



USER'S MANUAL
AS700 SERIES
ENGINEERING INVERTER

AS700 Series Engineering Inverter

Operating Manual

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Preface

Thank you very much for buying AS700 series engineering inverter.

In order to ensure the proper installation and **use of AS700 series engineering inverter**, please read this manual carefully and understand the safety precautions before using the product.

General statement

During the compilation and review, Shanghai Sigriner STEP Electric Co., Ltd. (hereinafter referred to as STEP) has checked the content of this manual for consistency with the hardware and software described. However, there are still possible omissions. We will regularly review the contents covered in this manual and make any necessary amendment in future revisions. Welcome to suggest improvements.

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ABOUT WARRANTY

Warranty period

The warranty period of the product shall be within 18 months from the date of delivery to you or your customers, or within 24 months from the date of manufacture, whichever comes first.

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Chapter 1 Safety Instructions

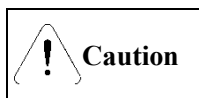
This section lists the safety instructions and precautions when using **AS700 series engineering inverter**. These instructions are divided into description of safety-related signs, purpose, arrival confirmation, transportation and storage, installation, wiring safety instructions, debugging/operation, troubleshooting and scrap product processing. To ensure personal safety and extend the service life of the equipment and its connecting devices, you must read the following safety rules and warnings and all warning signs pasted on the equipment before installing and debugging the inverter. Please read the information carefully.

1.1 Description of safety-related signs

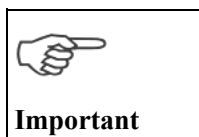
The following signs are used for the safety related content in this manual. The description and content with safety signs are important and shall be complied with.




indicates the wrong use, which may result in fire, serious personal injury, or even death.

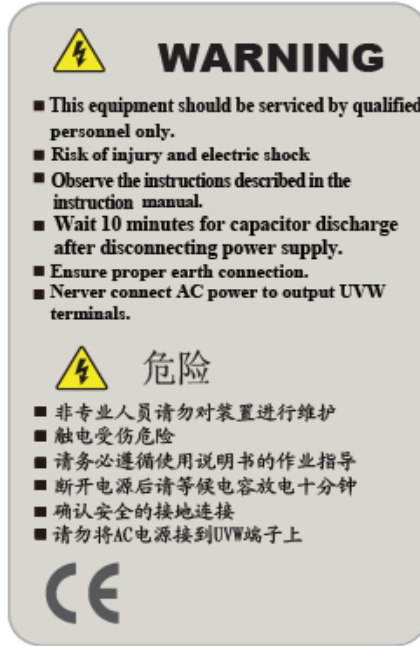


indicates the wrong use, which may cause moderate personal injury and equipment damage.




Section to be complied with and focused by the user.

In addition, even  the "Cautions", depending on the specific situations, may sometimes lead to major accidents




1.2 Safety matters

1.2.1 Purpose

| |
|---|
|  Danger |
| <p>This series of engineering inverter is used to control the variable speed operation of three-phase motor. It cannot be used for single-phase motor or other purposes, otherwise it may cause the fault or fire of engineering inverter.</p> <p>This series of engineering inverter cannot be simply applied to medical devices and other occasions directly related to personal safety.</p> <p>This series of engineering inverter is manufactured under strict quality management system. If the fault of the engineering inverter may lead to major accidents or losses, it is necessary to set up safety measures such as redundancy or bypass, just in case.</p> |

1.2.2 Arrival inspection

| |
|--|
|  Caution |
| <p>The goods delivered must be in good condition and in full compliance with the information on the purchase order. Please contact your local distributor or agent if you find the goods damaged or inconsistent with the information on the purchase order.</p> <p>If the delivered equipment is damaged or its parts are missing, it cannot be installed, and shall not be put</p> |

into use, otherwise accidents may occur.

1.2.3 Transportation and storage



Avoid violent vibration and impact during transport.
Immediately inform the transport company in case of equipment damage.
The equipment must be transported and stored in specified environmental conditions.
If the equipment has been in storage for more than a year, the capacitor must be recharged.

1.2.4 Installation



Be careful of fire or electric shock!
Do not install the equipment in flammable or combustible areas or in areas where there is a risk of water or corrosion.



Exert the force on the bottom of the product when handling or installing to prevent from damaging the engineering inverter.
Do not install the equipment in area where is susceptible to sustained vibration, shock, or electromagnetic interference.
The engineering inverter shall be installed on the flame retardants such as metals and kept away from flammable and heat.
Be careful of fire! Ensure that the engineering inverter and its radiator are free of any sundries (such as: wood chips, iron chips, dust, paper, etc.).

1.2.5 Electrical connection



Wiring must be done by qualified electrical engineers, otherwise there is a risk of electric shock or damage to the inverter.
Make sure the power supply is disconnected before wiring, otherwise there may be a risk of electric

shock or fire.

The grounding terminal PE shall be reliably grounded, otherwise there is a risk of electrification of the inverter housing.

Do not touch the main circuit terminal. The wiring of the main circuit terminal shall not contact the housing, otherwise there is a risk of electric shock.

When the power is turned on with the running signal on, the motor will automatically start running, so please make sure the running signal is disconnected before connecting the power. Otherwise there is a risk of personnel injury.

When setting the 3-wire sequential control, please set the parameters of the multi-function input terminal before the wiring operation of the control loop. Otherwise, it will cause personal injury due to motor rotation.

1.2.6 Test run



Danger

Do not turn on the power until you confirm that the front cover has been installed. Do not remove the cover when the power is connected, otherwise there is a risk of electric shock.

Please prepare another emergency stop switch (the stop button is only valid if the function is set).

Please reset the alarm after confirming that the operation signal is cut off, otherwise there is a risk of personal injury.



Caution

Motor no-load debugging is required before the motor load debugging.

Do not touch the engineering inverter radiator, motor or other high-temperature parts while the equipment is still running or within a period of time after the power is turned off to avoid burns.


Do not start and / stop the engineering inverter by repeatedly switching on and off the power supply, otherwise the equipment/system may be damaged.


Before operation, please confirm whether the motor and machinery are in the allowed range of use, otherwise it may damage the equipment.

When using on the lifting equipment, please configure a mechanical locking device at the same time.


Do not arbitrarily change the parameters of the engineering inverter. Most of the factory setting parameters of the rectifier feedback unit have been able to meet the operation requirements and only some necessary parameters need to be set. Arbitrary modification of parameters may cause damage to the mechanical equipment.

1.2.7 Maintenance and inspection

| |
|--|
|  Danger |
| <p>There are high voltage terminals of the engineering inverter, so do not touch at will. Otherwise there is a risk of electric shock.</p> <p>Be sure to install a protective cover when the power is on. In addition, when removing the protective cover, be sure to disconnect the circuit breaker used for wiring, Otherwise there is a risk of electric shock.</p> <p>After the power of the main circuit is cut off, wait at least 10mins to make sure that the charge lamp of the front cover is off before maintenance and inspection. Otherwise, there is residual voltage on the capacitor which is at the risk of electric shock.</p> <p>Only the designated personnel can repair, inspect or replace parts. [Take off the metal ornaments (watch, ring, etc.) before operation. Use tools that have been insulated during operation. Otherwise there is a risk of electric shock.</p> |

| |
|---|
|  Caution |
| <p>There is CMOS large scale integrated circuit on the circuit board. Do not touch the circuit board by hand to prevent electrostatic damage.</p> |

1.2.8 Scrap processing

| |
|---|
|  Danger |
| <p>Explosion may occur when the electrolytic capacitor of the main circuit and the electrolytic capacitor on the printed board are burned. Toxic gases are produced when plastic parts are burned. This equipment must be scrapped according to the laws and regulations of the relevant environmental protection departments on the disposal of industrial electronic waste.</p> |

1.3 Precautions

1.3.1 Motor insulation inspection

When the motor is used for the first time, used after placed for a long time and inspected regularly, the motor insulation inspection shall be done to prevent the damage to the engineering inverter caused by the insulation failure of the motor winding. Be sure to disconnect the motor wire from the engineering inverter during the insulation inspection. It is recommended to use a 500V megameter, and ensure that the insulation resistance measured is not less than 5MΩ.

1.3.2 Thermal protection of motor

If the rated capacity of the motor is not matched with that of the engineering inverter, especially when the rated power of the engineering inverter is greater than that of the motor, be sure to adjust the motor protection related parameters of the engineering inverter or install a thermal relay in front of the motor to protect the motor.

1.3.3 About motor heat and noise

The output voltage of the engineering inverter is PWM wave, which contains certain harmonics, so the temperature rise, noise and vibration of the motor will be slightly increased compared with the operation at power frequency.

When the engineering inverter drives the ordinary motor to run at low speed for a long time, the temperature of the motor will rise due to the poor heat dissipation effect of the motor. To run at low speed and constant torque for a long time, it is required to choose a variable frequency motor, or use forced air cooling.

1.3.4 Input/output notes

Due to PWM wave output by the engineering inverter, a capacitor that improves the power factor or a varistor for lightning protection, if installed at the output side, is easy to cause instantaneous overcurrent or even damage the engineering inverter. It shall not be used.

See Figure 1-1 for the schematic diagram of prohibiting connecting capacitor at the output side of the engineering inverter.

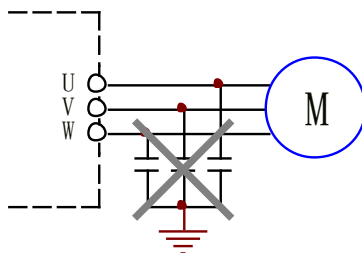


Figure 1-1 Schematic diagram of prohibiting connecting capacitor at the output side of the engineering inverter

If a contactor is installed between the power supply and the input end of the engineering inverter, it is not allowed to use the contactor to control the start and stop of the engineering inverter.

If the contactor and other switching devices are installed between the output end and the motor, the engineering inverter shall be turned on and off when there is no output, and the engineering inverter is not allowed to pull in the contactor when outputting, otherwise it is easy to cause damage to the module.

It is advisable to start and stop the engineering inverter through the terminal. It is strictly prohibited to use contactor and other switching devices to start and stop directly and frequently at the input side of the engineering inverter, otherwise the equipment will be damaged.

1.3.5 Use beyond rated voltage

If the external voltage is not within the allowable operating voltage range specified in this manual, the use of the engineering inverter is likely to cause damage. If necessary, please use the corresponding step-up or step-down device for voltage transformation.

1.3.6 Lightning impulse protection

This series of engineering inverter is not equipped with a lightning overcurrent protection device. For frequent lightning, the customer shall also install a protector in the front end of the engineering inverter.

1.3.7 Leakage protection

The high speed switch works during the operation of the engineering inverter, which will inevitably result in high-frequency leakage current and sometimes leakage protection circuit malfunction. In case of above problems, a leakage protector shall be installed correctly in addition to properly reducing the carrier frequency and shortening the lead.

When installing the leakage protector, pay attention to the following points:

The leakage protector is recommended to be installed at the input side of the engineering inverter behind the air switch (non-fuse breaker).

The leakage protector shall be of a model which is insensitive to higher harmonic or a special leakage protector for engineering inverter (sensitivity should above 30mA). If the ordinary leakage protector is adopted, the model with sensitivity of more than 200mA and operation time of more than 0.1s shall be selected.

1.3.8 Derating use

When the ambient temperature exceeds 40°C, the engineering inverter shall be used at the derating of 2% for every 1°C increase, and external forced heat dissipation must be added;

In an area with an altitude of more than 1000m, the thin air will lead to worsening cooling effect of the engineering inverter, so the unit shall be used at the derating of 1% for every 100m;

When the set carrier frequency is above the factory default, the engineering inverter shall be used at the derating of 10% for every 1kHz increase.

Please contact our company for technical consultation on derating

Chapter 2 Product Overview

AS700 series engineering inverter is a common DC multi-drive inverter designed and developed for industrial applications and mainly used in the lifting industry, such as large gantry crane, gantry crane, quay crane, bulk cargo crane, etc. It is also used in papermaking, metallurgy, mining, cement, energy, petrochemical and natural gas industries. With the use of advanced vector control technology and torque control technology, the product has the same excellent control performance with high-end international inverter meanwhile, combined with the application characteristics in the hoisting machinery industry, further strengthens the product reliability, environmental adaptation and customer-oriented design, which can better meet various drive application requirements.

2.1 Nameplate description

The nameplate is attached to the front of the basic power unit, recording the model, specification, batch number, manufacturing code and other information of the basic power unit.

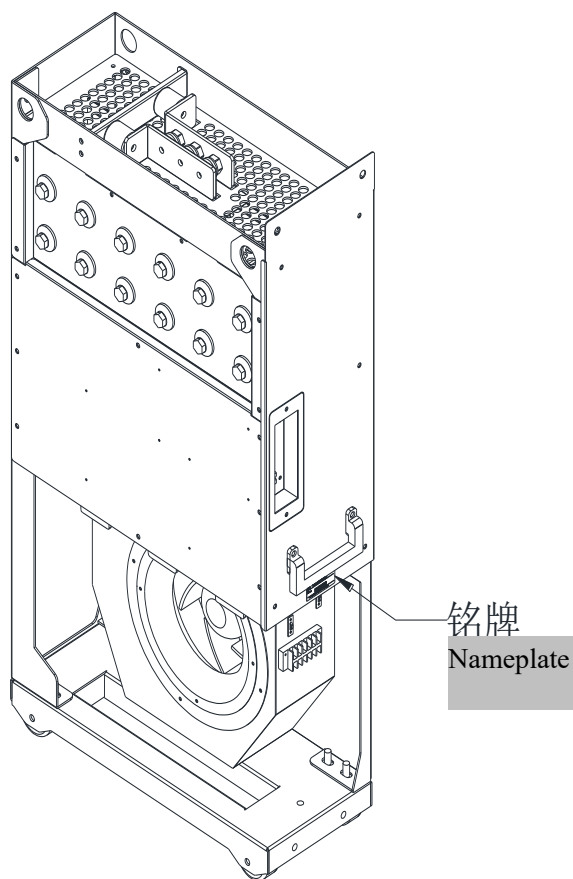


Figure 2-1 Nameplate of basic power unit of engineering inverter (example)

2.1.1 Product nameplate description

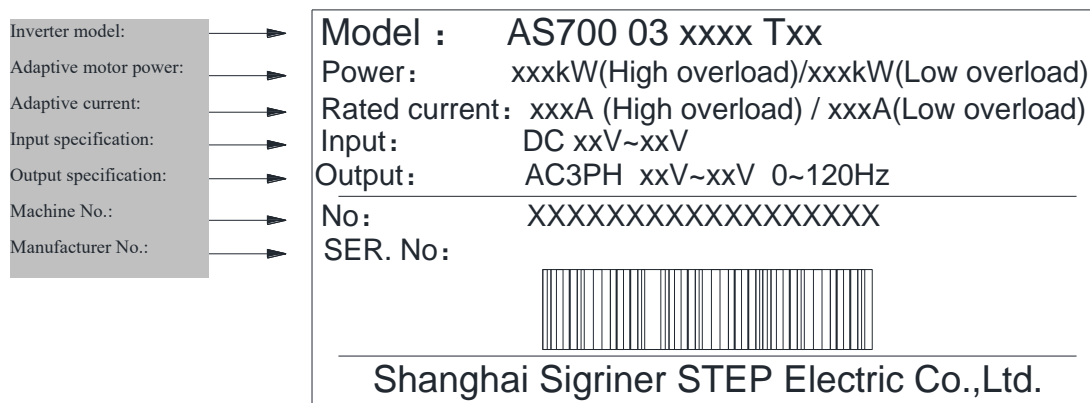


Figure 2-2 Nameplate of engineering inverter (example)

2.1.2 Description of product (order number)

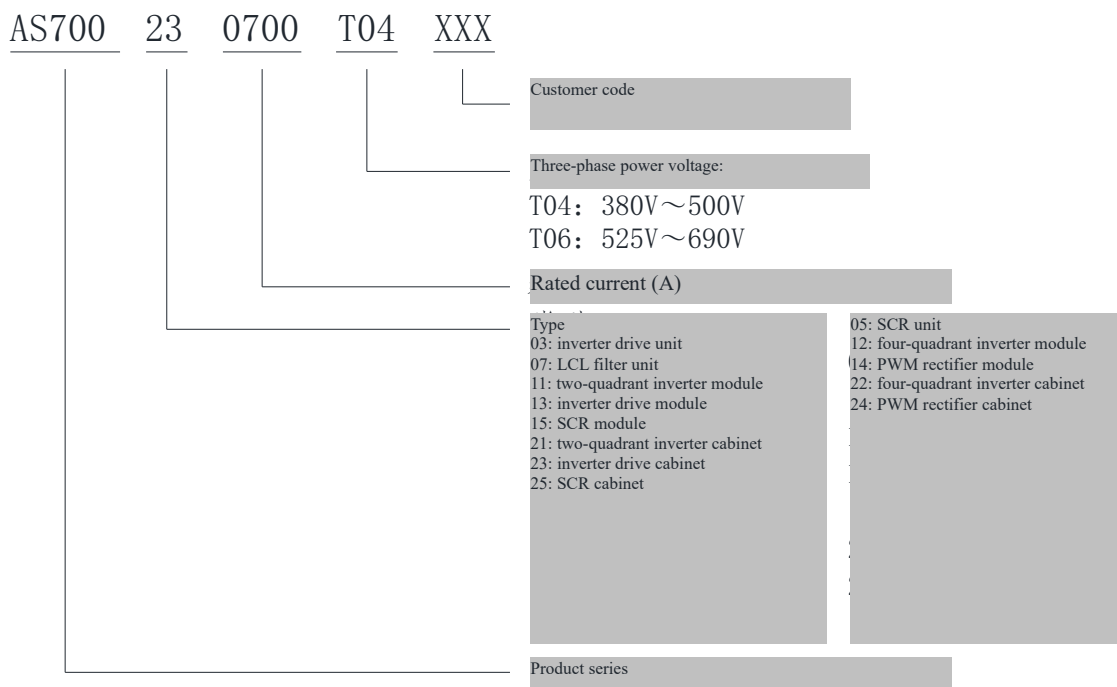


Figure 2-3 Inverter model description (example)

2.1.3 Product specification

2.1.3.1 Unit specification

Table 2.1 AS700 inverter drive unit specification

| Product model | Standard application | | Heavy load application | | Dimension | | | Weight kg | Frame |
|--------------------------|----------------------|-------|------------------------|--------|-------------|------------|------------|-----------|-------|
| | In A | Pn kW | Ihd A | Phd kW | Height (mm) | Width (mm) | Depth (mm) | | |
| Un=400V (range 380~500V) | | | | | | | | | |
| AS700 03 0490 T04 | 490 | 250 | 382 | 200 | 1080 | 232 | 550 | 84 | D08 |
| AS700 03 0600 T04 | 600 | 315 | 468 | 250 | 1080 | 232 | 550 | 84 | D08 |
| AS700 03 0700 T04 | 700 | 355 | 545 | 280 | 1080 | 232 | 550 | 84 | D08 |
| Un=690V (range 525~690V) | | | | | | | | | |
| AS700 03 0322 T06 | 322 | 315 | 251 | 220 | 1080 | 232 | 550 | 84 | D08 |
| AS700 03 0367 T06 | 367 | 355 | 286 | 280 | 1080 | 232 | 550 | 84 | D08 |
| AS700 03 0429 T06 | 429 | 400 | 334 | 315 | 1080 | 232 | 550 | 84 | D08 |

Table 2.2 AS700 Series SCR unit specification

| Product model | Standard application | | Heavy load application | | Dimension | | | Weight kg | Frame |
|--------------------------|----------------------|-------|------------------------|--------|-------------|------------|------------|-----------|-------|
| | In A | Pn kW | Ihd A | Phd kW | Height (mm) | Width (mm) | Depth (mm) | | |
| Un=400V (range 380~500V) | | | | | | | | | |
| AS700 05 0730 T04 | 730 | 432 | 546 | 321 | 1080 | 232 | 550 | 84 | D08 |
| Un=690V (range 525~690V) | | | | | | | | | |
| AS700 05 0450 T06 | 450 | 450 | 351 | 351 | 1080 | 232 | 550 | 84 | D08 |

Table 2.3 AS700 series LCL filter unit specification

| Product model | In A | Dimension | | | Weight kg | Frame |
|--------------------------|------|----------------|---------------|---------------|--------------|-------|
| | | Height (mm) | Width (mm) | Depth (mm) | | |
| Un=400V (range 380~500V) | | | | | | |
| AS700 07 0407 T04 | 407 | 1487 | 331 | 580 | 255 | L01 |
| AS700 07 0647 T04 | 647 | 1487 | 331 | 580 | 274 | L01 |
| AS700 07 0968 T04 | 968 | 1487 | 331 | 580 | 370 | L01 |
| Un=690V (range 525~690V) | | | | | | |
| AS700 07 0301 T06 | 301 | 1487 | 331 | 580 | 316 | L01 |
| AS700 07 0462 T06 | 462 | 1487 | 331 | 580 | 352 | L01 |
| AS700 07 0592 T06 | 592 | 1487 | 331 | 580 | 380 | L01 |

2.1.3.2 Module specification

Table 2.4 AS700 two-quadrant inverter module specification

| Product model | Standard application | | Heavy load application | | Frame |
|--------------------------|----------------------|-------|------------------------|--------|-------------|
| | In A | Pn kW | Ihd A | Phd kW | |
| Un=400V (range 380~500V) | | | | | |
| AS700 11 0490 T04 | 490 | 250 | 382 | 200 | D08*1+D08*1 |
| AS700 11 0600 T04 | 600 | 315 | 468 | 250 | D08*1+D08*1 |
| AS700 11 0700 T04 | 700 | 355 | 545 | 280 | D08*1+D08*1 |
| AS700 11 0960 T04 | 960 | 500 | 750 | 400 | D08*2+D08*2 |
| AS700 11 1176 T04 | 1176 | 630 | 918 | 500 | D08*2+D08*2 |
| AS700 11 1372 T04 | 1372 | 710 | 1071 | 560 | D08*2+D08*2 |
| AS700 11 1746 T04 | 1746 | 900 | 1372 | 710 | D08*3+D08*3 |
| AS700 11 2037 T04 | 2037 | 1120 | 1591 | 900 | D08*3+D08*3 |
| AS700 11 2688 T04 | 2688 | 1400 | 2100 | 1120 | D08*4+D08*4 |
| Un=690V (range 525~690V) | | | | | |
| AS700 11 0322 T06 | 322 | 315 | 251 | 220 | D08*1+D08*1 |
| AS700 11 0367 T06 | 367 | 355 | 286 | 280 | D08*1+D08*1 |
| AS700 11 0429 T06 | 429 | 400 | 334 | 315 | D08*1+D08*1 |
| AS700 11 0632 T06 | 632 | 630 | 493 | 450 | D08*2+D08*2 |
| AS700 11 0700 T06 | 700 | 710 | 545 | 500 | D08*2+D08*2 |
| AS700 11 0840 T06 | 840 | 800 | 655 | 630 | D08*2+D08*2 |
| AS700 11 1067 T06 | 1067 | 1120 | 831 | 800 | D08*3+D08*3 |
| AS700 11 1206 T06 | 1206 | 1200 | 940 | 900 | D08*3+D08*3 |
| AS700 11 1423 T06 | 1423 | 1400 | 1109 | 1000 | D08*4+D08*4 |
| AS700 11 1591 T06 | 1591 | 1600 | 1240 | 1200 | D08*4+D08*4 |

Table 2.5 AS700 four-quadrant inverter module specification

| Product model | Standard application | | Heavy load application | | Frame |
|--------------------------|----------------------|-------|------------------------|--------|---------------------|
| | In A | Pn kW | Ihd A | Phd kW | |
| Un=400V (range 380~500V) | | | | | |
| AS700 12 0490 T04 | 490 | 250 | 382 | 200 | D08*1+ D08*1+ L01 |
| AS700 12 0600 T04 | 600 | 315 | 468 | 250 | D08*1+ D08*1+ L01 |
| AS700 12 0700 T04 | 700 | 355 | 545 | 280 | D08*1+ D08*1+ L01 |
| AS700 12 0960 T04 | 960 | 500 | 750 | 400 | D08*2+ D08*2+ L01 |
| AS700 12 1176 T04 | 1176 | 630 | 918 | 500 | D08*2+ D08*2+ L01 |
| AS700 12 1372 T04 | 1372 | 710 | 1071 | 560 | D08*2+ D08*2+ L01 |
| AS700 12 1746 T04 | 1746 | 900 | 1372 | 710 | D08*3+ D08*3+ L01*2 |
| AS700 12 2037 T04 | 2037 | 1120 | 1591 | 900 | D08*3+ D08*3+ L01*2 |
| AS700 12 2688 T04 | 2688 | 1400 | 2100 | 1120 | D08*4+ D08*4+ L01*2 |
| Un=690V (range 525~690V) | | | | | |
| AS700 12 0322 T06 | 322 | 315 | 251 | 220 | D08*1+ D08*1+ L01 |
| AS700 12 0367 T06 | 367 | 355 | 286 | 280 | D08*1+ D08*1+ L01 |
| AS700 12 0429 T06 | 429 | 400 | 334 | 315 | D08*1+ D08*1+ L01 |
| AS700 12 0632 T06 | 632 | 630 | 493 | 450 | D08*2+ D08*2+ L01 |
| AS700 12 0700 T06 | 700 | 710 | 545 | 500 | D08*2+ D08*2+ L01 |
| AS700 12 0840 T06 | 840 | 800 | 655 | 630 | D08*2+ D08*2+ L01 |
| AS700 12 1067 T06 | 1067 | 1120 | 831 | 800 | D08*3+ D08*3+ L01*2 |
| AS700 12 1206 T06 | 1206 | 1200 | 940 | 900 | D08*3+ D08*3+ L01*2 |
| AS700 12 1423 T06 | 1423 | 1400 | 1109 | 1000 | D08*4+ D08*4+ L01*2 |
| AS700 12 1591 T06 | 1591 | 1600 | 1240 | 1200 | D08*4+ D08*4+ L01*2 |

Table 2.6 AS700 inverter drive module specification

| Product model | Standard application | | Heavy load application | | Frame |
|--------------------------|----------------------|-------|------------------------|--------|-------|
| | In A | Pn kW | Ihd A | Phd kW | |
| Un=400V (range 380~500V) | | | | | |
| AS700 13 0490 T04 | 490 | 250 | 382 | 200 | D08*1 |
| AS700 13 0600 T04 | 600 | 315 | 468 | 250 | D08*1 |
| AS700 13 0700 T04 | 700 | 355 | 545 | 280 | D08*1 |
| AS700 13 0960 T04 | 960 | 500 | 750 | 400 | D08*2 |
| AS700 13 1176 T04 | 1176 | 630 | 918 | 500 | D08*2 |
| AS700 13 1372 T04 | 1372 | 710 | 1071 | 560 | D08*2 |
| AS700 13 1746 T04 | 1746 | 900 | 1372 | 710 | D08*3 |
| AS700 13 2037 T04 | 2037 | 1120 | 1591 | 900 | D08*3 |
| AS700 13 2688 T04 | 2688 | 1400 | 2100 | 1120 | D08*4 |
| Un=690V (range 525~690V) | | | | | |

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| | | | | | |
|-------------------|------|------|------|------|-------|
| AS700 13 0322 T06 | 322 | 315 | 251 | 220 | D08*1 |
| AS700 13 0367 T06 | 367 | 355 | 286 | 280 | D08*1 |
| AS700 13 0429 T06 | 429 | 400 | 334 | 315 | D08*1 |
| AS700 13 0632 T06 | 632 | 630 | 493 | 450 | D08*2 |
| AS700 13 0700 T06 | 700 | 710 | 545 | 500 | D08*2 |
| AS700 13 0840 T06 | 840 | 800 | 655 | 630 | D08*2 |
| AS700 13 1067 T06 | 1067 | 1120 | 831 | 800 | D08*3 |
| AS700 13 1206 T06 | 1206 | 1200 | 940 | 900 | D08*3 |
| AS700 13 1423 T06 | 1423 | 1400 | 1109 | 1000 | D08*4 |
| AS700 13 1591 T06 | 1591 | 1600 | 1240 | 1200 | D08*4 |

Table 2.7 AS700 PWM rectifier module specification

| Product model | Standard application | | Heavy load application | | Frame |
|--------------------------|----------------------|-------|------------------------|--------|-------------|
| | In A | Pn kW | Ihd A | Phd kW | |
| Un=400V (range 380~500V) | | | | | |
| AS700 14 0384 T04 | 384 | 250 | 300 | 200 | D08*1+L01 |
| AS700 14 0473 T04 | 473 | 315 | 370 | 250 | D08*1+L01 |
| AS700 14 0573 T04 | 573 | 355 | 447 | 280 | D08*1+L01 |
| AS700 14 0752 T04 | 752 | 500 | 588 | 400 | D08*2+L01 |
| AS700 14 0927 T04 | 927 | 630 | 724 | 500 | D08*2+L01 |
| AS700 14 1123 T04 | 1123 | 710 | 880 | 560 | D08*2+L01 |
| AS700 14 1376 T04 | 1376 | 900 | 1075 | 710 | D08*3+L01*2 |
| AS700 14 1667 T04 | 1667 | 1120 | 1302 | 900 | D08*3+L01*2 |
| AS700 14 2200 T04 | 2200 | 1400 | 1718 | 1120 | D08*4+L01*2 |
| Un=690V (range 525~690V) | | | | | |
| AS700 14 0274 T06 | 274 | 315 | 214 | 220 | D08*1+L01 |
| AS700 14 0328 T06 | 328 | 355 | 256 | 280 | D08*1+L01 |
| AS700 14 0352 T06 | 352 | 400 | 274 | 315 | D08*1+L01 |
| AS700 14 0538 T06 | 538 | 630 | 420 | 450 | D08*2+L01 |
| AS700 14 0642 T06 | 642 | 710 | 500 | 500 | D08*2+L01 |
| AS700 14 0690 T06 | 690 | 800 | 538 | 630 | D08*2+L01 |
| AS700 14 0956 T06 | 956 | 1120 | 746 | 800 | D08*3+L01*2 |
| AS700 14 1024 T06 | 1024 | 1200 | 798 | 900 | D08*3+L01*2 |
| AS700 14 1272 T06 | 1272 | 1400 | 994 | 1000 | D08*4+L01*2 |
| AS700 14 1351 T06 | 1351 | 1600 | 1053 | 1200 | D08*4+L01*2 |

2.1.3.3 Cabinet specification

Table 2.8 AS700 two-quadrant inverter cabinet specification (SCR)

| Product model | Standard application | | Heavy load application | | Frame |
|--------------------------|----------------------|-------|------------------------|--------|-------|
| | In A | Pn kW | Ihd A | Phd kW | |
| Un=400V (range 380~500V) | | | | | |
| AS700 21 0490 T04 | 490 | 250 | 382 | 200 | A1 |
| AS700 21 0600 T04 | 600 | 315 | 468 | 250 | A1 |
| AS700 21 0700 T04 | 700 | 355 | 545 | 280 | A1 |
| AS700 21 0960 T04 | 960 | 500 | 750 | 400 | A2 |
| AS700 21 1176 T04 | 1176 | 630 | 918 | 500 | A2 |
| AS700 21 1372 T04 | 1372 | 710 | 1071 | 560 | A2 |
| AS700 21 1746 T04 | 1746 | 900 | 1372 | 710 | A3 |
| AS700 21 2037 T04 | 2037 | 1120 | 1591 | 900 | A3 |
| AS700 21 2688 T04 | 2688 | 1400 | 2100 | 1120 | A4 |
| Un=690V (range 525~690V) | | | | | |
| AS700 21 0322 T06 | 322 | 315 | 251 | 220 | A1 |
| AS700 21 0367 T06 | 367 | 355 | 286 | 280 | A1 |
| AS700 21 0429 T06 | 429 | 400 | 334 | 315 | A1 |
| AS700 21 0632 T06 | 632 | 630 | 493 | 450 | A2 |
| AS700 21 0700 T06 | 700 | 710 | 545 | 500 | A2 |
| AS700 21 0840 T06 | 840 | 800 | 655 | 630 | A2 |
| AS700 21 1067 T06 | 1067 | 1120 | 831 | 800 | A3 |
| AS700 21 1206 T06 | 1206 | 1200 | 940 | 900 | A3 |
| AS700 21 1423 T06 | 1423 | 1400 | 1109 | 1000 | A4 |
| AS700 21 1591 T06 | 1591 | 1600 | 1240 | 1200 | A4 |

Table 2.9 AS700 four-quadrant inverter cabinet specification (AFE active rectifier)

| Product model | Standard application | | Heavy load application | | Frame |
|--------------------------|----------------------|-------|------------------------|--------|-------|
| | In A | Pn kW | Ihd A | Phd kW | |
| Un=400V (range 380~500V) | | | | | |
| AS700 22 0490 T04 | 490 | 250 | 382 | 200 | B1 |
| AS700 22 0600 T04 | 600 | 315 | 468 | 250 | B1 |
| AS700 22 0700 T04 | 700 | 355 | 545 | 280 | B1 |
| AS700 22 0960 T04 | 960 | 500 | 750 | 400 | B2 |

| | | | | | |
|--------------------------|------|------|------|------|----|
| AS700 22 1176 T04 | 1176 | 630 | 918 | 500 | B2 |
| AS700 22 1372 T04 | 1372 | 710 | 1071 | 560 | B2 |
| AS700 22 1746 T04 | 1746 | 900 | 1372 | 710 | B3 |
| AS700 22 2037 T04 | 2037 | 1120 | 1591 | 900 | B3 |
| AS700 22 2688 T04 | 2688 | 1400 | 2100 | 1120 | B4 |
| Un=690V (range 525~690V) | | | | | |
| AS700 22 0322 T06 | 322 | 315 | 251 | 220 | B1 |
| AS700 22 0367 T06 | 367 | 355 | 286 | 280 | B1 |
| AS700 22 0429 T06 | 429 | 400 | 334 | 315 | B1 |
| AS700 22 0632 T06 | 632 | 630 | 493 | 450 | B2 |
| AS700 22 0700 T06 | 700 | 710 | 545 | 500 | B2 |
| AS700 22 0840 T06 | 840 | 800 | 655 | 630 | B2 |
| AS700 22 1067 T06 | 1067 | 1120 | 831 | 800 | B3 |
| AS700 22 1206 T06 | 1206 | 1200 | 940 | 900 | B3 |
| AS700 22 1423 T06 | 1423 | 1400 | 1109 | 1000 | B4 |
| AS700 22 1591 T06 | 1591 | 1600 | 1240 | 1200 | B4 |

2.2 Product technical indicators and specifications

2.2.1 Technical indicators and specifications of inverter module

Table 2.10 Technical indicators and specifications of inverter module

| | | | | | |
|-------------------------|------------------------|--|--------------------------|--------------------|--|
| Power input | Input voltage | U4N: DC power supply: 450~800Vdc U6N: DC power supply: 740~1200Vdc | | | |
| Power output | Output voltage | 0VAC~Un | | | |
| | Output frequency | V/F control: 0.00~ 300.00Hz Vector control: 0.00~ 120.00Hz | | | |
| | Overload capacity | Stable operation at 40°C, heavy load 150%, 1 min; light load 120%, 1 min | | | |
| | Efficiency (full load) | ≥0.97 | | | |
| Control characteristics | Control mode | V/F control | Open-loop vector control | Closed-loop vector | |

| | | | |
|--------------------------------|---|------------|-------------|
| Starting torque | 2.50Hz 150% | 0.5Hz 200% | 0.00Hz 200% |
| Speed adjustable range | 1:50 | 1:200 | 1:1000 |
| Steady speed precision | ± 2% | ± 0.2% | ± 0.02% |
| Torque precision | ± 5% (closed-loop control) | | |
| Carrier frequency | 2~5kHz | | |
| Frequency setting Resolution | 0.01Hz (digital command) ± 0.06Hz/120Hz (analog command 11bit+unsigned) | | |
| Running command channel | Operation panel given, control terminal given and communication given | | |
| Frequency given channel | Operation panel given, digital quantity/analog quantity given, communication given and function given | | |
| Torque compensation | Automatic torque compensation and manual torque compensation | | |
| V/F curve | User-defined V/F curve, linear V/F curve and 3 reduced torque characteristic curves | | |
| Automatic voltage regulation | Automatically adjust the duty cycle of PWM signal according to the bus voltage fluctuation, so as to reduce the impact of the network voltage fluctuation on the output voltage fluctuation | | |
| Non-stop at instantaneous stop | Achieve continuous operation through bus voltage control in case of instantaneous power failure | | |
| DC braking | Braking current: 0.0~ 120.0% rated current | | |

| | | |
|--------------------------|---|---|
| | capacity | |
| Characteristic functions | Parameter copy | The standard operation panel may achieve parameter upload and download and indicate the copy progress |
| | Process PID | Used for closed-loop control of process quantities |
| | Torque control function | Torque/speed control switching through terminals, many torque given modes |
| | Zero servo and position control function | Achieve zero speed position lock, accurate positioning and position control |
| Motor protection | Locked rotor | |
| | Motor overload | |
| | Speed limit | |
| | Torque limit | |
| | Output current limiting | |
| | Inverter overload | |
| | IGBT I2t protection | |
| | Input power undervoltage/overvoltage | |
| | DC bus undervoltage/overvoltage | |
| | IGBT overheating | |
| | Radiator overheated | |
| | Power failure | |
| | Analog input signal loss (speed reference value loss) | |
| | Communication exception | |
| Encoder connection fault | | |
| Self-setting fault | | |

2.2.2 Technical indicators and specifications of dynamic rectifier module

Table 2.11 Technical indicators and specifications of PWM rectifier module

| | | |
|-------------------------|--------------------------------|--|
| Power input | Voltage and power range | 3-Phase U4N: 380~500VA C [-10%...+10%] 3-Phase U6N: 525~690VA C [-10%...+10%] |
| | Input frequency | 45~65Hz |
| Control characteristics | Control mode | Vector control |
| | THDi (at rated current) | <4% (harmonics meet IEEE519 requirements) |
| | Power factor | Above 0.95 (under rated current) |
| | Overload capacity | 150% 1min |
| | Carrier frequency | 2~4k (Hz) |
| | Efficiency (under rated power) | >97% |

2.2.3 Operating environment and standard requirements

Table 2.12 Operating environment and standard requirements

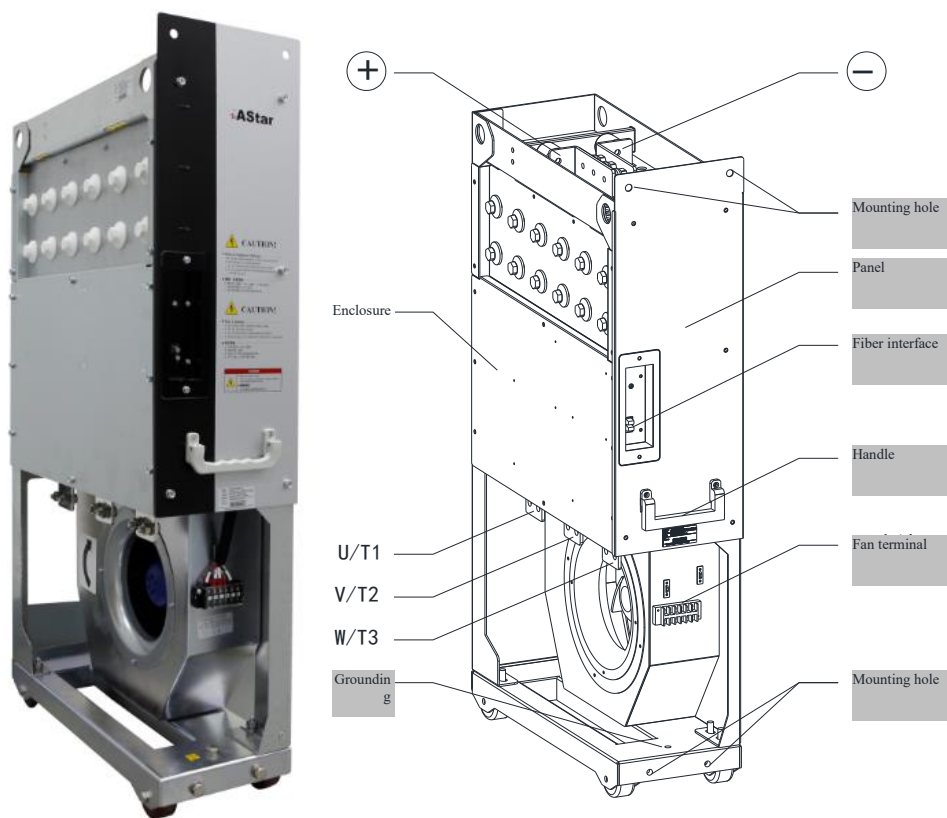
| | | |
|--------------------------|-------------------------------|--|
| Environmental conditions | Usage occasion | It is installed vertically in a well-ventilated electrical control cabinet; horizontal or other installation mode is not allowed. Keep out of direct sunlight, dust, corrosive gases, combustible gases, oil mist, water vapor or dropping water The cooling medium is air. |
| | Operating ambient temperature | -10°C [no frosting]...+40°C |
| | Temperature derating use | >40°C; when the temperature rises by 1°C, the rated output current is reduced by 2%, up to 50°C |
| | Storage temperature | -40°C...+70°C |
| | Transport temperature | -40°C...+70°C |

| | | |
|---------------------------------|---|---|
| | Relative humidity | 5~95%RH, no condensation, corrosion or dropping water |
| | Storage | IEC60721-3-1 Class 1C2 (chemical gas) Class 1S2 (solid particle) |
| | Transportation | IEC60721-3-2 Class 2C2 (chemical gas) Class 2S2 (solid particle) |
| | Operation | IEC60721-3-3 Class 3C1/3C2* (chemical gas) Class 3S2 (solid particle) C= chemical active substance, S= mechanical active substance, * coated circuit board |
| | Altitude | 1000m |
| | Height derating use | >1000M; when the height rises by 100m, the rated output current is reduced by 1% (up to 3000m) |
| | Earthquake-proof characteristics | 3.5m/s ² , 2~9Hz; 10m/s ² , 9~120Hz; |
| | Protection class | IP20 |
| Other | Cooling mode | Forced air cooling |
| | Installation mode | In-cabinet installation |
| | Protective coating | Optional enhanced protective coating for control board and I/O board |
| Product standard | <p>C E</p> <p>Low voltage clauses 73/23/EEC including amending clauses 93/68/EEC</p> <p>Mechanical clauses 98/37/EC</p> <p>EMC clauses 89/336/EEC including amending clauses 93/68/EEC</p> <p>Quality assurance system ISO 9001 and</p> <p>Environmental system ISO 14001</p> | |
| EMC (follow EN61800-3 standard) | <p>Unrestricted sales distribution in second environment</p> <p>- Optional up to Rx series in AS700 series</p> <p>Optional when the input current is less than 1000A under restricted sales distribution in first environment</p> | |

2.3 Product dimensions

2.3.1 Outline dimensions of inverter drive unit

2.3.1.1 Outline and parts of inverter drive unit



2.3.1.2 Installation dimensions of inverter drive unit

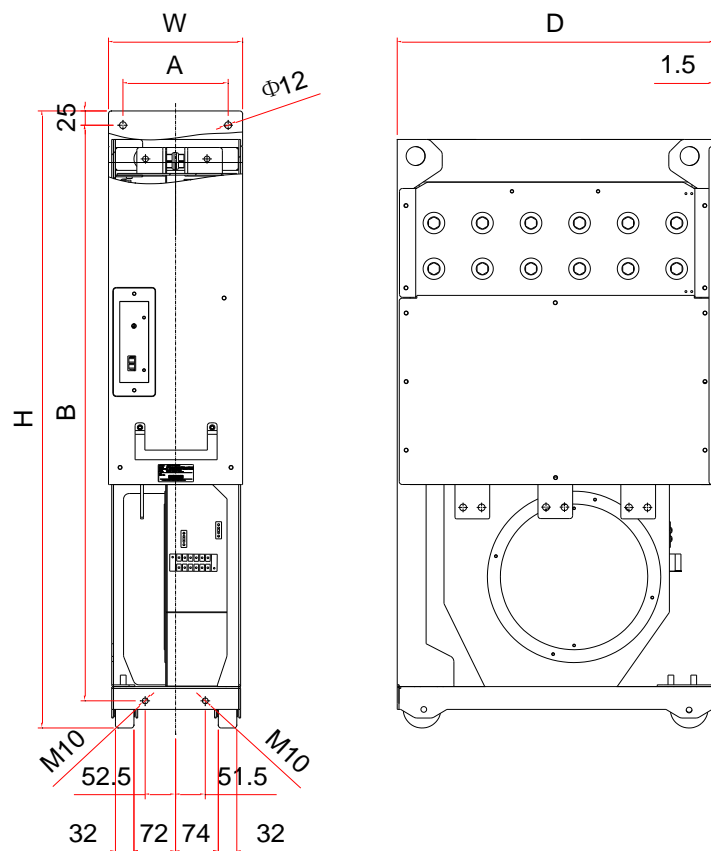


Figure 2-5 Outline and installation dimensions of inverter drive unit

Table 2.13 Outline and installation dimensions of inverter drive unit

| A (mm) | B (mm) | H (mm) | W (mm) | D (mm) | Mounting hole diameter Φ(mm) | Installation | | | Fasten ing torque (Nm) | Weigh t (kg) |
|-----------|-----------|-----------|-----------|-----------|---------------------------------------|--------------|----------------|----------------------|---------------------------------|-----------------|
| | | | | | | Bolt | Flat washer | Spring washe r | | |
| 182 | 1007.5 | 1080 | 232 | 549.5 | 12 | 4M10 | 4Φ10 | 4Φ10 | 14 | 84 |

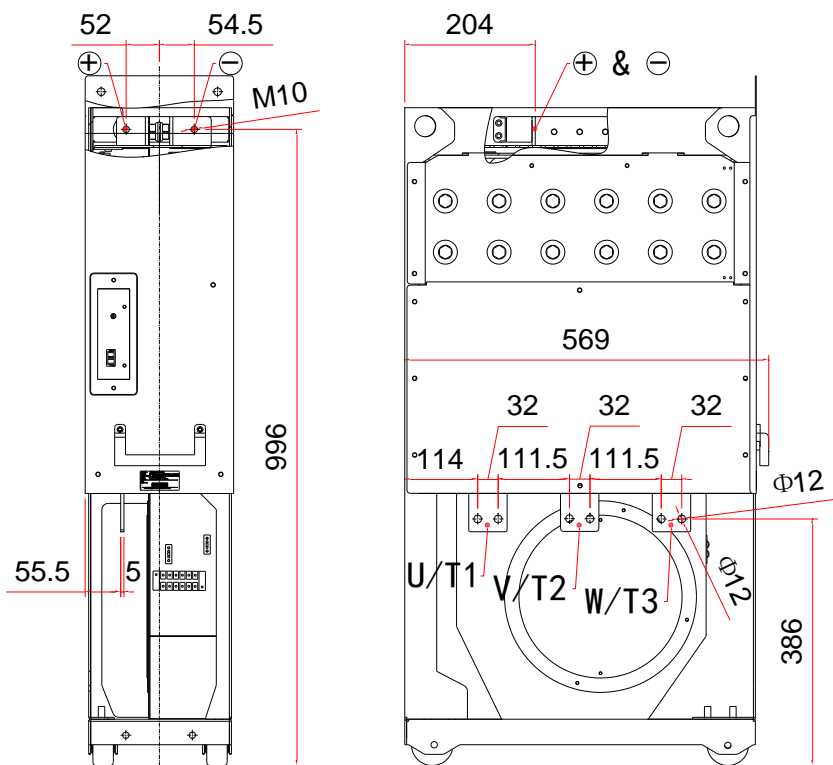


Figure 2-6 Main circuit terminal of inverter drive unit

2.3.2 Outline dimensions of SCR unit

2.3.2.1 Outline and parts of SCR unit

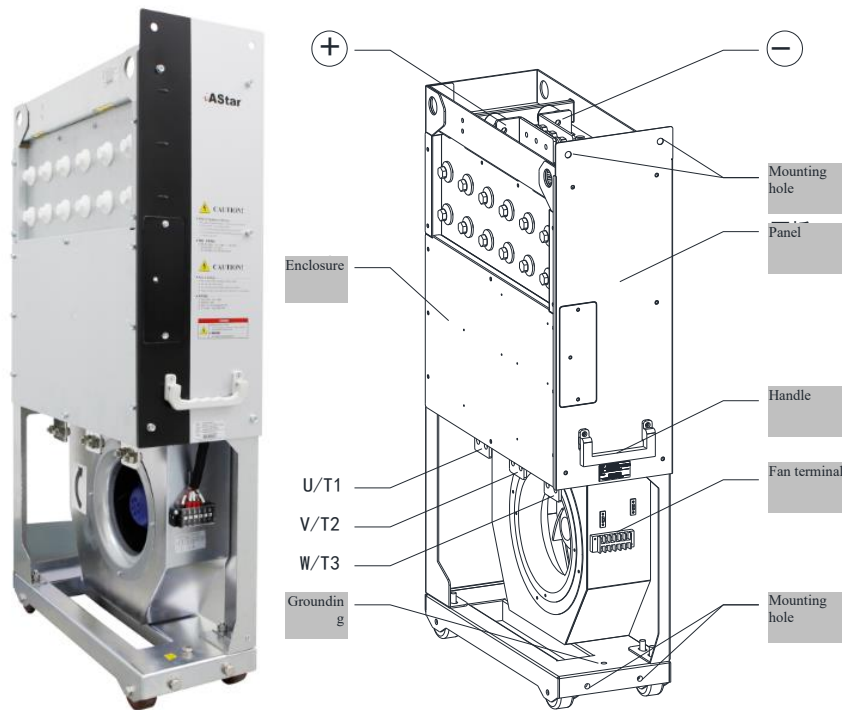


Figure 2-7 Outline and parts of SCR unit

2.3.2.2 Installation dimensions of SCR unit

The installation dimensions and main circuit terminal of the SCR unit are the same as the inverter drive unit.

2.3.3 Dimensions of LCL filter unit

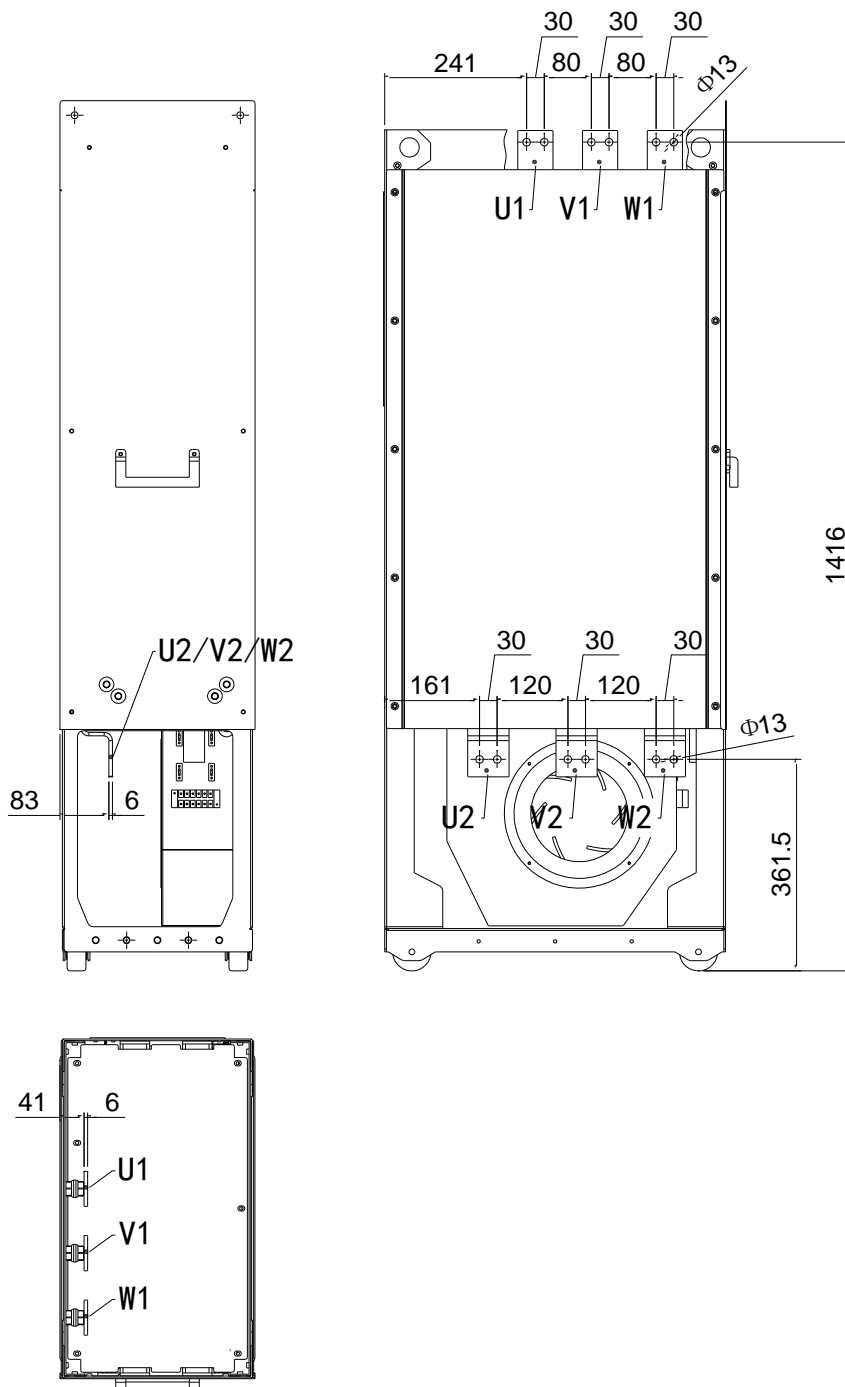


Figure 2-8 Main circuit terminal of LCL filter unit

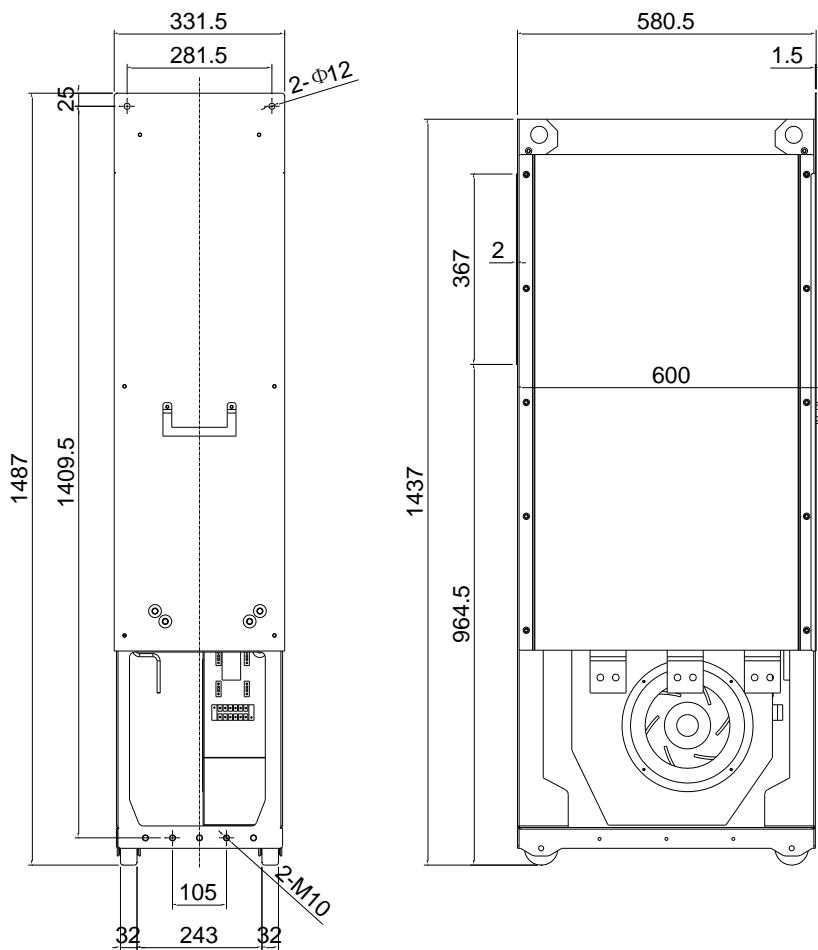


Figure 2-9 Outline and installation dimensions of LCL filter unit

2.3.4 Operation panel and embedded plate size

2.3.4.1 Mounting hole size of door plank operation panel

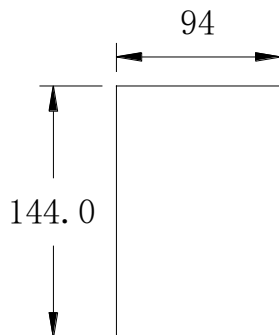


Figure 2-10 Mounting hole size of door plank operation panel

2.3.4.2 Operation panel embedded plate size

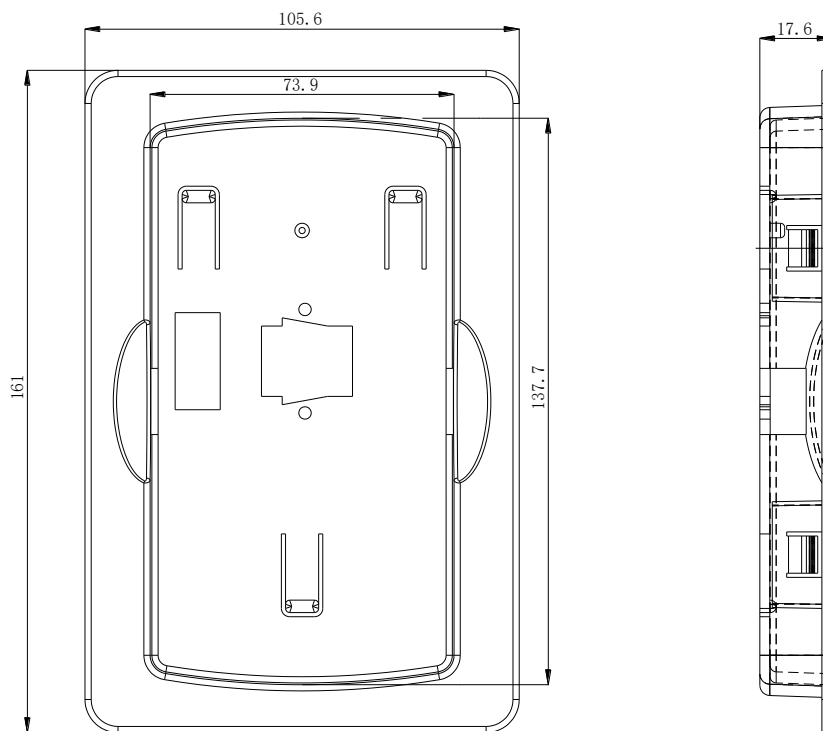


Figure 2-11 Operation panel embedded plate size

2.3.4.3 Operation panel size

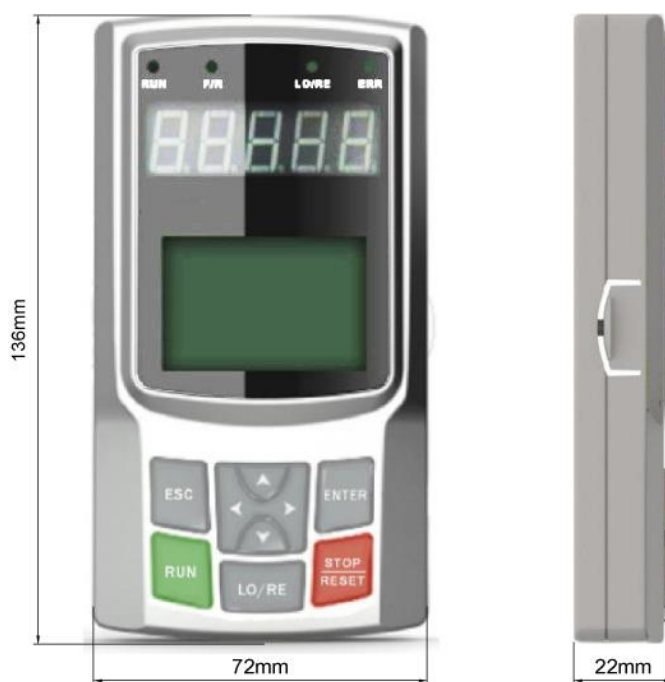


Figure 2-12 Operation panel size

2.3.5 AS.CN/A control unit size

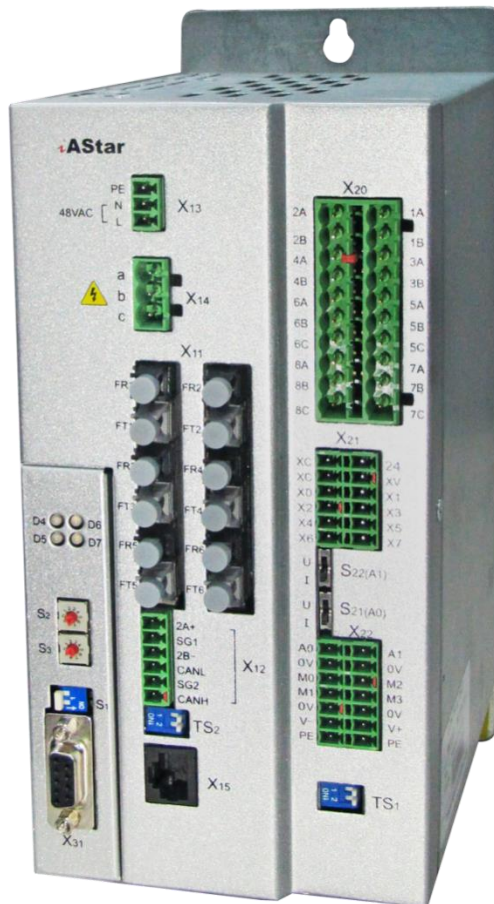


Figure 2-13 AS.CN/A control unit size

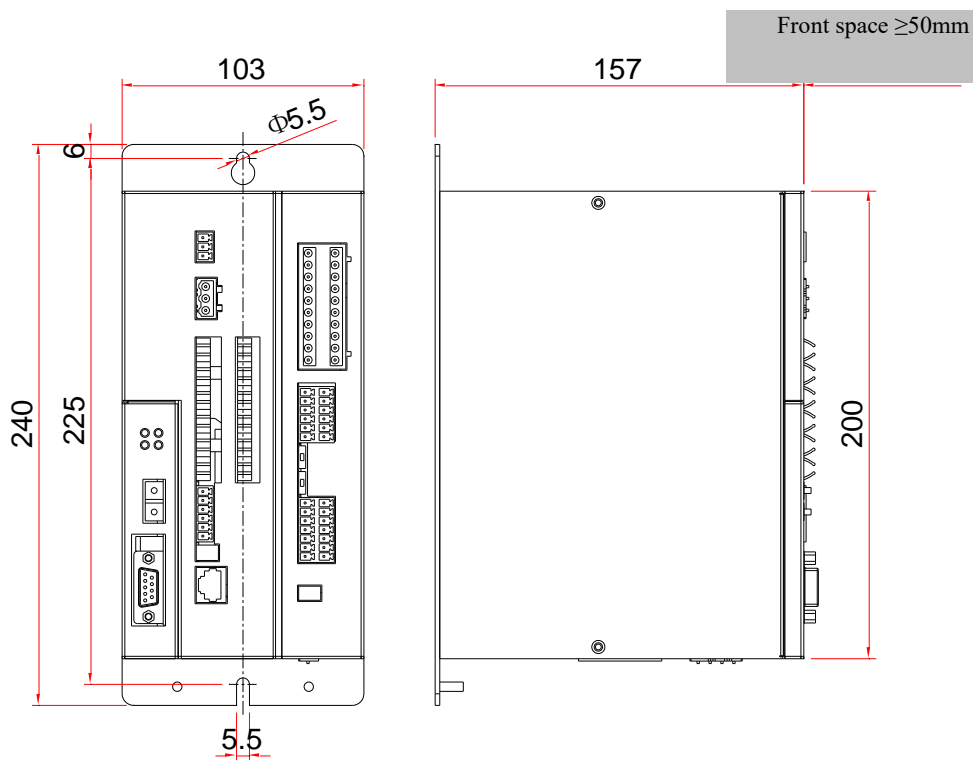


Figure 2-14 AS.CN/A control unit size

2.3.6 AS.PN/A phase acquisition box size

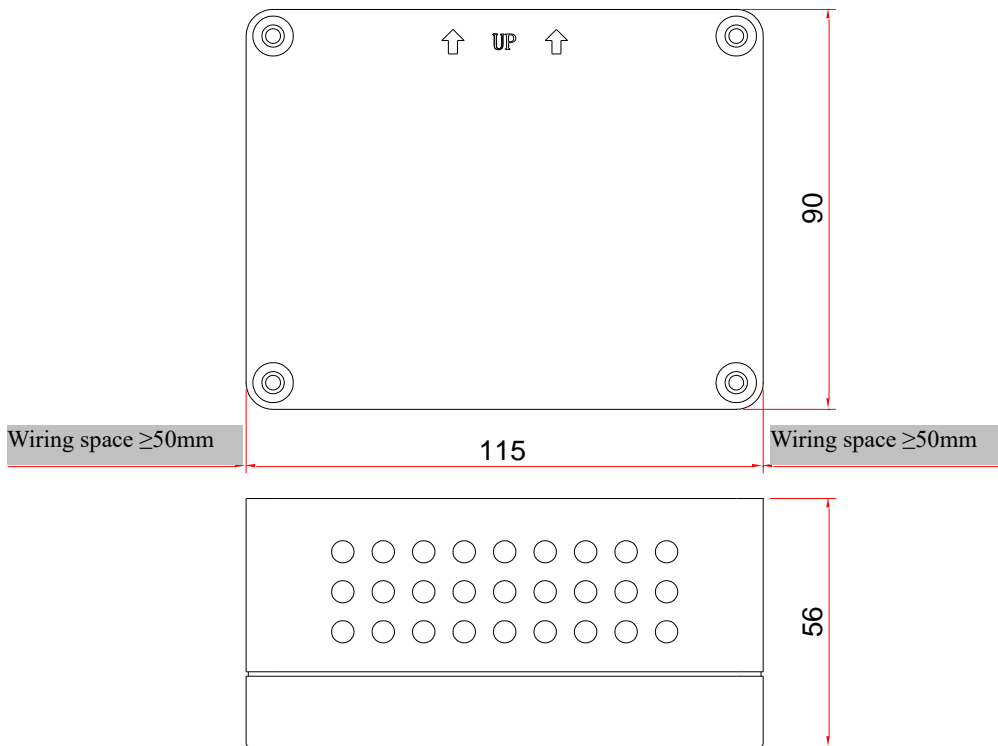


Figure 2- 15 Outline dimension diagram

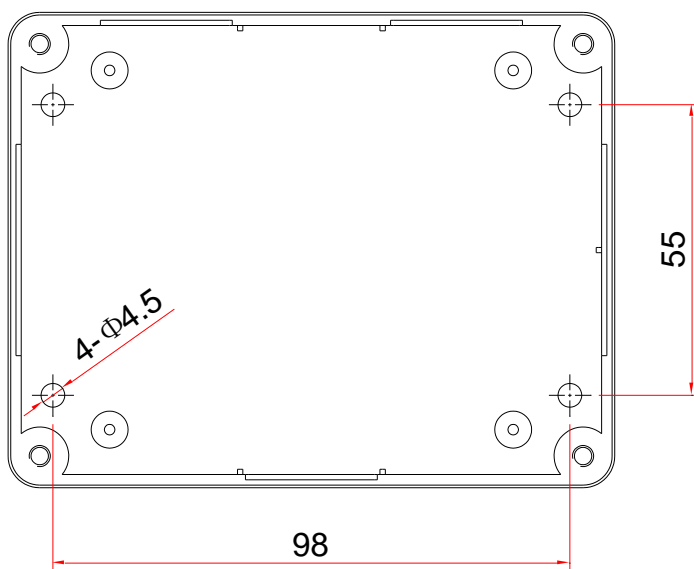


Figure 2- 16 Installation dimension diagram (mounting hole inside the box)

2.3.7 DC bus fuse specification and dimension

Table 2.14 DC bus fuse specification

| DC bus fuse specification | | | | |
|---------------------------|------------------------------|--------------|-------------------------------------|----------|
| Model of basic unit | Fuse specification and model | Manufacturer | Accessories | Quantity |
| Un=400V (range 380~500V) | | | | |
| AS700 03 0490 T04 | 690V/700A, 170M6011 | Bussman | Indicator without microswitch | 2 |
| AS700 03 0600 T04 | 690V/900A, 170M6013 | Bussman | Indicator without microswitch | 2 |
| AS700 03 0700 T04 | 690V/1100A, 170M6015 | Bussman | Indicator without microswitch | 2 |
| Un=690V (range 525~690V) | | | | |
| AS700 03 0322 T06 | 1250V/500A, 170M6142 | Bussman | Indicator without microswitch | 2 |
| AS700 03 0367 T06 | 1250V/630A, 170M6144 | Bussman | Indicator without microswitch | 2 |
| AS700 03 0429 T06 | 1250V/700A, 170M6145 | Bussman | Indicator without microswitch | 2 |

The sizes of the fuse models 170M6011, 170M6013 and 170M6015 are shown in Size3 in Figure 2-12:

Dimensions

DIN 43 653: Type -/80, -TN/80, -/110, -TN/110

| Size | A | B | B§ | C | C§ | D | E | H |
|------|----|-----|-----|----|-----|----|----|----|
| 1* | 50 | 104 | 134 | 78 | 108 | 58 | 45 | 22 |
| 1 | 50 | 108 | 138 | 78 | 108 | 66 | 53 | 25 |
| 2 | 50 | 108 | 138 | 78 | 108 | 75 | 61 | 25 |
| 3 | 51 | 109 | 139 | 78 | 108 | 90 | 76 | 30 |

§Valid for fuses type -/110, -TN/110

Dimension in mm.

1mm = 0.0394" 1" = 25.4mm

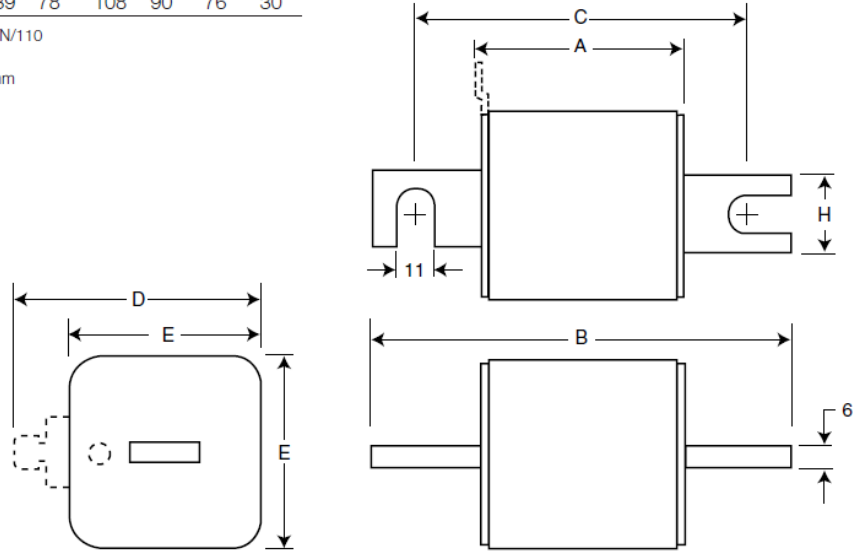


Figure 2-17 Fuse size 1

The sizes of the fuse models 170M6142, 170M6144 and 170M6145 are shown in Size3 in Figure 2-13:

Dimensions

DIN 43 653: Type -/110, -TN/110

| Size | A | B | D | E | H |
|------|----|-----|----|----|----|
| 1* | 80 | 138 | 58 | 45 | 20 |
| 1 | 80 | 138 | 66 | 53 | 25 |
| 2 | 80 | 138 | 75 | 61 | 25 |
| 3 | 81 | 139 | 90 | 76 | 30 |

Dimension in mm.

