Asynchronous motor

PMSM

# 9600 series
# High performance vector frequency inverter
# Product instructions

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## Product description

### 9600 series frequency inverter

CNweiken main models of 9600 series frequency inverter based company to customer needs accurate understanding,adhering to the company for high quality and high reliability has always been the pursuit,9600series frequency inverter can provide exvellent performance and powerful functions for customer,the purpose is bring brand-new user experience.

*Support vector control of multiple motors*

* *Supports the three phase AC asynchronous motor*
* *Supports the three phase AC synchronous motor*
* *Supports vector control of permanent magnet synchronous motor without absolute position feedback*

Asynchronous motor PMSM

*Support multiple encoders*

DPCM encoder

Open collector encoder

UVWencoder

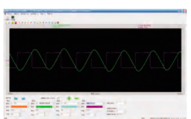
Rotating transformer encoder

*New speed sensorless vector control performance*

- Speed sensorless vector control performance can locked-rotro,output 150% rated torque at 0.5HZ.
- Sensorless vector control to reduce the sensitivity of the parameters of the motor,improve the field adaptability.
- Can be applied to winding control,multi motor drive load distribution under the same load and so on.

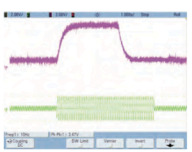
*High starting torque characteristics*

9600series frequency inverter in the 0.5HZ can provide 150% of the starting torque(sensorless vector control).The 0HZ can provide 180% zero speed torque(sensing vector control)



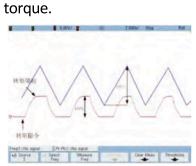
*Excellent responsiveness*

Torque response<20ms when sensorless vector control.
torque response <5ms when sensing vector control.



*Protect torque limit of the mechanical*

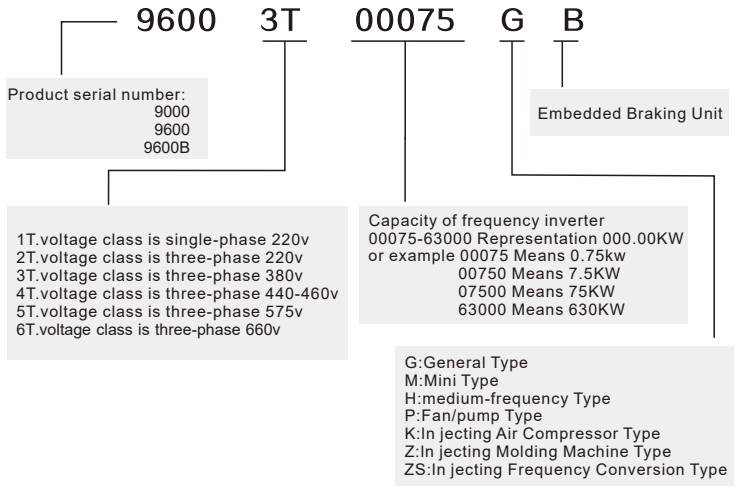
9600 series frequency inverter can provide limited torque.when the torque command more than machinery to be able to withstand the maximum torque,frequency inverter can make the torque limit play a mechanical maximum efficiency under the premise of the proper protective equipment safety wirhin the set of maximum torque.



▶9600 series vector frequency inverter instructions

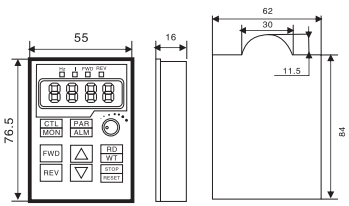
## contents

## Chapter 1:Description of model

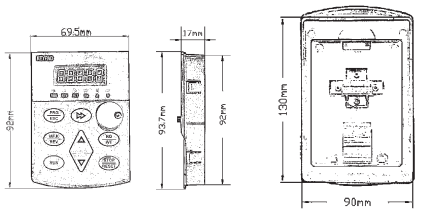



# Chapter 2:Outline drawings and dimensions

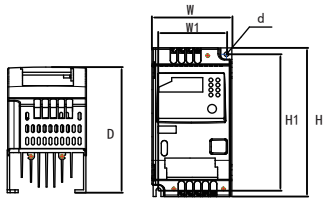
2.1 Small keyboard and mounting holes



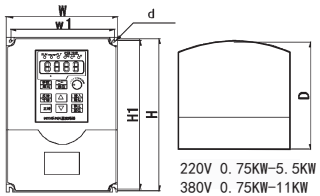

2.2 Big keyboard and mounting holes




2.3 Plastic shell products(0.75kw-11kw)

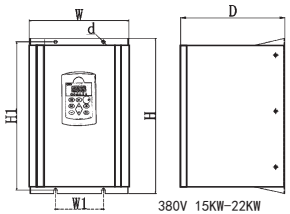



220V 0.75KW-2.2KW M type
380V 0.75KW-4.0KW M type

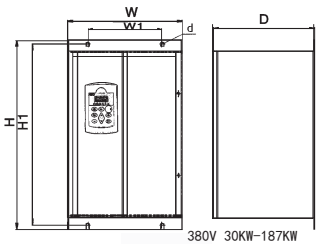



220V 0.75KW-5.5KW
380V 0.75KW-11KW

2.4 Iron shell products(15kw-187kw)

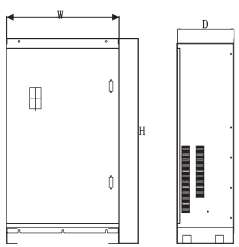



380V 15KW-22KW

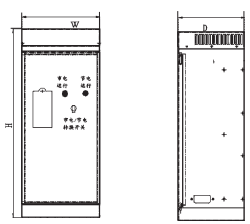



380V 30KW-187KW

2.5 Large power products(200kw-630kw)




2.6 Frequency conversion cabinet(11kw-110kw)








2.7 Product outline dimension and installation hole position size list

| Inverter Type | W (mm) | W1 (mm) | H (mm) | H1 (mm) | D (mm) | d (mm) |
|---|---|---|---|---|---|---|
| 9600-3T-00075-M 9600-1T-00075-M | 80 | 76 | 160 | 150 | 135 | Φ4 |
| 9600-3T-00150-M 9600-1T-00150-M | | | | | | |
| 9600-3T-00220-M 9600-1T-00220-M | | | | | | |
| 9600-3T-00075-G 9600-1T-00075-G | 126 | 115 | 170 | 160 | 160 | Φ4 |
| 9600-3T-00150-G 9600-1T-00150-G | | | | | | |
| 9600-3T-00220-G 9600-1T-00220-G | | | | | | |
| 9600-3T-00400-G 9600-1T-00400-G | | | | | | |
| 9600-3T-00550-G | | | | | | |
| 9600-3T-00750-P 9600-1T-00550-G | | | | | | |
| 9600-3T-00750-G 9600-3T-01100-P | 150 | 134 | 220 | 203 | 172 | Φ4 |
| 9600-3T-01100-G 9600-3T-01500-P | | | | | | |
| 9600-3T-01100-G 9600-3T-01500-P (Iron) | 150 | 88 | 270 | 260 | 177 | Φ9 |
| 9600-3T-01500-G 9600-3T-01850-P | 218 | 108 | 338 | 323 | 228 | Φ9 |
| 9600-3T-01850-G 9600-3T-02200-P | | | | | | |
| 9600-3T-02200-G 9600-3T-03000-P | | | | | | |
| 9600-3T-03000-G 9600-3T-03700-P 9600-6T-01850-G | 280 | 180 | 420 | 403 | 275 | Φ9 |
| 9600-3T-03700-G 9600-3T-04500-P 9600-6T-02200-G | | | | | | |
| 9600-3T-04500-G 9600-3T-05500-P 9600-6T-03700-G | 370 | 200 | 600 | 579 | 315 | Φ11 |
| 9600-3T-05500-G 9600-3T-07500-P 9600-6T-04500-G | | | | | | |
| 9600-3T-07500-G 9600-3T-09300-P 9600-6T-05500-G | | | | | | |
| 9600-3T-09300-G 9600-3T-11000-P 9600-6T-07500-G | | | | | | |
| 9600-3T-11000-G 9600-3T-13200-P 9600-6T-09300-G | | | | | | |
| 9600-3T-13200-G 9600-3T-16000-P 9600-6T-11000-G | 430 | 300 | 800 | 775 | 358 | Φ11 |
| 9600-3T-16000-G 9600-3T-18700-P 9600-6T-13200-G | | | | | | |
| 9600-3T-18700-G 9600-3T-20000-P 9600-6T-16000-G | | | | | | |
| 9600-3T-20000-G 9600-3T-22000-P 9600-6T-18700-G | 692 | – | 1260 | – | 355 | – |
| 9600-3T-22000-G 9600-3T-25000-P 9600-6T-20000-G | | | | | | |
| 9600-3T-25000-G 9600-3T-28000-P 9600-6T-22000-G | | | | | | |
| 9600-3T-28000-G 9600-3T-31500-P 9600-6T-25000-G | | | | | | |
| 9600-3T-31500-G 9600-3T-37500-P 9600-6T-28000-G | | | | | | |
| 9600-3T-37500-G 9600-3T-40000-P 9600-6T-31500-G | | | | | | |
| 9600-3T-40000-G 9600-3T-45000-P 9600-6T-37500-G | Please take the actual size as the criterion | | | | | |
| 9600-3T-45000-G 9600-3T-50000-P 9600-6T-40000-G | | | | | | |
| 9600-3T-50000-G 9600-3T-56000-P 9600-6T-45000-G | | | | | | |
| 9600-3T-56000-G 9600-3T-63000-P 9600-6T-50000-G | | | | | | |
| 9600-3T-63000-G 9600-6T-56000-G | | | | | | |
| 9600-6T-63000-G | | | | | | |
| 9600-3T-00750-ZS-B 9600-3T-01500-ZS-B | 230 | – | 570 | – | 240 | – |
| 9600-3T-01100-ZS-B 9600-3T-01850-ZS-B | | | | | | |
| 9600-3T-02200-ZS 9600-3T-03000-ZS 9600-3T-03700-ZS | 280 | – | 700 | – | 270 | – |
| 9600-3T-04500-ZS 9600-3T-05500-ZS 9600-3T-07500-ZS | 320 | – | 930 | – | 340 | – |
| 9600-3T-09300-ZS 9600-3T-11000-ZS | | | | | | |

Note:other models of product dimensions can refer to the above products.

# Chapter 3:Technology standard and selection

## 3.1 Explanation form of 9600 series technical parameter

| Item | | Specifications | |
|---|---|---|---|
| Standard functions | Maximum frequency | • Vector control: 0–650 Hz/0-3200Hz<br>• V/F control: 0–650 Hz/0-3200Hz | |
| | Carrier frequency | 0.5–16 kHz<br>The carrier frequency is automatically adjusted based on the load features. | |
| | Input frequency resolution | Digital setting: 0.01 Hz<br>Analog setting: maximum frequency x 0.025% | |
| | Control mode | • Sensorless flux vector control (SFVC)<br>• Closed-loop vector control (CLVC)<br>• Voltage/Frequency (V/F) control | |
| | Startup torque | • G type: 0.5 Hz/150% (SFVC); 0 Hz/180% (CLVC)<br>• P type: 0.5 Hz/100% | |
| | Speed range | 1:100 (SVC) | 1:1000 (FVC) |
| | Speed stability accuracy | • ± 0.5% (SVC)<br>• ± 0.02% (FVC) | |
| | Torque control accuracy | ± 5% (CLVC) | |
| Standard functions | Overload capacity | • G type: 60s for 150% of the rated current, 3s for 180% of the rated current<br>• P type: 60s for 120% of the rated current, 3s for 150% of the rated current | |
| | Torque boost | • Fixed boost<br>• Customized boost 0.1%–30.0% | |
| | V/F curve | • Straight-line V/F curve<br>• Multi-point V/F curve<br>• N-power V/F curve (1.2-power, 1.4-power, 1.6-power, 1.8-power, square) | |
| | V/F separation | Two types: complete separation; half separation | |
| | Ramp mode | • Straight-line ramp<br>• S-curve ramp<br>Four groups of acceleration/deceleration time with the range of 0.0–6500.0s | |
| | DC braking | DC braking frequency: 0.00 Hz to maximum frequency<br>Braking time: 0.0–36.0s<br>Braking action current value: 0.0%–100.0% | |
| | JOG control | JOG frequency range: 0.00–50.00 Hz<br>JOG acceleration/deceleration time: 0.0–6500.0s | |
| | Onboard multiple preset speeds | It implements up to 16 speeds via the simple PLC function or combination of X terminal states. | |
| | Onboard PID | It realizes process-controlled closed loop control system easily. | |
| | Auto voltage regulation (AVR) | It can keep constant output voltage automatically when the mains voltage changes. | |
| | Overvoltage/ Overcurrent stall control | The current and voltage are limited automatically during the running process so as to avoid frequent tripping due to overvoltage/overcurrent. | |
| | Torque limit and control | It can limit the torque automatically and prevent frequent over current tripping during the running process.<br>Torque control can be implemented in the FVC mode. | |
| Individualized functions | High performance | Control of asynchronous motor and synchronous motor are implemented through the high-performance current vector control technology. | |
| | Power dip ride through | The load feedback energy compensates the voltage reduction so that the AC drive can continue to run for a short time. | |
| | Rapid current limit | It helps to avoid frequent overcurrent faults of the AC drive. | |
| | Virtual I/Os | Five groups of virtual DI/Dos can realize simple logic control. | |
| | Timing control | Time range: 0.0–6500.0 minutes | |
| | Multi-motor switchover | Four motors can be switched over via four groups of motor parameters. | |
| | Multiple communication protocols | It supports communication via Modbus-RTU, PROFIBUS-DP, CANlink and CANopen. | |
| | Motor overheat protection | The optional I/O extension card enables AI3 to receive the motor temperature sensor input (PT100, PT1000) so as to realize motor overheat protection. | |
| | Multiple encoder types | It supports various encoders such as differential encoder, open-collector encoder, resolver, UVW encoder, and SIN/ COS encoder. | |





| Item | | Specifications |
|---|---|---|
| Individualized functions | User programmable function | The optional programming card helps you to realize secondary development. Its programming environment is compatible with that of the PLC of Inovance. |
| | Advanced background software | It supports the operation of AC drive parameters and virtual oscillograph function, via which the state inside the AC drive is monitored. |
| RUN | Running command source | • Operation panel<br>• Control terminals<br>• Serial communication port<br>You can perform switchover between these sources in various ways. |
| | Frequency source | There are a total of 10 frequency sources, such as digital setting, analog voltage setting, analog current setting, pulse setting and serial communication port setting.<br>You can perform switchover between these sources in various ways. |
| | Auxiliary frequency source | There are ten auxiliary frequency sources. It can implement fine tuning of auxiliary frequency and frequency synthesis. |
| | Input terminal | Standard:<br>6 digital input (X) terminals, two of which supports up to 100 kHz high-speed pulse input<br>2 analog input (AI) terminals, one of which only supports 0–10 V voltage input and the other supports 0–10 V voltage input or 4–20 mA current input<br>Expanding capacity:<br>4 X terminals<br>1 AI terminal that supports -10–10 V voltage input and also supports PT100\PT1000 |
| | Output terminal | Standard<br>1 high-speed pulse output terminal (open-collector) that supports 0–100 kHz square wave signal output<br>1 digital output (DO) terminal<br>1 relay output terminal<br>1 analog output (AM) terminal that supports 0–20 mA current output or 0–10 V voltage output<br>Expanding capacity: 1 DO terminal<br>1 relay output terminal<br>1 AO2 terminal that supports 0–20 mA current output or 0–10 V voltage output |
| Display and operation on the operation panel | LED display | It displays the parameters. |
| | Key locking and function selection | It can lock the keys partially or completely and define the function range of some keys so as to prevent mis-function. |
| | Protection mode | Motor short-circuit detection at power-on, input/output phase loss protection, overcurrent protection, overvoltage protection, undervoltage protection, overheat protection and overload protection |
| | Optional parts | LCD operation panel, braking unit, I/O extension card 1, I/O extension card 2, user programmable card, RS485 communication card, PROFIBUS-DP communication card, CANlink communication card, CANopen communication card, differential input PG card, UVW differential input PG card, resolver PG card and OC input PG card |
| Environment | Installation location | Indoor, free from direct sunlight, dust, corrosive gas, combustible gas, oil smoke, vapour, drip or salt. |
| | Altitude | Lower than 1000 m |
| | Ambient temperature | -10°C to +40°C (de-rated if the ambient temperature is between 40°C and 50°C) |
| | Humidity | Less than 95%RH, without condensing |
| | Vibration | Less than 5.9 m/s2 (0.6 g) |
| | Storage temperature | -20°C to +60°C |
| | IP level | IP20 |
| | Pollution degree | PD2 |
| | Power distribution system | TN , TT |

3.2 Frequency inverter selection table

| Voltage(V) | 220V (1F) | 220V (240V) | 380V (415V) | 460V (440V) | 575V | 660V |
|---|---|---|---|---|---|---|
| Power(KW) | Current(A) | Current(A) | Current(A) | Current(A) | Current(A) | Current(A) |
| 0.4 | 2.5 | 2.5 | | | | |
| 0.75 | 4 | 4 | 2.5 | 2.5 | | |
| 1.5 | 7 | 7 | 3.7 | 3.7 | | |
| 2.2 | 10 | 10 | 5 | 5 | | |
| 4 | 16 | 16 | 8.5 | 8 | | |
| 5.5 | 20 | 20 | 13 | 11 | | |
| 7.5 | 30 | 30 | 16 | 15 | | |
| 11 | 42 | 42 | 25 | 22 | 17 | 15 |
| 15 | 55 | 55 | 32 | 27 | 22 | 18 |
| 18.5 | 70 | 70 | 38 | 34 | 26 | 22 |
| 22 | 80 | 80 | 45 | 40 | 33 | 28 |
| 30 | 110 | 110 | 60 | 55 | 41 | 35 |
| 37 | | 130 | 75 | 65 | 52 | 45 |
| 45 | | 160 | 90 | 80 | 62 | 52 |
| 55 | | 200 | 110 | 100 | 76 | 63 |
| 75 | | 260 | 150 | 130 | 104 | 86 |
| 83 | | 320 | 170 | 147 | 117 | 98 |
| 110 | | 380 | 210 | 180 | 145 | 121 |
| 132 | | 420 | 250 | 216 | 173 | 150 |
| 160 | | 550 | 300 | 259 | 207 | 175 |
| 187 | | 600 | 340 | 300 | 230 | 198 |
| 200 | | 660 | 380 | 328 | 263 | 218 |
| 220 | | 720 | 415 | 358 | 287 | 240 |
| 250 | | | 470 | 400 | 325 | 270 |
| 280 | | | 520 | 449 | 360 | 330 |
| 315 | | | 600 | 516 | 415 | 345 |
| 375 | | | 680 | 600 | 450 | 390 |
| 400 | | | 750 | 650 | 520 | 430 |
| 450 | | | 820 | 720 | 650 | 465 |
| 500 | | | 900 | 800 | 700 | 550 |
| 560 | | | 1000 | 900 | 780 | 590 |
| 630 | | | 1100 | 1000 | 850 | 680 |

Note:
The common inverter, also called constant torque converter.Overload current 1.5 times of 1 minute,2 times the current instantaneous protection;Fan and water pump inverter also called load inverter,overload current 1.2 times 1 minutes, 1.5 times the current instantaneous protection;When we chooce the type of inverter,the general smaller level is of fan and water pump type.But considering the safety,we recommendations of fan and water pump also try to use common type,in order to avoid overload protection to affect production.





