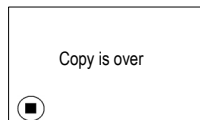


Chart7 (b) copy complete

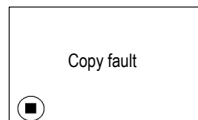


Chart7 (c) copy fault

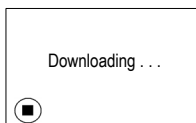


Chart7 (d) download

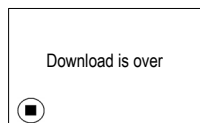


Chart7 (e) download complete

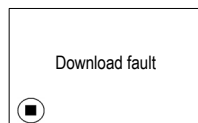


Chart7 (f) download fault

Parameter copy: details please refer to chart 7 (a), 7(b), 7(c)

Check E-64 and select item "sending to keyboard from AC drive",and then press **SET** .When it displays "completely copy ", it means finishing copy operation details refer to chart 7 (b) .When it displays "copy fault" ,it means operation is failed, details please refer to chart 8(c).Press **PRG** key to return .

Download: same way as copy

Note:AC drives must be the same series , when downloading parameters

8 Self-tuning

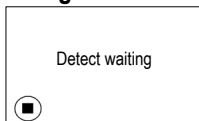


Chart 8 (a) waiting

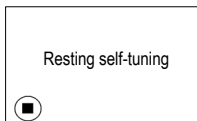


Chart 8 (b) resting type self-tuning

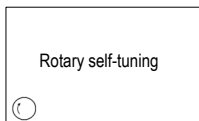


Chart 8 (c) rotary type self-tuning

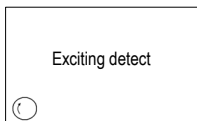


Chart 8 (d) exciting magnetic detecting

Resting type self-tuning: steps as chart 8 (a), (b) and (d). Please set H-62=2, and press **SET** key to go into motor detecting waiting menu, details refer to chart 8(a). Then press **FWD** key, and it will display resting self-tuning, details refer to 8(b). It displays "exciting detecting" when self-tuning is over, details refer to chart 9(d), then it will return back automatically.

Rotary self-tuning: steps as chart 8 (a), (b) and (d). Please set F-62=1, and press **SET** key to go into motor detecting waiting menu, details refer to chart 8(a). Then press **FWD** key, and it will display resting self-tuning, details refer to 8(b), while resting self-tuning is over, it displays rotary self-tuning, details refer to chart 8(c). After rotary self-tuning over, it displays exciting detecting, details refer to chart 8(d), then it will return back automatically.

9 Other Menus

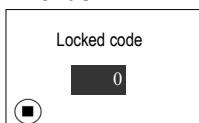


Chart 9 (a) keyboard locked

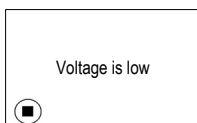


Chart 9 (b) low voltage

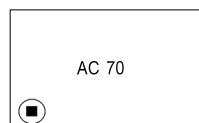


Chart 9 (c) model of AC drive

Keyboard locked, as chart 9(a). Keyboard will display locked menu when going into next menu, after user setting password and selecting parameter locked function. Please type correct password and then go into next menu.

Low voltage, as chart 9(b). When input voltage is low, it will display this warning.

Model of AC drive, as chart 9(c). When power on, if communication is ok, it will display this menu, and if not, it will display keyboard connection fault.