1mm = 0.0394" 1" = 25.4mm

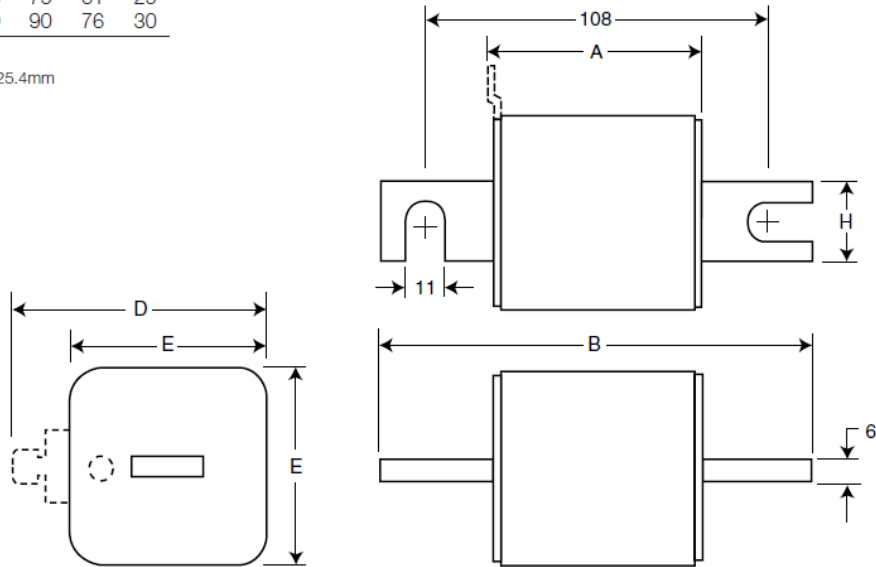


Figure 2-18 Fuse size 2

2.3.8 Equalizing reactor specification and dimension

2.3.8.1 600V equalizing reactor

Electrical parameters

- System voltage: 690VAC/50Hz
- Rated current: 429A
- Inductance value: 0.040mH±10% (current-voltage method)
- Overload capacity: 1.5x 60S, 1.8x 3S, 1.8x overload inductance unsaturated
- Bus voltage: 1100V
- Switching frequency: 4kHz
- Dielectric strength: AC3500V/5mA/60S
- Insulation resistance: ≥100MΩ (DC1000V)
- Insulation grade: F

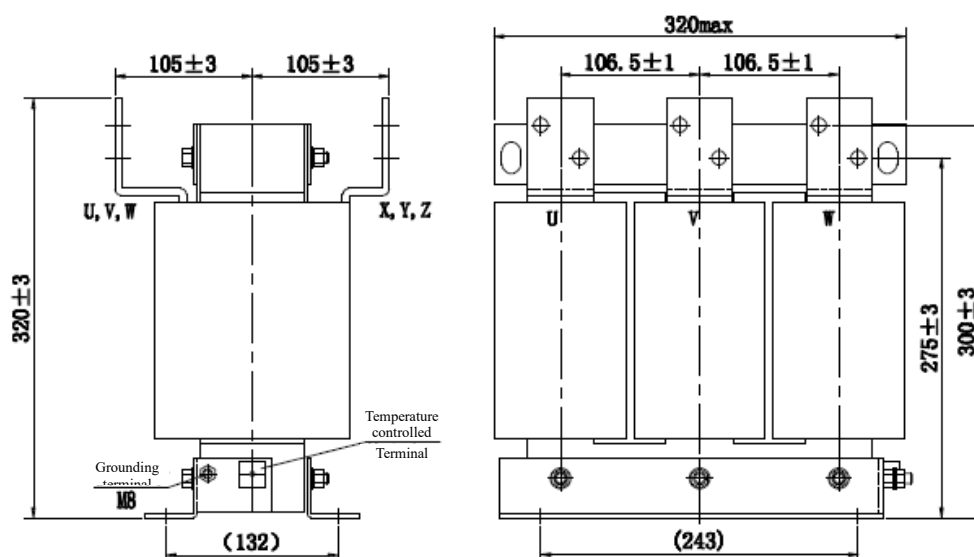


Figure 2-19 Dimension diagram of 429A/690V equalizing reactor

Electrical parameters

- System voltage: 690VAC/50Hz
- Rated current: 450A
- Inductance value: 0.056mH±5% (current-voltage method)
- Overload capacity: 1.2x 60S every 10 minutes, 1.2x overload inductance fall not exceeding 10%
- Bus voltage: 1200V
- Inductance imbalance: 5%
- Dielectric strength: AC3500V/5mA/60S
- Insulation resistance: ≥100MΩ (DC1000V)
- Insulation grade: H

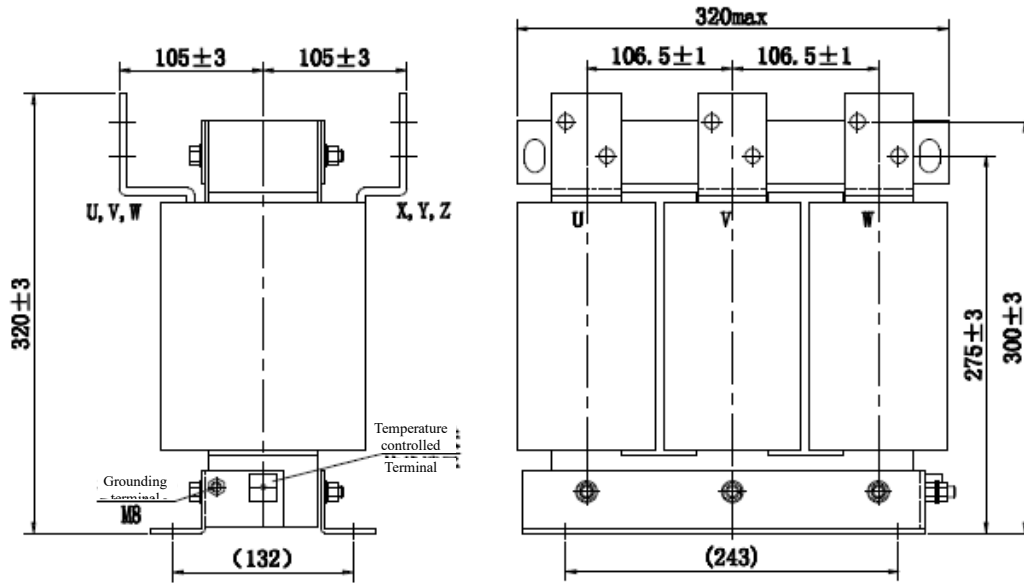


Figure 2-20 Dimension diagram of 450A/690V equalizing reactor

2.3.8.2 400V equalizing reactor

Electrical parameters

- System voltage: 400VAC/50Hz
- Rated current: 675A
- Inductance value: $0.015\text{mH} \pm (0 \sim +10)\%$ (current-voltage method) 3-phase inductance imbalance: 5%
- Overload capacity: 1.5x 60S, 1.8x 3S, 1.8x overload inductance unsaturated (inductance value $> 90\%L_n$)
- Bus voltage: 750V
- Dielectric strength: AC3000V/5mA/60S
- Insulation resistance: $\geq 100\text{M}\Omega$ (DC1000V)
- Insulation grade: F

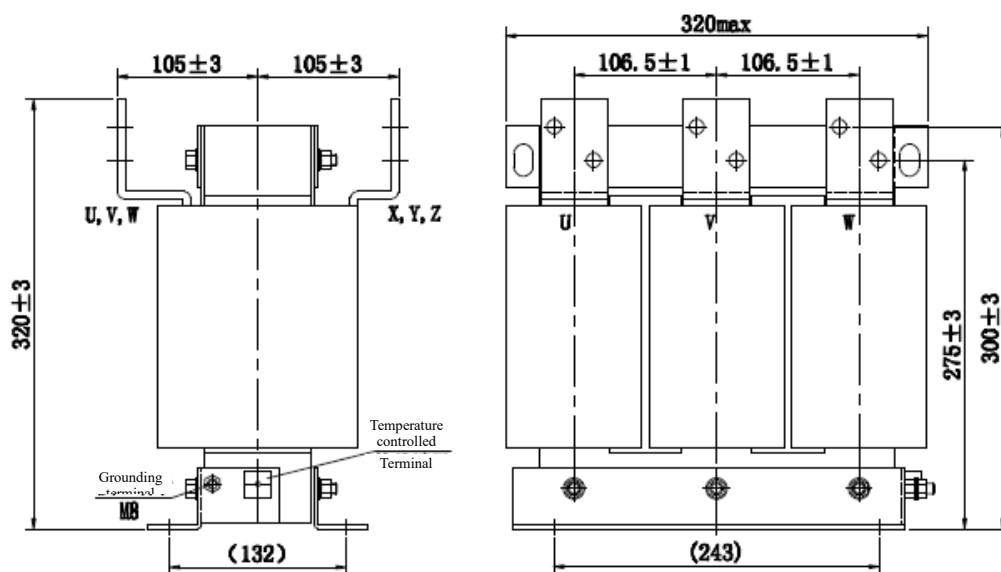


Figure 2-21 Dimension diagram of 675A/400V equalizing reactor

Electrical parameters

- System voltage: 400VAC/50Hz
- Rated current: 700A
- Inductance value: 0.021mH+5% (current-voltage method) 3-phase inductance imbalance: 5%
- Overload capacity: 1.2x 60S every 10 minutes, 1.2x overload inductance fall not exceeding 10%
- Inductance imbalance: 3%
- Bus voltage: 750V
- Dielectric strength: AC3500V/5mA/60S
- Insulation resistance: $\geq 100M\Omega$ (DC1000V)
- Insulation grade: H

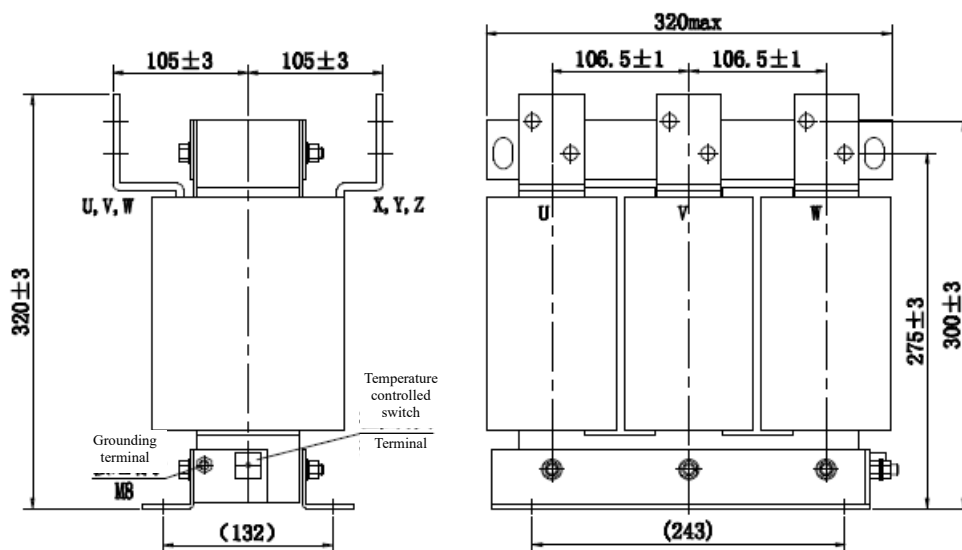


Figure 2-22 Dimension diagram of 700A/400V equalizing reactor

2.3.9 Transformer specification and dimension

Electrical parameters

- Insulation grade: Class H
- Power capacity: 2000VA
- Input voltage: 380V (690V optional)
- Output voltage: 220V/ 2000VA
- Working frequency: 50Hz
- Ambient temperature: -10°C~ +50°C (average 30°C)
- Cooling mode: AN (self-cooling)

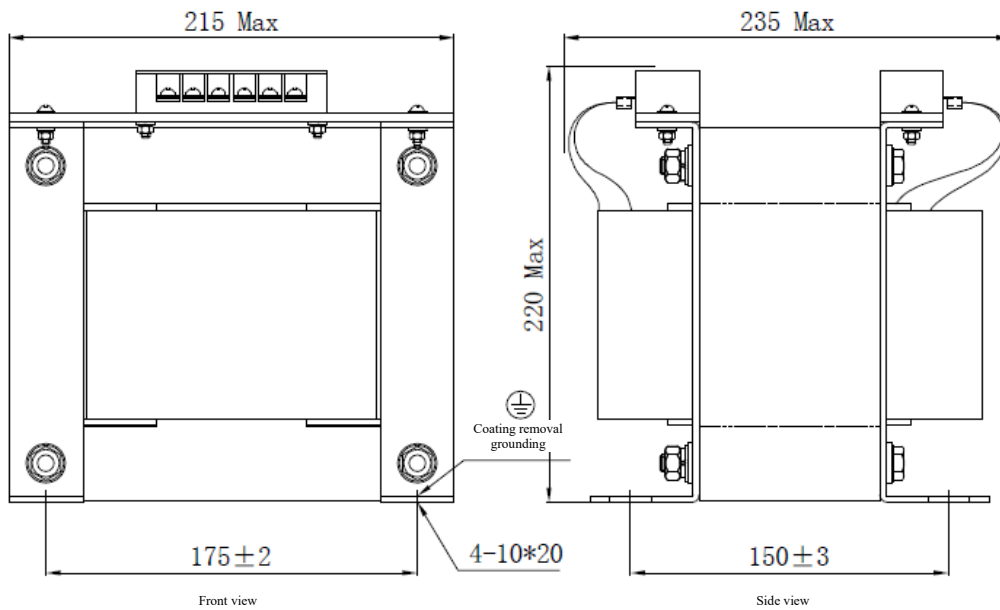


Figure 2- 23 Dimension diagram of 2000VA transformer

Electrical parameters

- Insulation grade: Class H
- Power capacity: 4000VA
- Input voltage: 380V (690V optional)
- Output voltage: 220V/ 4000VA
- Working frequency: 50Hz
- Ambient temperature: -10°C~ +50°C (average 30°C)
- Cooling mode: AN (self-cooling)

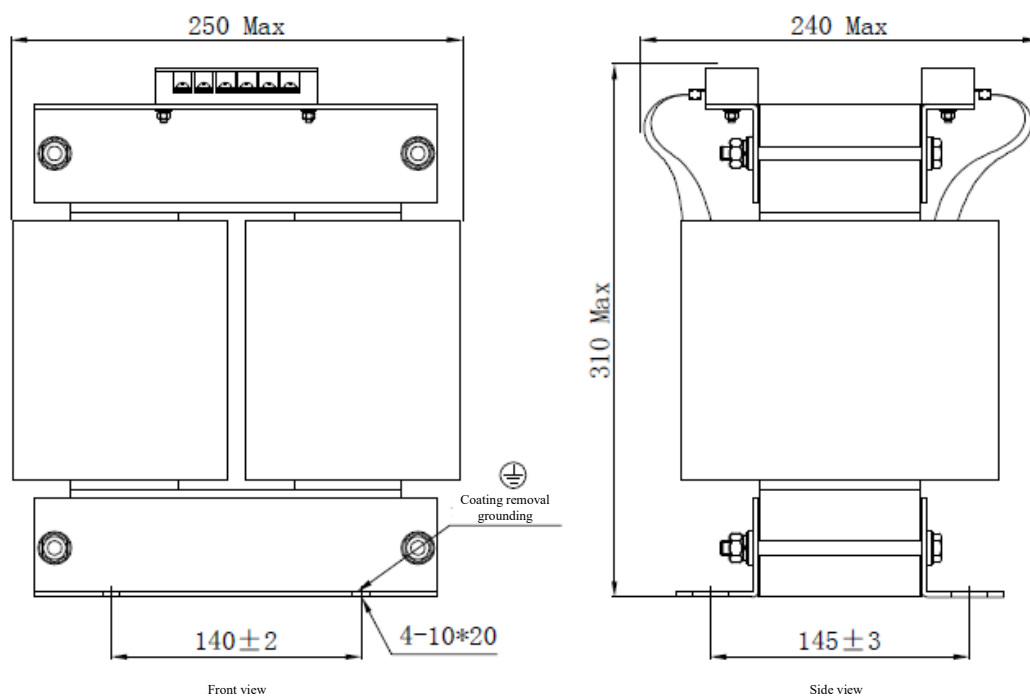


Figure 2- 24 Dimension diagram of 4000VA transformer

Electrical parameters

- Insulation grade: Class H
- Power capacity: 6000VA
- Input voltage: 380V (690V optional)
- Output voltage: 220V/ 6000VA
- Working frequency: 50Hz
- Ambient temperature: $-10^{\circ}\text{C} \sim +50^{\circ}\text{C}$ (average 30°C)
- Cooling mode: AN (self-cooling)

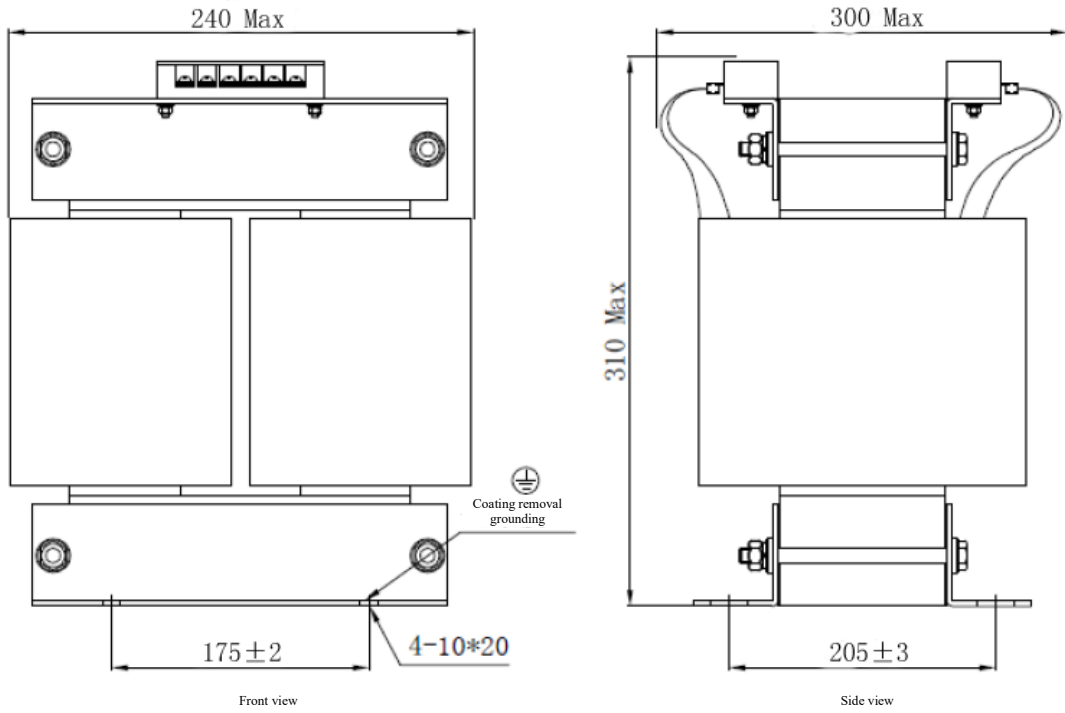


Figure 2- 25 Dimension diagram of 6000VA transformer

2.3.10 Drive unit fan specification and dimension

Corresponding parameters of **RH25V-2EP.WD.1R**: allowable environment temperature 60°C, maximum power 0.1KW and voltage range 230V±10% at 50HZ.

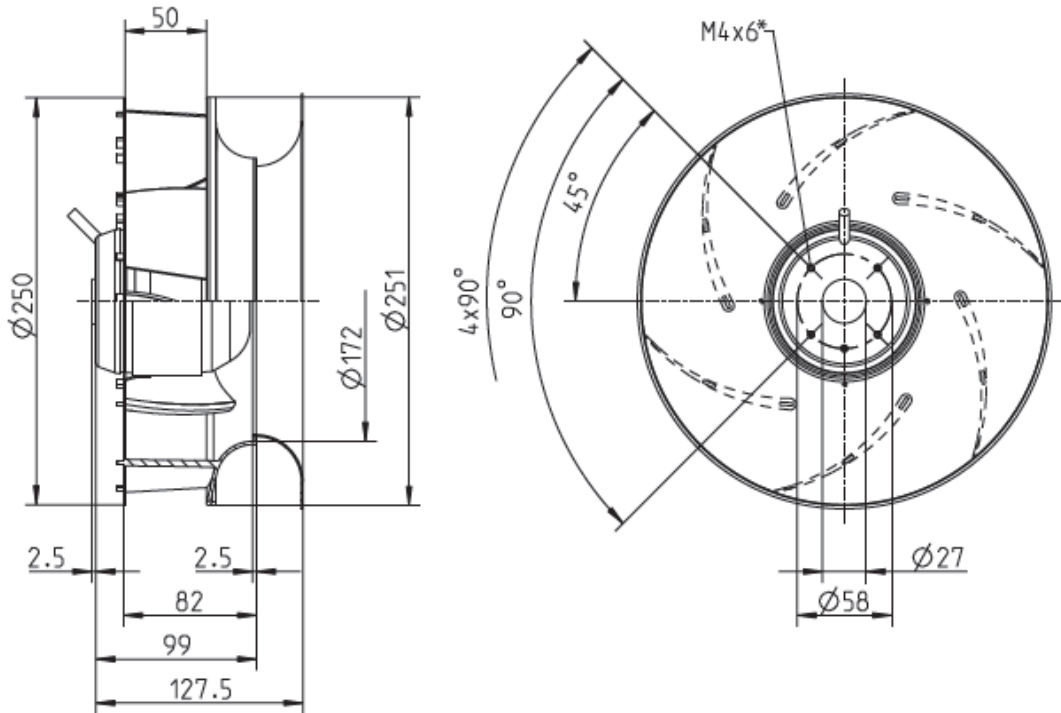


Figure 2-26 Dimension diagram of RH25V-2EP.WD.1R fan

2.3.11 AS700 cabinet product specification and dimension reference

2.3.11.1 AS700 two-quadrant inverter cabinet dimension (SCR)

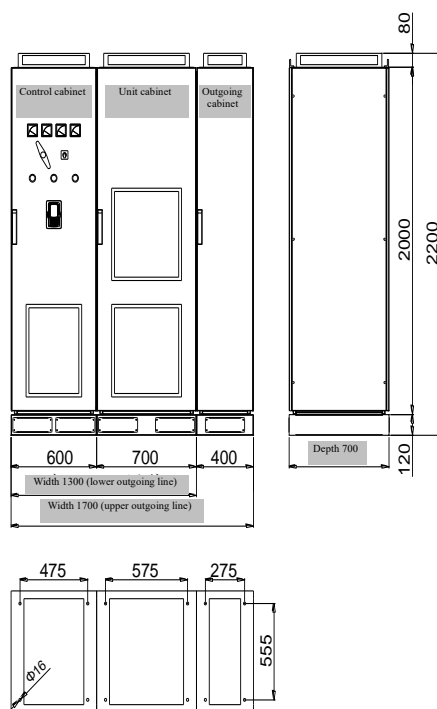


Figure 2-27 Frame A1 dimension drawing

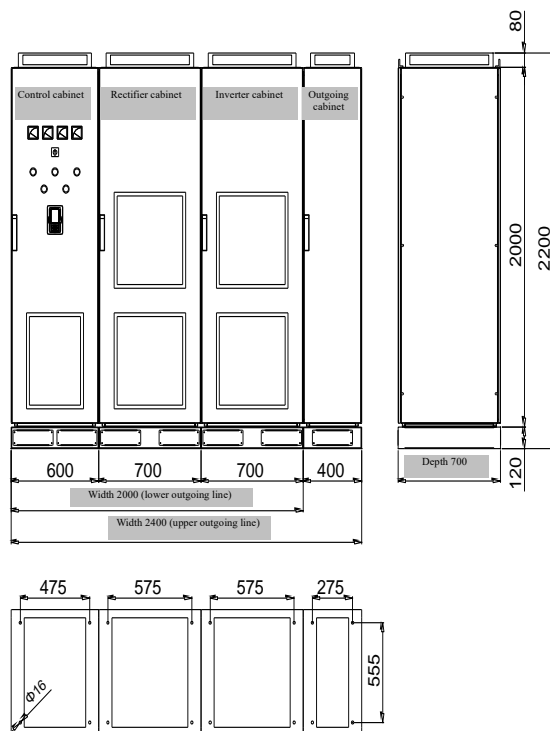


Figure 2-28 Frame A2 dimension drawing

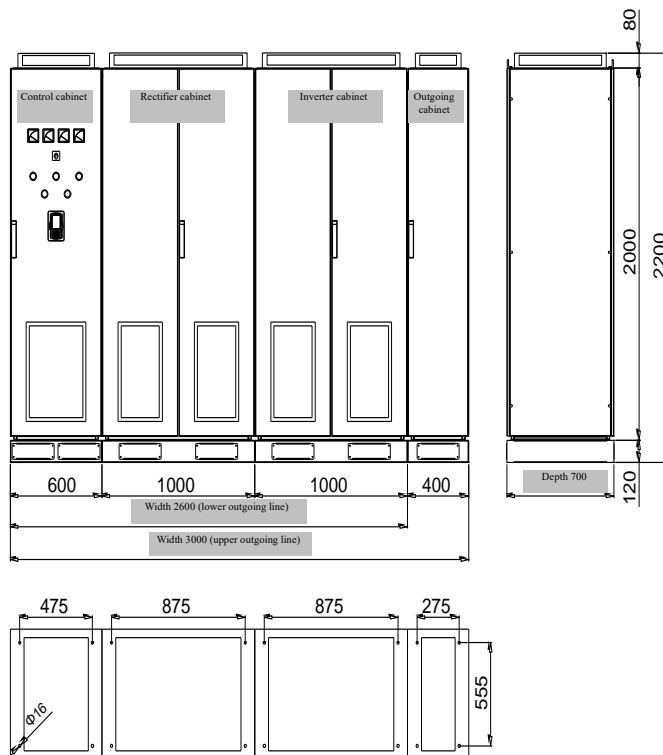


Figure 2-29 Frame A3 dimension drawing

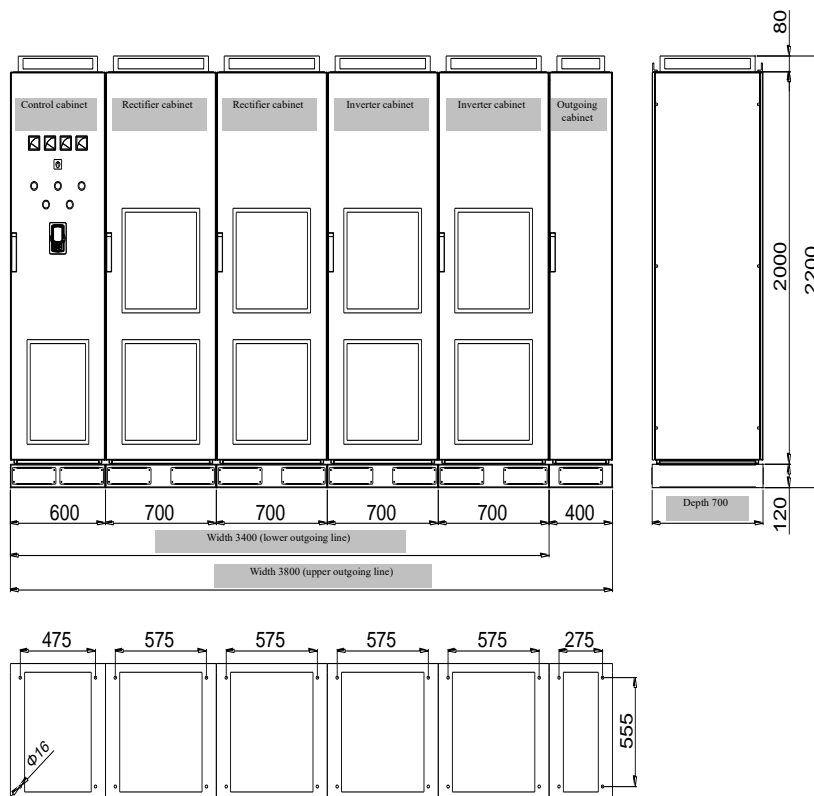


Figure 2-30 Frame A4 dimension drawing

2.3.11.2 2.3.11.2 AS700 four-quadrant inverter cabinet dimension (AFE active rectifier)

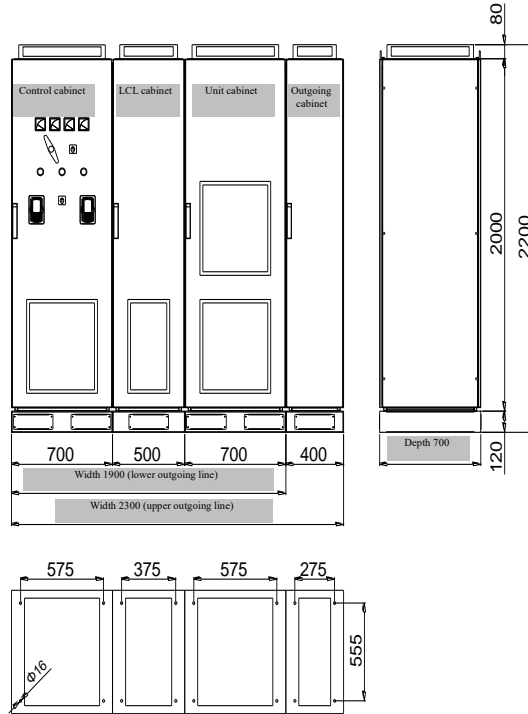


Figure 2-31 Frame B1 dimension drawing

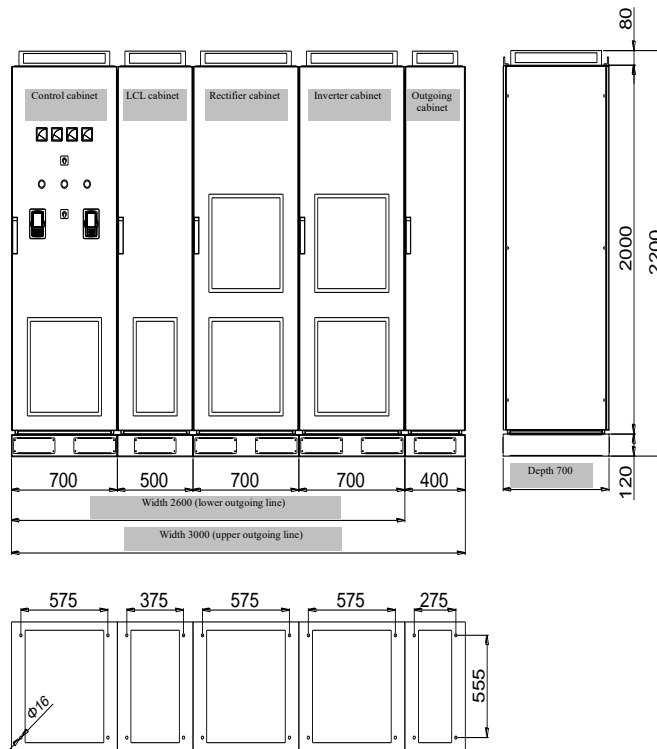


Figure 2-32 Frame B2 dimension drawing

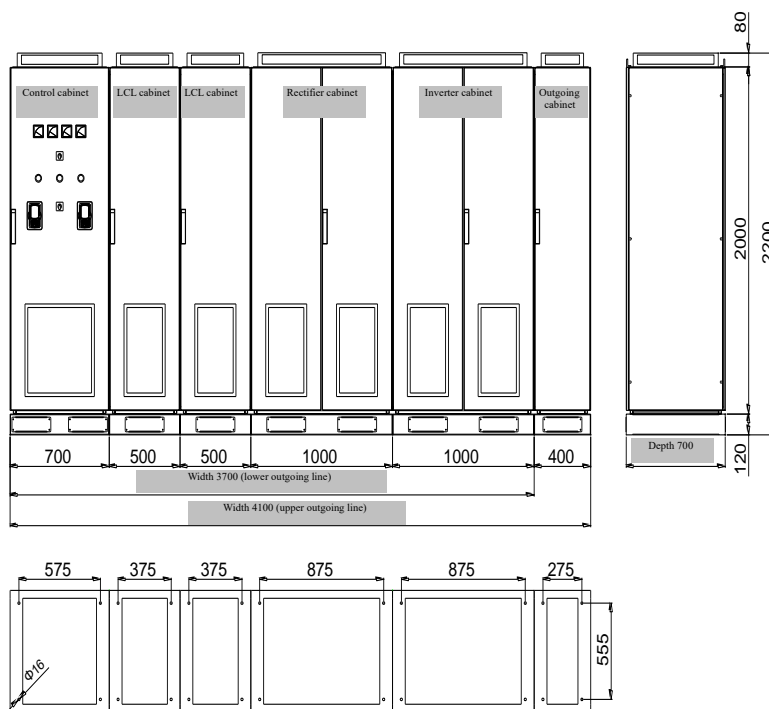


Figure 2-33 Frame B3 dimension drawing

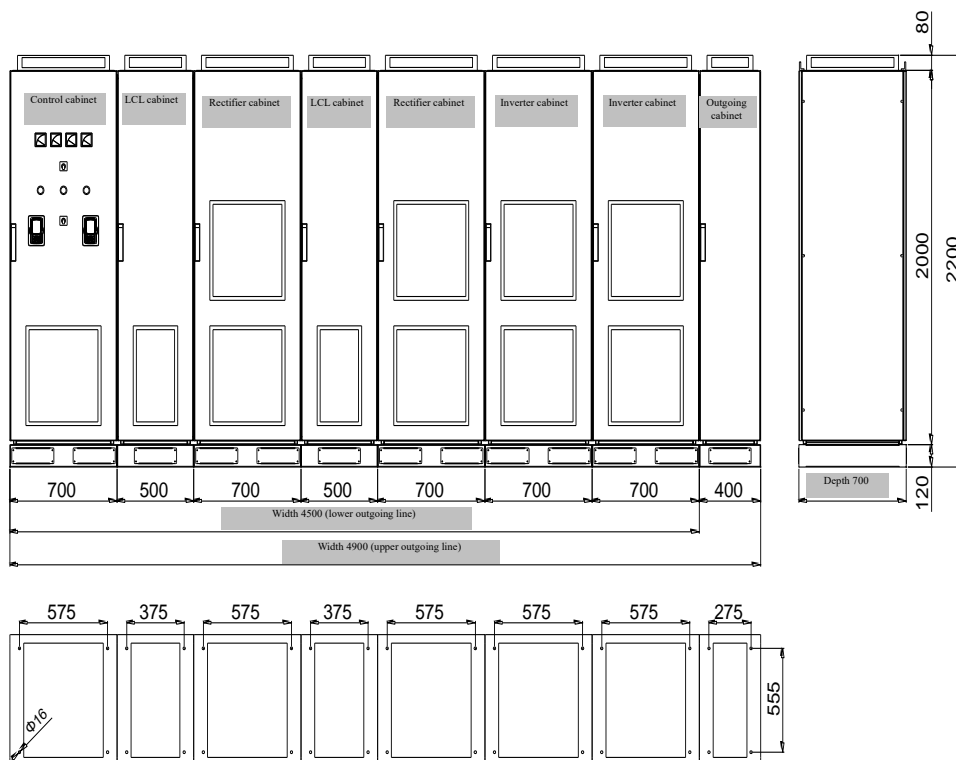


Figure 2-34 Frame B4 dimension drawing

Chapter 3 Assembly of Engineering Inverter

3.1 Installation Steps

Step 1: Deliver the engineering inverter

- Check and confirm that the catalog number printed on the label is the same as that on the purchase order
- Remove the package and check whether there is any damage during transport

Step 2: check the line voltage

- Check and confirm that the line voltage is compatible with the voltage and frequency range of the engineering inverter

Step 3: Install the engineering inverter

- Install the engineering inverter as described in this document
- Install all the internal and external options

Step 4: Wire the engineering inverter

- Connect the motor to ensure the voltage is consistent
- Connect the control circuit
- Connect speed given
- Connect the communication cable
- Connect the encoder cable
- Connect the power line after making sure the power is off

3.2 Mechanical installation

3.2.1 Installation environment

3.2.1.1 Temperature and humidity

The operating ambient temperature is between -10°C and 40°C. If the temperature exceeds 40°C, the inverter shall be derated, and the maximum temperature shall not exceed 50 °C. If the ambient temperature exceeds 40°C, the inverter shall be derated by 2% for every 1°C increase. Relative humidity of air $\leq 95\%$ (no condensation).

It is recommended to strengthen the engineering inverter in the occasions with harsh installation environment.

3.2.1.2 Altitude

When the engineering inverter is installed below 1000m above sea level, it can operate at its rated power. When the altitude exceeds 1000m, the power of the engineering inverter needs to be derated.

The specific derating range is shown in the following figure:

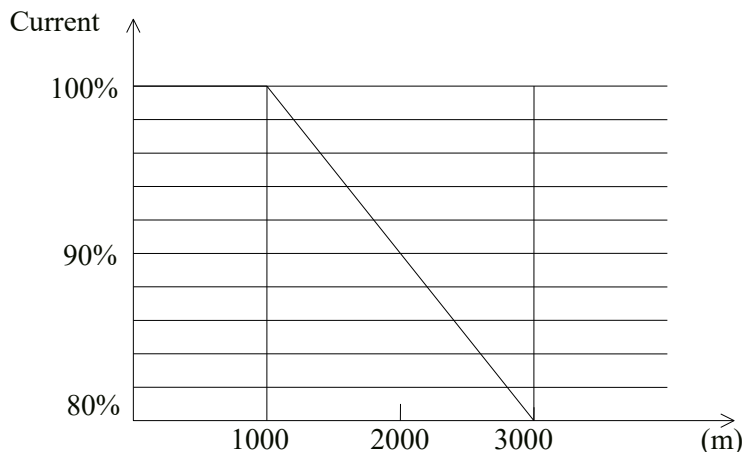



Figure 3-1 Relational graph between the rated output current of engineering inverter and altitude

3.2.1.3 Other environment requirements

- Do not install in the places that may be subject to violent vibration and impact, and the maximum amplitude shall not exceed $5.8\text{m/s}^2(0.6\text{g})$.
- Do not install in the places where there are electromagnetic radiation sources.
- Do not install in places with oil mist, metal dust and dust.
- Do not install in places with harmful gases, liquids, corrosive, flammable and explosive gases.
- Do not install in salty places.
- Do not install in places exposed to direct sunlight.
- Do not install on wood and other flammable objects.
- Do not drop the drilling residue into the inverter during installation.

3.2.2 Installation position and spacing requirements

| |
|--|
|  Danger |
| <p>According to the installation method selected, the basic power unit must be installed vertically in the cabinet:</p> <p>The basic power unit cannot be installed horizontally in the cabinet!</p> |

3.2.3 Inverter assembly steps

Install the basic power unit directly in the electric cabinet according to the following steps:

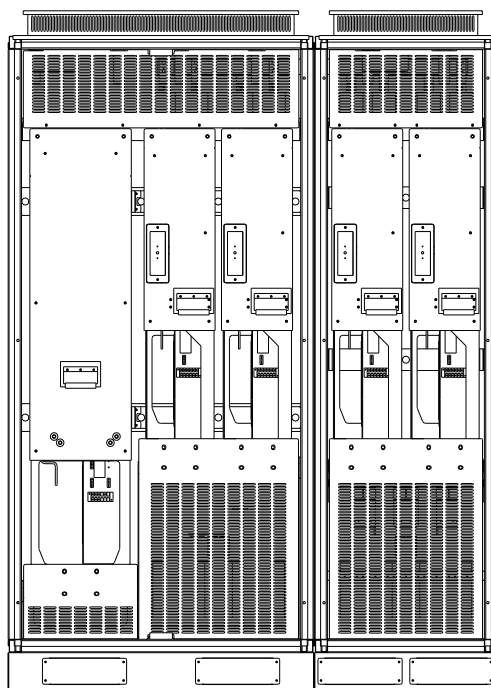
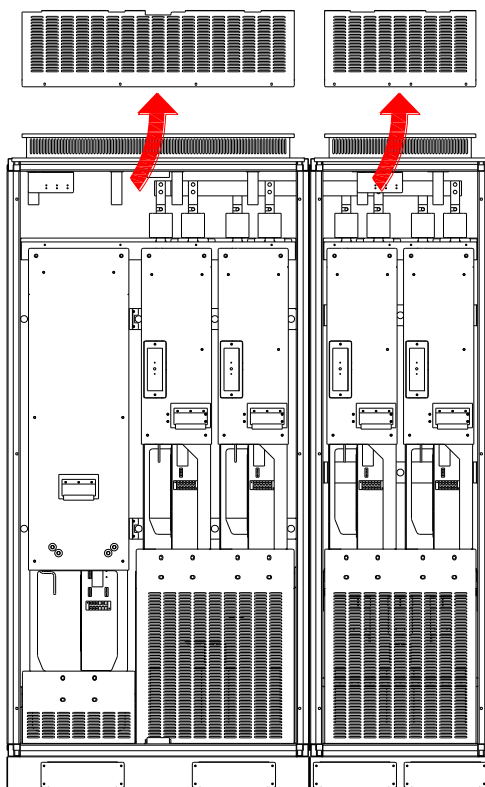
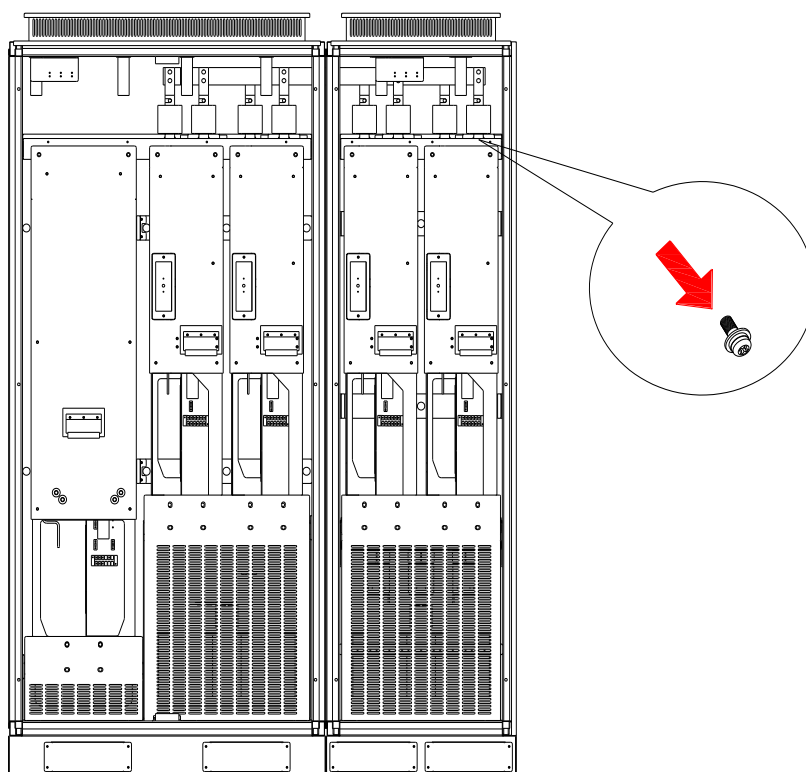


Figure 3-2 In-cabinet layout

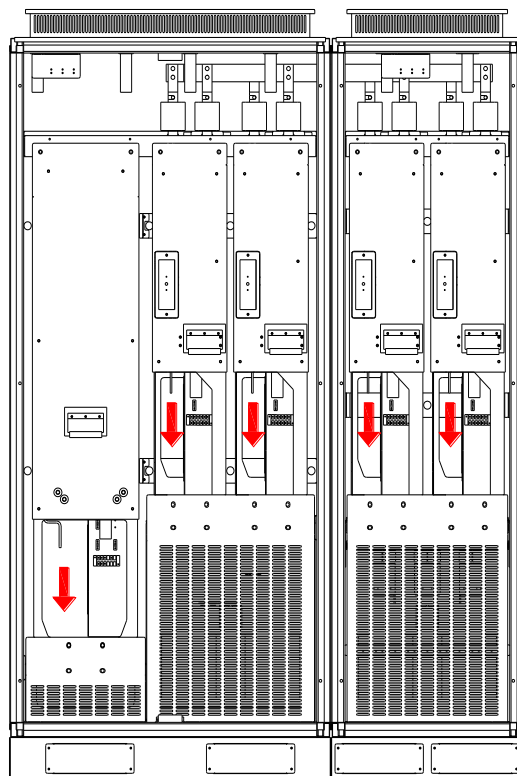
1. Remove the top electric shock cover



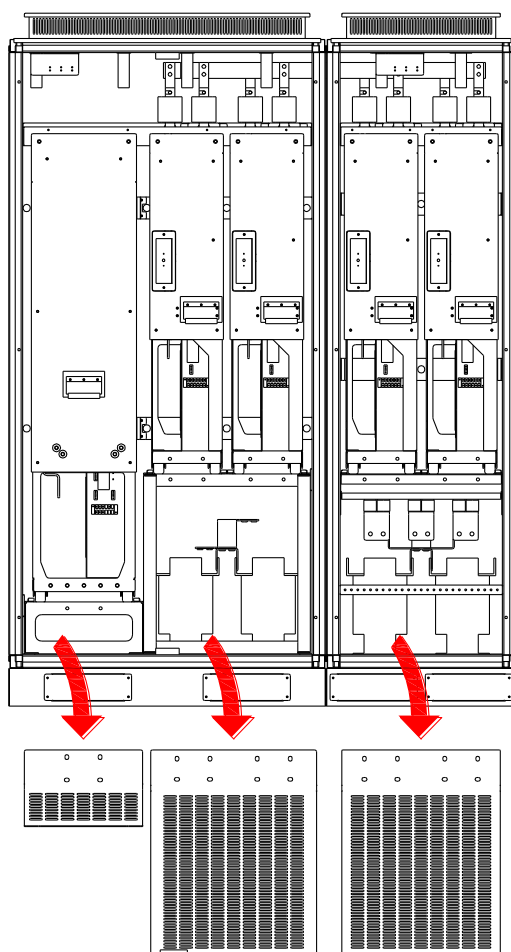
2. Remove the screw at the top of the unit that connects to the transfer copper bar



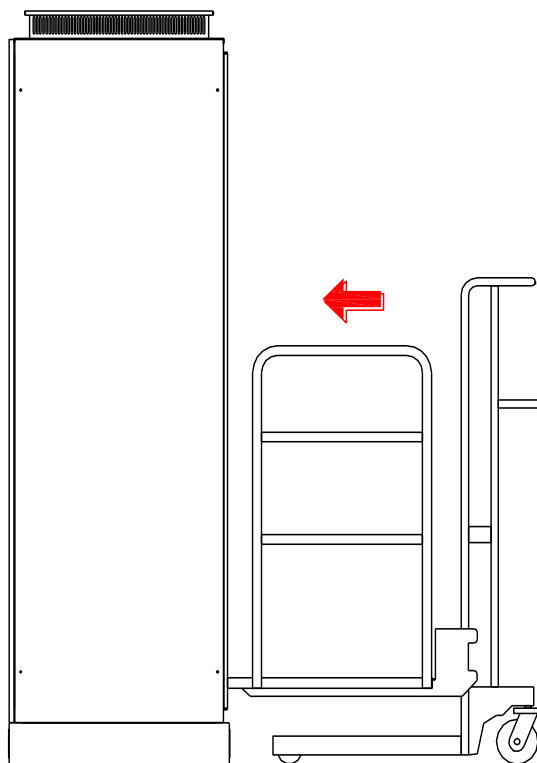
3. Remove the cable from the lower part of the unit and insert the cable under the pallet



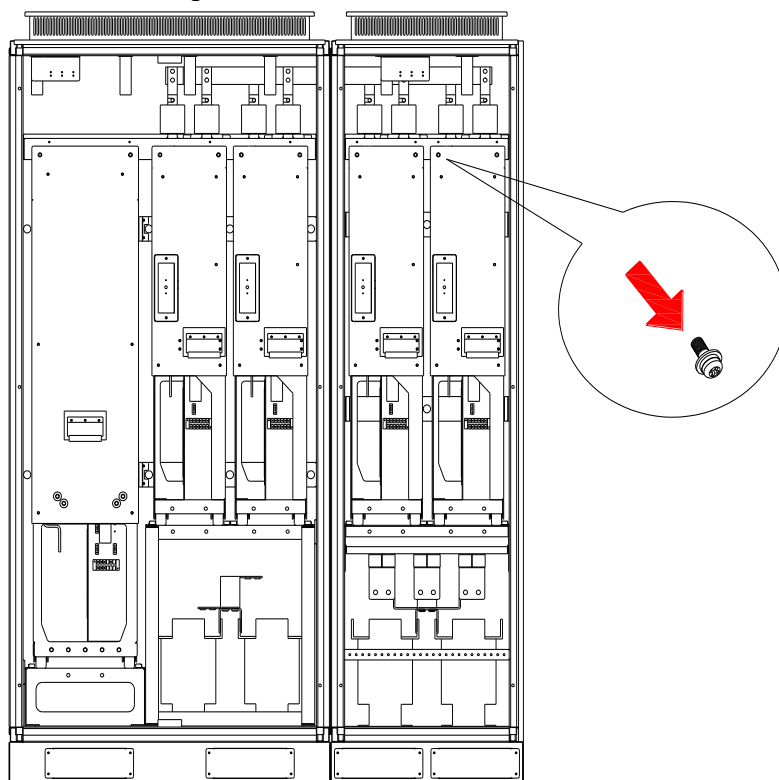
4. Remove the bottom electric shock cover



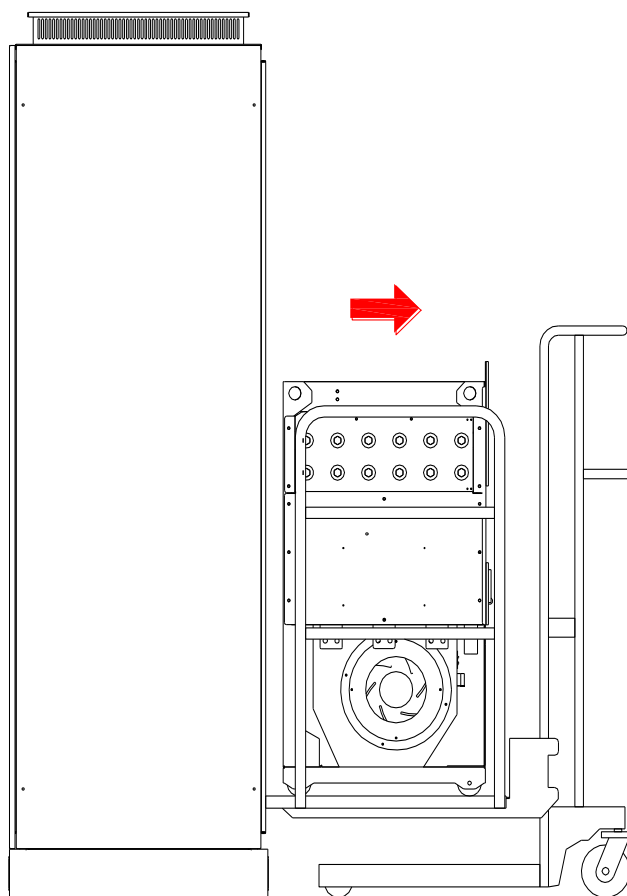
5. Put the trolley in the designated position



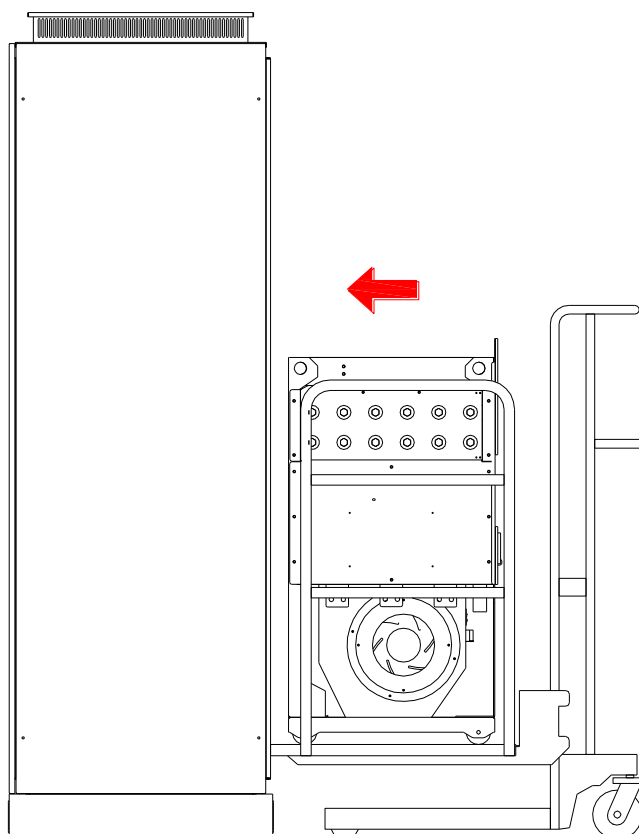
6. Remove set screw on top of unit



7. Pull out the unit



- Put a new unit in



 **Important**

Fasteners shall have vibration-proof parts, such as spring washer; the screws must be tightened.

The handling trolley dimensions are shown in Figure 3- 3

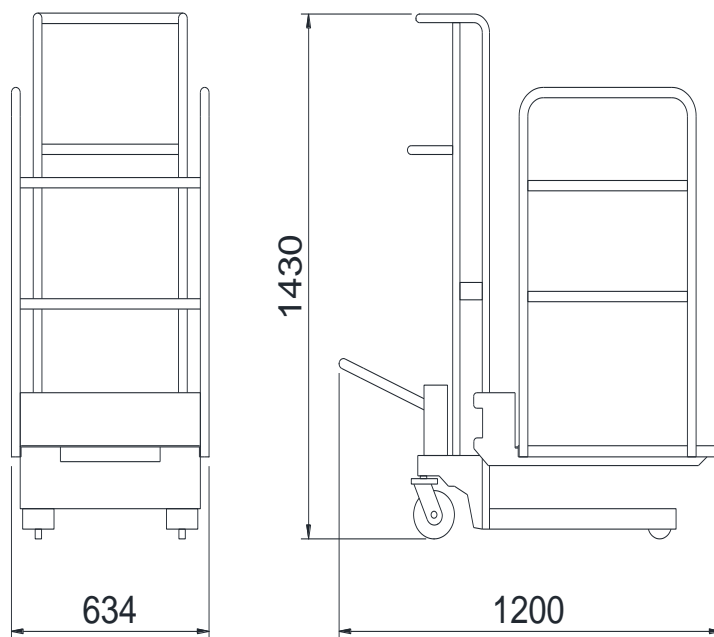


Figure 3- 3 Handling trolley dimensions

3.2.4 Disassembly and installation of operation panel

3.2.4.1 Disassemble the operation panel

- ① Press the lock catches on two sides of the operation panel simultaneously, so that it is separated from the panel to remove the Operation panel.
- ② There is a connecting line on the back of the Operation panel, and the plug of the connecting line should be pulled off the Operation panel. Note: do not exert force on the connecting line when unplugging to avoid damage.

3.2.4.2 Install the operation panel

Insert the plug of the connecting wire into the socket on the back side of the Operation panel, then insert a side buckle of the Operation panel into the side slot of the panel and finally press the Operation panel to the panel, until you hear the "click" sound. Both side buckles of the Operation panel are embedded in the panel.

Chapter 4 Wiring of Engineering Inverter

This chapter describes in detail the connection between the engineering inverter and the peripheral equipment, the wiring of the main circuit terminal of the basic power unit and the wiring of the control circuit terminal.



- ⊙ **Before wiring, confirm whether the input power is completely disconnected.**
Otherwise there is a risk of electric shock.
- ⊙ **Ask electrical professionals to conduct wiring operation.**
Otherwise there is a risk of electric shock.
- ⊙ **The grounding terminal PE must be reliably grounded.**
Otherwise there is a risk of electric shock.
- ⊙ **Do not touch the terminal directly by hand. The output line of the engineering inverter shall not contact with the outer cover.**
Otherwise there is a risk of electric shock.
- ⊙ **Do not directly connect the power to the output terminals U/T1, V/T2 and W/T3.**
Otherwise there is a risk of damage to the inverter.
- ⊙ **Do not short the terminal \oplus with \ominus .**
Otherwise there is a risk of explosion.
- ⊙ **Do not forcibly close the main circuit breaker before the end of charging.**
Start in a certain sequence, for example, charging, validation, main circuit breaker control and IGBT power module starting. It is prohibited to skip some signal detections (via jumpers) to change the starting sequence, as it may cause power unit damage.
- ⊙ **Verify whether the voltage of the AC main circuit power supply is consistent with the rated voltage of the inverter unit.**
Otherwise there is a risk of fire and personal injury.
- ⊙ **The main circuit terminal must be securely connected to the wire or wire crimp terminal.**
Otherwise there is a risk of damage to the engineering inverter.
- ⊙ **Check whether the transformer input voltage is correct.**
Otherwise there is a risk of damage to the engineering inverter.

4.1 Connection between the engineering inverter and the peripheral equipment

4.1.1 Single wire connection diagram of engineering inverter

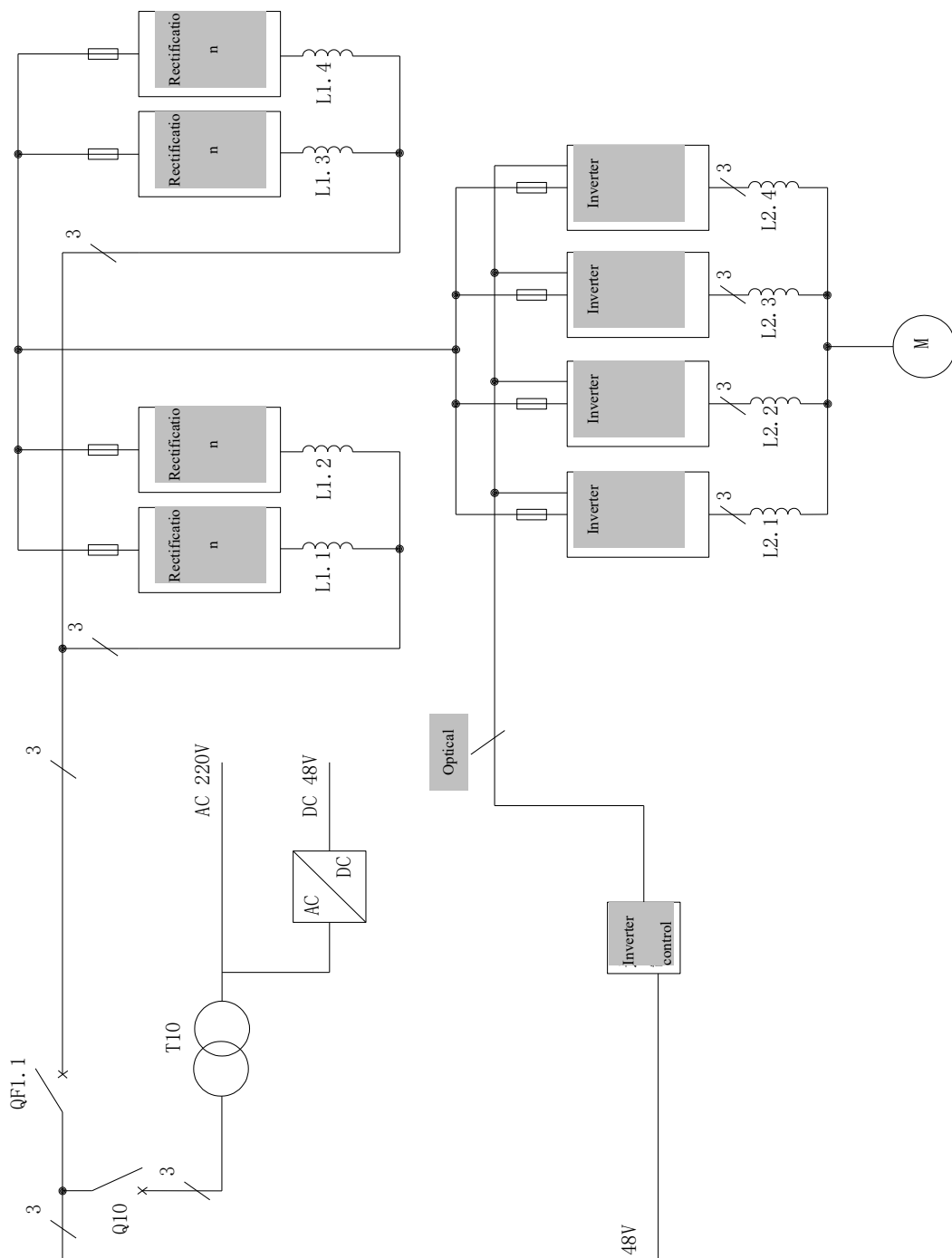


Figure 4-1 Single wire connection diagram of cabinet two-quadrant inverter (example)

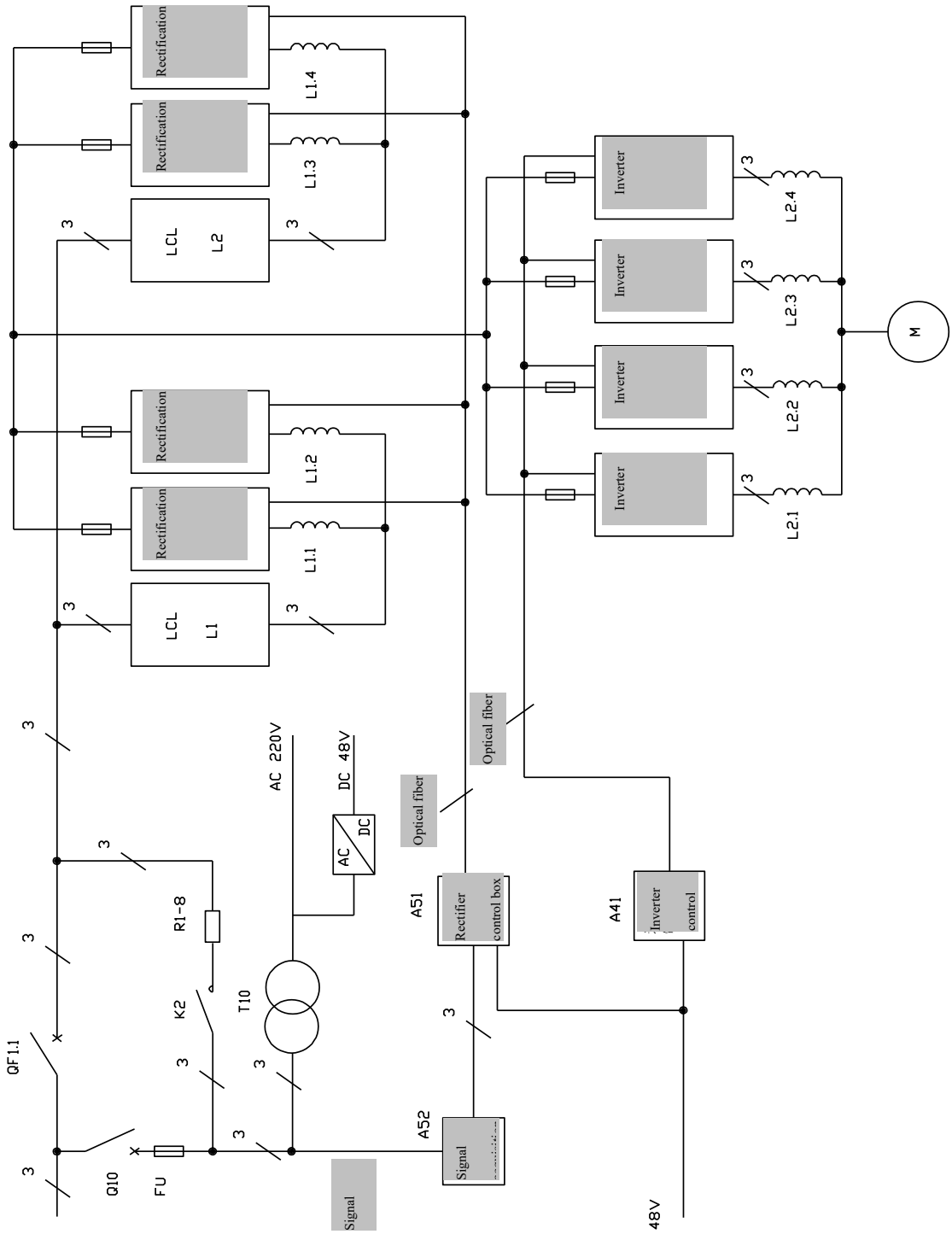


Figure 4-2 Single wire connection diagram of cabinet four-quadrant inverter (example)

4.1.2 Connection of main circuit and peripherals

4.1.2.1 Input power connection



The inverter cannot be operated beyond the rated input line voltage range. Overvoltage may cause permanent damage to the inverter.

Table 4-1 Technical requirements for input power

| Technical requirements for input power (main circuit) connection | |
|--|---|
| Input voltage | 3-Phase U4N: 380~500VAC [-10%...+10%] 3-Phase U6N: 520~690VAC [-10%...+10%] |
| Short-circuit current (IEC60909 standard) | If the incoming cable of the inverter is protected by a proper fuse, the maximum allowable short-circuit current is 100 kA within 1s. |
| Frequency | 45~65Hz |
| Unbalance | Max. ±3% of rated input line voltage |
| Cable temperature | Minimum rated value 90°C |

4.1.2.2 Input protection

The input protection includes circuit breaker, fuse and emergency stop equipment.

Circuit breaker

The power unit itself does not include a circuit breaker. Therefore, a circuit breaker must be installed between the AC input power and the power unit. This kind of circuit breaker must ensure that:

- It shall be selected in accordance with applicable safety regulations, including (but not limited to) national and local electrical regulations.
- During the installation and maintenance of the inverter, the circuit breaker must be able to remain in the disconnected position and locked.
- The circuit breaker shall not be used to control the start and stop of the motor. The motor should be controlled using the operation panel keys or commands from the I/O port.
- The capacity of the circuit breaker shall be selected as 1.5 ~ 2 times of the rated current of the power unit.
- The time characteristic of the circuit breaker shall fully consider the time characteristic of the power unit overheat protection(150% of rated output current for 1min).

Fuse

The end user must provide a circuit protector, which shall be selected according to the national and local electrical regulations. Table 2-2 provides the recommended DC fuse models for the basic power unit to provide the short-circuit protection for DC incoming line power part of the power unit.

Emergency stop equipment

The emergency stop equipment and other necessary safety equipment must be included in the overall equipment design and installation. Controlling the motor using the operation panel keys or commands from I/O port or communication cannot:

- Realize the emergency stop of the motor.
- Separate the inverter from the dangerous voltage.

4.1.2.3 Input power cable/connection

The connection of the input cable can be any of the following:

- Four-core cable (three-phase and Grounding protection wire), not requiring the shielding layer.
- Four-core insulated wire is installed in the conduit.

In all cases, the wire must be less than the maximum limit defined by the terminal size. The inverter shall be derated if the motor cable is too long or the cross-sectional area of the cable is too large. Cables for the inverter shall be the cables of specified area (see Table 4-2). As the greater the cross-sectional area of the cable, the greater the ground capacitance and the greater the earth leakage current, the output current shall be reduced if a larger the cross-sectional area of the cable is used, and the current is reduced by about 5% for every increase of area level. Table 4-2 lists the models of copper wire cables under different load currents. The recommended models are only suitable for the cases listed in the above table. The aluminum cable is not recommended.

Table 4-2 Corresponding load current of cable

| IEC | NEC |
|--|--|
| Based on: EN60204-1 and IEC60364-5-2/2001 PVC insulation 30 °C ambient temperature 70 °C surface temperature Symmetrical cable with copper screen shield No more than 9 cables are placed side by side in the same cable bridge. | Based on: See NEC Table 310-16 for copper wire cables. 90 °C cable insulation 40 °C ambient temperature No more than 3 current-carrying wires are allowed in the same trunking, cable trench or buried cable. Copper wire cable with copper screen shield |

| Maximum load current (A) | Copper wire cable (mm ²) | Maximum load current (A) | Copper wire cable (mm ²) |
|-----------------------------|---|-----------------------------|---|
| 3.5 | 1 | 128 | 50 |
| 6.2 | 1.5 | 160 | 70 |

| Maximum load current (A) | Copper wire cable (mm ²) | Maximum load current (A) | Copper wire cable (mm ²) |
|--------------------------|--------------------------------------|--------------------------|--------------------------------------|
| 9 | 1.5 | 195 | 95 |
| 13 | 1.5 | 210 | 95 |
| 19 | 2.5 | 240 | 120 |
| 27 | 4 | 302 | 185 |
| 34 | 6 | 352 | 240 |
| 41 | 10 | 390 | 95×2P |
| 48 | 10 | 426 | 95×2P |
| 65 | 16 | 480 | 150×2P |
| 80 | 25 | 520 | 150×2P |
| 96 | 35 | 650 | 95×4P |

In order to ensure personnel safety, correct operation, and reduce electromagnetic radiation, the inverter and the motor must be grounded at the installation site.

- The diameter of the wire must meet the requirements of safety regulations.
- The power cable shielding layer must be connected to the PE end of the inverter to comply with safety rules.
- Only when the specification of the shielding layer of the power cable meets the requirements of the safety regulations can the shielding layer be used as the grounding wire of the equipment.
- When installing multiple inverters, do not connect the terminals of the inverters in series.

4.1.2.4 Output power cable/connection

Table 4- 3 Technical requirements for motor connection

| Technical requirements for output power (motor) connection | |
|---|--|
| Output voltage | 0~ input voltage, symmetrical three-phase voltage |
| Current | Refer to AS700 engineering inverter specification in Table 2.1 |
| Switching frequency | Set: 2~5.5kHz |
| Cable rated temperature | Minimum rated value 90°C |
| Relationship between motor cable length and switching frequency | See 4.7.5 in Chapter 4 |

Grounding and wiring

The shielded motor cable shall be shielded by armored cable or shielded cable in the cable conduit. Shielded/armored cable: high-frequency and low-impedance shielded cables such as braided copper wire mesh and aluminum wire mesh or wire mesh.

Wire conduit

- A bridge with a grounding conductor shall be installed at each end of the conduit.
- The conduit is fixed to the housing.
- A separate conduit is used to lay the motor cable (also separate the input power cable from the control cable).
- Each inverter uses a separate conduit.

Armored cable

- A bridge with a grounding conductor shall be installed at each end of the conduit.
- Use the MC continuous corrugated aluminum armored cables with symmetrical grounding wires and 6 conductors (3 power lines and 3 ground wires).
- Armored motor cables can share a cable bridge with input power cables, but not with control cables.

Shielded cable

It is recommended to use the cable with symmetrical PE conductor that meets the standard CE or C-Tick.

Grounding

For the recommended cross-sectional area of grounding conductor, refer to Table 4-2

Corresponding load current of cable in Chapter 4.1.2.3.

4.1.2.5 Input side interference filter

A special input side interference filter can be selected to suppress the high-frequency noise interference from the power line of the inverter to the power supply. When used, the inverter may interfere with other peripheral electronic equipment through the power line. This filter can reduce the interference to the peripheral equipment.

See Figure 4-2 for the correct setting of the power side noise filter.

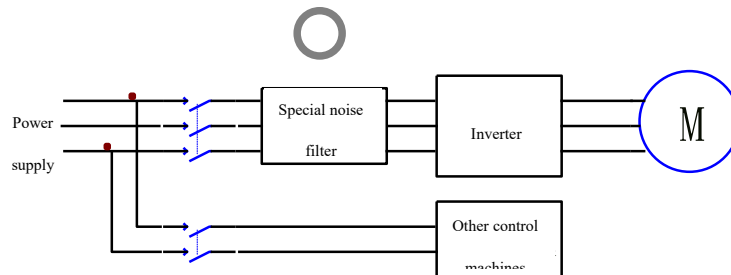


Figure 4-2 Correct setting of the power side noise filter

See Figures 4-3 and 4-4 for the incorrect setting of the power side noise filter.

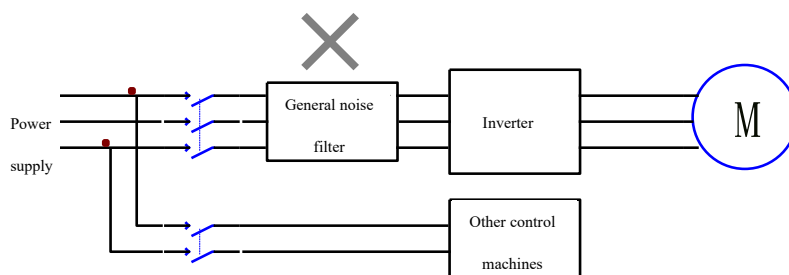


Figure 4-3 Incorrect setting 1 of the power side noise filter

The general noise filter set at the power side in Figure 4-3 may not achieve the desired effect and shall be avoided.

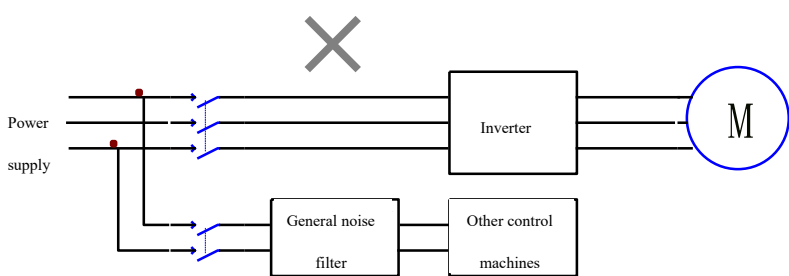


Figure 4-4 Incorrect setting 2 of the power side noise filter

The noise filter set at the receiving side in Figure 4-4 may not achieve the desired effect and shall be avoided.

Caution: The wire from the input noise filter to the input power side of the inverter shall be as short as possible.

The enclosure of the filter and the mounting cabinet shall be connected reliably in a large area to reduce the reflux impedance of the noise current I_g .

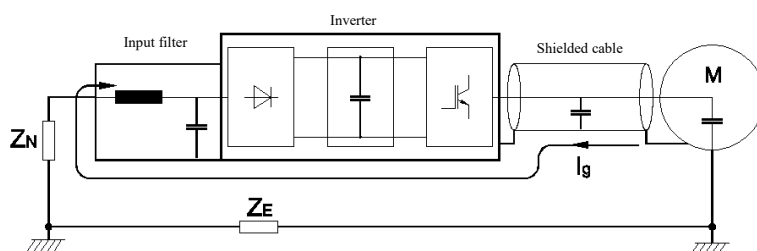


Figure 4-5 Schematic diagram of noise current of the noise filter

4.1.2.6 Input side/output side contactor

In order to protect the power supply and prevent the expansion of fault and effectively cut off the input power of the inverter in case of system fault, an electromagnetic contactor can be installed on the input side to control the on-off of the main circuit power supply to ensure safety. Do not use this contactor to control motor start and stop.

4.1.2.7 Output side interference filter

Adding an output noise filter can reduce the radio noise caused by the cable between the inverter and the motor and the leakage current of the wire.

4.2 Basic power unit wiring

4.2.1 Main circuit unit arrangement

The main circuit terminal arrangement of the basic power unit is shown in Figure 4-6.

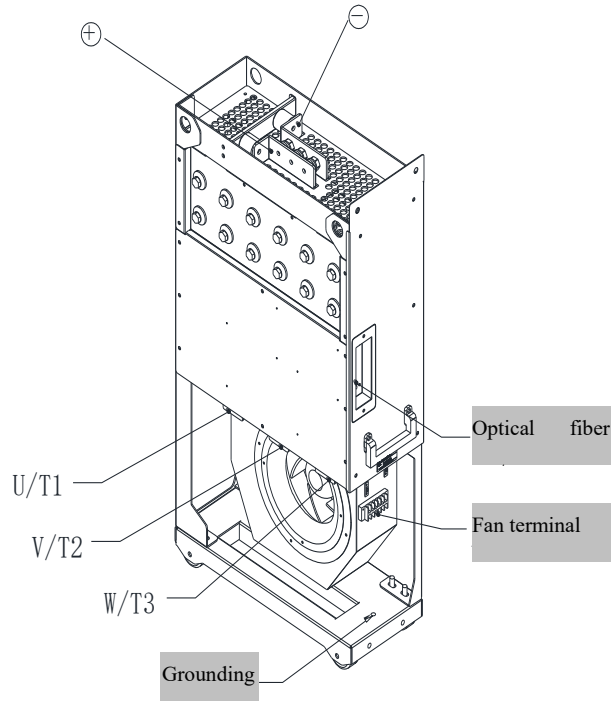


Figure 4-6 Basic power unit terminal arrangement

4.2.2 Main circuit terminal label and function description

The function description of the main circuit terminals is shown in Table 4-4.

Table 4-4 Function description of main circuit terminals

| Terminal label | Terminal function description |
|----------------|---|
| ⊕ | DC bus positive and negative terminals, common DC bus. ① DC |

| | |
|------|--|
| ⊖ | bus output when used as rectifier unit; ② DC bus input when used as inverter unit |
| U/T1 | ① Three-phase AC input when used as rectifier unit ② Three-phase AC output when used as inverter unit |
| V/T2 | |
| W/T3 | |
| ⊕ | Ground terminal, connecting the protection ground |

4.2.3 Main circuit wire specification

General rules

The model of the main power supply (input power) and motor cable is selected according to local specifications:

- The cable must be able to withstand the load current of the drive unit. Refer to the product specification for rated current.
- The cable shall withstand a temperature of at least 70°C for continuous use.
- The inductance and impedance of the PE conductor/cable (ground wire) must be selected according to the allowable contact voltage in case of fault. (In this way, the voltage at the fault point will not increase too much in the case of grounding fault).
- The 600 VAC cable can be used up to 500 VAC voltage. The rated voltage of the power cable connecting 690 VAC equipment shall be at least 1kV.
- See Table 4- 5 for the wire specification and tightening torque:

Table 4- 5 Wire specification and tightening torque

| Basic power unit model | Connectable wire specification (mm ²) | Recommended wire specification (mm ²) | Tightening torque (N.m) |
|------------------------|---|---|-------------------------|
| AS700 03 0490 T04 | 85~115(×2P) | 95×2P | 10 |
| AS700 03 0600 T04 | 125~175(×2P) | 150×2P | 10 |
| AS700 03 0700 T04 | 125~175(×2P) | 150×2P | 17 |
| AS700 03 0322 T06 | 95~135 | 120 | 10 |
| AS700 03 0367 T06 | 165~205 | 185 | 10 |
| AS700 03 0429 T06 | 85~115(×2P) | 95×2P | 10 |



Important

The open terminal is used for the main circuit of the inverter. The circular crimp terminal shall be used for the open terminal. See Table 4-6 for the selection of the circular crimp terminal:

Table 4-6 Circular crimp terminal specification

| Sectional area of wire (mm ²) | Terminal screw specification | Circular crimp terminal specification |
|---|------------------------------|---------------------------------------|
| 0.5 | M3.5 | 1.25/3.5 |
| | M4 | 1.25/4 |
| 0.75 | M3.5 | 1.25/3.5 |
| | M4 | 1.25/4 |
| 1.25 | M3.5 | 1.25/3.5 |
| | M4 | 1.25/4 |

| Sectional area of wire (mm ²) | Terminal screw specification | Circular crimp terminal specification |
|---|------------------------------|---------------------------------------|
| 2 | M3.5 | 2/3.5 |
| | M4 | 2/4 |
| | M5 | 2/5 |
| | M6 | 2/6 |
| | M8 | 2/8 |
| 3.5/5.5 | M4 | 5.5/4 |
| | M5 | 5.5/5 |
| | M6 | 5.5/6 |
| | M8 | 5.5/8 |
| 8 | M5 | 8/5 |
| | M6 | 8/6 |
| | M8 | 8/8 |
| 14 | M6 | 14/6 |
| | M8 | 14/8 |
| 22 | M6 | 22/6 |
| | M8 | 22/8 |
| 30/38 | M8 | 38/8 |
| 50/60 | M8 | 60/8 |
| | M10 | 60/10 |
| 80 | M10 | 80/10 |
| 100 | | 100/10 |
| 120 | M12 | 120/12 |
| 185 | M12 | 185/12 |
| 240 | M12 | 240/12 |
| 300 | M12 | 300/12 |
| 380 | M12 | 380/12 |



Important

Fully consider the wire voltage drop when determining the sectional area of the wire.