3.3 Guide for selection of brake components

**Introduction for selection brake assemblies**

Under the table to guide the data, the user can choose according to the actual situation of different resistance and power,resistance must not be less than table recommended values,but the power can be enlarged,the selection of braking resistor need according to the power of motor power of the practical application of the system to determine,and system inertia,deceleration time and potential energy load energy.

**Resistance selec0tion**

When braking,the regenerative energy of the motor is almost completely consumed on the braking resistance.
According to the formula:U*U/R=Pb

◆The U in the formula-brake voltage of the system stable brake
(different systems are not the same,for the general choice of 380V AC system 700V)
◆Pb---brake power

**Power selection of brake resistance**

In theory,the braking resistance is in agreement with the power and braking power,but the reduction is 70%.According to the formula:0.7*Pr=Pb*D

◆Pr-----power of the resistance
◆D-----brake frequency
(the regeneration process accounts for the proportion of the entire working process)

▶Elevator----20%~30% ▶Winding or unwinding machine----20%~30%
▶Centrifuge----50%~60% ▶Accidental braking load----5% ▶General take 10%

**Table for selection brake assemblies**

| Voltage(V) | Power | Resistance(Ω) | Capacity(w) | Remarks |
|---|---|---|---|---|
| 220 | 0.4KW | 200 | 80 | When ordering, the built-in braking unit can be customized. |
| | 0.75KW | 200 | 80 | |
| | 1.5KW | 100 | 150 | |
| | 2.2KW | 60 | 250 | |
| | 3.7KW | 40 | 300 | |
| | 5.5KW | 30 | 500 | |
| 380 | 0.75KW | 360 | 200 | |
| | 1.5KW | 180 | 400 | |
| | 2.2KW | 180 | 400 | |
| | 3.7KW | 100 | 500 | |
| | 5.5KW | 100 | 500 | |
| | 7.5KW | 50 | 1000 | |
| | 11KW | 50 | 1000 | |
| | 15KW | 40 | 1500 | |
| | 18.5KW | 40 | 1500 | |
| | 22KW | 30 | 3000 | |
| | 30KW | 20 | 5000 | |
| | 37KW | 20 | 5000 | |
| | 45KW | 15 | 9600 | |
| | 55KW | 15 | 10000 | |

| Voltage(V) | Power | Resistance(Ω) | Capacity(w) | Remarks |
|---|---|---|---|---|
| 380 | 75KW | 10 | 12000 | When ordering, the built-in braking unit can be customized. |
| | 93KW | 8 | 20000 | |
| | 110KW | 8 | 20000 | |
| | 132KW | 6 | 25000 | |
| | 160KW | 6 | 25000 | |
| The discharge period is defined as 10% | | | | |

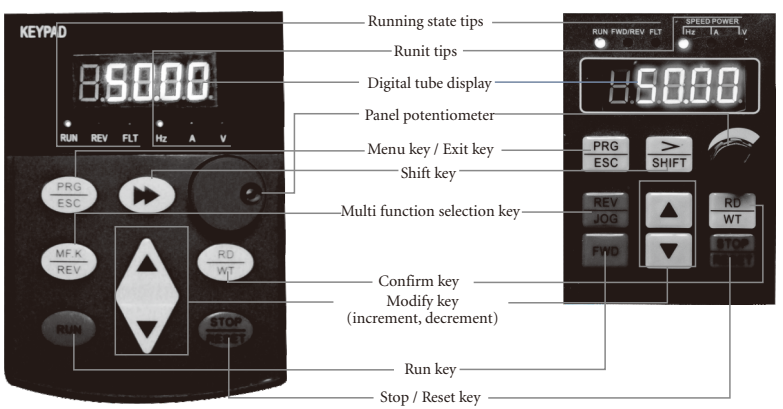
Remarks:

- Brake assembly be used in the consumption of certain potential large inertia load to the inverter feedback energy,avoid the cause of converter tripping over high voltage.Suitable for Large inertia load and frequent braking or fast parking.
- The discharge resistance is not directly connected to the N/P terminal,if the the terminal is P/N, must be add additional to the brake discharge module.If you need to use P/N terminal on 93KW above,please declare in order.4

# Chapter 4:Operation panel instructions

## 4.1 Operation panel diagram and key description

You can use the operation panel to modify the function parameters of the frequency inverter, also monitoring frequency inverter working state and operation control frequency inverter (start, stop) and so on, the external of panel and function area as shown below:








## 4.11 Instructions of function indicator

RUN:When lamp is off means the frequency inverter is shutdown, when lamp is on means the frequency inverter is running.

LOCAL/REMOT:Keyboard operation, terminal operation and remote operation (communication control) indicator, the lamp is off means the keyboard operation control state, the lamp is on means indicates terminal operation and control state, the lamp is flashes that is in the remote operation control state.

FWD/REV:forward and reverse inversion indicator, the indicator is on means in a forward state.

TUNE/TC:Tuned / torque control / fault indicator light, when the lamp on means into a torque control mode, when the lamp flashes slow means into a tuned state,when the lamp flashes fast means into a state of fault.

## 4.12 Unit indicate lamp

Hz:Frequency unit A:current unit V:voltage unit

RMP(Hz+A):Unit for speed of revolution %(A+V):percentage

## 4.13 Digital display area

5 bit LED display, can display the set frequency, output frequency, a variety of monitoring data and alarm code, etc.

## 4.2 The explanation of function keys

| Keystoke sign | Name | Function discription |
|---|---|---|
| PRG / ESC | Programming key | First level menu to enter or exit. |
| RO / WT | Readout/writein key | For reading the parameter value or confirm the datas write-in effectly. |
| ▶▶ | Right shift key | In the shutdown display interface and operation interface, can achieve right shift cycle to display parameters and can change the parameters in the selected position. |
| ▲ | Increasing key | Increasing of datas or parameter code. |
| ▼ | Decreasing key | Decreasing of datas or parameter code. |
| RUN/FWD | Running key | For controlling forward running of frequency inverter. |
| STOP/RES | Stop/reset key | In the running state,press this key can be used to stop running.When alarm status,all control modes are available to reset the key operation. The function code P7-02 control. |
| MF.K / REV | Fast multi function key | This function is determined by the function code "P7-01". |

### 4.3 The explanation of function keys

4.31 In the stop or running state, through the shift key can be displayed by a variety of state parameters. By the function code P7-03 (running parameter 1), P7-04 (running parameter 2), P7-05 (stop parameter) according to the binary bit select this parameter is displayed or not displayed.

4.32 In the stop state, a total of sixteen down state parameters can choose whether to display, respectively: set the frequency, generatrix voltage, X input, DO input, analog input AI1 voltage, analog input AI2 voltage, analog input AI3 voltage, the actual value, the actual length, PLC operation steps number, load speed display, PID set, PULSE input pulse frequency and 3 anti retention parameters, key sequence switch displays the selected parameters.

4.33 At running state, the five operating state parameters: running frequency, frequency setting, bus voltage, output voltage, output current is the default display, display the other parameters: output power, output torque, X input state, DO output state, analog input AI1 voltage, analog input AI2 voltage , analog input AI3 voltage . The actual value, the actual length, line speed, displayed or not displayed of PID set and feedback up to function code P7-03, P7-04 bitwise (convert binary) choice, key sequence switch displays the selected parameters.

### 4.4 Automatic tuning of motor parameters

Choose vector control operation mode, before the frequency inverter operation, must accurately input parameters of motor nameplate, 9600 inverter according to nameplate parameters matching standard motor parameter; Vector control dependence rely on motor parameters is very strong, to obtain good control performance, must obtain accurate parameters of controlled motor.

Automatic tuning steps for the motor parameters are as follows:
First of all make The command source (P0-02) is selected as the command channel for the operation panel, then according actual parameters of the motor enter the following parameters (according to the current motor selection).

| Motor selection | Parameter |
|---|---|
| Motor 1 | P1-00:Motor type selection P1-01:Motor rated power P1-02:Motor rated voltage<br>P1-03:Motor rated current P1-04:Motor rated frequency P1-05:Motor rated speed |
| Motor 2 | A2-00:Motor type selection A2-01:Motor rated power A2-02:Motor rated voltage<br>A2-03:Motor rated current A2-04:Motor rated frequency A2-05:Motor rated speed |
| Motor 3 | A3-00:Motor type selection A3-01:Motor rated power A3-02:Motor rated voltage<br>A3-03:Motor rated current A3-04:Motor rated frequency A3-05:Motor rated speed |
| Motor 4 | A4-00:Motor type selection A4-01:Motor rated power A4-02:Motor rated voltage<br>A4-03:Motor rated current A4-04:Motor rated frequency A4-05:Motor rated speed |

If the motor and the load can be completely disengaged, the P1-37 (motor 2/3/4 for A2/A3/A4-37) select 2 (Asynchronous motor complete auto-tuning) ,then press run key on the keyboard panel, frequency inverter will automatically calculate the the following parameters of motor:

| Motor selection | Parameter |
|---|---|
| Motor 1 | P1-16:Synchronous motor stator resistance P1-17:Synchronous motor D axis inductance<br>P1-18:Synchronous motor Q axis inductance |
| Motor 2 | A2-16:Synchronous motor stator resistance A2-17:Synchronous motor D axis inductance<br>A2-18:Synchronous motor Q axis inductance |
| Motor 3 | A3-16:Synchronous motor stator resistance A3-17:Synchronous motor D axis inductance<br>A3-18:Synchronous motor Q axis inductance |
| Motor 4 | A4-16:Synchronous motor stator resistance A4-17:Synchronous motor D axis inductance<br>A4-18:Synchronous motor Q axis inductance |

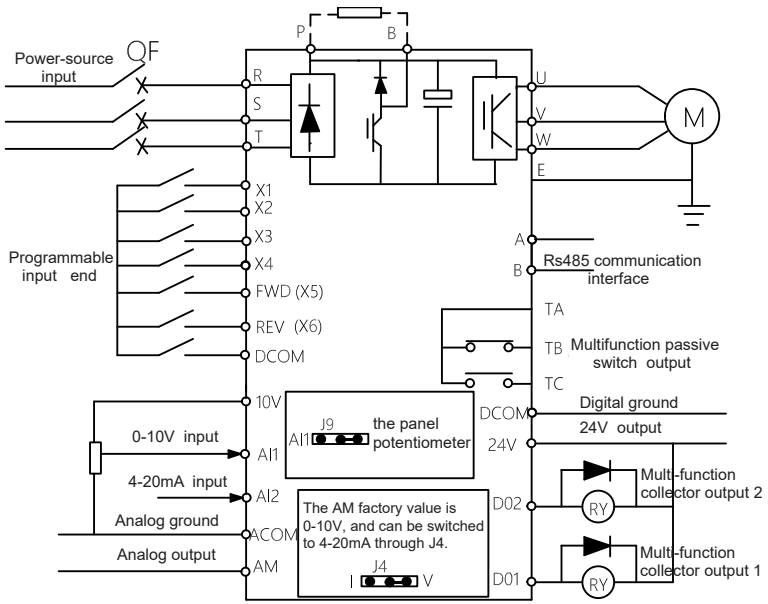
Finish Automatic tuning of motor parameters.
If the motor and the load can not be completely torn off, then P1-37 (motor 2/3/4 for A2/A3/A4-37) select 1 (Asynchronous motor static auto-tuning) then press the RUN key on the keyboard panel.



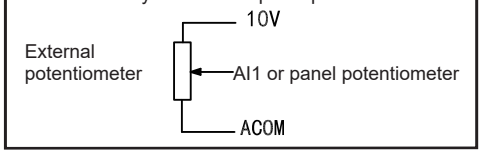


## Chapter 5:Connection Diagram

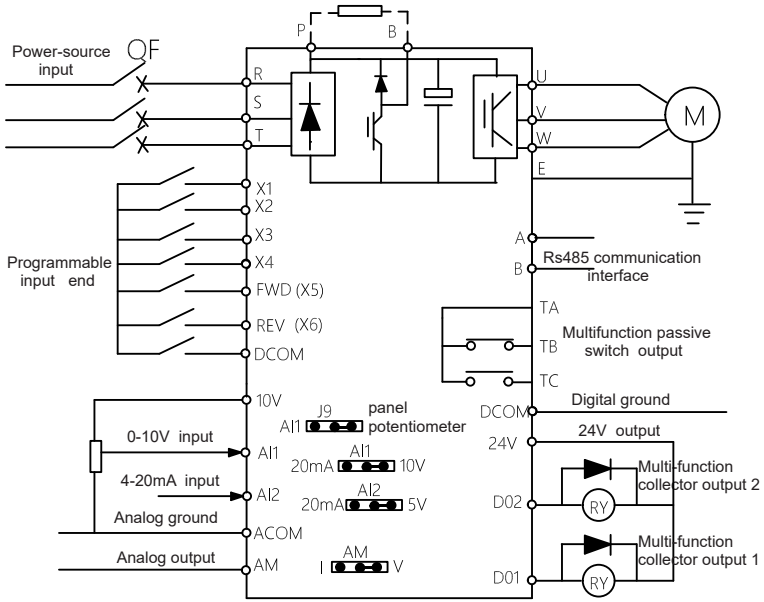
### 5.1 The wiring diagram of 9600 series 0.75KW-4.0KW



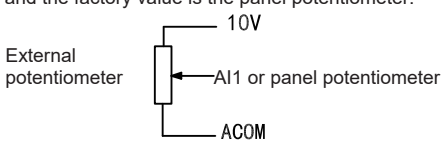

When P0-03=2, the AI1 external potentiometer or the panel potentiometer is selected by J9 to speed, and the factory value is the panel potentiometer.



5.2 The wiring diagram of 9600 series 4.0KW-630KW frequency inverter




When P0-03=2, the AI1 external potentiometer or the panel potentiometer is selected by J9 to speed, and the factory value is the panel potentiometer.



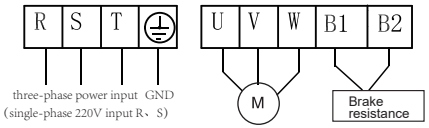




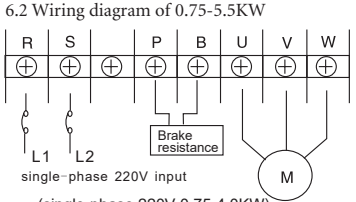

# Chapter 6:Description of main loop terminal

6.1 Wiring diagram of model M

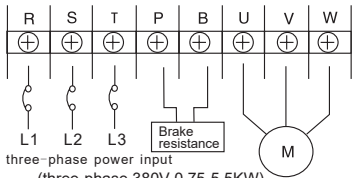
(single-phase 220V 0.75-2.2KW)
(three-phase 380V 0.75-4.0KW)




6.2 Wiring diagram of 0.75-5.5KW

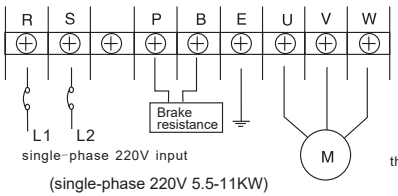



(single-phase 220V 0.75-4.0KW)

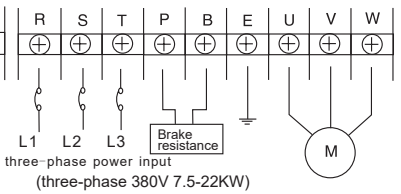



(three-phase 380V 0.75-5.5KW)
(three-phase 220V 0.75-4.0KW)

6.3 Wiring diagram of 7.5-22KW

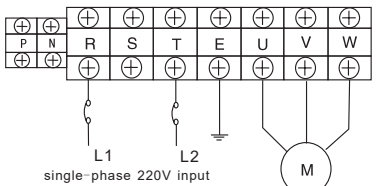



(single-phase 220V 5.5-11KW)

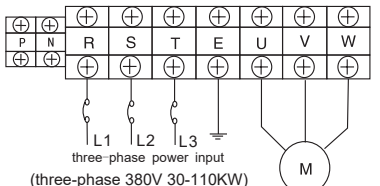



(three-phase 380V 7.5-22KW)
(three-phase 220V 5.5-11KW)

6.4 Wiring diagram of 30-110KW

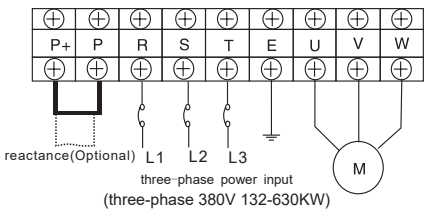



(single-phase 220V 15-75KW)




(three-phase 380V 30-110KW)
(three-phase 220V 15-75KW)

6.5 Wiring diagram of 132-630KW



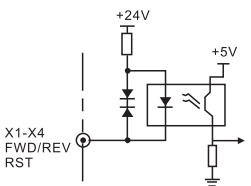
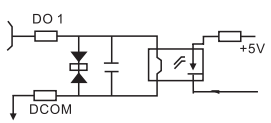
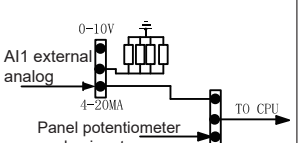

(three-phase 380V 132-630KW)

Note: other non-standard customized products, please in kind prevail mark

## 6.6 Identification of the main loop terminal

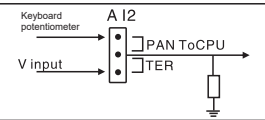
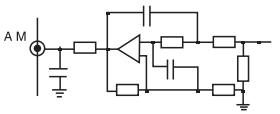
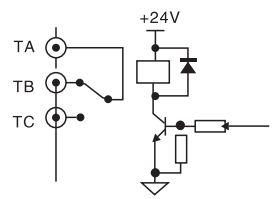
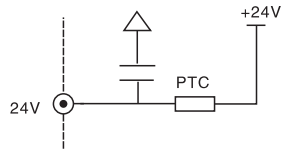
| Terminal symbol | Function description |
|---|---|
| R、S、T | AC power input terminal, connected to three-phase 380V AC power supply |
| R、S、(T) | AC power input terminal, connected to single-phase 220V AC power supply |
| U、V、W | Frequency inverter output terminal, connected to three phase AC motor |
| P、P+ | DC reactor connecting terminal, respectively, P and P+ |
| P+、N | Brake unit connecting terminal, Positive and negative electrodes are connected to P+, N |
| P、B | External brake unit connecting terminal,respectively, P and B |

## 6.7 Function description of control loop terminal

| Type | Terminal label | Function description | Electrical specifications | Internal circuit |
|---|---|---|---|---|
| Operation control terminal | X5/FWD | Forward when connect X5 to DOCM, deceleration then stop when disconnect the two | INPUT 0-24V level signal,Low level effective,5mA. (Note: X5 and X6 for high speed pulse input terminals) |   |
| | X6/REV | Reversal when connect X6 to DOCM, deceleration then stop when disconnect the two | | |
| Multi function digital input terminal | X1<br>X2<br>X3<br>X4<br>X5<br>X6 | Be effective when connect (X1~X6) to DCOM,the function setting control by parameter P4.00-P4.05. | INPUT 0-24V level signal,Low level effective,5mA. | |
| Digital input terminal | D01 | Multi-function programmable analog voltage output.DO1 control by P5.04=0-41 Do2 control by P5.01=0-41 | OUTPUT,Maximum load current≤50mA |   |
| | D02 | | | |
| Analog signal input and output terminal | AI 1 | Analog signal input1, ground wire reference ACOM (default = 0V-10V) | Input optional 0-5V or 0-10V DC voltage signal, selected by the jumper AI1. |   |

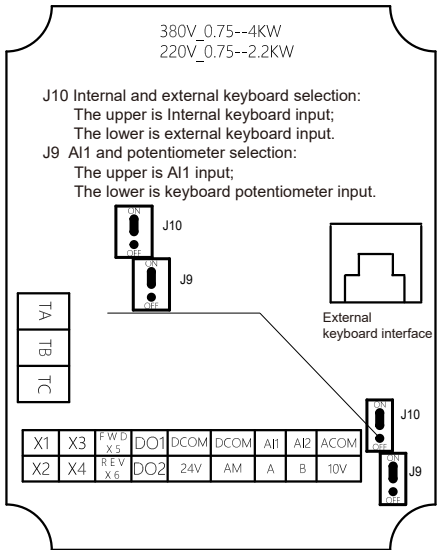




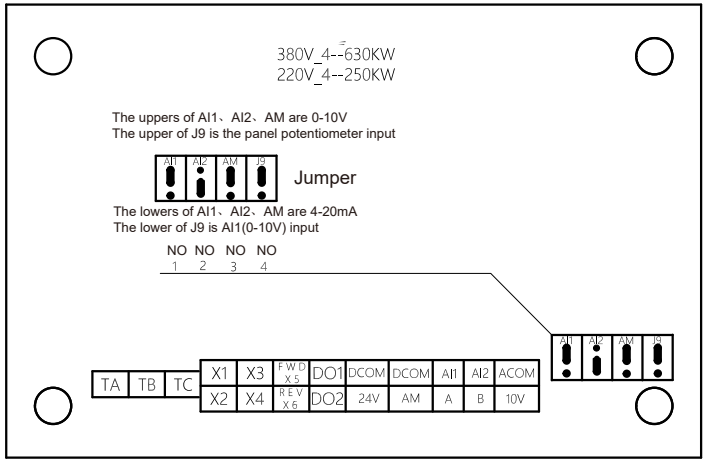
| Type | Terminal label | Function description | Electrical specifications | Internal circuit |
|---|---|---|---|---|
| Analog signal input and output terminal | A I2 | Analog signal input2, ground wire reference ACOM (default = 4-20mA) | Input optional 0-5V or 4-20mA signal, selected by the jumper AI2. |   |
| | A M | Multi function programmable analog signal output, ground wire reference ACOM can choose 0-10V or 4-20mA. | Output optional 0-10V or 4-20mA signal, selected by the jumper AM. |   |
| Relay input terminal | TA<br>TB<br>TC | TA and TB normal open output,TA and TC normal close output,control by P5.02=1-41. | Contact rating: 250VAC-3A 30VDC-1A. |   |
| Power interface | 24V | 24V is a common power supply of digital input terminal circuit. | 24VDC-100mA |   |
| | DCOM | DCOM is the ground terminal of digital signal input and output terminals. | | |
| | 10V | 10V power output,can be used as an external potentiometer for a given power. | Factory default settings:10VDC | |
| | ACOM | ACOM is the ground terminal of programmable system power supply. | | |

## 6.8、Schematic diagram of control loop terminal

### 6.8.1、9600 series 0.75-4KW




### 6.8.2、9600 series 4.0-630KW








# Chapter 7:Function Code Table

If PP-00 is set to a non-zero number, parameter protection is enabled. You must enter the correct user password to enter the menu.

To cancel the password protection function, enter with password and set PP-00 to 0.

Group P and Group A are standard function parameters. Group U includes the monitoring function parameters. The symbols in the function code table are described as follows:

"☆": The parameter can be modified when the AC drive is in either stop or running state.

"★": The parameter cannot be modified when the AC drive is in the running state. "

"●": The parameter is the actually measured value and cannot be modified.

"*" : The parameter is factory parameter and can be set only by the manufacturer.

## 7.1 Standard Function Parameters

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| Group P0: Standard Function parameters | | | | |
| P0-00 | G/P type display | 1: G type (constant torque load)<br>2: P type (variable torque load e.g. fan and pump) | Model dependent | • |
| P0-01 | Motor 1 control mode | 0：Speed Sensorless Vector Control(SVC)<br>1: Speed sensor vector control （FVC）<br>2: Voltage/Frequency (V/F) control | 0 | ★ |
| P0-02 | Command source selection | 0: Operation panel control (LED off)<br>1: Terminal control (LED on)<br>2: Communication control (LED blinking) | 0 | ☆ |
| P0-03 | Main frequency source X selection | 0: Digital setting (non-retentive at power failure)<br>1: Digital setting (retentive at power failure)<br>2: AI1<br>(The factory default is the panel potentiometer, which can be switched by jumper J9)<br>3: AI2<br>4: AI3<br>5: Pulse setting (X5/X6)<br>6: Multi-reference<br>7: Simple PLC<br>8: PID<br>9: Communication setting | 0 | ★ |
| P0-04 | Auxiliary frequency source Y selection | The same as P0-03 (Main frequency source X selection) | 0 | ★ |
| P0-05 | Range of auxiliary frequency Y for X and Y Operation | 0: Relative to maximum frequency<br>1: Relative to main frequency X | 0 | ☆ |
| P0-06 | Range of auxiliary frequency Y for X and Y Operation | 0%–150% | 100% | ☆ |
| P0-07 | Frequency source selection | Unit's digit (Frequency source selection)<br>0: Main frequency source X<br>1: X and Y Operation<br>(Operation relationship determined by ten's digit)<br>2: Switchover between X and Y<br>3: Switchover between X and "X and Y Operation"<br>4: Switchover between Y and "X and Y Operation"<br>Ten's digit (X and Y Operation relationship)<br>0: X+Y<br>1: X-Y<br>2: the maximum of both<br>3: The minimum of both | 0 | ☆ |
| P0-08 | Preset frequency | 0.00 to maximum frequency (valid when frequency source is digital setting) | 50.00 Hz | ☆ |

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P0-09 | Rotation direction | 0: Same direction<br>1: Reverse direction | 0 | ☆ |
| P0-10 | Maximum frequency | 50.00–650.00 Hz | 50.00 Hz | ★ |
| P0-11 | Source of frequency upper limit | 0: Set by P0-12<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting (X5/X6)<br>5: Communication setting | 0 | ★ |
| P0-12 | Frequency upper limit | Frequency lower limit (P0-14) to maximum frequency (P0-10) | 50.00 Hz | ☆ |
| P0-13 | Frequency upper limit offset | 0.00 Hz to maximum frequency (P0-10) | 0.00 Hz | ☆ |
| P0-14 | Frequency lower limit | 0.00 Hz to frequency upper limit (P0-12) | 0.00 Hz | ☆ |
| P0-15 | Carrier frequency | 0.5–16.0 kHz | Model dependent | ☆ |
| P0-16 | Carrier frequency adjustment with temperature | 0: No<br>1: Yes | 1 | ☆ |
| P0-17 | Acceleration time 1 | 0.00–650.00s (P0-19 = 2)<br>0.0–6500.0s (P0-19 = 1)<br>0–65000s (P0-19 = 0) | Model dependent | ☆ |
| P0-18 | Deceleration time 1 | 0.00–650.00s (P0-19 = 2)<br>0.0–6500.0s (P0-19 = 1)<br>0–65000s (P0-19 = 0) | Model dependent | ☆ |
| P0-19 | Acceleration/Deceleration time unit | 0:1s<br>1: 0.1s<br>2: 0.01s | 1 | ★ |
| P0-21 | Frequency offset of auxiliary frequency source for X and Y Operation | 0.00 Hz to maximum frequency (P0-10) | 0.00 Hz | ☆ |
| P0-22 | Frequency reference resolution | 1: 0.1 Hz<br>2: 0.01 Hz | 2 | ★ |
| P0-23 | Retentive of digital setting frequency upon power failure | 0: Not retentive<br>1: Retentive | 2 | ☆ |
| P0-24 | Motor parameter group selection | 0: Motor parameter group 1<br>1: Motor parameter group 2<br>2: Motor parameter group 3<br>3: Motor parameter group 4 | 0 | ★ |
| P0-25 | Acceleration and deceleration time reference frequency | 0: Maximum frequency (P0-10)<br>1: Set frequency<br>2: 100 Hz | 0 | ★ |
| P0-26 | Run frequency command UP / DOWN reference | 0: Running frequency<br>1: Set frequency | 0 | ★ |
| P0-27 | Binding command source to frequency source | Unit's digit (Binding Operation panel command to frequency source)<br>0: No binding<br>1: Frequency source by digital setting<br>2: AI1<br>3: AI2<br>4: AI3<br>5: Pulse setting (X5/X6)<br>6: Multi-reference<br>7: Simple PLC<br>8: PID<br>9: Communication setting<br>Tens digit: terminal command binding frequency source selection<br>Hundreds place: communication command binding frequency source selection<br>Thousands digit: Binding frequency source selection of automatic operation<br>0–9, same as unit's digit | 0000 | ☆ |





| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P0-28 | Serial communication protocol | 0: Modbus protocol<br>1: Profibus-DP bridge<br>2: CANopen bridge | 0 | ☆ |
| | | Group P1: Motor 1 parameters | | |
| P1-00 | Motor type selection | 0: Common asynchronous motor<br>1: Variable frequency asynchronous motor<br>2: Permanent magnetic synchronous motor | 1 | ★ |
| P1-01 | Rated motor power | 0.1–1000.0 kW | Model dependent | ★ |
| P1-02 | Rated motor voltage | 1–2000 V | Model dependent | ★ |
| P1-03 | Rated motor current | 0.01–655.35 A (AC drive power ≤55 kW)<br>0.1–6553.5 A (AC drive power >55 kW) | Model dependent | ★ |
| P1-04 | Rated motor frequency | 0.01 Hz to maximum frequency | Model dependent | ★ |
| P1-05 | Rated motor rotational speed | 1–65535 RPM | Model dependent | ★ |
| P1-06 | Stator resistance (asynchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent | ★ |
| P1-07 | Rotor resistance (asynchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent | ★ |
| P1-08 | Leakage inductive reactance (asynchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent | ★ |
| P1-09 | Mutual inductive reactance (asynchronous motor) | 0.1–6553.5 mH (AC drive power ≤ 55 kW)<br>0.01—655.35 mH (AC drive power > 55 kW) | Model dependent | ★ |
| P1-10 | No-load current (asynchronous motor) | 0.01 to P1-03 (AC drive power ≤55 kW)<br>0.1 to P1-03 (AC drive power >55kW) | Model dependent | ★ |
| P1-16 | Stator resistance (synchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent | ★ |
| P1-17 | Shaft D inductance (synchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent | ★ |
| P1-18 | Shaft Q inductance (synchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent | ★ |
| P1-20 | Back EMF (synchronous motor) | 0.1–6553.5 V | Model dependent | ★ |
| P1-27 | Encoder pulses per revolution | 1–65535 | 1024 | ★ |
| P1-28 | Encoder type | 0: ABZ incremental encoder<br>1: UVW incremental encoder<br>2: Resolver<br>3: SIN/COS encoder<br>4: Wire-saving UVW encoder | 0 | ★ |
| P1-30 | A/B phase sequence of ABZ incremental encoder | 0: Forward<br>1: Reserve | 0 | ★ |
| P1-31 | Encoder installation angle | 0.0°–359.9° | 0.0° | ★ |
| P1-32 | U, V, W phase sequence of UVW encoder | 0: Forward<br>1: Reserve | 0 | ★ |
| P1-33 | UVW encoder angle offset | 0.0°–359.9° | 0.0° | ★ |
| P1-34 | Number of pole pairs of resolver | 1–65535 | 1 | ★ |
| P1-36 | Encoder wire-break fault detection time | 0.0s: No action<br>0.1–10.0s | 0.0s | ★ |
| P1-37 | Auto-tuning selection | 0: No auto-tuning<br>1: Asynchronous motor static auto-tuning<br>2: Asynchronous motor complete auto-tuning<br>11: Synchronous motor with-load auto-tuning<br>12: Synchronous motor no-load auto-tuning | 0 | ★ |
| | | Group P2: Vector Control parameters | | |
| P2-00 | Speed loop proportional gain 1 | 0–100 | 30 | ☆ |
| P2-01 | Speed loop integral time 1 | 0.01–10.00s | 0.50s | ☆ |

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P2-02 | Switchover frequency 1 | 0.00 to P2-05 | 5.00 Hz | ☆ |
| P2-03 | Speed loop proportional gain 2 | 0–100 | 20 | ☆ |
| P2-04 | Speed loop integral time 2 | 0.01–10.00s | 1.00s | ☆ |
| P2-05 | Switchover frequency 2 | P2-02 to maximum output frequency | 10.00 Hz | ☆ |
| P2-06 | Vector control slip gain | 50%–200% | 100% | ☆ |
| P2-07 | Time constant of speed loop filter | 0.000–0.100s | 0.000s | ☆ |
| P2-08 | Vector control over- excitation gain | 0–200 | 64 | ☆ |
| P2-09 | Torque upper limit source in speed control mode | 0: P2-10<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting (X5/X6)<br>5: Communication setting<br>6: MIN（AI1,AI2）<br>7: MAX（AI1,AI2）<br>The full range of 1-7 selection corresponds to P7-25 | 0 | ☆ |
| P2-10 | Digital setting of torque upper limit in speed control mode | 0.0%–200.0% | 150.0% | ☆ |
| P2-13 | Excitation adjustment proportional gain | 0–60000 | 2000 | ☆ |
| P2-14 | Excitation adjustment integral gain | 0–60000 | 1300 | ☆ |
| P2-15 | Torque adjustment proportional gain | 0–60000 | 2000 | ☆ |
| P2-16 | Torque adjustment integral gain | 0–60000 | 1300 | ☆ |
| P2-17 | Speed loop integral property | Unit's digit: integral separation<br>0: Disabled<br>1: Enabled | 0 | ☆ |
| P2-18 | Field weakening mode of synchronous motor | 0: No field weakening<br>1: Direct calculation<br>2: Automatic adjustment | 1 | ☆ |
| P2-19 | Field weakening depth of synchronous motor | 50%–500% | 100% | ☆ |
| P2-20 | Maximum field weakening current | 1%–300% | 50% | ☆ |
| P2-21 | Field weakening automatic adjustment gain | 10%–500% | 100% | ☆ |
| P2-22 | Field weakening integral multiple | 2–10 | 2 | ☆ |
| Group P3: V/F Control parameters | | | | |
| P3-00 | V/F curve setting | 0: Linear V/F<br>1: Multi-point V/F<br>2: Square V/F<br>3: 1.2-power V/F<br>4: 1.4-power V/F<br>6: 1.6-power V/F<br>8: 1.8-power V/F<br>9: Reserved<br>10: V/F complete separation<br>11: V/F half separation | 0 | ★ |
| P3-01 | Torque boost | 0.0% (fixed torque boost)<br>0.1%–30.0% | Model dependent | ☆ |
| P3-02 | Cut-off frequency of torque boost | 0.00 Hz to maximum output frequency | 50.00 Hz | ★ |
| P3-03 | Multi-point V/F frequency 1 (F1) | 0.00 Hz to P3-05 | 0.00 Hz | ★ |
| P3-04 | Multi-point V/F voltage 1 (V1) | 0.0%–100.0% | 0.0% | ★ |
| P3-05 | Multi-point V/F frequency 2 (F2) | P3-03 to P3-07 | 0.00 Hz | ★ |
| P3-06 | Multi-point V/F voltage 2 (V2) | 0.0%–100.0% | 0.0% | ★ |





| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P3-07 | Multi-point V/F frequency 3 (F3) | P3-05 to rated motor frequency (P1-04)<br>Note: The rated frequencies of motors 2, 3, and 4 are resfectively set in A2-04, A3-04, and A4-04. | 0.00 Hz | ★ |
| P3-08 | Multi-point V/F voltage 3 (V3) | 0.0%–100.0% | 0.0% | ★ |
| P3-09 | V/F slip compensation gain | 0%–200.0% | 0.0% | ☆ |
| P3-10 | V/F over-excitation gain | 0–200 | 64 | ☆ |
| P3-11 | V/F oscillation suppression gain | 0–100 | Model dependent | ☆ |
| P3-13 | Voltage source for V/F separation | 0: Digital setting (P3-14)<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting (X5/X6)<br>5: Multi-reference<br>6: Simple PLC<br>7: PID<br>8: Communication setting 100.0% corresponds to the rated motor voltage (P1-02, A4-02, A5-02, A6-02). | 0 | ☆ |
| P3-14 | Voltage digital setting for V/F separation | 0 V to rated motor voltage | 0 V | ☆ |
| P3-15 | Voltage rise time of V/F separation | 0.0–1000.0s<br>It indicates the time for the voltage rising from 0 V to rated motor voltage. | 0.0s | ☆ |
| Group P4: Input Terminals | | | | |
| P4-00 | X1 function selection | 0: No function<br>1: Forward RUN (FWD)<br>2: Reverse RUN (REV)<br>3: Three-line control<br>4: Forward JOG (FJOG)<br>5: Reverse JOG (RJOG)<br>6: Terminal UP<br>7: Terminal DOWN 8: Coast to stop<br>9: fault reset (RESET)<br>10: RUN fause<br>11: Normally open (NO) input of external fault<br>12: Multi-reference terminal 1<br>13: Multi-reference terminal 2<br>14: Multi-reference terminal 3<br>15: Multi-reference terminal 4<br>16: Terminal 1 for acceleration/ deceleration time selection<br>17: Terminal 2 for acceleration/ deceleration time selection<br>18: Frequency source switchover<br>19: UP and DOWN setting clear (terminal, Operation panel)<br>20: Command source switchover terminal 1<br>21: Acceleration/Deceleration prohibited<br>22: PID fause<br>23: PLC status reset<br>24: Swing fause<br>25: Counter input<br>26: Counter reset<br>27: Length count input<br>28: Length reset<br>29: Torque control prohibited<br>30: Pulse input (enabled only for X5/X6)<br>31: Reserved<br>32: Immediate DC braking | 1 | ★ |
| P4-01 | X2 function selection | | 4 | ★ |
| P4-02 | X3 function selection | | 9 | ★ |
| P4-03 | X4 function selection | | 12 | ★ |
| P4-04 | X5 function selection | | 13 | ★ |
| P4-05 | X6 function selection | | 0 | ★ |