The general selection principle is that the voltage shall be kept within 2% of the rated voltage. The sectional area of the wire shall be increased in case of excessive voltage drop. The formula for calculating voltage drop is as follows:

$$\text{Voltage drop between wires (V)} = \sqrt{3} * \text{wire resistance } (\Omega) * \text{current (A)}$$

4.2.4 Main circuit terminal wiring details

4.2.4.1 Power supply

The inverter must be connected to the protected area. Considering the high leakage current (exceeding 3.5 mA), in order to comply with the relevant current requirements, protective grounding must be adopted.

4.2.4.2 Grounding terminal (PE)

- The grounding terminal is best connected with a special grounding electrode and must be well grounded, with the ground impedance less than 10Ω .
- Do not share the grounding wire with welding machine or other power equipment.
- The grounding wire shall be as short as possible and of the specification specified in the technical standards for electrical equipment. If the grounding wire is too far from the grounding point, the leakage current of the inverter will make the potential of the grounding terminal unstable.
- It is recommended to choose the special yellow and green ground wire. See Table 4-7 for the cross-sectional area of the ground wire.

Table 4-7 Cross-sectional area of ground wire

| Cross-sectional area of the wire at the time of installation, S(mm ²) | Minimum cross-sectional area of the corresponding ground wire, S _{min} (mm ²) |
|---|--|
| S≤16 | S |
| 16<S≤35 | 16 |
| 35<S | S/2 |

- When several inverters are grounded, it is recommended not to form a loop in order to avoid the formation of a circuit. See Figure 4-7 for the grounding method of multiple inverters.

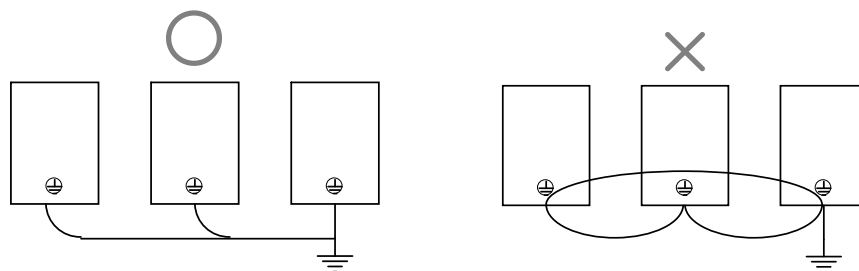


Figure 4-7 Grounding method of multiple inverters



Incorrect wiring:

If the input line voltage is applied directly to the (U/T1, V/T2, W/T3) terminals, the converter will be damaged.

Check the power connection before energizing the inverter.

To replace another inverter, make sure that all wiring to the inverter complies with all wiring instructions in this manual.

Failure to follow this manual may result in death or serious injury.

4.2.5 Basic power unit fan wiring

Figure 4-8 shows the basic power unit fan terminal wiring instructions. Allowable environment temperature 60°C, maximum power 0.1KW and voltage range 230V±10% at 50HZ. Please choose the right wire and cable according to the power consumption.

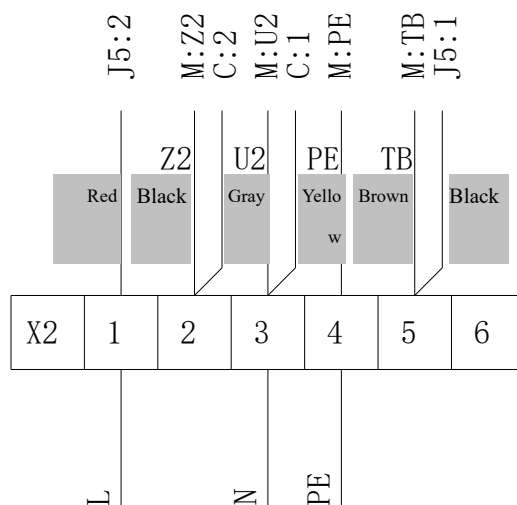


Figure 4-8 Drive unit fan terminal diagram

4.2.6 Precautions for wiring of basic power unit



Important

- a) The wiring specification shall conform to the electrical engineering standards.
- b) After wiring, be sure to check that the wiring is correct and connections are reliable. Make the following wiring inspection:
 - ◆ Whether the wiring is wrong;
 - ◆ Whether the wire chips and screws are left in the inverter;
 - ◆ Whether the screw is loose;
 - ◆ Whether the stripping bare wire at the terminal part is in contact with other terminals.
- c) The ground point PE of the basic power unit should be preferably connected with the special grounding electrode with the ground impedance less than 10Ω .
- d) The grounding cable should be as short as possible.
- e) Cut off the power first to change the wiring after power on. Since it takes a certain amount of time for the charging capacitor of the basic power unit main circuit to discharge, in order to avoid danger, it is necessary to measure the DC voltage at both ends of the charging capacitor with the DC voltmeter after the charge lamp is off, and confirm that the voltage value is less than the DC 24V safety voltage before the next step.

4.3 LCL filter wiring

4.3.1 Terminal arrangement and function description

The main circuit terminal arrangement of the LCL filter is shown in Figure 4-9.

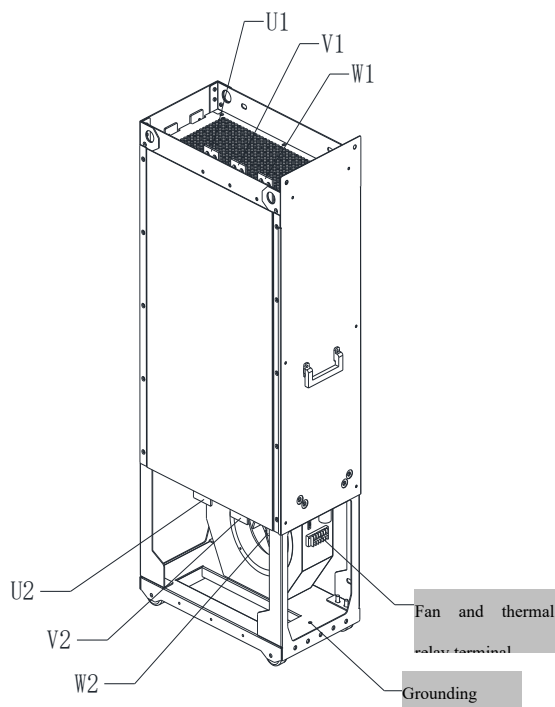


Figure 4-9 LCL filter terminal arrangement

The function description of the main circuit terminals is shown in Table 4-8.

Table 4-8 Function description of main circuit terminals

| Terminal label | Terminal function description |
|----------------|---|
| U1 | Three-phase AC input, connected with the power grid |
| V1 | |
| W1 | |
| U2 | Three-phase AC output, connected with the unit |
| V2 | |
| W2 | |
| ⊕ | Ground terminal, connecting the protection ground |

4.3.2 LCL fan wiring

Figure 4-10 shows the LCL fan terminal wiring instructions. Allowable environment temperature 60°C, maximum power 0.1KW and voltage range 230V±10% at 50HZ. Please choose the right wire and cable according to the power consumption. The maximum voltage of LCL temperature controlled switch is 250V and the maximum current is 4A at 50/60Hz.

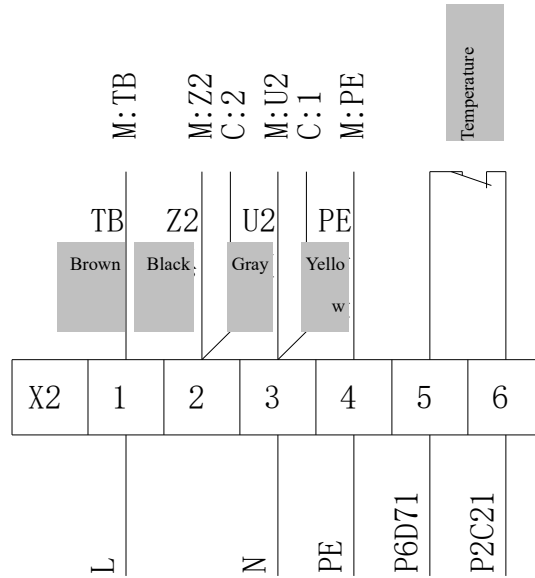


Figure 4-10 LCL fan terminal diagram

4.4 AS.CN/A control unit terminal wiring

4.4.1 Terminal arrangement and label description

See Figure 4-11 for the control circuit terminal arrangement.

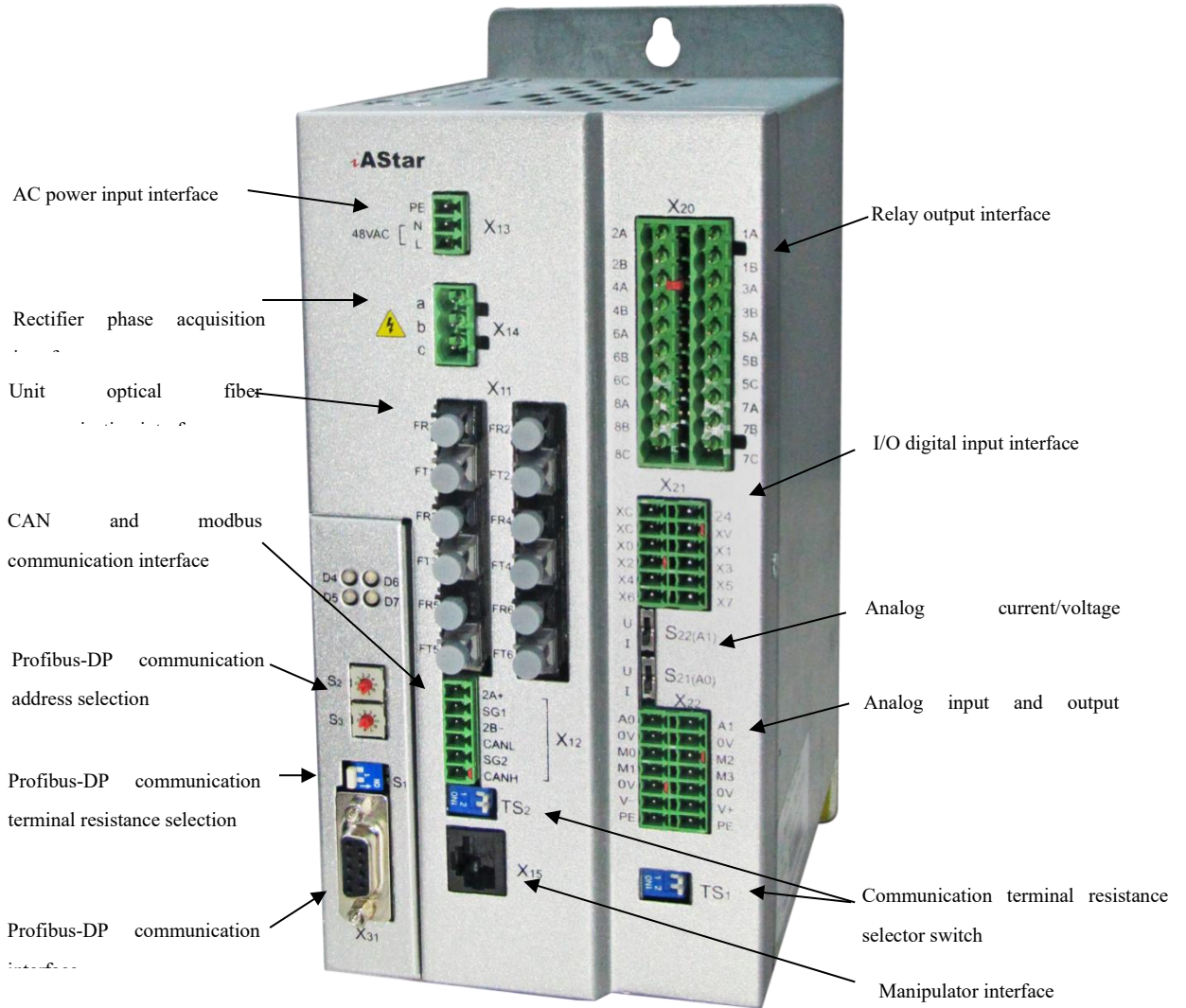


Figure 4-11 Terminal arrangement on the front of control box

Note: S21 and S22 analog current/voltage selection switching, I for current and U for voltage.

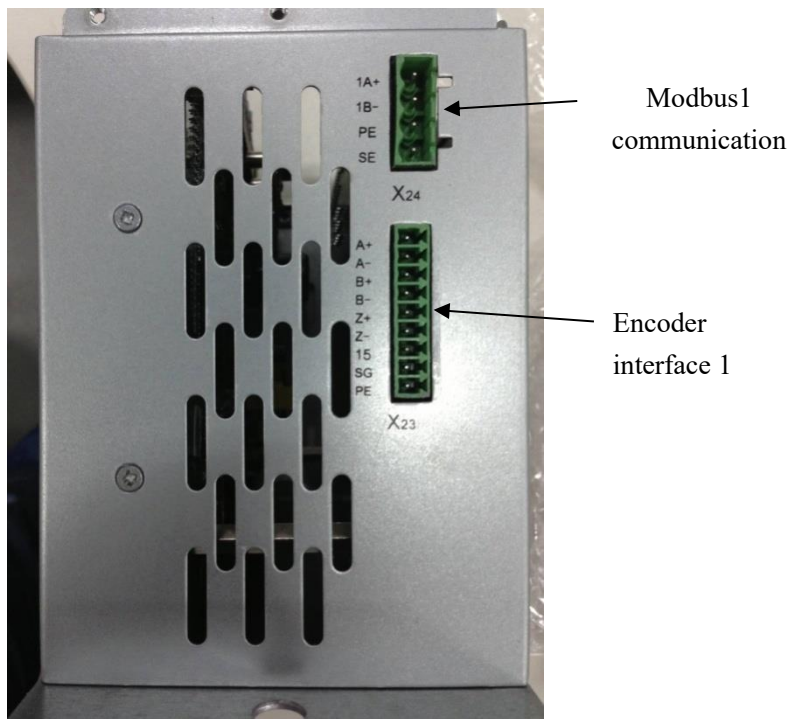


Figure 4-12 Terminal arrangement on the bottom end face of control box

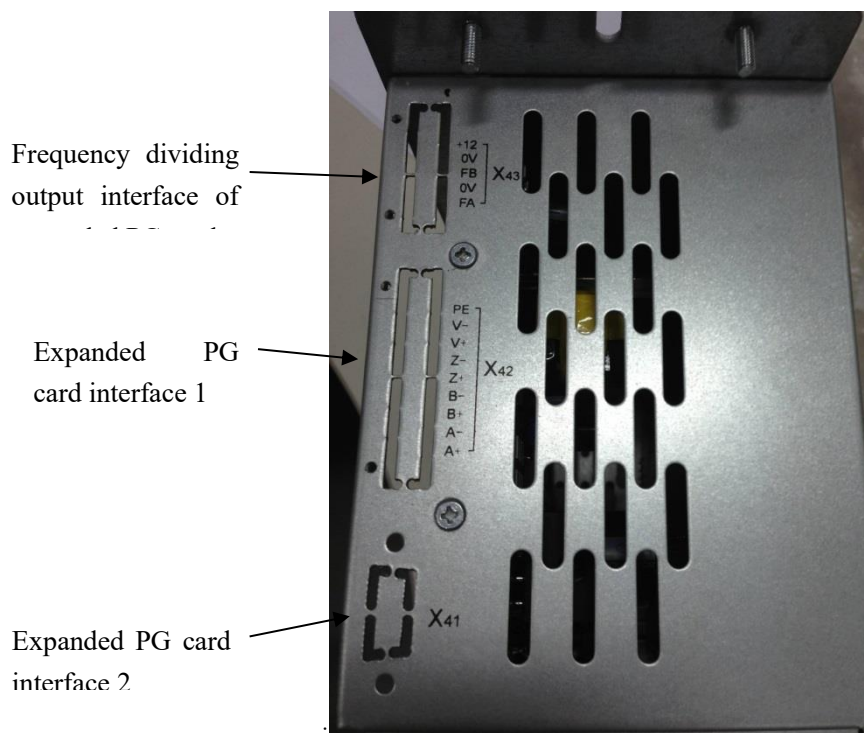


Figure 4-13 Terminal arrangement on the upper end face of control box



Figure 4-14 Insertion position diagram of anybus card and expanded PG card

4.4.2 AFE control circuit terminal function description

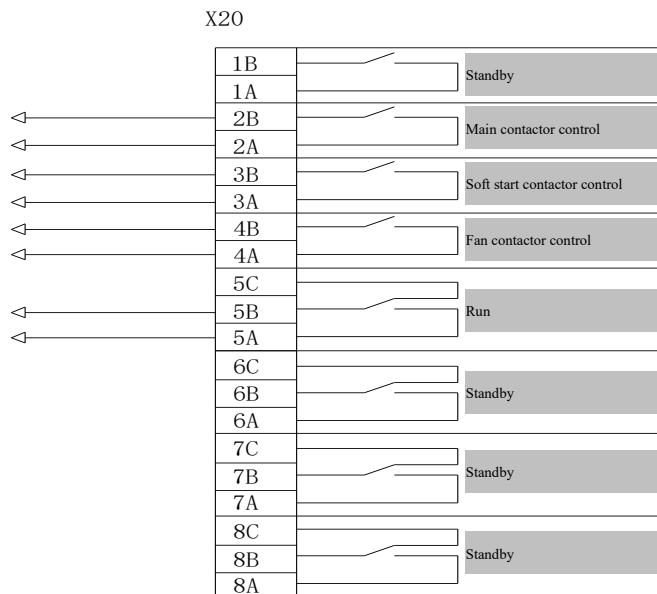
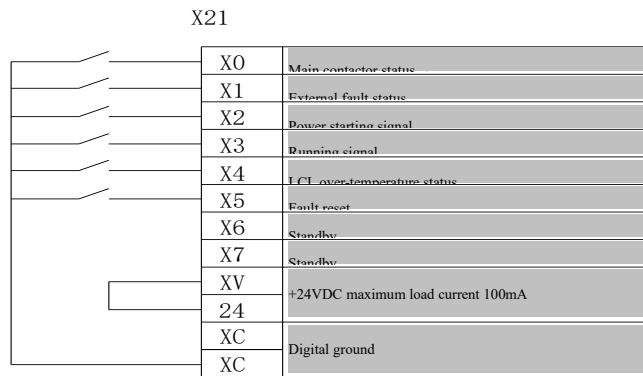


Figure 4-15 Rectifier control circuit terminal function description

4.4.3 Inverter drive control circuit terminal function description

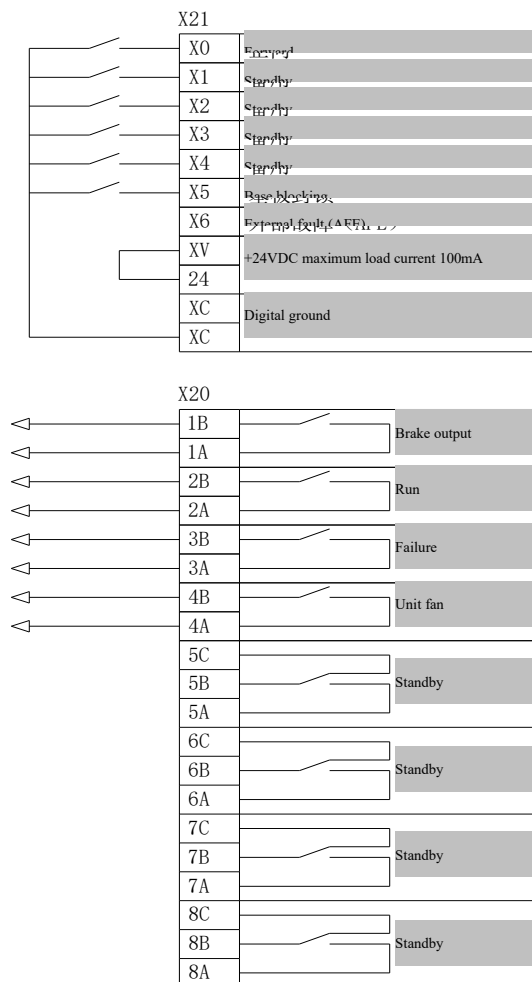


Figure 4-16 Inverter drive control circuit terminal function description

4.4.4 Technical specification of control circuit terminal

Table 4-9 Technical specification of control circuit terminal

| Name | Terminal label | Signal name | Remark | | | | |
|----------------------------|----------------|--|---|-----------------------|--------|--------------|-------|
| Digital input terminal X21 | X0 | Multifunction input 0 (function code P30.00) | Contact input. The input signal is valid when the contact is closed. Functions are selected by the parameters of the function group with function code P30. The digital input circuit specification is as follows: | | | | |
| | X1 | Multifunction input 1 (function code P30.01) | | | | | |
| | X2 | Multifunction input 2 (function code P30.02) | | | | | |
| | X3 | Multifunction input 3 (function code P30.03) | | | | | |
| | | | <table border="1"> <tr> <td>Internal power supply</td> <td>+24VDC</td> </tr> <tr> <td>Maximum load</td> <td>100mA</td> </tr> </table> | Internal power supply | +24VDC | Maximum load | 100mA |
| Internal power supply | +24VDC | | | | | | |
| Maximum load | 100mA | | | | | | |

| Name | Terminal label | Signal name | Remark | | |
|----------------------------|------------------------------|---|--|---|--|
| | X4 | Multifunction input 4 (function code P30.04) | <table border="1" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;">current</td> <td style="width: 50%;"></td> </tr> </table> | current | |
| | current | | | | |
| | X5 | Multifunction input 5 (function code P30.05) | | | |
| | X6 | Multifunction input 6 (function code P30.06) | | | |
| | X7 | Multifunction input 7 (function code P30.07) | | | |
| | 24 | Internal +24VDC power output | | | |
| | XV | Input signal common terminal | | | |
| XC | Internal 24V power supply 0V | | | | |
| Analog output terminal X22 | A0 | Multifunction analog input 0 (Function code P32.01) | Input analog voltage/current signal: Analog voltage input: -10V~+10V or 0~10V, $R_{in}=34k\Omega$ Or Analog current input: 0~20mA or 4~20mA, $R_{in}=120\Omega$ Used for analog speed given signal input. (Note: a selector switch is used for switching, and the specific operation is illustrated in Figure 4-11) | | |
| | A1 | Multifunction analog input 1 (Function code P32.07) | | | |
| | V+ | +10V power output | | +10VDC power output terminal for analog input, maximum allowable current 20mA | |
| | V- | -10V power output | | -10VDC power output terminal for analog input, maximum allowable current 20mA | |
| | 0V | Analog input signal reference ground | | Analog input signal reference ground | |
| | PE | Shielded ground | | Shielded ground | |
| | Analog output terminal X22 | M0 | | Programmable analog output 0 (Function code P33.00) | Analog voltage output: -10V~+10V or 0~10V, $R_L \geq 1k\Omega$ Used for monitoring output |
| M1 | | Programmable analog output 1 (Function code P33.03) | | | |
| M2 | | Programmable analog output 2 (Function code P33.06) | Analog current output: 0~20mA or 4~20mA, $R_L \leq 500\Omega$ Used for monitoring output | | |
| M3 | | Programmable analog output 3 (Function code P33.09) | | | |
| 0V | | Analog output signal reference ground | Analog output signal reference ground | | |
| PE | | Shielded ground | Shielded ground | | |

| Name | Terminal label | Signal name | Remark | | | | | | | | | |
|------------------------------------|---|---|--|------|-------------|----------------|---------------------------------|--------------------------------------|-----------------------------------|-------------------------------|----------------|------------|
| Relay output terminal X20 | 1A 1B | Programmable relay output 0 (Function code P31.00) Normally open contact | The programmable relay output function can be selected by the parameters of function code P31 group. The contact specification is as follows: <table border="1"> <thead> <tr> <th>Item</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Rated capacity</td> <td>Inductive: 1.5A/250VAC</td> </tr> <tr> <td>Switching frequency 120 times/min</td> <td>Fault rate P level 10mA/5V</td> </tr> <tr> <td>Actuation time</td> <td>Below 10ms</td> </tr> </tbody> </table> | Item | Description | Rated capacity | Inductive: 1.5A/250VAC | Switching frequency 120 times/min | Fault rate P level 10mA/5V | Actuation time | Below 10ms | |
| | Item | Description | | | | | | | | | | |
| | Rated capacity | Inductive: 1.5A/250VAC | | | | | | | | | | |
| | Switching frequency 120 times/min | Fault rate P level 10mA/5V | | | | | | | | | | |
| | Actuation time | Below 10ms | | | | | | | | | | |
| | 2A 2B | Programmable relay output 1 (Function code P31.01) Normally open contact | | | | | | | | | | |
| | 3A 3B | Programmable relay output 2 (Function code P31.02) Normally open contact | | | | | | | | | | |
| | 4A 4B | Programmable relay output 3 (Function code P31.03) Normally open contact | | | | | | | | | | |
| | 5A 5B 5C | Programmable relay output 4 (Function code P31.04) 5A-5B: normally open contact 5B-5C: normally closed contact | The programmable relay output function can be selected by the parameters of function code P31 group. The contact specification is as follows: <table border="1"> <thead> <tr> <th>Item</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Rated capacity</td> <td>Resistive: 4.5A 250VAC/30VDC</td> </tr> <tr> <td>Inductive: 0.4A 250VAC/30VDC</td> </tr> <tr> <td>Switching frequency 120 times/min</td> <td>Fault rate P level 10mA/5V</td> </tr> <tr> <td>Actuation time</td> <td>Below 10ms</td> </tr> </tbody> </table> | Item | Description | Rated capacity | Resistive: 4.5A 250VAC/30VDC | Inductive: 0.4A 250VAC/30VDC | Switching frequency 120 times/min | Fault rate P level 10mA/5V | Actuation time | Below 10ms |
| | Item | Description | | | | | | | | | | |
| | Rated capacity | Resistive: 4.5A 250VAC/30VDC | | | | | | | | | | |
| | | Inductive: 0.4A 250VAC/30VDC | | | | | | | | | | |
| Switching frequency 120 times/min | Fault rate P level 10mA/5V | | | | | | | | | | | |
| Actuation time | Below 10ms | | | | | | | | | | | |
| 6A 6B 6C | Programmable relay output 5 (Function code P31.05) 6A-6B: normally open contact 6B-6C: normally closed contact | | | | | | | | | | | |
| 7A 7B 7C | Programmable relay output 6 (Function code P31.06) 7A-7B: normally open contact 7B-7C: normally closed contact | | | | | | | | | | | |
| 8A 8B 8C | Programmable relay output 7 (Function code P31.07) 8A-8B: normally open contact 8B-8C: normally closed contact | | | | | | | | | | | |
| Modbus1 Communication Terminal X24 | 1A+ | Modbus communication signal+ | TS1 ON: monitor the valid state of terminal resistor OFF: monitor the invalid state of terminal resistor | | | | | | | | | |
| | 1B- | Modbus communication signal - | | | | | | | | | | |
| | PE | Protected ground | | | | | | | | | | |
| | AE | Signal ground | Modbus communication signal ground | | | | | | | | | |
| Modbus2 Communication Terminal X12 | 2A+ | Modbus communication signal+ | TS2: Modbus ON: monitor the valid state of terminal resistor OFF: monitor the invalid state of terminal resistor | | | | | | | | | |
| | 2B- | Modbus communication signal - | | | | | | | | | | |

| Name | Terminal label | Signal name | Remark |
|-----------------------------|----------------|--|---|
| | SG1 | Signal ground | |
| CAN communication X12 | CANL | Can communication L | TS2: CAN ON: monitor the valid state of CAN terminal resistor OFF: monitor the invalid state of CAN terminal resistor |
| | CANH | Can communication N | |
| | SG2 | Signal ground | |
| Power input X13 | PE | Protected ground | Supply voltage input 48VAC±10%, 50Hz, power consumption 30W |
| | N | AC 48V power input N | |
| | L | AC 48V power input L | |
| Phase acquisition input X14 | R | Three-phase AC acquisition input R phase | |
| | S | Three-phase AC acquisition input S phase | |
| | T | Three-phase AC acquisition input T phase | |
| Fiber interface X11 | FR1 FT1 | Optical fiber 1 | |
| | FR2 FT2 | Optical fiber 2 | |
| | FR3 FT3 | Optical fiber 3 | |
| | FR4 FT4 | Optical fiber 4 | |
| | FR5 FT5 | Optical fiber 5 | |
| | FR6 FT6 | Optical fiber 6 | |
| Manipulator interface X15 | | TTL level communication interface | 1-way TTL level communication interface, used for operation panel connection |
| Expanded port X31 | | | 1-way parallel port expansion interface, supporting anybus to PROFIBUS-DP communication card |
| Encoder interface 1 X23 | A+ | Encoder A phase signal + | Standard increment PG card interface Open collector/push-pull, maximum input frequency 100kHz Voltage 15VDC, maximum output current 300mA |
| | A- | Encoder A phase signal - | |
| | B+ | Encoder B phase signal + | |
| | B- | Encoder B phase signal - | |
| | Z+ | Encoder Z phase signal + | |

| Name | Terminal label | Signal name | Remark |
|---|----------------|--|---|
| | Z- | Encoder Z phase signal - | |
| | 15 | Positive pole of encoder power supply | |
| | SG | Negative pole of encoder power supply | |
| | PE | Bonding | |
| Expanded PG card interface 1 X42 | A+ | Encoder A phase signal + | Optional increment PG card interface Open collector/push-pull, maximum input frequency 100kHz Voltage + 5VDC, + 15VDC, maximum output current 300mA |
| | A- | Encoder A phase signal - | |
| | B+ | Encoder B phase signal + | |
| | B- | Encoder B phase signal - | |
| | Z+ | Encoder Z phase signal + | |
| | Z- | Encoder Z phase signal - | |
| | V+ | Positive pole of encoder power supply | |
| | V- | Negative pole of encoder power supply | |
| | PE | Bonding | Shielded wire ground terminal |
| Expanded PG card interface 2 X41 | | AS.T024 encoder interface | Optional |
| Frequency dividing output interface of expanded PG card X43 | +12 | Power supply | Triode open-collector output (maximum output frequency 100kHz) |
| | 0V | 24V GND | |
| | FB | Frequency dividing signal output phase B | |
| | 0V | 24V GND | |
| | FA | Frequency dividing signal output phase A | |

4.4.5 Control circuit wire specification

600V voltage-proof plastic insulated copper conductor should be used for the control circuit. See Table 4-10 for the wire specification and tightening torque.

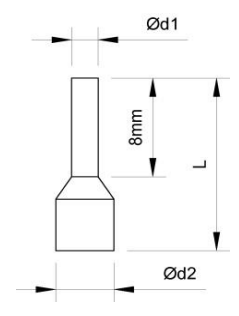
Table 4- 10 Wire specification and tightening torque

| Inverter model | Connectable wire specification mm ² | Recommended wire specification mm ² | Tightening torque (N.m) |
|----------------|--|--|-------------------------|
| AS700 series | 0.75~1 | 0.75 | 1.5 |

The wire specification is determined according to the ambient temperature of 50°C and the allowable wire temperature of 75°C.

Rod terminals are recommended for control circuit wiring. See Table 4-11 for the rod terminal specification.

Table 4-11 Rod terminal specification

| Sectional area of wire mm ² (AWG) | d1 (mm) | d2 (mm) | L (mm) | Explanatory chart |
|--|---------|---------|--------|--|
| 0.25 (24) | 0.8 | 2 | 12.5 |  |
| 0.5 (20) | 1.1 | 2.5 | 14 | |
| 0.75 (18) | 1.3 | 2.8 | 14 | |
| 1.5 (16) | 1.8 | 3.4 | 14 | |
| 2 (14) | 2.3 | 4.2 | 14 | |

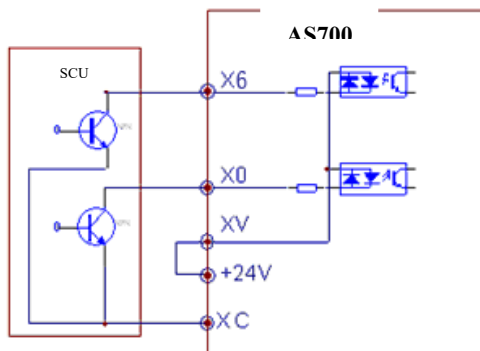
4.4.6 Control circuit terminal wiring details

4.4.6.1 Digital input terminal

Each control box has 8 multi-function digital input terminals, and the input function of each terminal can be defined by setting its function code according to the parameters of P30 group. The meanings represented by the value of each function code are shown in P30 group.

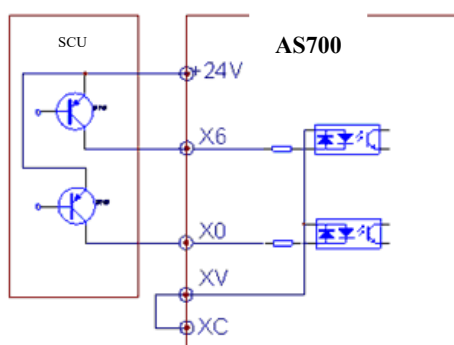
Specific wiring method:

- Use the wiring method of +24V inside the inverter and NPN sink current for external controller



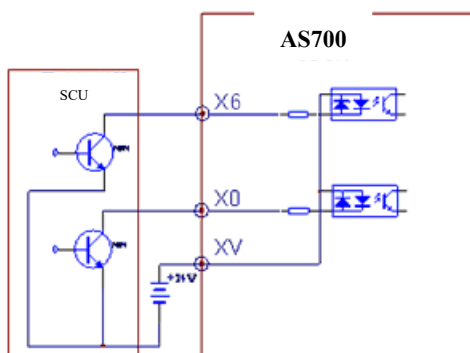
Note: A short-circuit plate is required between +24V and XV terminal

- Use the wiring method of +24V inside the inverter and PNP source current for external controller



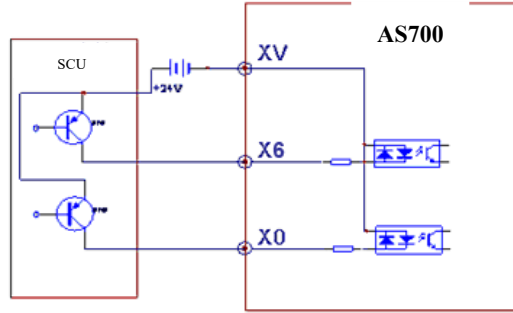
Note: Be sure to remove the short-circuit plate between +24V and XV terminals and connect it between XC and XV terminals.

- Use the wiring method of external power supply and NPN sink current for external controller



Note: Be sure to remove the short-circuit plate between +24V and XV terminals

- Use the wiring method of external power supply and PNP source current for external controller



Note: Be sure to remove the short-circuit plate between +24V and XV terminals

4.4.6.2 Analog input terminal

The inverter control box has two analog input ports, the input signal is optional: -10V ~ +10V(0 ~ +10V) or 0 ~ 20mA (4mA ~ 20mA) and the input mode is determined by the toggle switch corresponding to each port, which can be used for analog speed given signal input.

When using analog input signal, parameters such as upper limit and lower limit of each corresponding input signal and signal filtering time can also be set through P32.00 ~ P32.11 to better use the analog input port. For details, refer to Chapter 7.

When using analog signal connection, the connecting wire between the analog signal and the inverter shall be shielded wire as short as possible. The shielding layer of the shielded wire shall be grounded, as shown in Figure 4- 17.

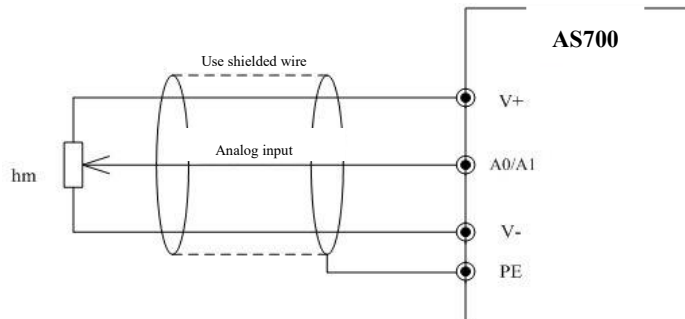


Figure 4-17 Wiring diagram of analog signal shielded wire

In most practical situations, the analog input signal can be provided by the upper controller and the wiring diagram is shown in Figure 4-18.

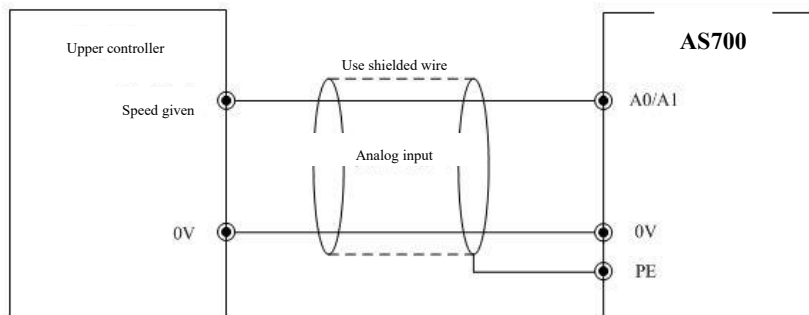


Figure 4-18 Wiring diagram of A0/A1 analog voltage signal

4.4.6.3 On-off output terminal

The control box has 8 relay outputs, and the relay contacts have two specifications. See Table 4-9 for the specifications. The output functions of each on-off output terminal can be defined by setting function code according to the parameters of P31 group. The meanings represented by the value of each function code are shown in P31 group.

4.4.6.4 Multifunction analog output terminal

The inverter control box of this frequency converter has 4 multi-function analog output outlets, among which M0 and M1 are analog voltage output, M2 and M3 are analog current output. Its output functions are defined by setting parameters P33.00, P33.03, P33.06 and P33.09. Each data represents its corresponding output point (P33.00 corresponds to M0 output point, P33.03 to M1 output point, P33.06 to M2 output point, and P33.09 to M3 output point). For details, refer to Chapter 7.

4.4.7 Accessories

PG cards are available in 2 types to accommodate different types of encoders, as shown in Table 4-12 below.

Table 4-12 Encoder adaption table

| PG card type | Motor type | Model | Input signal | Remark |
|-----------------|--------------------------|---------|-----------------------------|---------------|
| ABZ incremental | Asynchronous/synchronous | AS.T025 | Open collector signal | AS.T025 (12V) |
| | | AS.T041 | Push-pull signal | AS.T041 (5V) |
| SIN/COS | Synchronous | AS.T024 | SIN/COS differential signal | |

4.4.7.1 ABZ incremental PG card

The ABZ incremental PG card (model: AS.T025) can receive output signals from two encoders and can be equipped with encoders with open collector or push-pull signals.

■ Terminal arrangement of ABZ incremental PG card

The terminal arrangement of ABZ incremental PG card (model AS.T025) is shown in Figure 4-19.

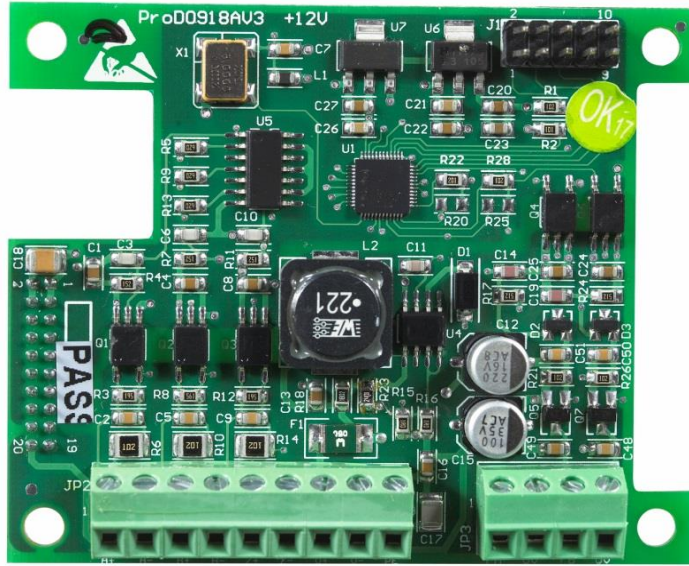


Figure 4-19 Terminal arrangement of ABZ incremental PG card

■ Terminal label of ABZ incremental PG card

The terminal label of ABZ incremental PG card is as follows:

JP3 frequency dividing output terminal:

| | | | |
|----|----|----|----|
| FA | V0 | FB | V0 |
|----|----|----|----|

JP2 input terminal:

| | | | | | | | | |
|----|----|----|----|----|----|----|----|----|
| A+ | A- | B+ | B- | Z+ | Z- | V+ | V- | PE |
|----|----|----|----|----|----|----|----|----|

■ Function description of ABZ incremental PG card terminals

The function description of the ABZ incremental PG card terminals is shown in Table 4-13:

Meter 4-13 Function description of ABZ incremental PG card terminals

| Name | Pin No. | Terminal label | Terminal function description | Specification |
|----------------------------------|---------|----------------|--|---|
| Frequency dividing signal output | JP3.1 | FA | Frequency dividing signal output phase | Triode open-collector output (maximum output frequency 100kHz); |
| | JP3.2 | 0V | 24V GND | |
| | JP3.3 | FB | Frequency dividing signal output phase | |
| | JP3.4 | 0V | 24V GND | |
| Encoder input | JP2.1 | A+ | Encoder A phase | Open collector/push-pull, maximum input frequency 100kHz |
| | JP2.2 | A- | Encoder A phase | |
| | JP2.3 | B+ | Encoder B phase | |
| | JP2.4 | B- | Encoder B phase | |
| | JP2.5 | Z+ | Encoder Z phase | |

| Name | Pin No. | Terminal label | Terminal function description | Specification |
|------|---------|----------------|-------------------------------|--|
| | JP2.6 | Z- | Encoder Z phase | |
| | JP2.7 | V+ | Positive pole of | Voltage 12VDC, maximum output current 300mA |
| | JP2.8 | V- | Negative pole of | |
| | JP2.9 | PE | Bonding | Shielded wire ground terminal |

■ **ABZ incremental PG card input terminal and encoder output signal wiring**

The ABZ incremental PG card can receive both PNP and NPN open-collector output encoder signals.

Wiring with NPN encoder is shown in Figure 4-20:

Note: PE is the grounding terminal of the inverter enclosure.

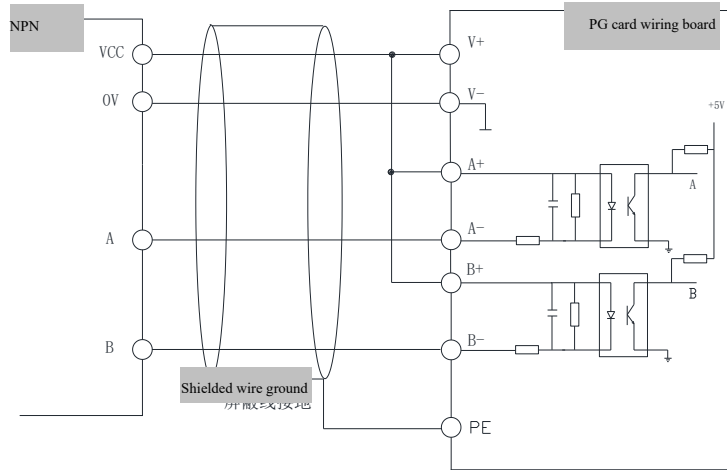


Figure 4- 20 Wiring with NPN encoder

Wiring with PNP encoder is shown in Figure 4-21:

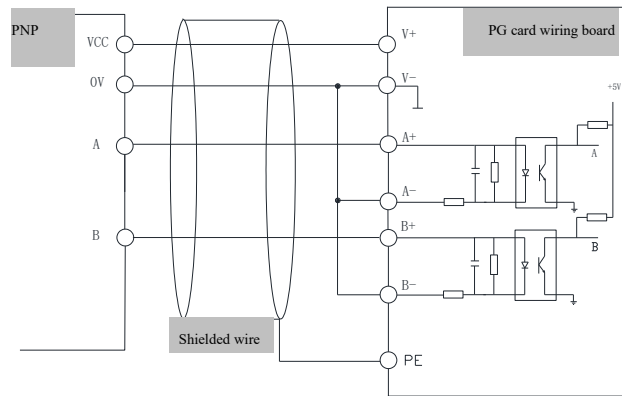


Figure 4- 21 Wiring with PNP encoder

4.4.7.2 SIN/COS PG card

The SIN/COS PG card (model AS.T024) can receive SIN/ COS differential output signals from the encoder and can be equipped with an encoder with SIN/COS differential output signals.

■ Terminal arrangement of SIN/COS PG card

The terminal arrangement of SIN/COS PG card is shown in Figure 4-22.

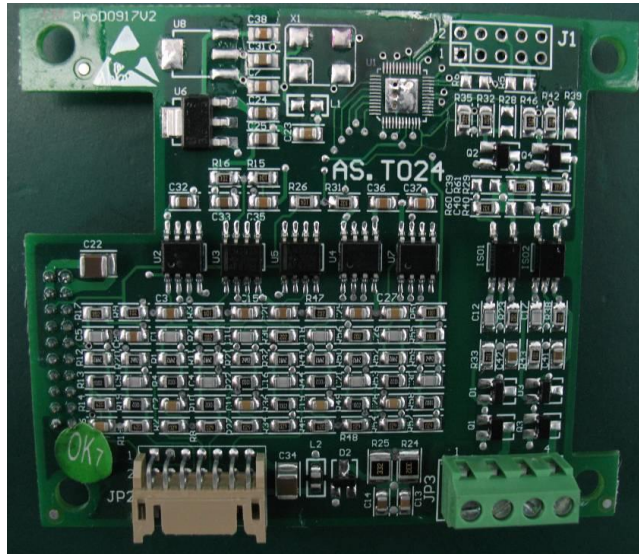


Figure 4-22 Terminal arrangement of SIN/COS PG card (AS.T024)

■ **Terminal label of SIN/COS PG card**

The terminal label of SIN/COS PG card (AS.T024) is as follows:

JP3 Terminal label

| | | | |
|----|----|----|----|
| FA | V0 | FB | V0 |
|----|----|----|----|

JP2 Terminal label (14-pin socket)

| | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| NC | NC | R- | R+ | B- | B+ | A- | A+ | NC | NC | NC | NC | 0V | V+ |

■ **Function description of SIN/COS PG card terminals**

The function description of the SIN/COS PG card (model AS.T024) terminals is shown in Table 4-14.

Table 4-14 Function description of SIN/COS PG card terminals

| Name | Terminal label | Terminal function description | Specification |
|------------------------------|----------------|---|---|
| Open collector Signal Output | FA | Frequency dividing signal output phase A | Triode open-collector output (maximum output frequency 100kHz); |
| | 0V | 24V GND | |
| | FB | Frequency dividing signal | |
| | 0V | 24V GND | |
| Encoder input | A+,A- | Encoder A phase signal | Differential signal, maximum input frequency 100kHz; |
| | B+,B- | Encoder B phase signal | |

| | | | |
|--|-------|------------------|------------------------------|
| | R+,R- | Encoder Z Signal | |
| | V+ | +5V | Maximum output current 300mA |
| | 0V | +5V GND | |

■ **SIN/COS PG card input terminal and encoder output signal wiring**

The SIN/COS PG card can receive the differential output signal from SIN/COS encoder. Wiring with the encoder is shown in Figure 4-23.

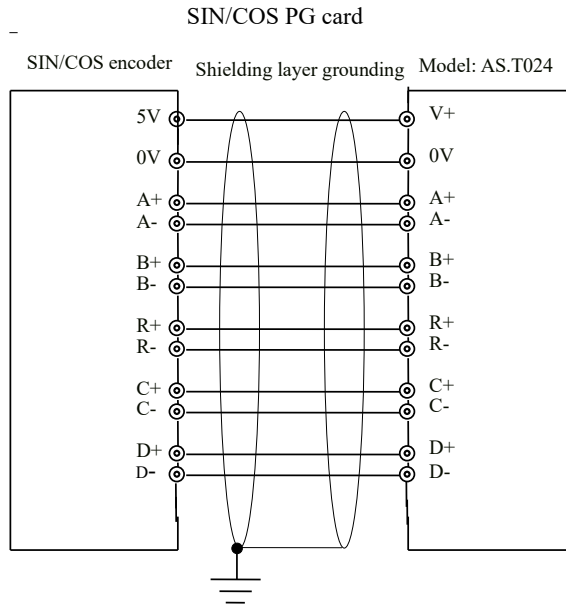


Figure 4-23 Wiring with differential output signal from SIN/COS encoder

4.4.7.3 Precautions for wiring of PG card terminals



Important

The encoder signal lines must be arranged separately from the main circuit and other power lines. Close parallel lines are strictly prohibited. The shielded wires shall be used for the encoder wiring and the shielding layer of the shielded wires is clamped in the enclosure ground PE.

4.4.7.4 Other precautions for wiring

The wiring of the control terminals must be kept away from the power line of the main circuit, or it may cause malfunction due to electromagnetic interference.

4.5 Control transformer wiring

The transformer capacity is 2KVA or 4KVA, the input voltage is 380V or 690V and the output voltage is 220V. Figure 4-24 shows the wiring instructions of the transformer terminals. Please choose the right wire and cable according to the power consumption.

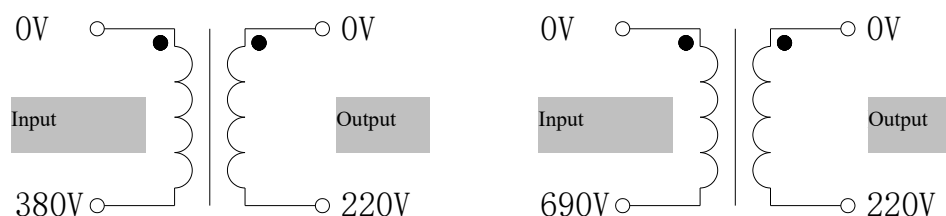


Figure 4-24 Transformer terminal diagram

4.6 Wiring of phase acquisition box

Figure 4-25 shows the terminal wiring instructions of the phase acquisition box. A, B and C must be connected one-to-one with the three-phase input of the main circuit. Please choose the right wire and cable according to the power consumption.



Figure 4-25 Phase acquisition box terminal diagram

| Terminal label | Terminal function description |
|----------------|-------------------------------|
| X1:A | Input phase A |
| X1:B | Input phase B |
| X1:C | Input phase C |
| X2:a | Connect to control box X14 |
| X2:b | |
| X2:c | |

4.7 Anti-interference measures

4.7.1 Special noise filter connected at output side

In order to suppress the noise produced by the output side of the inverter, a special noise filter can be connected to the output side of the inverter. See Figure 4-26 for the wiring of the noise filter at the inverter output side.

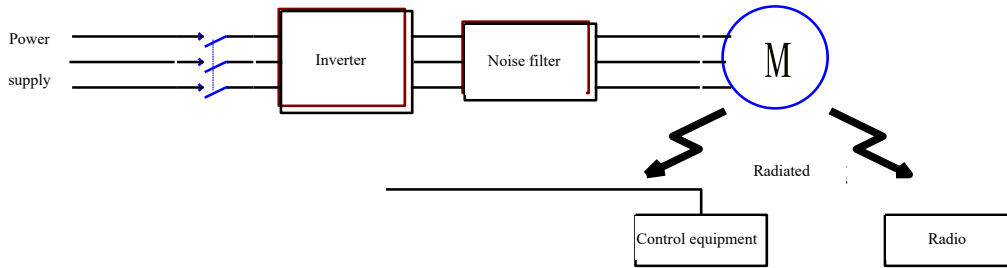


Figure 4-26 Wiring of the noise filter at the inverter output side

4.7.2 Surge suppressor connected at output side

When the inverter is connected to the inductive load equipment (electromagnetic contactor, relay, solenoid valve, etc.), be sure to use a surge suppressor on the coil of the load equipment, as shown in Figure 4-27:

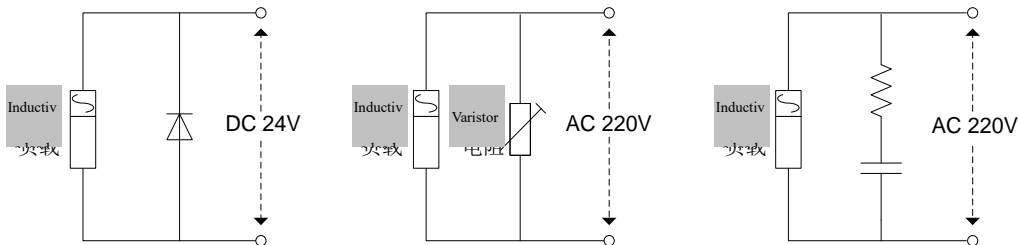


Figure 4-27 Application of inductive load surge suppressor

4.7.3 Main circuit wiring

In order to suppress the radiated interference generated from the output side of the inverter and enhance the anti-interference performance, there should be enough distance between them as far as possible, especially when the cables are installed in parallel and extend for a long distance. When the signal cable must pass through the power cable, it shall pass through the power cable vertically. See Figures 4-28 and 4-29 for the main circuit wiring.

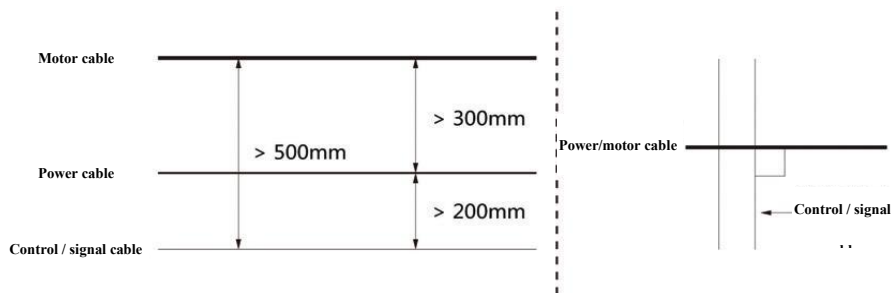


Figure 4-28 Main circuit wiring 1

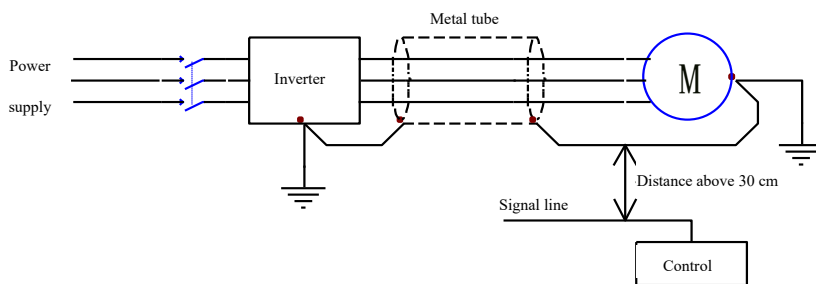


Figure 4-29 Main circuit wiring 2

Generally, the control cable must be a shielded cable, and the shielded wire mesh must be connected to the metal chassis of the inverter through the cable clamps at both ends, as shown in Figure 4-30.

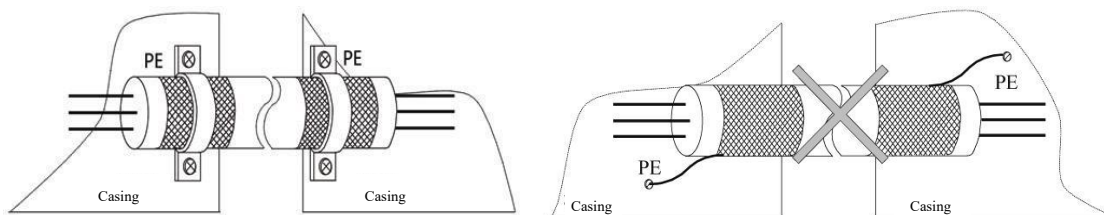


Figure 4-30 Grounding mode comparison

4.7.4 Perfect anti-interference measures

Perfect anti-interference measures are to set noise filters on both input and output sides of the inverter, and to shield the inverter body in an iron box. See Figure 4-31.

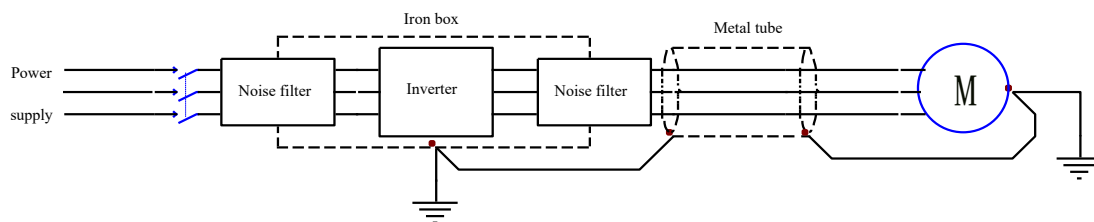


Figure 4-31 Perfect anti-interference measures

4.7.5 Relationship between wiring length and carrier frequency

Relationship between the length of the motor cable and the switching frequency: if the wiring between the inverter and the motor is too long, it will increase the high harmonic leakage current due to the influence of the distributed capacitance of the wire, which may make the output of the inverter overcurrent protection and have adverse effects on the surrounding equipment and the motor. Therefore, the wiring length between the inverter and the motor should not exceed 100 m. If the wiring length exceeds 100 m, adjust the carrier frequency parameter P71.14 according to Table 4-15, and choose the output side filter and reactor.

Table 4-15 Carrier frequency

| Wiring distance between the inverter and the motor | Below 100m | More than 100m |
|--|------------|----------------|
| Carrier frequency | Below 8kHz | Below 5kHz |

4.7.6 Optical fiber wiring precautions

The optical fiber of AFE basic power unit is connected with the AFE control box, and the optical fiber of the inverter basic power unit is connected with the inverter control box. Please be careful when installing optical fiber. Do not pull or twist it. Do not bend with radius less than 50mm. After pulling out the optical fiber, please put on the protective cap in time.

Chapter 5 Debugging and Test Run

In the following sections, the noun description related to the control, operation and state of the engineering inverter will be mentioned several times. Please read this chapter carefully before using the product so that you can understand and use the functions mentioned in the following sections.

Danger

The input power can only be closed after confirming the installation of the engineering inverter case housing. Do not remove the case housing after power-on, otherwise there is a risk of electric shock.

If the engineering inverter has been set with the power failure restart function, keep away from the mechanical transmission equipment to prevent the injuries caused by the inverter starting mechanical equipment when power is on.

Be sure to confirm the allowable application scope of the equipment before the engineering inverter starts the equipment, or there is a risk of injury.

Caution

Do not check the measuring signal during operation of the engineering inverter, or there is a risk of damage to the equipment.

Do not change the parameter setting of the engineering inverter arbitrarily, otherwise it will not achieve the proper operation effect and may damage the transmission equipment.

Be sure to switch and debug before the engineering inverter run command channel switching, or there is a risk of equipment damage and personal injury!

5.1 Operating setting

The operation panel is the basic tool for operation of the engineering inverter. It can not only observe various states and fault codes of the engineering inverter, but also set and view various parameters of the engineering inverter. This section describes in detail the basic operating methods of the operation panel.

5.1.1 Engineering inverter run command channel

It specifies the physical channels through which the engineering inverter accepts the run command: Start, Stop, etc. There are three types of run command channels:

Operation panel: control with RUN, STOP/RESET and LOC/REM on the control panel;

Control terminal: control with the control terminals X0~X7 (digital) and A0~A1 (analog);
Communication port: the upper computer controls start/stop through Modbus/Profibus-DP communication.

The selection of command channels can be set by function code P10.01.

Note: Be sure to switch and debug before the command channel switching, or there is a risk of equipment damage and personal injury!

5.1.2 Operating state of engineering inverter

The operating state of engineering inverter is divided into halt state and running state. Halt state: in case of no run command input or in the case of halt command during running after power-on initialization, the engineering inverter enters the halt state.

Running state: the engineering inverter enters the running state after receiving a run command.

5.2 Operation guide

The operation panel is the basic tool for operation of the engineering inverter. It can not only observe various states and fault codes of the engineering inverter, but also set and view various parameters of the engineering inverter. This section describes in detail the basic operating methods of the operation panel.

Through the operation panel, the user can:

- Monitor the operating state of engineering inverter
- Check and respond to fault or alarm
- Set and modify parameters
- Switch between local mode and remote mode

5.2.1 Introduction to functions of each part of operation panel

See Table 5-1 for the name and function of each part of Operation panel.

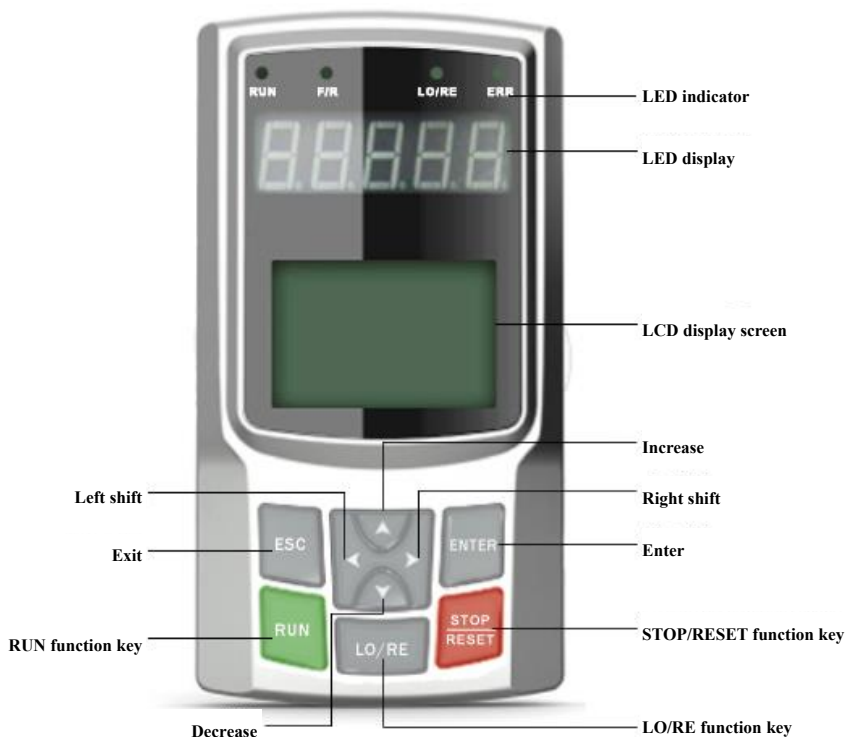


Figure 5- 1 Function of operation panel

5.2.2 LED indicator

There are four LED indicators at the top of the Operation panel, which are RUN, F/R (forward/reverse), LO/RE (local/remote) and ERR (fault light). In the old version of Operation panel, the indicators are D1 (Run), D2 (forward/reverse), D3 (local/remote) and D4 (fault light) respectively. These indicator lights indicate the unit status. See Table 5-1 for the indication of indicator light status.

Table 5-1 Indication of indicator running status

| Status | RUN (run) | F/R (forward/reverse) | LO/RE (local/remote) | ERR (fault) |
|-----------------|-----------|-----------------------|----------------------|-------------|
| Fault/warning | Off | Unrelated | Unrelated | Flash |
| Panel operation | On | On/off | On | Off |
| Not power on | Flash | Flash | Flash | Flash |

5.2.3 LED Nixie tube

There are 4 LEC Nixie tubes at the top of the Operation panel, which can display the content through parameter selection.

5.2.4 LCD display










In the middle of the LCD Operation panel is a liquid crystal display, which serves as the main

window to set the engineering inverter parameters, display the operating parameters and view the fault codes of the engineering inverter.

5.2.5 Keyboard

There are 9 keys at the bottom of the operation panel, with the functions shown in Table 5-2.

Table 5-2 Key functions

| Key | Name | Function |
|---|-------------------------|--|
|  | Right shift | When selecting a function, select the next function group; Move the modify (cursor) bit to the right in [Parameter settings]. |
|  | Left shift | When selecting a function, select the previous function group; When [parameter setting], move left to modify the (cursor) bit. |
|  | Increase | When selecting a function, select the previous function code; Increase the parameter in [Parameter settings]. |
|  | Decrease | When selecting a function, select the next function code; Decrease the parameter in [Parameter settings]. |
|  | Enter | Enter the function selection interface under [Monitored state]; Enter the selected function interface in the function selection interface; |
|  | Exit | Exit the [Monitored state] in the function selection interface; Exit the function selection interface in each function operation interface. |
|  | Run key | It is Run function in the local panel control (LOCAL) state; <i>Note: It is F1 function key in old version of Operation panel.</i> |
|  | Stop/fault reset key | It is Stop function in the local panel control (LOCAL) running state; It is Fault reset key in the halt state; <i>Note: It is F2 function key in old version of Operation panel.</i> |
|  | Local/remote toggle key | Toggle key between local panel control (LOCAL) mode and remote control (REMOTE) mode. <i>Note: It is F3 function key in old version of Operation panel.</i> |

5.3 Operation of LCD Operation panel

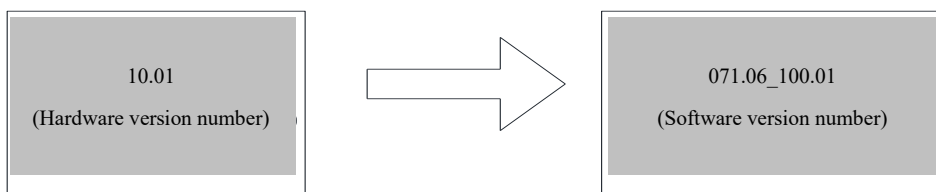
The Operation panel has three states: [Monitored state], [Function selection] and [Parameter modification]. The Operation panel menu is displayed in Chinese and English and the factory setting

is Chinese. The language may be switched to English by setting the “Language selection” parameter in the Advanced Menu to 1.

5.3.1 Power-on initialization

There is a few seconds of initialization process after the Operation panel power-on. In this process, the Operation panel LCD displays the [Version No.].

The [Boot screen] is as follows:



Note: Enter the monitored state after displaying the software version number.

5.3.2 Display after power on

Display the “Monitored state” interface 5s after power on

5.3.3 [Monitored state] details

Switch the monitored status interface by pressing and or and in the “Monitored state” interface. The real-time running data can be displayed by default in the monitored state. These data can only be displayed, and cannot be modified.

Table 5-3 Data comparison in AFE default running state

| Display | Name | Content | Setting range | Unit Bit | Delivery Setting | Remark |
|---------|-------------------------------|--|---------------|----------|------------------|--------|
| DCref | Given bus voltage | Display the set bus voltage | 600-1200 | V | 650 | |
| DCfbk | Feedback bus voltage | Display real-time bus tracking voltage | × | V | × | |
| Irms | Input current effective value | Display input current | × | A | × | |

| Display | Name | Content | Setting range | Unit Bit | Delivery Setting | Remark |
|---------|---------------------------------------|---|---------------|----------|------------------|--------|
| Urms | Effective value of grid line voltage | Display current network voltage | × | V | × | |
| Temp | Current value of radiator temperature | Display the real-time IGBT radiator temperature | × | °C | × | |
| A0 | A11 input voltage | Display the input voltage at the analog input port 1 (A0) of the rectifier feedback unit | × | V | × | |
| A1 | A12 input voltage | Display the input voltage at the analog input port 1 (A1) of the rectifier feedback unit | × | V | × | |
| DI | Input X0-X7 state | Display the state of the input terminals X0-X7. DI is displayed in the form of "XXXXXXXX", where "X" =0 means no input; "X" =1 means there is input. | × | × | × | |
| DO | Output K1-K8 state | Display the state of the output terminals K1-K8. DO is displayed in the form of "XXXXXXXX", where "X" =0 means no output; "X" =1 means there is output. | × | × | × | |

Table 5-4 Data comparison in inverter default running state

| Display | Name | Content | Setting range | Unit Bit | Delivery Setting | Remark |
|---------|-------------------|---|---------------|----------|------------------|--------|
| Vobj | Target speed | Display the target speed command value of the motor | × | Hz | × | |
| Vref | Given speed | Display the speed given command value of the motor | × | Hz | × | |
| Vfbk | Feedback speed | Display the motor feedback speed value | × | Hz | × | |
| Irms | Output current | Display the output current | × | A | × | |
| Torq | Output torque | Display the torque output value | × | % | × | |
| Tzero | Zero servo torque | Display the zero servo torque value at startup | × | % | × | |

| Display | Name | Content | Setting range | Unit Bit | Delivery Setting | Remark |
|---------|----------------------------------|---|---------------|-------------|------------------|--------|
| Udc | DC bus voltage | Display the DC voltage of the main circuit inside the inverter | × | V | × | |
| Uout | Output voltage | Display the inverter output voltage | × | V | × | |
| A0 | A0 input voltage | Display the input voltage at the analog input port 0 (A0) of the inverter | × | V | × | |
| A1 | A1 input voltage | Display the input voltage at the analog input port 1 (A1) of the inverter | × | V | × | |
| PIDRef | Process closed loop PID given | Display the current PID given value | × | V (default) | × | |
| PIDFbk | Process closed loop PID feedback | Display the current PID feedback value | × | V (default) | × | |
| DI | Input X0-X7 state | Display the state of the input terminals X0-X7. DI is displayed in the form of "XXXXXXXX", where "X" =0 means no input; "X" =1 means there is input. | × | × | × | |
| DO | Output K1-K8 state | Display the state of the output terminals K1-K8. DO is displayed in the form of "XXXXXX", where "X" =0 means no output; "X" =1 means there is output. | × | × | × | |

5.3.4 [Panel control] details

Press **LO/RE** in the “Monitored state” interface to switch between “Monitored state” and “Panel control”. In the “Panel control” state, the LED indicator LO/RE on the Operation panel will be on. At this time, press **RUN** to control the rectifier feedback unit (inverter unit) to enter the running state, and the LED indicator RUN on the operation panel will be on. Press **STOP RESET** to control the rectifier feedback unit (inverter unit) to enter the halt state and the LED indicator RUN on the operation panel



will be off. Press  and  in the “Panel control” interface to switch the monitored content. You can modify 1 panel control running parameter (given bus voltage DCref) and display 4 real-time running data in the “Panel control” interface. In the inverter part, you can modify 2 panel control running parameters (panel operation speed Vref and motor running direction Vdir) and display 4 real-time running data in the “Panel control” interface.

Table 5-5 AFE panel control data comparison

| Display | Name | Content | Setting range | Unit Bit | Delivery Setting | Remarks |
|---------|---------------------------------------|---|---------------|----------|------------------|---------|
| DCref | Given bus voltage | Display the set bus voltage | 600-1200 | V | 650 | |
| DCfbk | Feedback bus voltage | Display real-time bus tracking voltage | × | V | × | |
| Irms | Input current effective value | Display input current | × | A | × | |
| Urms | Effective value of grid line voltage | Display current network voltage | × | V | × | |
| Temp | Current value of radiator temperature | Display the real-time IGBT radiator temperature | × | °C | × | |

Table 5-6 Inverter panel control data comparison

| Display | Name | Content | Setting range | Unit Bit | Delivery Setting | Remarks |
|---------|-----------------------|--|---------------|----------|------------------|---------|
| Vref | Panel operation speed | Set the given speed of the inverter when the panel is operated | 0.00-300.00 | Hz | 5.00 | |
| Vfbk | Feedback speed | Display the motor feedback speed value | × | Hz | × | |
| Irms | Output current | Display the output current | × | A | × | |

| | | | | | | |
|------|-------------------------|--|-----|---|---|--|
| Vdir | Motor running direction | Set motor positive drive or reverse drive | 0~1 | × | 1 | |
| Udc | DC bus voltage | Display the DC voltage of the main circuit inside the inverter | × | V | × | |
| Uout | Output voltage | Display the inverter output voltage | × | V | × | |

5.3.5 Operating state of rectifier feedback unit operation panel

The operation panel has four operating states, which are [Parameter settings], [Sampling setting], [Fault checking] and [Parameter processing]. In any monitored state interface, press to enter the following function selection interface

- * 1: Parameter settings
- 2: Sampling setting
- 3: Fault checking
- 4: Parameter processing

5.3.5.1 [Parameter settings] details

The [Parameter settings] of the operation panel is used to modify the parameters. See Chapter 6 for the parameter setting range.

Select the parameter group by pressing or in [Parameter settings] state. Select the parameter code in the parameter group by pressing or . Press after selecting the parameter to be modified. A cursor indicating the modified bit appears in the parameter bit to be modified. Change the modified bit by pressing or to move the cursor. Modify the parameter value by pressing or . Press to confirm the modification is valid. The modification of the parameter is invalid if is not pressed. Press to return to the previous menu state.

5.3.5.2 [Sampling setting] state details

- 1: Parameter settings
- *2: Sampling setting
- 3: Fault checking
- 4: Parameter processing

It is used to calibrate the sensor deviation during the AFE factory test. This function is only for internal use.

5.3.5.3 [Fault checking] state details

- 1: Parameter settings
- 2: Sampling setting
- *3: Fault checking
- 4: Parameter processing

In [Fault checking] state, check the content of the recent 8 faults, and the voltage, current, given speed and feedback speed state recorded when the fault occurs. Press in the main state interface to display ER0=X and press or to change between ER0 and ER7, where ER0 represents the serial number of recent faults, ER7 represents the serial number of the farthest fault and X represents the fault code under current serial number. The fault meaning of the fault code will be displayed in Chinese below. Press again in the fault code display state to display the DC bus voltage (Udc), output current (Irms), given speed (Vref), feedback speed (Vfbk) recorded under the current fault, and then press to return to the fault code display state. Press to return to the previous menu state.

5.3.5.4 [Parameter processing] state details

- 1: Parameter settings
- 2: Sampling setting
- 3: Fault checking
- *4: Parameter processing

In [parameter processing] state, parameters can be uploaded, downloaded, initialized, and all faults can be cleared. Select the corresponding operating mode by modifying the value of X in Init = X.

Press . A cursor indicating the modified bit appears in the parameter bit X to be modified.


Press or to select the corresponding operating mode and press to confirm. There are 4 modes of parameter processing and selection, and the meaning are as follows:

- 1: Upload parameter to operation panel
- 2: Download parameter to rectifier feedback unit
- 7: Reset parameter
- 8: Reset fault

Press to return to the previous menu state.

5.3.6 Operating state of inverter unit operation panel












The operation panel has five operating states, which are [Parameter settings], [Motor setting], [Fault checking], [Parameter processing] and [Modified parameters]. In any monitored state interface, press


 to enter the following function selection interface

- *1: Parameter settings
- 2: Motor setting
- 3: Fault checking
- 4: Parameter processing
- 5: Modified parameters

5.3.6.1 [Parameter settings] details

The [Parameter settings] of the operation panel is used to modify the parameters. See Chapter 6 for the parameter setting range.


Select the parameter group by pressing  or  in [Parameter settings] state. Select the parameter code in the parameter group by pressing  or . Press  after selecting the parameter to be modified. A cursor indicating the modified bit appears in the parameter bit to be modified. Change the modified bit by pressing  or  to move the cursor. Modify the parameter value by pressing  or . Press  to confirm the modification is valid. The modification of the parameter is invalid if  is not pressed.




Press  to return to the previous menu state.

5.3.6.2 [Motor setting] state details

- 1: Parameter settings
- *2: Motor setting
- 3: Fault checking
- 4: Parameter processing
- 5: Modified parameters


Self-learn the motor (asynchronous), encoder phase angle and parameters manually in the [Motor setting] state and select corresponding self-learning style by modifying the value of X in ATun = X.

Press . A cursor indicating the modified bit appears in the parameter bit to be modified. Press

 or  to select the self-learning item and press  to confirm. There are 8 modes of







self-tuning and selection parameters, and the meanings are as follows:

- 0: Normal operation mode
- 1: Standby
- 2: Encoder correction
- 3: Encoder self-learning
- 4: Static self-learning of motor
- 5: Optimized self-learning of inverter
- 6: Static advanced learning of motor
- 7: Dynamic self-learning of editor

Press  to return to the previous menu state.