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P4-06 | X7 function selection | 33: Normally closed (NC) input of external fault<br>34: Frequency modificationforbidden<br>35: Reverse PID action direction<br>36: External STOP terminal 1<br>37: Command source switchoverterminal 2<br>38: PID integral fause<br>39: Switchover between main frequency source X and preset frequency<br>40: Switchover between auxiliary frequency source Y and preset frequency<br>41: Motor selection terminal 1<br>42: Motor selection terminal 2<br>43: PID parameter switchover<br>44: User-defined fault 1<br>45: User-defined fault 2<br>46: Speed control/Torque control switchover<br>47: Emergency stop<br>48: External STOP terminal 2<br>49: Deceleration DC braking<br>50: Clear the current running time<br>51: Switchover between two-line mode and three-line mode<br>52–59: Reserved | 0 | ★ |
| P4-07 | X8 function selection | | 0 | ★ |
| P4-08 | X9 function selection | | 0 | ★ |
| P4-09 | X10 function selection | | 0 | ★ |
| P4-10 | X terminal filter time | 0.000–1.000s | 0.010s | ☆ |
| P4-11 | Terminal command mode | 0: Two-line mode 1<br>1: Two-line mode 2<br>2: Three-line mode 1<br>3: Three-line mode 2 | 0 | ★ |
| P4-12 | Terminal UP/DOWN rate | 0.01–65.535 Hz/s | 1.00 Hz/s | ☆ |
| P4-13 | AI curve 1 minimum input | 0.00 V to P4-15 | 0.00 V | ☆ |
| P4-14 | Corresponding setting of AI curve 1 minimum input | -100.00%–100.0% | 0.0% | ☆ |
| P4-15 | AI curve 1 maximum input | P4-13 to 10.00 V | 10.00 V | ☆ |
| P4-16 | Corresponding setting of AI curve 1 maximum input | -100.00%–100.0% | 100.0% | ☆ |
| P4-17 | AI1 filter time | 0.00–10.00s | 0.10s | ☆ |
| P4-18 | AI curve 2 minimum input | 0.00 V to P4-20 | 0.00 V | ☆ |
| P4-19 | Corresponding setting of AI curve 2 minimum input | -100.00%–100.0% | 0.0% | ☆ |
| P4-20 | AI curve 2 maximum input | P4-18 to 10.00 V | 10.00 V | ☆ |
| P4-21 | Corresponding setting of AI curve 2 maximum input | -100.00%–100.0% | 100.0% | ☆ |
| P4-22 | AI2 filter time | 0.00–10.00s | 0.10s | ☆ |
| P4-23 | AI curve 3 minimum input | -10.00 V to P4-25 | -10.00 V | ☆ |
| P4-24 | Corresponding setting of AI curve 3 minimum input | 0.00%–100.0% | 0.0% | ☆ |
| P4-25 | AI curve 3 maximum input | P4-23 to 10.00 V | 8.00 V | ☆ |
| P4-26 | Corresponding setting of AI curve 3 maximum input | -100.00%–100.0% | 100.0% | ☆ |
| P4-27 | AI3 filter time | 0.00–10.00s | 0.10s | ☆ |
| P4-28 | Pulse minimum input | 0.00 kHz to P4-30 | 0.00 kHz | ☆ |
| P4-29 | Corresponding setting of pulse minimum input | -100.00%–100.0% | 0.0% | ☆ |
| P4-30 | Pulse maximum input | P4-28 to 50.00 kHz | 50.00 kHz | ☆ |
| P4-31 | Corresponding setting of pulse maximum input | -100.00%–100.0% | 100.0% | ☆ |
| P4-32 | Pulse filter time | 0.00–10.00s | 0.10s | ☆ |





| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P4-33 | AI curve selection | Unit's digit (AI1 curve selection)<br>Curve 1 (2 points, see P4-13 to P4-16)<br>Curve 2 (2 points, see P4-18 to P4-21)<br>Curve 3 (2 points, see P4-23 to P4-26)<br>Curve 4 (4 points, see A6-00 to A6-07)<br>Curve 5 (4 points, see A6-08 to A6-15)<br>Ten's digit (AI2 curve selection)<br>Curve 1 to curve 5 (same as AI1)<br>Hundred's digit (AI3 curve selection)<br>Curve 1 to curve 5 (same as AI1) | 321 | ☆ |
| P4-34 | Setting for AI less than minimum input | Unit's digit (Setting for AI1 less than minimum input)<br>0: Minimum value<br>1: 0.0%<br>Ten's digit (Setting for AI2 less than minimum input)<br>0, 1 (same as AI1)<br>Hundred's digit (Setting for AI3 less than minimum input)<br>0, 1 (same as AI1) | 000 | ☆ |
| P4-35 | X1 delay time | 0.0–3600.0s | 0.0s | ★ |
| P4-36 | X2 delay time | 0.0–3600.0s | 0.0s | ★ |
| P4-37 | X3 delay time | 0.0–3600.0s | 0.0s | ★ |
| P4-38 | X valid mode selection 1 | Unit's digit (X1 valid mode)<br>0: High level valid 1: Low level valid<br>Ten's digit (X2 valid mode)<br>0, 1 (same as X1)<br>Hundred's digit (X3 valid mode)<br>0, 1 (same as X1)<br>Thousand's digit (X4 valid mode)<br>0, 1 (same as X1)<br>Ten thousand's digit (X5 valid mode)<br>0, 1 (same as X1) | 00000<br>00000 | ★<br>★ |
| P4-39 | X valid mode selection 2 | Unit's digit (X1 valid mode)<br>0, 1 (same as X1)<br>Ten's digit (X2 valid mode)<br>0, 1 (same as X1)<br>Hundred's digit (X3 state)<br>0, 1 (same as X1)<br>Thousand's digit (X4 valid mode)<br>0, 1 (same as X1)<br>Ten thousand's digit (X5 valid mode)<br>0, 1 (same as X1) | 00000 | ★ |
| P4-40 | AI2 input signal selection | 0: Voltage signal<br>1: Current signal | 0 | ★ |
| | | Group P5: Output Terminals | | |
| P5-00 | DO2 terminal output mode | 0: Pulse output (FMP)<br>1: Switch signal output (FMR) | 0 | ☆ |

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P5-01 | DO2 function (open- collector output terminal) | 0: No output<br>1: AC drive running<br>2: Fault output (stop)<br>3: Frequency-level detection PDT1 output<br>4: Frequency reached<br>5: Zero-speed running (no output at stop)<br>6: Motor overload pre-warning<br>7: AC drive overload pre-warning<br>8: Set count value reached<br>9: Designated count value reached<br>10: Length reached<br>11: PLC cycle complete<br>12: Accumulative running time reached<br>13: Frequency limited<br>14: Torque limited<br>15: Ready for RUN<br>16: AI1 larger than AI2<br>17: Frequency upper limit reached<br>18: Frequency lower limit reached<br>(no out put at stop)<br>19: Undervoltage state output<br>20: Communication setting<br>21: Reserved<br>22: Reserved<br>23: Zero-speed running 2 (having output at stop)<br>24: Accumulative power-on time reached<br>25: Frequency level detection PDT2 output<br>26: Frequency 1 reached<br>27: Frequency 2 reached<br>28: Current 1 reached<br>29: Current 2 reached<br>30: Timing reached<br>31: AI1 input limit exceeded<br>32: Load becoming 0<br>33: Reverse running<br>34: Zero current state<br>35: Module temperature reached<br>36: Software current limit exceeded<br>37: Frequency lower limit reached<br>(having output at stop)<br>38: Alarm output<br>39: Motor overheat warning<br>40: Current running time reached<br>41: Fault output (There is no output if it is the coast to stop Fault and undervoltage occurs.) | 2 | ☆ |
| P5-02 | Relay function (TA-TB-TC) | | 2 | ☆ |
| P5-03 | Extension card relay function (P/A-P/B-P/C) | | 0 | ☆ |
| P5-04 | DO1 function selection (open-collector output terminal) | | 1 | ☆ |
| P5-05 | Extension card DO2 function | | 4 | ☆ |





| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P5-06 | FMP function selection | 0: Running frequency<br>1: Set frequency<br>2: Output current<br>3: Output torque (absolute value)<br>4: Output power<br>5: Output voltage<br>6: Pulse input<br>7: AI1<br>8: AI2<br>9: AI3<br>10: Length<br>11: Count value<br>12: Communication setting<br>13: Motor rotational speed<br>14: Output current<br>15: Output voltage<br>16: Output torque (actual value) | 0 | ☆ |
| P5-07 | AM function selection | | 0 | ☆ |
| P5-08 | AO2 function selection | | 1 | ☆ |
| P5-09 | MaximumDO2 output frequency | 0.01–100.00 kHz | 50.00 kHz | ☆ |
| P5-10 | AM offset coefficient | -100.0%–100.0% | 0.0% | ☆ |
| P5-11 | AM gain | -10.00–10.00 | 1.00 | ☆ |
| P5-12 | AO2 offset coefficient | -100.0%–100.0% | 0.00% | ☆ |
| P5-13 | AO2 gain | -10.00–10.00 | 1.00 | ☆ |
| P5-17 | DO2 output delay time | 0.0–3600.0s | 0.0s | ☆ |
| P5-18 | Relay 1 output delay time | 0.0–3600.0s | 0.0s | ☆ |
| P5-19 | Relay 2 output delay time | 0.0–3600.0s | 0.0s | ☆ |
| P5-20 | DO1 output delay time | 0.0–3600.0s | 0.0s | ☆ |
| P5-21 | DO3 output delay time | 0.0–3600.0s | 0.0s | ☆ |
| P5-22 | DO valid mode selection | Unit's digit (FMR valid mode)<br>0: Positive logic<br>1: Negative logic<br>Ten's digit (Relay 1 valid mode)<br>0, 1 (same as FMR)<br>Hundred's digit (Relay 2 valid mode)<br>0, 1 (same as FMR)<br>Thousand's digit (DO1 valid mode)<br>0, 1 (same as FMR)<br>Ten thousand's digit (DO3 valid mode)<br>0, 1 (same as FMR) | 00000 | ☆ |
| | | Group P6: Start/Stop Control | | |
| P6-00 | Start mode | 0: Direct start<br>1: Rotational speed tracking restart<br>2: Pre-excited start (asynchronous motor) | 0 | ☆ |
| P6-01 | Rotational speed tracking mode | 0: From frequency at stop<br>1: From zero speed<br>2: From maximum frequency | 0 | ★ |
| P6-02 | Rotational speed tracking speed | 1–100 | 20 | ☆ |
| P6-03 | Startup frequency | 0.00–10.00 Hz | 0.00 Hz | ☆ |
| P6-04 | Startup frequency holding time | 0.0–100.0s | 0.0s | ★ |
| P6-05 | Startup DC braking current/ Pre-excited current | 0%–100% | 0% | ★ |
| P6-06 | Startup DC braking time/ Pre-excited time | 0.0–100.0s | 0.0s | ★ |
| P6-07 | Acceleration/Deceleration mode | 0: Linear acceleration/ deceleration<br>1: S-curve acceleration/ deceleration A<br>2: S-curve acceleration/deceleration B | 0 | ★ |
| P6-08 | Time proportion of S-curve start segment | 0.0% to (100.0% – P6-09) | 30.0% | ★ |
| P6-09 | Time proportion of S-curve end segment | 0.0% to (100.0% – P6-08) | 30.0% | ★ |

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P6-10 | Stop mode | 0: Decelerate to stop<br>1: Coast to stop | 0 | ☆ |
| P6-11 | Initial frequency of stop DC braking | 0.00 Hz to maximum frequency | 0.00 Hz | ☆ |
| P6-12 | Waiting time of stop DC braking | 0.0–36.0s | 0.0s | ☆ |
| P6-13 | Stop DC braking current | 0%–100% | 0% | ☆ |
| P6-14 | Stop DC braking time | 0.0–36.0s | 0.0s | ☆ |
| P6-15 | Brake use ratio | 0%–100% | 100% | ☆ |
| Group P7: Operation panel and Display | | | | |
| P7-01 | MF.K Key function selection | 0: MF.K key disabled<br>1: Switchover between Operation panel control and remote command control (terminal or communication)<br>2: Switchover between forward rotation and reverse rotation<br>3: Forward JOG<br>4: Reverse JOG | 0 | ★ |
| P7-02 | STOP/RESET key function | 0: STOP/RESET key enabled only in Operation panel control<br>1: STOP/RESET key enabled in any Operation mode | 1 | ☆ |
| P7-03 | LED display running parameters 1 | 0000–FFFF<br>Bit00: Running frequency 1 (Hz)<br>Bit01: Set frequency (Hz)<br>Bit02: Bus voltage (V)<br>Bit03: Output voltage (V)<br>Bit04: Output current (A)<br>Bit05: Output power (kW)<br>Bit06: Output torque (%)<br>Bit07: X input status<br>Bit08: DO output status<br>Bit09: AI1 voltage (V)<br>Bit10: AI2 voltage (V)<br>Bit11: AI3 voltage (V)<br>Bit12: Count value<br>Bit13: Length value<br>Bit14: Load speed display<br>Bit15: PID setting | 1F | ☆ |
| P7-04 | LED display running parameters 2 | 0000–FFFF<br>Bit00: PID feedback<br>Bit01: PLC stage<br>Bit02: Pulse setting frequency (kHz)<br>Bit03: Running frequency 2 (Hz)<br>Bit04: Remaining running time<br>Bit05: AI1 voltage before correction (V)<br>Bit06: AI2 voltage before correction (V)<br>Bit07: AI3 voltage before correction (V)<br>Bit08: Linear speed<br>Bit09: Current power-on time (Hour)<br>Bit10: Current running time (Min)<br>Bit11: Pulse setting frequency (Hz)<br>Bit12: Communication setting value<br>Bit13: Encoder feedback speed (Hz)<br>Bit14: Main frequency X display (Hz)<br>Bit15: Auxiliary frequency Y display (Hz) | 0 | ☆ |





| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P7-05 | LED display stop parameters | 0000–FFFF<br>Bit00: Set frequency (Hz)<br>Bit01: Bus voltage (V)<br>Bit02: X input status<br>Bit03: DO output status<br>Bit04: AI1 voltage (V)<br>Bit05: AI2 voltage (V)<br>Bit06: AI3 voltage (V)<br>Bit07: Count value<br>Bit08: Length value<br>Bit09: PLC stage<br>Bit10: Load speed<br>Bit11: PID setting<br>Bit12: Pulse setting frequency (kHz) | 33 | ☆ |
| P7-06 | Load speed display coefficient | 0.0001–6.5000 | 1.0000 | ☆ |
| P7-07 | Heatsink temperature of inverter module | 0.0–100.0°C | - | ● |
| P7-08 | Rectifier bridge heatsink temperature | 0.0–100.0°C | - | ● |
| P7-09 | Accumulative running time | 0–65535 h | - | ● |
| P7-10 | Product number | - | - | ● |
| P7-11 | Software version | - | - | ● |
| P7-12 | Number of decimal places for load speed display | 0: 0 decimal place<br>1: 1 decimal place<br>2: 2 decimal places<br>3: 3 decimal places | 1 | ☆ |
| P7-13 | Accumulative power-on time | 0–65535 h | 0 h | ● |
| P7-14 | Accumulative power consumption | 0–65535 kWh | - | ● |
| Group P8: Auxiliary Functions | | | | |
| P8-00 | JOG running frequency | 0.00 Hz to maximum frequency | 2.00 Hz | ☆ |
| P8-01 | JOG acceleration time | 0.0–6500.0s | 20.0s | ☆ |
| P8-02 | JOG deceleration time | 0.0–6500.0s | 20.0s | ☆ |
| P8-03 | Acceleration time 2 | 0.0–6500.0s | Model dependent | ☆ |
| P8-04 | Deceleration time 2 | 0.0–6500.0s | Model dependent | ☆ |
| P8-05 | Acceleration time 3 | 0.0–6500.0s | Model dependent | ☆ |
| P8-06 | Deceleration time 3 | 0.0–6500.0s | Model dependent | ☆ |
| P8-07 | Acceleration time 4 | 0.0–500.0s | Model dependent | ☆ |
| P8-08 | Deceleration time 4 | 0.0–6500.0s | Model dependent | ☆ |
| P8-09 | Jump frequency 1 | 0.00 Hz to maximum frequency | 0.00 Hz | ☆ |
| P8-10 | Jump frequency 2 | 0.00 Hz to maximum frequency | 0.00 Hz | ☆ |
| P8-11 | Frequency jump amplitude | 0.00 Hz to maximum frequency | 0.00 Hz | ☆ |
| P8-12 | Forward/Reverse rotation dead-zone time | 0.0–3000.0s | 0.0s | ☆ |
| P8-13 | Reverse control | 0: Enabled<br>1: Disabled | 0 | ☆ |
| P8-14 | Running mode when set frequency lower than frequency lower limit | 0: Run at frequency lower limit<br>1: Stop<br>2: Run at zero speed | 0 | ☆ |
| P8-15 | Droop control | 0.00–10.00 Hz | 0.00 Hz | ☆ |
| P8-16 | Accumulative power-on time threshold | 0–65000 h | 0 h | ☆ |
| P8-17 | Accumulative running time threshold | 0–65000 h | 0 h | ☆ |