5.3.6.3 [Fault checking] state details

- 1: Parameter settings
- 2: Motor setting
- *3: Fault checking
- 4: Parameter processing
- 5: Modified parameters


In [Fault checking] state, check the content of the recent 8 faults, and the voltage, current, given speed, feedback speed state and three-phase current instantaneous values of U, V and W recorded when the fault occurs. Press  in the main state interface to display ER0=X and press  or  to change between ER0 and ER7, where ER0 represents the serial number of recent faults, ER7 represents the serial number of the farthest fault and X represents the fault code under current serial number. The fault meaning of the fault code will be displayed in Chinese below. Press  again in the fault code display stage to display the DC bus voltage (U_{dc}), output current instantaneous value (I_{rms}), current given frequency (V_{ref}), feedback frequency (V_{fbk}), U phase current instantaneous value (I_u), V phase current instantaneous value (I_v) and W phase current instantaneous value (I_w) recorded under the current fault and press  again to return to the fault code display state. Press  to return to the previous menu state.




5.3.6.4 [Parameter processing] state details

- 1: Parameter settings
- 2: Motor setting
- 3: Fault checking
- *4: Parameter processing
- 5. Modified parameters


In [parameter processing] state, parameters can be uploaded, downloaded, initialized, and all faults

can be cleared. Select the corresponding operating mode by modifying the value of X in Init = X.

Press . A cursor indicating the modified bit appears in the parameter bit X to be modified.

Press  or  to select the corresponding operating mode and press  to confirm. There are 4 modes of parameter processing and selection, and the meaning are as follows:









- 1: Upload parameter to operation panel
- 2: Download parameter to inverter
- 7: Reset parameter


Press  to return to the previous menu state.


5.3.6.5 [Modified parameters] state details

- 1: Parameter settings
- 2: Motor setting
- 3: Fault checking
- 4: Parameter processing

In the [Modified Parameters] state, you can query and modify the recently modified parameters.

Select the parameter code in the parameter group by pressing  or . Press  after selecting the parameter to be modified. A cursor indicating the modified bit appears in the parameter bit to be modified. Change the modified bit by pressing  or  to move the cursor. Modify the parameter value by pressing  or . Press  to confirm the modification is valid.

The modification of the parameter is invalid if  is not pressed.

Press  to return to the previous menu state.

5.4 AFE power-on sequence chart

Warning! The main circuit must be pre-charged before power on. Do not forcibly close the main circuit breaker before the end of charging. Start in a certain sequence, for example, charging, validation, main circuit breaker control and IGBT power module starting. It is prohibited to skip some signal detections (via jumpers) to change the starting sequence, as it may cause power unit damage.

The power-on sequence is shown in Figure 5-2:

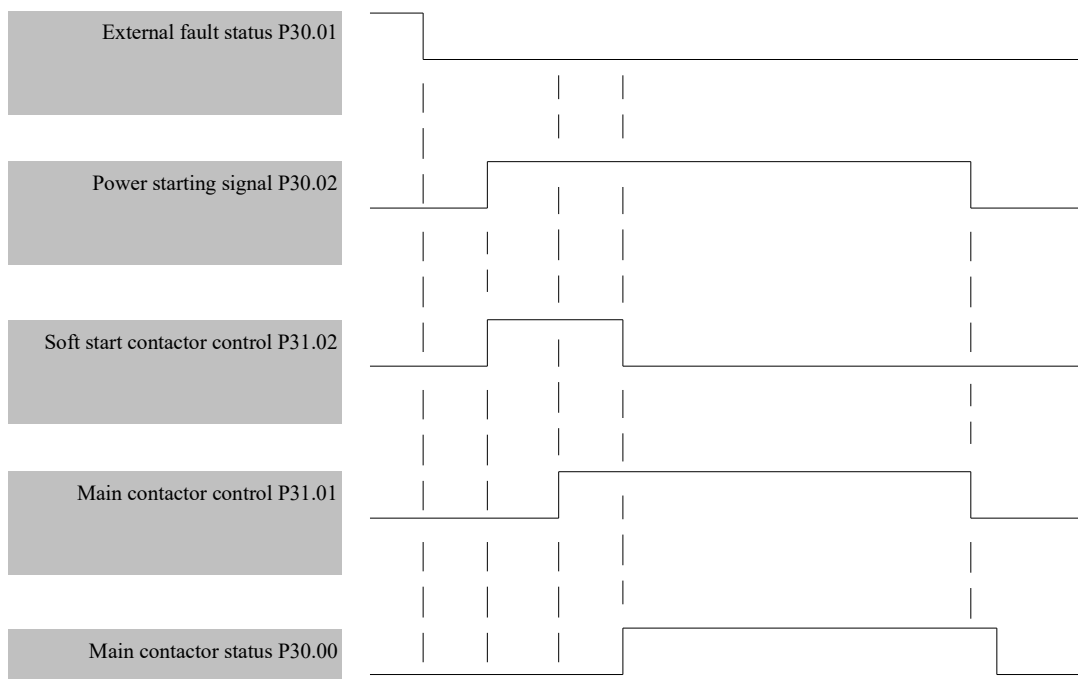
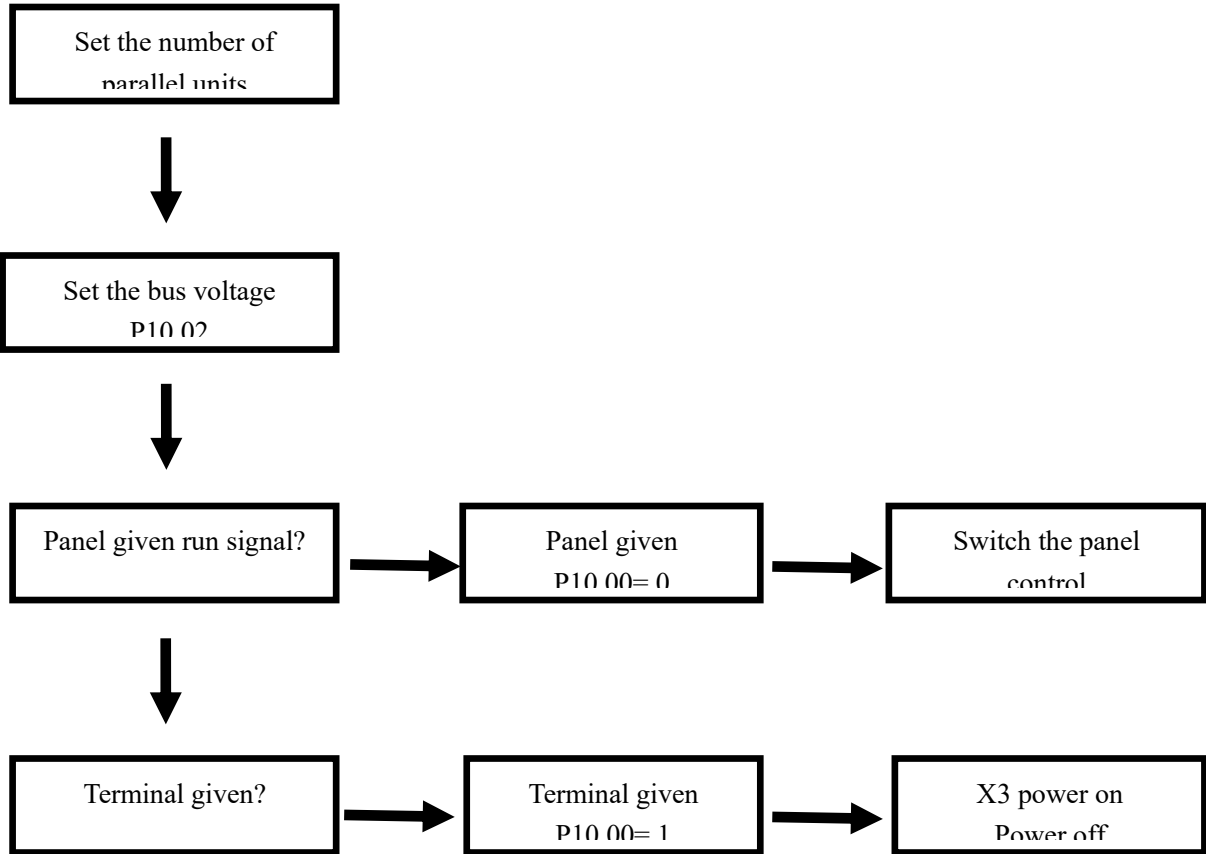


Figure 5-2 Power-on sequence chart

5.5 AFE quick debugging process





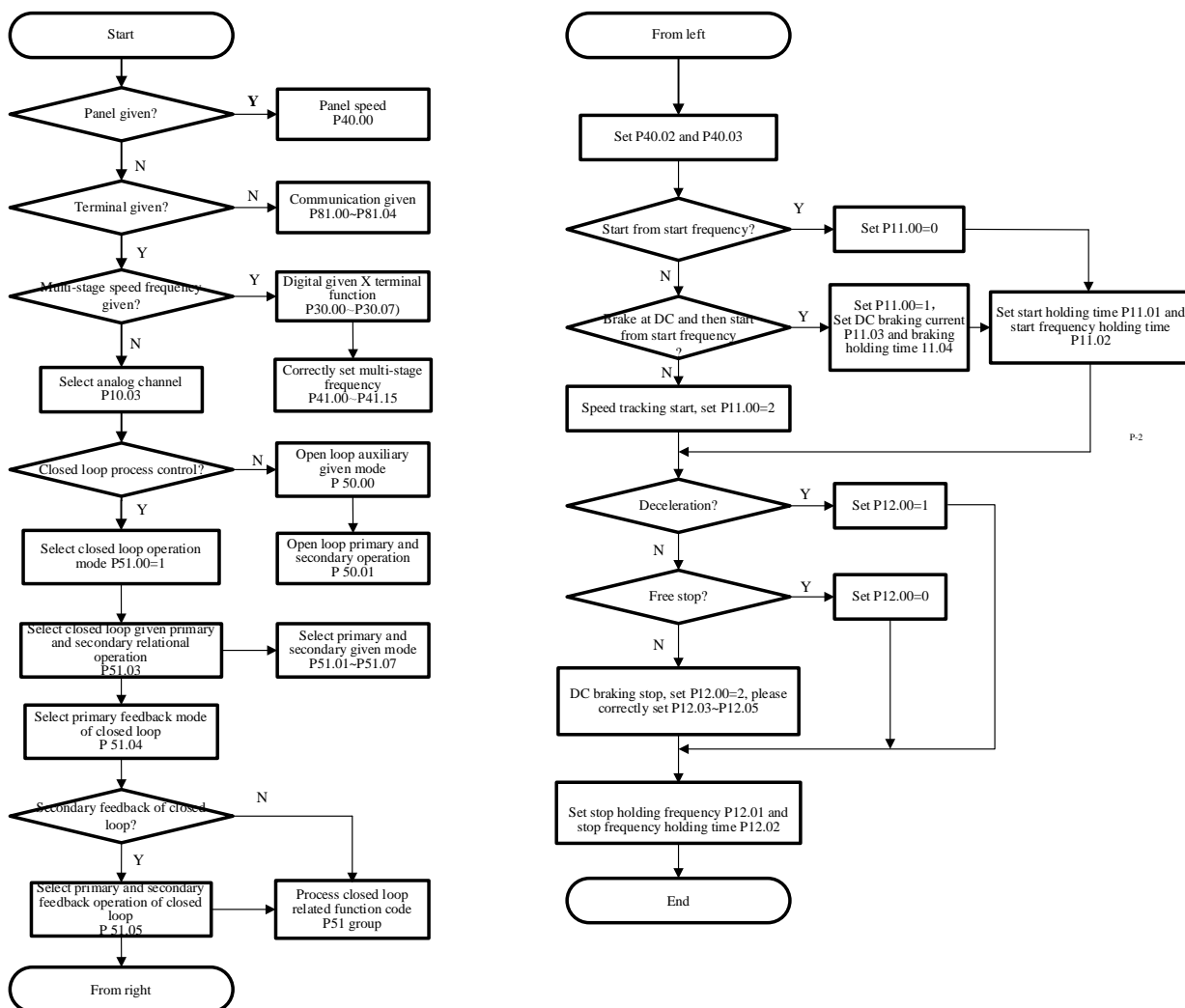
Remarks:

Sampling setting:

1. Network voltage setting - Switch on the control power, disconnect the mains power, click ENTER under the monitoring state, select 2 Sampling setting, set ATun = 1, display ATUN = 8 after self-learning, and then set ATun = 0;
2. Inductive current setting - After completing the network voltage setting, switch on the mains power and set the current without any fault in the steps similar to 1. Set ATun = 2, display ATun = 8 after self-learning and then set ATun = 0;

5.6 Quick debugging of inverter V/F control

Caution: The number of parallel units must be set before any debugging, parameter 96.17.

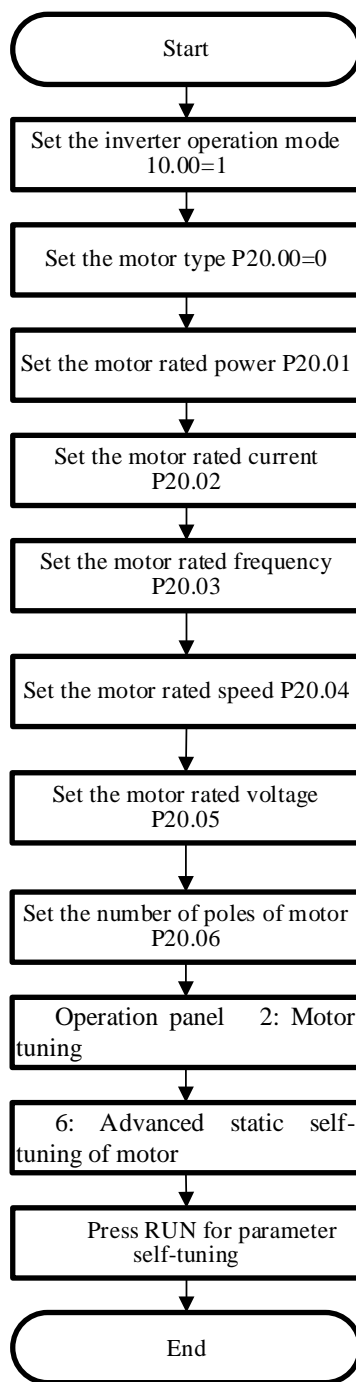


5.7 Quick debugging of inverter vector control

Caution: The number of parallel units must be set before any debugging, parameter 96.17.

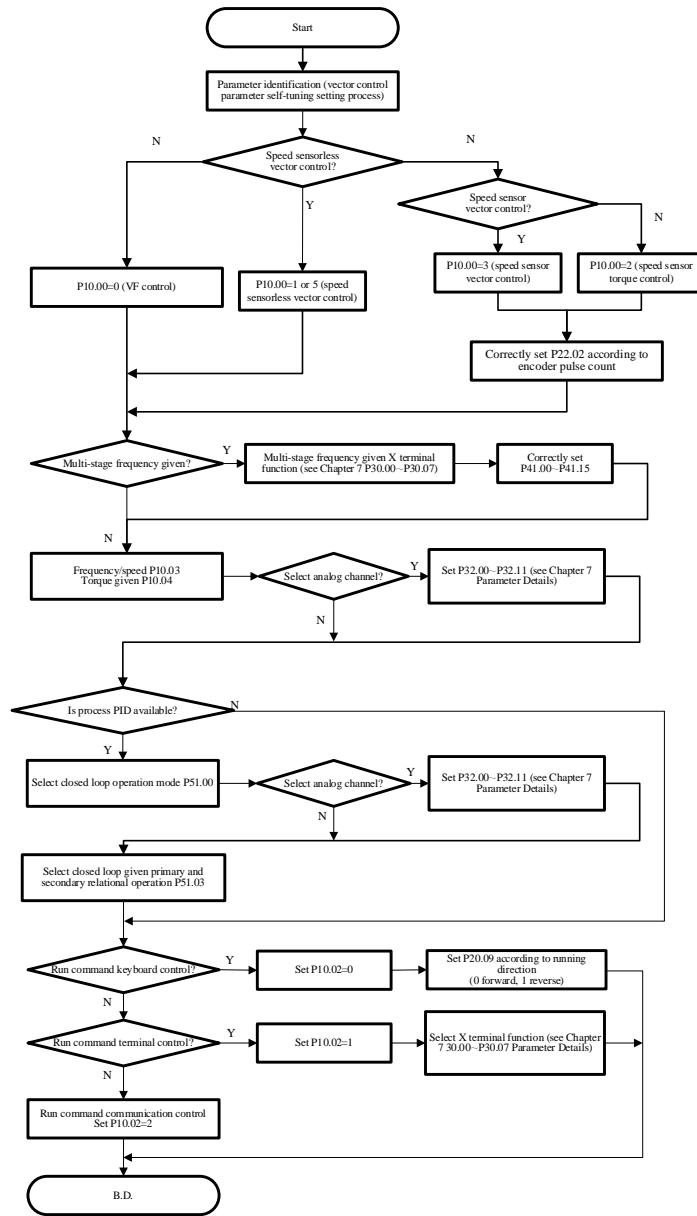
The method for quick debugging of vector control is introduced below, using vector control without PG as an example. If “vector control with PG” is used, the encoder parameters shall also be set according to the encoder parameter P22 in this manual.

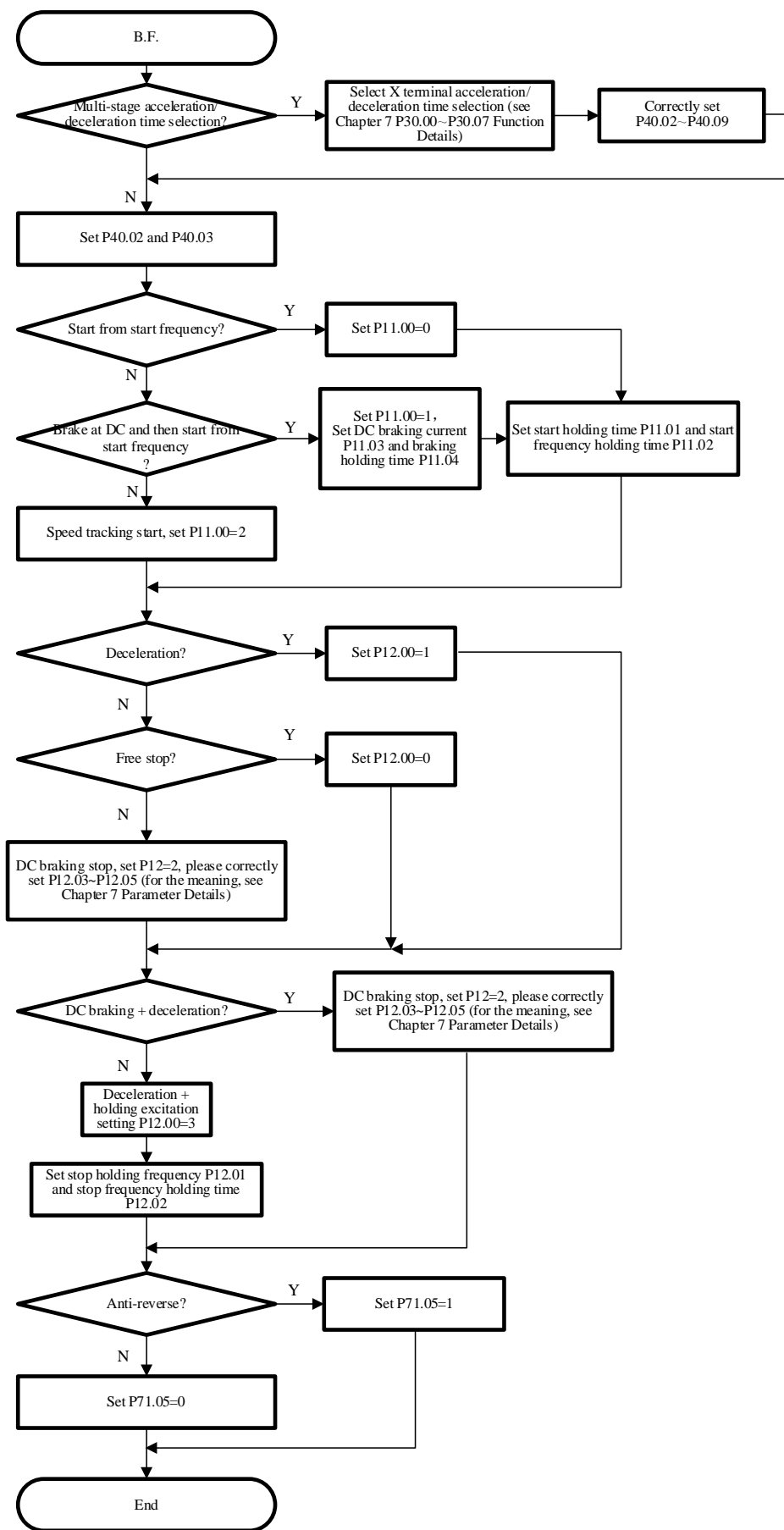
1. P20.10 “Motor no-load current coefficient”: adjust the magnetic flux intensity, so that the motor current in the vector control low-speed (non-flux weakening area) and no-load running is close to the motor no-load current;
2. Motor parameters self-tuning: For vector control, self-learning of static motor parameters is required, as follows.



Static self-tuning

3. Vector control flow. Note that in vector control, self-tuning is required.





Chapter 6 Functional Parameter Table

6.1 Function code parameter table description

| Short form field | Explanation |
|------------------|---|
| Function code | Code name of function code, e.g. P00.00 |
| Function code | Name of function code to explain the function code |
| Factory default | Set value of function code after reset to factory default (see P00.01) |
| Setting range | Minimum to maximum value of function code allowed to set |
| Unit | V: voltage; A: current; °C: degree centigrade; Ω: Ohm; mH: millihenry; rpm: speed; %: percentage; bps: Baud rate; Hz, kHz: frequency; ms, s, min, h, kh: time; kW: power; /: no |
| Attribute | ○: the function code can be modified in running; ×: the function code can be modified only in halt state; *: the function code is read-only and cannot be modified. |
| Function code | Function code parameter setting list |
| User defined | For the user to record parameters |

6.2 Short form of AFE function code parameters

6.2.1 P0X group User parameters

| P00 group Password parameters | | | | | | |
|-------------------------------|--------------------|-----------------|---------------|------|-----------|---|
| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
| P00.00 | Login password | 0 | 0~65535 | / | × | 0: no password; other: login password; |
| P00.01 | Change password | 0 | 0~65535 | / | × | 0: no password; other: password protection; |
| P00.02 | Standby password | 0 | 0~65535 | / | × | Standby |

6.2.2 P1X group Control parameters

6.2.2.1 P10 group Basic control parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--------------------------------|-----------------|---------------|------|-----------|---|
| P10.00 | Command channel selection | 0 | 0~3 | / | × | 0: Panel given run command |
| | | | | | | 1: Terminal given run command |
| | | | | | | 2: CAN given command |
| | | | | | | 3: MODBUS given command |
| P10.01 | Operation mode | 0 | 0~1 | / | × | 0: normal operation |
| | | | | | | 1: Sensor self-learning |
| P10.02 | Given bus voltage | 650 | 600~1200 | V | × | Given bus voltage |
| P10.03 | Active given channel selection | 0 | 0~1 | / | × | 0: Voltage loop given active |
| | | | | | | 1: CAN given active |
| P10.04 | Reactive compensation | 0 | 0~120.00 | % | × | Reactive compensation |
| P10.05 | Reactive channel selection | 0 | 0~4 | / | × | Reactive common given |
| P10.06 | Active current given | 0 | 0~120.00 | % | × | Active current given value |
| P10.07 | Test instruction | 0 | 0~1 | / | × | Drive test |
| P10.08 | Confirmed number of fan faults | 10 | 0~20 | / | × | Confirmed number of fan faults |
| P10.09 | Power-off self-start enable | 0 | 0~655351 | / | × | Enable the power grid power-off self-start function |
| P10.10 | Power-off time | 35 | 0~655.35 | S | × | Time interval of power-off self-start |

6.2.3 P2X group Sensor parameters

6.2.3.1 P20 group Sensor parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|----------------------|-----------------|---------------|------|-----------|----------------------|
| P20.00 | RS line voltage gain | 100.0 | 0~120.0 | % | × | RS line voltage gain |
| P20.01 | ST line voltage gain | 100.0 | 0~120.0 | % | × | ST line voltage gain |
| P20.02 | RS line voltage bias | 100.0 | 80~120.0 | % | × | RS line voltage bias |
| P20.03 | ST line voltage bias | 100.0 | 80~120.0 | % | × | ST line voltage bias |
| P20.04 | Bus voltage gain | 100.0 | 80~120.0 | % | × | Bus voltage gain |
| P20.05 | Ia bias | 100.0 | 80~120.0 | % | × | Ia bias |
| P20.06 | Ib bias | 100.0 | 80~120.0 | % | × | Ib bias |
| P20.07 | Ic bias | 100.0 | 80~120.0 | % | × | Ic bias |
| P20.08 | TR line voltage gain | 100.0 | 0~120.0 | % | × | TR line voltage gain |
| P20.09 | TR line voltage bias | 100.0 | 80~120.0 | % | × | TR line voltage bias |

6.2.4 P3X group: Digital parameters

6.2.4.1 P30 group Digital input parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--------------------------------------|-----------------|---------------|------|-----------|---|
| P30.00 | X0 terminal input function selection | 10 | 0~199 | / | × | 0: no function 1: Running signal 2: Inching signal 3: Stop signal (normally closed) 4: Fault reset signal 5: External fault status |
| P30.01 | X1 terminal input function selection | 105 | 0~199 | / | × | |
| P30.02 | X2 terminal input function selection | 9 | 0~199 | / | × | |

| | | | | | | |
|--------|--------------------------------------|-----|-------|---|---|--|
| P30.03 | X3 terminal input function selection | 1 | 0~199 | / | × | 6: Emergency power supply running signal |
| P30.04 | X4 terminal input function selection | 111 | 0~199 | / | × | 7: Basic electrode locking signal |
| P30.05 | X5 terminal input function selection | 4 | 0~199 | / | × | 8: Feedback Prohibited 9: Power starting signal |
| P30.06 | X6 terminal input function selection | 0 | 0~199 | / | × | 10: Main contactor status 11: LCL over-temperature status |
| P30.07 | X7 terminal input function selection | 0 | 0~199 | / | × | |
| P30.08 | Digital input filter times | 0 | 0~100 | / | × | Input filter times |

6.2.4.2 6.2.4.2 P31 group Digital output parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|------------------------------------|-----------------|---------------|------|-----------|--|
| P31.00 | Relay output 0 function definition | 0 | 0~199 | / | × | 0: no function 1: Normal POST 2: Fault output 3: Running 4: Standby 5: Forecast fault output 6: Rectification/feedback state 7: Undervoltage state 8: Main contactor control 9: Soft start contactor control 10: Fan contactor control 11: Self-start 12: AC circuit breaker off 13: Grid fault |
| P31.01 | Relay output 1 function definition | 8 | 0~199 | / | × | |
| P31.02 | Relay output 2 function definition | 9 | 0~199 | / | × | |
| P31.03 | Relay output 3 function definition | 10 | 0~199 | / | × | |
| P31.04 | Relay output 4 function definition | 3 | 0~199 | / | × | |
| P31.05 | Relay output 5 function definition | 0 | 0~199 | / | × | |
| P31.06 | Relay output 6 function definition | 0 | 0~199 | / | × | |
| P31.07 | Relay output 7 function definition | 0 | 0~199 | / | × | |
| P31.08 | Relay output 0 on delay | 0 | 0~6553.5 | s | × | Output K0 on delay 0.0s |
| P31.09 | Relay output 0 off delay | 0 | 0~6553.5 | s | × | Output K0 off delay 0.0s |
| P31.10 | Relay output 1 on delay | 0 | 0~6553.5 | s | × | Output K1 on delay 0.0s |

| | | | | | | |
|--------|--------------------------|---|----------|---|---|--------------------------|
| P31.11 | Relay output 1 off delay | 0 | 0~6553.5 | s | × | Output K1 off delay 0.0s |
| P31.12 | Relay output 2 on delay | 0 | 0~6553.5 | s | × | Output K2 on delay 0.0s |
| P31.13 | Relay output 2 off delay | 0 | 0~6553.5 | s | × | Output K2 off delay 0.0s |
| P31.14 | Relay output 3 on delay | 0 | 0~6553.5 | s | × | Output K3 on delay 0.0s |
| P31.15 | Relay output 3 off delay | 0 | 0~6553.5 | s | × | Output K3 off delay 0.0s |
| P31.16 | Relay output 4 on delay | 0 | 0~6553.5 | s | × | Output K4 on delay 0.0s |
| P31.17 | Relay output 4 off delay | 0 | 0~6553.5 | s | × | Output K4 off delay 0.0s |
| P31.18 | Relay output 5 on delay | 0 | 0~6553.5 | s | × | Output K5 on delay 0.0s |
| P31.19 | Relay output 5 off delay | 0 | 0~6553.5 | s | × | Output K5 off delay 0.0s |
| P31.20 | Relay output 6 on delay | 0 | 0~6553.5 | s | × | Output K6 on delay 0.0s |
| P31.21 | Relay output 6 off delay | 0 | 0~6553.5 | s | × | Output K6 off delay 0.0s |
| P31.22 | Relay output 7 on delay | 0 | 0~6553.5 | s | × | Output K7 on delay 0.0s |
| P31.23 | Relay output 7 off delay | 0 | 0~6553.5 | s | × | Output K7 off delay 0.0s |

6.2.5 P4X group Vector control parameters

6.2.5.1 P40 group Voltage loop parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--|-----------------|---------------|------|-----------|--|
| P40.00 | Voltage loop proportionality coefficient | 100.0 | 0~6553.5 | % | × | Voltage loop proportionality coefficient |
| P40.01 | Voltage loop integration coefficient | 100.0 | 0~6553.5 | % | × | Voltage loop integration coefficient |

6.2.5.2 P41 group Current loop parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--|-----------------|---------------|------|-----------|--|
| P41.00 | Current loop proportionality coefficient | 20.0 | 0~6553.5 | % | × | Current loop proportionality coefficient |
| P41.01 | Current loop integration coefficient | 10.0 | 0~6553.5 | % | × | Current loop integration coefficient |
| P41.02 | Current error threshold | 60 | 0~6553.5 | × | A | Power unevenness judgment threshold |

6.2.5.3 P42 group Torque control parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--------------------------|-----------------|---------------|------|-----------|--------------------------|
| P42.00 | Compensating torque gain | 100.0 | 0~6553.5 | % | × | Compensating torque gain |
| P42.01 | Current limit | 120.0 | 0~6553.5 | % | × | Current limit |

6.2.6 P5X group Enhanced control parameters

6.2.6.1 P50 group Special function parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|-----------------------------------|-----------------|---------------|------|-----------|---|
| P50.00 | PWM carrier frequency | 3.000 | 2~5 | kHz | × | PWM carrier frequency |
| P50.01 | Dead zone compensation time | 8.000 | 0~8.000 | us | × | Dead zone compensation time |
| P50.02 | PWM modulation selection | 1 | 0~1 | us | × | 0: underflow update 1: overflow/underflow update |
| P50.03 | Interruption frequency | 6000 | 4K~10K | kHz | × | Interruption frequency |
| P50.04 | Dead zone compensation hysteresis | 100.0 | 0~100 | / | × | Dead zone compensation current hysteresis |
| P50.05 | PWM modulation method | 0 | 0~1 | / | × | 0: 7 form |
| | | | | | | 1: 5 form |

6.2.7 P6X group Monitoring function parameters

6.2.7.1 P60 group Language selection parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--------------------|-----------------|---------------|------|-----------|--------------------|
| P60.00 | AFE language | 0 | 0~1 | / | × | 0: Chinese |

6.2.7.2 P61 group LCD display parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|----------------------|-----------------|---------------|------|-----------|----------------------|
| P61.00 | Given bus voltage | 1 | 0~29 | V | × | Given bus voltage |
| P61.01 | Feedback bus voltage | 2 | 0~29 | V | × | Feedback bus voltage |
| P61.02 | Output current | 3 | 0~29 | A | × | Output current |

| | | | | | | |
|--------|----------------------|---|------|----|---|----------------------|
| P61.03 | Line voltage | 4 | 0~29 | V | × | Line voltage |
| P61.04 | Radiator temperature | 5 | 0~29 | °C | × | Radiator temperature |
| P61.05 | Active power | 6 | 0~29 | / | × | Active power |
| P61.06 | U07 display data | 0 | 0~29 | / | × | / |
| P61.07 | U08 display data | 0 | 0~29 | / | × | / |

6.2.7.3 P62 group LED display parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|----------------------|-----------------|---------------|------|-----------|----------------------|
| P62.00 | Feedback bus voltage | 2 | 0~29 | V | × | Feedback bus voltage |

6.2.7.4 P63 group Running record parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|-------------------------------|-----------------|---------------|------------|-----------|---|
| P63.00 | Cumulative conduction time | 0 | 0~65535 | h | * | Cumulative conduction time |
| P63.01 | Cumulative running time | 0 | 0~65535 | h | * | Cumulative running time |
| P63.02 | Maximum radiator temperature | 60 | 0~6553.5 | °C | * | Maximum radiator temperature |
| P63.03 | Rectifier power consumption H | 0 | 0~65535 | 10,000 kWh | * | High bit of rectifier power consumption |
| P63.04 | Rectifier power consumption L | 0 | 0~65535 | kWh | * | Low bit of rectifier power consumption |
| P63.05 | Feedback energy H | 0 | 0~65535 | 10,000 kWh | * | High bit of feedback energy |
| P63.06 | Feedback energy L | 0 | 0~65535 | kWh | * | Low bit of feedback energy |
| P63.07 | Total energy consumption H | 0 | 0~65535 | 10,000 kWh | * | High bit of total energy consumption |

| | | | | | | |
|--------|----------------------------|---|---------|-----|---|-------------------------------------|
| P63.08 | Total energy consumption L | 0 | 0~65535 | kWh | * | Low bit of total energy consumption |
| P63.09 | Power reset | 0 | 0~1 | / | * | Power clear |

6.2.7.5 P64 group Troubleshooting parameters

| Function code | Function code Name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|----------------------------------|-----------------|---------------|-------|-----------|---|
| P64.00 | Minor fault handling | 1 | 0~1 | / | ○ | 0: Non output fault relay; 1: Output fault relay |
| P64.01 | Automatic fault reset time | 10.0 | 0~6553.5 | s | × | Automatic fault reset time |
| P64.02 | Number of automatic fault resets | 30 | 0~65535 | / | × | Number of automatic fault resets |
| P64.03 | Overheating time of radiator | 0.50 | 0~10.00 | s | × | Overheating time of radiator |
| P64.04 | Number of input default phase | 100 | 0~65535 | Times | * | Number of input default phase |
| P64.05 | Number of output default phase | 2.000 | 0~65.535 | Times | * | Number of output default phase |

6.2.7.6 P65 group Version parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|-------------------------------------|-----------------|---------------|------|-----------|-------------------------------------|
| P65.00 | AFE hardware version | 71.06 | 0~655.35 | / | * | AFE hardware version |
| P65.01 | AFE software version | 120.01 | 0~6553.5 | / | * | AFE software version |
| P65.02 | Profibus_DP software version number | 0.000 | 0~65.535 | / | * | Profibus_DP software version number |

6.2.7.7 P66 group Rectifier feedback unit information parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--------------------|-----------------|---------------|------|-----------|--------------------|
| P66.00 | AFE rated power | 315 | 0~6553.5 | kW | * | AFE rated power |

| | | | | | | |
|--------|---|-------|------------|----|---|---|
| P66.01 | AFE rated current | 285 | 0~6553.5 | A | * | AFE rated current |
| P66.02 | Heavy load rated power | 280 | 0~6553.5 | kW | * | Heavy load rated power |
| P66.03 | Heavy load rated current | 256 | 0~6553.5 | A | * | Heavy load rated current |
| P66.04 | AFE maximum current | 668 | 0~6553.5 | A | * | AFE maximum current |
| P66.05 | AFE rated voltage | 380.0 | 0~65535 | V | * | AFE rated voltage |
| P66.06 | AFE power coefficient | 100 | 0~65535 | / | * | AFE power coefficient |
| P66.07 | Current sensor current | 1500 | 0~65535 | A | * | Current sensor current |
| P66.08 | IGBT module current | 1000 | 0~65535 | A | * | Module current |
| P66.09 | Three-phase current balance coefficient | 1.000 | 0.80~1.200 | / | * | Three-phase current balance coefficient |
| P66.10 | ID_0 | 12799 | 0~65535 | / | * | ID_0 |
| P66.11 | ID_1 | 45247 | 0~65535 | / | * | ID_1 |
| P66.12 | ID_2 | 12866 | 0~65535 | / | * | ID_2 |
| P66.13 | ID_3 | 13106 | 0~65535 | / | * | ID_3 |
| P66.14 | ID_4 | 2419 | 0~65535 | / | * | ID_4 |
| P66.15 | ID_5 | 4163 | 0~65535 | / | * | ID_5 |
| P66.16 | ID_6 | 3 | 0~65535 | / | * | ID_6 |
| P66.17 | Number of inverter units | 1 | 1~6 | / | * | Number of parallel units |
| P66.18 | Current sampling mode | 1 | 0~1 | / | * | Current sampling mode |
| P66.19 | Current sharing hysteresis width | 5 | 0~100 | A | * | Current sharing hysteresis width |
| P66.20 | Sharing current compensation quantity | 0 | 0~120 | % | * | Sharing current compensation quantity |
| P66.21 | Line side inductance value | 120 | 0~65535 | uH | * | Grid side inductance value |
| P66.22 | Machine side inductance value | 240 | 0~65535 | uH | * | Machine side inductance value |
| P66.23 | Inductive equivalent resistance | 0 | 0~65535 | / | * | Inductive equivalent resistance |

| | | | | | | |
|--------|----------------------------|------|-----------|----|---|-----------------------------|
| P66.24 | LCL equivalent capacitance | 20 | 0~6553.5 | uF | * | LCL equivalent capacitance |
| P66.25 | Bus capacitance | 0 | 0~65535 | uF | * | DC bus capacity |
| P66.26 | Unit channel selection 1 | 3210 | 0123~3210 | / | * | Fiber channel configuration |
| P66.27 | Unit channel selection 2 | 7654 | 4567~7654 | / | * | Fiber channel configuration |

6.3 Short form of inverter module function code parameters

6.3.1 P0X group User parameters

| P00 group Password parameters | | | | | | |
|-------------------------------|--------------------|-----------------|---------------|------|-----------|---|
| Function code | Function code Name | Factory default | Setting range | Unit | Attribute | Option description |
| P00.00 | Login password | 0 | 0~65535 | / | × | 0: no password; other: login password; |
| P00.01 | Change password | 0 | 0~65535 | / | × | 0: no password; other: password protection; |
| P00.02 | Standby | 0 | 0~65535 | / | × | Standby |

6.3.2 P1X group Control parameters

6.3.2.1 P10 group Basic control parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|--------------------------------------|------------------------------|-----------------|---------------|------|-----------|--|
| P10.00 | Control mode selection | 0 | 0~5 | / | × | 0: voltage vector V/f control |
| | | | | | | 1: Speed sensorless vector control |
| | | | | | | 2: Speed sensor torque control |
| | | | | | | 3: Speed sensor vector control |
| | | | | | | 4: Standby |
| 5: Speed sensorless vector control 1 | | | | | | |
| P10.01 | Operating mode selection | 0 | 0~4 | / | × | 0: two-wire system 1; 1: two-wire system 2; 2: three-wire system 1; 3: three-wire system 2; 4: one-wire system |
| P10.02 | Run command given mode | 0 | 0~4 | / | × | 0: panel 1: terminal 2: communication (Modbus) 3: Standby 4: Profibus_DP given |
| P10.03 | Frequency/speed given mode 1 | 0 | 0~16 | / | × | 0: panel frequency ▲, ▼ given |
| | | | | | | 1: Digital quantity multi-stage given target speed |

| | | | | | | |
|--------|--------------------------------|---|-----|---|---|---|
| | | | | | | 2: Standby |
| | | | | | | 3: Analog 0 given target speed |
| | | | | | | 4: Analog 0 given current speed |
| | | | | | | 5: Analog 1 given target speed |
| | | | | | | 6: Analog 1 given current speed |
| | | | | | | 7: Standby |
| | | | | | | 8: PID given target speed |
| | | | | | | 9: Standby |
| | | | | | | 10: Standby |
| | | | | | | 11: Standby |
| | | | | | | 12: Communication (Modbus) given target speed |
| | | | | | | 13: Standby |
| | | | | | | 14: Standby |
| | | | | | | 15: Up/Down given speed: |
| | | | | | | 16: Profibus_DP given speed |
| P10.04 | Torque given mode | 0 | 0~6 | / | × | 0: Panel given torque |
| | | | | | | 1: Analog 0 given target torque |
| | | | | | | 2: Analog 1 given target torque |
| | | | | | | 3: Standby |
| | | | | | | 4: Standby |
| | | | | | | 5: ModBus given torque |
| | | | | | | 6: Profibus_DP given torque |
| P10.05 | Compensating torque given mode | 0 | 0~6 | / | × | 0: Uncompensated torque |
| | | | | | | 1: Digital compensating torque |
| | | | | | | 2: Analog 0 given compensating torque |
| | | | | | | 3: Analog 1 given compensating torque |
| | | | | | | 4: Standby |
| | | | | | | 5: Automatic compensating torque |
| | | | | | | 6: Profibus compensating torque |

| | | | | | | |
|--------------------|------------------------------|---|------|---|---|-------------------------------|
| P10.06 | Speed limit selection | 0 | 0~5 | / | × | 0: Internal parameter limit |
| | | | | | | 1: Analog 0 limit |
| | | | | | | 2: Analog 1 limit |
| | | | | | | 3: Standby |
| | | | | | | 4: ModBus communication limit |
| 5: Automatic limit | | | | | | |
| P10.07 | Frequency/speed given mode 2 | 0 | 0~16 | / | × | The same as P10.03 |

6.3.2.2 P11 group startup parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|-------------------------------|-----------------|---------------|------|-----------|---------------------------|
| P11.00 | Start mode | 0 | 0~2 | / | × | 0: Normal start |
| | | | | | | 1: Start after DC braking |
| | | | | | | 2: Speed tracking start |
| P11.01 | Start holding frequency | 0.00 | 0.00~60.00 | Hz | × | |
| P11.02 | Start frequency holding time | 0.0 | 0.0~3600.0 | s | × | |
| P11.03 | Start DC injection current | 30.0 | 0.0~120.0 | % | × | |
| P11.04 | Start DC injection time | 5.0 | 0.0~99.9 | s | × | |
| P11.05 | Excitation time | 0.0 | 0.0~99.9 | s | × | |
| P11.06 | Zero servo time | 0.0 | 0.0~99.9 | s | × | |
| P11.07 | Brake actuation time | 0.20 | 0.00~99.99 | s | × | |
| P11.08 | Tracking delay time | 1000 | 0~65535 | ms | × | |
| P11.09 | Zero voltage tracking time | 100 | 0.0~65535 | ms | × | |
| P11.10 | Tracking voltage Kp | 0.2 | 0.0~655.35 | / | × | |
| P11.11 | Tracking voltage Ki | 0.3 | 0.0~655.35 | / | × | |
| P11.12 | Tracking voltage Kd | 0.0 | 0.0~655.35 | / | × | |
| P11.13 | Tracking exit delay | 1000 | 0~65535 | ms | × | |
| P11.14 | Maximum current when tracking | 100.0 | 0~6553.5 | % | × | |

| | | | | | | |
|--------|---------------------------------------|-------|-------------|----|---|--|
| P11.15 | Tracking frequency variation gain | 10.0 | 0~6553.5 | % | × | |
| P11.17 | Initial tracking frequency | 50.00 | 0.00~300.00 | Hz | × | |
| P11.19 | Breaking current of negative rotation | 20.0 | 0~100.0 | % | × | |

6.3.2.3 P12 group Stop parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|------------------------------|-----------------|---------------|------|-----------|--------------------------------------|
| P12.00 | Stop mode | 0 | 0~4 | / | × | 0: Inertial stop |
| | | | | | | 1: Decelerated stop |
| | | | | | | 2: Deceleration + DC braking |
| | | | | | | 3: Deceleration + holding excitation |
| | | | | | | 4: Deceleration + holding torque |
| P12.01 | Stop holding frequency | 0 | 0.00~300.00 | Hz | × | |
| P12.02 | Stop frequency holding time | 0 | 0.0~99.9 | s | × | |
| P12.03 | DC braking start frequency | 2.5 | 0.00~10.00 | Hz | × | |
| P12.04 | Stop DC braking current | 50.0 | 0.0~100.0 | % | × | |
| P12.05 | Stop DC braking time | 0.5 | 0~10.0 | s | × | |
| P12.06 | Stop excitation holding time | 0 | 0~65535 | s | × | |

6.3.2.4 P14 group V/F control parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|---------------------------------------|-----------------|---------------|------|-----------|---|
| P14.00 | V/F curve setting | 0 | 0~5 | / | × | 0: standard V/F straight line; |
| | | | | | | 1: 1.2-power curve; |
| | | | | | | 2: 1.5-power curve |
| | | | | | | 3: 2-power curve |
| | | | | | | 4: User defined |
| | | | | | | 5: VF complete separation |
| P14.01 | V/F voltage value V0 | 76 | 0.0~460.0 | V | × | |
| P14.02 | V/F frequency value F0 | 10.00 | 0.00~300.00 | Hz | × | F0<F1 |
| P14.03 | V/F voltage value V1 | 152 | 0.0~460.0 | V | × | |
| P14.04 | V/F frequency value F1 | 20.00 | 0.00~300.00 | Hz | × | F1<F2 |
| P14.05 | V/F voltage value V2 | 228 | 0.0~460.0 | V | × | |
| P14.06 | V/F frequency value F2 | 30.00 | 0.00~300.00 | Hz | × | F2<F3 |
| P14.07 | V/F voltage value V3 | 304 | 0.0~460.0 | V | × | |
| P14.08 | V/F frequency value F3 | 40.00 | 0.00~300.00 | Hz | × | F3<F4 |
| P14.09 | V/F voltage value V4 | 380 | 0.0~460.0 | V | × | |
| P14.10 | V/F frequency value F4 | 50.00 | 0.00~300.00 | Hz | × | |
| P14.11 | VF complete separation voltage source | 0 | 0~5 | / | × | 0: internal digital given 1: Analog quantity A0 given 2: Analog quantity A1 given 3: PID given 4: Modbus communication given 5: Profibus communication given |

| | | | | | | |
|--------|--|------|----------|---|---|--|
| P14.12 | Internal setting of separation voltage | 380 | 0~690 | V | × | |
| P14.13 | Separation voltage acceleration time | 5.00 | 0~655.35 | s | × | |
| P14.14 | Separation voltage deceleration time | 5.00 | 0~655.35 | s | × | |

6.3.3 P2X group motor parameters

6.3.3.1 P20 Basic motor parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--|-----------------|---------------|------|-----------|--|
| P20.00 | Type of motor 1 | 0 | 0~1 | / | | 0: asynchronous 1: synchronous |
| P20.01 | Rated power of motor 1 | 315 | 0~6553.5 | kW | × | Set by motor nameplate |
| P20.02 | Rated current of motor 1 | 334 | 0~6553.5 | A | × | Set by motor nameplate |
| P20.03 | Rated frequency of motor 1 | 50.00 | 0.00~6553.5 | Hz | × | Set by motor nameplate |
| P20.04 | Rated speed of motor 1 | 1460 | 0~65535 | rpm | × | Set by motor nameplate |
| P20.05 | Rated voltage of motor 1 | 380 | 0~480 | V | × | Set by motor nameplate |
| P20.06 | Number of poles of motor 1 | 4 | 2~128 | / | × | Number of pole-pairs = number of poles/2 |
| P20.07 | Rated slip frequency of motor 1 | 1.40 | 0.10~655.35 | Hz | × | Set by motor nameplate |
| P20.08 | Maximum slip frequency of motor 1 | 2.80 | 0.10~655.35 | Hz | × | |
| P20.09 | Phase sequence of motor 1 | 1 | 0~1 | / | × | 0: negative phase sequence; 1: positive phase sequence |
| P20.10 | No-load current coefficient of motor 1 | 30.00 | 1.00~60.00 | % | × | |
| P20.12 | Maximum power coefficient of motor 1 | 250 | 50~400 | % | × | |

| | | | | | | |
|--------|--|-------|-------------|-----|---|--|
| P20.14 | Type of motor 2 | 0 | 0~1 | / | | 0: asynchronous 1: synchronous |
| P20.15 | Rated power of motor 2 | 315 | 0~6553.5 | kW | × | Set by motor nameplate |
| P20.16 | Rated current of motor 2 | 334 | 0~6553.5 | A | × | Set by motor nameplate |
| P20.17 | Rated frequency of motor 2 | 50.00 | 0.00~6553.5 | Hz | × | Set by motor nameplate |
| P20.18 | Rated speed of motor 2 | 1460 | 0~65535 | rpm | × | Set by motor nameplate |
| P20.19 | Rated voltage of motor 2 | 380 | 0~480 | V | × | Set by motor nameplate |
| P20.20 | Number of poles of motor 2 | 4 | 2~128 | / | × | Number of pole-pairs = number of poles/2 |
| P20.21 | Rated slip frequency of motor 2 | 1.40 | 0.10~655.35 | Hz | × | Set by motor nameplate |
| P20.22 | Maximum slip frequency of motor 2 | 2.80 | 0.10~655.35 | Hz | × | |
| P20.23 | Phase sequence of motor 2 | 1 | 0~1 | / | × | 0: negative phase sequence; 1: positive phase sequence |
| P20.24 | No-load current coefficient of motor 2 | 30.00 | 1.00~60.00 | % | × | |
| P20.25 | Maximum power coefficient of motor 2 | 250 | 50~400 | % | × | |
| P20.27 | Motor parameter calculation enable | 0 | 0~65535 | / | × | |

Note 1: Different inverter powers correspond to different factory values.

6.3.3.2 P21 advanced motor parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--------------------|-----------------|---------------|------|-----------|------------------------------------|
| P21.00 | Motor setting | 0 | 0~7 | / | × | 0: normal operation |
| | | | | | | 1: Static self-learning of encoder |

| | | | | | | |
|--------|------------------------------|--------|---|---|---------------------|--|
| | | | | | | 2: Encoder correction self-learning |
| | | | | | | 3: End of encoder self-learning |
| | | | | | | 4: Static self-learning of motor |
| | | | | | | 5: Dynamic self-learning of motor |
| | | | | | | 6: Static advanced self-learning of motor |
| | | | | | | 7: Dynamic self-learning of editor |
| P21.01 | Stator resistance of motor 1 | 0.037 | / | Ω | Scientific notation | Representation format of this parameter: ABCDE – n = ABCDE * 10 ⁻ⁿ For example, the handheld display value is 624-5Ω, which represents the value of 624 * 10 ⁻⁵ Ω, i.e. 0.00624 Ω, and its value is also equivalent to 6240-4 Ω |
| P21.02 | Rotor resistance of motor 1 | 0.027 | / | Ω | Scientific notation | See P21.01 for the definition of the parameter value |
| P21.03 | Stator inductance of motor 1 | 0.0000 | / | H | Scientific notation | See P21.01 for the definition of the parameter value |
| P21.04 | Rotor inductance of motor 1 | 0.0000 | / | H | Scientific notation | See P21.01 for the definition of the parameter value |
| P21.05 | Mutual inductance of motor 1 | 0.0000 | / | H | Scientific notation | See P21.01 for the definition of the parameter value |
| P21.06 | Stator resistance of motor 2 | 0.037 | / | Ω | Scientific notation | See P21.01 for the definition of the parameter value |
| P21.07 | Rotor resistance of motor 2 | 0.027 | / | Ω | Scientific notation | See P21.01 for the definition of the parameter value |
| P21.08 | Stator inductance of motor 2 | 0.0000 | / | H | Scientific notation | See P21.01 for the definition of the parameter value |
| P21.09 | Rotor inductance of motor 2 | 0.0000 | / | H | Scientific notation | See P21.01 for the definition of the parameter value |

| | | | | | | |
|--------|------------------------------|--------|---|---|---------------------|--|
| P21.10 | Mutual inductance of motor 2 | 0.0000 | / | H | Scientific notation | See P21.01 for the definition of the parameter value |
|--------|------------------------------|--------|---|---|---------------------|--|

6.3.3.3 P22 Auxiliary motor parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|---|-----------------|---------------|------|-----------|--|
| P22.01 | Encoder type | 0 | 0 | / | × | 0: incremental; 1:SinCos; 2:EnDat; 3:Rezav |
| P22.02 | Encoder 1 pulse number | 1024 | 500~16000 | ppr | × | Encoder pulse number |
| P22.03 | Encoder frequency dividing coefficient | 0 | 0~7 | / | × | Encoder frequency dividing coefficient |
| P22.04 | Encoder 1 position angle | 0.0 | 0.0~360.0 | rad | * | Encoder position angle |
| P22.05 | Encoder feedback speed filter time constant | 10 | 0~30 | ms | × | |
| P22.06 | Encoder 1 direction | 1 | 0~1 | / | × | 0: negative phase sequence, 1: positive phase sequence |
| P22.07 | SinCos encoder subdivision coefficient | 11 | 7,9,11 | / | × | 7—128;9-512;11-2048 |
| P22.08 | Number of poles of Rezav encoder 1 | 2 | 2~128 | P | × | |
| P22.09 | Encoder 2 type | 0 | 0~3 | / | × | 0: incremental; 1:SinCos; 2:EnDat; 3:Rezav |
| P22.10 | Encoder 2 pulse number | 1024 | 500~16000 | ppr | × | Encoder pulse number |
| P22.11 | Encoder 2 position angle | 0.0 | 0.0~360.0 | rad | * | Encoder position angle |
| P22.12 | Encoder 2 direction | 1 | 0~1 | / | × | 0: negative phase sequence, 1: positive phase sequence |
| P22.13 | Number of poles of Rezav encoder 2 | 2 | 2~128 | P | × | |
| P22.14 | Encoder 1 channel selection | 0 | 0~1 | | × | 0: Select incremental channel on IO board; 1: Select expanded PG card channel |
| P22.15 | Encoder 2 channel selection | 0 | 0~1 | | × | 0: Select incremental channel on IO board; |

| | | | | | | |
|--------|---------------------------------------|------|-------------|---|---|------------------------------------|
| | | | | | | 1: Select expanded PG card channel |
| P22.16 | Feedback speed amplitude limit filter | 0.00 | 0.00~100.00 | % | × | |

6.3.3.4 P23 motor protection parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--|-----------------|---------------|------|-----------|---------------------------|
| P23.01 | Motor sensor protection threshold | 5.00 | 0.00~10.00 | V | × | |
| P23.03 | Low speed overflow threshold of motor | 150.00 | 0.00~150.00 | % | × | 20% rated speed and below |
| P23.04 | Low-speed overcurrent time of motor | 60.0 | 0.1~120.0 | s | × | |
| P23.05 | High speed overflow threshold of motor | 120.00 | 0.00~150.00 | % | × | Above 20% rated speed |
| P23.06 | High-speed overcurrent time of motor | 30.0 | 0.1~60.0 | s | × | |

6.3.4 P3X group: Digital parameters

6.3.4.1 P30 Digital input parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|----------------------------|-----------------|---------------|------|-----------|--------------------------------------|
| P30.00 | X0 terminal input function | 7 | 0~199 | / | × | Refer to Chapter 7 Parameter Details |
| P30.01 | X1 terminal input function | 0 | 0~199 | / | × | |
| P30.02 | X2 terminal input function | 0 | 0~199 | / | × | |
| P30.03 | X3 terminal input function | 0 | 0~199 | / | × | |
| P30.04 | X4 terminal input function | 0 | 0~199 | / | × | |

| | | | | | | |
|--------|----------------------------|-----|-------|------|---|--|
| P30.05 | X5 terminal input function | 118 | 0~199 | / | × | |
| P30.06 | X6 terminal input function | 114 | 0~199 | / | × | |
| P30.07 | X7 terminal input function | 0 | 0~199 | / | × | |
| P30.08 | Digital input filter times | 5 | 0~99 | Time | | |

6.3.4.2 P31 Digital output parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--------------------------|-----------------|---------------|------|-----------|--|
| P31.00 | Relay output K1 function | 25 | 0~199 | / | × | See Chapter 7 P31 group Multi-function output terminal definition table |
| P31.01 | Relay output K2 function | 3 | 0~199 | / | × | |
| P31.02 | Relay output K3 function | 2 | 0~199 | / | × | |
| P31.03 | Relay output K4 function | 31 | 0~199 | / | × | |
| P31.04 | Relay output K5 function | 0 | 0~199 | / | × | |
| P31.05 | Relay output K6 function | 2 | 0~199 | / | × | |
| P31.06 | Relay output K7 function | 3 | 0~199 | / | × | |
| P31.07 | Relay output K8 function | 0 | 0~199 | / | × | |
| P31.08 | Output K1 action delay | 0.0 | 0.0~60.0 | s | × | |
| P31.09 | Output K1 reset delay | 0.0 | 0.0~60.0 | s | × | |
| P31.10 | Output K2 action delay | 0.0 | 0.0~60.0 | s | × | |
| P31.11 | Output K2 reset delay | 0.0 | 0.0~60.0 | s | × | |
| P31.12 | Output K3 action delay | 0.0 | 0.0~60.0 | s | × | |
| P31.13 | Output K3 reset delay | 0.0 | 0.0~60.0 | s | × | |
| P31.14 | Output K4 action delay | 0.0 | 0.0~60.0 | s | × | |
| P31.15 | Output K4 reset delay | 0.0 | 0.0~60.0 | s | × | |
| P31.16 | Output K5 action delay | 0.0 | 0.0~60.0 | s | × | |
| P31.17 | Output K5 reset delay | 0.0 | 0.0~60.0 | s | × | |
| P31.18 | Output K6 action delay | 0.0 | 0.0~60.0 | s | × | |

| | | | | | | |
|--------|-----------------------------------|------|-------------|----|---|----------------------------------|
| P31.19 | Output K6 reset delay | 0.0 | 0.0~60.0 | s | × | |
| P31.20 | Output K7 action delay | 0.0 | 0.0~60.0 | s | × | |
| P31.21 | Output K7 reset delay | 0.0 | 0.0~60.0 | s | × | |
| P31.22 | Output K8 action delay | 0.0 | 0.0~60.0 | s | × | |
| P31.23 | Output K8 reset delay | 0.0 | 0.0~60.0 | s | × | |
| P31.24 | Zero current detection width | 4.0 | 0.0~50.0 | % | × | |
| P31.25 | Frequency arrival detection width | 1.00 | 0.0~300.00 | Hz | × | |
| P31.26 | Detection frequency | 1.00 | 0.00~300.00 | Hz | × | For frequency detection function |
| P31.27 | Detection frequency width | 0.20 | 0.00~300.00 | Hz | × | For frequency detection function |
| P31.28 | Single running time arrival | 2 | 0~65535 | h | × | |
| P31.29 | Cumulative running time arrival | 8 | 0~65535 | h | × | |

6.3.4.3 P32 Analog input parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|------------------------------------|-----------------|----------------|------|-----------|--|
| P32.00 | Analog input A0 type | 0 | 0~2 | / | × | 0:-10V~10V 1: 0mA~20mA 2: 4mA~20 mA |
| P32.01 | Analog input A0 function selection | 0 | 0~6 | / | × | 0: no function 1: Target speed signal 2: Current speed signal 3: Torque signal 4: Compensating torque signal 5: Speed limit signal 6: PTC temperature signal |
| P32.02 | Lower limit of analog input A0 | 0.00 | -100.00~327.67 | % | × | |
| P32.03 | Upper limit of analog input A0 | 100.00 | 0.00~655.35 | % | × | |

| | | | | | | |
|--------|--|--------|--------------------|------|---|--|
| P32.04 | Analog input A0 filter time | 10 | 0~65535 | ms | × | The default value is 2000ms when PTC temperature signal is selected |
| P32.05 | Analog input A0 amplitude limit | 10.000 | 0.000~10.000 | V/mA | × | This value shall be set to 20.000mA if the current input is selected |
| P32.06 | Analog input A1 type | 1 | 0~2 | / | × | 0:-10V~10V 1: 0mA~20mA 2: 4mA~20mA |
| P32.07 | Analog input A1 function selection | 0 | 0~6 | / | × | The parameters are the same as A0. See P32.01 |
| P32.08 | Lower limit of analog input A1 | 0.00 | -100.00~ 327.67 | % | × | |
| P32.09 | Upper limit of analog input A1 | 100.00 | 0.00~655.35 | % | × | |
| P32.10 | Analog input A1 filter time | 10 | 0~65535 | ms | × | The default value is 2000ms when PTC temperature signal is selected |
| P32.11 | Analog input A1 amplitude limit | 10.000 | 0.000~10.000 | V/mA | × | This value shall be set to 20.000mA if the current input is selected |

6.3.4.4 P33 Analog output parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|------------------------------|-----------------|---------------|------|-----------|---|
| P33.00 | Analog output M0 function | 1 | 0~127 | / | × | 0: no function; 1: Output current 2: Output voltage 3: Torque given 4: Bus voltage 5: Total output power 6: Active output power 7: Current speed (unsigned) 8: Speed given (signed) 9: Speed feedback 10: Acceleration |

| | | | | | | |
|--------|--------------------------------------|-------|--------------------|---|---|--|
| | | | | | | 11: Radiator temperature 12: Analog quantity A0 13: Analog quantity A1 14: Standby 15: ModBus analog output 0 16: ModBus analog output 1 |
| P33.01 | Lower limit of analog output M0 | -1.00 | -100.00~ 327.67 | % | × | Lower limit of output M0 |
| P33.02 | Upper limit of analog output M0 | 92.00 | 0.00~ 655.35 | % | × | Upper limit of output M0 |
| P33.03 | Analog output M1 function definition | 2 | 0~127 | / | × | 0: no function; 1: Output current 2: Output voltage 3: Torque given 4: Bus voltage 5: Total output power 6: Active output power 7: Current speed (unsigned) 8: Speed given (signed) 9: Speed feedback 10: Acceleration 11: Radiator temperature 12: Analog quantity A0 13: Analog quantity A1 14: Analog quantity A2 15: ModBus analog output 0 16: ModBus analog output 1 |
| P33.04 | Lower limit of analog output M1 | -1.00 | -100.00~ 327.67 | % | × | Lower limit of output M1 |
| P33.05 | Upper limit of analog output M1 | 92.00 | 0.00~ 655.35 | % | × | Upper limit of output M1 |
| P33.06 | Analog output M2 function definition | 0 | 0~127 | / | × | 0: no function; 1: Output current 2: Output voltage 3: Torque given 4: Bus voltage |

| | | | | | | |
|--------|---|-------|-----------------|---|---|--|
| | | | | | | 5: Total output power 6: Active output power 7: Current speed (unsigned) 8: Speed given (signed) 9: Speed feedback 10: Acceleration 11: Radiator temperature 12: Analog quantity A0 13: Analog quantity A1 14: Analog quantity A2 15: ModBus analog output 0 16: ModBus analog output 1 |
| P33.07 | Lower limit of analog output M2 | 20.05 | -100~ 327.67 | % | × | Lower limit of output M2 |
| P33.08 | Upper limit of analog output M2 | 97.90 | 0.00~ 655.35 | % | × | Upper limit of output M2 |
| P33.09 | Analog output M3 function definition | 0 | 0~127 | / | × | 0: no function; 1: Output current 2: Output voltage 3: Torque given 4: Bus voltage 5: Total output power 6: Active output power 7: Current speed (unsigned) 8: Speed given (signed) 9: Speed feedback 10: Acceleration 11: Radiator temperature 12: Analog quantity A0 13: Analog quantity A1 14: Analog quantity A2 15: ModBus analog output 0 16: ModBus analog output 1 |
| P33.10 | Lower limit of analog output M3 | 20.05 | -100~ 327.67 | % | × | Lower limit of output M3 |

| | | | | | | |
|--------|---------------------------------|-------|-----------------|---|---|--------------------------|
| P33.11 | Upper limit of analog output M3 | 97.90 | 0.00~ 655.35 | % | × | Upper limit of output M3 |
|--------|---------------------------------|-------|-----------------|---|---|--------------------------|

6.3.5 P4X group Speed control parameters

6.3.5.1 P40 Basic speed parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|---------------------------------|-----------------|----------------|------|-----------|--|
| P40.00 | Panel speed | 5.00 | 0.0~ 300.00 | Hz | × | |
| P40.01 | Basic frequency | 50.00 | 0.0~ 300.00 | Hz | × | |
| P40.02 | Acceleration time 0 | 30.00 | 0.1~ 360.00 | s | × | The higher the power, the longer the default acceleration time |
| P40.03 | Deceleration time 0 | 30.00 | 0.1~ 360.00 | s | × | |
| P40.04 | Acceleration time 1 | 5.00 | 0.1~ 360.00 | s | × | |
| P40.05 | Deceleration time 1 | 5.00 | 0.1~ 360.00 | s | × | |
| P40.06 | Acceleration time 2 | 5.00 | 0.1~ 360.00 | s | × | |
| P40.07 | Deceleration time 2 | 5.00 | 0.1~ 360.00 | s | × | |
| P40.08 | Acceleration time 3 | 5.00 | 0.1~ 360.00 | s | × | |
| P40.09 | Deceleration time 3 | 5.00 | 0.1~ 360.00 | s | × | |
| P40.10 | Acceleration rounded corner Ts0 | 0.00 | 0.00~ 10.00 | s | × | Acceleration start |
| P40.11 | Acceleration rounded corner Ts1 | 0.00 | 0.00~ 10.00 | s | × | Acceleration end |
| P40.12 | Deceleration rounded corner Ts2 | 0.00 | 0.00~ 10.00 | s | × | Deceleration start |
| P40.13 | Deceleration rounded corner Ts3 | 0.00 | 0.00~ 10.00 | s | × | Deceleration end |

6.3.5.2 P41 Digital multi-stage parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|---------------------------------------|-----------------|---------------|------|-----------|--------------------|
| P41.00 | Digital quantity multi-stage given 0 | 0.00 | 0.00~300.00 | Hz | × | |
| P41.01 | Digital quantity multi-stage given 1 | 5.00 | 0.00~300.00 | Hz | × | |
| P41.02 | Digital quantity multi-stage given 2 | 10.00 | 0.00~300.00 | Hz | × | |
| P41.03 | Digital quantity multi-stage given 3 | 20.00 | 0.00~300.00 | Hz | × | |
| P41.04 | Digital quantity multi-stage given 4 | 30.00 | 0.00~300.00 | Hz | × | |
| P41.05 | Digital quantity multi-stage given 5 | 40.00 | 0.00~300.00 | Hz | × | |
| P41.06 | Digital quantity multi-stage given 6 | 50.00 | 0.00~300.00 | Hz | × | |
| P41.07 | Digital quantity multi-stage given 7 | 60.00 | 0.00~300.00 | Hz | × | |
| P41.08 | Digital quantity multi-stage given 8 | 0.00 | 0.00~300.00 | Hz | × | |
| P41.09 | Digital quantity multi-stage given 9 | 0.00 | 0.00~300.00 | Hz | × | |
| P41.10 | Digital quantity multi-stage given 10 | 0.00 | 0.00~300.00 | Hz | × | |
| P41.11 | Digital quantity multi-stage given 11 | 0.00 | 0.00~300.00 | Hz | × | |
| P41.12 | Digital quantity multi-stage given 12 | 0.00 | 0.00~300.00 | Hz | × | |
| P41.13 | Digital quantity multi-stage given 13 | 0.00 | 0.00~300.00 | Hz | × | |
| P41.14 | Digital quantity multi-stage given 14 | 0.00 | 0.00~300.00 | Hz | × | |
| P41.15 | Digital quantity multi-stage given 15 | 0.00 | 0.00~300.00 | Hz | × | |
| P41.16 | Inching frequency given | 5 | 0.00~50.00 | Hz | × | |

6.3.6 P5X group Process control parameters

6.3.6.1 P50 group Process open loop parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|---|-----------------|---------------|------|-----------|---|
| P50.00 | Open loop auxiliary given mode | 0 | 0~5 | / | × | 0: NA; 1: A0; 2: A1; 3: standby 4: standby; 5: PID given target speed |
| P50.01 | Open loop primary and secondary given operation | 0 | 0~6 | / | × | 0: No operation 1: primary + secondary 2: primary - secondary 3: Standby 4: Standby 5: Maximum value 6: Minimum value |

6.3.6.2 P51 Process closed loop parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|---|-----------------|---------------|------|-----------|--|
| P51.00 | Closed loop operation control selection | 0 | 0~1 | / | × | 0: invalid closed loop operation control 1: valid closed loop operation control |
| P51.01 | Primary given mode of closed-loop control | 0 | 0~6 | / | × | 0: internal given 1: A0 2: A1 3: Standby 4: Standby 5: Standby 6: Modbus communication given |
| P51.02 | Secondary given mode of closed-loop control | 2 | 0~6 | / | × | 0: NA 1: A0 2: A1 3: Standby |

| | | | | | | |
|--------|---|------|------------|---|---|---|
| | | | | | | 4: Standby 5: Standby 6: Modbus communication given |
| P51.03 | Closed loop primary and secondary given operation | 0 | 0~6 | / | × | 0: No operation 1: primary + secondary 2: primary - secondary 3: Standby 4: Standby 5: Maximum value 6: Minimum value |
| P51.04 | Primary feedback mode of closed-loop control | 1 | 0~6 | / | × | 0: NA 1: A0 2: A1 3: Standby 4: Standby 5: Multi-stage voltage set 6: Modbus communication given |
| P51.05 | Secondary feedback mode of closed-loop control | 2 | 0~6 | / | × | 0: NA 1: A0 2: A1 3: Standby 4: Standby 5: Standby 6: Modbus communication given |
| P51.06 | Primary and secondary feedback operation of closed-loop control | 0 | 0~6 | / | × | 0: No operation 1: primary + secondary 2: primary - secondary 3: Standby 4: Standby 5: Maximum value 6: Minimum value |
| P51.07 | PID internal given value | 0.70 | 0.00~10.00 | | × | Unit depends on P51.08 |
| P51.08 | Unit | 0 | 0~3 | / | × | Unit 0: V 1: % 2: Mpa 3: ° |

| | | | | | | |
|--------|--|-------|------------------|----|---|--|
| P51.09 | Proportional gain Kp | 0.50 | 0.000~ 10.000 | / | ○ | |
| P51.10 | Integral gain Ki | 0.50 | 0.000~ 10.000 | / | ○ | |
| P51.11 | Differential gain Kd | 0.00 | 0.000~ 10.000 | / | ○ | |
| P51.13 | Integration mode selection | 0 | 0~1 | / | × | 0: Frequency to the upper and lower limits Stop integral control 1: Frequency to the upper and lower limits Continue integral control |
| P51.22 | Upper limit of integral action | 100.0 | 0.0~200.0 | % | × | |
| P51.24 | Upper limit of closed loop input | 50.0 | 0.0~200.0 | % | × | |
| P51.25 | Lower limit of closed loop input | 0.0 | 0.0~20.0 | % | × | |
| P51.26 | Upper limit of closed loop output | 100.0 | 0.0~200.0 | % | × | |
| P51.28 | Sleep selection | 0 | 0~1 | / | × | 0: sleep not enabled 1: sleep at the output frequency |
| P51.29 | Sleep frequency | 30.00 | 0.0~ 50.0 | Hz | × | P51.28= 1 valid |
| P51.30 | Sleep delay | 10.0 | 0.0~ 6553.5 | s | × | P51.28= 1 valid |
| P51.31 | Wakeup deviation | 0.10 | 0.00~ 655.35 | | × | P51.2= 1 valid Unit depends on P51.08 |
| P51.32 | Wakeup delay | 10.0 | 0.0~3600.0 | s | × | |
| P51.33 | Given acceleration and deceleration time | 0.0 | 0.0~50.0 | s | × | |
| P51.34 | Closed loop output filter time | 0.010 | 0.000~ 50.000 | s | × | Unit depends on P51.08 |
| P51.35 | Lower limit of given quantity | 0.00 | 0.00~ 100.00 | % | × | Unit depends on P51.08 |
| P51.36 | Lower limit of feedback quantity range | 0.00 | 0.0~100.00 | % | × | Unit depends on P51.08 |

| | | | | | | |
|--------|--|-------|-------------------------------|----|---|--|
| P51.37 | Upper limit of given quantity | 10.00 | 0.00~ 100.00 | % | × | Unit depends on P51.08 |
| P51.38 | Upper limit of feedback quantity range | 10.00 | 0.00~ 100.00 | V | × | |
| P51.39 | Preset frequency | 22.00 | 0.00~ maximum frequency | Hz | × | |
| P51.40 | Preset frequency holding time | 0 | 0~300 | s | × | |
| P51.41 | Positive and negative characteristics | 0 | 0~1 | / | × | 0: positive characteristics 1: negative characteristics |

6.3.7 P6X group Vector control parameters

6.3.7.1 P60 group Speed loop control parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--------------------------------|-----------------|-----------------|------|-----------|----------------------|
| P60.00 | Zero speed of speed loop P0 | 0.00 | 0.00~ 655.35 | / | × | Zero servo section |
| P60.01 | Zero speed of speed loop Ti0 | 0.00 | 0.00~ 65535 | ms | × | |
| P60.02 | Zero speed of speed loop D0 | 0.00 | 0.00~ 655.35 | / | × | |
| P60.03 | Low speed of speed loop P1 | 150.00 | 0.00~ 655.35 | / | × | Low speed section |
| P60.04 | Low speed of speed loop Ti1 | 900 | 0.00~ 65535 | ms | × | |
| P60.05 | Low speed of speed loop D1 | 0 | 0.00~ 655.35 | / | × | |
| P60.06 | Medium speed of speed loop P2 | 150.00 | 0.00~ 655.35 | / | × | Medium speed section |
| P60.07 | Medium speed of speed loop Ti2 | 900 | 0.00~ 65535 | ms | × | |
| P60.08 | Medium speed of speed loop D2 | 0 | 0.00~ 655.35 | / | × | |

| | | | | | | |
|--------|------------------------------|--------|-------------|----|---|--------------------|
| P60.09 | High speed of speed loop P3 | 150.00 | 0.00~655.35 | / | × | High speed section |
| P60.10 | High speed of speed loop Ti3 | 900 | 0.00~65535 | ms | × | |
| P60.11 | High speed of speed loop D3 | 0 | 0.00~655.35 | / | × | |
| P60.12 | Switching frequency 0 | 10.0 | 0.0~100.0 | % | × | |
| P60.13 | Switching frequency fl | 60.0 | 0.0~6553.5 | % | × | |

6.3.7.2 P61 group Current control parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|------------------------------|-----------------|---------------|------|-----------|--------------------|
| P61.00 | Current loop Kp | 1.40 | 0.01~9.99 | / | × | |
| P61.01 | Current loop Ki | 1.00 | 0.01~9.99 | / | × | |
| P61.02 | Current loop Kd | 0.00 | 0.00~9.99 | / | × | |
| P61.03 | Current loop bandwidth | 400.0 | 0.1~1000.0 | Hz | × | |
| P61.05 | Current loop selection | 0 | 0~10 | / | × | |
| P61.06 | V/F control current loop Max | 1.0 | 0.0~6553.5 | % | × | |
| P61.07 | V/F control current loop Min | 1.0 | 0.0~6553.5 | % | × | |
| P61.08 | Flux weakening Kp | 0.5 | 0.00~655.35 | | | |
| P61.09 | Flux weakening Ki | 0.0050 | 0.0000~6.5535 | | | |

6.3.7.3 P62 group Torque control parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--------------------|-----------------|---------------|------|-----------|--------------------|
| P62.00 | Torque given | 0.0 | 0~100.0 | % | × | |
| P62.01 | Torque direction | 0 | 0 or 1 | / | × | |

| | | | | | | |
|--------|-------------------------|------|-------------------|---|---|--|
| P62.02 | Torque increase time | 1.00 | 0.01~ 655.35 s | s | × | |
| P62.03 | Torque decrease time | 1.00 | 0.01~ 655.35 s | s | × | |

6.3.7.4 P63 Torque compensating parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--------------------------------|-----------------|---------------|------|-----------|--------------------|
| P63.00 | Compensating torque direction | 0 | 0 or 1 | / | × | |
| P63.01 | Compensating torque gain | 100.0 | 0.0~200.0 | % | × | |
| P63.03 | Light load switch compensation | 0.0 | 0.0~99.9 | % | × | |
| P63.04 | Heavy load switch compensation | 0.0 | 0.0~99.9 | % | × | |

6.3.8 P7X group Enhanced control parameters

6.3.8.1 P70 restriction and protection parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--------------------------|-----------------|---|------|-----------|--------------------------------|
| P70.00 | Upper limit of frequency | 50.00 | 0.01~ maximum frequency | Hz | × | 0.01~ maximum frequency |
| P70.01 | Lower limit of frequency | 0.00 | 0.00~ upper limit of frequency | Hz | × | 0.01~ upper limit of frequency |

| | | | | | | |
|--------|---|--------|------------------|----|---|--|
| P70.02 | Maximum output frequency | 55.00 | 0.01~ 300.00 | Hz | × | 0.01~300.00 |
| P70.04 | Output torque limit | 150 | 0.00~ 200.00 | % | × | |
| P70.05 | Inverter acceleration overcurrent threshold | 160 | 0.00~ 200.00 | % | × | |
| P70.06 | Inverter deceleration overvoltage threshold | 750 | 540~800 | V | × | |
| P70.07 | Overspeed protection factor | 120.00 | 0.00~ | % | × | |
| P70.08 | Special function selection | 16 | 0~65535 | / | × | |
| P70.10 | PT signal channel | 0 | 0~2 | / | × | 0: NC 1:A0 2:A1 |
| P70.11 | Upper threshold of PT protection | 10.000 | 0.000~ 10.000 | V | × | |
| P70.12 | Lower threshold of PT protection | 0.000 | 0.000~ 10.000 | V | × | |
| P70.13 | PT protective action delay | 3.0 | 0.0~10.0 | s | × | |
| P70.14 | HT signal channel | 0 | 0~2 | / | × | 0: NC 1:A0 2:A1 |
| P70.15 | Upper threshold of HT protection | 10.000 | 0.000~ 10.000 | V | × | |
| P70.16 | Lower threshold of HT protection | 0.000 | 0.000~ 10.000 | V | × | |
| P70.17 | HT protective action delay | 3.0 | 0.0~10.0 | s | × | |
| P70.18 | Bus undervoltage threshold | 380 | 0~740 | V | × | 180 for 200V, 380 for 400V, 740 for 600V |
| P70.19 | Maximum torque of no-load uplink | 0 | 0~65535 | % | × | |

| | | | | | | |
|--------|---|-----|---------|----|---|--|
| P70.20 | Maximum torque of no-load downlink | 0 | 0~65535 | % | × | |
| P70.21 | PWM detection delay | 800 | 0~5000 | ms | × | |
| P70.22 | Frequency selection below the lower limit | 0 | 0~3 | | × | |

6.3.8.2 P71 control optimization parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|----------------------------------|-----------------|---------------|------|-----------|--|
| P71.00 | Frequency hopping speed f3 | 0.00 | 0.01~100.00 | Hz | × | |
| P71.01 | Frequency hopping speed f3 | 0.00 | 0.01~100.00 | Hz | × | |
| P71.02 | Frequency hopping speed f3 | 0.00 | 0.01~100.00 | Hz | × | |
| P71.03 | Frequency hopping width | 0.00 | 0.01~100.00 | Hz | × | |
| P71.04 | Inertia compensation coefficient | 0.0 | 0.0~200.0 | % | × | × |
| P71.05 | Prohibit reverse rotation | 0 | 0~1 | / | × | 0: N 1: Y |
| P71.06 | Positive and negative interval | 0.0 | 0.1~6553.5 | S | × | |
| P71.07 | PWM modulation mode | 2 | 0~2 | / | × | 0: 5 form; 1: 7 form; 2: <40%rpm 7-segment, >40% 5-segment |
| P71.08 | Automatic torque lifting | 125 | 0~127 | / | × | 0: NA 1: Automatic torque lifting 2: Oscillation suppression 1 4: Slip compensation 8: Stator resistance compensation 16: Dead zone compensation 32: Bus voltage compensation 64: Oscillation suppression 2 (Bit selection function) |

| | | | | | | |
|--------|--|-------|-------------|-----|---|---|
| P71.09 | V/F torque compensation | 0.0 | 0.0~30.0 | % | × | Manual torque lifting, P71.08=0 |
| P71.10 | Maximum frequency of V/F compensation | 10.00 | 0.00~50.00 | Hz | × | |
| P71.12 | Current slow fall time | 0.00 | 0.01~655.35 | S | × | |
| P71.14 | PWM carrier frequency | 2.000 | 1.100~4.000 | KHz | × | |
| P71.16 | Regulator mode | 2 | 0~3 | / | × | |
| P71.17 | Contact on delay | 0.8 | 0.0~ | S | × | |
| P71.18 | Brake open delay | 0.4 | 0.0~ | S | × | |
| P71.19 | Contact off delay | 1.0 | 0.0~ | S | × | |
| P71.20 | Brake close delay | 0.1 | 0.0~ | S | × | |
| P71.21 | Output off delay | 0.3 | 0.001~ | s | × | |
| P71.22 | Zero speed threshold | 0.20 | 0.0~10.0 | Hz | × | |
| P71.23 | Forward dead zone compensation | 100 | 0~100 | % | × | |
| P71.25 | Zero servo compensation | 0 | 0~100 | % | × | |
| P71.26 | Power-on learning angle | 0 | 0~1 | / | × | 0: no learning 1: self-learning |
| P71.27 | Motor current gain coefficient | 150 | 50~200 | % | × | |
| P71.28 | Zero servo current loop gain coefficient | 100 | 50~200 | % | × | |
| P71.29 | PWM modulation selection | 1 | 0~1 | / | × | 0: underflow update 1: overflow/underflow update |

| | | | | | | |
|--------|--------------------------------------|-------|-------------|----|------------|--|
| | | | | | | Switching frequency below 4kHz can be set to 1 |
| P71.30 | Power factor compensation angle | 0.0 | 0.0~360.0 | °C | × | |
| P71.31 | Power factor compensation direction | 0 | 0~1 | / | × | 0: Reverse; 1: positive |
| P71.32 | Power factor compensation mode | 0 | 0~2 | / | × | |
| P71.33 | Speed accuracy adjustment | 100.0 | 0.0~100.0 | % | × | |
| P71.34 | Performance improvement compensation | 128 | 0~256 | / | × | |
| P71.35 | System inertia coefficient | 100.0 | 0.0~300.0 | % | × | |
| P71.36 | Automatic low speed torque lifting | 100.0 | 0.0~300.0 | % | × | |
| P71.37 | Droop control gain | 0.0% | 0.0~200.0 | % | × | |
| P71.38 | Droop control filter | 0.05 | 0.00~2.00 | S | × | |
| P71.39 | Power outage detection threshold | 480 | 330~580 | V | × | |
| P71.40 | KEB bus target voltage | 500 | 330~580 | V | × | |
| P71.41 | Power outage disposal mode | 0 | 00000~00014 | / | Set by bit | By units, tens, hundreds, thousands and ten thousands places, the value of this parameter is defined as: Units parameter: 0: Not processed 1: Tracking start (limited time) |

| | | | | | | |
|--------|--|--------|-------------|----|---|--|
| | | | | | | 2: Tracking start (unlimited time) 3: KEB (undervoltage detected) 4: KEB (undervoltage undetected) Tens parameter: 1: Enable 3s delay alarm for external fault |
| P71.42 | Maximum power outage compensation time | 3.0 | 0.0~6553.5 | s | × | |
| P71.43 | KEB shortest actuation time | 100 | 0~65535 | ms | × | |
| P71.44 | KEB initial frequency drop | 2.00 | 0~.00655.35 | Hz | × | |
| P71.45 | KEB deceleration time | 10.00 | 0.00~655.35 | s | × | |
| P71.47 | KEB acceleration time | 25.00 | 0.00~655.35 | s | × | |
| P71.48 | KEB proportion Kp | 200.00 | 0.00~655.35 | / | × | |
| P71.49 | KEB integral Ki | 0.00 | 0.00~655.35 | / | × | |
| P71.50 | KEB differential Kd | 0.00 | 0.00~655.35 | / | × | |
| P71.51 | Upper limit of KEB integral | 100.0 | 0.0~6553.5 | % | × | |
| P71.52 | Lower limit of KEB integral | 100.0 | 0.0~6553.5 | % | × | |
| P71.53 | Upper limit of KEB closed loop output | 100.0 | 0.0~6553.5 | % | × | |
| P71.54 | Lower limit of KEB closed loop output | 100.0 | 0.0~6553.5 | % | × | |

| | | | | | | |
|--------|---|--------|------------|----|---|--|
| P71.55 | Upper limit of KEB voltage deviation | 300.0 | 0.0~6553.5 | V | × | |
| P71.56 | KEB voltage zero deviation | 0.0 | 0.0~6553.5 | V | × | |
| P71.58 | Fan control selection | 0 | 0~4 | / | × | |
| P71.59 | Optimization coefficient 1 | 0.0000 | | / | × | |
| P71.60 | Optimization coefficient 2 | 100.0 | 1.0~300.0 | % | × | |
| P71.61 | Optimization coefficient 3 | 100.0 | 1.0~300.0 | % | × | |
| P71.62 | UP/DOWN single step length | 0.10 | | Hz | × | |
| P71.63 | UFVC optimization coefficient | 0 | 0~100 | / | × | |

6.3.9 P8X group Communication parameters

6.3.9.1 P80 group Communication selection parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|---|-----------------|---------------|------|-----------|--------------------|
| P80.01 | Profibus-DP communication switch | 0 | 0~1 | \ | × | 0: off 1: On |
| P80.02 | X12 port - 485 communication switch | 0 | 0~1 | \ | × | 0: off |
| P80.03 | X24 port - 485 communication switch | 0 | 0~1 | \ | × | 1: On |

6.3.9.2 P81 group Modbus communication parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--|-----------------|---------------|------|-----------|------------------------------------|
| P81.00 | X12 port -485 Baud rate | 3 | 0~7 | bps | × | 0: 1200 bps |
| | | | | | | 1: 2400bps |
| | | | | | | 2: 4800 bps |
| | | | | | | 3: 9600 bps |
| | | | | | | 4: 19200 bps |
| P81.01 | X12 port -485 Data format | 0 | 0~3 | / | × | 5: 38400 bps |
| | | | | | | 6: 57600 bps |
| | | | | | | 7: 76800 bps |
| | | | | | | 0: 1-8-1 format, no parity |
| | | | | | | 1: 1-8-1 format, even parity check |
| P81.02 | X12 port - 485 transmission mode selection | 1 | 0~1 | / | × | 2: 1-8-1 format, odd parity check |
| | | | | | | 3: 1-8-2 format, no parity |
| P81.04 | Local address | 1 | 1~247 | / | × | 0: ASC; 1: RTU |
| P81.07 | Communication address format selection | 1 | | / | × | 1~247, 0 is broadcast address |
| P81.08 | X24 port -485 Baud rate | 3 | 0~7 | bps | × | 0: hexadecimal; 1: decimal |
| | | | | | | 0: 1200 bps |
| | | | | | | 1: 2400bps |
| | | | | | | 2: 4800 bps |
| | | | | | | 3: 9600 bps |
| P81.08 | X24 port -485 Baud rate | 3 | 0~7 | bps | × | 4: 19200 bps |
| | | | | | | 5: 38400 bps |
| | | | | | | 6: 57600 bps |
| P81.08 | X24 port -485 Baud rate | 3 | 0~7 | bps | × | 7: 76800 bps |

| | | | | | | |
|--------|--|---|-----|---|---|---|
| P81.09 | X24 port -485 Data format | 0 | 0~3 | / | × | 0: 1-8-1 format, no parity 1: 1-8-1 format, even parity check 2: 1-8-1 format, odd parity check 3: 1-8-2 format, no parity |
| P81.10 | X24 port - 485 transmission mode selection | 1 | 0~1 | / | × | 0: ASC; 1: RTU |

6.3.9.3 P82 group Profibus_DP Communication parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|------------------------------|-----------------|---------------|------|-----------|--|
| P82.01 | Large and small segment mode | 0 | 0~1 | / | × | 0: issue high 8 bits first and then low 8 bits 1: issue low 8 bits first and then high 8 bits |
| P82.02 | Custom status word 1 | 16 | 0~59 | | × | See Communication Appendix C |
| P82.03 | Custom status word 2 | 13 | 0~59 | / | × | See Communication Appendix C |
| P82.04 | Custom status word 3 | 10 | 0~59 | / | × | See Communication Appendix C |
| P82.05 | Custom status word 4 | 18 | 0~59 | / | × | See Communication Appendix C |

6.3.10 P9X group Fault and display parameters

6.3.10.1 P90 group Language selection parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--------------------|-----------------|---------------|------|-----------|--------------------|
|---------------|--------------------|-----------------|---------------|------|-----------|--------------------|

| | | | | | | |
|--------|------------------------------------|---|-----|---|---|--------------------------|
| P90.00 | Operation panel language selection | 0 | 0~1 | / | × | 0: Chinese 1: English |
|--------|------------------------------------|---|-----|---|---|--------------------------|

6.3.10.2 P91 group LCD display parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--------------------|-----------------|---------------|------|-----------|--------------------|
| P91.00 | U01 display data | 1 | 0~71 | / | × | See Chapter 7 |
| P91.01 | U02 display data | 2 | 0~71 | / | × | |
| P91.02 | U03 display data | 3 | 0~71 | / | × | |
| P91.03 | U04 display data | 7 | 0~71 | / | × | |
| P91.04 | U05 display data | 8 | 0~71 | / | × | |
| P91.05 | U06 display data | 6 | 0~71 | / | × | |
| P91.06 | U07 display data | 9 | 0~71 | / | × | |
| P91.07 | U08 display data | 0 | 0~71 | / | × | |

6.3.10.3 P92 group LED display parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--------------------|-----------------|---------------|------|-----------|--------------------|
| P92.00 | LED display data | 2 | 0~71 | / | × | See Chapter 7 |

6.3.10.4 P93 group Running record parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|----------------------------|-----------------|---------------|------|-----------|--------------------|
| P93.00 | Cumulative conduction time | 0 | 0~65535 | h | * | |
| P93.01 | Cumulative running time | 0 | 0~65535 | h | * | |
| P93.02 | Set total conduction time | 0 | | | | |
| P93.03 | Remaining conduction time | 0 | | | | |

| | | | | | | |
|--------|--------------------------------|-----|-----------|-----|---|---|
| P93.04 | Maximum radiator temperature | 0.0 | 0.0~100.0 | °C | * | Record the maximum value during startup |
| P93.05 | Cumulative output work | 0.0 | | kWh | * | |
| P93.06 | Inverter output work | 0 | | MWh | * | |
| P93.07 | Cumulative running time of fan | 0 | | h | * | |

6.3.10.5 P94 group Troubleshooting parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|--|-----------------|----------------|-------|-----------|--|
| P94.00 | Minor fault handling mode | 1 | 0~1 | / | × | 0: Non output fault relay 1: Output fault relay |
| P94.01 | Automatic fault reset time | 10.0 | 0.0~180 | S | × | Automatic fault reset time of inverter |
| P94.02 | Number of automatic fault resets | 0 | 1~100 | / | × | Number of automatic fault resets of inverter |
| P94.03 | Overheating time of radiator | 0.5 | 0.0~180.0 | S | × | |
| P94.04 | Overspeed protection time | 1.00 | 0.00~180.00 | S | × | |
| P94.05 | Input default phase voltage threshold | 65 | 0~150 | V | × | |
| P94.07 | Confirmed number of encoder disconnections | 2 | 0~100 | Times | × | |
| P94.08 | Output default phase recognition time | 2.000 | 0.00 ~ 180.000 | S | × | |
| P94.09 | Relay fault recognition voltage | 90 | 0~350 | V | × | |
| P94.10 | CD misphase judgment threshold | 300 | 300~1000 | / | × | |
| P94.11 | ABZ protection threshold | 20 | 20~100 | % | × | |

| | | | | | | |
|--------|---|-------|--------------|-------|------------|---|
| P94.12 | IGBT protection times | 2 | 0~1000 | / | × | |
| P94.13 | I ² t protection selection | 0 | 0~3 | / | × | |
| P94.14 | Analog A0 disconnection value | 0.0 | 0.0~100% | % | × | |
| P94.15 | Analog A1 disconnection value | 0.0 | 0.0~100% | % | × | |
| P94.16 | Analog exception handling | 0 | 0~1 | / | × | 0: Not handled 1: Protected |
| P94.17 | Temperature sampling disconnection handling | 0 | 0~1 | / | × | 0: Not handled 1: Protected |
| P94.18 | Communication protection | 1 | 0~1 | / | × | Bit0:Profibus-DP protection shutdown set bit Bit1:X12-485 MODBUS protection shutdown set bit Bit2: X24-485 MODBUS protection shutdown set bit A bit value of 0 indicates not handled; 1 means shutdown protection. |
| P94.19 | X12-485 Communication disconnection protection time | 2.000 | 0.000~65.535 | s | × | |
| P94.20 | Number of grounding protections | 100 | 1~60000 | / | × | |
| P94.21 | X24-485 Communication disconnection protection time | 2.000 | 0.000~65.535 | s | × | |
| P94.22 | Confirmed number of fan faults | 10 | 0~20 | Times | × | 0 means fan fault detection ignored |
| P94.23 | Fault action selection 1 | 00000 | 00000~12201 | / | Set by bit | By units, tens, hundreds, thousands and ten thousands places, the value of this parameter is defined as: 0: free stop 1: stop by stop mode |

| | | | | | | |
|--------|--|-------|-------------|---|------------|--|
| | | | | | | 2. warning to continue operation |
| P94.24 | Fault action selection 2 | 00000 | 00000~22222 | / | Set by bit | The same as P94.23 |
| P94.25 | Fault action selection 3 | 00000 | 00000~22122 | / | Set by bit | The same as P94.23 |
| P94.26 | Fault action selection 4 | 00000 | 00000~02222 | / | Set by bit | The same as P94.23 |
| P94.27 | Continue operating frequency selection | 0 | 0~4 | / | × | 0: Run at target frequency 1: Run at current frequency 2: Run at upper limit of frequency 3: Run at lower limit of frequency 4: Run at multi-stage speed 15 |

6.3.10.6 P95 group Product identification parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|---------------------------|-----------------|---------------|------|-----------|---------------------------|
| P95.00 | Inverter hardware version | 70.04 | | / | * | Inverter hardware version |
| P95.01 | Inverter software version | 100.01 | | / | * | Inverter software version |
| P95.02 | Version No. | 100. 01 | | / | * | Version No. |

6.3.10.7 P96 group Inverter product parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|-----------------------------|-----------------|---------------|------|-----------|---|
| P96.00 | Rated power of inverter | 315 | 0.0~65535.5 | kW | * | Rated value of inverter in light load application |
| P96.01 | Rated current of inverter | 334 | 0.0~65535.5 | A | * | Rated value of inverter in light load application |
| P96.02 | Maximum current of inverter | 668 | 0.0~999.9 | A | * | |
| P96.03 | Rated voltage of inverter | 380 | 0~690 | V | * | 380V, 690V |

| | | | | | | |
|--------|---|--------|---------------|----|---|---|
| P96.04 | Inverter power coefficient | 100 | 0~100 | % | * | |
| P96.05 | Inverter sensor current | 1500 | 0~9999 | A | * | |
| P96.06 | Rated current of IGBT module | 1280 | 0~9999 | A | * | |
| P96.08 | Three-phase current balance coefficient | 1.000 | 0.80~1.200 | | * | |
| P96.15 | Software upgrade number | 20 | 0~65535 | / | * | |
| P96.16 | Special parameters | 90 | 0~65535 | / | * | |
| P96.17 | Number of inverter units | 1 | 0~6 | / | * | |
| P96.18 | Current sampling mode | 0 | 0~1 | / | * | |
| P96.19 | Current sharing hysteresis width | 0.00 | 0~655.35 | A | * | |
| P96.20 | Sharing current compensation quantity | 0.00 | 0~655.35 | % | * | |
| P96.21 | Heavy load rated power | 315 | 0.0~65535.5 | kW | * | Rated value of inverter in heavy load application |
| P96.22 | Heavy load rated current | 334 | 0.0~65535.5 | A | * | Rated value of inverter in heavy load application |
| P96.23 | Sensor coefficient correction | 0 | 0~3 | / | * | 0: UW 1: UW 2: UV 3: VW |
| P96.24 | Optical fiber selection 1 | 0x3210 | 0x0000~0x7777 | / | * | Optical fiber port of configuration unit |
| P96.25 | Optical fiber selection 2 | 0x7654 | 0x0000~0x7777 | / | * | Optical fiber port of configuration unit |

Chapter 7 Parameter Details

7.1 AFE parameter details

7.1.1 Main menu and fault description

7.1.1.1 Parameter settings

Display the parameters in P0X~P9X groups after entry. When the login password is correct, you can modify the modifiable parameters. See the following parameters for details.

| Short form field | Explanation |
|-----------------------|---|
| Function code No. | Code name of function code, e.g. P00.00 |
| Function code name | Name of function code to explain the function code |
| Function code options | Function code parameter setting list |
| Setting range | Minimum to maximum value of function code allowed to set |
| Unit | V: voltage; A: current; °C: degree centigrade; Ω: Ohm; mH: millihenry; rpm: speed; %: percentage; bps: Baud rate; Hz, kHz: power; ms, s, min, h, kh: time; kW: power; /: no unit |
| Factory default | Set value of function code after reset to factory default (see P00.04) |
| Attribute | ○: the function code can be modified in running; ×: the function code can be modified only in halt state; *: the function code is read-only and cannot be modified. |
| User defined | For the user to record parameters |

7.1.1.2 Sampling setting

It is used to calibrate the sensor deviation during the factory test. This function is only for internal use.

7.1.1.3 Fault checking

Press the ENTER key to enter the fault list, and 8 faults can be displayed in reverse chronological order. If you see a fault, press the ENTER key to display the bus voltage, output current and operating frequency when the fault occurs. The fault types corresponding to the fault codes are shown in the following table.

| Fault code | Fault display | Fault code | Fault display |
|------------|--|------------|--|
| 1 | Unit hardware overcurrent | 2 | Standby |
| 3 | Radiator overheated | 4 | Standby |
| 5 | Standby | 6 | Standby |
| 7 | Standby | 8 | Bus overvoltage protection |
| 9 | Bus undervoltage | 10 | Output default phase |
| 11 | Main circuit breaker fault | 12 | Charging contactor fault |
| 13 | Charging not allowed | 14 | Reactor overheating fault |
| 15 | Standby | 16 | Standby |
| 17 | Standby | 18 | Standby |
| 19 | Standby | 20 | Standby |
| 21 | abc overcurrent | 22 | Standby |
| 23 | Input overvoltage | 24 | Standby |
| 25 | Unit fan fault | 26 | Standby |
| 27 | Input overcurrent | 28 | Standby |
| 29 | Input default phase | 30 | Standby |
| 31 | I ² T power overload | 32 | Grounding protection |
| 33 | Standby | 34 | External fault |
| 35 | Standby | 36 | Standby |
| 37 | Standby | 38 | Standby |
| 39 | Standby | 40 | Standby |
| 41 | Standby | 42 | Unit IGBT fault |
| 43 | Communication fault | 44 | Phase lock fault |
| 45 | I ² t instantaneous value overcurrent | 46 | I ² t effective value overcurrent |
| 47 | Standby | 48 | Standby |
| 49 | Standby | 50 | Standby |
| 51 | Standby | 52 | Standby |
| 53 | Unit optical fiber | 54 | PowerID fault |

| Fault code | Fault display | Fault code | Fault display |
|------------|-----------------------------|------------|-------------------------|
| | communication fault | | |
| 55 | Unit power unevenness fault | 56 | Unit current bias fault |

7.1.1.4 Parameter processing

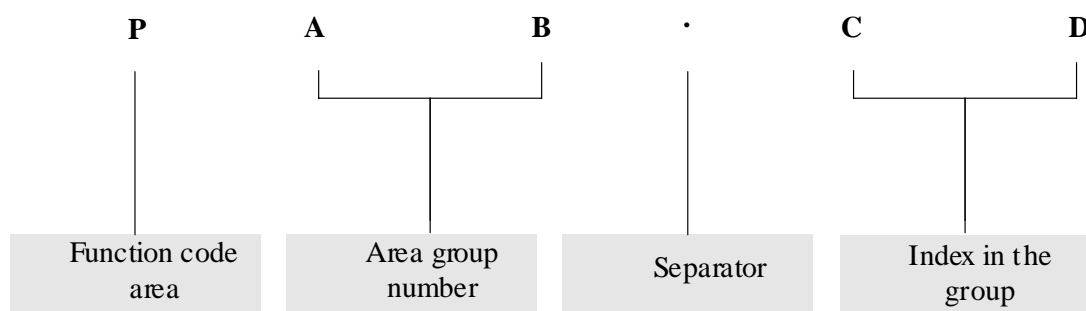
Press ENTER. This function is used to set the change permissions and initialization level of the parameters.

- 0: All parameters are allowed to change.
- 1: All parameters are not allowed to change.
- 2: Restore the P0X group parameters to factory set values.
- 3: Restore all non-P0X group parameters (show/hide area of user-defined function codes) to factory set values.
- 4: Restore all user parameters to factory set values.

Note: After parameter initialization, the password set by the user will be reset automatically. Press the ESC key to return to the main menu interface

7.1.2 Parameter group classification and format

7.1.2.1 Parameter group format



7.1.2.2 Parameter group area division

| Function code area | Domain group | Function code description |
|------------------------|--------------|-------------------------------|
| P0X user parameters | P00 group | Password parameter group |
| P1X control parameters | P10 group | Basic control parameter group |
| P2X sensor parameters | P20 group | Sensor parameter group |
| P3X terminal control | P30 group | Digital input parameter group |

| | | |
|------------------------------------|-----------|--------------------------------|
| parameters | P31 group | Digital output parameter group |
| P4X vector control parameters | P40 group | Voltage loop parameter group |
| | P41 group | Current loop parameter group |
| | P42 group | Torque control parameter group |
| P5X enhanced control | P50 group | Special function parameter |
| P6X monitoring function parameters | P60 group | Language selection parameter |
| | P61 group | LCD display parameter group |
| | P62 group | LED display parameter group |
| | P63 group | Running record parameter group |
| | P64 group | Troubleshooting parameter |
| | P65 group | Version parameter group |
| | P66 group | Rectifier feedback unit |

7.1.3 P0X group: user parameter group

7.1.3.1 P00 group basic function parameters

| Function code | Name | Setting range | Factory setting |
|---------------|----------------|---------------|-----------------|
| P00.00 | Login password | 0~65535 | 0 |

This function is used to prevent irrelevant personnel from querying and modifying parameters and to protect the parameter safety of the inverter.

00000: no password protection. All parameters can be inquired and the inverter has no password when leaving factory.

Once the user password takes effect, when entering the parameter setting state again, all parameters can be viewed only and cannot be changed through the operation panel until the correct password is entered. The password in the parameter always shows 00000.

Note: The **AS700** engineering inverter does not set the user password when it leaves the factory (P00.00=0), so you don't need a password to log in for the first time.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------|---------------|-----------------|
| P00.01 | Change password | 0~65535 | 0 |

Set password:

Enter 5 digits as the user password, press ENTER to confirm, and repeat the setting once.

Change password:

Press ENTER to enter the password verification state, and it will display 00000. Input the correct password and enter the parameter edit state. Select P00.01 (P00.00 parameter is displayed as 00000), enter the new password, press ENTER to confirm and then set the same password as P00.01. The new password is set successfully after "Password set successfully" is displayed.

Cancel password:

Press ENTER to enter the password verification state, and it will display 00000. Input the correct user password and enter the parameter edit state. Check that P00.01 is 00000, press ENTER to

confirm and reset P00.01 = 00000. The password is cleared after “Password clear” is displayed.

| Function code | Name | Setting range | Factory setting |
|---------------|------------------|---------------|-----------------|
| P00.02 | Standby password | 0~65535 | 0 |

When the user forgets the password already set, the manufacturer may change the parameters, including the new password, by entering the correct the alternate password.

7.1.4 P1X group: control parameter group

7.1.4.1 P10 group: Basic control parameters

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------|---------------|-----------------|
| P10.00 | Control mode selection | 0~3 | 0 |

This function is used to set the control run mode of the rectifier feedback unit.

0: Panel given run command mode: run and shut down the rectifier feedback unit by the keys F1(RUN), F2(STOP), F3(LOC/REM) on the operation panel.

1: Terminal given run command mode: run and stop the rectifier feedback unit by defining the multifunction terminals X0~X7. Refer to P30.00~P30.07.

2: CAN given command mode: run and stop the rectifier feedback unit by CAN communication.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------|---------------|-----------------|
| P10.01 | Operation mode | 0~1 | 0 |

This function is only used to display the operation mode of the rectifier feedback unit, so as to avoid the rectifier feedback unit in the wrong working state, where 0 is normal operation and 1 is sensor self-learning.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------|---------------|-----------------|
| P10.02 | Given bus voltage (V) | 600~1200 | 650 |

Set the bus voltage of the rectifier feedback unit system.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------------|---------------|-----------------|
| P10.03 | Compensating torque channel selection | 0~1 | 0 |

This function is suitable for selecting whether to enable compensating torque, where 0 is uncompensated torque and 1 is Can given active.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------|---------------|-----------------|
| P10.04 | Reactive compensation (%) | 0~120 | 0 |

This function is suitable for setting the reactive compensation of the rectifier feedback unit.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------|---------------|-----------------|
| P10.05 | Reactive channel selection | 0~4 | 0 |

This function is suitable for setting the reactive command given of the rectifier feedback unit.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------|---------------|-----------------|
| P10.06 | Active current given (%) | 0~120 | 0 |

This function is suitable for setting the active current given of the rectifier feedback unit.

| Function code | Name | Setting range | Factory setting |
|---------------|------------------|---------------|-----------------|
| P10.07 | Test instruction | 0~1 | 0 |

This function is suitable for R&D test.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------------|---------------|-----------------|
| P10.08 | Confirmed number of fan faults | 0~20 | 10 |

This function is suitable for setting the enabling and judging conditions of the fan detection of the rectifier feedback unit.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------------|---------------|-----------------|
| P10.09 | Power-off self-start enable | 0~65535 | 0 |

This function is enabled only when the grid power-off self-start function is required, and is not enabled in the standard configuration.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------|---------------|-----------------|
| P10.10 | Power-off time | 0~655.35 | 35 |

Under the enabling condition in P10.09, the power grid is recovered within the set time after power-off and the system starts automatically.

7.1.5 P2X group: Sensor parameters

7.1.5.1 P20 group: Sensor parameters

| Function code | Function code name | Factory default | Setting range | Unit | Attribute | Option description |
|---------------|----------------------|-----------------|---------------|------|-----------|----------------------|
| P20.00 | RS line voltage gain | 100.0 | 0~120.0 | % | × | RS line voltage gain |
| P20.01 | ST line voltage gain | 100.0 | 0~120.0 | % | × | ST line voltage gain |
| P20.02 | RS line voltage bias | 100.0 | 80~120.0 | % | × | RS line voltage bias |
| P20.03 | ST line voltage bias | 100.0 | 80~120.0 | % | × | ST line voltage bias |

| | | | | | | |
|--------|----------------------|-------|----------|---|---|----------------------|
| P20.04 | Bus voltage gain | 100.0 | 80~120.0 | % | × | Bus voltage gain |
| P20.05 | Ia bias | 100.0 | 80~120.0 | % | × | Ia bias |
| P20.06 | Ib bias | 100.0 | 80~120.0 | % | × | Ib bias |
| P20.07 | Ic bias | 100.0 | 80~120.0 | % | × | Ic bias |
| P20.08 | TR line voltage gain | 100.0 | 0~120.0 | % | × | TR line voltage gain |
| P20.09 | TR line voltage bias | 100.0 | 80~120.0 | % | × | TR line voltage bias |

This group of parameters provides a reference for the sensor calibration for factory workers and may not be set by the user.

7.1.6 P3X group: Terminal parameter group

7.1.6.1 P30 group: Digital input parameters

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------------------|---------------|-----------------|
| P30.00 | X0 terminal input function selection | 0~199 | 10 |
| P30.01 | X1 terminal input function selection | 0~199 | 105 |
| P30.02 | X2 terminal input function selection | 0~199 | 9 |
| P30.03 | X3 terminal input function selection | 0~199 | 1 |
| P30.04 | X4 terminal input function selection | 0~199 | 111 |
| P30.05 | X5 terminal input function selection | 0~199 | 4 |
| P30.06 | X6 terminal input function selection | 0~199 | 0 |
| P30.07 | X7 terminal input function selection | 0~199 | 0 |

Function input terminal definition table:

| No. | Function definition | No. | Function definition |
|-----|---------------------|-----|-------------------------------|
| 0 | No function | 1 | Running signal |
| 2 | Inching signal | 3 | Stop signal (normally closed) |

| | | | |
|----|---------------------------------------|----|--------------------------------|
| 4 | Fault reset signal | 5 | External fault status |
| 6 | Emergency power supply running signal | 7 | Basic electrode locking signal |
| 8 | Feedback prohibited | 9 | Power starting signal |
| 10 | Main contactor status | 11 | Reactor overheating fault |

0: no function

1: Running signal

AFE is running when the terminal signal is valid.

2: Inching signal

This parameter is used for testing by factory personnel and may not be set by the user.

3: Stop signal

This parameter is used for testing by factory personnel and may not be set by the user.

4: Fault reset signal

External terminal reset AFE fault when the terminal signal is valid.

5: External fault status

AFE stops due to external fault when the terminal signal is valid (commonly used for control circuit closing detection).

6: Emergency power supply running signal

This parameter is used for testing by factory personnel and may not be set by the user.

7: Basic electrode locking signal

AFE basic electrode is not allowed to operate when the terminal signal is valid.

8: Feedback Prohibited

AFE feedback is prohibited when the terminal signal is valid.

9: Power starting signal

When the terminal signal is valid, the main power supply is on. For details of the power on process, please refer to AFE power-on sequence chart in Section 5.4.

10: Main contactor status

The main contactor state pulls in when the terminal signal is valid.

11: Reactor overheating fault

Reactor (including LCL and control transformer) overheating fault when the terminal signal is valid.

AFE stops running in case of fault.

Caution: 1 can be set before the above parameters as logic negation. Example: 105: Externally normal when the terminal input signal is valid.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------|---------------|-----------------|
| P30.08 | Digital input filter times | 0~100 | 0 |

The anti-interference ability of the terminal can be improved by appropriately increasing the setting of P30.08. The larger the number of terminal filter times, the longer the delay of terminal action.

7.1.6.2 P31 group: Digital output parameters

| Function code | Name | Setting range | Factory setting |
|---------------|------|---------------|-----------------|
|---------------|------|---------------|-----------------|

| | | | |
|--------|--------------------------------------|-------|----|
| P31.00 | Digital output 0 function definition | 0~199 | 0 |
| P31.01 | Digital output 1 function definition | 0~199 | 8 |
| P31.02 | Digital output 2 function definition | 0~199 | 9 |
| P31.03 | Digital output 3 function definition | 0~199 | 10 |
| P31.04 | Digital output 4 function definition | 0~199 | 3 |
| P31.05 | Digital output 5 function definition | 0~199 | 0 |
| P31.06 | Digital output 6 function definition | 0~199 | 0 |
| P31.07 | Digital output 7 function definition | 0~199 | 0 |

Function input terminal definition table:

| No. | Function definition | No. | Function definition |
|-----|------------------------------|-----|------------------------------|
| 0 | No function | 1 | Normal POST |
| 2 | Fault output | 3 | Running |
| 4 | Standby | 5 | Forecast fault output |
| 6 | Rectification/feedback state | 7 | Undervoltage state |
| 8 | Main contactor control | 9 | Soft start contactor control |
| 10 | Fan contactor control | 11 | Self-start |
| 12 | AC circuit breaker off | 13 | Grid fault |

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------------------|---------------|-----------------|
| P31.08 | Digital output 0 action delay (s) | 0~6553.5 | 0.0 |
| P31.09 | Digital output 0 reset delay (s) | 0~6553.5 | 0.0 |
| P31.10 | Digital output 1 action delay (s) | 0~6553.5 | 0.0 |
| P31.11 | Digital output 1 reset delay (s) | 0~6553.5 | 0.0 |
| P31.12 | Digital output 2 action delay (s) | 0~6553.5 | 0.0 |
| P31.13 | Digital output 2 reset delay (s) | 0~6553.5 | 0.0 |
| P31.14 | Digital output 3 action delay (s) | 0~6553.5 | 0.0 |
| P31.15 | Digital output 3 reset delay (s) | 0~6553.5 | 0.0 |
| P31.16 | Digital output 4 action delay (s) | 0~6553.5 | 0.0 |
| P31.17 | Digital output 4 reset delay (s) | 0~6553.5 | 0.0 |
| P31.18 | Digital output 5 action delay (s) | 0~6553.5 | 0.0 |

| | | | |
|--------|-----------------------------------|----------|-----|
| P31.19 | Digital output 5 reset delay (s) | 0~6553.5 | 0.0 |
| P31.20 | Digital output 6 action delay (s) | 0~6553.5 | 0.0 |
| P31.21 | Digital output 6 reset delay (s) | 0~6553.5 | 0.0 |
| P31.22 | Digital output 7 action delay (s) | 0~6553.5 | 0.0 |
| P31.23 | Digital output 7 reset delay (s) | 0~6553.5 | 0.0 |

P31.06~P31.17 are the time constants to set the action delay and reset delay of output end signals. Through them, the delay time of the output state of each output end relative to its corresponding actual signal can be flexibly set as needed. Moreover, the delay time of the output state mentioned above can be set respectively when the signal is triggered or when the signal is reset.

7.1.7 P4X group: Vector control parameters

7.1.7.1 P40 group: Voltage loop parameters

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P40.00 | Voltage loop proportionality coefficient (%) | 0.0~6553.5 | 100.0 |

Voltage loop proportionality coefficient given by the panel, which can be changed by the button

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P40.01 | Voltage loop integration coefficient (%) | 0.0~6553.5 | 100.0 |

Voltage loop integration coefficient given by the panel, which can be changed by the button

7.1.7.2 P41 group: Current loop parameters

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P41.00 | Current loop proportionality coefficient (%) | 0.0~6553.5 | 20.0 |

Current loop proportionality coefficient given by the panel, which can be changed by the button

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P41.01 | Current loop integration coefficient (%) | 0.0~6553.5 | 10.0 |

Current loop integration coefficient given by the panel, which can be changed by the button

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------|---------------|-----------------|
| P41.02 | Current error threshold | 0~65535 | 60 |

Current threshold for the given power unevenness of panel

7.1.7.3 P42 group: Torque control parameters

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------------|---------------|-----------------|
| P42.00 | Compensating torque gain (%) | 0.0~6553.5 | 100.0 |

Compensating torque gain given by the panel, which can be changed by the button

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------|---------------|-----------------|
| P42.01 | Current limit (%) | 0.0~6553.5 | 120.0 |

Current limit given by the panel, which can be changed by the button.

7.1.8 P5X group: Enhanced control parameters

7.1.8.1 P50 group: Special function parameters

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------------|---------------|-----------------|
| P50.00 | PWM carrier frequency (kHz) | 2~5 | 3 |

Set the carrier frequency of the rectifier feedback unit

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------------|---------------|-----------------|
| P50.01 | Dead zone compensation time (us) | 0~8.000 | 8.000 |

The adjustment of the dead zone compensation time can improve the current THD. Generally, it can be set as factory parameters without adjustment.

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------------|---------------|-----------------|
| P50.02 | PWM modulation selection (us) | 0~1 | 1 |
| P50.03 | Interruption frequency (kHz) | 6000~8000 | 6000 |

This parameter determines the program execution frequency.

| Function code | Name | Setting range | Factory setting |
|---------------|---|---------------|-----------------|
| P50.04 | Dead zone compensation current hysteresis | 0~100 | 100 |

Dead zone compensation percentage

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------|---------------|-----------------|
| P50.05 | PWM modulation method | 0~1 | 1 |

0 indicates 7-segment modulation and 1 indicates 5-segment modulation.

7.1.9 P6X group: Monitoring function parameters

7.1.9.1 P60 group: Rectifier feedback unit language parameters

| Function code | Name | Setting range | Factory setting |
|---------------|--------------|---------------|-----------------|
| P60.00 | AFE language | 0~1 | 0 |

The display language of the rectifier feedback unit can be set. The current default is 0 (Chinese displayed).

7.1.9.2 P61 group: LCD display parameters

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------|---------------|-----------------|
| P61.00 | Given bus voltage | 0~29 | 1 |
| P61.01 | Feedback bus voltage | 0~29 | 2 |
| P61.02 | Output current | 0~29 | 3 |
| P61.03 | Line voltage | 0~29 | 4 |
| P61.04 | Radiator temperature | 0~29 | 5 |
| P61.05 | Active power | 0~29 | 6 |
| P61.06 | U07 display data | 0~29 | 0 |
| P61.07 | U08 display data | 0~29 | 0 |

P61 parameter group is used to enable the Operation panel display content, 0: no function; >0: with function

Display function definition table:

| Function setting | Meaning | Function setting | Meaning |
|------------------|--------------------------|------------------|---------------------------|
| 0 | No function | 1 | Given bus voltage (V) |
| 2 | Feedback bus voltage (V) | 3 | Output current (A) |
| 4 | Line voltage (V) | 5 | Radiator temperature (°C) |
| 6 | Active power (KW) | 7 | Reactive power (KW) |
| 8 | Apparent power (VA) | 9 | Power coefficient (%) |
| 10 | Analog 1 input (mA) | 11 | Analog 2 input (mA) |
| 12 | Analog 3 input (mA) | | |

7.1.9.3 P62 group: LED display parameters

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------|---------------|-----------------|
| P62.00 | Feedback bus voltage (V) | 0~29 | 2 |

P62 parameter group is used to enable the Operation panel display content, 0: no function; >0: with

function

Display function definition table:

| Function setting | Meaning | Function setting | Meaning |
|------------------|--------------------------|------------------|---------------------------|
| 0 | No function | 1 | Given bus voltage (V) |
| 2 | Feedback bus voltage (V) | 3 | Output current (A) |
| 4 | Line voltage (V) | 5 | Radiator temperature (°C) |
| 6 | Active power (KW) | 7 | Reactive power (KW) |
| 8 | Apparent power (VA) | 9 | Power coefficient (%) |
| 10 | Analog 1 input (mA) | 11 | Analog 2 input (mA) |
| 12 | Analog 3 input (mA) | | |

7.1.9.4 P63 group: Running record parameters

| Function code | Name | Setting range | Factory setting |
|---------------|---|---------------|-----------------|
| P63.00 | Cumulative conduction time (h) | 0~65535 | 0 |
| P63.01 | Cumulative running time (h) | 0~65535 | 0 |
| P63.02 | Maximum radiator temperature (°C) | 0~6553.5 | 60 |
| P63.03 | High bit of rectifier power consumption (10,000kWh) | 0~65535 | 0 |
| P63.04 | Low bit of rectifier power consumption (kWh) | 0~65535 | 0 |
| P63.05 | High bit of feedback energy (10,000kWh) | 0~65535 | 0 |
| P63.06 | Low bit of feedback energy (kWh) | 0~65535 | 0 |
| P63.07 | High bit of total energy consumption (10,000kWh) | 0~65535 | 0 |
| P63.08 | Low bit of total energy | 0~65535 | 0 |

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------|---------------|-----------------|
| | consumption (kWh) | | |
| P63.09 | Power reset | 0~1 | 0 |

63 parameter group is used to display relevant menu content.

7.1.9.5 P64 group Troubleshooting parameters

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------|---------------|-----------------|
| P64.00 | Minor fault handling | 0~1 | 1 |

This function is used to set the minor fault handling mode of the rectifier feedback unit: 0: Non output fault relay; 1: output fault relay

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------------|---------------|-----------------|
| P64.01 | Automatic fault reset time (s) | 0~6553.5 | 10.0 |

This function is used to set the automatic fault reset time of the rectifier feedback unit.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------------|---------------|-----------------|
| P64.02 | Number of automatic fault resets | 0~65535 | 30 |

This function is used to set the automatic fault reset time of the rectifier feedback unit.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------------|---------------|-----------------|
| P64.03 | Overheating time of radiator (s) | 0~10.00 | 0.50 |

This function is used to set the radiator overheating time of the rectifier feedback unit.

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------------------|---------------|-----------------|
| P64.04 | Number of input default phase times | 0~65535 | 100 |

This function is used to set the number of input default phase of the rectifier feedback unit.

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P64.05 | Number of output default phase (times) | 0~65.535 | 2.000 |

This function is used to set the number of output default phase of the rectifier feedback unit.

7.1.9.6 P65 group: Version parameters

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------|---------------|-----------------|
| P65.00 | AFE hardware version | 0~655.35 | 71.06 |
| P65.01 | AFE software version | 0~6553.5 | 120.01 |
| P65.02 | Profibus_DP version | 0~65.535 | 0.000 |

This function is used to display the relevant version information of the rectifier feedback unit.

7.1.9.7 P66 group: Rectifier feedback unit information parameters

| Function code | Name | Setting range | Factory settings |
|---------------|---|---------------|------------------|
| P66.00 | AFE rated power | 0~6553.5 | 315 |
| P66.01 | AFE rated current | 0~6553.5 | 285 |
| P66.02 | Heavy load rated power | 0~6553.5 | 280 |
| P66.03 | Heavy load rated current | 0~6553.5 | 256 |
| P66.04 | AFE maximum current | 0~6553.5 | 668 |
| P66.05 | AFE rated voltage | 0~65535 | 380.0 |
| P66.06 | AFE power coefficient | 0~65535 | 100 |
| P66.07 | Current sensor current | 0~65535 | 1500 |
| P66.08 | IGBT module current | 0~65535 | 1000 |
| P66.09 | Three-phase current balance coefficient | 0.80~1.200 | 1.000 |
| P66.10 | ID_0 | 0~65535 | 12799 |
| P66.11 | ID_1 | 0~65535 | 45247 |
| P66.12 | ID_2 | 0~65535 | 12866 |
| P66.13 | ID_3 | 0~65535 | 13106 |
| P66.14 | ID_4 | 0~65535 | 2419 |
| P66.15 | ID_5 | 0~65535 | 4163 |
| P66.16 | ID_6 | 0~65535 | 3 |
| P66.17 | Number of inverter units | 1~6 | 1 |
| P66.18 | Current sampling mode | 0~1 | 1 |

| | | | |
|--------|---------------------------------------|-----------|------|
| P66.19 | Current sharing hysteresis width | 0~100 | 5 |
| P66.20 | Sharing current compensation quantity | 0~120 | 0 |
| P66.21 | Line side inductance value | 0~65535 | 120 |
| P66.22 | Machine side inductance value | 0~65535 | 240 |
| P66.23 | Inductive equivalent resistance | 0~65535 | 0 |
| P66.24 | LCL equivalent capacitance | 0~6553.5 | 20 |
| P66.25 | Bus capacitance | 0~65535 | 0 |
| P66.26 | Unit channel selection 1 | 0123~3210 | 3210 |
| P66.27 | Unit channel selection 2 | 4567~7654 | 7654 |

This function is used to display the relevant parameter information of the rectifier feedback unit.

7.2 Inverter module parameter details

7.2.1 Main menu and fault description

7.2.1.1 Parameter settings

Display the parameters in P0X~P9X groups after entry. When the login password is correct, you can modify the modifiable parameters. See the following parameters for details

| Short form field | Explanation |
|-----------------------|---|
| Function code No. | Code name of function code, e.g. P00.00 |
| Function code name | Name of function code to explain the function code |
| Function code options | Function code parameter setting list |
| Setting range | Minimum to maximum value of function code allowed to set |
| Unit | V: voltage; A: current; °C: degree centigrade; Ω: Ohm; mH: millihenry; rpm: speed; %: percentage; bps: Baud rate; Hz, kHz: power; ms, s, min, h, kh: time; kW: power; /: no unit |
| Factory default | Set value of function code after reset to factory default (see P00.04) |
| Attribute | ○: the function code can be modified in running; ×: the function code can be modified only in halt state; *: the function code is read-only and cannot be modified. |
| User defined | For the user to record parameters |

7.2.1.2 Fault checking

Press the ENTER key to enter the fault list, and 8 faults can be displayed in reverse chronological order. If you see a fault, press the ENTER key to display the bus voltage, output current and operating frequency when the fault occurs.

The fault types corresponding to the fault codes are shown in the following table.

| Fault code | Fault display | Fault code | Fault display |
|------------|---------------------------|------------|----------------------------|
| 1 | Unit hardware overcurrent | 3 | Radiator overheated |
| 7 | Speed variation | 8 | Bus overvoltage protection |
| 9 | Bus undervoltage | 10 | Output default phase |

| Fault code | Fault display | Fault code | Fault display |
|------------|--|------------|--|
| 11 | Low-speed overcurrent of the motor | 12 | Encoder fault |
| 16 | Motor phase sequence error | 17 | Overspeed in the same direction |
| 18 | Overspeed in the reverse direction | 20 | Encoder communication fault |
| 21 | abc overcurrent | 22 | Brake detection fault |
| 25 | Unit fan fault | 26 | Encoder non-self-learning |
| 27 | Output overcurrent | 28 | SinCos encoder fault |
| 29 | Input default phase | 30 | Overspeed protection |
| 31 | Motor high speed overcurrent | 32 | Grounding protection |
| 34 | External fault | 37 | Current sensor fault |
| 40 | Output contactor fault | 42 | Unit IGBT fault |
| 43 | Communication fault (Modbus, Profibus-DP) | 44 | Abnormal input power |
| 45 | I _t instantaneous value overcurrent | 46 | I _t effective value overcurrent |
| 47 | Abnormal analog input | 48 | Temperature sampling disconnection |
| 49 | PT detection fault | 50 | Humidity fault |
| 51 | Abnormal running current | 52 | Motor PTC over temperature alert |
| 53 | Unit optical fiber communication fault | 54 | PowerID fault |
| 55 | Unit power unevenness fault | 56 | Unit current bias fault |
| 57 | No power on warning of power unit | | |

7.2.1.3 Parameter processing

Press ENTER. This function is used to set the change permissions and initialization level of the parameters.

0: Standby

1: Upload parameter to operation panel

2: Download parameter to inverter

3: Standby

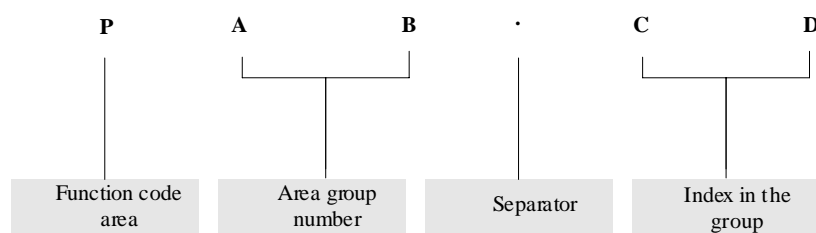
4: Standby

- 5: Standby
- 6: Standby
- 7: Reset parameter
- 8: Reset fault

Note: Press the ESC key to return to the main menu interface

7.2.2 Parameter group classification and format

7.2.2.1 Parameter group format



7.2.2.2 Parameter group area division

| Function code area | Domain | Function code description |
|---------------------------------|-----------|---------------------------------|
| P0X user parameters | P00 group | Password parameter group |
| P1X control parameters | P10 group | Basic control parameter group |
| | P11 group | Startup parameter group |
| | P12 group | Stop parameter group |
| | P14 group | V/F Parameter group |
| P2X motor parameters | P20 group | Basic motor parameter group |
| | P21 group | Advanced motor parameter |
| | P22 group | Motor auxiliary parameter group |
| | P23 group | Motor protection parameter |
| P3X terminal control parameters | P30 group | Digital input parameter group |
| | P31 group | Digital output parameter group |
| | P32 group | Analog input parameter group |
| | P33 group | Analog output parameter group |
| P4X speed parameters | P40 group | Basic speed parameter group |
| | P41 group | Digital multi-stage parameter |
| P5X Process control parameters | P50 group | Process open loop parameter |
| | P51 group | Process closed loop parameter |
| P6X vector control parameters | P60 group | Speed loop control parameter |
| | P61 group | Current loop control parameter |
| | P62 group | Torque control parameter group |
| | P63 group | Compensating torque control |

| Function code area | Domain | Function code description |
|---------------------------------|-----------|---------------------------------|
| P7X enhanced control parameters | P70 group | Restriction and protection |
| | P71 group | Control optimization parameter |
| P8X Communication parameters | P80 group | Communication function |
| | P81 group | Modbus communication group |
| | P82 group | Profibus DP communication |
| P9X display parameters | P90 group | Language selection group |
| | P91 group | LCD display group |
| | P92 group | LED display group |
| | P93 group | Running record parameter group |
| | P94 group | Troubleshooting parameter group |
| | P95 group | Inverter product identification |
| | P96 group | Inverter product parameters |

7.2.3 P0X group user parameter group

7.2.3.1 P00 group basic function parameters

| Function code | Name | Setting range | Factory setting |
|---------------|----------------|---------------|-----------------|
| P00.00 | Login password | 0~65535 | 0 |

This function is used to prevent irrelevant personnel from querying and modifying parameters and to protect the parameter safety of the inverter.

00000: no password protection. All parameters can be inquired and the inverter has no password when leaving factory.

Once the user password takes effect, when entering the parameter setting state again, all parameters can be viewed only and cannot be changed through the operation panel until the correct password is entered. The password in the parameter always shows 00000.

Note: The AS700 engineering inverter does not set the user password when it leaves the factory (P00.00=0), so you don't need a password to log in for the first time.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------|---------------|-----------------|
| P00.01 | Change password | 0~65535 | 0 |

Set password:

Enter 5 digits as the user password, press ENTER to confirm, and repeat the setting once.

Change password:

Press ENTER to enter the password verification state, and it will display 00000. Input the correct password and enter the parameter edit state. Select P00.01, enter the new password, press ENTER to confirm and then set the same password as P00.01. The new password is set successfully after "Password set successfully" is displayed.

Cancel password:

Press ENTER to enter the password verification state, and it will display 00000. Input the correct user password and enter the parameter edit state. Check that P00.01 is 00000, press ENTER to confirm and reset P00.01 = 00000. The password is cleared after “Password clear” is displayed.

| Function code | Name | Setting range | Factory setting |
|---------------|---------|---------------|-----------------|
| P00.02 | Standby | 0~65535 | 0 |

When the user forgets the password already set, the manufacturer may change the parameters, including the new password, by entering the correct the alternate password.

7.2.3.2 P01~09 group User function parameters

7.2.4 P1X group Control parameter group

7.2.4.1 P10 group Basic control parameters

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------|---------------|-----------------|
| P10.00 | Control mode selection | 0~5 | 0 |

This function is used to set the control run mode of the inverter. 0: V/f control; 1, 3, 5: vector speed control; 2: vector torque control.

0: Voltage vector V/f control: suitable for most occasions where the frequency is adjusted to be proportional to the voltage and the speed is controlled under flux, without encoder.

When selecting V/F control, please set P14 group V/F control parameters reasonably to achieve good control effect.

1: Speed sensorless vector control 2: suitable for universal variable speed drive occasions with high speed control accuracy requirement and large torque requirement.

When selecting vector control, it is necessary to conduct the motor parameter self-tuning first, set the motor nameplate parameters to P20.XX ~ P20.XX correctly, start the motor parameter self-tuning to obtain accurate motor parameters, and set P6X group vector control parameters reasonably, in order to give play to the excellent control effect of the vector.

2: Speed sensor torque control: similar to 3, with speed encoder, higher control accuracy and better speed protection.

3: Speed sensor torque control: a pulse encoder is required to achieve higher precision of speed and torque performance than speed sensorless vector control 2.

4: Standby

5: Speed sensorless vector control 1: without the need for pulse encoder, it can achieve higher precision of speed and torque performance than open loop vf and lower performance index of speed sensorless vector control 2, but it is not sensitive to motor parameters, so it is suitable for occasions where the motor parameters are not easy to obtain.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------|---------------|-----------------|
| P10.01 | Operating mode selection | 0~4 | 0 |

P10.01 is used to set the mode of starting and stopping of inverter controlled by X0 (forward) and X1 (reverse) terminals under the run command given mode of the terminal.

0: two-wire system 1

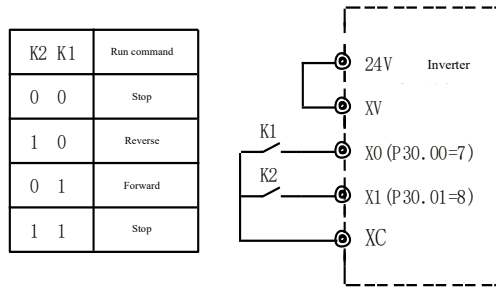


Figure 7- 1 Two-wire running mode 1

1: two-wire system 2

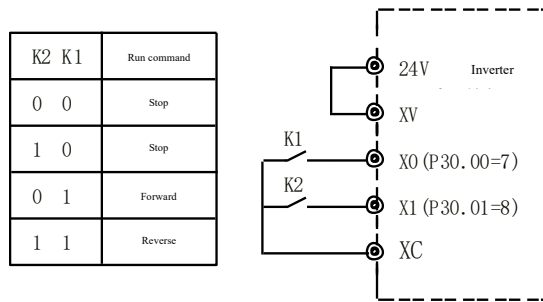


Figure 7- 2 Two-wire running mode 2

2: three-wire system 1

“9: Three-wire running control” function is set at Xi (i=2~7) terminal.

When K3 is closed, K1(forward) and K2 (reverse) control is invalid; when K3 is disconnected, K1 and K2 control is invalid, and the inverter stops;

The rising edge of X0 terminal represents forward running command; the rising edge of X1 terminal represents reverse running command.

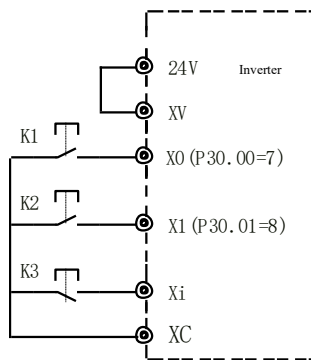


Figure 7- 3 Three-wire system running mode 1

3: three-wire system 2

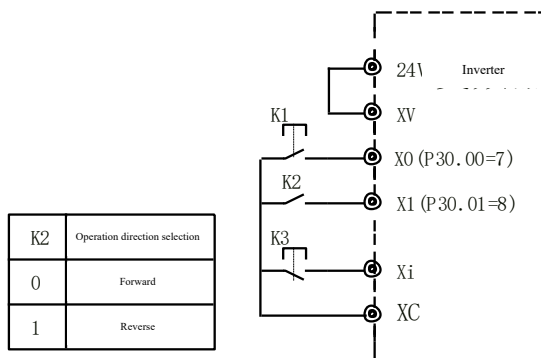


Figure 7- 4 Three-wire system running mode 2

“9: Three-wire running control” function is set at Xi (i=2~7) terminal.

The rising edge of K1 terminal represents the running command; K2 terminal disconnected represents the forward direction command; K2 terminal closed represents the reverse direction command; when K3 is disconnected, the inverter stops.

4: one-wire system

To use the one-wire control mode, the "frequency/speed given mode" shall be set to the analog 1 and analog 2 given target speed.

“9: Three-wire running control” function is set at Xi (i=2~7) terminal.

When the three-wire running control terminal is enabled, the analog quantity is given as positive, and the operation direction is positive given. On the contrary, when the analog quantity is give as negative, and the operation direction is reverse given.

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------|---------------|-----------------|
| P10.02 | Run command given mode | 0~4 | 0 |

Three different inverter run command given modes may be selected.

0: Operation panel run command given mode: run, stop, forward/reverse the inverter by the keys RUN(F1), STOP(F2), LO/ RE(F3) on the operation panel.

1: Terminal run command given mode: run, stop, forward/reverse the inverter by defining the multifunction terminals X0~X7, as shown in P30.00~P30.07.

2: Communication given mode: run, stop, forward/reverse the inverter through Modbus communication, as shown in Modbus communication protocol in the appendix.

3: Standby

4: Profibus_DP given: optional, given through Profibus_DP.

Note: See corresponding supplementary agreement for communication protocols 3 and 4.

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------------|---------------|-----------------|
| P10.03 | Frequency/speed given mode 1 | 0~16 | 0 |

This function is suitable for V/f control and the frequency given under sensorless vector control and sensor vector control. See P10.00 group function code for the control mode selection.

0: Panel digital frequency given: set the frequency by P40.00. In operation, you can also increase or decrease the frequency by ▲ and ▼ keys. The frequency will be held in stop and not held in power off.

1: Digital quantity multi-stage given target speed: if the digital quantity multi-stage terminals 0~3

are valid, the frequency is determined by the terminal combination, as shown in P41.00~P41.15.

2: Standby

3: A0 analog target speed given

4: A0 analog current speed given

5: A1 analog target speed given

6: A1 analog current speed given

The target speed can be given through the analog input port and the output frequency is calculated through the acceleration and deceleration time of P40 group; or the current speed can be given and the acceleration and deceleration time of P40 group is invalid

7: Standby

8: PID given target speed: industry application macro occasions

9: Standby

10: Standby

11: Standby

12: Communication given target speed: standard configuration, as shown in Modbus protocol

13: Standby

14: Standby

Option, speed command given through CANBus

15: Up/Down given speed

16: Profibus_DP given speed

Option, speed command given through Profibus_DP

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------|---------------|-----------------|
| P10.04 | Torque given mode | 0~6 | 0 |

In the torque control mode, the torque is given by the following channels

0: Panel given: panel digital torque given

1: A0 Analog quantity given

2: A1 Analog quantity given

When the torque given mode is set as analog input, it must be correctly matched when setting and defining the function parameters of the analog port. For example, when P10.04 is set to 1, P32.01 must be set to 3; similarly; if P10.04 is set to 1, P32.07 must also be set to 3

3: Standby

4: Standby

5: ModBus given torque: standard configuration, as shown in Modbus protocol

6: Profibus given torque: option, torque command given through Profibus.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------------|---------------|-----------------|
| P10.05 | Compensating torque given mode | 0~6 | 0 |

Set the starting compensating torque in the closed loop vector mode. The compensating torque selection modes include:

0: Uncompensated torque

1: Digital compensating torque: set the compensating torque by light/full-load digital input, as

shown in P63 group

2: Analog A0 given compensating torque

3: Analog A1 given compensating torque

Give the compensating torque through the analog input port. The compensating torque direction is determined by the positive and negative analog quantity

4: Communication given compensating torque: standard configuration, as shown in Modbus protocol

5: Automatic torque compensation: automatic torque compensation is mainly aimed at the lifting industry. This function is to remember the torque when stopping at zero speed, and then release the brake with the remembered torque before releasing the brake. For the time being, it can only be used for closed loop control.

6: Profibus given compensation: option, compensating torque command given through Profibus.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------|---------------|-----------------|
| P10.06 | Speed limit selection | 0~5 | 0 |

Select different channels to limit speed given to prevent speed overrun. It is only valid under torque control.

0: Internal parameter limit: limit the frequency through the upper and lower limits of P70.00 and P70.01

1: Analog 0 limit

2: Analog 1 limit: 10V corresponds to the maximum output frequency of P70.02

3: Standby

4: ModBus communication limit: see Modbus protocol

5: Automatic limit

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------------|---------------|-----------------|
| P10.07 | Frequency/speed given mode 2 | 0~16 | 0 |

The same as P10.03 speed channel selection 1

7.2.4.2 P11 group Start control parameters

| Function code | Name | Setting range | Factory setting |
|---------------|------------|---------------|-----------------|
| P11.00 | Start mode | 0~2 | 0 |

Different start modes can be adopted according to different application scenarios.

0: Normal start (start at start frequency)

Start operation from the start frequency P11.01 and accelerate to the set frequency after the start frequency holding time P11.02.

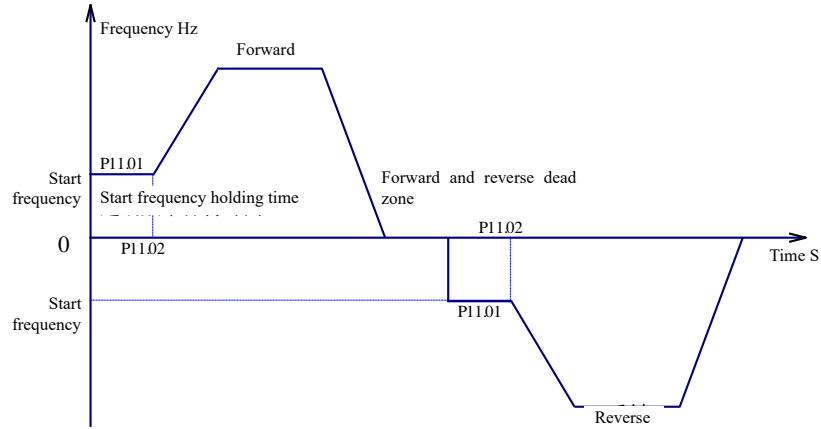


Figure 7-5 Schematic diagram of start mode at start frequency

1: Start after DC braking (DC braking start)

Inject DC first for DC excitation and DC braking for the motor. The size and time of DC injection are set by P11.03 and P11.04. After arrival of the DC injection time, start operation from the start frequency P11.01 and accelerate to the set frequency after the start frequency holding time P11.02.

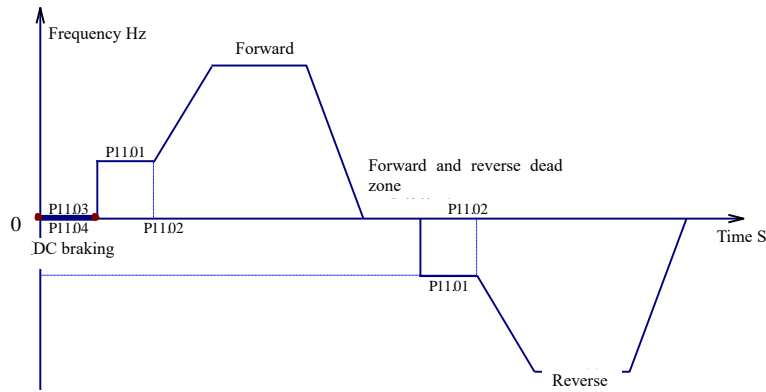


Figure 7-6 Schematic diagram of DC braking start mode

2: Speed tracking start

The inverter can identify the speed of the rotating motor and directly track the start from the recognized frequency. The current and voltage are smooth without impact during the starting process.

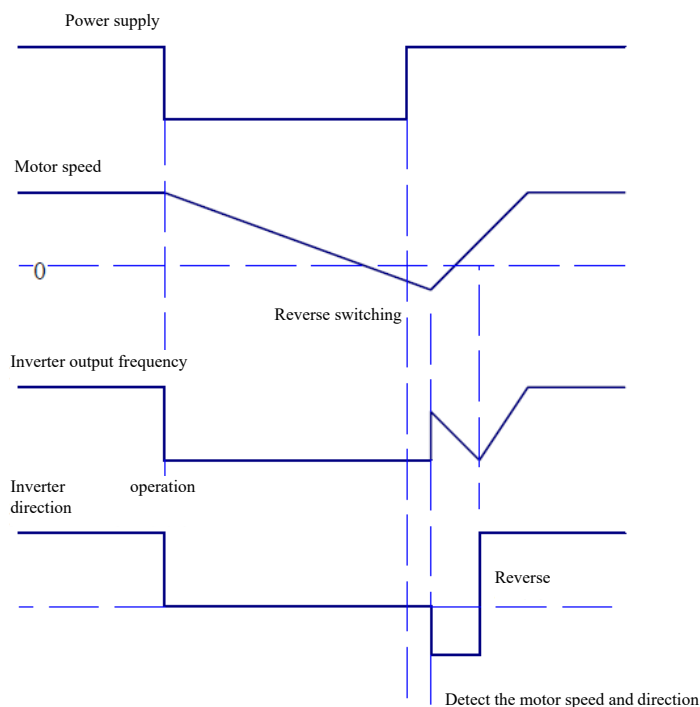


Figure 7-7 Schematic diagram of speed tracking start mode

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------------|---------------|-----------------|
| P11.01 | Start holding frequency (Hz) | 0.00~30.00 | 0.00 |
| P11.02 | Start frequency holding time (s) | 0.00~3600.00 | 0.00 |

Start frequency refers to the initial frequency when the inverter starts, as shown in f_s in the figure; start frequency holding time t_s refers to the running holding time at the start frequency during the starting of the inverter, as shown in the figure. The inverter does not run when the frequency command is below the start holding frequency.

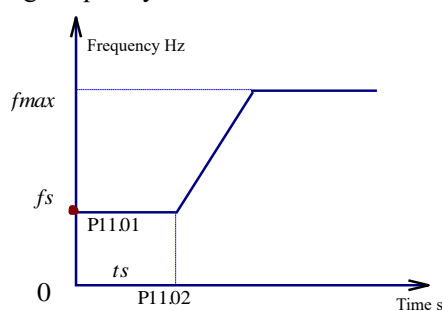


Figure 7-8 Schematic diagram of start frequency and start time

The inverter starts operation from the start frequency P11.01 and accelerates for the set acceleration time after the start frequency holding time P11.02.

Note: In heavy load starting occasions, properly setting the start frequency holding time is conducive to starting. In the vector control with encoder speed feedback, the factory default of the start frequency is 0.00Hz and of others is set above 0.50Hz.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------------|---------------|-----------------|
| P11.03 | Start DC injection current (%) | 0.0~120.0 | 30.0 |
| P11.04 | Start DC injection time (s) | 0.0~99.9 | 5.0 |

P11.03 and P11.04 are valid only when the start mode is selected as “Start after DC braking (P11.00=1)”, as shown in the figure below.

The start DC braking current (P11.03) is set with respect to the percentage of the rated current of inverter. If the set DC braking current is greater than 120% of the rated current of motor, the injected current is 120% of the rated current of motor. 0.0~120.0% in heavy load; 0.0~90.0% in light load. The DC braking start time (P11.04) is the injection actuation time. When P11.04=0, there is no DC braking process.

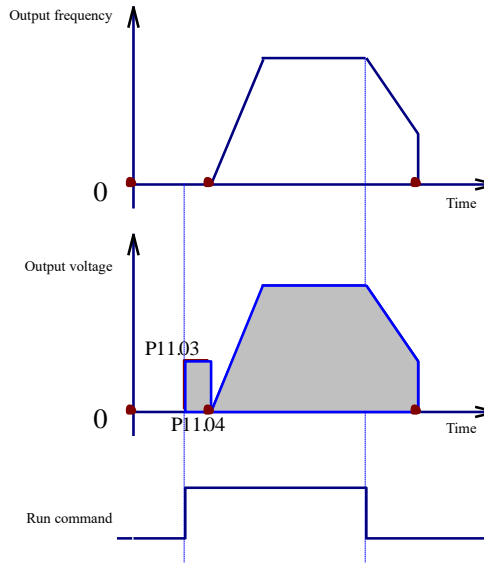


Figure 7-9 Schematic diagram of DC braking

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------|---------------|-----------------|
| P11.05 | Excitation time (s) | 0.0~99.9 | 0.3 |

The excitation time is the time required to establish the magnetic flux in advance before the motor starts, in order to achieve the purpose of rapid response when the motor starts. When there is a running command, it first enters the pre-excitation state according to the time set by this function code, and then enters the normal accelerated running after the magnetic flux is established. This function code is set to 0 to indicate no pre-excitation process.

Note: The motor may rotate during the pre-excitation. Please use mechanical brake together at this time.

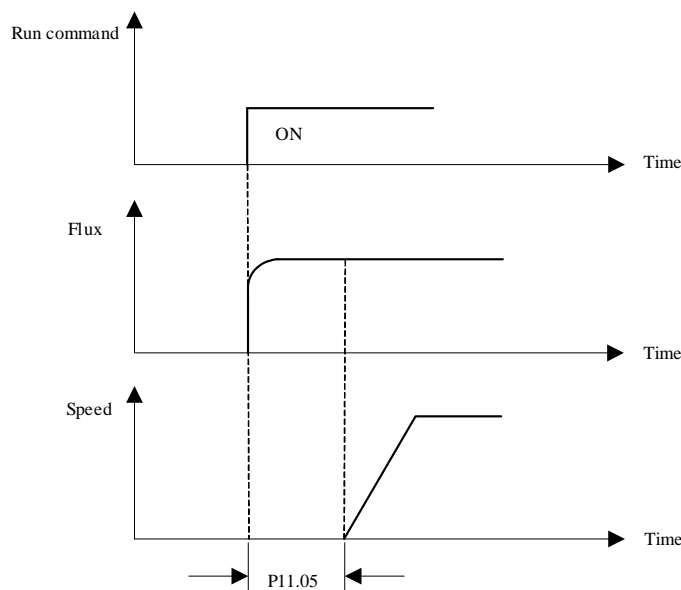


Figure 7-10 Schematic diagram of pre-excitation

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------|---------------|-----------------|
| P11.06 | Zero servo time (s) | 0.0~99.9 | 0.0 |
| P11.07 | Brake actuation time (s) | 0.00~99.99 | 0.20 |

Brake actuation time is the time for the external brake to fully open from receiving the opening command. After opening, the external brake enters the zero servo time, namely the zero speed holding time.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------|---------------|-----------------|
| P11.08 | Tracking delay time (ms) | 0~65535 | 1000 |

This time is used to wait for motor demagnetization. This value shall be increased if overcurrent appears at the beginning of tracking.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------|---------------|-----------------|
| P11.09 | Zero voltage tracking time (ms) | 0~65535 | 100 |

Enter the tracking waiting time.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------|---------------|-----------------|
| P11.10 | Tracking voltage Kp | 0.0~6553.5 | 0.2 |

Kp in the tracking process. If the value is too small, the tracking process will be longer, leading to overcurrent in the tracking process.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------|---------------|-----------------|
| P11.11 | Tracking voltage Ki | 0.0~6553.5 | 0.3 |

Ki in the tracking process. If the value is too small, the tracking process will be longer, leading to

overcurrent in the tracking process.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------|---------------|-----------------|
| P11.12 | Tracking voltage Kd | 0.0~6553.5 | 0.0 |

Kp in the tracking process. If the value is too small, the overshoot current suppression is not obvious in the tracking process; if the value is too large, overcurrent will appear in the tracking process.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------|---------------|-----------------|
| P11.13 | Tracking exit delay (ms) | 1000~65535 | 1000 |

Ensure a smooth tracking exit process. Increasing this time is conducive to smooth exit.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------------------|---------------|-----------------|
| P11.14 | Maximum current when tracking (%) | 0.0~200.0 | 100.0 |

Percentage of rated current of motor. When small load drags large load, the maximum current when tracking shall be less than the rated current of inverter. This value shall be reduced in case of overcurrent in the tracking process.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------------|---------------|-----------------|
| P11.15 | Tracking frequency variation gain (%) | 0.0~100.0 | 10.0 |

This value shall be reduced in case of overvoltage or P60.09 greater than 600V in the tracking process.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------------------|---------------|-----------------|
| P11.16 | Maximum voltage when tracking (V) | 0~65535 | 0 |

This parameter is read only to monitor the maximum voltage of the bus during tracking.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------|---------------|-----------------|
| P11.17 | Initial tracking frequency (Hz) | 0.00~100.00 | 50.00 |

It is usually set to the maximum operating frequency before tracking. If the inertial stop speed of the system decreases rapidly, the value can be appropriately reduced.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------------------|---------------|-----------------|
| P11.18 | Maximum current when tracking (A) | 0.0~6553.5 | 0.0 |

This parameter is read only to monitor the maximum effective current during tracking.

| Function code | Name | Setting range | Factory setting |
|---------------|------|---------------|-----------------|
|---------------|------|---------------|-----------------|

| | | | |
|--------|---|-----------|------|
| P11.19 | Breaking current of negative rotation (%) | 0.0~120.0 | 20.0 |
|--------|---|-----------|------|

Use the motor braking control in the lifting industry. The braking conditions can be met only when the motor reverse start current is greater than P11.19 current.

7.2.4.3 P12 group Stop control parameters

| Function code | Name | Setting range | Factory setting |
|---------------|-----------|---------------|-----------------|
| P12.00 | Stop mode | 0~4 | 0 |

Different stop modes can be adopted according to different application scenarios.