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P8-18 | Startup protection | 0: No<br>1: Yes | 0 | ☆ |
| P8-19 | Frequency detection value (PDT1) | 0.00 Hz to maximum frequency | 50.00 Hz | ☆ |
| P8-20 | Frequency detection hysteresis (PDT hysteresis 1) | 0.0%–100.0% (PDT1 level) | 5.0% | ☆ |
| P8-21 | Detection range of frequency reached | 0.00–100% (maximum frequency) | 0.0% | ☆ |
| P8-22 | Jump frequency during acceleration/deceleration | 0: Disabled<br>1: Enabled | 0 | ☆ |
| P8-25 | Frequency switchover point between acceleration time 1 and acceleration time 2 | 0.00 Hz to maximum frequency | 0.00 Hz | ☆ |
| P8-26 | Frequency switchover point between deceleration time 1 and deceleration time 2 | 0.00 to maximum frequency | 0.00 Hz | ☆ |
| P8-27 | Terminal JOG preferred | 0: Disabled1: Enabled | 0 | ☆ |
| P8-28 | Frequency detection value (PDT2) | 0.00 to maximum frequency | 50.00 Hz | ☆ |
| P8-29 | Frequency detection hysteresis (PDT hysteresis 2) | 0.0%–100.0% (PDT2 level) | 5.0% | ☆ |
| P8-30 | Any frequency reaching detection value 1 | 0.00 Hz to maximum frequency | 50.00 Hz | ☆ |
| P8-31 | Any frequency reaching detection amplitude 1 | 0.0%–100.0% (maximum frequency) | 0.0% | ☆ |
| P8-32 | Any frequency reaching detection value 2 | 0.00 Hz to maximum frequency | 50.00 Hz | ☆ |
| P8-33 | Any frequency reaching detection amplitude 2 | 0.0%–100.0% (maximum frequency) | 0.0% | ☆ |
| P8-34 | Zero current detection level | 0.0%–300.0% (rated motor current) | 5.0% | ☆ |
| P8-35 | Zero current detection delay time | 0.00–600.00s | 0.10s | ☆ |
| P8-36 | Output overcurrent threshold | 0.0% (no detection)<br>0.1%–300.0% (rated motor current) | 200.0% | ☆ |
| P8-37 | Output overcurrent detection delay time | 0.00–600.00s | 0.00s | ☆ |
| P8-38 | Any current reaching 1 | 0.0%–300.0% (rated motor current) | 100.0% | ☆ |
| P8-39 | Any current reaching 1 amplitude | 0.0%–300.0% (rated motor current) | 0.0% | ☆ |
| P8-40 | Any current reaching 2 | 0.0%–300.0% (rated motor current) | 100.0% | ☆ |
| P8-41 | Any current reaching 2 amplitude | 0.0%–300.0% (rated motor current) | 0.0% | ☆ |
| P8-42 | Timing function | 0: Disabled<br>1: Enabled | 0 | ☆ |
| P8-43 | Timing duration source | 0: P8-44<br>1: AI1<br>2: AI2<br>3: AI3<br>(100% of analog input corresponds to the value of P8-44) | 0 | ☆ |
| P8-44 | Timing duration | 0.0–6500.0 min | 0.0 min | ☆ |
| P8-45 | AI1 input voltage lower limit | 0.00 V to P8-46 | 3.10 V | ☆ |
| P8-46 | AI1 input voltage upper limit | P8-45 to 10.00 V | 6.80 V | ☆ |
| P8-47 | Module temperature threshold | 0–100°C | 75°C | ☆ |
| P8-48 | Cooling fan control | 0: fan working during running<br>1: fan working continuously | 0 | ☆ |
| P8-49 | Wakeup frequency | Dormant frequency (P8-51) to maximum frequency (P0-10) | 0.00 Hz | ☆ |
| P8-50 | Wakeup delay time | 0.0–6500.0s | 0.0s | ☆ |
| P8-51 | Dormant frequency | 0.00 Hz to wakeup frequency (P8-49) | 0.00 Hz | ☆ |
| P8-52 | Dormant delay time | 0.0–6500.0s | 0.0s | ☆ |





| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P8-53 | Current running time reached | 0.0–6500.0 min | 0.0 min | ☆ |
| P8-54 | Output power correction coefficient | 0.00%–200 .0% | 100.0% | ☆ |
| | | Group P9: fault and Protection | | |
| P9-00 | Motor overload protection selection | 0: Disabled<br>1: Enabled | 1 | ☆ |
| P9-01 | Motor overload protection gain | 0.20–10.00 | 1.00 | ☆ |
| P9-02 | Motor overload warning coefficient | 50%–100% | 80% | ☆ |
| P9-03 | Overvoltage stall gain | 0 (no stall overvoltage)–100 | 0 | ☆ |
| P9-04 | Overvoltage stall protective voltage | 120%–150% | 130% | ☆ |
| P9-05 | Overcurrent stall gain | 0–100 | 20 | ☆ |
| P9-06 | Overcurrent stall protective current | 100%–200% | 150% | ☆ |
| P9-07 | Short-circuit to ground upon power-on | 0: Disabled<br>1: Enabled | 1 | ☆ |
| P9-09 | fault auto reset times | 0–20 | 0 | ☆ |
| P9-10 | DO action during fault auto reset | 0: Not act<br>1: Act | 0 | ☆ |
| P9-11 | Time interval of fault auto reset | 0.1s–100.0s | 1.0s | ☆ |
| P9-12 | Input phase loss protection/ contactor energizing protection selection | Unit's digit: Input phase loss protection<br>Ten's digit: Contactor energizing protection<br>0: Disabled<br>1: Enabled | 11 | ☆ |
| P9-13 | Output phase loss protection selection | 0: Disabled<br>1: Enabled | 1 | ☆ |
| P9-14 | 1st fault type | 0: No fault<br>1: Reserved<br>2: Overcurrent during acceleration<br>3: Overcurrent during deceleration<br>4: Overcurrent at constant speed<br>5: Overvoltage during acceleration<br>6: Overvoltage during deceleration<br>7: Overvoltage at constant speed<br>8: Bupper resistance overload<br>9: Undervoltage<br>10: AC drive overload<br>11: Motor overload<br>12:Power input phase loss<br>13: Power output phase loss<br>14: Module overheat<br>15: External equipment fault<br>16: Communication fault<br>17: Contactor fault<br>18: Current detection fault<br>19: Motor auto-tuning fault<br>20: Encoder/PG card fault<br>21: EEPROM read-write fault<br>22: AC drive hardware fault<br>23: Short circuit to ground<br>24: Reserved<br>25: Reserved<br>26: Accumulative running time reached<br>27: User-defined fault 1<br>28: User-defined fault 2<br>29: Accumulative power-on time reached<br>30: Load becoming 0<br>31: PID feedback lost during running<br>40: With-wave current limit fault<br>41: Motor switchover fault during running<br>42: Too large speed deviation<br>43: Motor over-speed<br>45: Motor overheat | - | • |
| P9-15 | 2nd fault type | | - | • |
| P9-16 | 3rd (latest) fault type | | - | • |

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P9-17 | Frequency upon 3rd fault | - | - | ● |
| P9-18 | Current upon 3rd fault | - | - | ● |
| P9-19 | Bus voltage upon 3rd fault | - | - | ● |
| P9-20 | Input terminal status upon 3rd fault | - | - | ● |
| P9-21 | Output terminal status upon 3rd fault | - | - | ● |
| P9-22 | AC drive status upon 3rd fault | - | - | ● |
| P9-23 | Power-on time upon 3rd fault | - | - | ● |
| P9-24 | Running time upon 3rd fault | - | - | ● |
| P9-27 | Frequency upon 2nd fault | - | - | ● |
| P9-28 | Current upon 2nd fault | - | - | ● |
| P9-29 | Bus voltage upon 2nd fault | - | - | ● |
| P9-30 | Input terminal status upon 2nd fault | - | - | ● |
| P9-31 | Output terminal status upon 2nd fault | - | - | ● |
| P9-32 | AC drive status upon 2nd fault | - | - | ● |
| P9-33 | Power-on time upon 2nd fault | - | - | ● |
| P9-34 | Running time upon 2nd fault | - | - | ● |
| P9-37 | Frequency upon 1st fault | - | - | ● |
| P9-38 | Current upon 1st fault | - | - | ● |
| P9-39 | Bus voltage upon 1st fault | - | - | ● |
| P9-40 | Input terminal status upon 1st fault | - | - | ● |
| P9-41 | Output terminal status upon 1st fault | - | - | ● |
| P9-42 | AC drive status upon 1st fault | - | - | ● |
| P9-43 | Power-on time upon 1st fault | - | - | ● |
| P9-44 | Running time upon1st fault | - | - | ● |
| P9-47 | fault protection action selection 1 | Unit's digit (Motor overload, Err11)<br>0: Coast to stop<br>1: Stop according to the stop mode<br>2: Continue to run<br>Ten's digit (Power input phase loss, Err12)<br>Same as unit's digit<br>Hundred's digit (Power output phase loss, Err13)<br>Same as unit's digit<br>Thousand's digit (External equipment fault, Err15)<br>Same as unit's digit<br>Ten thousand's digit (Communication fault, Err16)<br>Same as unit's digit | 00000 | ☆ |
| P9-48 | fault protection action selection 2 | Unit's digit (Encoder fault, Err20)<br>0: Free parking<br>1: Switch over to V/F control, stop according to the stop mode<br>2: Switch over to V/F control,continue to run<br>Ten's digit (EEPROM read-write fault, Err21)<br>0: Coast to stop<br>1: Stop according to the stop mode<br>Hundred's digit: reserved<br>Thousand's digit (Motor overheat, Err25)<br>Same as unit's digit in P9-47<br>Ten thousand's digit (Accumulative running time reached)<br>Same as unit's digit in P9-47 | 00000<br>00000 | ☆<br>☆ |





| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P9-49 | fault protection action selection 3 | Unit's digit (User-defined fault 1,Err27)<br>Same as unit's digit in P9-47<br>Ten's digit (User-defined fault 2,Err28)<br>Same as unit's digit in P9-47<br>Hundred's digit (Accumulative power-on time reached, Err29)<br>Same as unit's digit in P9-47<br>Thousand's digit (Load becoming 0, Err30)<br>0: Free parking<br>1: Stop according to the stop mode<br>2: Continue to run at 7% of rated motor frequency and resume to the set frequency if the load recovers<br>Ten thousand's digit (PID feedback lost during running, Err31)<br>Same as unit's digit in P9-47 | 00000 | ☆ |
| P9-50 | fault protection action selection 4 | Unit's digit (Too large speed deviation, Err42)<br>Same as unit's digit in P9-47<br>Ten's digit (Motor over-speed, Err43)<br>Same as unit's digit in P9-47<br>Hundred's digit (Initial position fault, Err51)<br>Same as unit's digit in P9-47<br>Thousand's digit (Speed feedback fault, Err52)<br>Same as unit's digit in P9-47<br>Ten thousand's digit: Reserved | 00000 | ☆ |
| P9-54 | Frequency selection for continuing to run upon fault | 0: Current running frequency<br>1: Set frequency<br>2: Frequency upper limit<br>3: Frequency lower limit<br>4: Backup frequency upon abnormality | 0 | ☆ |
| P9-55 | Backup frequency upon abnormality | 0.0%–100.0% (maximum frequency) | 100.0% | ☆ |
| P9-56 | type of motor temperature sensor | 0: No temperature sensor<br>1: PT100<br>2: PT1000 | 1 | ☆ |
| P9-57 | Motor overheat protection threshold | 0–200°C | 110°C | ☆ |
| P9-58 | Motor overheat warning threshold | 0–200°C | 90°C | ☆ |
| P9-59 | Action selection at instantaneous power failure | 0: Invalid<br>1: Decelerate<br>2: Decelerate to stop | 0 | ☆ |
| P9-60 | Action fause judging voltage at instantaneous power failure | 80.0%–100.0% | 90.0% | ☆ |
| P9-61 | Voltage rally judging time at instantaneous power failure | 0.00–100.00s | 0.50s | ☆ |
| P9-62 | Action judging voltage at instantaneous power failure | 60.0%–100.0% (standard bus voltage) | 80.0% | ☆ |
| P9-63 | Protection upon load becoming 0 | 0: Disabled<br>1: Enabled | 0 | ☆ |
| P9-64 | Detection level of load becoming 0 | 0.0%–100.0% (rated motor current) | 10.0% | ☆ |
| P9-65 | Detection time of load becoming 0 | 0.0–60.0s | 1.0s | ☆ |
| P9-67 | Over-speed detection value | 0.0%–50.0% (maximum frequency) | 20.0% | ☆ |
| P9-68 | Over-speed detection time | 0.0–60.0s | 1.0s | ☆ |
| P9-69 | Detection value of too large speed deviation | 0.0%–50.0% (maximum frequency) | 20.0% | ☆ |

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P9-70 | Detection time of too large speed deviation | 0.0–60.0s | 5.0s | ☆ |
| Group PA: Process Control PID Function | | | | |
| PA-00 | PID setting source | 0: PA-01<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting (X5/X6)<br>5: Communication setting<br>6: Multi-reference | 0 | ☆ |
| PA-01 | PID digital setting | 0.0%–100.0% | 50.0% | ☆ |
| PA-02 | PID feedback source | 0: AI1<br>1: AI2<br>2: AI3<br>3: AI1 – AI2<br>4: Pulse setting (X5/X6)<br>5: Communication setting<br>6: AI1 + AI2<br>7: MAX (\|AI1\|, \|AI2\|)<br>8: MIN (\|AI1\|, \|AI2\|) | 0 | ☆ |
| PA-03 | PID action direction | 0: Forward action<br>1: Reverse action | 0 | ☆ |
| PA-04 | PID setting feedback range | 0–65535 | 1000 | ☆ |
| PA-05 | Proportional gain Kp1 | 0.0–100.0 | 20.0 | ☆ |
| PA-06 | Integral time Ti1 | 0.01–10.00s | 2.00s | ☆ |
| PA-07 | Dipperential time Td1 | 0.000–10.000s | 0.000s | ☆ |
| PA-08 | Cut-off frequency of PID reverse rotation | 0.00 to maximum frequency | 2.00 Hz | ☆ |
| PA-09 | PID deviation limit | 0.0%–100.0% | 0.0% | ☆ |
| PA-10 | PID dipperential limit | 0.00%–100.00% | 0.10% | ☆ |
| PA-11 | PID setting change time | 0.00–650.00s | 0.00s | ☆ |
| PA-12 | PID feedback filter time | 0.00–60.00s | 0.00s | ☆ |
| PA-13 | PID output filter time | 0.00–60.00s | 0.00s | ☆ |
| PA-14 | Reserved | - | - | ☆ |
| PA-15 | Proportional gain Kp2 | 0.0–100.0 | 20.0 | ☆ |
| PA-16 | Integral time Ti2 | 0.01–10.00s | 2.00s | ☆ |
| PA-17 | Dipperential time Td2 | 0.000–10.000s | 0.000s | ☆ |
| PA-18 | PID parameter switchover condition | 0: No switchover<br>1: Switchover via X<br>2: Automatic switchover based on deviation | 0 | ☆ |
| PA-19 | PID parameter switchover deviation 1 | 0.0% to PA-20 | 20.0% | ☆ |
| PA-20 | PID parameter switchover deviation 2 | PA-19 to 100.0% | 80.0% | ☆ |
| PA-21 | PID initial value | 0.0%–100.0% | 0.0% | ☆ |
| PA-22 | PID initial value holding time | 0.00–650.00s | 0.00s | ☆ |
| PA-23 | Maximum deviation between two PID outputs in forward direction | 0.00%–100.00% | 1.00% | ☆ |
| PA-24 | Maximum deviation between two PID outputs in reverse direction | 0.00%–100.00% | 1.00% | ☆ |
| PA-25 | PID integral property | Unit's digit (Integral separated)<br>0: Invalid<br>1: Valid<br>Ten's digit (Whether to stop integral Operation when the output reaches the limit)<br>0: Continue integral Operation<br>1: Stop integral Operation | 00 | ☆ |
| PA-26 | Detection value of PID feedback loss | 0.0%: Not judging feedback loss 0.1%–100.0% | 0.0% | ☆ |





| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| PA-27 | Detection time of PID feedback loss | 0.0–20.0s | 0.0s | ☆ |
| PA-28 | PID Operation at stop | 0: No PID Operation at stop<br>1: PID Operation at stop | 0 | ☆ |
| Group PB: Swing Frequency, Fixed Length and Count | | | | |
| PB-00 | Swing frequency setting mode | 0: Relative to the central frequency<br>1: Relative to the maximum frequency | 0 | ☆ |
| PB-01 | Swing frequency amplitude | 0.0%–100.0% | 0.0% | ☆ |
| PB-02 | Jump frequency amplitude | 0.0%–50.0% | 0.0% | ☆ |
| PB-03 | Swing frequency cycle | 0.0–3000.0s | 10.0s | ☆ |
| PB-04 | Triangular wave rising time coefficient | 0.0%–100.0% | 50.0% | ☆ |
| PB-05 | Set length | 0–65535 m | 1000 m | ☆ |
| PB-06 | Actual length | 0–65535 m | 0 m | ☆ |
| PB-07 | Number of pulses per meter | 0.1–6553.5 | 100.0 | ☆ |
| PB-08 | Set count value | 1–65535 | 1000 | ☆ |
| PB-09 | Designated count value | 1–65535 | 1000 | ☆ |
| GroupPC: Multi-Reference and Simple PLC Function | | | | |
| PC-00 | Reference 0 | -100.0%–100.0% | 0.0% | ☆ |
| PC-01 | Reference 1 | -100.0%–100.0% | 0.0% | ☆ |
| PC-02 | Reference 2 | -100.0%–100.0% | 0.0% | ☆ |
| PC-03 | Reference 3 | -100.0%–100.0% | 0.0% | ☆ |
| PC-04 | Reference 4 | -100.0%–100.0% | 0.0% | ☆ |
| PC-05 | Reference 5 | -100.0%–100.0% | 0.0% | ☆ |
| PC-06 | Reference 6 | -100.0%–100.0% | 0.0% | ☆ |
| PC-07 | Reference 7 | -100.0%–100.0% | 0.0% | ☆ |
| PC-08 | Reference 8 | -100.0%–100.0% | 0.0% | ☆ |
| PC-09 | Reference 9 | -100.0%–100.0% | 0.0% | ☆ |
| PC-10 | Reference 10 | -100.0%–100.0% | 0.0% | ☆ |
| PC-11 | Reference 11 | -100.0%–100.0% | 0.0% | ☆ |
| PC-12 | Reference 12 | -100.0%–100.0% | 0.0% | ☆ |
| PC-13 | Reference 13 | -100.0%–100.0% | 0.0% | ☆ |
| PC-14 | Reference 14 | -100.0%–100.0% | 0.0% | ☆ |
| PC-15 | Reference 15 | -100.0%–100.0% | 0.0% | ☆ |
| PC-16 | Simple PLC running mode | 0: Stop after the AC drive runs one cycle<br>1: Keep final values after the AC drive runs one cycle<br>2: Repeat after the AC drive runs one cycle | 0 | ☆ |
| PC-17 | Simple PLC retentive selection | Unit's digit (Retentive upon power failure)<br>0: No<br>1: Yes<br>Ten's digit (Retentive upon stop)<br>0: No<br>1: Yes | 00 | ☆ |
| PC-18 | Running time of simple PLC reference 0 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-19 | Acceleration/deceleration time of simple PLC reference 0 | 0–3 | 0 | ☆ |
| PC-20 | Running time of simple PLC reference 1 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-21 | Acceleration/deceleration time of simple PLC reference 1 | 0–3 | 0 | ☆ |
| PC-22 | Running time of simple PLC reference 2 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-23 | Acceleration/deceleration time of simple PLC reference 2 | 0–3 | 0 | ☆ |
| PC-24 | Running time of simple PLC reference 3 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-25 | Acceleration/deceleration time of simple PLC reference 3 | 0–3 | 0 | ☆ |

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| PC-26 | Running time of simple PLC reference 4 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-27 | Acceleration/deceleration time of simple PLC reference 4 | 0–3 | 0 | ☆ |
| PC-28 | Running time of simple PLC reference 5 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-29 | Acceleration/deceleration time of simple PLC reference 5 | 0–3 | 0 | ☆ |
| PC-30 | Running time of simple PLC reference 6 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-31 | Acceleration/deceleration time of simple PLC reference 6 | 0–3 | 0 | ☆ |
| PC-32 | Running time of simple PLC reference 7 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-33 | Acceleration/deceleration time of simple PLC reference 7 | 0–3 | 0 | ☆ |
| PC-34 | Running time of simple PLC reference 8 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-35 | Acceleration/deceleration time of simple PLC reference 8 | 0–3 | 0 | ☆ |
| PC-36 | Running time of simple PLC reference 9 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-37 | Acceleration/deceleration time of simple PLC reference 9 | 0–3 | 0 | ☆ |
| PC-38 | Running time of simple PLC reference 10 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-39 | Acceleration/deceleration time of simple PLC reference 10 | 0–3 | 0 | ☆ |
| PC-40 | Running time of simple PLC reference 11 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-41 | Acceleration/deceleration time of simple PLC reference 11 | 0–3 | 0 | ☆ |
| PC-42 | Running time of simple PLC reference 12 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-43 | Acceleration/deceleration time of simple PLC reference 12 | 0–3 | 0 | ☆ |
| PC-44 | Running time of simple PLC reference 13 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-45 | Acceleration/deceleration time of simple PLC reference 13 | 0–3 | 0 | ☆ |
| PC-46 | Running time of simple PLC reference 14 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-47 | Acceleration/deceleration time of simple PLC reference 14 | 0–3 | 0 | ☆ |
| PC-48 | Running time of simple PLC reference 15 | 0.0–6553.5s (h) | 0.0s (h) | ☆ |
| PC-49 | Acceleration/deceleration time of simple PLC reference 15 | 0–3 | 0 | ☆ |
| PC-50 | Time unit of simple PLC running | 0: s (second)1:h (hour) | 0 | ☆ |
| PC-51 | Reference 0 source | 0: Set by PC-00<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting<br>5: PID<br>6: Set by preset frequency (P0- 08), modified via terminal UP/ DOWN | 0 | ☆ |





| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| Group PD: Communication parameters | | | | |
| PD-00 | Baud rate | Unit's digit (Modbus baud rate)<br>0: 300 BPs<br>1: 600 BPs<br>2: 1200 BPs<br>3: 2400 BPs<br>4: 4800 BPs<br>5: 9600 BPs<br>6: 19200 BPs<br>7: 38400 BPs<br>8: 57600 BPs<br>9: 115200 BPs<br>Ten's digit (PROFIBUS-DP baud rate)<br>0: 115200 BPs<br>1: 208300 BPs<br>2: 256000 BPs<br>3: 512000 Bps<br>Hundred's digit (reserved)<br>Thousand's digit (CANlink baud rate)<br>0: 20<br>1: 50<br>2: 100<br>3: 125<br>4: 250<br>5: 500<br>6: 1 M | 6005 | ☆ |
| PD-01 | Data format | 0: No check, data format <8,N,2><br>1: Even farity check, data format <8,E,1><br>2: Odd farity check, data format <8,O,1><br>3: No check, data format <8,N,1> Valid for Modbus | 0 | ☆ |
| PD-02 | Local address | 0: Broadcast address<br>1–247<br>Valid for Modbus, PROFIBUS-DP and CANlink | 1 | ☆ |
| PD-03 | Response delay | 0–20 ms Valid for Modbus | 2 ms | ☆ |
| PD-04 | Communication timeout | 0.0s (invalid)<br>0.1–60.0s Valid for Modbus, PROFIBUS-DP and CANopen | 0.0s | ☆ |
| PD-05 | Modbus protocol selection and PROFIBUS-DP data format | Unit's digit: Modbus protocol<br>0: Non-standard Modbus protocol<br>1: Standard Modbus protocol<br>Ten's digit: PROFIBUS-DP data format<br>0: PPO1 format<br>1: PPO2 format<br>2: PPO3 format<br>3: PPO5 format | 30 | ☆ |
| PD-06 | Communication reading current resolution | 0: 0.01A<br>1: 0.1A | 0 | ☆ |
| PD-08 | CANlink communication timeout time | 0.0s: Invalid<br>0.1–60.0s | 0 | ☆ |

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| Group PE: User-defined parameters | | | | |
| PE-00 | User-defined function code 0 | P0-00 to PP-xx<br>A0-00 to Ax-xx<br>U0-xx to U0-xx | P0-10 | ☆ |
| PE-01 | User-defined function code 1 | | P0-02 | ☆ |
| PE-02 | User-defined function code 2 | | P0-03 | ☆ |
| PE-03 | User-defined function code 3 | | P0-07 | ☆ |
| PE-04 | User-defined function code 4 | | P0-08 | ☆ |
| PE-05 | User-defined function code 5 | | P0-17 | ☆ |
| PE-06 | User-defined function code 6 | | P0-18 | ☆ |
| PE-07 | User-defined function code 7 | | P3-00 | ☆ |
| PE-08 | User-defined function code 8 | | P3-01 | ☆ |
| PE-09 | User-defined function code 9 | | P4-00 | ☆ |
| PE-10 | User-defined function code 10 | | P4-01 | ☆ |
| PE-11 | User-defined function code 11 | | P4-02 | ☆ |
| PE-12 | User-defined function code 12 | | P5-04 | ☆ |
| PE-13 | User-defined function code 13 | | P5-07 | ☆ |
| PE-14 | User-defined function code 14 | | P6-00 | ☆ |
| PE-15 | User-defined function code 15 | | P6-10 | ☆ |
| PE-16 | User-defined function code 16 | | P0-00 | ☆ |
| PE-17 | User-defined function code 17 | | P0-00 | ☆ |
| PE-18 | User-defined function code 18 | | P0-00 | ☆ |
| PE-19 | User-defined function code 19 | | P0-00 | ☆ |
| PE-20 | User-defined function code 20 | | P0-00 | ☆ |
| PE-21 | User-defined function code 21 | | P0-00 | ☆ |
| PE-22 | User-defined function code 22 | | P0-00 | ☆ |
| PE-23 | User-defined function code 23 | | P0-00 | ☆ |
| PE-24 | User-defined function code 24 | | P0-00 | ☆ |
| PE-25 | User-defined function code 25 | | P0-00 | ☆ |
| PE-26 | User-defined function code 26 | | P0-00 | ☆ |
| PE-27 | User-defined function code 27 | | P0-00 | ☆ |
| PE-28 | User-defined function code 28 | | P0-00 | ☆ |
| PE-29 | User-defined function code 29 | | P0-00 | ☆ |
| Group PP: Function Code Management | | | | |
| PP-00 | User password | 0–65535 | 0 | ☆ |
| PP-01 | Restore default settings | 0: No Operation<br>01: Restore factory settings except motor parameters<br>02: Clear records<br>04: reserved<br>501: reserved | 0 | ★ |
| PP-02 | Function parameter group display selection | Unit's digit (Group U display selection)<br>0: Not display<br>1: Display<br>Ten's digit (Group A display selection)<br>0: Not display<br>1: Display | 11 | ★ |
| PP-03 | Individualized parameter display property | Unit's digit (User-defined parameter display selection)<br>0: Not display<br>1: Display<br>Ten's digit (User-modified parameter display selection)<br>0: Not display<br>1: Display | 00 | ☆ |
| PP-04 | parameter modification property | 0: Modifiable<br>1: Not modifiable | 0 | ☆ |





| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| Group A0: Torque Control and Restricting parameters | | | | |
| A0-00 | Speed/Torque control selection | 0: Speed control<br>1: Torque control | 0 | ★ |
| A0-01 | Torque setting source in torque control | 0: Digital setting (A0-03)<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting (X5/X6)<br>5: Communication setting<br>6: MIN (AI1, AI2)<br>7: MAX (AI1, AI2)<br>Full range of values 1–7 corresponds to the digital setting of A0-03. | 0 | ★ |
| A0-03 | Torque digital setting in torque control | -200.0%–200.0% | 150.0% | ☆ |
| A0-05 | Forward maximum frequency in torque control | 0.00 Hz to maximum frequency (P0-10) | 50.00 Hz | ☆ |
| A0-06 | Reverse maximum frequency in torque control | 0.00 Hz to maximum frequency (P0-10) | 50.00 Hz | ☆ |
| A0-07 | Acceleration time in torque control | 0.00–65000s | 0.00s | ☆ |
| A0-08 | Deceleration time in torque control | 0.00–65000s | 0.00s | ☆ |
| Group A1: Virtual X (VX)/Virtual DO (VDO) | | | | |
| A1-00 | VX1 function selection | 0–59 | 0 | ★ |
| A1-01 | VX2 function selection | 0–59 | 0 | ★ |
| A1-02 | VX3 function selection | 0–59 | 0 | ★ |
| A1-03 | VX4 function selection | 0–59 | 0 | ★ |
| A1-04 | VX5 function selection | 0–59 | 0 | ★ |
| A1-05 | VX state setting mode | Unit's digit (VX1)<br>0: Decided by state of VDOx<br>1: Decided by A1-06<br>Ten's digit (VX2)<br>0, 1 (same as VX1)<br>Hundred's digit (VX3)<br>0, 1 (same as VX1)<br>Thousand's digit (VX4)<br>0, 1 (same as VX1)<br>Ten thousand's digit (VX5)<br>0, 1 (same as VX1) | 00000 | ★ |
| A1-06 | VX state selection | Unit's digit (VX1)<br>0: Invalid 1: Valid<br>Ten's digit (VX2)<br>0, 1 (same as VX1)<br>Hundred's digit (VX3)<br>0, 1 (same as VX1)<br>Thousand's digit (VX4)<br>0, 1 (same as VX1)<br>Ten thousand's digit (VX5)<br>0, 1 (same as VX1) | 00000 | ★ |
| A1-07 | Function selection for AI1 used as X | 0–59 | 0 | ★ |
| A1-08 | Function selection for AI2 used as X | 0–59 | 0 | ★ |
| A1-09 | Function selection for AI3 used as X | 0–59 | 0 | ★ |

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| A1-10 | State selection for AI used as X | Unit's digit (AI1)<br>0: High level valid 1: Low level valid<br>Ten's digit (AI2)<br>0, 1 (same as unit's digit)<br>Hundred's digit (AI3)<br>0, 1 (same as unit's digit) | 000 | ★ |
| A1-11 | VDO1 function selection | 0: Short with physical Xx internally<br>1–40: Refer to function selection of physical DO in group P5. | 0 | ☆ |
| A1-12 | VDO2 function selection | 0: Short with physical Xx internally<br>1–40: Refer to function selection of physical DO in group P5. | 0 | ☆ |
| A1-13 | VDO3 function selection | 0: Short with physical Xx internally<br>1–40: Refer to function selection of physical DO in group P5. | 0 | ☆ |
| A1-14 | VDO4 function selection | 0: Short with physical Xx internally<br>1–40: Refer to function selection of physical DO in group P5. | 0 | ☆ |
| A1-15 | VDO5 function selection | 0: Short with physical Xx internally<br>1–40: Refer to function selection of physical DO in group P5. | 0 | ☆ |
| A1-16 | VDO1 output delay | 0.0–3600.0s | 0.0s | ☆ |
| A1-17 | VDO2 output delay | 0.0–3600.0s | 0.0s | ☆ |
| A1-18 | VDO3 output delay | 0.0–3600.0s | 0.0s | ☆ |
| A1-19 | VDO4 output delay | 0.0–3600.0s | 0.0s | ☆ |
| A1-20 | VDO5 output delay | 0.0–3600.0s | 0.0s | ☆ |
| A1-21 | VDO state selection | Unit's digit (VDO1)<br>0: Positive logic<br>1: Reverse logic<br>Ten's digit (VDO2)<br>0, 1 (same as unit's digit)<br>Hundred's digit (VDO3)<br>0, 1 (same as unit's digit)<br>Thousand's digit (VDO4)<br>0, 1 (same as unit's digit)<br>Ten thousand's digit (VDO5)<br>0, 1 (same as unit's digit) | 00000 | ☆ |
| Group A2: Motor 2 parameters | | | | |
| A2-00 | Motor type selection | 0: Common asynchronous motor<br>1: Variable frequency asynchronous motor<br>2: Permanent magnetic synchronous motor | 0 | ★ |
| A2-01 | Rated motor power | 0.1–1000.0 kW | Model dependent | ★ |
| A2-02 | Rated motor voltage | 1–2000 V | Model dependent | ★ |
| A2-03 | Rated motor current | 0.01–655.35 A (AC drive power ≤55 kW)<br>0.1–6553.5 A (AC drive power >55 kW) | Model dependent | ★ |
| A2-04 | Rated motor frequency | 0.01 Hz to maximum frequency | Model dependent | ★ |
| A2-05 | Rated motor rotational speed | 1–65535 RPM | Model dependent | ★ |
| A2-06 | Stator resistance (asynchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent | ★ |
| A2-07 | Rotor resistance (asynchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent | ★ |
| A2-08 | Leakage inductive reactance (asynchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent | ★ |
| A2-09 | Mutual inductive reactance (asynchronous motor) | 0.1–6553.5 mH (AC drive power ≤ 55 kW)<br>0.01–655.35 mH (AC drive power > 55 kW) | Model dependent | ★ |
| A2-10 | No-load current (asynchronous motor) | 0.01 A to A2-03 (AC drive power ≤ 55 kW)<br>0.1 A to A2-03 (AC drive power > 55 kW) | Model dependent | ★ |





| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| A2-16 | Stator resistance (synchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent | ★ |
| A2-17 | Shaft D inductance (synchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent | ★ |
| A2-18 | Shaft Q inductance (synchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent | ★ |
| A2-20 | Back EMF (synchronous motor) | 0.1–6553.5 V | Model dependent | ★ |
| A2-27 | Encoder pulses per revolution | 1–65535 | 1024 | ★ |
| A2-28 | Encoder type | 0: ABZ incremental encoder<br>1: UVW incremental encoder<br>2: Resolver<br>3: SIN/COS encoder<br>4: Wire-saving UVW encoder | 0 | ★ |
| A2-29 | Speed feedback PG selection | 0: Local PG<br>1: Extended PG<br>2: Pulse input (X5/X6) | 0 | ★ |
| A2-30 | A, B phase sequence of ABZ incremental encoder | 0: Forward<br>1: Reserve | 0 | ★ |
| A2-31 | Encoder installation angle | 0.0°–359.9° | 0.0° | ★ |
| A2-32 | U, V, W phase sequence of UVW encoder | 0: Forward<br>1: Reverse | 0 | ★ |
| A2-33 | UVW encoder angle offset | 0.0°–359.9° | 0.0° | ★ |
| A2-34 | Number of pole pairs of resolver | 1–65535 | 1 | ★ |
| A2-36 | Encoder wire-break fault detection time | 0.0s: No action<br>0.1–10.0s | 0.0s | ★ |
| A2-37 | Auto-tuning selection | 0: No auto-tuning<br>1: Asynchronous motor static auto-tuning<br>2: Asynchronous motor complete auto-tuning<br>11: Synchronous motor with-load auto-tuning<br>12: Synchronous motor no-load auto-tuning | 0 | ★ |
| A2-38 | Speed loop proportional gain 1 | 0–100 | 30 | ☆ |
| A2-39 | Speed loop integral time 1 | 0.01–10.00s | 0.50s | ☆ |
| A2-40 | Switchover frequency 1 | 0.00 to A2-43 | 5.00 Hz | ☆ |
| A2-41 | Speed loop proportional gain 2 | 0–100 | 15 | ☆ |
| A2-42 | Speed loop integral time 2 | 0.01–10.00s | 1.00s | ☆ |
| A2-43 | Switchover frequency 2 | A2-40 to maximum output frequency | 10.00 Hz | ☆ |
| A2-44 | Vector control slip gain | 50%–200% | 100% | ☆ |
| A2-45 | Time constant of speed loop filter | 0.000–0.100s | 0.000s | ☆ |
| A2-46 | Vector control over- excitation gain | 0–200 | 64 | ☆ |
| A2-47 | Torque upper limit source in speed control mode | 0: A2-48<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting (X5/X6)<br>5: Via communication<br>6: MIN(AI1,AI2)<br>7: MIN(AI1,AI2)<br>Full range of values 1–7 corresponds to the digital setting of A2-48. | 0 | ☆ |
| A2-48 | Digital setting of torque upper limit in speed control mode | 0.0%–200.0% | 150.0% | ☆ |
| A2-51 | Excitation adjustment proportional gain | 0–20000 | 2000 | ☆ |
| A2-52 | Excitation adjustment integral gain | 0–20000 | 1300 | ☆ |

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| A2-53 | Torque adjustment proportional gain | 0–20000 | 2000 | ☆ |
| A2-54 | Torque adjustment integral gain | 0–20000 | 1300 | ☆ |
| A2-55 | Speed loop integral property | Unit's digit: Integral separated<br>0: Disabled<br>1: Enabled | 0 | ☆ |
| A2-56 | Field weakening mode of synchronous motor | 0: No field weakening<br>1: Direct calculation<br>2: Adjustment | 0 | ☆ |
| A2-57 | Field weakening degree of synchronous motor | 50%–500% | 100% | ☆ |
| A2-58 | Maximum field weakening current | 1%–300% | 50% | ☆ |
| A2-59 | Field weakening automatic adjustment gain | 10%–500% | 100% | ☆ |
| A2-60 | Field weakening integral multiple | 2–10 | 2 | ☆ |
| A2-61 | Motor 2 control mode | 0: Sensorless flux vector control (SVC )<br>1: Closed-loop vector control (FVC)<br>2: Voltage/Frequency (V/F) control | 0 | ☆ |
| A2-62 | Motor 2 acceleration/ deceleration time | 0: Same as motor 1<br>1: Acceleration/Deceleration time 1<br>2: Acceleration/Deceleration time 2<br>3: Acceleration/Deceleration time 3<br>4: Acceleration/Deceleration time 4 | 0 | ☆ |
| A2-63 | Motor 2 torque boost | 0.0%: Automatic torque boost<br>0.1%–30.0% | Model dependent | ☆ |
| A2-65 | Motor 2 oscillation suppression gain | 0–100 | Model dependent | ☆ |
| | | Group A3: Motor 3 parameters | | |
| A3-00 | Motor type selection | 0: Common asynchronous motor<br>1: Variable frequency asynchronous motor<br>2: Permanent magnetic synchronous motor | 0 | ★ |
| A3-01 | Rated motor power | 0.1–1000.0 kW | Model dependent | ★ |
| A3-02 | Rated motor voltage | 1–2000 V | Model dependent | ★ |
| A3-03 | Rated motor current | 0.01–655.35 A (AC drive power ≤55 kW)<br>0.1–6553.5 A (AC drive power >55 kW) | Model dependent | ★ |
| A3-04 | Rated motor frequency | 0.01 Hz to maximum frequency | Model dependent | ★ |
| A3-05 | Rated motor rotational speed | 1–65535 RPM | Model dependent | ★ |
| A3-06 | Stator resistance (asynchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent | ★ |
| A3-07 | Rotor resistance (asynchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent | ★ |
| A3-08 | Leakage inductive reactance (asynchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent | ★ |
| A3-09 | Mutual inductive reactance (asynchronous motor) | 0.1–6553.5 mH (AC drive power ≤ 55 kW)<br>0.01–655.35 mH (AC drive power > 55 kW) | Model dependent | ★ |
| A3-10 | No-load current (asynchronous motor) | 0.01 A to A2-03 (AC drive power ≤ 55 kW)<br>0.1 A to A2-03 (AC drive power > 55 kW) | Model dependent | ★ |
| A3-16 | Stator resistance (synchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent | ★ |
| A3-17 | Shaft D inductance (synchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent | ★ |
| A3-18 | Shaft Q inductance (synchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent | ★ |
| A3-20 | Back EMF (synchronous motor) | 0.1–6553.5 V | Model dependent | ★ |





| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| A3-27 | Encoder pulses per revolution | 1–65535 | 1024 | ★ |
| A3-28 | Encoder type | 0: ABZ incremental encoder<br>1: UVW incremental encoder<br>2: Resolver<br>3: SIN/COS encoder<br>4: Wire-saving UVW encoder | 0 | ★ |
| A3-29 | Speed feedback PG selection | 0: Local PG<br>1: Extended PG<br>2: Pulse input (X5/X6) | 0 | ★ |
| A3-30 | A, B phase sequence of ABZ incremental encoder | 0: Forward<br>1: Reserve | 0 | ★ |
| A3-31 | Encoder installation angle | 0.0°–359.9° | 0.0° | ★ |
| A3-32 | U, V, W phase sequence of UVW encoder | 0: Forward<br>1: Reverse | 0 | ★ |
| A3-33 | UVW encoder angle offset | 0.0°–359.9° | 0.0° | ★ |
| A3-34 | Number of pole pairs of resolver | 1–65535 | 1 | ★ |
| A3-36 | Encoder wire-break fault detection time | 0.0s: No action 0.1–10.0s | 0.0s | ★ |
| A3-37 | Auto-tuning selection | 0: No auto-tuning<br>1: Asynchronous motor static auto-tuning<br>2: Asynchronous motor complete auto-tuning<br>11: Synchronous motor with-load auto-tuning<br>12: Synchronous motor no-load auto-tuning | 0 | ★ |
| A3-38 | Speed loop proportional gain 1 | 0–100 | 30 | ☆ |
| A3-39 | Speed loop integral time 1 | 0.01–10.00s | 0.50s | ☆ |
| A3-40 | Switchover frequency 1 | 0.00 to A3-43 | 5.00 Hz | ☆ |
| A3-41 | Speed loop proportional gain 2 | 0–100 | 15 | ☆ |
| A3-42 | Speed loop integral time 2 | 0.01–10.00s | 1.00s | ☆ |
| A3-43 | Switchover frequency 2 | A3-40 to maximum output frequency | 10.00 Hz | ☆ |
| A3-44 | Vector control slip gain | 50%–200% | 100% | ☆ |
| A3-45 | Time constant of speed loop filter | 0.000–0.100s | 0.000s | ☆ |
| A3-46 | Vector control over- excitation gain | 0–200 | 64 | ☆ |
| A3-47 | Torque upper limit source in speed control mode | 0: A3-48<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting (X5/X6)<br>5: Via communication<br>6: MIN (AI1,AI2)<br>7: MAX (AI1,AI2)<br>Full range of values 1–7 corresponds to the digital setting of A3-48. | 0 | ☆ |
| A3-48 | Digital setting of torque upper limit in speed control mode | 0.0%–200.0% | 150.0% | ☆ |
| A3-51 | Excitation adjustment proportional gain | 0–20000 | 2000 | ☆ |
| A3-52 | Excitation adjustment integral gain | 0–20000 | 1300 | ☆ |
| A3-53 | Torque adjustment proportional gain | 0–20000 | 2000 | ☆ |
| A3-54 | Torque adjustment integral gain | 0–20000 | 1300 | ☆ |
| A3-55 | Speed loop integral property | Unit's digit: Integral separated<br>0: Disabled<br>1: Enabled | 0 | ☆ |