- 0: inverter blocking output and free motor stop;
- 1: decelerate and stop according to the set deceleration time;
- 2: decelerate and stop according to the set DC braking. When the frequency is less than the DC braking start frequency P12.03, inject the DC braking current P12.04 for the time determined by P12.05;
- 3: decelerate and stop according to the set deceleration time. Keep the excitation on the motor after stop so that it can respond to start quickly in case of running command;
- 4: decelerate and stop according to the set deceleration time. Maintain the current torque at zero speed, and stop after P12.06.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------|---------------|-----------------|
| P12.01 | Stop holding frequency (Hz) | 0.00~300.0 | 0.00 |
| P12.02 | Stop frequency holding time (s) | 0.0~99.9 | 0.0 |

The inverter decelerates from normal running speed to stop frequency P12.01 and then decelerates to zero in for the set deceleration time after the stop frequency holding time P12.02 to facilitate stop stability.

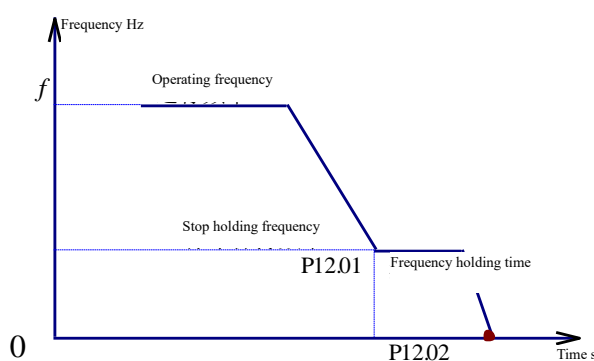


Figure 7-11 Schematic diagram of stop holding frequency

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------|---------------|-----------------|
| P12.03 | DC braking start frequency (Hz) | 0.00~10.00 | 2.50 |
| P12.04 | Stop DC braking current (%) | 0.00~100.00 | 50.00 |

| | | | |
|--------|--------------------------|----------|-----|
| P12.05 | Stop DC braking time (s) | 0.0~10.0 | 0.5 |
|--------|--------------------------|----------|-----|

P12.03~P12.05 are valid only when the stop mode is “deceleration + DC braking (P12.00=2)”.

The stop DC braking current (P12.03) is set with respect to the percentage of the rated current of inverter. If the set DC braking current is greater than 100% of the rated current of motor, the injected current is 100% of the rated current of motor. 0.0~100.0% in heavy load; 0.0~90.0% in light load.

The DC braking stop time (P12.04) is the injection actuation time. When P12.04=0, there is no DC braking process.

When P12.00=2, P12.03 can be set as the braking start frequency for quick braking.

P12.04 sets the DC braking current, which is a percentage relative to the rated current of inverter. 0.0~90.0% for variable torque load.

P12.05 sets the DC braking actuation time.

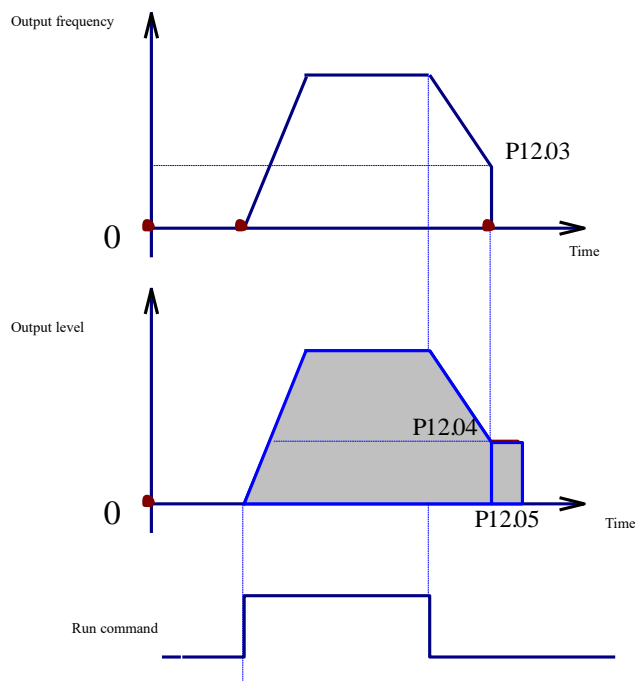


Figure 7-12 Schematic diagram of stop DC braking

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------------|---------------|-----------------|
| P12.06 | Stop excitation holding time (s) | 0~65535 | 0 |

The inverter stops when the stop mode is deceleration + holding excitation/torque and the deceleration/torque time is greater than the value of P12.06.

7.2.4.4 P14 group V/F control parameters

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------------|---------------|-----------------|
| P14.00 | V/F curve given | 0~5 | 0 |
| P14.01 | V/F voltage value V0 (V) | 0.0~460.0 | 76.0 |
| P14.02 | V/F frequency value F0 (Hz) | 0.00~300.00 | 10.00 |
| P14.03 | V/F voltage value V1 (V) | 0.0~460.0 | 152.0 |

| | | | |
|--------|--|-------------|-------|
| P14.04 | V/F frequency value F1 (Hz) | 0.00~300.00 | 20.00 |
| P14.05 | V/F voltage value V2 (V) | 0.0~460.0 | 228.0 |
| P14.06 | V/F frequency value F2 (Hz) | 0.00~300.00 | 30.00 |
| P14.07 | V/F voltage value V3 (V) | 0.0~460.0 | 304.0 |
| P14.08 | V/F frequency value F3 (Hz) | 0.00~300.00 | 40.00 |
| P14.09 | V/F voltage value V4 (V) | 0.0~460.0 | 380.0 |
| P14.10 | V/F frequency value F4 (Hz) | 0.00~300.00 | 50.00 |
| P14.11 | VF complete separation voltage source | 0~5 | 0 |
| P14.12 | Internal setting of separation voltage | 0~690 | 380 |
| P14.13 | Separation voltage acceleration time | 0~655.35 | 5.00 |
| P14.14 | Separation voltage deceleration time | 0~655.35 | 5.00 |

P14.00 parameter determines different V/F curves under the voltage vector V/F control mode (P10.00=0).

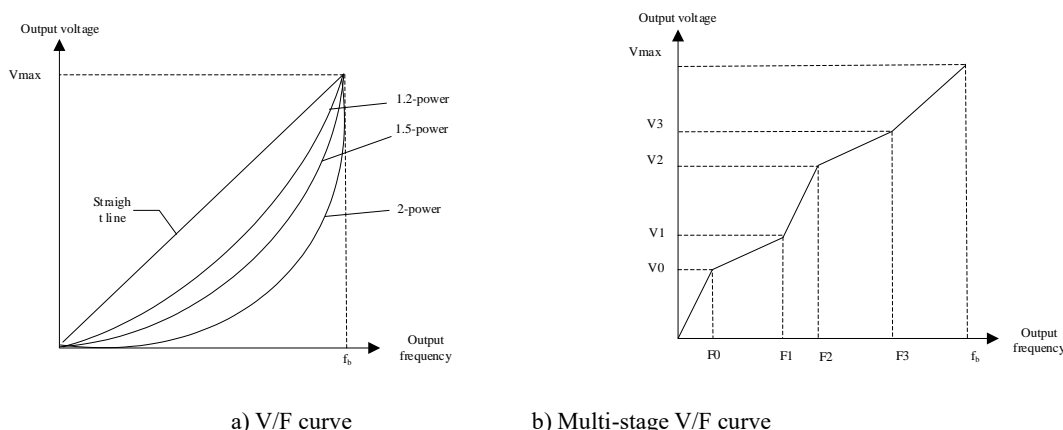


Figure 7-13 Schematic diagram of VF curve

P14.00=0 applies to constant torque load and the relationship between V and F is linear with coefficient 1, as shown in the straight line in the figure for details.

P14.00=4 user defined curve, is suitable for the segmented constant torque load, as shown in the figure.

In Figure 7-12, $F_0 < F_1 < F_2 < F_3 < F_4 \leq f_b$ f_b is the basic operating frequency P40.01
 $V_0 \leq V_1 \leq V_2 \leq V_3 < V_4 \leq V_{max}$ V_0, V_1, V_2, V_3 and V_4 are the actual output voltage relative to the maximum output voltage and rated frequency ($V_1 = (V_{max} / f_b) * F_1$ default to $V_{max} = 380V$, $f_b = 50Hz$).

P14.00=1~3 applies to the variable torque load of fan and pump. P14.00 is set to 1~3, corresponding to 1.2-power, 1.5-power and 2-power curve respectively, as shown in Figure 7-12. Where, the 2-power curve applies to water supply, and 1.2-power and 1.5-power curves apply to

other medium type liquid loads. Appropriate curve may be selected according to the actual situation.

P14.00=5 VF separation Separate control of voltage and frequency

P14.11 VF complete separation voltage source: 0: internal digital given; 1: analog A0 given; 2: analog A1 given; 3: PID given; 4: Modbus communication given; 5: Profibus communication given;

P14.12 Internal setting of separation voltage. The voltage output value is the set value of parameter P14.11 when the set value is 0.

P14.13 sets the separation voltage acceleration time, i.e. the acceleration of voltage amplitude change in VF separation mode.

P14.14 sets the separation voltage deceleration time, i.e. the deceleration of voltage amplitude change in VF separation mode.

7.2.5 P2X group motor parameter group

7.2.5.1 P20 group Basic motor parameters

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------------------|---------------|-----------------|
| P20.00 | Type of motor 1 | 0~1 | 0 |
| P20.01 | Rated power of motor 1 (kW) | 0~6553.5 | 315 |
| P20.02 | Rated current of motor 1 (A) | 0~6553.5 | 334 |
| P20.03 | Rated frequency of motor 1 (Hz) | 0.00~6553.50 | 50.00 |
| P20.04 | Rated speed of motor 1 (rpm) | 0~65535 | 1460 |
| P20.05 | Rated voltage of motor 1 (V) | 0~480 | 380 |
| P20.06 | Number of poles of motor 1 | 2~128 | 4 |
| P20.07 | Rated slip frequency of motor 1 (Hz) | 0.10~655.35 | 1.40 |

P20.00 motor type: 0: asynchronous motor; 1: synchronous motor.

P20.01~P20.07 and P20.11 are used to set the inverter-driven motor parameters and shall be set correctly according to the motor nameplate before use.

P20.06 is used to set the number of poles of motor according to the nameplate. If there is no number of poles of motor on the nameplate, it can be calculated as follows:

$$\text{Number of poles} = (120 \times f) \div n$$

Where: n—— rated speed; f——rated frequency.

The even integer of the calculated value is the "number of poles".

Note: The inverter power level shall match the motor.

P20.07 is used to set the slip frequency.

If there is no slip frequency data on the motor nameplate, the set value of P20.07 can be calculated by the following formula:

Set the rated frequency to F (P20.03), the rated speed to N (P20.04), and the number of poles of motor to P (P20.06), then:

$$\text{Slip frequency} = f - ((n \times p) \div 120)$$

Example: The rated frequency is 50Hz, the rated speed is 1430rpm and the number of poles of motor is 4,

Then the set value of P20.07 = $50 - ((1430 \times 4) \div 120) = 2.33\text{Hz}$.

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P20.08 | Maximum slip frequency of motor 1 (Hz) | 0.10~655.35 | 2.80 |
| P20.09 | Phase sequence of motor 1 | 0~1 | 1 |
| P20.10 | No-load current coefficient of motor 1 (%) | 1.00~60.00 | 30.00 |

P20.08 sets the maximum slip frequency of motor, which is generally 2 times the rated slip frequency.

P20.09: motor rotation direction, 0 is rotation with negative phase sequence and 1 is rotation with positive phase sequence.

P20.10 sets the no-load current coefficient of motor, which is generally about 30%.

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P20.12 | Maximum power coefficient of motor 1 (%) | 50~400 | 250 |

P20.12: maximum power coefficient of motor, used to limit the maximum torque currently allowed to output by the inverter under the closed-loop vector control mode. When the current actual output power of the inverter is less than the power set by P20.12, the maximum torque allowed to output by the inverter is P70.04 output torque limit; otherwise, it will be gradually reduced and the power is maintained no more than P20.12.

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P20.14 | Type of motor 2 | 0~1 | 0 |
| P20.15 | Rated power of motor 2 (kW) | 0~6553.5 | 315 |
| P20.16 | Rated current of motor 2 (A) | 0~6553.5 | 334 |
| P20.17 | Rated frequency of motor 2 (Hz) | 0.00~6553.50 | 50.00 |
| P20.18 | Rated speed of motor 2 (rpm) | 0~65535 | 1460 |
| P20.19 | Rated voltage of motor 2 (V) | 0~480 | 380 |
| P20.20 | Number of poles of motor 2 | 2~128 | 4 |
| P20.21 | Rated slip frequency of motor 2 (Hz) | 0.10~655.35 | 1.40 |
| P20.22 | Maximum slip frequency of motor 2 (Hz) | 0.10~655.35 | 2.80 |
| P20.23 | Phase sequence of motor 2 | 0~1 | 1 |
| P20.24 | No-load current coefficient of motor 2 (%) | 1.00~60.00 | 30.00 |

| | | | |
|--------|--|---------|-----|
| P20.25 | Maximum power coefficient of motor 2 (%) | 50~400 | 250 |
| P20.27 | Motor parameter calculation enable | 0~65535 | 0 |

P20.14~P20.25: parameters of motor 2, the same with those of motor 1.

P20.27 sets the motor parameter calculation enable. After the value is set to 1, the rated power value of P20.01 can be modified to obtain a motor parameter value calculated according to the motor nameplate parameter.

7.2.5.2 P21 group Advanced motor parameters

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------------|---------------|-----------------|
| P21.01 | Stator resistance of motor 1 (Ω) | / | 0.037 |
| P21.02 | Rotor resistance of motor 1 (Ω) | / | 0.027 |
| P21.03 | Stator inductance of motor 1 (H) | / | 0.0000 |
| P21.04 | Rotor inductance of motor 1 (H) | / | 0.0000 |
| P21.05 | Mutual inductance (H) | / | 0.0000 |

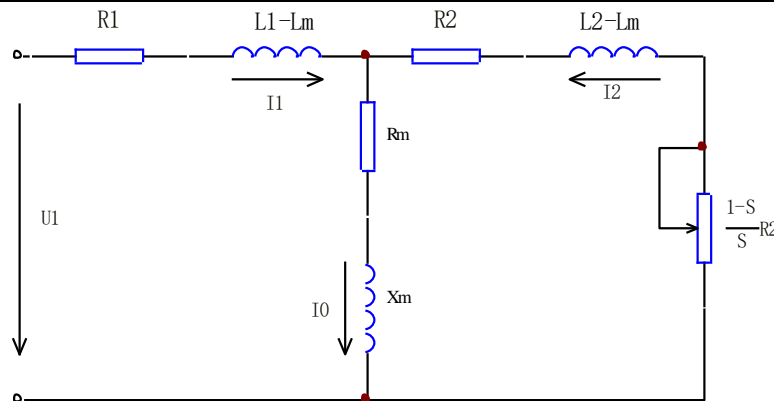


Figure 7-14 Steady state equivalent circuit diagram of asynchronous motor

R_1 , R_2 , L_1 , L_2 , L_m and I_0 in the figure represent stator resistance, stator inductance, rotor resistance, rotor inductance, mutual inductance and exciting current, respectively. The exciting current may be calculated by the motor rated current and motor power factor or measured by rotation self-tuning.

Relationship between rated torque current, exciting current and motor rated current:

$$\text{Rated torque current} = \text{power factor} \times \text{motor rated current}$$

$$\text{No-load exciting current} = \sqrt{1 - \text{Power factor}^2} \times \text{Motor rated current} \times \text{Motor efficiency, general motor efficiency is about 85\%}.$$

Parameters P21.01, P21.02, P21.03, P21.04 and P21.05 are valid only for asynchronous motor. They are internal characteristic parameters of the motor and shall be obtained automatically through the inverter self-learning of the motor.

The parameter attribute of P21.01~P20.05 is scientific notation, in the presentation format of ABCDE – n = ABCDE * 10⁻ⁿ. For example, the handheld display value is 624-5Ω, which represents the value of 624 * 10⁻⁵Ω, i.e. 0.00624 Ω, and its value is also equivalent to 6240-4 Ω.

By performing parameter self-tuning, the key motor parameters affecting the operation control of the inverter are determined. These motor parameters will be automatically saved in the inverter after the parameter self-tuning process is completed until the next parameter input or next parameter self-tuning.

The parameter self-tuning process is as follows:

- ① Correctly input P20.00 ~ P20.11 according to the motor nameplate; correctly set the basic operating frequency P40.01, maximum output frequency P70.02 and maximum output voltage P70.05; set appropriate acceleration and deceleration time P40.02 and P40.04;
- ② Select the parameter self-tuning execution mode (see start menu selection).

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------------|---------------|-----------------|
| P21.06 | Stator resistance of motor 2 (Ω) | / | 0.037 |
| P21.07 | Rotor resistance of motor 2 (Ω) | / | 0.027 |
| P21.08 | Stator inductance of motor 2 (H) | / | 0.0000 |
| P21.09 | Rotor inductance of motor 2 (H) | / | 0.0000 |
| P21.10 | Mutual inductance (H) | / | 0.0000 |

P21.06~P21.10: parameters of motor 2, the same with those of motor 1.

7.2.5.3 P22 group Motor auxiliary parameters

| Function code | Name | Setting range | Factory setting |
|---------------|--------------|---------------|-----------------|
| P22.01 | Encoder type | 0~3 | 0 |

P22.01: encoder type:

0: incremental; 1: SinCos type; 2: EnDat type; 3: Rezav type

| Function code | Name | Setting range | Factory setting |
|---------------|---|---------------|-----------------|
| P22.02 | Encoder 1 pulse number | 500~16000 | 1024 |
| P22.03 | Encoder 1 frequency dividing coefficient | 0~7 | 0 |
| P22.04 | Encoder 1 position angle | 0~360 | 0 |
| P22.05 | Encoder 1 feedback speed filter time (ms) | 0~30 | 10 |
| P22.06 | Encoder 1 direction | 0~1 | 1 |
| P22.07 | SinCos encoder subdivision coefficient | 7、9、11 | 11 |
| P22.08 | Number of poles of Rezav encoder 1 | 2~128 | 2 |

This group of parameters is used to select the number of pulses per revolution and frequency dividing coefficient. The position angle is read from the self-learning and cannot be set. The filter time shall be adjusted within a controllable range. The encoder shall choose P22.06 or hardware line change according to the actual situation.

P22.02 sets the encoder pulse number.

P22.03 sets the frequency dividing coefficient, 0~7 corresponding to 1~128 frequency division.

P22.05 encoder feedback filter time defaults to 0 when P10.00=3 and defaults to 5,s in the other control modes, which can be modified.

P22.06 parameter can be used to select the encoder feedback direction, default to 1, which is not needed to change generally. However, if it is found on site that the wiring error of the encoder causes the feedback direction to be opposite to the actual direction, it can also be adjusted by modifying the P22.06 parameter.

P22.07 sets the SinCos encoder subdivision coefficient, which is adjusted according to the actual situation.

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------------------|---------------|-----------------|
| P22.09 | Encoder 2 type | 0~3 | 0 |
| P22.10 | Encoder 2 pulse number | 500~16000 | 1024 |
| P22.11 | Encoder 2 position angle | 0~360 | 0 |
| P22.12 | Encoder 2 direction | 0~1 | 1 |
| P22.13 | Number of poles of Reszav encoder 2 | 2~128 | 2 |

This group of parameters is used to select the encoder 2 type, the number of pulses per revolution and frequency dividing coefficient. The position angle is read from the self-learning and cannot be set. The filter time shall be adjusted within a controllable range. The encoder shall choose P22.11 or hardware line change according to the actual situation.

P22.12 parameter can be used to select the encoder feedback direction, default to 1, which is not needed to change generally. However, if it is found on site that the wiring error of the encoder causes the feedback direction to be opposite to the actual direction, it can also be adjusted by modifying the P22.12 parameter.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------------|---------------|-----------------|
| P22.14 | Encoder 1 channel selection | 0~1 | 0 |
| P22.15 | Encoder 2 channel selection | 0~1 | 0 |

P22.14 Encoder 1 channel selection: 0: Select incremental channel on IO board; 1: Select expanded PG card channel.

P22.15 Encoder 2 channel selection: 0: Select incremental channel on IO board; 1: Select expanded PG card channel.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------------|---------------|-----------------|
| P22.16 | Feedback speed amplitude limit filter | 0.00~100 | 0.00 |

P22.16 Feedback speed amplitude limit filter. After the encoder is interfered, it will cause the sudden

change in the speed feedback, and the reasonable setting of this value can filter out the sudden speed change caused by the interference.

7.2.5.4 P23 group motor protection parameters

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P23.01 | Motor sensor protection threshold | 0.00~10.00 | 5.00 |
| P23.03 | Low speed overflow threshold of motor | 0.00~150.00 | 150.00 |
| P23.04 | Low-speed overcurrent time of motor | 0.1~120.0 | 60.0 |
| P23.05 | High speed overflow threshold of motor | 0.00~150.00 | 120.00 |
| P23.06 | High-speed overcurrent time of motor | 0.1~60.0 | 30.0 |

P23.01~P23.05 are used to set the thresholds of the motor speed and overcurrent, and the overspeed is usually set within 20%. Overcurrent ratio is inversely proportional to time. The higher the overcurrent peak is, the shorter the set time will be. These parameters can be set according to the motor report after lowered appropriately. High speed and low speed are bounded by 20%.

7.2.6 P3X group Terminal parameter group

7.2.6.1 P30 group Digital input parameters

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------------------|---------------|-----------------|
| P30.00 | X0 terminal input function selection | 0~199 | 7 |
| P30.01 | X1 terminal input function selection | 0~199 | 0 |
| P30.02 | X2 terminal input function selection | 0~199 | 0 |
| P30.03 | X3 terminal input function selection | 0~199 | 0 |
| P30.04 | X4 terminal input function selection | 0~199 | 0 |
| P30.05 | X5 terminal input function selection | 0~199 | 118 |
| P30.06 | X6 terminal input function selection | 0~199 | 114 |
| P30.07 | X7 terminal input function | 0~199 | 0 |

| | | | |
|--|-----------|--|--|
| | selection | | |
|--|-----------|--|--|

Function input terminal definition table:

| No. | Function definition | No. | Function definition |
|-------|-------------------------------|-----|--------------------------------|
| 0 | No function | 1 | Acceleration/deceleration time |
| 2 | Acceleration/deceleration | 3 | Digital stage speed 0 |
| 4 | Digital stage speed 1 | 5 | Digital stage speed 2 |
| 6 | Digital stage speed 3 | 7 | Forward (FWD) |
| 8 | Reverse (REV) | 9 | Three-wire running control |
| 10 | Analog stage speed 0 | 11 | Analog stage speed 1 (standby) |
| 12 | Analog stage speed 2 | 13 | External reset terminal |
| 14 | External fault terminal | 15 | External self-learning input |
| 16 | Emergency power supply | 17 | Weighing compensation input |
| 18 | Base blocking | 19 | Light load switch input |
| 20 | Heavy load switch input | 21 | Output contactor detection |
| 22 | Brake contactor detection | 23 | Brake switch detection |
| 24 | Motor selection | 25 | Encoder selection |
| 26 | Function parameter 0 | 27 | Function parameter 1 (standby) |
| 28 | Pulse frequency DI0 input | 29 | Pulse frequency DI1 input |
| 30 | Speed/ torque (static) | 31 | Frequency increase (not held) |
| 32 | Frequency decrease (not held) | 33 | Emergency stop signal |
| 34 | Forward deceleration input | 35 | Reverse deceleration input |
| 36 | Forward stop input | 37 | Reverse stop input |
| 38 | Frequency increase (held) | 39 | Frequency decrease (held) |
| 40 | Inching frequency selection | 41 | Command switched to the |
| 42 | Command switched to the | 43 | Command switched to the upper |
| 44 | Open loop primary and | 45 | PID primary given to internal |
| 46 | PID primary given to analog | 47 | PID secondary given to invalid |
| 48 | PID secondary given to | 49 | FJOG command |
| 50 | RJOG command | 51 | PID primary given to analog A1 |
| 52 | PID secondary given to | 53 | Speed given mode selection |
| Other | Standby | | |

0: no function

- 1: Acceleration/deceleration time terminal 1
- 2: Acceleration/deceleration time terminal 2

See the following table for the usage method:

| Acceleration/deceleration | Acceleration/deceleration | Acceleration/deceleration |
|---------------------------|---------------------------|--|
| OFF | OFF | Acceleration/deceleration time 0 (P40.02~P40.03) |
| OFF | ON | Acceleration/deceleration time 1 (P40.04~P40.05) |
| ON | OFF | Acceleration/deceleration time 2 (P40.06~P40.07) |
| ON | ON | Acceleration/deceleration time 3 (P40.08~P40.09) |

- 3: Digital stage speed 0
- 4: Digital stage speed 1
- 5: Digital stage speed 2
- 6: Digital stage speed 3

See P41.00~P41.15 for the usage method

- 7: Terminal forward input (FWD)
- 8: Terminal reverse input (REV)
- 9: Three-wire running control

Valid only in the terminal run command given mode (P10.02=1). See P10.1 for usage method.

- 10: Analog stage speed 0 (standby)
- 11: Analog stage speed 1 (standby)
- 12: Analog stage speed 2 (standby)

See P51.24~P51.32 for the usage method.

- 13: External reset terminal

When the external reset terminal signal is valid, the external signal resets the inverter fault.

- 14: External fault terminal

When the external fault terminal signal is valid, the inverter stops running.

- 15: External self-learning input terminal

Magnetic pole tuning input, external input signal controlling the start of the self-learning.

- 16: Emergency power supply running

Indicate that the inverter runs under external emergency conditions.

- 17: Weighing compensation input

Command input for user-set weighting compensation for a specific application.

- 18: Basic electrode locking

This functional terminal effectively disables the output of the inverter.

- 19: Light load switch input

- 20: Heavy load switch input

The actual load weight less than the counterweight is light load and greater than the counterweight is heavy load.

- 21: Output contactor feedback

It is generally used in conjunction with the output function 17 to control the inverter output

contactor, so as to confirm the suction state of the contactor before the output current of the inverter, and cut off the inverter output in time when the contactor trips.

22: Brake contactor detection

It is generally used in conjunction with the output function 18 to judge whether the brake output contactor is engaged.

23: Brake switch detection

It is generally used in conjunction with the output function 18 to judge whether the brake is open in real time.

24: Motor selection

See the following table for the usage method:

| Motor selection | Motor parameter group selection |
|-----------------|---------------------------------|
| OFF | Motor 1 parameter group |
| ON | Motor 2 parameter group |

25: Encoder selection

See the following table for the usage method:

| Encoder selection | Encoder parameter group |
|-------------------|---------------------------|
| OFF | Encoder 1 parameter group |
| ON | Encoder 2 parameter group |

26: Function parameter 0 (standby)

27: Function parameter 1 (standby)

28: Pulse input 0 (standby)

29: Pulse input 1 (standby)

30: Speed/torque mode switching (The inverter stops and switches effectively)

The input signal is valid and the inverter control mode switches from speed mode to torque mode.

31: Frequency increase (not held)

When the signal is valid, the target frequency continues to increase until the limit value; when the signal is invalid, the current frequency is held, and the shutdown and power off frequency is 0.

32: Frequency decrease (not held)

When the signal is valid, the target frequency continues to decrease until the 0; when the signal is invalid, the current frequency is held, and the shutdown and power off frequency is 0.

33: Emergency stop (hanging signal)

When the signal is valid under closed-loop vector control, the speed regulator is set to 0 and the maximum reverse torque makes the inverter stop quickly.

34: Forward deceleration

When the signal is valid in forward running, the target frequency is 0Hz, and the inverter slows down to 0Hz.

35: Reverse deceleration

When the signal is valid in reverse running, the target frequency is 0Hz, and the inverter slows down to 0Hz.

36: Forward stop

When the signal is valid in forward running, the inverter stops.

37: Reverse stop

When the signal is valid in reverse running, the inverter stops.

38: Frequency increase (held)

When the signal is valid, the target frequency continues to increase until the limit value; when the signal is invalid, the current frequency is held, and the shutdown and power off frequency is also held at the current frequency

39: Frequency decrease (held)

When the signal is valid, the target frequency continues to decrease until the 0; when the signal is invalid, the current frequency is held, and the shutdown and power frequency is also held at the current frequency.

40: Inching frequency selection

When the signal is valid in multi-stage running, the target frequency is switched to the inching frequency.

41: Command switched to the operation panel

When the signal is valid in the stop state, the command channel is switched to the panel given.

42: Command switched to the terminal

When the signal is valid in the stop state, the command channel is switched to the terminal given.

43: Command switched to the upper computer given (modbus communication given)

When the signal is valid in the stop state, the command channel is switched to the upper computer (modbus communication) given.

44: Open loop primary and secondary given switching

When this signal is valid, the speed channel source is switched to the open loop secondary given. That is, P10.03 speed channel is switched to P50.00 given mode.

45: PID primary given to internal

When this signal is valid, the primary given channel of process closed-loop control is switched to the digital internal given; otherwise, it is not switched.

46: PID primary given to analog A0

When this signal is valid, the primary given channel of process closed-loop control is switched to A0; otherwise, it is not switched.

47: PID secondary given to invalid

When this signal is valid, the secondary given channel of process closed-loop control is switched to invalid; otherwise, it is not switched.

48: PID secondary given to analog A0

When this signal is valid, the secondary given channel of process closed-loop control is switched to A0; otherwise, it is not switched.

49: FJOG command (inching forward command)

When this signal is valid, the inverter runs forward at the target frequency as the inching frequency; when the signal is invalid, the inverter stops.

50: RJOG command (inching reverse command)

When this signal is valid, the inverter runs reversely at the target frequency as the inching frequency; when the signal is invalid, the inverter stops.

51: PID primary given to analog A1

When this signal is valid, the primary given channel of process closed-loop control is switched to A1; otherwise, it is not switched.

52: PID secondary given to analog A1

When this signal is valid, the secondary given channel of process closed-loop control is switched to

A1; otherwise, it is not switched.

53: Speed given mode selection

| Speed given mode | Speed given mode |
|------------------|---------------------------|
| OFF | P10.03 speed given mode 1 |
| ON | P10.07 speed given mode 2 |

Caution: 1 can be set before the above parameters as logic negation. Example: 114: When the external fault terminal has no signal, the inverter stops running.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------|---------------|-----------------|
| P30.08 | X0~ X7 input filter times | 0~99 | 5 |

The anti-interference ability of the terminal can be improved by appropriately increasing the setting of P30.08. The larger the number of terminal filter times, the longer the delay of terminal action.

7.2.6.2 P31 group Digital output parameters

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------------------|---------------|-----------------|
| P31.00 | Relay output 1 function definition | 0~199 | 25 |
| P31.01 | Relay output 2 function definition | 0~199 | 3 |
| P31.02 | Relay output 3 function definition | 0~199 | 2 |
| P31.03 | Relay output 4 function definition | 0~199 | 31 |
| P31.04 | Relay output 5 function definition | 0~199 | 0 |
| P31.05 | Relay output 6 function definition | 0~199 | 2 |
| P31.06 | Relay output 7 function definition | 0~199 | 3 |
| P31.07 | Relay output 8 function definition | 0~199 | 0 |

Function definition table of multifunction digital output:

| Function | Meaning | Function | Meaning |
|----------|--------------------------------|----------|--|
| 0 | No function | 1 | The inverter is ready for operation |
| 2 | Inverter fault | 3 | Inverter running signal (RUN) |
| 4 | Frequency arrival signal (FAR) | 5 | Consistent frequency speed (FDT) |
| 6 | Inverter zero speed running | 7 | The DC bus voltage is not less than 85% of the rated voltage |

| Function | Meaning | Function | Meaning |
|----------|---|----------|----------------------------------|
| 8 | Exceeding 5% of the rated current in running and 10% of the rated | 9 | Tuning |
| 10 | Frequency detection 1 | 11 | Frequency detection 2 |
| 12 | The output is 1 in fault forecast, and | 13 | Self-tuning request (synchronous |
| 14 | Zero servo torque direction output | 15 | Zero current detection |
| 16 | Power generation and electric state | 17 | Output contactor control |
| 18 | Brake contactor control | 19 | Pulse output DO0 (standby) |
| 20 | Pulse output DO1 (standby) | 21 | Radiator overheating alarm |
| 22 | Motor overheating alarm | 23 | Motor selection output |
| 24 | Encoder selection output | 25 | Brake output |
| 26 | Cumulative running time arrival | 27 | Single running time arrival |
| 28 | Output X1 | 29 | Output X2 |
| 30 | Undervoltage blocking stopping | 31 | Fan control |
| 32 | Analog disconnection | 33 | Motor PTC alarm |
| 34 | Reverse state | | |

P31.00~P31.07 define the functions of output ports K1~K8. The set value range and the function of the corresponding output port when set to each value are as follows:

0: no function

1 or 101: The inverter is ready for operation (RDY)

1: The inverter is normal in self-test without fault, the corresponding output point is connected; otherwise it is disconnected;

101: The inverter is normal in self-test without fault, the corresponding output point is disconnected; otherwise it is connected;

2 or 102: Inverter fault

2: When the inverter is in fault halt state, the corresponding output point is connected; otherwise it is disconnected;

102: When the inverter is in fault halt state, the corresponding output point is disconnected; otherwise it is connected;

3 or 103: Inverter running signal (RUN)

3: When the inverter can run normally after responding to the run command, the corresponding output point is connected; otherwise it is disconnected;

103: When the inverter can run normally after responding to the run command, the corresponding output point is disconnected; otherwise it is connected.

4 or 104: Frequency arrival signal (FAR)

See P31.25 for details

5 or 105: Consistent frequency speed (FDT)

See 31.26 and 31.27 for details

6 or 106: Inverter zero speed running

6: When the inverter output frequency is 0 in the running process, the corresponding output point is

connected; otherwise it is disconnected;

106: When the inverter output frequency is 0 in the running process, the corresponding output point is disconnected; otherwise it is connected.

7 or 107: The DC bus voltage is not less than 85% of the rated value

7: When the inverter bus voltage is not lower than 85% of the rated value, the corresponding output point is connected; otherwise it is disconnected;

107: When the inverter bus voltage is not lower than 85% of the rated value, the corresponding output point is disconnected; otherwise it is connected.

8 or 108: Exceeding 5% of the rated current in running and 10% of the rated current when stopping

8: When above conditions are met, the corresponding output point is connected; otherwise it is disconnected;

108: When above conditions are met, the corresponding output point is disconnected; otherwise it is connected.

9 or 109: Tuning

9: When the inverter is in the self-learning state, the corresponding output point is connected; otherwise it is disconnected;

109: When the inverter is in the self-learning state, the corresponding output point is disconnected; otherwise it is connected.

10 or 110: Frequency detection 1

When the output frequency of the inverter reaches or exceeds the value of any frequency detection (P31.26) plus frequency detection width (P31.27), the frequency detection 1 is triggered; after action at the corresponding output point, when the output frequency of the inverter falls back to any frequency detection (P31.26), the frequency detection 1 is reset.

10: When frequency detection 1 is enabled, the corresponding output point is disconnected;

110: When frequency detection 1 is enabled, the corresponding output point is connected.

11 or 111: Frequency detection 2

When the output frequency of the inverter reaches or exceeds the value of any frequency detection (P31.26), the frequency detection 2 is triggered; after action at the corresponding output point, when the output frequency of the inverter falls back to any frequency detection (P31.26) minus the frequency detection width (P31.27), the frequency detection 2 is reset.

11: When frequency detection 2 is enabled, the corresponding output point is connected;

111: When frequency detection 2 is enabled, the corresponding output point is disconnected.

12 or 112: Fault forecast

12: In case of the fault forecast, the corresponding output point is connected; otherwise it is disconnected;

112: In case of the fault forecast, the corresponding output point is disconnected; otherwise it is connected.

13 or 113: The Self-tuning request (synchronous motor)

14 or 114: Zero servo torque direction judgment (use when the motor is powered off for emergency leveling)

14: In case of heavy test load and light counterweight of the inverter, the corresponding output point is connected; otherwise it is disconnected;

114: In case of heavy test load and light counterweight of the inverter, the corresponding output

point is disconnected; otherwise it is connected.

15 or 115: Zero current detection

15: When the output current is greater than the zero current detection threshold (P31.24) at the inverter stop, the corresponding output point is connected; otherwise it is disconnected;

115: When the output current is greater than the zero current detection threshold (P31.24) at the inverter stop, the corresponding output point is disconnected; otherwise it is connected.

16 or 116: Power generation and electric state discrimination

16: 0—electric state; 1— power generation;

116: 0— power generation; 1— electric state.

17 or 117: Output contactor control

17: When output is 1, the contactor is closed;

117: When output is 0, the contactor is closed.

It is generally used in conjunction with the input function 21 to control the output contactor to close before the inverter output current.

18 or 118: Brake contactor control

18: Open the brake when the output is 1;

118: Open the brake when the output is 0.

It is generally used in conjunction with the input functions 22 and 23 to control the external brake to open at the appropriate time and confirm the feedback point.

19 or 119: Pulse DO0 output (standby)

20 or 120: Pulse DO1 output (standby)

21 or 121: overheating alarm above 90°C

When the radiator temperature is greater than or equal to 90°C, the corresponding output point is connected; otherwise it is disconnected.

22: Motor overheating alarm output

23: Motor switching output

When the motor output is selected, the corresponding output point is disconnected: motor 1;

corresponding output point connected: motor 2.

24: Encoder switching output

When the encoder output is selected, the corresponding output point is disconnected: encoder 1;

corresponding output point connected: encoder 2.

25: Brake output

When the brake is open, the output point is connected; when the brake is closed, the output point is disconnected

26: Cumulative running time arrival

When the cumulative running time of the inverter is greater than the time set by P31.25, the output terminal is connected, otherwise it is disconnected.

27: Set continuous running time arrival

When the single continuous running time of the inverter is greater than the time set by P31.24, the output terminal is connected, otherwise it is disconnected.

28: Output X1

Output the level state of the input terminal X1 through the output terminal.

29: Output X2

Output the level state of the input terminal X2 through the output terminal.

30: Undervoltage blocking stopping

The output terminal outputs the active level in case of system undervoltage.

31: Fan control

In case of inverter running or overtemperature, the output terminal is connected, otherwise it is disconnected after 1min delay.

32: Analog input disconnection

33: Motor PTC alarm

0~10V input types of analog A0 and A1 channels can be connected to motor PTC signal, P32.01 and P32.07 are set to 6, P32.04 and P32.10 filter time set o 2000ms and the protection threshold set to P23.01. A 52# fault will be reported if the motor PTC signal is greater than P23.01 for 2s.

34: Reverse state

Note:

- ① “Connected” above means: for relay output, normally open contacts (1B and 1C, 2B and 2C) are connected, normally closed contacts (1B and 1A, 2B and 2A) are disconnected; output to the open collector indicates that the output point is at low level state. Similarly, “Disconnected” above means: for relay output, normally open contacts (1B and 1C, 2B and 2C) are disconnected, normally closed contacts (1B and 1A, 2B and 2A) are connected; output to the open collector indicates that the output point is at high resistance state.
- ② At the factory settings, when P31.01 = 3, port Y0 is specified as the running signal (RUN) output port; when P31.02 = 2, port Y1 is specified as the output port of inverter fault signal.
- ③ Running signal (RUN) given: the running signal (RUN) is given only when the inverter receives the up/down direction command signal without basic electrode locking.
- ④ Fault signal time sequence: the fault signal is output in case of inverter fault and the running signal is cleared. The fault signal is latched and can be cleared by external input of reset signal, or reset operation of the operation panel, or power failure, or internal set delay time. The fault signal time sequence is shown in Figure 7- 15.

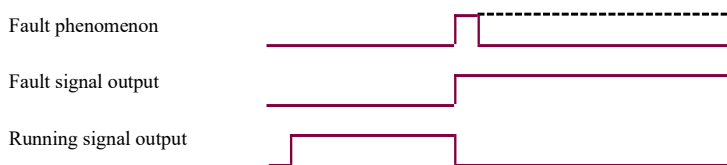


Figure 7- 15 Fault signal time sequence

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------------------|---------------|-----------------|
| P31.08 | Relay output K1 action delay (s) | 0.0~60.0 | 0.0 |
| P31.09 | Relay output K1 reset delay (s) | 0.0~60.0 | 0.0 |
| P31.10 | Relay output K2 action delay (s) | 0.0~60.0 | 0.0 |
| P31.11 | Relay output K2 reset delay (s) | 0.0~60.0 | 0.0 |
| P31.12 | Relay output K3 action delay (s) | 0.0~60.0 | 0.0 |

| | | | |
|--------|----------------------------------|----------|-----|
| P31.13 | Relay output K3 reset delay (s) | 0.0~60.0 | 0.0 |
| P31.14 | Relay output K4 action delay (s) | 0.0~60.0 | 0.0 |
| P31.15 | Relay output K4 reset delay (s) | 0.0~60.0 | 0.0 |
| P31.16 | Relay output K5 action delay (s) | 0.0~60.0 | 0.0 |
| P31.17 | Relay output K5 reset delay (s) | 0.0~60.0 | 0.0 |
| P31.18 | Relay output K6 action delay (s) | 0.0~60.0 | 0.0 |
| P31.19 | Relay output K6 reset delay (s) | 0.0~60.0 | 0.0 |
| P31.20 | Relay output K7 action delay (s) | 0.0~60.0 | 0.0 |
| P31.21 | Relay output K7 reset delay (s) | 0.0~60.0 | 0.0 |
| P31.22 | Relay output K8 action delay (s) | 0.0~60.0 | 0.0 |
| P31.23 | Relay output K8 reset delay (s) | 0.0~60.0 | 0.0 |

P31.08~P31.23 are the time constants to set the action delay and reset delay of K1~K8 output end signals. Through them, the delay time of the output state of each output end relative to its corresponding actual signal can be flexibly set as needed. Moreover, the delay time of the output state mentioned above can be set respectively when the signal is triggered or when the signal is reset.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------------|---------------|-----------------|
| P31.24 | Zero current detection width (%) | 0.0~50.0 | 4.0 |

This function can be used for load change detection. Set the output terminal function to "15: Zero current detected" and output the indication signal when the inverter output current is less than the zero current detection width P31.24.

When the inverter current is greater than the threshold at stop, the corresponding output end set by the function code 15 (or 115) acts.

Note: The function parameter is the percentage of the output current of the inverter relative to the rated current of the motor.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------------------|---------------|-----------------|
| P31.25 | Frequency arrival detection width | 0.00~300.00 | 1.00 |
| P31.26 | Detection frequency | 0.00~300.00 | 1.00 |
| P31.27 | Detection frequency width | 0.00~300.00 | 0.20 |

P31.25 is used for deviation detection between output frequency and set frequency. Set the output terminal function to "4: Frequency arrival signal". When the deviation between the output frequency and set frequency of the inverter is within the set range of this function code, the indication signal is output, as shown in the frequency arrival signal (FAR) in the figure.

Yi represents setting relay output terminal.

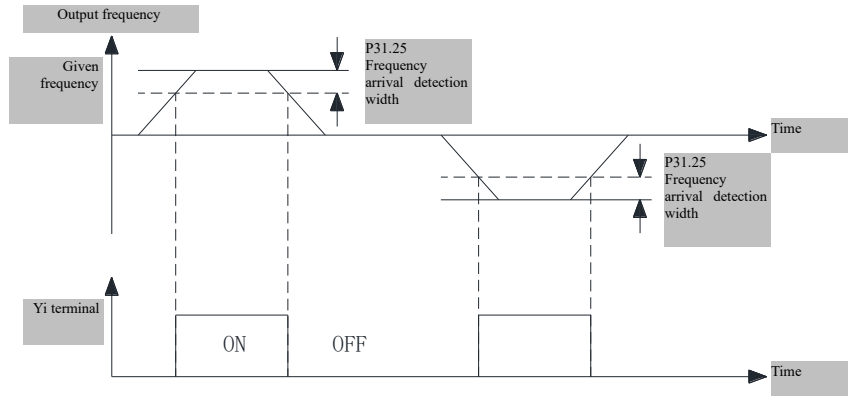


Figure 7-15 Frequency consistency detection 1

P31.26 and P31.27 are two parameters used for any frequency detection: detection frequency and detection frequency width. The two parameters are combined for frequency/speed consistency, frequency detection 1 and frequency detection 2 functions and mainly used to determine whether the output frequency of the inverter is within a specified frequency range. In the frequency detection 1, when the output frequency of the inverter reaches or exceeds the frequency detection speed (P31.26) plus frequency detection width (P31.27), the frequency detection 1 is triggered; after action at the corresponding output point, when the output frequency of the inverter falls back to the frequency detection speed (P31.26), the frequency detection 1 is reset. Frequency detection 1 is negative logic. When it is triggered, the corresponding output state is OFF; when it is reset, the corresponding output state is ON.

In frequency detection 2, when the output frequency of the inverter reaches or exceeds the frequency detection speed (P31.26), the frequency detection 2 is triggered; after action at the corresponding output point, when the output frequency of the inverter falls back to the frequency detection speed (P31.26) minus the frequency detection width (P31.27), the frequency detection 2 is reset. Frequency detection 2 is positive logic. When it is triggered, the corresponding output state is ON; when it is reset, the corresponding output state is OFF.

Set the output terminal function to “5: Frequency/speed consistency”, as shown below.

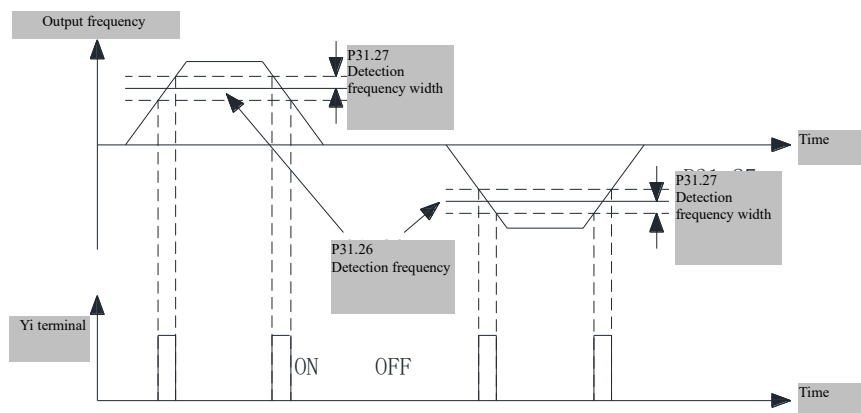


Figure 7-16 Frequency consistency detection 2

Set the output terminal function to “10: Frequency detection 1”, as shown below.

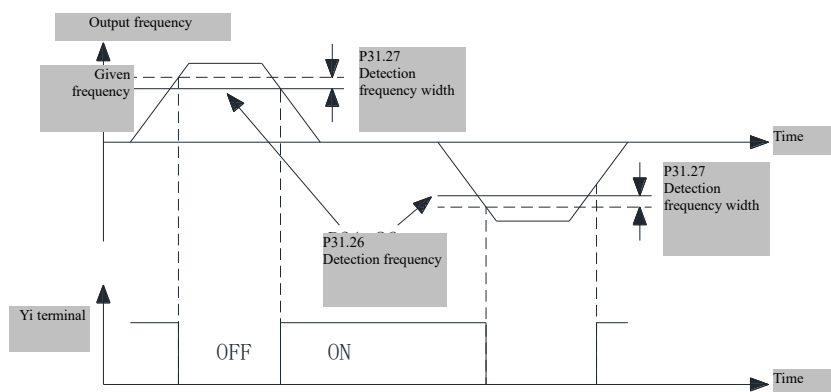


Figure 7-17 Frequency detection 1

Set the output terminal function to “11: Frequency detection 2”, as shown below.

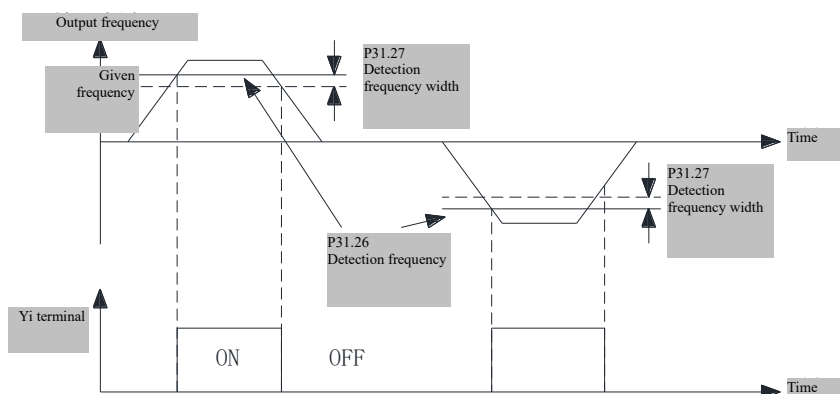


Figure 7-18 Frequency detection 2

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------|---------------|-----------------|
| P31.28 | Single running time arrival (h) | 0~65535 | 2 |

Output the indication signal when the single continuous running time reaches P31.28 from the inverter run command. Achieve the output indication signal by defining the output terminal function code as “27”.

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------------------|---------------|-----------------|
| P31.29 | Cumulative running time arrival (h) | 0~65535 | 8 |

Output the indication signal when the cumulative running time reaches P31.29 from the inverter power on. Achieve the output indication signal by defining the output terminal function code as “26”.

7.2.6.3 P32 group Analog input parameters

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------|---------------|-----------------|
| P32.00 | Analog input A0 type | 0~2 | 0 |
| P32.06 | Analog input A1 type | 0~2 | 1 |

Analog input type parameter settings:

0: -10~10V; 1: 0mA~20mA; 2: 4mA~20mA

Note that the analog input type setting is consistent with the analog input dialing position setting on the control box.

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------------------|---------------|-----------------|
| P32.01 | Analog input A0 function selection | 0~6 | 0 |
| P32.07 | Analog input A1 function selection | 0~6 | 0 |

P32.01 and P32.07 set the analog A1 input functions:

0: **no function**

1: **Target speed signal**

2: **Current speed signal**

3: **Torque signal**

4: **Compensating torque signal**

When the frequency given mode P10.03=3, 5, 7, A0 and A1 will be automatically set to 1;

When the frequency given mode P10.03=4, 6, 8, A0 and A1 will be automatically set to 2;

When the torque given mode P10.04=1, 2, 3, A0 and A1 will be automatically set to 3;

When the compensating torque given mode P10.05=2, 3, 4, A0 and A1 will be automatically set to 4.

5: **Speed limit signal**

6: **Motor PTC signal**

| Function code | Name | Setting range | Factory setting |
|---------------|--|----------------|-----------------|
| P32.02 | Lower limit of analog input A0 (%) | -100.00~327.67 | 0.00 |
| P32.03 | Upper limit of analog input A0 (%) | 0.00~655.35 | 100.00 |
| P32.04 | Analog input A0 filter time (ms) | 0~65535 | 10 |
| P32.05 | Analog input A0 amplitude limit (V/mA) | 0.000~20.000 | 10.000 |
| P32.08 | Lower limit of analog input A1 (%) | -100.00~327.67 | 0.00 |
| P32.09 | Upper limit of analog input A1 (%) | 0.00~655.35 | 100.00 |
| P32.10 | Analog input A1 filter time (ms) | 0~65535 | 10 |

| | | | |
|--------|--|--------------|--------|
| P32.11 | Analog input A1 amplitude limit (V/mA) | 0.000~10.000 | 10.000 |
|--------|--|--------------|--------|

P32.02~P32.05 and P32.08~P32.11 set the upper limit, lower limit, filter time and amplitude limit of two analog input ports respectively

The lower limit and upper limit adjust the minimum and maximum input signals, respectively.

Appropriate adjustment of the filter time can improve the anti-interference ability of the terminal input, because in field applications, the analog input through A0 and A1 terminals usually has certain interference signals, but the longer the filter time is, the longer the response delay of terminal action will be.

Amplitude limit only limits the final processing signal of the analog input within a certain control range. For the current type, the amplitude limit shall be changed to 20.000mA.

Example 1: The analog input 0~10V is given as the speed, and the actual corresponding input frequency is 0~ maximum motor frequency P20.13. The lower limit and upper limit shall be set 100%. If 10V is given, but the inverter actually receives 9.9V, the upper limit is adjusted to 101.0%; if 0V is given, but the inverter actually receives 0.1V, then the lower limit is adjusted to 99.0%

Example 2: The analog input 4~20mA is given as the speed and the actual corresponding input frequency is 0~maximum motor frequency P20.13. The analog input type shall be set to 2:4~20mA and the analog amplitude limit set to 20.000mA. If it is found that the given quantity is not consistent with the actual quantity, then adjust the upper and lower limits to calibrate the analog input given.

7.2.6.4 P33 group Analog output parameters

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------------------|---------------|-----------------|
| P33.00 | Analog output M0 function selection | 0~127 | 1 |
| P33.03 | Analog output M1 function selection | 0~127 | 2 |
| P33.06 | Analog output M2 function selection | 0~127 | 0 |
| P33.09 | Analog output M3 function selection | 0~127 | 0 |

Analog DAC monitoring digital output 0~1000 represents 0~10.00V

Function definition table of multifunction analog output (some commonly used monitoring data):

| Function | Meaning | Corresponding relationship |
|----------|--------------------|---------------------------------|
| 0 | No function | |
| 1 | Output current | 0~Ie corresponds to 0~10V |
| 2 | Output voltage | 0~ Ue corresponds to 0~10V |
| 3 | Torque given | 0~Te corresponds to 0~10V |
| 4 | Bus voltage | 0~Udc corresponds to 0~10V |
| 5 | Total output power | 0~ P total corresponds to 0~10V |

| Function | Meaning | Corresponding relationship |
|----------|--------------------------|-----------------------------------|
| 6 | Active output power | 0~ Pe corresponds to 0~10V |
| 7 | Current speed (unsigned) | 0~Ne corresponds to 0~10V |
| 8 | Speed given (signed) | 0~Ne corresponds to 0~10V |
| 9 | Speed feedback (signed) | 0~Ne corresponds to 0~10V |
| 10 | Acceleration | 0~ 50Hz/s corresponds to 0~10V |
| 11 | Radiator temperature | 0~ 100° corresponds to 0~10V |
| 12 | Analog A0 input | 0~10V corresponds to output 0~10V |
| 13 | Analog A1 input | 0~10V corresponds to output 0~10V |
| 14 | Analog A2 (standby) | 0~10V corresponds to output 0~10V |
| 15 | ModBus analog output 0 | 0~ 10000 corresponds to 0~10V |
| 16 | ModBus analog output 1 | 0~ 10000 corresponds to 0~10V |

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------------------|----------------|-----------------|
| P33.01 | Lower limit of analog output M0 | -100.00~327.67 | -1.00 |
| P33.02 | Upper limit of analog output M0 | 0.00~655.35 | 92.00 |
| P33.04 | Lower limit of analog output M1 | -100.00~327.67 | -1.00 |
| P33.05 | Upper limit of analog output M1 | 0.00~655.35 | 92.00 |
| P33.07 | Lower limit of analog output M2 | -100.00~327.67 | 21.05 |
| P33.08 | Upper limit of analog output M2 | 0.00~655.35 | 97.90 |
| P33.10 | Lower limit of analog output M3 | -100.00~327.67 | 21.05 |
| P33.11 | Upper limit of analog output M3 | 0.00~655.35 | 97.90 |

This function can be used to adjust the analog output defined in above table. The adjusted analog quantity is the actual output quantity of M terminal.

Example 1: If the output frequency is set to 0~50.00Hz (rated frequency), the lower limit set to 20% and the upper limit set to 100%, then the actual output voltage of the analog voltage output port is 2V corresponding to 0Hz, 10V corresponding to 50.00Hz (the analog current output port is 4mA corresponding to 0Hz, 20mA corresponding to 50Hz).

Example 2: If the output frequency is set to 0~50.00Hz (rated frequency), the lower limit set to 0% and the upper limit set to 100%, then the actual output voltage of the analog voltage output port is 0V corresponding to 0Hz, 10V corresponding to 50.00Hz (the analog current output port is 0mA corresponding to 0Hz, 20mA corresponding to 50Hz).

7.2.7 P4X Group speed parameter group

7.2.7.1 P40 group Basic speed parameters

| Function code | Name | Setting range | Factory setting |
|---------------|-------------|---------------|-----------------|
| P40.00 | Panel speed | 0.0~300.0 | 5.0 |

Initial speed given by the panel, which can be changed by the button.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------|---------------|-----------------|
| P40.01 | Basic frequency | 0.0~300.0 | 50.0 |

Basic operating frequency refers to the minimum frequency corresponding to the maximum output voltage of the inverter. It corresponds to the rated frequency of the standard AC motor, as shown in the motor nameplate.

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------|---------------|-----------------|
| P40.02 | Acceleration time 0 (s) | 0.10~360.00 | 30.00 |
| P40.03 | Deceleration time 0 (s) | 0.10~360.00 | 30.00 |

This function can set the rate of acceleration to constant speed or deceleration from constant speed to shutdown after the inverter is started.

Acceleration time 0: time P40.02 taken for the output frequency of inverter to rise from zero frequency to the maximum frequency.

Deceleration time 0: time P40.03 taken for the output frequency of inverter to fall from maximum frequency to zero.

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------|---------------|-----------------|
| P40.04 | Acceleration time 1 (s) | 0.10~360.00 | 5.00 |
| P40.05 | Deceleration time 1 (s) | 0.10~360.00 | 5.00 |
| P40.06 | Acceleration time 2 (s) | 0.10~360.00 | 5.00 |
| P40.07 | Deceleration time 2 (s) | 0.10~360.00 | 5.00 |
| P40.08 | Acceleration time 3 (s) | 0.10~360.00 | 5.00 |
| P40.09 | Deceleration time 3 (s) | 0.10~360.00 | 5.00 |

In addition to the previously defined acceleration time 0 (P40.02) and deceleration time 0 (P40.03), you can also define three groups of acceleration and deceleration time (acceleration/deceleration time 1, acceleration/deceleration time 2 and acceleration/deceleration time 3). By defining the multi-function X terminal (acceleration/deceleration time 1 ~ 2), different acceleration/deceleration time is selected according to different terminal states. The meaning of the three groups of acceleration/deceleration time is the same as P40.02 and P40.03.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------------------|---------------|-----------------|
| P40.10 | Acceleration rounded corner 0 (s) | 0.00~10.00 | 0.00 |
| P40.11 | Acceleration rounded corner 1 (s) | 0.00~10.00 | 0.00 |
| P40.12 | Deceleration rounded corner 0 (s) | 0.00~10.00 | 0.00 |
| P40.13 | Deceleration rounded corner 1 (s) | 0.00~10.00 | 0.00 |

Acceleration/deceleration rounded corner: time P40.10~P40.13 of arc segment added to improve the smoothness of the start and end segments during acceleration and deceleration. The curve time of the arc segment applies to the conveyor belts for carrying fragile items or applications requiring smooth speed regulation.

P40.10 ~ P40.13 are S curve (speed curve) parameters of the motor when the switching multi-stage speed is given, and specify the acceleration time (P40.02), deceleration time (P40.03), acceleration rounded corner time (P40.10 and P40.11) and deceleration rounded corner time (P40.12 and P40.13), which directly affect the characteristics of the S curve and are therefore directly related to the motor operating efficiency and ride comfort. The specific positions of the above parameters in the S speed curve of motor operation are shown in Figure 7-20.

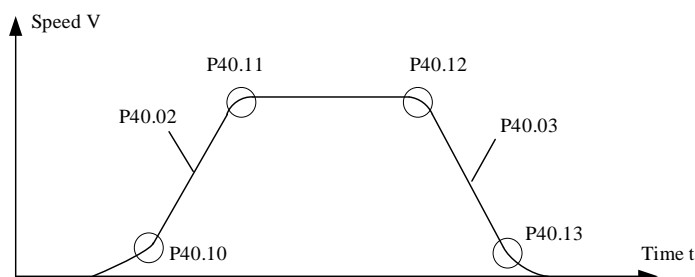


Figure 7-19 Position of S curve in motor operation

7.2.7.2 P41 Group Digital multi-stage parameters

| Function code | Name | Setting range | Factory setting |
|---------------|---|---------------|-----------------|
| P41.00 | Digital quantity multi-stage given 0 (Hz) | 0.00~300.00 | 0.00 |
| P41.01 | Digital quantity multi-stage given 1 (Hz) | 0.00~300.00 | 5.00 |
| P41.02 | Digital quantity multi-stage given 2 (Hz) | 0.00~300.00 | 10.00 |
| P41.03 | Digital quantity multi-stage given 3 (Hz) | 0.00~300.00 | 20.00 |
| P41.04 | Digital quantity multi-stage given 4 (Hz) | 0.00~300.00 | 30.00 |

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P41.05 | Digital quantity multi-stage given 5 (Hz) | 0.00~300.00 | 40.00 |
| P41.06 | Digital quantity multi-stage given 6 (Hz) | 0.00~300.00 | 50.00 |
| P41.07 | Digital quantity multi-stage given 7 (Hz) | 0.00~300.00 | 60.00 |
| P41.08 | Digital quantity multi-stage given 8 (Hz) | 0.00~300.00 | 0.00 |
| P41.09 | Digital quantity multi-stage given 9 (Hz) | 0.00~300.00 | 0.00 |
| P41.10 | Digital quantity multi-stage given 10 (Hz) | 0.00~300.00 | 0.00 |
| P41.11 | Digital quantity multi-stage given 11 (Hz) | 0.00~300.00 | 0.00 |
| P41.12 | Digital quantity multi-stage given 12 (Hz) | 0.00~300.00 | 0.00 |
| P41.13 | Digital quantity multi-stage given 13 (Hz) | 0.00~300.00 | 0.00 |
| P41.14 | Digital quantity multi-stage given 14 (Hz) | 0.00~300.00 | 0.00 |
| P41.15 | Digital quantity multi-stage given 15 (Hz) | 0.00~300.00 | 0.00 |

It can be set as the process open-loop frequency. By defining the multi-function X terminal (digital multi-stage 0 ~ 3), different multi-stage frequency is set with different terminal states. ON means that the terminal is valid, and OFF means that the terminal is invalid.

Note: During the process open-loop operation, if the analog multi-stage and digital multi-stage are set simultaneously for the input terminal, the digital multi-stage is of higher priority.

P41.00 ~ P41.15 define the speed instruction values of 15 stages of digital multi-stage speed 1 ~ 15. 16 states are combined by the binary codes of the four input points of switching multi-stage speeds 0 ~ 3, which correspond to the above 15 given speed commands of P41.00 ~ P41.15 and 0 given speed (when the combination code is 0) respectively. The corresponding relationship between the multi-stage input port signal and the given speed command is shown in Table 6.2 below.

Table 6.2 Corresponding relationship between the multi-stage input port combination and the given speed

| Multi-stage combination code | Multi-stage given 3 | Multi-stage given 2 | Multi-stage given 1 | Multi-stage given 0 | Given frequency |
|------------------------------|---------------------|---------------------|---------------------|---------------------|-----------------|
| 0 | 0 | 0 | 0 | 0 | Given speed 0 |
| 1 | 0 | 0 | 0 | 1 | Given speed 1 |

| Multi-stage combination code | Multi-stage given 3 | Multi-stage given 2 | Multi-stage given 1 | Multi-stage given 0 | Given frequency |
|------------------------------|---------------------|---------------------|---------------------|---------------------|-----------------|
| 2 | 0 | 0 | 1 | 0 | Given speed 2 |
| 3 | 0 | 0 | 1 | 1 | Given speed 3 |
| 4 | 0 | 1 | 0 | 0 | Given speed 4 |
| 5 | 0 | 1 | 0 | 1 | Given speed 5 |
| 6 | 0 | 1 | 1 | 0 | Given speed 6 |
| 7 | 0 | 1 | 1 | 1 | Given speed 7 |
| 8 | 1 | 0 | 0 | 0 | Given speed 8 |
| 9 | 1 | 0 | 0 | 1 | Given speed 9 |
| 10 | 1 | 0 | 1 | 0 | Given speed 10 |
| 11 | 1 | 0 | 1 | 1 | Given speed 11 |
| 12 | 1 | 1 | 0 | 0 | Given speed 12 |
| 13 | 1 | 1 | 0 | 1 | Given speed 13 |
| 14 | 1 | 1 | 1 | 0 | Given speed 14 |
| 15 | 1 | 1 | 1 | 1 | Given speed 15 |

In the above table, the state "0" means that the input port has no input signal, while the state "1" means that the input port has input signal. To further illustrate the above table, take the following example: if the speed given 0 and the speed given 1 have input signals and the speed given 2 and speed given 3 have no input signals, the binary code is "0011" = 3, and the corresponding given speed is the given speed 3, specified by the parameter P41.03.

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------------|---------------|-----------------|
| P41.16 | Inching frequency given (Hz) | 0.00~50.00 | 5.00 |

Frequency given value set for inching operation.

7.2.8 P5X group Process control parameter group

7.2.8.1 P50 group Process open loop parameters

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------------|---------------|-----------------|
| P50.00 | Open loop auxiliary given mode | 0~5 | 0 |

Process open loop auxiliary given mode P50.00 is selected as follows:

0: NA; 1: A0; 2: A1; 3: Standby; 4: Standby; 5: PID given target speed

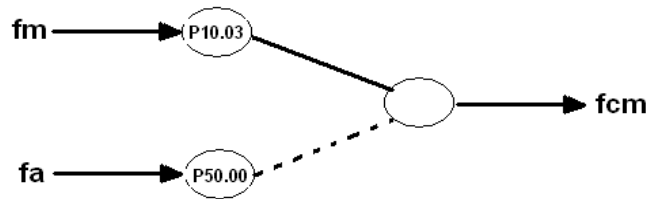


Figure 7- 20 Schematic diagram of open loop auxiliary given mode

f_c is given by P10.03 primary given value f_m by default. When the 44: Open loop primary and secondary given is switched to the auxiliary given value, the primary given value f_m is switched to the auxiliary given value f_a .

| Function code | Name | Setting range | Factory setting |
|---------------|---|---------------|-----------------|
| P50.01 | Open loop primary and secondary given operation | 0~6 | 0 |

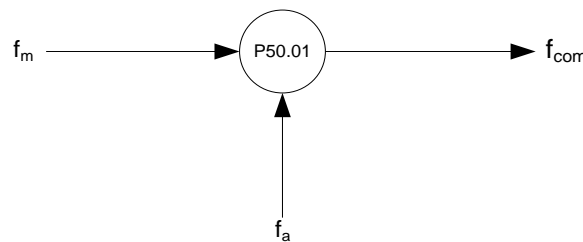


Figure 7- 21 Open loop primary and secondary synthesis diagram

In the process open-loop control mode, the auxiliary given value f_a is superimposed on the primary given value f_m to generate the process open-loop synthesized frequency given $f_{com} = f_m + f_a$.

The primary given value f_m and secondary given value f_a can undergo operations such as "add", "subtract", "offset", "take the maximum", "take the minimum", etc.

The process open loop primary and secondary relational operation P50.01 is defined as follows:

0: No operation

1: Primary given+secondary given: function “add” when the secondary frequency given value is superimposed on the primary given value.

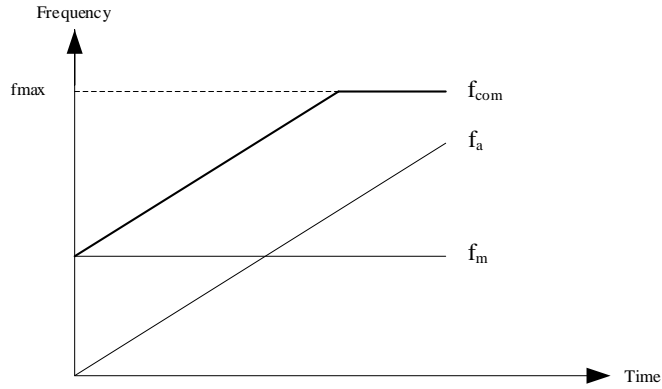


Figure 7-22 Open loop primary and secondary given operation 1

Process open loop synthesis given $f_{com} = \text{primary given } f_m + \text{secondary given } f_a$

2: Primary given - secondary given: function “subtract” when the secondary frequency given value is superimposed on the primary given value.

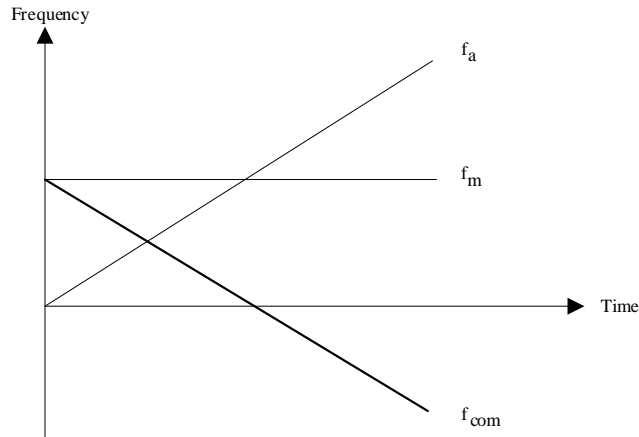


Figure 7-23 Open loop primary and secondary given operation 2

Process open loop synthesis given $f_{com} = \text{primary given } f_m - \text{secondary given } f_a$

3: Standby

4: Standby

5: Take the maximum: take the maximum between the primary given f_m and the secondary given f_a .

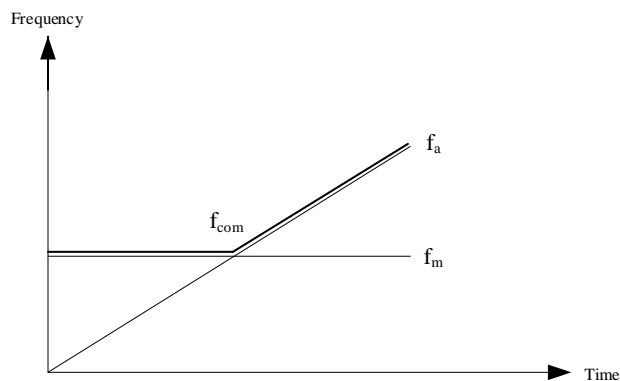


Figure 7- 24 Open loop primary and secondary given operation 5

Process open loop synthesis given $f_{com} = \text{Max}\{\text{primary given } f_m, \text{secondary given } f_a\}$

6: **Take the minimum:** take the minimum between the primary given f_m and the secondary given f_a .

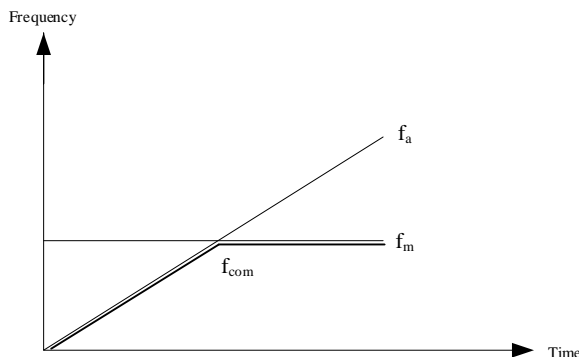


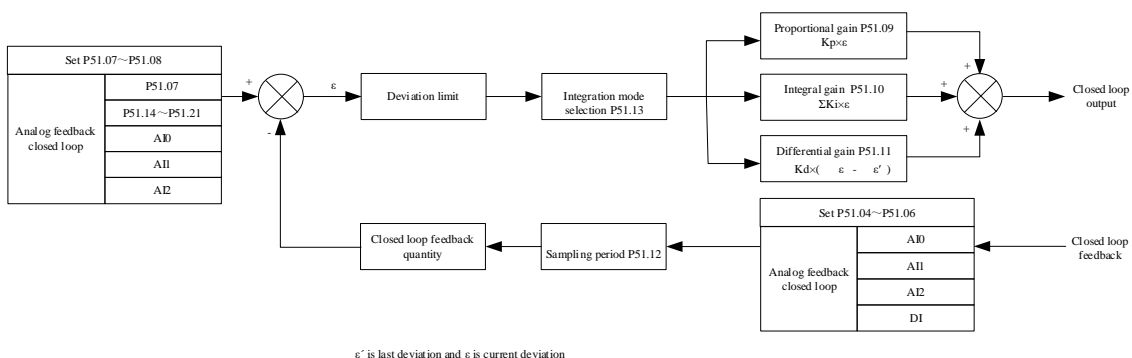
Figure 7- 25 Open loop primary and secondary given operation 6

Process open loop synthesis given $f_{com} = \text{Min}\{\text{primary given } f_m, \text{secondary given } f_a\}$

Note: When the frequency corresponding to the synthetic quantity f_{com} exceeds the upper and lower limits of frequency, the output frequency is limited at the upper and lower limits.

7.2.8.2 P51 group Process closed loop parameters

PID control is a common method used for process control. The inverter output frequency is adjusted through the proportion, integral and differential operation of the deviation between the feedback signal of the controlled quantity and the target quantity signal to form a negative feedback system and to make the controlled quantity stable on the target quantity. It applies to flow control, pressure control, temperature control and other process control. The basic control functional block diagram is as follows.



ϵ' is last deviation and ϵ is current deviation

Figure 7- 26 PID functional block diagram

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------------|---------------|-----------------|
| P51.00 | Closed loop control selection | 0~1 | 0 |

Closed loop operation control selection: 0: invalid; 1: valid

| Function code | Name | Setting range | Factory setting |
|---------------|---|---------------|-----------------|
| P51.01 | Primary given mode of closed loop | 0~6 | 0 |
| P51.02 | Secondary given mode of closed loop | 0~6 | 2 |
| P51.03 | Closed loop primary and secondary given operation | 0~6 | 0 |

If there are primary and secondary given values in a closed-loop system with feedback, the primary given values may be digital voltage, analog quantity, pulse quantity, multi-stage voltage and communication; secondary given values may be analog quantity, pulse quantity and multi-stage voltage.

P51.01 Primary given mode of closed-loop control is selected as follows:

0: Digital voltage given (P51.07); 1: A0; 2: A1; 3: Standby; 4: Standby; 5: Standby; 6: Communication

P51.02 Secondary given mode of closed-loop control is selected as follows:

0: NA; 1: A0; 2: A1; 3: Standby; 4: Standby; 5: Standby; 6: Modbus communication given

P51.03 Primary and secondary given operation of closed-loop control is selected as follows:

0: No operation; 1: Primary + secondary; 2: Primary - secondary; 3: Standby; 4: Standby; 5: Take the maximum; 6: Take the minimum

The primary and secondary operation function given for the closed loop is the same as that given for the open loop. See P50.01 for details.

Note: The closed-loop control analog quantities, such as primary given, secondary given, primary feedback and secondary feedback, cannot be set as the same channel.

| Function code | Name | Setting range | Factory setting |
|---------------|---|---------------|-----------------|
| P51.04 | Primary feedback mode of closed loop | 0~6 | 1 |
| P51.05 | Secondary feedback mode of closed loop | 0~6 | 2 |
| P51.06 | Primary and secondary feedback operation of closed loop | 0~6 | 0 |

In the closed-loop system with feedback, the primary feedback and secondary feedback may be analog quantity or pulse quantity.

Primary and secondary operation function and process of process closed-loop feedback: The primary and secondary operation function given for the closed loop is the same as that given for the open loop. See P50.01 for details.

P51.04 Primary feedback mode of closed-loop control is selected as follows:

0: NA; 1: A0; 2: A1; 3: Standby; 4: Standby; 5: Standby; 6: Modbus communication given

P51.05 Secondary feedback mode of closed-loop control is selected as follows:

0: NA; 1: A0; 2: A1; 3: Standby; 4: Standby; 5: Standby; 6: Modbus communication given

P51.06 Primary and secondary feedback operation of closed-loop control is selected as follows:

0: No operation; 1: Primary + secondary; 2: Primary - secondary; 3: Standby; 4: Standby; 5: Take the maximum; 6: Take the minimum

Note: The closed-loop control analog quantities, such as primary given, secondary given, primary feedback and secondary feedback, cannot be set as the same channel.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------|---------------|-----------------|
| P51.07 | PID internal given value | 0.00~10.00 | 0.70 |
| P51.08 | Unit | 0~3 | 0 |

Before determining the process closed-loop given quantity, the current control run mode P51.00=1 should be determined first.