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| A3-56 | Field weakening mode of synchronous motor | 0: No field weakening<br>1: Direct calculation<br>2: Adjustment | 0 | ☆ |
| A3-57 | Field weakening degree of synchronous motor | 50%–500% | 100% | ☆ |
| A3-58 | Maximum field weakening current | 1%–300% | 50% | ☆ |
| A3-59 | Field weakening automatic adjustment gain | 10%–500% | 100% | ☆ |
| A3-60 | Field weakening integral multiple | 2–10 | 2 | ☆ |
| A3-61 | Motor 2 control mode | 0: Sensorless flux vector control (SVC )<br>1: Closed-loop vector control (FVC)<br>2: Voltage/Frequency (V/F) control | 0 | ☆ |
| A3-62 | Motor 2 acceleration/ deceleration time | 0: Same as motor 1<br>1: Acceleration/Deceleration time 1<br>2: Acceleration/Deceleration time 2<br>3: Acceleration/Deceleration time 3<br>4: Acceleration/Deceleration time 4 | 0 | ☆ |
| A3-63 | Motor 2 torque boost | 0.0%: Automatic torque boost<br>0.1%–30.0% | Model dependent | ☆ |
| A3-65 | Motor 2 oscillation suppression gain | 0–100 | Model dependent | ☆ |
| | | Group A4: Motor 4 parameters | | |
| A4-00 | Motor type selection | 0: Common asynchronous motor<br>1: Variable frequency asynchronous motor<br>2: Permanent magnetic synchronous motor | 0 | ★ |
| A4-01 | Rated motor power | 0.1–1000.0 kW | Model dependent | ★ |
| A4-02 | Rated motor voltage | 1–2000 V | Model dependent | ★ |
| A4-03 | Rated motor current | 0.01–655.35 A (AC drive power ≤ 55 kW)<br>0.1–6553.5 A (AC drive power > 55 kW) | Model dependent | ★ |
| A4-04 | Rated motor frequency | 0.01 Hz to maximum frequency | Model dependent | ★ |
| A4-05 | Rated motor rotational speed | 1–65535 RPM | Model dependent | ★ |
| A4-06 | Stator resistance (asynchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent | ★ |
| A4-07 | Rotor resistance (asynchronous motor) | 0.001–65.535 Ω (AC drive power≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent | ★ |
| A4-08 | Leakage inductive reactance (asynchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent | ★ |
| A4-09 | Mutual inductive reactance (asynchronous motor) | 0.1–6553.5 mH (AC drive power ≤ 55 kW)<br>0.01–655.35 mH (AC drive power > 55 kW) | Model dependent | ★ |
| A4-10 | No-load current (asynchronous motor) | 0.01 A to A2-03 (AC drive power ≤ 55 kW)<br>0.1 A to A2-03 (AC drive power > 55 kW) | Model dependent | ★ |
| A4-16 | Stator resistance (synchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent | ★ |
| A4-17 | Shaft D inductance (synchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent | ★ |
| A4-18 | Shaft Q inductance (synchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent | ★ |
| A4-20 | Back EMF (synchronous motor) | 0.1–6553.5 V | Model dependent | ★ |
| A4-27 | Encoder pulses per revolution | 1–65535 | 1024 | ★ |
| A4-28 | Encoder type | 0: ABZ incremental encoder<br>1: UVW incremental encoder<br>2: Resolver<br>3: SIN/COS encoder<br>4: Wire-saving UVW encoder | 0 | ★ |





| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| A4-29 | Speed feedback PG selection | 0: Local PG<br>1: Extended PG<br>2: Pulse input (X5/X6) | 0 | ★ |
| A4-30 | A, B phase sequence of ABZ incremental encoder | 0: Forward<br>1: Reserve | 0 | ★ |
| A4-31 | Encoder installation angle | 0.0°–359.9° | 0.0° | ★ |
| A4-32 | U, V, W phase sequence of UVW encoder | 0: Forward<br>1: Reverse | 0 | ★ |
| A4-33 | UVW encoder angle offset | 0.0°–359.9° | 0.0° | ★ |
| A4-34 | Number of pole pairs of resolver | 1–65535 | 1 | ★ |
| A4-36 | Encoder wire-break fault detection time | 0.0s: No action<br>0.1–10.0s | 0.0s | ★ |
| A4-37 | Auto-tuning selection | 0: No auto-tuning<br>1: Asynchronous motor static auto-tuning<br>2: Asynchronous motor complete auto-tuning<br>11: Synchronous motor with-load auto-tuning<br>12: Synchronous motor no-load auto-tuning | 0 | ★ |
| A4-38 | Speed loop proportional gain 1 | 0–100 | 30 | ☆ |
| A4-39 | Speed loop integral time 1 | 0.01–10.00s | 0.50s | ☆ |
| A4-40 | Switchover frequency 1 | 0.00 to A4-43 | 5.00 Hz | ☆ |
| A4-41 | Speed loop proportional gain 2 | 0–100 | 15 | ☆ |
| A4-42 | Speed loop integral time 2 | 0.01–10.00s | 1.00s | ☆ |
| A4-43 | Switchover frequency 2 | A4-40 to maximum output frequency | 10.00 Hz | ☆ |
| A4-44 | Vector control slip gain | 50%–200% | 100% | ☆ |
| A4-45 | Time constant of speed loop filter | 0.000–0.100s | 0.000s | ☆ |
| A4-46 | Vector control over- excitation gain | 0–200 | 64 | ☆ |
| A4-47 | Torque upper limit source in speed control mode | 0: A4-48<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting (X5/X6)<br>5: Via communication<br>6: MIN(AI1,AI2)<br>7: MIN(AI1,AI2)<br>Full range of values 1–7 corresponds to the digital setting of A4-48. | 0 | ☆ |
| A4-48 | Digital setting of torque upper limit in speed control mode | 0.0%–200.0% | 150.0% | ☆ |
| A4-51 | Excitation adjustment proportional gain | 0–20000 | 2000 | ☆ |
| A4-52 | Excitation adjustment integral gain | 0–20000 | 1300 | ☆ |
| A4-53 | Torque adjustment proportional gain | 0–20000 | 2000 | ☆ |
| A4-54 | Torque adjustment integral gain | 0–20000 | 1300 | ☆ |
| A4-55 | Speed loop integral property | Unit's digit: Integral separated<br>0: Disabled<br>1: Enabled | 0 | ☆ |
| A4-56 | Field weakening mode of synchronous motor | 0: No field weakening<br>1: Direct calculation<br>2: Adjustment | 0 | ☆ |
| A4-57 | Field weakening degree of synchronous motor | 50%–500% | 100% | ☆ |
| A4-58 | Maximum field weakening current | 1%–300% | 50% | ☆ |

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| A4-59 | Field weakening automatic adjustment gain | 10%–500% | 100% | ☆ |
| A4-60 | Field weakening integral multiple | 2–10 | 2 | ☆ |
| A4-61 | Motor 2 control mode | 0: Sensorless flux vector control (SVC )<br>1: Closed-loop vector control (FVC)<br>2: Voltage/Frequency (V/F) control | 0 | ☆ |
| A4-62 | Motor 2 acceleration/ deceleration time | 0: Same as motor 1<br>1: Acceleration/Deceleration time 1<br>2: Acceleration/Deceleration time 2<br>3: Acceleration/Deceleration time 3<br>4: Acceleration/Deceleration time 4 | 0 | ☆ |
| A4-63 | Motor 2 torque boost | 0.0%: Automatic torque boost<br>0.1%–30.0% | Model dependent | ☆ |
| A4-65 | Motor 2 oscillation suppression gain | 0–100 | Model dependent | ☆ |
| Group A5: Control Optimization parameters | | | | |
| A5-00 | DPWM switchover frequency upper limit | 0.00–15.00 Hz | 12.00 Hz | ☆ |
| A5-01 | PWM modulation mode | 0: Asynchronous modulation<br>1: Synchronous modulation | 0 | ☆ |
| A5-02 | Dead zone compensation mode selection | 0: No compensation<br>1: compensation mode 1<br>2: compensation mode 2 | 1 | ☆ |
| A5-03 | Random PWM depth | 0: Random PWM invalid 1–10 | 0 | ☆ |
| A5-04 | Rapid current limit | 0: Disabled1: Enabled | 1 | ☆ |
| A5-05 | Current detection compensation | 0–100 | 5 | ☆ |
| A5-06 | Undervoltage threshold | 60.0%–140.0% | 100.0% | ☆ |
| A5-07 | SVC optimization mode selection | 0: No optimization<br>1: Optimization mode 1<br>2: Optimization mode 2 | 1 | ☆ |
| A5-08 | Dead-zone time adjustment | 100%–200% | 150% | ☆ |
| A5-09 | Overvoltage threshold | 200.0–2500.0 V | 2000.0 V | ☆ |
| Group A6: AI Curve Setting | | | | |
| A6-00 | AI curve 4 minimum input | -10.00 V to A6-02 | 0.00 V | ☆ |
| A6-01 | Corresponding setting of AI curve 4 minimum input | -100.0%–100.0% | 0.0% | ☆ |
| A6-02 | AI curve 4 inflexion 1 input | A6-00 to A6-04 | 3.00 V | ☆ |
| A6-03 | Corresponding setting of AI curve 4 inflexion 1 input | -100.0%–100.0% | 30.0% | ☆ |
| A6-04 | AI curve 4 inflexion 1 input | A6-02 to A6-06 | 6.00 V | ☆ |
| A6-05 | Corresponding setting of AI curve 4 inflexion 1 input | -100.0%–100.0% | 60.0% | ☆ |
| A6-06 | AI curve 4 maximum input | A6-06 to 10.00 V | 10.00 V | ☆ |
| A6-07 | Corresponding setting of AI curve 4 maximum input | -100.0%–100.0% | 100.0% | ☆ |
| A6-08 | AI curve 5 minimum input | -10.00 V to A6-10 | 0.00 V | ☆ |
| A6-09 | Corresponding setting of AI curve 5 minimum input | -100.0%–100.0% | 0.0% | ☆ |
| A6-10 | AI curve 5 inflexion 1 input | A6-08 to A6-12 | 3.00 V | ☆ |
| A6-11 | Corresponding setting of AI curve 5 inflexion 1 input | -100.0%–100.0% | 30.0% | ☆ |
| A6-12 | AI curve 5 inflexion 1 input | A6-10 to A6-14 | 6.00 V | ☆ |
| A6-13 | Corresponding setting of AI curve 5 inflexion 1 input | -100.0%–100.0% | 60.0% | ☆ |
| A6-14 | AI curve 5 maximum input | A6-14 to 10.00 V | 10.00 V | ☆ |
| A6-15 | Corresponding setting of AI curve 5 maximum input | -100.0%–100.0% | 100.0% | ☆ |
| A6-16 | Jump point of AI1 input corresponding setting | -100.0%–100.0% | 0.0% | ☆ |





| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| A6-17 | Jump amplitude of AI1 input corresponding setting | 0.0%–100.0% | 0.5% | ☆ |
| A6-18 | Jump point of AI2 input corresponding setting | -100.0%–100.0% | 0.0% | ☆ |
| A6-19 | Jump amplitude of AI2 input corresponding setting | 0.0%–100.0% | 0.5% | ☆ |
| A6-20 | Jump point of AI3 input corresponding setting | -100.0%–100.0% | 0.0% | ☆ |
| A6-21 | Jump amplitude of AI3 input corresponding setting | 0.0%–100.0% | 0.5% | ☆ |
| Group A7: User Programmable Function | | | | |
| A7-00 | User programmable function selection | 0: Disabled<br>1: Enabled | 0 | ★ |
| A7-01 | Selection of control mode of the output terminals on the control board | Unit's digit: FMR (DO2 used as digital output)<br>0: Controlled by the AC drive<br>1: Controlled by the user programmable card<br>Ten's digit: relay (TA-TB-TC)<br>Same as unit's digit<br>Hundred's digit: DO1<br>Same as unit's digit<br>Thousand's digit FMR (DO2 used as pulse output)<br>Same as unit's digit<br>Ten thousand's digit: AM<br>Same as unit's digit | 00000 | ★ |
| A7-02 | AI/AM/AO2 function selection of the user programmable card | 0: AI3 (voltage input), AO2 (voltage output)<br>1: AI3 (voltage input), AO2 (current output)<br>2: AI3 (current input), AO2 (voltage output)<br>3: AI3 (current input), AO2 (current output)<br>4: AI3 (PTC input), AO2 (voltage output)<br>5: AI3 (PTC input), AO2 (current output)<br>6: AI3 (PT100 input), AO2 (voltage output)<br>7: AI3 (PT100 input), AO2 (current output) | 0 | ★ |
| A7-03 | FMP output | 0.0%–100.0% | 0.0% | ☆ |
| A7-04 | AM output | 0.0%–100.0% | 0.0% | ☆ |
| A7-05 | Digital output | Binary setting<br>Unit's digit: FMR<br>Ten's digit: TA-TB-TC<br>Hundred's digit: DO | 1 | ☆ |
| A7-06 | Frequency setting through the user programmable card | -100.00% to 100.00% | 0.0% | ☆ |
| A7-07 | Torque setting through the user programmable card | -200.00% to 200.00% | 0.0% | ☆ |
| A7-08 | Command given by the user programmable card | 1: Forward RUN<br>2: Reverse RUN<br>3: Forward JOG<br>4: Reverse JOG<br>5: Coast to stop<br>6: Decelerate to stop<br>7: fault reset | 0 | ☆ |
| A7-09 | faults given by the user programmable card | 0: No fault<br>80–89: fault codes | 0 | ☆ |
| Group A8: Point-point Communication | | | | |
| A8-00 | Point-point communication selection | 0: Disabled<br>1: Enabled | 0 | ☆ |
| A8-01 | Master and slave selection | 0: Master<br>1: Slave | 0 | ☆ |

| Function Code | parameter Name | Setting Range | Default | Property |
|---|---|---|---|---|
| A8-02 | Slave following master command selection | 0: Slave not following running commands of the master<br>1: Slave following running commands of the master | 0 | ☆ |
| A8-03 | Usage of data received by slave | 0: Torque setting<br>1: Frequencysetting | 0 | ☆ |
| A8-04 | Zero offset of received data (torque) | -100.00%–100.00% | 0.00% | ★ |
| A8-05 | Gain of received data (torque) | -10.00–10.00 | 1.00 | ★ |
| A8-06 | Point-point communication interruption detection time | 0.0–10.0s | 1.0s | ☆ |
| A8-07 | Master data sending cycle | 0.001–10.000s | 0.001s | ☆ |
| A8-08 | Zero offset of received data zero offset (frequency) | -100.00%–100.00% | 0.00% | ★ |
| A8-09 | Gain of received data gain (frequency) | -10.00–10.00 | 1.00 | ★ |
| A8-10 | Runaway prevention coefficient | 0.00%–100.00% | 10.00% | ★ |
| Group AC: AI/AM/AO2 Correction | | | | |
| AC-00 | AI1 measured voltage 1 | 0.500–4.000 V | factory corrected | ☆ |
| AC-01 | AI1 displayed voltage 1 | 0.500–4.000 V | factory corrected | ☆ |
| AC-02 | AI1 measured voltage 2 | 6.000–9.999 V | factory corrected | ☆ |
| AC-03 | AI1 displayed voltage 2 | 6.000–9.999 V | factory corrected | ☆ |
| AC-04 | AI2 measured voltage 1 | 0.500–4.000 V | factory corrected | ☆ |
| AC-05 | AI2 displayed voltage 1 | 0.500–4.000 V | factory corrected | ☆ |
| AC-06 | AI2 measured voltage 2 | 6.000–9.999 V | factory corrected | ☆ |
| AC-07 | AI2 displayed voltage 2 | 9.999–10.000 V | factory corrected | ☆ |
| AC-08 | AI3 measured voltage 1 | 9.999–10.000 V | factory corrected | ☆ |
| AC-09 | AI3 displayed voltage 1 | 9.999–10.000 V | factory corrected | ☆ |
| AC-10 | AI3 measured voltage 2 | 9.999–10.000 V | factory corrected | ☆ |
| AC-11 | AI3 displayed voltage 2 | 9.999–10.000 V | factory corrected | ☆ |
| AC-12 | AM target voltage 1 | 0.500–4.000 V | factory corrected | ☆ |
| AC-13 | AM measured voltage 1 | 0.500–4.000 V | factory corrected | ☆ |
| AC-14 | AM target voltage 2 | 6.000–9.999 V | factory corrected | ☆ |
| AC-15 | AM measured voltage 2 | 6.000–9.999 V | factory corrected | ☆ |
| AC-16 | AO2 target voltage 1 | 0.500–4.000 V | factory corrected | ☆ |
| AC-17 | AO2 measured voltage 1 | 0.500–4.000 V | factory corrected | ☆ |
| AC-18 | AO2 target voltage 2 | 6.000–9.999 V | factory corrected | ☆ |
| AC-19 | AO2 measured voltage 2 | 6.000–9.999 V | factory corrected | ☆ |