When the current control operation mode is the analog feedback process closed loop, if P50.01 is set to 0, the given quantity of the closed loop is determined by P51.07.

P51.08 is used to set the units of some parameters: 0: V; 1: %; 2: Mpa; 3: °.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------|---------------|-----------------|
| P51.09 | Proportional gain Kp | 0.000~10.000 | 0.500 |
| P51.10 | Integral gain Ki | 0.000~10.000 | 0.500 |
| P51.11 | Differential gain Kd | 0.000~10.000 | 0.000 |

The larger the Kp is, the faster the response will be, but it is easy to produce oscillation. Kp cannot completely eliminate the deviation, and Ki can be used to eliminate the residual deviation; the larger the KI is, the faster the inverter responds to the variation of deviation, but it is easy to produce oscillation; in case of frequent jump feedback in the system, Kd is required, which can quickly respond to the system feedback and given deviation variation. The larger the Kd is, the faster the response will be, but it is easy to produce oscillation.

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------|---------------|-----------------|
| P51.13 | Integral selection mode | 0~1 | 0 |

This function determines the specific operation mode during the process closed-loop regulation.

If the output of the process closed-loop regulation reaches the limit of the upper or lower frequency limit (P70.00 or P70.01), there are two actions to choose in the integral link.

0: Stop integral control when frequency to the upper and lower limits: The integral remains unchanged. In case of any change in the magnitude trend between a given quantity and the feedback quantity, the integral quickly follows the trend.

1: Continue integral control when frequency to the upper and lower limits: The integral responds in real time to the change between the given quantity and the feedback quantity, unless the internal integral limit has been reached. In case of change in the magnitude trend between a given quantity and the feedback quantity, a longer time is needed to counteract the effect of further integration before the integral follows the trend.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------------|---------------|-----------------|
| P51.22 | Upper limit of integral action | 0.00~ | 100.00 |

| | (%) | | |
|--------|---------------------------------------|----------|-------|
| P51.24 | Upper limit of closed loop input (%) | 0.0~ | 50.0 |
| P51.25 | Lower limit of closed loop input (%) | 0.0~20.0 | 0.0 |
| P51.26 | Upper limit of closed loop output (%) | 0.0~ | 100.0 |

P51.22 is used in combination with P51.13. When P51.22=1, the limit value that needs to be set by P51.22 is valid.

P51.24 ~ P51.26 set the limit value in the process closed-loop control. If the limit value exceeds the upper input limit P51.24, it is adjusted according to the upper limit value; if it is less than the lower limit, PID regulation is not made, and the limit value in the process closed-loop control is set.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------|---------------|-----------------|
| P51.28 | Sleep selection | 0~1 | 0 |
| P51.29 | Sleep frequency (Hz) | 0.00~50.00 | 30.00 |
| P51.30 | Sleep delay (s) | 0.00~655.35 | 10.00 |
| P51.31 | Wakeup deviation (%) | 0.00~655.35 | 0.10 |
| P51.32 | Wakeup delay (s) | 0~6553.5 | 10.0 |

Sleep parameter:

P51.28 sleep selection: 0: invalid; 1: valid

Set sleep frequency, sleep delay, wakeup deviation and wakeup delay when the sleep selection is valid.

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P51.33 | Given acceleration and deceleration time | 0.0~50.0 | 0.0 |
| P51.34 | Closed loop output filter time | 0.00~50.00 | 0.01 |

In case of sudden change in the closed-loop given value, the two parameters can be adjusted to make the given control in a certain response time, so that the closed-loop process in some environments can respond more smoothly.

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P51.35 | Lower limit of given quantity | 0.0~100.0 | 0.0 |
| P51.36 | Lower limit of feedback quantity range | 0.0~100.0 | 0.0 |
| P51.37 | Upper limit of given quantity | 0.0~100.0 | 10.0 |

| | | | |
|--------|--|-----------|------|
| P51.38 | Upper limit of feedback quantity range | 0.0~100.0 | 10.0 |
|--------|--|-----------|------|

P51.35~P51.38 define the relation curve between the analog closed-loop given and the expected feedback quantity. The set value is the percentage of the actual value of the given and feedback physical quantity relative to the reference value (10V or 20mA).

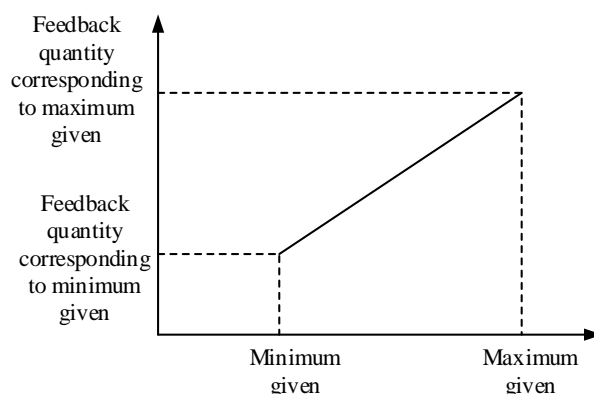


Figure 7-27 Positive feedback regulation

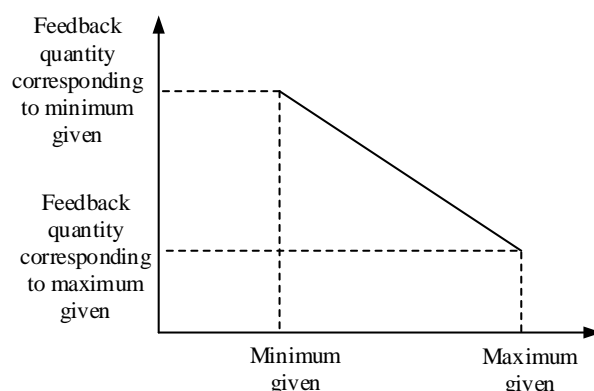


Figure 7-28 Negative feedback regulation

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------------------|---------------------------|-----------------|
| P51.39 | Preset frequency (Hz) | 0.001 ~ maximum frequency | 22.0 |
| P51.40 | Preset frequency holding time (s) | 0~300 | 0 |

After the closed-loop operation is started, the frequency is first accelerated to the closed-loop preset frequency P51.39 according to the acceleration time, and remains at this point for a period of time P51.40 before the closed-loop operation is performed. If the closed-loop preset frequency function is not required, set the preset frequency and hold time to 0.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------------|---------------|-----------------|
| P51.41 | Positive and negative characteristics | 0~1 | 0 |

Whether the comparison result between the feedback signal and the set value is negated, 0: No

negation; I: Deviation negation.

7.2.9 P6X group Vector control parameter group

7.2.9.1 P60 group Speed control parameters

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------------|---------------|-----------------|
| P60.00 | Zero speed of speed loop P0 | 0.00~655.35 | 0.00 |
| P60.01 | Zero speed of speed loop Ti0 | 0.00~655.35 | 0.00 |
| P60.02 | Zero speed of speed loop D0 | 0.00~655.35 | 0.00 |
| P60.03 | Low speed of speed loop P1 | 0.00~655.35 | 150.00 |
| P60.04 | Low speed of speed loop Ti1 | 0.00~655.35 | 900 |
| P60.05 | Low speed of speed loop D1 | 0.00~655.35 | 0 |
| P60.06 | Medium speed of speed loop P2 | 0.00~655.35 | 150.00 |
| P60.07 | Medium speed of speed loop Ti2 | 0.00~655.35 | 900 |
| P60.08 | Medium speed of speed loop D2 | 0.00~655.35 | 0 |
| P60.09 | High speed of speed loop P3 | 0.00~655.35 | 150.00 |
| P60.10 | High speed of speed loop Ti3 | 0.00~655.35 | 900 |
| P60.11 | High speed of speed loop D3 | 0.00~655.35 | 0 |
| P60.12 | Switching frequency 0 (%) | 0.0~6553.5 | 10.0 |
| P60.13 | Switching frequency 1 (%) | 0.0~6553.5 | 60.0 |

For PID regulation of speed loop, P0, Ti0 and D0 are used as the zero servo regulation parameters. The other three groups of parameters are divided into three groups by P60.12 and P60.13. P1, Ti1 and D1 are regulation parameters in low speed section; P2, Ti2 and D2 are regulation parameters in medium speed section; P3, Ti3 and D3 are regulation parameters in high speed section.

The P60 parameter group mainly adjusts the proportional gain and integration time of the speed regulator.

Proportional gain P:

Please adjust according to the size of the rotational inertia of the machine connected to the motor. For mechanical devices with large rotational inertia, increase P gain; for devices with small rotational inertia, reduce the P gain.

When the P gain is larger than the inertia, although the control response can be accelerated, the motor may oscillate or overshoot. Conversely, if the P gain is smaller than the inertia, the control response will be slower and the time to adjust the speed to the steady value will be longer.

Integration time I:

0 indicates that the integration is invalid (P is controlled separately). To make the deviation between the speed instruction in the steady state and the actual speed be zero, please set the integration time I to a non-zero value. When the value of I is set small, the system responds fast, but too small value is likely to cause oscillation; when I is set large, the system responds slowly.

Differentiation time D:

It is generally not adjusted and is set by default. This parameter can quickly respond to system feedback and the given deviation change. The larger the value is, the faster the response will be, but it is easy to produce oscillation. Differentiation doesn't work when it is set to 0.

Adjustment of PID set value at high, medium and low speeds:

When the motor speed is higher than switching frequency 1, P60.09 ~ P60.11 work, so that the system can achieve a better dynamic response without oscillation. When the motor speed is lower than the switching frequency 0, P60.03 ~ P60.05 work. In general, to achieve better dynamic response at low speed, proportional gain P60.03 can be appropriately increased and integration time P60.04 reduced. When the speed is lower than switching frequency 1 and higher than switching frequency 0, P60.06 ~ P60.08 work.

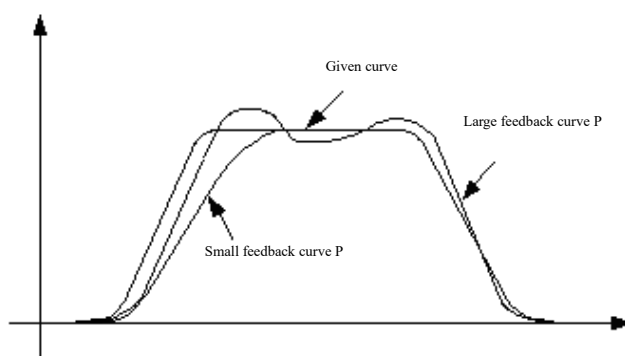


Figure 7-30 Impact of proportional constant P on feedback tracking

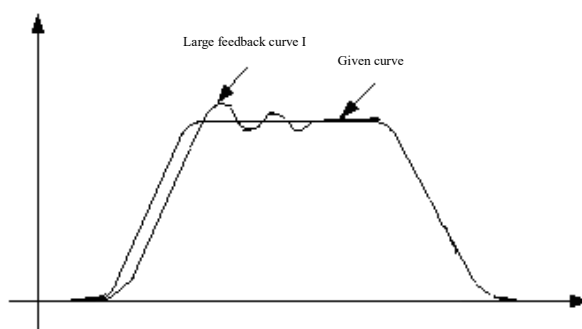


Figure 7-31 Impact of integration constant I on feedback tracking

7.2.9.2 P61 group Current control parameters

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------------|---------------|-----------------|
| P61.00 | Current loop Kp | 0.01~9.99 | 1.40 |
| P61.01 | Current loop Ki | 0.01~9.99 | 1.00 |
| P61.02 | Current loop Kd | 0.00~9.99 | 0.00 |
| P61.03 | Current loop bandwidth (Hz) | 0.1~1000.0 | 400.0 |
| P61.05 | Current loop selection | 0~10 | 0 |
| P61.06 | V/F control current loop Max | 0.0~100.0 | 1.0 |
| P61.07 | V/F control current loop Min | 0.0~100.0 | 1.0 |
| P61.08 | Flux weakening Kp | 0.00~655.35 | 0.50 |

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------|---------------|-----------------|
| P61.09 | Flux weakening Ki | 0.0000~6.5535 | 0.0050 |

The P61 parameter group mainly adjusts the PID of the current loop. It is not adjusted generally and set according to the default value.

7.2.9.3 P62 group Torque control parameters

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------|---------------|-----------------|
| P62.00 | Torque given (%) | 0.0~100.0 | 0.0 |
| P62.01 | Torque direction | 0~1 | 0 |
| P62.02 | Torque increase time (s) | 0.01~655.35 | 1.00 |
| P62.03 | Torque decrease time (s) | 0.01~655.35 | 1.00 |

When P10.00=2 is set, the four parameters can be enabled:

When the torque given mode P10.04=0, the torque size is determined by P62.00, the direction determined by P62.01, and the acceleration/deceleration time determined by P62.02 and P62.03.

7.2.9.4 P63 Torque compensating parameters

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------------------|---------------|-----------------|
| P63.00 | Compensating torque direction | 0~1 | 0 |
| P63.01 | Compensating torque gain (%) | 0.0~200.0 | 100.0 |
| P63.03 | Light load switch compensation (%) | 0.0~99.9 | 0.0 |
| P63.04 | Heavy load switch compensation (%) | 0.0~99.9 | 0.0 |

When P10.05 is set to non-zero, these four parameters are enabled to calculate the proportion and deviation of compensation according to the given compensation channel.

The compensation gain is a proportionality coefficient and the offset is the adjustment of the deviation.

When the digital torque compensation function is used, the light load torque is compensated for the light load switch action and the heavy load torque is compensated for the heavy load switch action.

7.2.10 P7X group Enhanced control parameter group

7.2.10.1 P70 group Restriction and protection parameters

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------------|--------------------------------|-----------------|
| P70.00 | Upper limit of frequency (Hz) | 0.01~ maximum frequency | 50.00 |
| P70.01 | Lower limit of frequency (Hz) | 0.01~ upper limit of frequency | 0.00 |

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------------|---------------|-----------------|
| P70.02 | Maximum output frequency (Hz) | 0.01~300.00 | 55.00 |

The maximum output frequency f_{max} is the maximum frequency that the inverter can output. The upper limit of frequency f_H and lower limit of frequency f_L are the highest and lowest frequency of motor operation set by the user according to the requirements of production process during use.

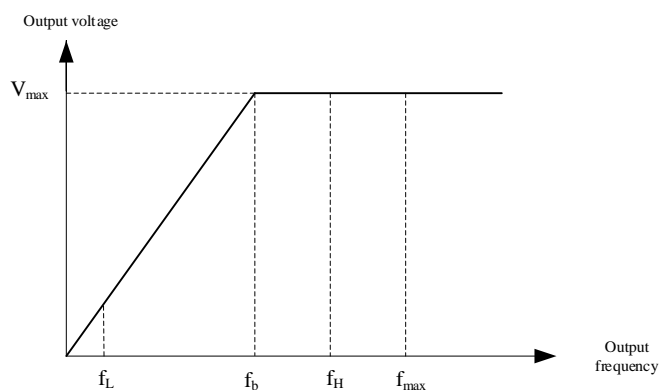


Figure 7- 32 Upper and lower limits of frequency

| Function code | Name | Setting range | Factory setting |
|---------------|---|---------------|-----------------|
| P70.04 | Output torque limit (%) | 0.00~200.00 | 150.00 |
| P70.05 | Inverter acceleration overcurrent threshold (%) | 0.00~200.00 | 160.00 |
| P70.06 | Inverter deceleration overvoltage threshold (V) | 540~800 | 750 |
| P70.07 | Overspeed protection factor (%) | 0.00~ | 120.00 |

P70.04 ~ P70.06 set the threshold value for the overcurrent and overvoltage of the inverter. Usually, when the set speed or motor load changes dramatically, the output current of the inverter may reach above the overcurrent protection point, leading to overcurrent fault. Current limiting function is to control the instantaneous output of the inverter to limit the dramatically changed output current not to exceed the protection action value, so as to effectively reduce the occurrence of overcurrent fault and ensure the continuous and reliable operation of the system. When the current exceeds a certain value (P70.04), the inverter enters the current limiting state; during running at constant speed, stable load capacity can be guaranteed by current limiting without overcurrent fault. When the load is reduced, the inverter will automatically exit current limiting state and resume normal work. This function is particularly applicable when speed or load changes dramatically.

P70.07 sets overspeed protection value.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------|---------------|-----------------|
| P70.08 | Special function selection | 0~65535 | 16 |

Parameters are set by bits, with specific meanings as follows: For example, 16 means that the classic speed loop is selected

bit3: 8 Whether to calculate rotor time constant depending on motor parameters (1: Depending on motor parameters; 0: Depending on slip frequency)

bit4: 16 Small speed decrease for sudden load increase; small speed increase for sudden load decrease.

bit5: 32 Alarm for undervoltage (1: No alarm; 0: Alarm)

bit7: 128 Zero servo mode (1: Calculate the zero servo torque depending on the acceleration; 0: Calculate the zero servo torque depending on the feedback speed)

bit8: 256 Whether to self-learn the encoder phase angle at each run (1: Yes; 0: Learn only once in power on)

bit10: 1024 Is the bus voltage compensated when the emergency power supply is running (1: Yes; 0: No)

bit11: 2048 standby

bit12: 4096 standby

bit13: 8192 standby

bit14: 16384 standby

bit15: 32768 standby

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------------------|---------------|-----------------|
| P70.10 | PT signal channel | 0~2 | 0 |
| P70.11 | Upper PT protection threshold (V) | 0.000~10.000 | 10.000 |
| P70.12 | Lower PT protection threshold (V) | 0.000~10.000 | 0.000 |
| P70.13 | PT protective action delay (s) | 0.0~10.0 | 3.0 |

P70.10: select PT signal channel (0: NC; 1: AI0; 2: AI1).

Trigger condition for 49# fault (PT detection fault): after the inverter runs for 5s, “PT value >P70.11” or “PT value <P70.12” for the time set by P70.13;

Clear condition for 49# fault (PT detection fault): inverter stop or “P70.12<PT P70.11” for 2S.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------------------|---------------|-----------------|
| P70.14 | HT signal channel | 0~2 | 0 |
| P70.15 | Upper HT protection threshold (V) | 0.000~10.000 | 10.000 |
| P70.16 | Lower HT protection threshold (V) | 0.000~10.000 | 0.000 |
| P70.17 | HT protective action delay (s) | 0.0~10.0 | 3.0 |

P70.14: select HT signal channel (0: NC; 1: AI0; 2: AI1).

Trigger condition for 50# fault (Humidity fault): “HT value >P70.15” or “PT value <P70.16” for the time set by P70.17;

Clear condition for 50# fault (Humidity fault): “P70.16<PT < P70.15” for 2S.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------------|---------------|-----------------|
| P70.18 | Bus undervoltage threshold (V) | 0~740 | 380 |

The default bus undervoltage threshold of 200V inverter is 180V.

The default bus undervoltage threshold of 400V inverter is 380V.

The default bus undervoltage threshold of 600V inverter is 740V.

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P70.19 | Maximum torque of no-load uplink (%) | 0~65535 | 0 |
| P70.20 | Maximum torque of no-load downlink (%) | 0~65535 | 0 |

P70.19 and P70.20 record the inertia of the system when running without load. If the automatic speed limit function is used, the final speed limit is based on this parameter, which is usually used when the hoisting equipment has flux weakening control. After changing the acceleration/deceleration time of the system, set the software version parameter 95.01=12.34. The system goes up or down once. After stopping the operation, set the software version parameter 95.01=12.34 again, and run again in the opposite direction. After operation, parameters 70.19 and 70.20 record the no-load torque of the system up and down. In normal operation, the automatic limit function will judge the load weight, thereby determining the final running speed.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------|---------------|-----------------|
| P70.21 | PWM detection delay (ms) | 0~65535 | 800 |

The inverter reports 51# fault after operation and parameter PWM detection delay if the output current is 0.

| Function code | Name | Setting range | Factory setting |
|---------------|---|---------------|-----------------|
| P70.22 | Frequency selection below the lower limit | 0~3 | 0 |

Set the operation mode when the target command frequency is lower than the lower limit of frequency:

- 0: Run at lower limit of frequency
- 1: Stop
- 2: Zero speed operation
- 3: Inertial stop after reaching the lower limit of frequency

7.2.10.2 P71 group control optimization parameters

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------|---------------|-----------------|
| P71.00 | Frequency hopping speed f1 (Hz) | 0.00~100.00 | 0.00 |

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------|---------------|-----------------|
| P71.01 | Frequency hopping speed f2 (Hz) | 0.00~100.00 | 0.00 |
| P71.02 | Frequency hopping speed f3 (Hz) | 0.00~100.00 | 0.00 |
| P71.03 | Frequency hopping width (Hz) | 0.00~100.00 | 0.00 |

To avoid mechanical resonance point, the frequency hopping range of the inverter can be set. When the set frequency of the inverter falls into the hopping frequency, it will automatically run in the hopping frequency range. The frequency hopping interval is from [frequency hopping speed -0.5× frequency hopping width, frequency hopping speed +0.5× frequency hopping width], and a total of three frequency modulation intervals can be set.

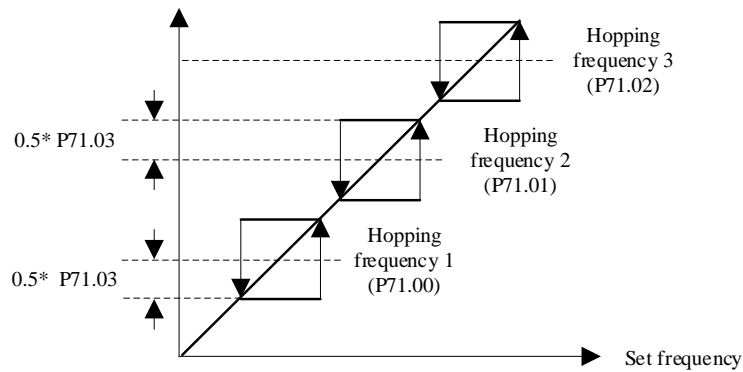


Figure 7- 33 Upper and lower limits of hopping frequency

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------------------|---------------|-----------------|
| P71.04 | Inertia compensation coefficient (%) | 0.00~100.00 | 0.00 |
| P71.05 | Prohibit reverse rotation | 0~1 | 0 |
| P71.06 | Positive and negative interval (s) | 0.0~6553.5 | 0.0 |
| P71.07 | PWM modulation mode | 0~2 | 2 |

The rotational inertia compensation coefficient is determined by P71.04. When the system load inertia is large in the torque control mode, it is required to provide additional rotational inertia compensation in the system acceleration and deceleration process.

Reverse may lead to damage to some production equipment. This function can be used to disable reverse. P71.05 Reverse allowed by default, set to 1: Reverse prohibited.

When the rotation direction of the motor is opposite to the direction required by the equipment, the wiring of any two terminals on the output side of the inverter can be exchanged to make the forward direction of the equipment consistent with the forward direction defined by the inverter.

Set P71.06 to realize the waiting time when the speed passes zero when the inverter changes from forward to reverse (or from reverse to forward).

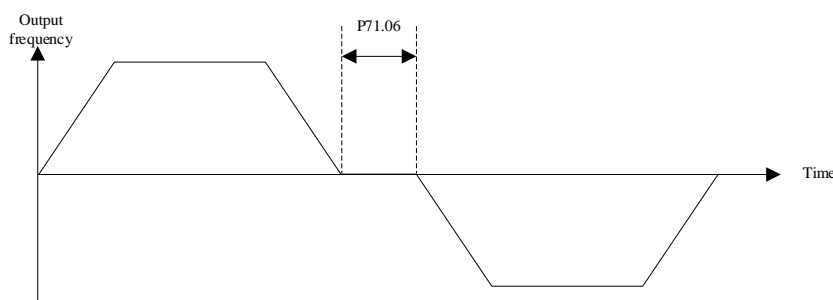


Figure 7- 34 Forward and reverse dead zone time

P71.07 function selects PWM modulation mode. **0**: 5 form; **1**: 7 form; **2**: <40%rpm 7-segment, >40% 5-segment.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------|---------------|-----------------|
| P71.08 | Automatic torque lifting | 0~1000 | 125 |

P71.08 Automatic torque lifting (bit selection function)

Bit0: 0: NA

Bit1: 1 **Automatic torque lifting**, to improve the load performance at low speed

Bit2: 2 **Oscillation suppression 1**, to suppress motor oscillation at no load and light load

Bit3: 4 **Slip compensation**, to improve the speed control accuracy

Bit4: 8 **Stator resistance compensation**, to improve the load performance at low speed

Bit5: 16 **Dead zone compensation**, to improve the voltage accuracy

Bit6: 32 **Bus voltage compensation**, to stabilize the output voltage

Bit7: 64 **Oscillation suppression 2**

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------------|---------------|-----------------|
| P71.09 | V/F torque compensation | 0.0~30.0 | 0.0 |
| P71.10 | Maximum frequency of V/F compensation | 0.0~50.0 | 10.0 |

Torque compensation function: in the low frequency operation of the inverter V/F, improve the output voltage and offset the stator pressure drop to generate enough torque to ensure the normal operation of the motor.

P71.09 sets the manual compensating torque in V/F control to effectively improve the low-speed torque.

P71.10 sets the maximum frequency to provide compensating torque in V/F control.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------|---------------|-----------------|
| P71.12 | Current slow fall time (s) | 0.01~655.35 | 0.00 |
| P71.14 | Carrier frequency (kHz) | 1.1~4.0 | 2.0 |

P71.12 sets the current slow fall time to reduce the strike note at the motor stop.

Carrier frequency regulation: if the inverter sounds too loud, the carrier frequency may be increased to reduce the sound.

Note: The default carrier frequency of AS700 series inverter is related to the power of the inverter. The higher the power is, the lower the default carrier frequency will be. If it exceeds the default value, please use at the derating of 10% for every 1km increase.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------|---------------|-----------------|
| P71.16 | Regulator mode | 0~3 | 2 |

Regulation period of the speed loop when setting vector control, 0: 0.5ms; 1: 1ms; 2: 2ms; 3: 4ms. The greater the value, the slower the speed regulation, which can reduce the electromagnetic noise of the motor.

The regulator mode is different according to the default carrier frequency of the inverter. When the default carrier $\geq 4\text{kHz}$, the regulator mode defaults to 1; when the default carrier frequency $\leq 3\text{kHz}$, the regulator mode defaults to 2.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------|---------------|-----------------|
| P71.17 | Contact on delay (s) | 0.0~10.0 | 0.8 |
| P71.18 | Brake open delay (s) | 0.0~10.0 | 0.4 |
| P71.19 | Contact off delay (s) | 0.0~10.0 | 1.0 |
| P71.20 | Brake close delay (s) | 0.0~10.0 | 0.1 |
| P71.21 | Output off delay (s) | 0.0~10.0 | 0.3 |

This group of parameters is mainly applied to the control system, and the control logic of output contactor and external brake is increased. Adjusting delay time can make the control more stable and improve the comfort.

Such parameters can also be used in many industries with lifting mechanisms and requiring output contactor control.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------|---------------|-----------------|
| P71.22 | Zero speed threshold (Hz) | 0.0~10.0 | 0.2 |

P71.22 sets the zero speed threshold, and the default value is 0.2Hz. It is considered as zero speed if the actual operating frequency is lower than the set value.

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------------------|---------------|-----------------|
| P71.23 | Forward dead zone compensation (%) | 0~100 | 100 |

P71.23 compensates the dead zone time for the open-close conversion of the upper and lower bridge arms in positive rotation, and the default value is 100%.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------------|---------------|-----------------|
| P71.25 | Zero servo compensation (%) | 0~100 | 0 |

In the closed-loop vector control mode, if the incremental encoder is used and P71.25 is greater than 0, then the output of the zero servo regulating ring is superimposed with the compensation amount of P71.25 for the zero servo compensation time of P11.07.

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------|---------------|-----------------|
| P71.26 | Power-on learning angle | 0~1 | 0 |

Whether the synchronous motor is energized to learn phase angle: 0: no learning; 1: self-learning

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------------------|---------------|-----------------|
| P71.27 | Motor current gain coefficient (%) | 50~200 | 150 |

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P71.28 | Zero servo current loop gain coefficient | 50~200 | 100 |

P71.28: The torque current PI used during the zero servo change by zero servo gain may not be changed generally. The parameter P71.28 can be adjusted properly win case of jitter and overcurrent in the zero servo process.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------|---------------|-----------------|
| P71.29 | PWM modulation selection | 0~1 | 1 |

PWM modulation mode:

- 0: underflow update
- 1: overflow/underflow update

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------------------|---------------|-----------------|
| P71.30 | Power factor compensation angle | 0.0~360.0 | 0.0 |
| P71.31 | Power factor compensation direction | 0~1 | 0 |
| P71.32 | Power factor compensation mode | 0~2 | 0 |

P71.32 Power compensation mode:

- 0: Manual compensation above 80% of the target speed
- 1: Full manual compensation
- 2: Automatic compensation

P71.30 and P71.31 are the compensation angle and direction of manual compensation.

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------------|---------------|-----------------|
| P71.33 | Speed accuracy adjustment (%) | 0.0~100.0 | 100.0 |

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P71.34 | Performance improvement compensation | 0~1000 | 128 |
| P71.35 | System inertia coefficient (%) | 0.0~300.0 | 100.0 |
| P71.36 | Automatic low speed torque lifting (%) | 0.0~300.0 | 100.0 |

The above parameters are used to set the characteristics in the speed sensorless vector control 1. If the acceleration and deceleration time is short, increase the value of P71.35 to accelerate the speed response. If the startup is difficult and the low-speed torque is required, increase the value of P71.36.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------|---------------|-----------------|
| P71.37 | Droop control gain | 0.0~200.0 | 0.0 |
| P71.38 | Droop control filter | 0.00~2.00 | 0.05 |

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------------|---------------|-----------------|
| P71.39 | Power outage detection threshold | 330~580 | 480 |

P71.39 is generally 480. In case of KEB process fault, the value can be appropriately increased by referring to the bus voltage of the inverter.

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------|---------------|-----------------|
| P71.40 | KEB bus target voltage | 330~580 | 500 |

The value of P71.40 shall be greater than P71.39 (power outage detection threshold) and less than the bus voltage of the inverter in the normal power supply. This value can be appropriately increased by referring to the bus voltage of the inverter.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------|---------------|-----------------|
| P71.41 | Power outage disposal mode | 00000~00014 | 00000 |

P71.41 setting by bits. By units, tens, hundreds, thousands and ten thousands places, this parameter is defined as:

Units parameter:

- 0: Not processed
- 1: Tracking start (limited time)
- 2: Tracking start (unlimited time)
- 3: KEB (undervoltage detected) KEB is enabled. Report undervoltage fault if the bus voltage is still low after exceeding P71.45 (maximum power outage compensation time).
- 4: KEB (undervoltage undetected)

Tens parameter:

- 1: Enable 3s delay alarm for external fault

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P71.42 | Maximum power outage compensation time (s) | 0.0~60.0 | 3.0 |

KEB is enabled. Report undervoltage fault if the bus voltage is still low exceeding P71.42 (maximum power outage compensation time).

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------------|---------------|-----------------|
| P71.43 | KEB shortest actuation time (ms) | 0~2000 | 100 |

If KEB is enabled, it will be exited at least after P71.43 (KEB shortest actuation time).

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------|---------------|-----------------|
| P71.44 | KEB initial frequency drop (Hz) | 0.00~5.00 | 2.00 |

This value can be set within the range of 0~2 times the rated slip frequency of the motor in order to make the motor in the generating state quickly.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------|---------------|-----------------|
| P71.45 | KEB deceleration time (s) | 0.00~655.35 | 10.00 |

The value is increased in case of overvoltage during KEB action and is reduced in case of undervoltage or overcurrent.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------|---------------|-----------------|
| P71.47 | KEB acceleration time (s) | 0.00~655.35 | 25.00 |

Consistent with the set motor acceleration time.

| Function code | Name | Setting range | Factory setting |
|---------------|---|---------------|-----------------|
| P71.48 | KEB proportion Kp | 0.00~655.35 | 200.00 |
| P71.49 | KEB integral Ki | 0.00~655.35 | 0.00 |
| P71.50 | KEB differential Kd | 0.00~655.35 | 0.00 |
| P71.51 | Output upper limit of KEB integral (%) | 0.0~6553.5 | 100.0 |
| P71.52 | Output lower limit of KEB integral (%) | 0.0~6553.5 | 100.0 |
| P71.53 | Upper limit of KEB closed loop output (%) | 0.0~6553.5 | 100.0 |
| P71.54 | Lower limit of KEB closed loop output (%) | 0.0~6553.5 | 100.0 |

| Function code | Name | Setting range | Factory setting |
|---------------|------------|---------------|-----------------|
| | output (%) | | |

The above parameters are set according to the default factory values, and generally may not be changed.

Too small Kp in the KEB process will result in too short KEB time; too large Kp will result in bus overvoltage fault.

Too small Ki in the KEB process will result in too short KEB time; too large Ki will result in bus overvoltage fault.

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P71.55 | Upper limit of KEB voltage deviation (V) | 0.0~500.0 | 300.0 |

When KEB is enabled, limit the deviation of the bus voltage from the set target voltage to no more than P71.55 (upper limit of KEB voltage deviation). If this value is exceeded, it is equal to this value.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------------|---------------|-----------------|
| P71.56 | KEB voltage zero deviation (V) | 0.0~10.0 | 0.0 |

Less than this value is deemed that the bus voltage deviation is 0.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------|---------------|-----------------|
| P71.58 | Fan control selection | 0~4 | 0 |

- 0: When the inverter runs, the fan runs; when the inverter stops, the fan stops after 1min delay;
 1: When the inverter runs, the fan runs; when the inverter stops, the fan stops after 5min delay;
 2: When the inverter runs, the fan runs; when the inverter stops, the fan stops after 30min delay;
 3: Fan running conditions: the fan runs when the radiator temperature is higher than 40°C; the fan stops after 1s delay when the radiator temperature is lower than 35°C;
 4: The fan is always running after inverter power on.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------|---------------|-----------------|
| P71.59 | Optimization coefficient 1 | | 0.0000 |
| P71.60 | Optimization coefficient 2 | 1.0~300.0 | 100.0 |
| P71.61 | Optimization coefficient 3 | 1.0~300.0 | 100.0 |

The above parameters are valid for open-loop vector:

P71.59 is the internal parameter of the inverter, which need not be changed.

P71.60 and P71.61 are the control gain in the forward and reverse switching.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------|---------------|-----------------|
| P71.62 | UP/DOWN single step length | 0.0~10.0 | 0.1 |

UP/DOWN function for single step length setting, range 0 ~ 1Hz, default 0.1Hz.

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------------|---------------|-----------------|
| P71.63 | VFVC optimization coefficient | 0~100 | 0 |

P71.63 sets VFVC optimization coefficient

7.2.11 P8X group Communication parameter group

7.2.11.1 P80 group Communication selection parameters

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------------|---------------|-----------------|
| P80.01 | Profibus-DP communication switch | 0~1 | 0 |

Select the current communication mode of the inverter:

0: off

1: On

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------------------|---------------|-----------------|
| P80.02 | X12 port - 485 communication switch | 0~1 | 0 |
| P80.03 | X24 port - 485 communication switch | 0~1 | 0 |

Select the current communication mode of the inverter:

0: off

1: On

7.2.11.2 P81 group Modbus communication parameters

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P81.00 | X12 port — 485 Baud rate | 0~7 | 3 |
| P81.01 | X12 port — 485 Data format | 0~3 | 0 |
| P81.02 | X12 port — 485 transmission mode selection | 0~1 | 1 |
| P81.08 | X24 port — 485 Baud rate | 0~7 | 3 |
| P81.09 | X24 port — 485 Data format | 0~2 | 0 |
| P81.10 | X24 port — 485 transmission mode selection | 0~1 | 1 |

The machine supports the internationally accepted Modbus protocol. See Appendix.

P81.00 and P81.08 determine the communication baud rate from 1200 to 57600bps.

0: 1200bps

- 1: 2400bps
- 2: 4800bps
- 3: 9600bps
- 4: 19200bps
- 5: 38400bps
- 6: 57600bps
- 7: 76800bps

P81.01 and P81.09 set the communication format, parity check.

- 0: 1-8-1 format, no parity
- 1: 1-8-1 format, even parity check
- 2: 1-8-1 format, odd parity check
- 3: 1-8-2 format, no parity

P81.02 and P81.10 set the transmission mode: 0: ASCII 1: RTU

| Function code | Name | Setting range | Factory setting |
|---------------|---------------|---------------|-----------------|
| P81.04 | Local address | 1~247 | 1 |

P81.04 sets the local address. 0 is the broadcast address, available addresses are 1 ~ 247, with 248 ~ 255 reserved.

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P81.07 | Communication address format selection | 0~1 | 1 |

Select the communication address format, 0: hexadecimal 1: decimal

7.2.11.3 P82 group Profibus_DP Communication parameters

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------------|---------------|-----------------|
| P82.01 | Large and small segment mode | 0~1 | 0 |

P82.01 sets large and small segment mode:

- 0: issue high 8 bits first and then low 8 bits
- 1: issue low 8 bits first and then high 8 bits

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------|---------------|-----------------|
| P82.02 | Custom status word 1 | 0~59 | 16 |
| P82.03 | Custom status word 2 | 0~59 | 13 |
| P82.04 | Custom status word 3 | 0~59 | 10 |
| P82.05 | Custom status word 4 | 0~59 | 18 |

P82.02~P82.05 set custom state:

- 0: Running state 1
- 1: Running state 2 (standby)
- 2: Detection state (standby)

- 10: **Output torque**
- 13: target frequency given
- 14: current operating frequency
- 15: feedback speed (Hz)
- 16: feedback speed (**rpm**)
- 18: output voltage RMS
- 19: **output current RMS**
- 22: **Total output power**
- 23: **Bus voltage**
- 29: **Output terminal state**
- 31: **Input terminal state**
- 34: **Analog input AI0**
- 35: **Analog input AI1**
- 37: **Output DA0**
- 38: **Output DA1**
- 40: **Recent fault No.**
- 43: **Radiator temperature**
- Other: Standby

7.2.12 P9X group Fault and display parameter group

7.2.12.1 P90 group Language selection parameters

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------------------|---------------|-----------------|
| P90.00 | Operation panel language selection | 0~1 | 0 |

0: Chinese; 1: English.

7.2.12.2 P91 group LCD display parameters

| Function code | Name | Setting range | Factory setting |
|---------------|------------------|---------------|-----------------|
| P91.00 | U01 display data | 0~71 | 1 |
| P91.01 | U02 display data | 0~71 | 2 |
| P91.02 | U03 display data | 0~71 | 3 |
| P91.03 | U04 display data | 0~71 | 7 |
| P91.04 | U05 display data | 0~71 | 8 |
| P91.05 | U06 display data | 0~71 | 6 |
| P91.06 | U07 display data | 0~71 | 9 |
| P91.07 | U08 display data | 0~71 | 0 |

A total of 8 LCD display parameters are set, as follows.

| Function | Meaning | Function | Meaning |
|----------|---------------------------------|----------|-------------------------------------|
| 0 | Undefined | 1 | Output speed rpm |
| 2 | Given speed Hz | 3 | Feedback speed Hz |
| 4 | Output current A | 5 | Output voltage V |
| 6 | Output torque % | 7 | Bus voltage V |
| 8 | Analog input A0 | 9 | Analog input A1 |
| 10 | Standby | 11 | AB phase counting value in Z signal |
| 12 | AB phase counting value | 13 | U phase angle |
| 14 | Corresponding pulse count of CD | 15 | Encoder position angle |
| 16 | Pre-torque % | 17 | Number of disturbances to Z |
| 18 | Number of disturbances to AB | 19 | Running state |
| 20 | Target speed (Hz) | 21 | Center point of encoder Sin |
| 22 | Center point of encoder Cos | 23 | Weighing compensation |
| 24 | Given speed rpm | 25 | Speed variation rpm |
| 26 | Weighing compensation % | 27 | Center point of encoder C phase |
| 28 | Center point of encoder D phase | 29 | Radiator temperature |
| 30 | Input port state | 31 | Output port state |
| 32 | PID given value | 33 | PID feedback value |
| 34 | Output power | | |

7.2.12.3 P92 group LED display parameters

| Function code | Name | Setting range | Factory setting |
|---------------|------------------|---------------|-----------------|
| P92.00 | LED display data | 0~71 | 2 |

See P91 group for the meaning.

7.2.12.4 P93 group Running record parameters

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------------|---------------|-----------------|
| P93.00 | Cumulative power-on time (kh) | 0.000~65.535 | 0.000 |
| P93.01 | Cumulative running time (kh) | 0.000~65.535 | 0.000 |

The inverter can automatically record the cumulative power-on time and cumulative running time.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------|---------------|-----------------|
| P93.02 | Set total conduction time | | 0 |
| P93.03 | Remaining conduction time | | 0 |

Set total conduction time and remaining conduction time

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------------------|---------------|-----------------|
| P93.04 | Maximum radiator temperature (°C) | 0.0~100.0 | 0.0 |

The inverter can automatically record the maximum radiator temperature

| Function code | Name | Setting range | Factory setting |
|---------------|------------------------------|---------------|-----------------|
| P93.05 | Cumulative output work (kWh) | 0.0~999.9 | 0.0 |

Cumulative power output per unit time after the inverter is powered on and starts operation, in kWh.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------|---------------|-----------------|
| P93.06 | Inverter output work (MWh) | 0~65535 | 0 |

Cumulative power output per unit time after the inverter is powered on and starts operation, in MWh.

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------------|---------------|-----------------|
| P93.07 | Inverter fan running time (h) | 0~65535 | 0 |

Inverter fan running time, h.

7.2.12.5 P94 group Troubleshooting parameters

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------------|---------------|-----------------|
| P94.00 | Minor fault handling mode | 0~1 | 1 |
| P94.01 | Automatic fault reset time (s) | 0.0~180.0 | 10.0 |
| P94.02 | Number of automatic fault resets | 0~100 | 0 |

P94.00 sets fault handling mode:

0: Non output fault relay in case of minor fault;

1: Output fault relay in case of minor fault;

P94.01 sets the automatic reset time, 10s by default.

P94.02 sets the number of automatic resets within 30 minutes, no automatic reset by default. The automatic reset fault may cause dangerous operation of the system, so please use with caution.

| Function code | Name | Setting range | Factory setting |
|---------------|----------------------------------|---------------|-----------------|
| P94.03 | Overheating time of radiator (s) | 0.0~180.0 | 0.5 |

| Function code | Name | Setting range | Factory setting |
|---------------|---|---------------|-----------------|
| P94.04 | Overspeed protection time (s) | 0.00~180.00 | 1.00 |
| P94.05 | Input default phase voltage threshold (V) | 0~150 | 65 |

P94.03 sets the protection time of radiator overheat protection (3# fault). When the radiator temperature exceeds 80°C, the protection time of P94.03 shall be continued;

P94.04 sets the recognition time of overspeed protection (30# fault);

P94.05 sets the judged voltage drop value of input default phase (29# fault). When the input voltage fluctuation is greater than the protection value of P94.05, it can be increased in the area of unstable power grid;

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P94.07 | Confirmed number of encoder disconnections | 0~100 | 2 |
| P94.08 | Output default phase recognition time (s) | 0.000~180.000 | 2.000 |
| P94.09 | Relay fault recognition voltage (V) | 0~350 | 90 |
| P94.10 | CD misphase judgment threshold | 300~1000 | 300 |
| P94.11 | ABZ protection threshold (%) | 20~100 | 20 |

P94.07 is the number of SINCOS encoder disconnections when:

1. 94.07 protection lasts when the AB signal is at both high and low
2. 94.07 protection lasts 5 times when the CD signal is at both high and low

The output default phase recognition time set by P94.08 can be detected only in normal operation or dynamic self-learning of editor when the phase current is continuously longer than the time protection of P94.08.

P94.09 is relay fault recognition voltage. It is VDC1 when not running, VDCmax or VDCmin when running. Protect when (VDC1-VDCmax) is greater than 94.09 and greater than (VDCmax-VDCmin) *5 for 10 consecutive times every 20ms.

P94.10 sets CD misphase judgment threshold:

Protect when the difference between AB signal and CD signal of SinCos encoder exceeds 94.11 for consecutive 500ms;

Protect when the difference between the absolute position of Endate and the position of AB signal exceeds 94.10.

P94.11 is the ABZ protection threshold for the incremental encoder:

When P10.00=3, the feedback speed is less than 1%, and when the speed error is large, the protection can be provided after 400ms.

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------|---------------|-----------------|
| P94.12 | IGBT protection times | 0~65535 | 2 |

Set the number of times that the output current of the inverter is greater than the IGBT protection current threshold (21# fault).

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------------|---------------|-----------------|
| P94.13 | I ² t protection selection | 0~3 | 0 |

I²t protection selection:

0: I²t protected

1: the protection fault only includes 45 # or 46#, used for frequent start/stop applications

2: the protection fault only includes 21# or 27#, used for continuous overload applications

3: I²t not protected

| Function code | Name | Setting range | Factory setting |
|---------------|-----------------------------------|---------------|-----------------|
| P94.14 | Analog A0 disconnection value (%) | 0.0~100.0 | 0.0 |
| P94.15 | Analog A1 disconnection value (%) | 0.0~100.0 | 0.0 |

Analog A0/A1 input signal disconnection detection value, a percentage relative to 10V. The analog input is considered to be disconnected if the analog A0/A1 input voltage is less than 10V multiplied by P94.14/P94.15.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------|---------------|-----------------|
| P94.16 | Analog exception handling | 0~1 | 0 |

In case of analog input exception fault reported by the inverter, P94.16 sets how the inverter runs.

0: no action

1: protection

Note: The fault cannot be reset automatically when P94.17=1 and is reset automatically in the other cases.

| Function code | Name | Setting range | Factory setting |
|---------------|---|---------------|-----------------|
| P94.17 | Temperature sampling disconnection handling | 0~1 | 0 |

In case of temperature sampling disconnection fault reported by the inverter, P94.17 sets how the inverter runs.

0: no action

1: protection

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------|---------------|-----------------|
| P94.18 | Communication protection | 0~1 | 1 |
| P94.19 | X12-485 Communication | 0.000~65.535 | 2.000 |

| Function code | Name | Setting range | Factory setting |
|---------------|---|---------------|-----------------|
| | disconnection protection time (s) | | |
| P94.21 | X24-485 Communication disconnection protection time (s) | 0.000~65.535 | 2.000 |

P94.18 communication protection. The parameters are set by bits:

Bit0: 1 Profibus-DP protection shutdown set bit;

Bit1: 2 X12-485 MODBUS protection shutdown set bit;

Bit2: 4 X24-485 MODBUS protection shutdown set bit;

Other bits are reserved.

A bit value of 0 indicates not handled; 1 means shutdown protection.

Report 43# fault after X12-485 normal communication is interrupted for P94.19 time.

Report 43# fault after X24-485 normal communication is interrupted for P94.21 time.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------|---------------|-----------------|
| P94.20 | Number of grounding protections | 0~60000 | 100 |

Set the confirmed number of 32# faults.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------------|---------------|-----------------|
| P94.22 | Confirmed number of fan faults | 0~20 | 10 |

P95.22 Confirmed number of fan faults: 10 means that fan fault is reported when no fan running signal is detected in 10 consecutive detection cycles, and each detection cycle is 1 second. 0 means that fan fault detection is ignored.

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------|---------------|-----------------|
| P94.23 | Fault action selection 1 | 00000~12201 | 00000 |
| P94.24 | Fault action selection 2 | 00000~22222 | 00000 |
| P94.25 | Fault action selection 3 | 00000~22122 | 00000 |
| P94.26 | Fault action selection 4 | 00000~02222 | 00000 |

By units, tens, hundreds, thousands and ten thousands places, P94.23~P94.26 are defined as follows:

0: free stop 1: stop by stop mode 2: warning to continue operation

| Function code | Name | Setting range | Factory setting |
|---------------|--|---------------|-----------------|
| P94.27 | Continue operating frequency selection | 0~4 | 0 |

P94.27 parameter setting:

0: Run at target frequency 1: Run at current frequency 2: Run at upper limit of frequency 3: Run at lower limit of frequency 4: Run at multi-stage speed 15

7.2.12.6 P95 group Product identification parameters

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------|---------------|-----------------|
| P95.00 | Inverter hardware version | | 70.04 |
| P95.01 | Inverter software version | | 100.01 |
| P95.02 | Version No. | | 100.01 |

P95 group mainly displays the hardware and software version parameters of the inverter, generally set directly by the manufacturer.

7.2.12.7 P96 group Inverter product parameters

| Function code | Name | Setting range | Factory setting |
|---------------|---|---------------|-----------------|
| P96.00 | Rated power of inverter (kW) | 0.0~65535.5 | |
| P96.01 | Rated current of inverter (A) | 0.0~65535.5 | |
| P96.02 | Maximum current of inverter (A) | 0.0~999.9 | |
| P96.03 | Rated voltage of inverter (V) | 0~460 | 380 |
| P96.04 | Inverter power coefficient (%) | 0~99 | 15 |
| P96.05 | Inverter sensor current (A) | 0~9999 | 404 |
| P96.06 | Rated current of inverter module (A) | 0~9999 | |
| P96.08 | Three-phase current balance coefficient (%) | 0.000~99.999 | 1.000 |

P96 group mainly displays the fixed parameters of the inverter, generally set directly by the manufacturer.

P96.00~P96.04, initially set by the manufacturer;

P96.05~P96.08: parameter settings of the inverter, determined by hardware, read-only.

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------------------|---------------|-----------------|
| P96.15 | Software upgrade number | 0~65535 | 20 |
| P96.16 | Special parameters | 0~65535 | 90 |
| P96.17 | Number of inverter units | 0~6 | 1 |
| P96.18 | Current sampling mode | 0~1 | 0 |
| P96.19 | Current sharing hysteresis width | 0~655.35 | 0.00 |
| P96.20 | Sharing current compensation quantity | 0~655.35 | 0.00 |

| Function code | Name | Setting range | Factory setting |
|---------------|--------------------------|---------------|-----------------|
| P96.21 | Heavy load rated power | 0.0~65535.5 | 315 |
| P96.22 | Heavy load rated current | 0.0~65535.5 | 334 |

P96.17 number of units: set to 2 if two units are running in parallel; set to 1 by the factory.

P96.18 current sampling mode: determine the number of sampling times during each on-off action, which is set to 0 by the factory. 0 is high-speed sampling and 1 is low-speed sampling.

P96.19 current sharing hysteresis width, set to 0.00A by the factory. This parameter is the current sharing hysteresis width in parallel operation of multiple units. In general, it is set to 1.00A when two units are in parallel operation.

P96.20 sharing current compensation quantity, set to 0.00A by the factory. This parameter is the sharing current compensation quantity in multi-unit parallel operation and related to the unbalance degree of the equalizing reactor. If it is the configuration marked by manufacturer, it is set to 100% in multi-unit parallel operation.

P96.21 Rated value of inverter in light load application.

P96.22 Rated value of inverter in heavy load application.

| Function code | Name | Setting range | Factory setting |
|---------------|-------------------------------|---------------|-----------------|
| P94.23 | Sensor coefficient correction | 0~3 | 0 |

P94.23 Parameter correction settings:

0: UW 1: UW 2: UV 3: VW

| Function code | Name | Setting range | Factory setting |
|---------------|---------------------------|---------------|-----------------|
| P94.24 | Optical fiber selection 1 | 0x0000~0x7777 | 0x3210 |
| P94.25 | Optical fiber selection 2 | 0x0000~0x7777 | 0x7654 |

Optical fiber port of configuration unit, supporting the use of any fiber port, with the configuration parameters of P96.24 and P96.25 used with the number of units.

| p96.25 | | | | p96.24 | | | |
|---|----------------------------|----------------------------|----------------------------|---|----------------------------|----------------------------|------------------------------|
| The hexadecimal system is divided into four edit bits | | | | The hexadecimal system is divided into four edit bits | | | |
| Port selection bit of unit | Port selection bit of unit | Port selection bit of unit | Port selection bit of unit | Port selection bit of unit | Port selection bit of unit | Port selection bit of unit | Port selection bit of unit 0 |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | |

The valid unit port selection bit is related to the number of units set. For example: if the unit is 4, the selection bits of units 0~3 are valid and it is only required to set the parameter p96.24. If p96.24 is set to 0x6215, the ports FT&R 6, FT&R 2, FT&R 3 and FT&R 7 are open for use and the other ports are closed.

Chapter 8 Fault checking

This chapter describes in detail the inverter faults, fault code, content, causes and countermeasures.



- ◎ **The maintenance operation shall be carried out 10min after the input power is disconnected. At this time, the charge lamp is completely off or the DC bus voltage is below 24VDC.**
Otherwise there is a risk of electric shock.
- ◎ **Never reinvent the inverter.**
Otherwise there is a risk of electric shock and injury.
- ◎ **Ask electrical engineers to carry out maintenance operation. It is strictly prohibited to leave wire end or metal objects inside the inverter.**
Otherwise there is a risk of fire.



- ◎ **Do not change the wiring and disconnect the terminals while the power is on.**
Otherwise there is a risk of electric shock.

In case of fault in the inverter, the fault light LED above the digital manipulator flashes, and the LED Nixie tube displays the current fault code in real time. See following AFE and inverter fault list for the fault causes and countermeasures corresponding to inverter fault codes.

8.1 AFE rectifier fault code table

| Fault code | Fault display | Possible causes | Solutions |
|------------|----------------------------|--|--|
| 1 | Unit hardware overcurrent | 1. Hardware damage; | Ask professional technicians for maintenance |
| | | 2. Abnormal load; | Check the load for abnormal conditions |
| | | 3. Abnormal power grid. | Check whether the main power line of the grid is consistent with the used voltage connection |
| 3 | Radiator overheated | 1. Excess ambient temperature | Reduce the ambient temperature and strengthen ventilation and heat dissipation |
| | | 2. Abnormal cooling fan | Check whether the fan is working properly |
| | | 3. Temperature detection circuit fault | Ask professional technicians for maintenance |
| 8 | Bus overvoltage protection | 1. Network overvoltage | Check whether the network voltage exceeds the calibration permit |
| | | 2. Hardware damage | Ask professional technicians for maintenance |
| | | 3. Abnormal load operation | Check the load for abnormal conditions |
| 9 | Bus undervoltage | 1. Abnormal power grid | Check whether the network voltage is normal |
| | | 2. Abnormal AC circuit breaker | Check whether the AC circuit breaker can be closed normally |
| | | 3. System overload operation | Determine whether the load exceeds the AFE capacity permit |
| 10 | Output default phase | 1. Power grid default phase | Check whether the network voltage is normal or wiring is normal |
| | | 2. Current sampling circuit fault | Ask professional technicians for maintenance |
| 11 | Main circuit breaker fault | 1. Mechanical fault | Check whether the main circuit breaker can be closed normally |
| | | 2. Closed IO given signal line fault | Check whether the IO wiring is normal |
| 12 | Charging contactor fault | 1. Charging resistor damage | Check whether the charging resistor is intact |
| | | 2. Low network voltage | Check whether the network voltage is below the calibration permit |

| Fault code | Fault display | Possible causes | Solutions |
|------------|---------------------------------|---|--|
| | | 3. Charging given signal fault | Check whether the charging IO signal line is normal |
| 13 | Charging not allowed | 1. The charging button is not pressed | Confirm whether the charging button is pressed |
| | | 2. Charging signal fault | Check whether the corresponding IO input signal wiring is normal |
| 14 | Reactor overheating fault | 1. Fan fault | Check whether the fan is working properly |
| | | 2. Excess ambient temperature | Reduce the ambient temperature and strengthen ventilation and heat dissipation |
| | | 3. The overload operating time is too long | Check whether the system is overloaded for a long time |
| 21 | abc overcurrent | 1. Excessive instantaneous current | Check the load for abnormal conditions |
| | | 2. Hardware sampling circuit fault | Ask professional technicians for maintenance |
| 23 | Input overvoltage | The network voltage exceeds the calibration | Measure whether the actual input voltage exceeds the allowable calibration value |
| 25 | Unit fan fault | 1. Abnormal input power | Check the input power supply |
| | | 2. The fan power supply connection is disconnected or loose | Check whether the fan power line is properly connected |
| | | 3. Fan damage | Replace with the fan of the same model |
| 27 | Input overcurrent | 1. Running too long in an overloaded state,(shorter time if greater load) | Stop running for a period of time, and if it reappears again after running, check whether the load is in the allowed range |
| | | 2. Power grid short circuit | Check the power grid is short-circuited |
| 29 | Input default phase | 1. Abnormal voltage at the input side | Check the network voltage |
| | | 2. Input voltage default phase | |
| | | 3. Loose terminal at the input side | Check the input terminal wiring |
| 31 | I ² T power overload | The system runs at over power for a long time | Check whether the load is running at over power for a long time |

| Fault code | Fault display | Possible causes | Solutions |
|------------|--|--|---|
| 32 | Grounding protection | 1. Abnormal load | Check the load for abnormal conditions |
| | | 2. Hardware damage | Ask professional technicians for maintenance |
| 34 | External fault | External input fault signal | Check external fault causes |
| 42 | Unit IGBT fault | Short circuit in the phase bridge arm, drive optocoupling protection | Ask professional technicians for maintenance |
| 43 | Communication fault | No communication data received in the fixed time | Check the communication signal line |
| 44 | Phase lock fault | 1. Abnormal power grid | Check whether the power grid is normal |
| | | 2. Sampling wiring error | Check whether the three-phase sampling wiring is normal |
| 45 | I _t instantaneous value overcurrent | Excessive inductive current | Determine whether the system is running in an overloaded state for a long time |
| 46 | I _t effective value overcurrent | Excessive inductive current | Determine whether the system is running in an overloaded state for a long time |
| 53 | Unit optical fiber communication fault | Problem in fiber communication line | Check fiber communication line |
| 54 | PowerID fault | 1. No power on of power unit | The fault will disappear after the power unit is powered on |
| | | 2. Problem in fiber communication line | Check the fiber communication line after the power unit is powered on |
| | | 3. Inconsistent power unit model or incorrect unit number setting | Confirm whether the model of the units used is consistent, and the number of units used is the same as the number of units set by the parameter |
| | | 4. Problem in the insertion sequence of unit ports in the master control box | Insert optical fibers in the terminal number order |
| 55 | Unit power unevenness fault | DC bus fuse fault | Check whether the DC bus fuse is normal |
| 56 | Unit current bias fault | DC bus fuse fault | Check whether the DC bus fuse is normal |

8.2 Inverter fault code table

| Fault code | Fault display | Possible causes | Solutions |
|------------|---------------------------|---|---|
| 1 | Unit hardware overcurrent | Excessive DC terminal voltage | Check the power grid source to see whether the high inertia load stops quickly without dynamic braking |
| | | Short circuit in the periphery | Check the motor and output wire for short circuit and whether it is shorted to ground. |
| | | Output default phase | Check the motor and output wire for looseness |
| | | Encoder fault | Check whether the encoder is damaged or whether the wiring is correct |
| | | Poor hardware contact or damage | Ask professional technicians for maintenance |
| | | Internal connector looseness of inverter | Ask professional technicians for maintenance |
| | | Overheat of the power circuit parts due to cooling fan or cooling system problems | Check whether the cooling fan is working properly |
| | | Damage to fuse at the DC side of other units | Replace fuse |
| | | Warning: The inverter can be started only after the cause of fault is cleared to avoid IGBT damage. | |
| 3 | Radiator overheated | Excess ambient temperature | Lower the environment temperature by promoting , the ventilation and heat dissipation to keep the surrounding temperature below 40°C or check the inverter capacity according to this performance |
| | | Damage to cooling fan or foreign matter entering cooling system | Check whether the fan power line is properly connected, or replace with the same type of fan and remove foreign matters |
| | | Abnormal cooling fan | Check whether the cooling fan is working properly |
| | | Temperature detection circuit fault | Ask professional technicians for maintenance |

| Fault code | Fault display | Possible causes | Solutions |
|---|--|--|---|
| 7 | Speed variation | The acceleration time is too short | Extend the acceleration time |
| | | Excessive load | Lighten the load |
| | | Current limit too low | Increase the current limit value appropriately within the allowable range |
| 8 | Bus overvoltage protection (in accelerated running) | Abnormal voltage of the input power (SCR used) | Check the input power supply |
| | | High-speed starting again in the high-speed running of the motor | Start after the motor stops running |
| | Bus overvoltage protection (in decelerated running) | Excessive load moment of inertia | Use appropriate dynamic braking components (SCR) |
| | | The deceleration time is too short | Extend the deceleration time |
| | | Improper setting of instantaneous non-stop setting | Adjust deceleration overvoltage threshold parameter |
| | Bus overvoltage protection (in constant speed running) | Abnormal input power | Check the input power supply |
| | | Excessive load moment of inertia | Use appropriate dynamic braking components (SCR) |
| | | Improper setting of instantaneous non-stop setting | Adjust deceleration overvoltage threshold parameter |
| | 9 | Bus undervoltage | The power voltage is below the minimum working voltage of the equipment |
| Momentary power failure | | | Check the input power supply. After the input power supply is normal, reset and restart |
| The variation in voltage of the input power supply is too large | | | |
| The terminal of the power supply is loose | | | Check the input wiring |
| Abnormal internal switching power supply | | | Ask professional technicians for maintenance |
| There is a load with high starting current in the same power system | | | Change the power system to meet the specification value |
| 10 | Output default phase | Abnormal wiring, missing connection or | Check the wiring at the inverter output side according to the |

| Fault code | Fault display | Possible causes | Solutions |
|------------|--|---|--|
| | | disconnection at the inverter output side | operating instructions to eliminate the missing connection and disconnection |
| | | Loose output terminal | |
| | | The motor power is too small and is below 1/20 of the maximum applicable motor capacity of the inverter | Adjust the inverter capacity or motor capacity |
| | | Output three-phase imbalance | Check whether the motor wiring is intact |
| | | | Disconnect the power and check whether the terminal characteristics are consistent at the inverter output side and DC side |
| 11 | Low-speed overcurrent of the motor (in accelerated running) | Low grid voltage | Check the input power supply |
| | | The motor parameters are not set normally | Correctly set the motor parameters |
| | | Quickly start directly during motor running | Start after the motor stops running |
| | | The acceleration time is too short for the load inertia (GD2). | Extend the acceleration time |
| | Low-speed overcurrent of the motor (in slow running) | Low grid voltage | Check the input power supply |
| | | Excessive load moment of inertia | Use appropriate dynamic braking components |
| | | The motor parameters are not set normally | Correctly set the motor parameters |
| | | The deceleration time is too short for the load inertia (GD2). | Extend the deceleration time |
| | Low-speed overcurrent of the motor (in constant-speed running) | Sudden load change during running | Reduce the sudden load change frequency and amplitude |
| | | The motor parameters are not set normally | Correctly set the motor parameters |
| 12 | Encoder fault | Wrong encoder connection | Change the encoder wiring |
| | | No signal output in the encoder | Check the encoder and the power supply |
| | | Encoder wiring disconnected | Repair the disconnected wiring |

| Fault code | Fault display | Possible causes | Solutions |
|------------|--|---|---|
| | | Abnormal function code setting | Confirm that relevant function codes of the inverter encoder are set correctly |
| 16 | Motor phase sequence error | Motor reverse wiring | Reverse the wire or adjust the parameters |
| 17 | Overspeed in the same direction (within the allowable range of maximum speed) | Encoder parameter setting is incorrect or disturbed | Check the encoder loop |
| | | Excessive forward load or sudden load change | Check the external causes for sudden load change |
| 18 | Overspeed in the reverse direction (within the allowable range of maximum speed) | Encoder parameter setting is incorrect or disturbed | Check the encoder loop |
| | | Excessive reverse load or sudden load change | Check the external causes for sudden load change |
| 20 | Encoder communication fault | The communication signal is interfered and the calibration failed | Check whether the chassis ground of the motor and the inverter is connected together and whether the PG card is properly inserted |
| 21 | abc overcurrent (instantaneous value of three-phase) | Motor single phase short circuit to ground | Check the motor and output line loop |
| | | Encoder fault | Check whether the encoder is damaged or whether the wiring is correct |
| | | Drive board detection circuit error | Replace the drive board |
| 22 | Brake detection fault | The output relay is inactive | Check the relay control circuit |
| | | The relay actuator is not open | Check whether the brake power line is loose and broken |
| | | The feedback element does not detect the signal | Adjust the feedback element |
| 25 | Unit fan fault | Abnormal input power | Check the input power supply |
| | | The fan power supply connection is disconnected or loose | Check whether the fan power line is properly connected |
| | | Fan damage | Replace with the fan of the same model |
| 26 | Encoder non-self-learning | Self-learning required for the encoder used | Encoder self-learning after power on |

| Fault code | Fault display | Possible causes | Solutions |
|------------|---|--|--|
| 27 | Output overcurrent (effective value) | Running too long in an overloaded state,(shorter time if greater load) | Stop running for a period of time, and if it reappears again after running, check whether the load is in the allowed range |
| | | Motor stalling | Check the motor or brake |
| | | Motor coil short circuit | Check the motor |
| | | Output short circuit | Check the wiring or motor |
| 28 | SinCos encoder fault | Encoder damaged or wrong line | Check the encoder and its line |
| 29 | Input default phase | Abnormal voltage at the input side | Check the network voltage |
| | | Input voltage default phase | |
| | | Loose terminal at the input side | Check the input terminal wiring |
| 30 | Overspeed protection (Exceeding the maximum speed protection limit) | Encoder parameter setting is incorrect or disturbed | Check the encoder loop |
| | | Sudden load change | Check the external causes for sudden load change |
| | | Overspeed protection parameter setting error | Check the parameter |
| 31 | Motor high speed overcurrent | Low grid voltage | Check the input power supply |
| | | Sudden load change during running | Reduce the sudden load change frequency and amplitude |
| | | The motor parameters are not set normally | Correctly set the motor parameters |
| | | Encoder parameter setting is incorrect or disturbed | Check the encoder loop |
| 32 | Grounding protection | Wiring error | Correct the incorrect wiring according to the user manual |
| | | Abnormal motor | To replace the motor, the ground insulation test shall be carried out first |
| | | Excessive earth leakage current at the output side of the inverter | Ask professional technicians for maintenance |
| 34 | External fault | External input fault signal | Check external fault causes |
| 37 | Current sensor fault | Drive board hardware fault | Ask professional technicians for maintenance |

| Fault code | Fault display | Possible causes | Solutions |
|-------------------|--|--|--|
| 40 | Output contactor fault | Abnormal KMY output when there is KMY special function | Check the external connection to make sure the motor is running properly without load |
| 42 | Unit IGBT fault | Short circuit in the phase bridge arm, drive optocoupling protection | Ask professional technicians for maintenance |
| 43 | Communication fault (Modbus, Profibus-DP) | No communication data received in the fixed time | Check the communication signal line |
| 44 | Abnormal input power | Excessive fluctuation of input supply voltage | Modify relevant parameters and check the input power supply |
| 45 | I ² t instantaneous value overcurrent | IGBT overheating | Ask professional technicians for maintenance |
| 46 | I ² t effective value overcurrent | IGBT overheating | Ask professional technicians for maintenance |
| 47 | Abnormal analog input | Analog input signal disconnection Abnormal analog input signal | 1. Modify relevant parameters 2. Check the analog input signal |
| 48 | Temperature sampling disconnection | Radiator temperature sampling disconnection | Check the temperature sampling connection |
| 49 | PT detection fault | PT input signal disconnection Abnormal PT input signal | Check PT input signal Modify relevant parameters |
| 50 | Humidity fault | HT input signal disconnection Abnormal HT input signal | 1. Check PT input signal 2. Modify relevant parameters |
| 51 | Abnormal running current | Improper parameter settings Disconnection from inverter to motor Inverter hardware fault | Check the parameter P70.21 Check the connecting cable Ask professional technicians for maintenance |
| 52 | Motor PTC over temperature alert | Continuous motor overload Small motor size Abnormal PTC | Check the load Calculate the motor selection Check PTC |
| 53 | Unit optical fiber communication fault | Problem in fiber communication line | Check fiber communication line |
| 54 | PowerID fault | No power on of power unit | The fault will disappear after the power unit is powered on |

| Fault code | Fault display | Possible causes | Solutions |
|------------|-----------------------------------|---|---|
| | | Problem in fiber communication line | Check the fiber communication line after the power unit is powered on |
| | | Inconsistent power unit model or incorrect unit number setting | Confirm whether the model of the units used is consistent, and the number of units used is the same as the number of units set by the parameter |
| | | Problem in the insertion sequence of unit ports in the master control box | Insert optical fibers in the terminal number order |
| 55 | Unit power unevenness fault | DC bus fuse fault | Check whether the DC bus fuse is normal |
| 56 | Unit current bias fault | DC bus fuse fault | Check whether the DC bus fuse is normal |
| 57 | No power on warning of power part | No power on of power unit | The warning will disappear automatically after the power unit is powered on |
| | | Problem in fiber communication line | Check the fiber communication line after the power unit is powered on |

Chapter 9 Maintenance

This chapter gives general information on maintenance.



- ◎ **The maintenance operation shall be carried out 10min after the input power is disconnected. At this time, the charge lamp is completely off or the DC bus voltage is below 24VDC.**
Otherwise there is a risk of electric shock.
- ◎ **Never reinvent the inverter.**
Otherwise there is a risk of electric shock and injury.
- ◎ **Ask electrical engineers to carry out maintenance operation. It is strictly prohibited to leave wire end or metal objects inside the inverter.**
Otherwise there is a risk of fire.



- ◎ **Do not change the wiring and disconnect the terminals while the power is on.**
Otherwise there is a risk of electric shock.

9.1 Warranty period

The company will provide warranty service if the following happens to the basic supply power unit (body):

In case of fault or damage under normal use, the manufacturer is responsible for the warranty within the warranty period (from the date of delivery); reasonable maintenance fees will be charged beyond the warranty period.

However, for the faults due to the following reasons, a certain fee will be charged even in the warranty period:

- 1) Problems caused by failure to use the product according to the operating manual or by repair or alteration without permission.
- 2) Problems caused by use beyond standard specifications.

- 3) Dropping after purchase or damage during transportation.
- 4) Damage caused by earthquake, fire, flood, lightning stroke, abnormal voltage or other natural disasters and associated causes.

9.2 Product query

In case of product damage, fault or other problems, contact our office or after-sales service department for the following information.

Basic power unit model

Production No.

Date of purchase

Problems to be contacted include damage, confusion, and fault.

9.3 Daily inspection

Do not remove the housing when the basic power unit is energized and running. Check whether the basic power unit is running normally through external visual inspection. Daily check:

- a) Whether the surrounding environment conforms to the standard specification;
- b) Whether the operation performance conforms to the standard specification;
- c) Whether there is abnormal noise, vibration and abnormality;
- d) Whether the cooling fan installed on the basic power unit is in normal operation;
- e) Whether there is overheating.

9.4 Regular inspection

During the regular inspection, stop the operation first and remove the housing after cutting off the power. At this point, the main circuit capacitor still has charging voltage and it takes some time to discharge. Therefore, wait for the charge lamp to be off, and test the DC bus voltage below the safe value (below DC 24V) with the multimeter before the inspection.

There is a risk of electric shock if you touch the terminal immediately after powering off.

See Table 9-1 for regular inspection items.

Table 9-1 Regular inspection items

| Inspection part | Inspection item | Method of inspection | Criteria |
|-----------------------------|--|--|---|
| Operating environment | 1) Confirm the ambient temperature, humidity, vibration and presence of dust, corrosive gases, oil mist, water droplets, etc. 2) Check for any dangerous goods around | 1) Visual inspection, thermometer and hygrometer 2) Visual inspection | 1) The ambient temperature is lower than 40°C. The humidity and other requirements meet environmental requirements 2) No dangerous goods |
| LCD | 1) Whether the LCD display is clear and backlight is uniform 2) Whether the characters are missing on LCD display | Visual inspection | 1) Uniform backlight 2) Display normally |
| Connector Terminal and bolt | 1) Whether the bolt is loose 2) Whether the connector is loose | 1) Tighten 2) Visual inspection | 1) No abnormality 2) Install firmly |
| Main circuit | Wire | 1) Whether the sheath is broken and discolored 2) Whether the connecting copper bar is deformed | Visual inspection No abnormality |
| | Electromagnetic contactor and relay | 1) Whether there is vibration sound while working 2) Whether the contact is closed | Auditory and visual inspection 1) None 2) There is contact closing sound |
| | Electrolytic capacitor | 1) Whether there is leakage, discoloration, crack and housing expansion 2) Whether the safety valve is out and whether the valve body has significant expansion | Visual inspection No abnormality |

| | | | | |
|-----------------|--------------------|--|---|---|
| | Cooling fin | 1) Whether the dust is accumulated 2) Whether the fan duct is blocked and foreign bodies are attached | Visual inspection | No abnormality |
| | Cooling Fans | 1) Whether there is abnormal noise 2) Whether there is abnormal vibration 3) Whether there is discoloration due to overheating | 1) Auditory and visual inspection. Turn the fan blade by hand after switching off the power 2) Visual inspection 3) Visual, smell | 1) Smooth rotation 2), 3) No abnormality |
| Control circuit | Connection Plug-in | Whether there is dust and foreign body on the double-row connector plug-in between the control board and the main circuit | Visual inspection | No abnormality |
| | Control board | 1) Whether the control circuit board has discoloration and odor 2) Whether the control board has cracks, damage, deformation | 1) Visual, smell 2) Visual inspection | No abnormality |

Chapter A Installation Guide of Inverter EMC

This appendix introduces the EMC design and installation guide of the inverter in terms of noise suppression, wiring requirements, grounding, surge absorption of external equipment, leakage current, installation area division and installation precautions, use of power filter and radiated noise treatment, etc., for the reference of inverter users.

A.1 Noise suppression

The working principle of the inverter determines that it will produce some noise. Its influence on peripheral devices is related to the noise type, noise propagation path and the design, installation, wiring and grounding of the drive system.

A.1.1 Noise type

The noise type is shown in Figure A.1.

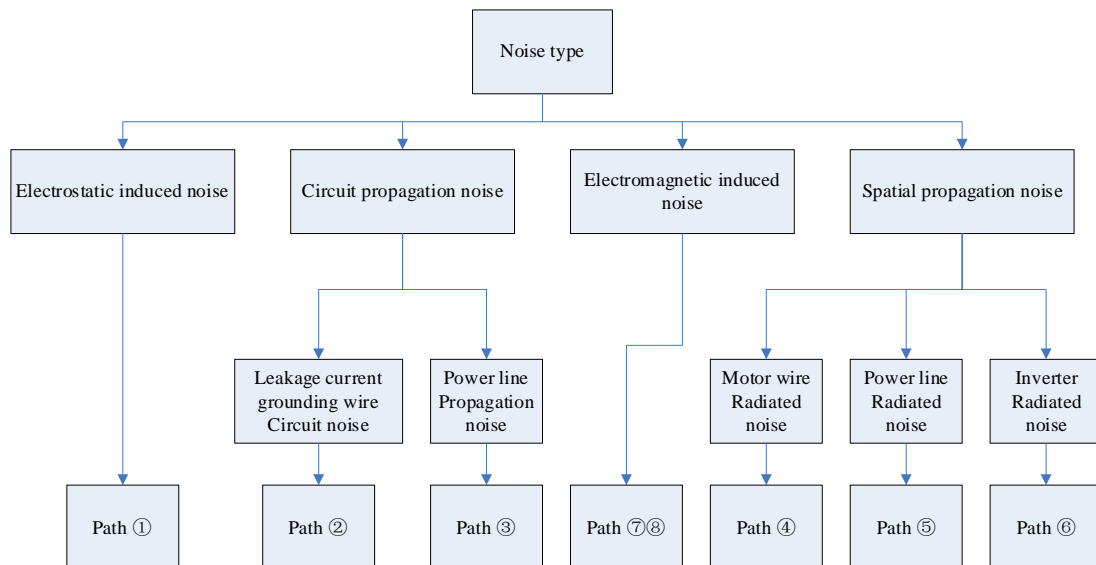


Figure A.1 Noise type diagram

A.1.2 Noise propagation path

The noise propagation path is shown in Figure A.2.

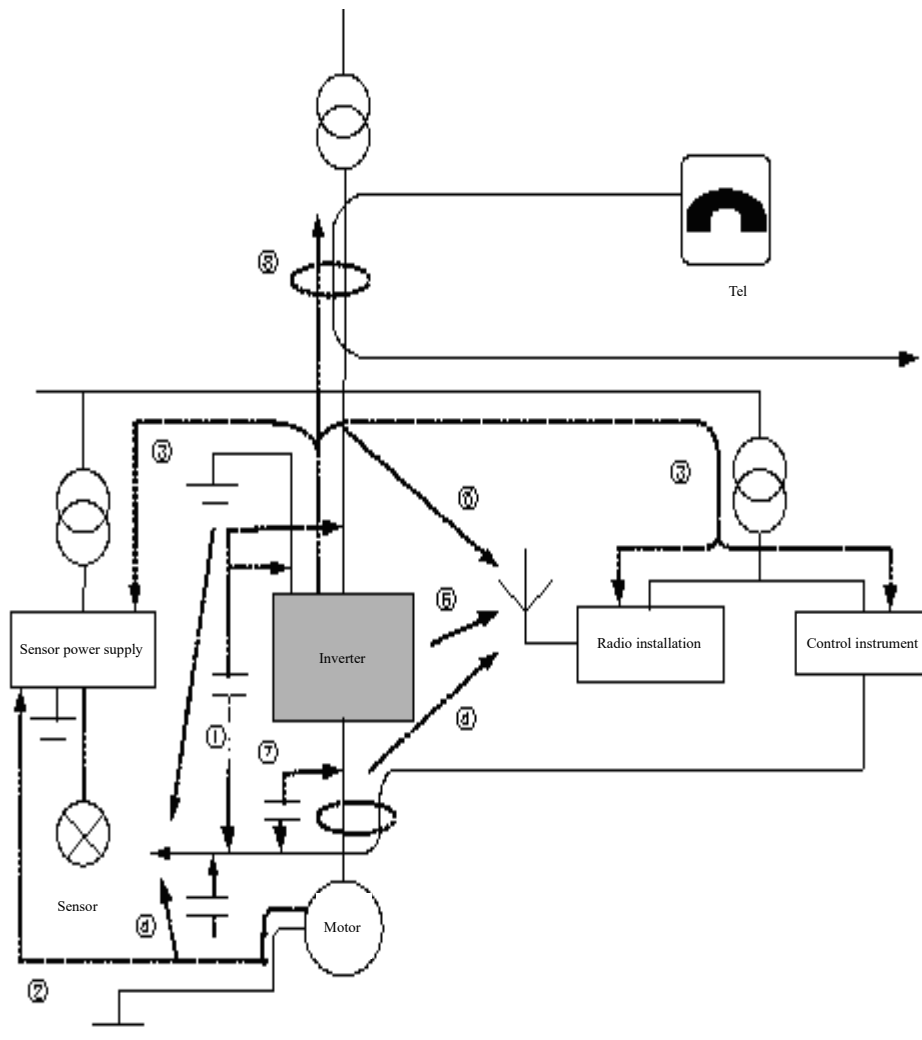


Figure A.2 Noise propagation diagram

A.1.3 Basic countermeasure of noise suppression

See Table A.1 for basic countermeasure of noise suppression.

Table A. 1 Basic countermeasure of noise suppression

| No. | Causes | Countermeasures |
|-------------|---|--|
| ① ⑦ ⑧ | If the signal line and the power line are wired in parallel or bundled, the noise will spread in the signal line due to electromagnetic induction and electrostatic induction, which will cause malfunction of the peripheral devices. | <ol style="list-style-type: none"> 1. Avoid the signal line and the power line wired in parallel or bundled; 2. Keep the vulnerable peripheral devices as far away from the inverter as possible; 3. Keep the vulnerable signal line as far away from the input and output cables of the inverter as possible; 4. The signal line and the power line are shielded. The effect will be better if they are sheathed in the metal tubes respectively (the distance between the metal tubes shall be at least 20cm). |
| ② | When the peripheral devices form a closed loop through the wiring of the inverter, the leakage current of the grounding wire of the inverter will cause malfunction of the peripheral devices. | If the peripheral devices are not grounded at this time, the malfunction caused by the leakage current will be eliminated. |
| ③ | When the peripheral devices share the same power supply system with the inverter, the noise generated by the inverter is transmitted along the power line, which may cause the malfunction of other peripheral devices connected to the system. | A noise filter may be installed at the input end of the inverter or the other peripheral devices are isolated with an isolation transformer/power filter. |

| | | |
|----------------------|--|--|
| <p>④ ⑤ ⑥</p> | <p>The weak current equipment, such as control computer, measuring instrument, radio installation and sensor, in the peripheral device and its signal line, if installed with the inverter in the same control cabinet and wired close to the inverter, may have malfunction due to radiated interference.</p> | <p>1. The vulnerable peripheral device and its signal line shall be installed as far away from the inverter as possible. The signal line shall be shielded and the shielding layer shall be grounded. The signal line cable shall be sheathed in a metal tube and shall be far away from the inverter and its input and output cables. If the signal line must traverse the input and output cables of the inverter, the two must be orthogonal;</p> <p>2. A radio noise filter or a linear noise filter (ferrite common mode choke) may be installed on the input and output sides of the inverter to suppress the noise radiation from the input and output cables of the inverter;</p> <p>3. The cables from the inverter to the motor shall be placed in a thick barrier and can be placed in a pipeline above 2mm or embedded in the cement tank. The cable shall be sheathed in a metal tube and shielded and grounded (The motor cable can be 4-core cable, one of which is grounded on the side of the inverter and connected to the motor shell on the other side).</p> |
|----------------------|--|--|

A.2 Distribution requirements

A.2.1 Cable laying requirements

To avoid interference with each other, the control signal cable shall be laid separately from the power cable and the motor cable at a sufficient distance as far as possible, as shown in Figure A.3 (a); if required, the control signal cable must orthogonally traverse the power cable or the motor cable, as shown in Figure A.3(b).

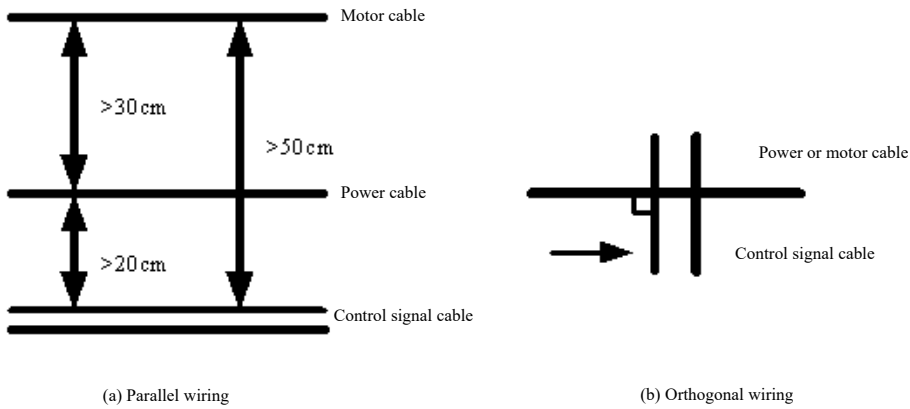


Figure A.3 Wiring requirements

A.2.2 Requirements for cross-sectional area of cables

As the greater the cross-sectional area of the cable, the greater the ground capacitance and the greater the earth leakage current, the output current shall be reduced if the cross-sectional area of the motor cable is larger (the current is reduced by 5% for every increase of area level).

A.2.3 Requirements for shielded cables

High-frequency and low-impedance shielded armored cables such as braided copper wire mesh and aluminum wire mesh shall be used.

A.2.4 Requirements for installation of shielded cables

The control cable shall generally be a shielded cable, and the shielded wire mesh must be connected to the metal chassis by 360° ring connection through the strain relief clamps at both ends, as shown in Figure A.4. The shielding grounding method in Figure A.5 is wrong.

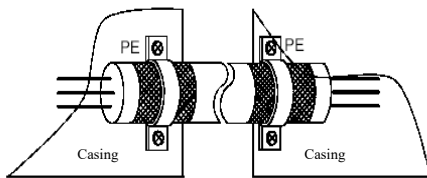


Figure A.4 Correct shielding grounding method

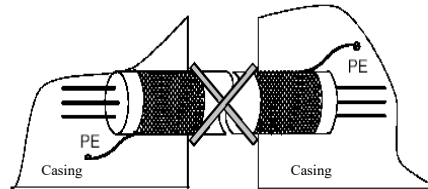


Figure A.5 Incorrect shielding grounding method

A.3 Grounding

A.3.1 Grounding mode

See Figure A.6 for the grounding mode of the grounding electrodes.

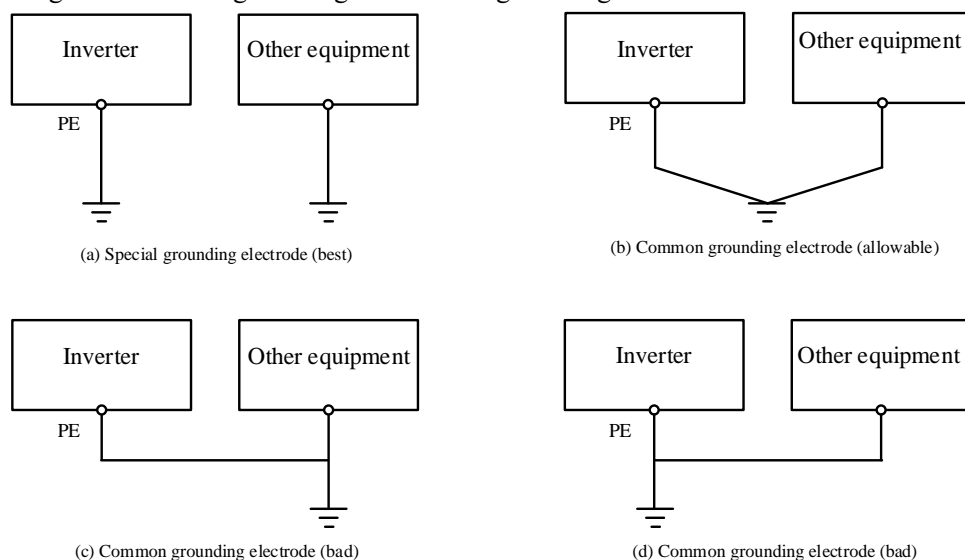


Figure A.6 Special grounding electrode diagram

Of the four grounding modes shown above, (a) is the best grounding mode and is recommended whenever possible.

A.3.2 Precautions for grounding connection

- (1) The ground cable of standard sectional area shall be used as far as possible to minimize the ground impedance; because the high-frequency impedance of the flat cable is smaller than that of the round conductor, it is better to choose the flat cable under the same cross-sectional area.
- (2) The grounding cable shall be as short as possible and the grounding point shall be as close to the inverter as possible.
- (3) If the four-core cable is used, one four-core cable must be grounded at the inverter side and the other side is connected to the motor grounding terminal; the best grounding effect can be obtained if the motor and the inverter have special grounding electrodes respectively.
- (4) When the grounding terminals of all components in the control system are connected together, the noise source formed by the earth leakage current will affect other peripheral devices except the inverter in the control system; therefore, in the same control system, the inverter shall be

separated from the weak current equipment such as computer, sensor or audio equipment.

- (5) To obtain lower high-frequency impedance, the fixing bolts of the devices can be used as the high-frequency terminals connected with the rear panel of the cabinet. Pay attention to remove the insulation varnish at the fixed point when installing.
- (6) The grounding cable shall be laid away from the wiring of the noise sensitive equipment I/O part, and shall be as short as possible.

A.4 Installation of surge absorber

A surge suppressor must be installed even if a large number of noise-generating devices such as relay, contactor and electromagnetic brake are installed outside the chassis of the inverter, as shown in Figure A.7.

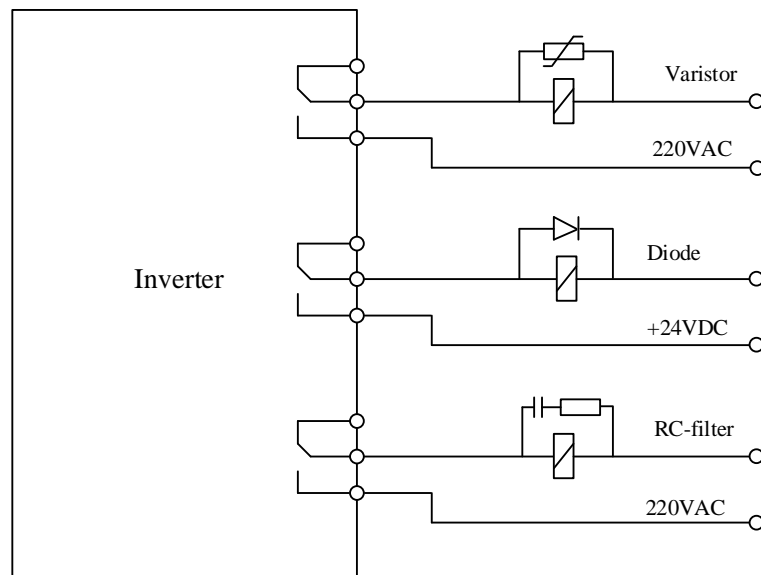


Figure A.7 Operating requirements for relay, contactor and electromagnetic brake

A.5 Leakage current and its countermeasures

The leakage current flows through the line capacitor and motor capacitor at the input and output sides of the inverter, including the earth leakage current and leakage current between lines, as shown in Figure A.8. The leakage current depends on the carrier frequency and capacitance.

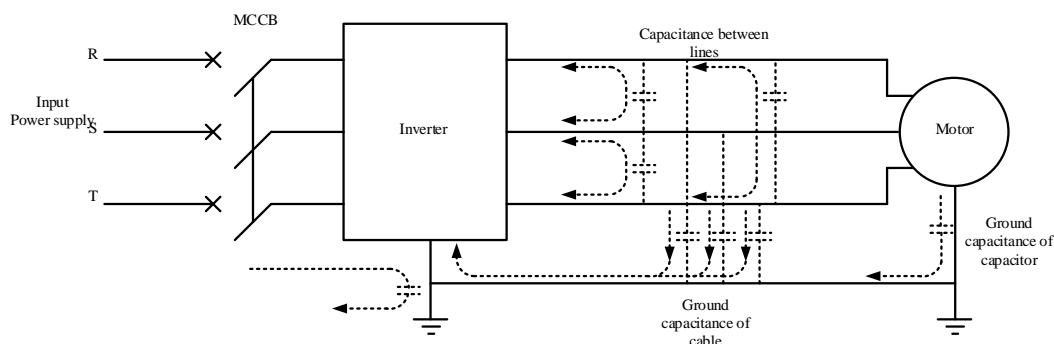


Figure A.8 Leakage current path

A.5.1 Earth leakage current

The earth leakage current not only flows into the inverter, but also flows into other devices through the grounding wire. It may cause malfunction of the residual-current circuit breaker, relay or other devices. The higher the carrier frequency of the inverter is, the longer the motor cable is and the greater the leakage current is.

Suppression measures: reduce the carrier frequency; shorten the motor cable as far as possible; use a residual-current circuit breaker specifically designed for higher harmonic/surge leakage current.

A.5.2 Leakage current between lines

Leakage current flowing through the distributed capacitance between the cables on the output side of the inverter may cause malfunction of the external thermal relay in its higher harmonics. When the wiring is very long (above 50M), the leakage current increases and it is easy to cause the malfunction of the external thermal relay.

Suppression measures: reduce the carrier frequency; install an AC output reactor at the output side; it is recommended to use a temperature sensor to directly monitor the motor temperature, or replace the external thermal relay with an electronic thermal relay with the motor overload protection function of the inverter itself.

A.6 Radiated emission suppression of inverter

The inverter is usually installed in the metal control cabinet. The equipment outside the metal cabinet is little affected by the radiated emission of the inverter, and the external connection cable is the main radiated emission source. As the power cable and motor cable of the inverter, as well as the control cable and keyboard cable shall be drawn out of the shielding cabinet, special treatment shall be done in the drawing out position, otherwise the shielding will fail.

In Figure A.9, the cable in the shielding cabinet acts as an antenna and radiates the noise radiation in the cabinet to the space after transmitting to outside of the shielding cabinet through the cable; in Figure A.10, the cable shielding layer is connected to the shielding case ground at the exit, so that

the noise radiation received by the cable in the cabinet flows directly to the ground through the shielding case to eliminate the influence on the outside world.

When the shielding layer grounding method as shown in Figure A.10 is adopted, the cable shielding layer shall be connected to the case ground as close as possible to the exit, otherwise the cable from the grounding point to the exit will still act as an antenna. The distance between the noise grounding point and the exit shall be at least 15cm, the smaller the better.

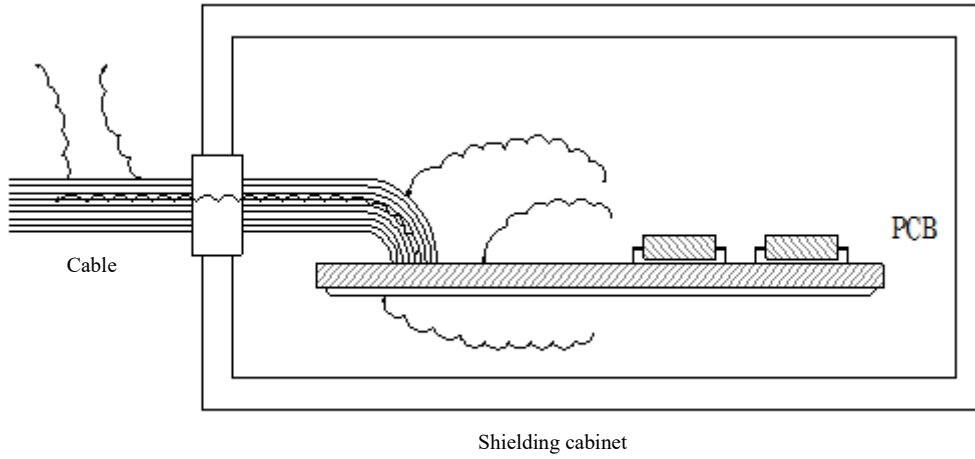


Figure A.9 Radiation from the outgoing cable of shielding cabinet

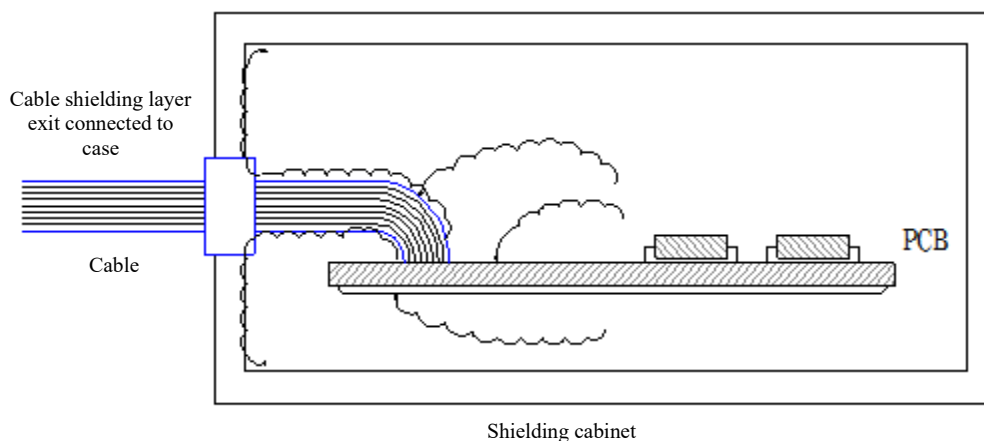


Figure A.10 Radiation suppression by cable shielding layer connected to shielding case ground

A.7 Guidelines for power line filter

Power line filters can be used for devices that can produce strong interference and devices that are sensitive to external interference.

A.7.1 Function of power line filter

- (1) The power line filter is a bidirectional low-pass filter, which only allows the DC and 50Hz power frequency current, rather than the electromagnetic interference current with higher frequency to pass. Therefore, it can inhibit the electromagnetic interference generated by the device from entering the power line and inhibit the interference from the power line from entering the device.
- (2) The power line filter enables the equipment to meet the requirements of the electromagnetic compatibility standards for conducted emission and conducted susceptibility, and it also inhibits the radiated interference of the equipment.

A.7.2 Precautions for installation of power line filter

- (1) In the cabinet, the installation site of the filter shall be as close as possible to the power line inlet end, and the power input line of the filter shall be as short as possible in the control cabinet.
- (2) If the input line of the filter is too close to the output line, the high-frequency interference will

bypass the filter and directly couple the input line and output line of the filter, so that the power filter will be out of action.

- (3) There is usually a dedicated grounding terminal on the filter enclosure. However, if a wire is used to connect the ground terminal of the filter to the cabinet case, the filter performs practically no function because the long wire has very large high-frequency impedance and cannot play an effective bypass role. The correct installation method is to attach the filter enclosure to the conductive plane of the metal case with the contact area as large as possible.

Remove the insulation varnish when installing to ensure good electrical contact.

A.8 Division of EMC installation area of inverter

In the drive system composed of the inverter and the motor, the inverter and peripheral devices such as control device and sensor are usually installed in the same control cabinet. The interference generated by the control cabinet to the outside of the cabinet can be suppressed at the main contact, so a radio noise filter and an inlet AC reactor shall be installed at the incoming line end of the control cabinet. In order to meet EMC requirements, the control cabinet shall also achieve electromagnetic compatibility.

In the drive system composed of the inverter and the motor, the inverter, the brake unit and the contactor are all the strong noise sources, which will affect the normal operation of the automation device, encoder, sensor and other peripheral devices sensitive to noise. By electrical characteristics, the peripheral devices can be installed in different EMC areas to achieve spatial isolation of noise source and noise receiver, which is the most effective measure to reduce interference.

The division of EMC installation area of the inverter is shown in Figure A.11.

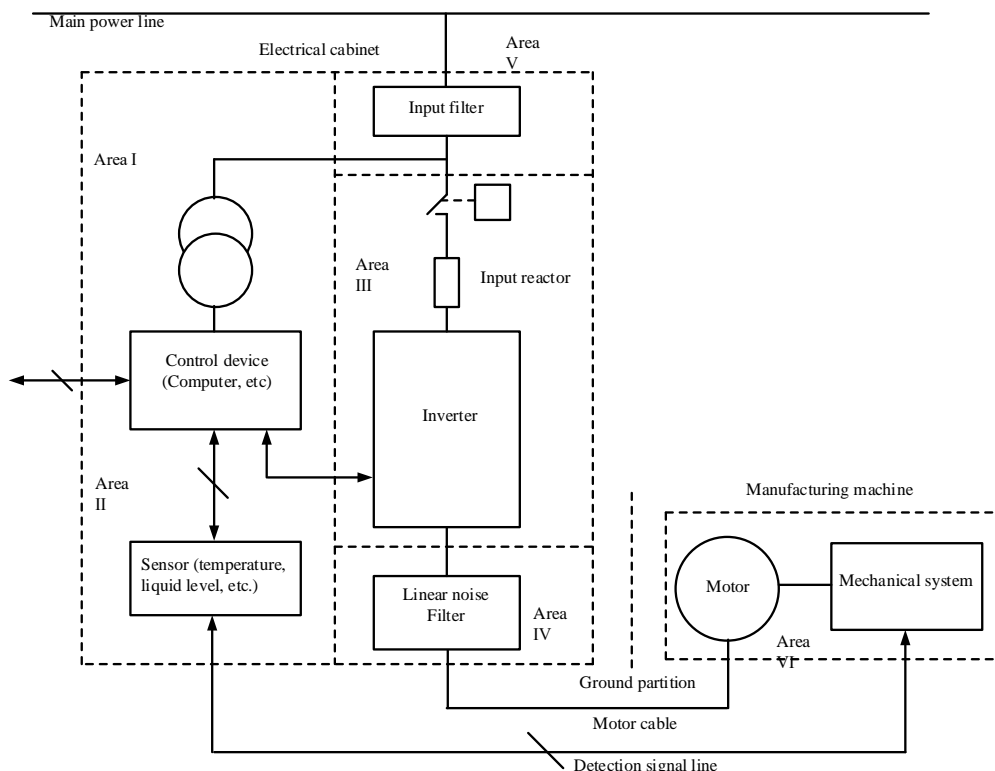


Figure A.11 EMC installation area diagram of inverter

The above installation area is divided as follows:

Area I: control power transformer, control device and sensor, etc.

Area 2: control signal and its cable interface, requiring certain immunity

Area III: main noise sources such as input reactor, inverter, brake unit and contactor.

Area IV: output noise filter and its wiring part.

Area V: power supply (including radio noise filter wiring part).

Area VI: motor and its cable.

The areas shall be isolated with a minimum interval of 20cm to achieve electromagnetic decoupling; the areas shall be decoupled by ground partitions and the cables in different areas shall be placed in different cable conduits; when a filter is required, it shall be installed at the interface between the areas; all bus cables (e.g. RS485) and signal cables drawn from the cabinet must be shielded.

A.9 Precautions for electrical installation of inverter

The electrical installation of the inverter is shown in Figure A.12:

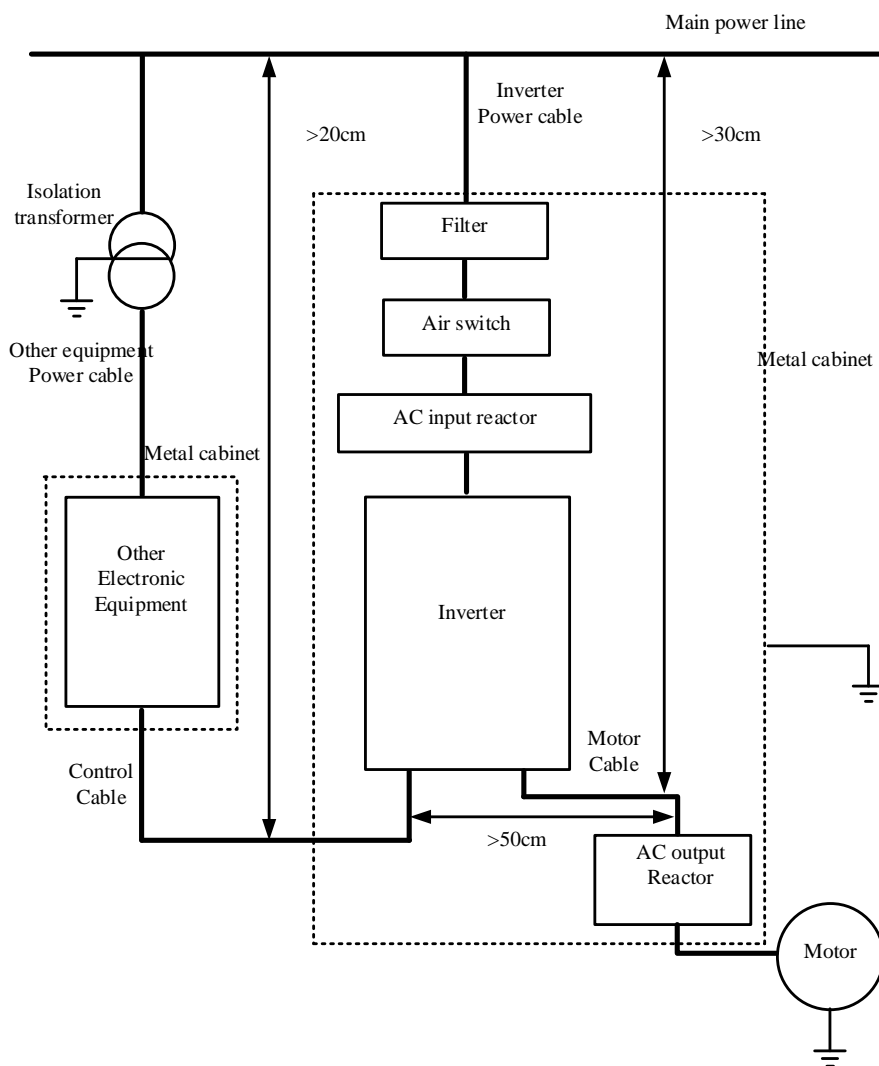


Figure A-12 Electrical installation diagram of inverter

To meet EMC requirements, the following shall be noted during installation:

- (1) The inverter shall be installed in the cabinet. The baseboard of the inverter and the housings of the peripherals such as input filter shall be fixed on the backboard of the control cabinet to ensure good electrical contact with the backboard; the distance between the inverter and the filter shall be as short as possible, less than 15cm, which can minimize the high-frequency impedance of the grounding wire between the inverter and the input filter and reduce the high-frequency noise.
- (2) A wide grounding bar shall be installed at the control cabinet inlet (no more than 5cm from the outlet). The shielding layer of all incoming and outgoing cabinet cables shall be fixed on the grounding bar by 360° ring connection to ensure good electrical contact.
- (3) The motor cables must be shielded, preferably with a double screen of spiral metal strap and wire mesh. At the end of the inverter, the shielding layer of the motor cable must be fixed on

the backboard of the cabinet with a metal strain relief clamp by A 360° ring connection (as shown in Figure A.4) at two fixing positions: as close to the inverter as possible, preferably less than 15cm; and fixed to the grounding bar. The motor cable shielding layer shall be connected with the metal case ground of the motor by 360° ring connection when the motor end passes through the motor terminal box; if difficult, the shielding layer can be twisted into a braid, flattened and connected to the motor grounding terminal. The flattening width shall be greater than 1/5 of the length of the braid. The length of the motor cable core and its PE braid outgoing line shall be as short as possible, preferably less than 5cm.

- (4) Terminal control cables must be shielded. The shielding layer shall be connected to the grounding bar at the cabinet inlet with a metal strain relief clamp by A 360° ring connection; at the inverter end, the shielding layer can be fixed to the metal case of the inverter with a metal strain relief clamp; if difficult, the shielding layer can be twisted to form a wide and short braid, which is then flattened and connected to the inverter PE terminal. The length of the cable core wire exposed and PE braid outgoing line shall be as short as possible, preferably less than 15cm.
- (5) The keyboard cable cannot be out of the shielding cabinet.
- (6) The hole seam size of the shielding cabinet shall be as small as possible, no longer than 15cm.

A.10 EMC standards to be met by AS700 engineering inverter

After the AS700 series engineering inverter is installed with the appropriate input/output filter and AC reactor (see "Options" for the optional filter and reactor models) and wired according to the above precautions, the EMC standards that can be satisfied are shown in Table A.2.

Table A.2 Summary of EMC performance of AS700 series inverter

| Item | Standard satisfied | Standard level |
|---|--------------------|--|
| Conducted disturbance emission | EN12015.1998 | $0.15 \leq f < 0.50MHz, 100dB(\mu v/m) Quasi - peak value$ $0.50 \leq f < 5.0MHz, 86dB(\mu v/m) Quasi - peak value$ $5.0 \leq f < 30MHz, 90 \sim 70dB(\mu v/m) Quasi - peak value$ |
| Radiated disturbance emission | EN12015.1998 | $30 \leq f < 230MHz, 40dB(\mu v/m) Quasi - peak value$ $230 \leq f < 1000MHz, 47dB(\mu v/m) Quasi - peak value$ |
| Electrostatic discharge immunity | EN12016.2004 | Criterion B (contact discharge 4000V, air discharge 8000V) |
| Radiated electromagnetic field immunity | EN12016.2004 | Level 3 criterion A (3V/m) |
| Electrical fast transient | EN12016.2004 | Level 4 criterion B (high voltage side $\pm 2KV/2.5kHz$) |

| | | |
|----------------------|--------------|-----------------------------|
| pulse train immunity | | |
| Surge immunity | EN12016.2004 | Criterion B ($\pm 1KV$) |
| Conducted immunity | EN12016.2004 | Criterion A (3V,0.15~80MHz) |

Chapter B Standards for Inverter



1. European low voltage specifications

The AS700series inverter conforms to 73/23/EEC and its amendment 98/68/EEC.

The inverter also meets the following standard specifications:

EN61800-5-1: Adjustable speed electrical power drive systems - Part 5-1 Safety requirements - Electrical, thermal and energy

2. European EMC specifications

When installed as recommended in this manual, the AS700 series inverter products meet the following EMC standards:

EN12015.1998 Electromagnetic compatibility-Product family standard for lifts, escalators and passenger conveyors-Emission.

EN12016.2004 Electromagnetic compatibility-Product family standard for lifts, escalators and passenger conveyors-Immunity.

EN61800-3: 2004: Adjustable speed electrical power drive systems - Part 3



North American safety specifications

AS700 series inverter products comply with north American safety certification. The inverter conforms to the following standard specifications:

UL508: Industrial Control Equipment

UL508C:Power Conversion Equipment

ISO9001 quality management system

Shanghai Sigriner STEP Electric Company Ltd. manages its quality management system according to ISO9001 standard.

Chapter C Profibus_DP communication protocol

There are three types of PROFIBUS communication protocol of the inverter: 2WORD, 4WORD and 8WORD. The communication protocol is described in three parts as follows:

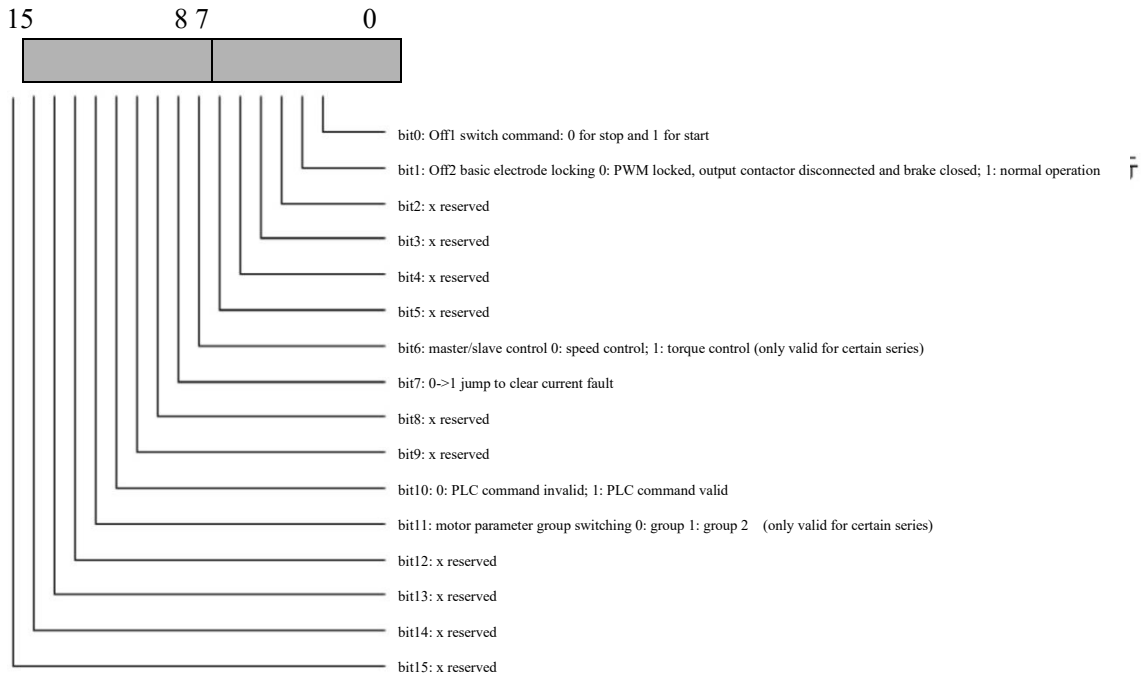
Part 1: Protocol content (including GSD file download address)

The content of this part of protocol can be selected by the user. The user can choose the type of protocol as needed:

1. 2WORD communication protocol meaning, containing 2 control words and 2 status words:

Inverter control words

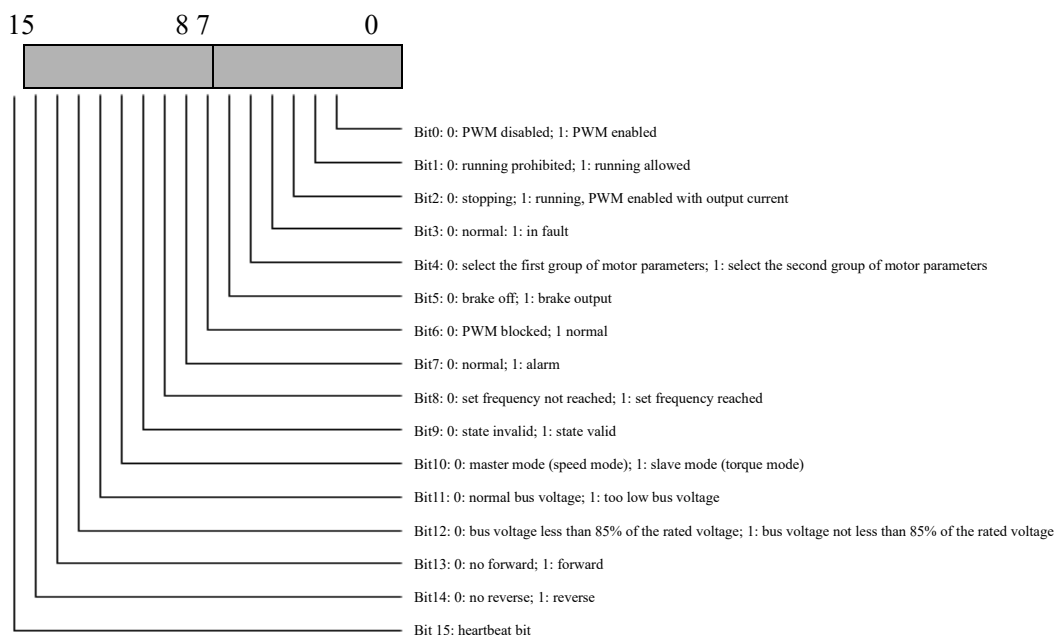
Control word WORD1, with each bit defined as follows:



Control word WORD2: used for speed given. For example: 5000 represents forward 50.00 Hz; -5000 represents reverse 50.00 Hz

Inverter status words

Status word WORD1, with each bit defined as follows:



Note: Meaning of bit9 of WORD1:

=0: the inverter status received by PLC from Profibus is invalid

=1: the inverter status received by PLC from Profibus is valid

Status word WORD2: feedback frequency HZ. For example: 5000 represents forward 50.00 Hz; -5000 represents reverse 50.00 Hz

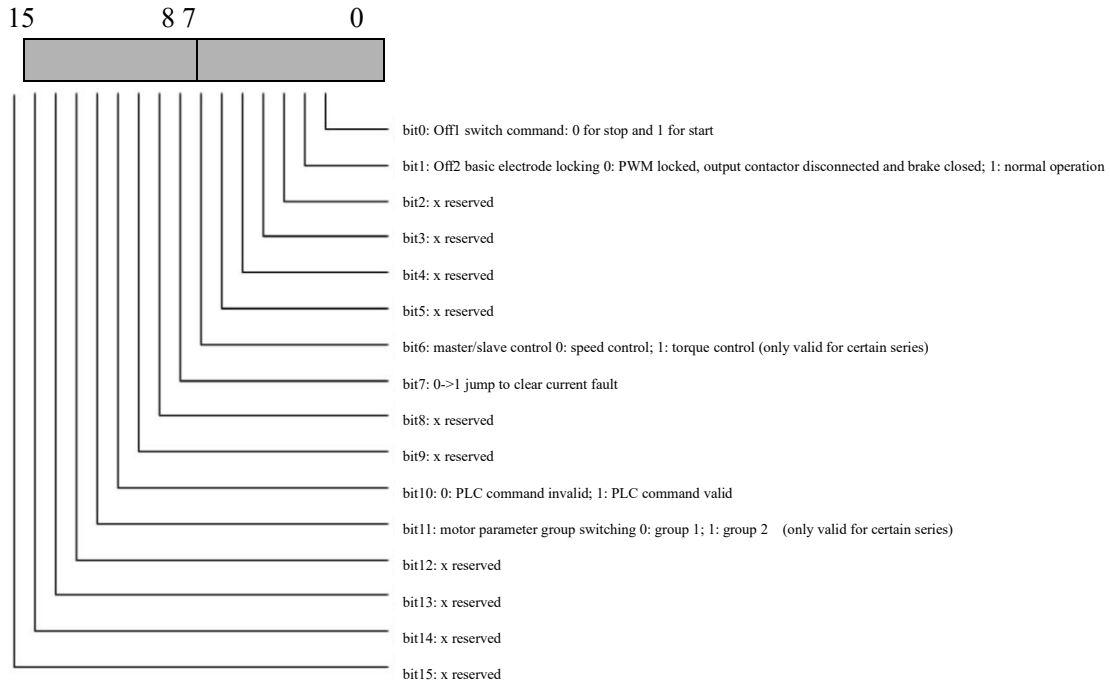
In closed-loop control mode: the word is the encoder feedback speed

In V/F control mode: the word is actual output frequency

2. 4WORD communication protocol meaning, containing 4 control words and 4 status words:

Inverter control words

Control word WORD1, with each bit defined as follows:



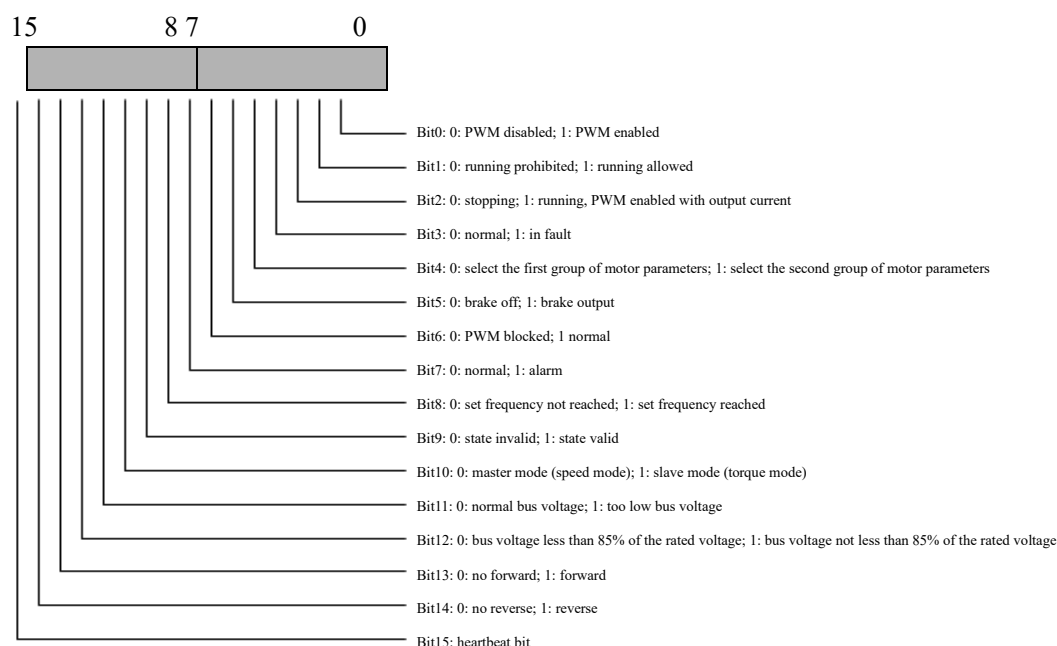
WORD2: speed given. For example: 5000 represents forward 50.00 Hz; -5000 represents reverse 50.00 Hz

WORD3: torque given (0.1%), signed, rated torque of standard value motor, 999 represents 99.9% and -1000 represents -100.0% (only valid in the slave mode (torque mode) of specific series)

WORD4: compensating torque given (0.1%), signed, rated torque of standard value motor, 999 represents 99.9% and -1000 represents -100.0% (only valid in the master mode (speed mode) of specific series)

Inverter status words

Status word WORD1, with each bit defined as follows:



Note: Meaning of bit9 of WORD1:

=0: the inverter status received by PLC from Profibus is invalid

=1: the inverter status received by PLC from Profibus is valid

Status WORD2: feedback frequency Hz. For example: 5000 represents forward 50.00 Hz; -5000 represents reverse 50.00 Hz

In closed-loop control mode: the word is the encoder feedback speed

In V/F control mode: the word is actual output frequency

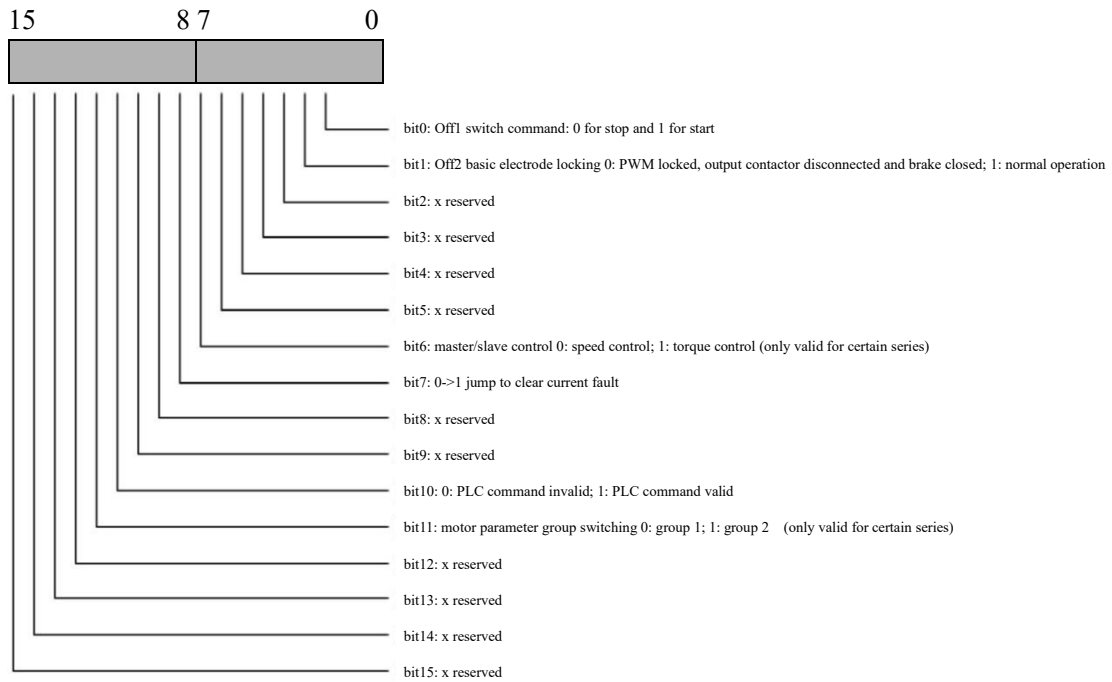
Status WORD3: output current A, example: 100 represents 10.0A

Status WORD4: output voltage V, example: 380 represents 380V

3. 8WORD communication protocol meaning, containing 8 control words and 8 status words:

Inverter control words

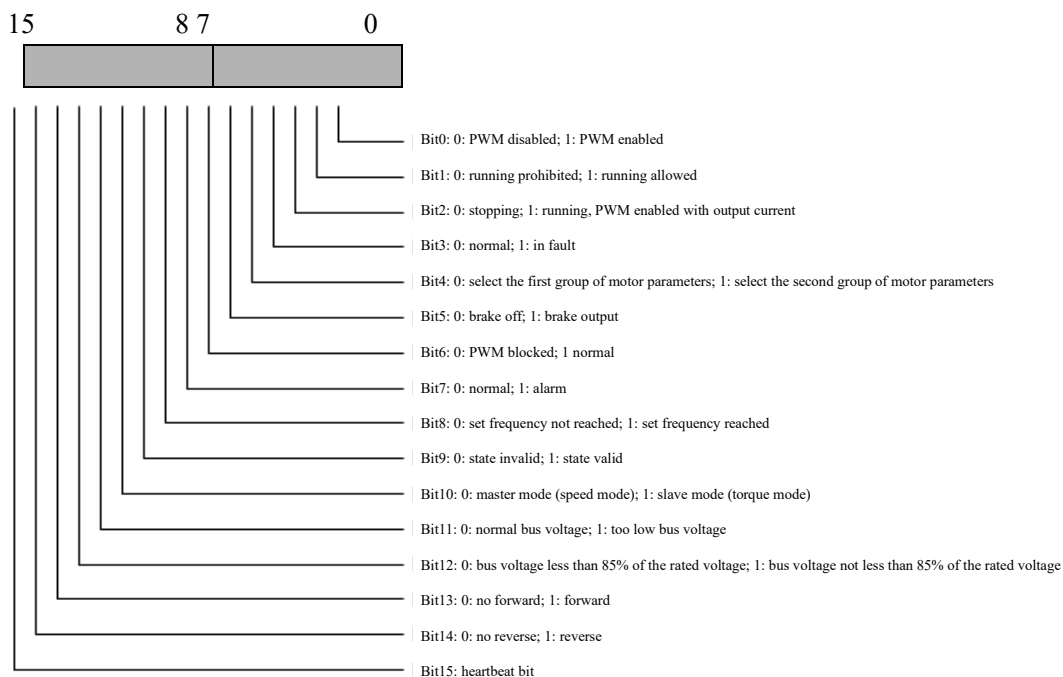
Control word WORD1, with each bit defined as follows:



Control word WORD2: speed given. For example: 5000 represents forward 50.00 Hz; -5000 represents reverse 50.00 Hz

Inverter status words

Status word WORD1, with each bit defined as follows:



Note: Meaning of bit9 of WORD1:

=0: the inverter status received by PLC from Profibus is invalid

=1: the inverter status received by PLC from Profibus is valid

Status word WORD2: Feedback frequency Hz. For example: 5000 represents forward 50.00 Hz; -5000 represents reverse 50.00 Hz

In closed-loop control mode: the word is the encoder feedback speed

In V/F control mode: the word is actual output frequency

Status word WORD3: Output current A, example: 100 represents 10.0A

Status WORD4: output voltage V, example: 380 represents 380V

Status word WORD5: Custom status 1, set according to parameter P82.02

Status WORD6: custom status 2, set according to parameter P82.03

Status word WORD7: Custom status 3, set according to parameter P82.04

Status WORD8: custom status 4, set according to parameter P82.05

Attached I: Profibus custom status word description

This description is mainly valid for **Profibus 8WORD** communication protocol type. The last four words of the status word can be selected through the inverter parameters P82.02, P82.03, P82.04 and P82.05. The optional definition of each parameter is as follows:

| | | | |
|-----------|-----|--|--|
| Parameter | set | Standby | |
| to 0 | | | |
| Parameter | set | Standby | |
| to 1 | | | |
| Parameter | set | Standby | |
| to 2 | | | |
| Parameter | set | Standby | |
| to 3 | | | |
| Parameter | set | Standby | |
| to 4 | | | |
| Parameter | set | Standby | |
| to 5 | | | |
| Parameter | set | Standby | |
| to 6 | | | |
| Parameter | set | Standby | |
| to 7 | | | |
| Parameter | set | The given torque of the inverter is signed and is the rated torque of standard value | |
| to 8 | | motor. 999 represents 99.9% and -1000 represents -100.0% | |
| Parameter | set | Standby | |
| to 9 | | | |
| Parameter | set | The current output torque of the inverter is signed and is the rated torque of | |
| to 10 | | standard value motor. 999 represents 99.9% and -1000 represents -100.0% | |
| Parameter | set | Standby | |
| to 11 | | | |
| Parameter | set | Standby | |
| to 12 | | | |
| Parameter | set | The given target frequency of the inverter is unsigned. 5000 represents 50.00Hz | |
| to 13 | | | |
| Parameter | set | The current operating frequency of the inverter is signed. 5000 represents | |
| to 14 | | 50.00Hz and -5000 represents -50.00Hz | |
| Parameter | set | The feedback frequency of the inverter is signed. 5000 represents 50.00Hz and - | |
| to 15 | | 5000 represents -50.00Hz | |
| Parameter | set | The feedback speed of the inverter is signed. 1000 represents 100.0rpm and -1000 | |
| to 16 | | represents -100.0rpm | |
| Parameter | set | Standby | |
| to 17 | | | |
| Parameter | set | The output voltage RMS of the inverter is unsigned. 380 represents 380V | |

| | | | |
|-----------|-----|--|-----------------------|
| | | to 18 | |
| Parameter | set | The output current RMS of the inverter is unsigned. 100 represents 10.0A | |
| | | to 19 | |
| Parameter | set | The active output power of the inverter is unsigned. 1000 represents 100.0% of | |
| | | to 20 | the motor rated power |
| Parameter | set | Standby | |
| | | to 21 | |
| Parameter | set | Standby | |
| | | to 22 | |
| Parameter | set | The bus voltage of the inverter is unsigned. 650 represents 650V | |
| | | to 23 | |
| Parameter | set | Standby | |
| | | to 24 | |
| Parameter | set | Standby | |
| | | to 25 | |
| Parameter | set | Standby | |
| | | to 26 | |
| Parameter | set | Standby | |
| | | to 27 | |
| Parameter | set | Standby | |
| | | to 28 | |
| Parameter | set | Inverter output terminal state 1: ON 0: OFF | |
| | | to 29 | |
| Parameter | set | Standby | |
| | | to 30 | |
| Parameter | set | Inverter input terminal state 1: ON 0: OFF | |
| | | to 31 | |
| Parameter | set | Standby | |
| | | to 32 | |
| Parameter | set | Standby | |
| | | to 33 | |
| Parameter | set | Analog input channel 0, 10000 represents 10.000V | |
| | | to 34 | |
| Parameter | set | Analog input channel 1, 10000 represents 10.000V | |
| | | to 35 | |
| Parameter | set | Standby | |
| | | to 36 | |
| Parameter | set | Standby | |
| | | to 37 | |
| Parameter | set | Standby | |
| | | to 38 | |
| Parameter | set | Standby | |
| | | to 39 | |
| Parameter | set | Recent fault No.: 0~63 | |

to 40
Parameter set Standby
to 41
Parameter set Standby
to 42
Parameter set Radiator temperature, 60 represents 60°C
to 43
Parameter set Encoder counting 0~65535
to 44
Parameter set Standby
to 45
Parameter set Standby
to 46
Parameter set Standby
to 47
Parameter set Standby
to 48
Parameter set Standby
to 49
Parameter set Standby
to 50
Parameter set Standby
to 51
Parameter set Standby
to 52
Parameter set Standby
to 53
Parameter set Standby
to 54
Parameter set Standby
to 55
Parameter set Standby
to 56
Parameter set Standby
to 57
Parameter set Standby
to 58
Parameter set Standby
to 59

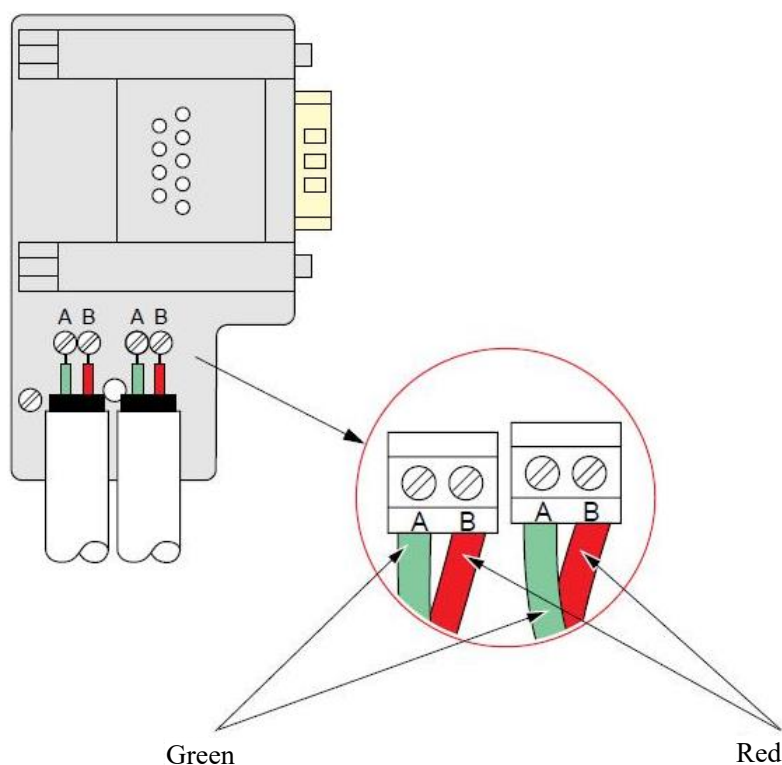
Attached II: Inverter GSD file

Profibus communication inverter GSD file is provided by the service personnel of Shanghai Sigriner STEP Electric Co., Ltd.

Part 2: Introduction to network settings

1. Connector connection method

- * The bus uses a D-type 9-pin socket (female head). A terminal resistance switch on the socket housing can be used to control the terminal resistance on the bus



2. Baud rate and bus length

- * There is a certain relationship between the length of Profibus bus and the baud rate, and the appropriate baud rate should be selected according to the data in the following table. The baud rate is set in the hardware configuration and adaptive by the slave.

| | | | | | | | | | |
|--------------------|------|------|-------|-------|-----|------|------|------|-------|
| Baud rate k/bps | 9.6 | 19.2 | 93.75 | 187.5 | 500 | 1500 | 3000 | 6000 | 12000 |
| Length m | 1200 | 1200 | 1200 | 1000 | 400 | 200 | 100 | 100 | 100 |

3. Host settings

- * Profibus DP master station file (.GSD) must be configured in the master station.

2WORD,4WORD and 8WORD protocols are integrated internally and may be selected by the user according to the actual needs. The slave machine will automatically identify the protocol type.

- * The communication baud rate of Profibus-DP bus is set in Profibus master station.

4. Slave settings

- * Profibus slave station (inverter) sets P80.01 to 1 and sets the run command and speed given to Profibus in P10 group
- * Profibus slave station address (inverter) can be set using the handheld manipulator. The slave station address is set in the inverter parameter P82.00 and shall be the same as the address configured for the host hardware.

5. Terminal settings

- * The terminal of the master station connector is set to ON, the user defined terminal of the last slave station connector is set to ON, and the remaining slave address terminals are set to OFF.

Part 3: Protocol usage

Through the description of the above types of communication protocols, we have a general understanding of PROFIBUS communication of the inverter. The following are specific application examples of PROFIBUS communication:

For Example

Step 1: Prepare a PLC, such as Siemens S7-300;

Step 2: Prepare the GSD file provided by us;

Step 3: Prepare an inverter with Profibus provided by us;

Step 4: Power on the inverter and set the following in the parameter group of the inverter:

P10.02 = 4 Profibus command given

P10.03 = 16 Profibus given speed

P80.01 = 1 Profibus communication mode (note: this mode is Modbus or Profibus, or no choice)

P82.00 = 3 Profibus address note: this address is consistent with the slave address set in PLC.

P82.01 = 0 communication big endian note: 0 means MSB First

1 means LSB first

Generally, Siemens PLC is set to 0, and GE and Fuji PLC is set to 1.

Generally, when the communication has been established, the mode can be determined by checking the heartbeat bit of the status word

P82.02 Custom status word 1 Select the status word to be detected through the annotation on the operation panel

P82.03 Custom status word 2 Select the status word to be detected through the annotation on the operation panel

P82.04 Custom status word 3 Select the status word to be detected through the annotation on the operation panel

P82.05 Custom status word 4 Select the status word to be detected through the annotation on the operation panel

Step 5: Connect PLC and inverter with Profibus standard cable. (Please perform step 5 after completing step 4)

Turn ON both ends of the terminal resistor on the Profibus cable. If there are multiple inverters or multiple Profibus slave stations, it is only necessary to turn off the PLC terminal and one terminal resistor at the farthest end of the Profibus bus.

Step 6: After PLC imports GSD file, no matter which type of protocol is selected, the following bits of the inverter protocol control WORD1 shall be assigned through Profibus communication, which is the running condition of the inverter:

Word1 (running condition)

Bit0 = 1 run Bit0 = 0 stop

Bit1 = 1 normal run Bit1 = 0 emergency stop

Bit10 = 1 PLC command valid

Bit7 = 1 reset fault Bit7 = 0 normal state

Word2 (speed given)

-30000 ~ 30000 speed given

Chapter D Modbus Communication Protocol

Inverter with hexadecimal **Modbus** address:

Modbus address of register = register address + 0x999A

Modbus address of register bit = register address * 16 + bit number n (n=0, ..., 15)

Modbus address of inverter parameter = parameter number in hexadecimal representation

(example, Modbus address of parameter P10.23 is 0x1023)

Inverter with decimal **Modbus** address:

Modbus address of register = register address + 10000

Modbus address of register bit = register address * 16 + bit number n (n=0, ..., 15)

Modbus address of inverter parameter = parameter number in decimal representation (example,

Modbus address of parameter P10.23 is 1023)

D.1 Command data [registers 3 and 6] [bits 1 and 5]

The registers in this table are read with function code 3 and written with function code 6

The bits in this table are read with function code 1 and written with function code 5

| Register address | Content |
|------------------|---|
| 0000H | Communication control word bit0 1: forward 0: invalid bit1 1: reverse 0: invalid bit2 1: run 0: stop bit3 Reserved (1: with external fault) bit4 1: Reset fault command bit7~5 Reserved (multi-stage speed selection #Table Z-1) bit8 Reserved (1: inching frequency valid #) bit10~9 Acceleration/deceleration time selection 0: curve 1 1: curve 2 bit11 Reserved (1: basic electrode locking#) bit12 1: Select run and given command 2 0: Select run and given command 1 bit13 1: Select PID parameter group 2 0: Select PID parameter group 1 bit15~14 Unused* |
| 0001H | modbus target frequency given value and communicates given value 0~30000: 0.00~300.00Hz |
| 0002H | Reserved (modbus target frequency given value) IQ10(1.0): rated frequency |
| 0003H | Reserved (Modbus PID given value) 10000 corresponds to 100% given value |

| Register address | Content |
|------------------|--|
| 0004H | Reserved (Modbus PID target value validity 1: valid 0: invalid) |
| 0005H | Reserved (AO1 output value) -1024~1024: -5.00~5.00V |
| 0006H | Reserved (AO2 output value) -1024~1024: -5.00~5.00V |
| 0007H | Multifunction port output # bit0 1: DO0 (relay A) ON 0: OFF bit1 1: DO1 (relay B) ON 0: OFF bit2 1: DO2 ON 0: OFF bit3 1: DO3 ON 0: OFF bit4 1: DO4(OC) ON 0: OFF bit5 1: DO5(OC) ON 0: OFF bit6 Unused bit7 Unused bit15~8 Unused # Actual terminal output value = Modbus set value Internal output value of function terminals |
| 0008H | Reserved (Modbus broadcast data validity) bit0 1: Terminal DI0 Modbus broadcast given valid 0: invalid bit1 1: Terminal DI1 Modbus broadcast given valid 0: invalid bit2 1: Terminal DI2 Modbus broadcast given valid 0: invalid bit3 1: Terminal DI3 Modbus broadcast given valid 0: invalid bit4 1: Terminal DI4 Modbus broadcast given valid 0: invalid bit5 1: Terminal DI5 Modbus broadcast given valid 0: invalid bit6 1: Terminal DI6 Modbus broadcast given valid 0: invalid bit7 1: Terminal DI7 Modbus broadcast given valid 0: invalid bit8 Unused bit9 Unused bit10 1: Target frequency broadcast given value valid 0: invalid bit11 1: Current frequency broadcast given value valid 0: invalid bit12 1: Run command (forward, reverse, start/stop command) broadcast given value valid bit15~13 Unused |
| 0009H | Reserved (target frequency broadcast given value) |
| 000AH | Reserved (current frequency broadcast given value) |
| 000BH | Reserved (running signal broadcast given value) bit0 Terminal DI0 Modbus broadcast given value #(the corresponding specific function is set by the parameter) bit1 Terminal DI1 Modbus broadcast given value #(the corresponding specific function is set by the parameter) bit2 Terminal DI2 Modbus broadcast given value #(the corresponding |

| Register address | Content |
|------------------|---|
| | <p>specific function is set by the parameter)</p> <p>bit3 Terminal DI3 Modbus broadcast given value #(the corresponding specific function is set by the parameter)</p> <p>bit4 Terminal DI4 Modbus broadcast given value #(the corresponding specific function is set by the parameter)</p> <p>bit5 Terminal DI5 Modbus broadcast given value #(the corresponding specific function is set by the parameter)</p> <p>bit6 Terminal DI6 Modbus broadcast given value #(the corresponding specific function is set by the parameter)</p> <p>bit7 Terminal DI7 Modbus broadcast given value #(the corresponding specific function is set by the parameter)</p> <p>bit8 Unused</p> <p>bit9 Unused</p> <p>bit10 1: forward 0: invalid</p> <p>bit11 1: reverse 0: invalid</p> <p>bit12 1: run 0: stop</p> <p>bit13 1: with external fault</p> <p>bit14 1: Reset fault command</p> <p>bit15 Unused</p> <p># Adopted value of function input terminals = (Modbus broadcast value & broadcast given validity) Actual input value of function terminals</p> |
| 000CH~0018H | Reserved (broadcast data) |
| 0019H | <p>Virtual input terminals</p> <p>bit0: Virtual terminal X0</p> <p>bit1: Virtual terminal X1</p> <p>bit2: Virtual terminal X2</p> <p>bit3: Virtual terminal X3</p> <p>bit4: Virtual terminal X4</p> <p>bit5: Virtual terminal X5</p> <p>bit6: Virtual terminal X6</p> <p>bit7: Virtual terminal X7</p> <p>bit8~15: reserved</p> <p># Actual terminal input value = Modbus set value External terminal input value</p> |
| 001AH~0068H | <p>Reserved control words (79 spaces)</p> <p>001AH: communication given torque -1000~1000 → -100.0%~100.0% motor rated torque</p> <p>001BH: speed limit 0~40000 → 0.00~400.00Hz</p> |
| 0069H | <p>Parameter update request</p> <p>After the parameters are received from the slave inverter through Modbus, they are saved in the parameter image area of the inverter.</p> <p>0x55: Update the actual parameters in RAM with the parameters in the image</p> |

| Register address | Content |
|------------------|---|
| | area 0xAA: Update the actual parameters in RAM with the default factory parameters Zero: Not update [Note]: The unit will be reset automatically after each update |
| 006AH~01F9H | Reserved (parameter) |
| 01FAH~046FH | 630 spaces reserved |

D.2 Monitoring data [register 4] [bit 2]

The bits in this table are read with function code 4 and written with function code 2

| Register address | Content |
|------------------|---|
| 0470H | Inverter status word bit0 1: With running signal 0: without running signal bit1 1: Running bit2 1: At zero speed bit3 1: In forward 0: In reverse bit4 1: Normal inverter power on 0: Abnormal inverter power on bit5 1: Basic electrode locking bit6 Unused bit7 1: Fault in progress bit8 Reserved (1: fault retrying) bit9 Reserved (1: incorrect parameter setting) bit10 1: self-tuning bit11 1: request self-tuning bit15~12 Unused |
| 0471H | Detection state bit0 1: frequency detection LF, frequency \leq detection frequency bit1 1: frequency detection GF, frequency \geq detection frequency bit2 1: frequency detection EF, given and feedback frequency, in detection frequency band bit3 1: Speed arrival bit4 Reserved (1: loss of analog signal given frequency command) bit5 1: Overtorque detecting bit6 1: Undervoltage detecting bit7 1: Bus voltage greater than 85% of the rated voltage bit8 1: Exceeding 5% of the rated current in running and 10% of the rated current when stopping bit9 1: fault forecast |

| Register address | Content |
|------------------|--|
| | bit15~10 Unused |
| 0472H | Reserved (given target frequency) |
| 0473H | Current operating frequency 5000 corresponding to 50.00Hz |
| 0474H | Reserved (PID given value) |
| 0475H | Reserved (PID feedback value) |
| 0476H | Reserved (PID output value) |
| 0477H | Reserved (PID proportion item) |
| 0478H | Reserved (PID integral item) |
| 0479H | Reserved (PID differential item) |
| 047AH | Reserved (communication fault) bit0 1: communication timeout bit1 1: frame format bit2 1: CRC error bit3 1: data length error bit4 1: parity check error bit5 1: overload error bit6 1: illegal command bit7 Reserved (operation panel communication fault) bit15~8 Unused |
| 047BH | Parameter update status bit0 1: updating 0: updated bit1 Reserved (1: data overrun) bit2 Reserved (1: data mismatch) bit3~15 Unused |
| 047CH~0484H | Unused (9 units) |
| 0485H | Inverter output monitoring 1 bit0 1: normal power on 0: abnormal power on bit1 1: fault 0: normal bit2 1: With running signal 0: without running signal bit3 1: frequency/speed arrival signal bit4 1: frequency/speed consistency bit5 1: At zero speed bit6 1: DC bus voltage greater than 85% of the rated voltage bit7 1: Exceeding 5% of the rated current in running and 10% of the rated current when stopping bit8 1: self-tuning bit9 1: speed detection 1 bit10 1: speed detection 2 bit11 1: fault forecast bit12 1: self-tuning request |

| Register address | Content |
|------------------|---|
| 0486H | Reserved (inverter output monitoring 2) |
| 0487H | Reserved (inverter output monitoring 3) |
| 0488H | Reserved (inverter output monitoring 4) |
| 0489H | Pump output monitoring 1 bit0 1: Pump sleep bit1 1: Motor 1 start bit2 1: Motor 2 start bit3 1: Motor 3 start bit4 1: Motor 4 start bit5 1: Motor 5 start bit6 1: Motor 6 start bit7 Reserved (Y8) bit8 Reserved (Y9) bit9 Reserved (Y10) bit10 Reserved (Y11) bit11 Reserved (Y12) bit12 Reserved (Y13) bit13 Reserved (Y14) bit14 Reserved (Y15) bit15 Reserved (Y16) |
| 048AH | Pump output monitoring 2 bit0 Reserved (Y17) bit1 Reserved (Y18) bit2 Reserved (Y19) bit3 Reserved (Y20) bit4 Reserved (Y21) bit5 Reserved (Y22) bit6 Reserved (Y23) bit7 Reserved (Y24) bit8 Reserved (Y25) bit9 Reserved (Y26) bit10 Reserved (Y27) bit11 Reserved (Y28) bit12 Reserved (Y29) bit13 Reserved (Y30) bit14 Reserved (Y31) bit15 Reserved (Y32) |
| 048BH | Fault indication 1 bit0 Module overcurrent protection bit1 ADC fault bit2 Radiator overheated bit3 Brake unit fault |

| Register address | Content |
|------------------|---|
| | bit4 Reserved bit5 Reserved bit6 Speed variation bit7 Bus overvoltage bit8 Bus undervoltage bit9 Output default phase bit10 Low-speed overcurrent of the motor bit11 Encoder fault bit12 Reserved bit13 Reserved bit14 Reserved bit15 Motor phase sequence error |
| 048CH | Fault indication 2 bit0 Overspeed in the same direction bit1 Overspeed in the reverse direction bit2 Reserved bit3 Encoder communication fault bit4 abc overcurrent bit5 Brake detection fault bit6 Input overvoltage bit7 Reserved bit8 Reserved bit9 Encoder non-self-learning bit10 Output overcurrent bit11 SINCOS encoder fault bit12 Input default phase bit13 Overspeed protection bit14 Motor high speed overcurrent bit15 Grounding protection |
| 048DH | Fault indication 3 bit0 Capacitor aging bit1 External fault bit2 Reserved bit3 Reserved bit4 Current sensor fault bit5 Brake resistance short circuit bit6 Excessive current instantaneous value bit7 Output contactor fault bit8 Brake switch fault bit9 IGBT short-circuit protection bit10 Communication fault bit11 Abnormal input power |

| Register address | Content |
|------------------|---|
| 049DH | Radiator temperature |
| 049EH | U phase voltage (instantaneous value) |
| 049FH | V phase voltage (instantaneous value) |
| 0490H | W phase voltage (instantaneous value) |
| 04A1H | U phase current (instantaneous value) |
| 04A 2H | V phase current (instantaneous value) |
| 04A 3H | W phase current (instantaneous value) |
| 04A 4H | Active output power |
| 04A 5H | Total output power |
| 04A 6H | Reactive power |
| 04A 7H | Power factor |
| 04A 8H | Feedback speed (rpm) -9999~9999→-999.9~999.9 |
| 04A 9H | Pre-torque |
| 04AAH~04B9H | 16 units reserved |
| 04BAH~04D9H | <p>View[0~31]: The specific monitoring content is related to the inverter model. Please refer to the instructions of "Select LCD to display the data content" in the inverter manual.</p> <p>04BAH: View[0]//undefined</p> <p>04BBH: View[1]</p> <p>04BCH: View[2]</p> <p>04BDH: View[3]</p> <p>04BEH: View[4]</p> <p>04BFH: View[5]</p> <p>04C0H: View[6]</p> <p>04C1H: View[7]</p> <p>04C2H: View[8]</p> <p>04C3H: View[9]</p> <p>04C4H: View[10]</p> <p>04C5H: View[11]</p> <p>04C6H: View[12]</p> <p>04C7H: View[13]</p> <p>04C8H: View[14]</p> <p>04C9H: View[15]</p> <p>04CAH: View[16]</p> <p>04CBH: View[17]</p> <p>04CCH: View[18]</p> <p>04CDH: View[19]</p> <p>04CEH: View[20]</p> <p>04CFH: View[21]</p> <p>04D0H: View[22]</p> |

| Register address | Content |
|------------------|--|
| | 04D1H: View[23] 04D2H: View[24] 04D3H: View[25] 04D4H: View[26] 04D5H: View[27] 04D6H: View[28] 04D7H: View[29] 04D8H: View[30] 04D9H: View[31] |
| 04DAH~04E5H | Uxx monitoring data (curve data) 04DAH: U01 data value (curve 1) 04DBH: U02 data value (curve 2) 04DCH: U03 data value (curve 3) 04DDH: U04 data value (curve 4) 04DEH: U05 data value (curve 5) 04DFH: U06 data value (curve 6) 04E0H: U07 data value (curve 7) 04E1H: U08 data value (curve 8) 04E2H: low byte: U01 identifier (curve 1 configuration); high byte: U02 identifier (curve 2 configuration) 04E3H: low byte: U03 identifier (curve 3 configuration); high byte: U04 identifier (curve 4 configuration) 04E4H: low byte: U05 identifier (curve 5 configuration); high byte: U06 identifier (curve 6 configuration) 04E5H: low byte: U07 identifier (curve 7 configuration); high byte: U08 identifier (curve 8 configuration) |
| 04E6H~04E9H | 4 units reserved (for drive) |
| 04EAH~05E9H | U phase current (buffer 256 points for graphic display) [sampling every 10 PWM cycles] |
| 05EAH~06E9H | V phase current (buffer 256 points for graphic display) |
| 06EAH~07E9H | W phase current (buffer 256 points for graphic display) |
| 07EAH | Output torque (for graphic display) |
| 07EBH | Given speed (for graphic display) |
| 07ECH | Feedback speed (for graphic display) |
| 07EDH | Bus voltage (for graphic display) |
| 07EEH~09EDH | 512 spaces reserved (for graphic display) |
| 0A34H~0A38H | Historical Fault code |

| Register address | Content | |
|------------------|-----------------------|--|
| | fault 0 (Recent) | Actual speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Given speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Bus voltage at the time of fault |
| | | Current at the time of fault |
| 0A39H~0A3DH | Historical fault 1 | Fault code |
| | | Actual speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Given speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Bus voltage at the time of fault |
| | | Current at the time of fault |
| 0A3EH~0A42H | Historical fault 2 | Fault code |
| | | Actual speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Given speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Bus voltage at the time of fault |
| | | Current at the time of fault |
| 0A43H~0A47H | Historical fault 3 | Fault code |
| | | Actual speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Given speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Bus voltage at the time of fault |
| | | Current at the time of fault |
| 0A48H~0A4CH | Historical fault 4 | Fault code |
| | | Actual speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Given speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Bus voltage at the time of fault |
| | | Current at the time of fault |
| 0A4DH~0A51H | Historical fault 5 | Fault code |
| | | Actual speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Given speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Bus voltage at the time of fault |
| | | Current at the time of fault |

| Register address | Content | |
|------------------|-----------------------------------|--|
| 0A52H~0A56H | Historical fault 6 | Fault code |
| | | Actual speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Given speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Bus voltage at the time of fault |
| | | Current at the time of fault |
| 0A57H~0A5BH | Historical fault 7 (First happen) | Fault code |
| | | Actual speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Given speed at the time of fault: -30000~30000→-300.00~300.00Hz |
| | | Bus voltage at the time of fault |
| | | Current at the time of fault |