7.2 Monitoring Parameters

| Function Code | Parameter Name | Min. Unit | Communication Address |
|---|---|---|---|
| Group U0: Standard Monitoring Parameters | | | |
| U0-00 | Running frequency (Hz) | 0.01 Hz | 7000H |
| U0-01 | Set frequency (Hz) | 0.01 Hz | 7001H |
| U0-02 | Bus voltage | 0.1 V | 7002H |
| U0-03 | Output voltage | 1 V | 7003H |
| U0-04 | Output current | 0.01 A | 7004H |
| U0-05 | Output power | 0.1 kW | 7005H |
| U0-06 | Output torque | 0.1% | 7006H |
| U0-07 | X state | 1 | 7007H |
| U0-08 | DO state | 1 | 7008H |
| U0-09 | AI1 voltage (V) | 0.01 V | 7009H |
| U0-10 | AI2 voltage (V)/current (mA) | 0.01 V/0.01 mA | 700AH |
| U0-11 | AI3 voltage (V) | 0.01 V | 700BH |
| U0-12 | Count value | 1 | 700CH |
| U0-13 | Length value | 1 | 700DH |
| U0-14 | Load speed | 1 | 700EH |
| U0-15 | PID setting | 1 | 700FH |
| U0-16 | PID feedback | 1 | 7010H |
| U0-17 | PLC stage | 1 | 7011H |
| U0-18 | Input pulse frequency (Hz) | 0.01 kHz | 7012H |
| U0-19 | Feedback speed | 0.01 Hz | 7013H |
| U0-20 | Remaining running time | 0.1 Min | 7014H |
| U0-21 | AI1 voltage before correction | 0.001 V | 7015H |
| U0-22 | AI2 voltage (V)/current (mA) before correction | 0.01 V/0.01 mA | 7016H |
| U0-23 | AI3 voltage before correction | 0.001 V | 7017H |
| U0-24 | Linear speed | 1 m/Min | 7018H |
| U0-25 | Accumulative power-on time | 1 Min | 7019H |
| U0-26 | Accumulative running time | 0.1 Min | 701AH |
| U0-27 | Pulse input frequency | 1 Hz | 701BH |
| U0-28 | Communication setting value | 0.01% | 701CH |
| U0-29 | Encoder feedback speed | 0.01 Hz | 701DH |
| U0-30 | Main frequency X | 0.01 Hz | 701EH |
| U0-31 | Auxiliary frequency Y | 0.01 Hz | 701FH |
| U0-32 | Viewing any register address value | 1 | 7020H |
| U0-33 | Synchronous motor rotor position | 0.1° | 7021H |
| U0-34 | Motor temperature | 1°C | 7022H |

| Function Code | Parameter Name | Min. Unit | Communication Address |
|---|---|---|---|
| U0-35 | Target torque | 0.1% | 7023H |
| U0-36 | Resolver position | 1 | 7024H |
| U0-37 | Power factor angle | 0.1° | 7025H |
| U0-38 | ABZ position | 1 | 7026H |
| U0-39 | Target voltage upon V/F separation | 1 V | 7027H |
| U0-40 | Output voltage upon V/F separation | 1V | 7028H |
| U0-41 | X state visual display | 1 | 7029H |
| U0-42 | DO state visual display | 1 | 702AH |
| U0-43 | X function state visual display 1 | 1 | 702BH |
| U0-44 | X function state visual display 2 | 1 | 702CH |
| U0-45 | Fault information | 1 | 702DH |
| U0-58 | Phase Z counting | 1 | 703AH |
| U0-59 | Current set frequency | 0.01% | 703BH |
| U0-60 | Current running frequency | 0.01% | 703CH |
| U0-61 | AC drive running state | 1 | 703DH |
| U0-62 | Current fault code | 1 | 703EH |
| U0-63 | Sent value of point-point communication | 0.01% | 703FH |
| U0-64 | Received value of point-point communication | 0.01% | 7040H |
| U0-65 | Torque upper limit | 0.1% | 7041H |





# Chapter 8 Description of Function Codes

## Group P0 Basic Parameters

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-00 | G/P type display | 1: G type (constant torque load)<br>2: P type (variable torque load e.g. fan and pump) | Model dependent |

This parameter is used to display the delivered model and cannot be modified

- 1: Applicable to constant torque load with rated parameters specifie
- 2: Applicable to variable torque load (fan and pump) with rated parameters specifie

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-01 | Motor 1 control mode | 0: Sensorless flux vector control (SVC)<br>1: Closed-loop vector control (FVC)<br>2: Voltage/Frequency (V/F) control | 0 |

- 0: Sensorless flux vector control (SVC)

  It indicates open-loop vector control, and is applicable to high-performance control applications such as machine tool, centrifuge, wire drawing machine and injection moulding machine. One AC drive can operate only one motor.

- 1: Closed-loop vector control (FVC)

  It is applicable to high-accuracy speed control or torque control applications such as high-speed paper making machine, crane and elevator. One AC drive can operate only one motor. An encoder must be installed at the motor side, and a PG card matching the encoder must be installed at the AC drive side.

- 2: Voltage/Frequency (V/F) control

  It is applicable to applications with low load requirements or applications where one AC drive operates multiple motors, such as fan and pump.

**Note**

- If vector control is used, motor auto-tuning must be performed because the advantages of vector control can only be utilized after correct motor parameters are obtained. Better performance can be achieved by adjusting speed regulator parameters in group P2 (or groups A2, A3, and A4 respectively for motor 2, 3, and 4).
- For the permanent magnetic synchronous motor (PMSM), the 9600 series does not support SVC FVC is used generally. In some low-power motor applications, you can also use V/F.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-02 | Command source selection | 0: Operation panel control (LED off)<br>1: Terminal control (LED on)<br>2: Communication control (LED blinking) | 0 |

It is used to determine the input channel of the AC drive control commands, such as run, stop, forward rotation, reverse rotation and jog operation. You can input the commands in the following three channels:

- 0: Operation panel control ("LOCAL/REMOT" indicator off)

  Commands are given by pressing keys RUN(FWD) and STOP/RESET on the operation panel.

- 1: Terminal control ("LOCAL/REMOT" indicator on)

  Commands are given by means of multifunctional input terminals with functions such as FWD, REV, JOGF, and JOGR.

- 2: Communication control ("LOCAL/REMOT" indicator blinking)

  Commands are given from host computer. If this parameter is set to 2, a communication card (Modbus RTU, PROFIBUS-DP card, CANlink card, user programmable card or CANopen card) must be installed.

  – If a PROFIBUS-DP card is selected and PZD1 data is valid, commands are given by means of PZD1 data.
  – If a user programmable card is selected, commands are written to A7-08 by means of the programmable card.
  – If any other card is selected, commands are written by means of the communication address 0x2000.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-03 | Main frequency source X selection | 0: Digital setting (non-retentive at power failure)<br>1: Digital setting (retentive at power failure)<br>2: AI1<br>3: AI2<br>4: AI3<br>5: Pulse setting (X5/X6)<br>6: Multi-reference<br>7: Simple PLC<br>8: PID<br>9: Communication setting | 0 |





It is used to select the setting channel of the main frequency. You can set the main frequency in the following 10 channels:

- 0: Digital setting (non-retentive at power failure)

  The initial value of the set frequency is the value of P0-08 (Preset frequency). You can change the set frequency by pressing △ and ▽ on the operation panel (or using the UP/DOWN function of input terminals).

  When the AC drive is powered on again after power failure, the set frequency reverts to the value of P0-08.

- 1: Digital setting (retentive at power failure)

  The initial value of the set frequency is the value of P0-08 (Preset frequency). You can change the set frequency by pressing keys △ and ▽ on the operation panel (or using the UP/DOWN function of input terminals).

  When the AC drive is powered on again after power failure, the set frequency is the value memorized at the moment of the last power failure.

  Note that P0-23 (Retentive of digital setting frequency upon power failure) determines whether the set frequency is memorized or cleared when the AC drive stops. It is related to stop rather than power failure.

- 2: AI1 (0–10 V voltage input)
  The factory default is the panel potentiometer, which can be switched by jumper J9.

- 3: AI2 (0–10 V voltage input or 4–20 mA current input, determined by jumper AI2)

- 4: AI3 (0–10 V voltage input)

  The frequency is set by analog input. The 9600 series control board provides two analog input (AI) terminals (AI1, AI2). Another AI terminal (AI3) is provided by the I/O extension card.

  The 9600 series provides five curves indicating the mapping relationship between the input voltage of AI1, AI2 and AI3 and the target frequency, three of which are linear (point-point) correspondence and two of which are four-point correspondence curves. You can set the curves by using function codes P4-13 to P4-27 and function codes in group A6, and select curves for AI1, AI2 and AI3 in P4-33.

  When AI is used as the frequency setting source, the corresponding value 100% of the voltage/current input corresponds to the value of P0-10 (Maximum frequency).

- 5: Pulse setting (X5/X6)

  The frequency is set by X5/X6 (high-speed pulse). The signal specification of pulse setting is 9–30 V (voltage range) and 0–100 kHz (frequency range). The corresponding value 100% of pulse setting corresponds to the value of P0-10 (Maximum frequency).

- 6: Multi-reference

  In multi-reference mode, combinations of different X terminal states correspond to different set frequencies. The 9600 series supports a maximum of 16 speeds implemented by 16 state combinations of four X terminals (allocated with functions 12 to 15) in Group PC. The multiple references indicate percentages of the value of P0-10 (Maximum frequency).

If a X terminal is used for the multi-reference function, you need to perform related setting in group P4.

- 7: Simple PLC

  When the simple programmable logic controller (PLC) mode is used as the frequency source, the running frequency of the AC drive can be switched over among the 16 frequency references. You can set the holding time and acceleration/deceleration time of the 16 frequency references. For details, refer to the descriptions of Group PC.

- 8: PID

  The output of PID control is used as the running frequency. PID control is generally used in on-site closed-loop control, such as constant pressure closed-loop control and constant tension closed-loop control.

  When applying PID as the frequency source, you need to set parameters of PID function in group PA.

- 9: Communication setting

  The frequency is set by means of communication.

  If the AC drive is a slave in point-point communication and receives data as the frequency source, data transmitted by the master is used as the set frequency. For details, see the description of group A8.

  If PROFIBUS-DP communication is valid and PZD1 is used for frequency setting, data transmitted by PDZ1 is directly used as the frequency source. The data format is -100.00% to 100.00%. 100% corresponds to the value of P0-10 (Maximum frequency).

  In other conditions, data is given by the host computer through the communication address 0x1000. The data format is -100.00% to 100.00%. 100.00% corresponds to the value of P0-10 (Maximum frequency).

  The 9600 series supports four host computer communication protocols: Modbus, PROFIBUS-DP, CANopen and CANlink. They cannot be used simultaneously.

  If the communication mode is used, a communication card must be installed. The 9600 series provides four optional communication cards and you can select one based on actual requirements. If the communication protocol is Modbus, PROFIBUS-DP or CANopen, the corresponding serial communication protocol needs to be selected based on the setting of P0-28.

  The CANlink protocol is always valid.





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-04 | Auxiliary frequency source Y selection | 0: Digital setting (non-retentive at power failure)<br>1: Digital setting (retentive at power failure)<br>2: AI1<br>3: AI2<br>4: AI3<br>5: Pulse setting (X5/X6)<br>6: Multi-reference<br>7: Simple PLC<br>8: PID<br>9: Communication setting | 0 |

When used as an independent frequency input channel (frequency source switched over from X to Y), the auxiliary frequency source Y is used in the same way as the main frequency source X (refer to P0-03).

When the auxiliary frequency source is used for operation (frequency source is "X and Y operation"), pay attention to the following aspects:

1) If the auxiliary frequency source Y is digital setting, the preset frequency (P0-08) does not take effect. You can directly adjust the set main frequency by pressing keys  and  on the operation panel (or using the UP/DOWN function of input terminals).

2) If the auxiliary frequency source is analog input (AI1, AI2 and AI3) or pulse setting, 100% of the input corresponds to the range of the auxiliary frequency Y (set in P0-05 and P0-06).

3) If the auxiliary frequency source is pulse setting, it is similar to analog input.

**Note**

The main frequency source X and auxiliary frequency source Y must not use the same channel. That is, P0-03 and P0-04 cannot be set to the same value.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-05 | Range of auxiliary frequency Y for X and Y operation | 0: Relative to maximum frequency<br>1: Relative to main frequency X | 0 |
| P0-06 | Range of auxiliary frequency Y for X and Y operation | 0%–150% | 0 |

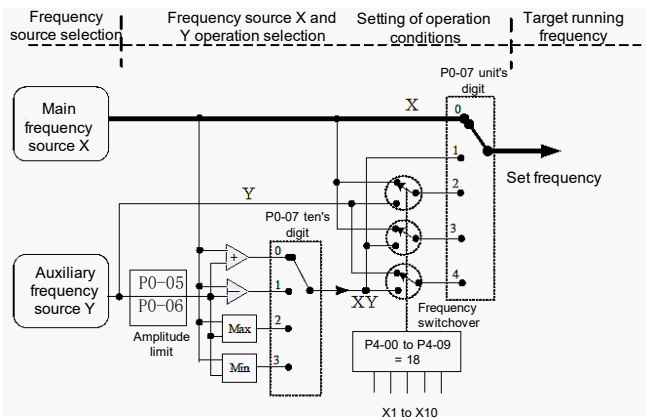
If X and Y operation is used, P0-05 and P0-06 are used to set the adjustment range of the auxiliary frequency source.

You can set the auxiliary frequency to be relative to either maximum frequency or main frequency X. If relative to main frequency X, the setting range of the auxiliary frequency Y varies according to the main frequency X.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-07 | Frequency source selection | Unit's digit (Frequency source selection)<br>0: Main frequency source X<br>1: X and Y operation<br>(operation relationship determined by ten's digit)<br>2: Switchover between X and Y<br>3: Switchover between X and "X and Y operation"<br>4: Switchover between Y and "X and Y operation"<br>Ten's digit (X and Y operation relationship)<br>0: X+Y<br>1: X-Y<br>2: Maximum<br>3: Minimum | 0 |

It is used to select the frequency setting channel. If the frequency source involves X and Y operation, you can set the frequency offset in P0-21 for superposition to the X and Y operation result, flexibly satisfying various requirements.

Figure 8-1 Frequency setting based on main frequency source X and auxiliary frequency source Y








| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-08 | Preset frequency | 0.00 to maximum frequency (valid when frequency source is digital setting) | 50 Hz |

If the frequency source is digital setting or terminal UP/DOWN, the value of this parameter is the initial frequency of the AC drive (digital setting).

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-09 | Rotation direction | 0: Same direction<br>1: Reverse direction | 0 |

You can change the rotation direction of the motor just by modifying this parameter without changing the motor wiring. Modifying this parameter is equivalent to exchanging any two of the motor's U, V, W wires.

**Note**

The motor will resume running in the original direction after parameter initialization. Do not use this function in applications where changing the rotating direction of the motor is prohibited after system commissioning is complete.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-10 | Maximum frequency | 50.00–650.00 Hz | 50.00 Hz |

When the frequency source is AI, pulse setting (X5/X6), or multi-reference, 100% of the input corresponds to the value of this parameter.

The output frequency of the 9600 series can reach up to 3200 Hz. To take both frequency reference resolution and frequency input range into consideration, you can set the number of decimal places for frequency reference in P0-22.

- If P0-22 is set to 1, the frequency reference resolution is 0.1 Hz. In this case, the setting range of P0-10 is 50.0 to 3200.0 Hz.
- If P0-22 is set to 2, the frequency reference resolution is 0.01 Hz. In this case, the setting range of P0-10 is 50.00 to 650.00 Hz.

**Note**

After the value of P0-22 is modified, the frequency resolution of all frequency related function codes change accordingly.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-11 | Source of frequency upper limit | 0: Set by P0-12<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting (X5/X6)<br>5: Communication setting | 0 |

It is used to set the source of the frequency upper limit, including digital setting (P0-12), AI, pulse setting or communication setting. If the frequency upper limit is set by means of AI1, AI2, AI3, X5 or communication, the setting is similar to that of the main frequency source X. For details, see the description of P0-03.

For example, to avoid runaway in torque control mode in winding application, you can set the frequency upper limit by means of analog input. When the AC drive reaches the upper limit, it will continue to run at this speed.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-12 | Frequency upper limit | Frequency lower limit (P0-14) to maximum frequency (P0-10) | 50.00 Hz |

This parameter is used to set the frequency upper limit.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-13 | Frequency upper limit offset | 0.00 Hz to maximum frequency (P0-10) | 0.00 Hz |

If the source of the frequency upper limit is analog input or pulse setting, the final frequency upper limit is obtained by adding the offset in this parameter to the frequency upper limit set in P0-11.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-14 | Frequency lower limit | 0.00 Hz to frequency upper limit (P0-12) | 0.00 Hz |

If the frequency reference is lower than the value of this parameter, the AC drive can stop, run at the frequency lower limit, or run at zero speed, determined by P8-14.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-15 | Carrier frequency | 0.5–16.0 kHz | Model dependent |

It is used to adjust the carrier frequency of the AC drive, helping to reduce the motor noise, avoiding the resonance of the mechanical system, and reducing the leakage current to the earth and interference generated by the AC drive.

If the carrier frequency is low, output current has high harmonics, and the power loss and temperature rise of the motor increase.

If the carrier frequency is high, power loss and temperature rise of the motor declines. However, the AC drive has an increase in power loss, temperature rise and interference.





Adjusting the carrier frequency will exert influences on the aspects listed in the following table.

Table 6-1 Influences of carrier frequency adjustmen

| Carrier frequency | Low | High |
|---|---|---|
| Motor noise | Large | Small |
| Output current waveform | Bad | Good |
| Motor temperature rise | High | Low |
| AC drive temperature rise | Low | High |
| Leakage current | Small | Large |
| External radiation interference | Small | Large |

The factory setting of carrier frequency varies with the AC drive power. If you need to modify the carrier frequency, note that if the set carrier frequency is higher than factory setting, it will lead to an increase in temperature rise of the AC drive's heatsink. In this case, you need to de-rate the AC drive. Otherwise, the AC drive may overheat and alarm.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-16 | Carrier frequency adjustment with temperature | 0: No<br>1: Yes | 1 |

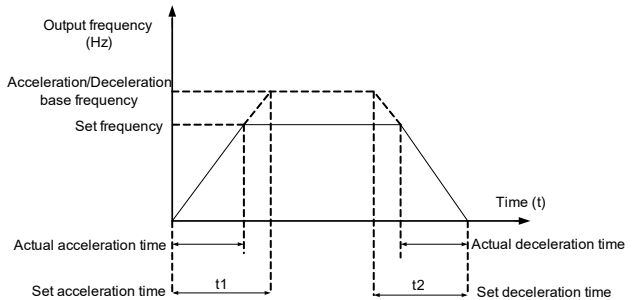
It is used to set whether the carrier frequency is adjusted based on the temperature. The AC drive automatically reduces the carrier frequency when detecting that the heatsink temperature is high. The AC drive resumes the carrier frequency to the set value when the heatsink temperature becomes normal. This function reduces the overheat alarms.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-17 | Acceleration time 1 | 0.00–650.00s (P0-19 = 2)<br>0.0–6500.0s (P0-19 = 1)<br>0–65000s (P0-19 = 0) | Model dependent |
| P0-18 | Deceleration time 1 | 0.00–650.00s (P0-19 = 2)<br>0.0–6500.0s (P0-19 = 1)<br>0–65000s (P0-19 = 0) | Model dependent |

Acceleration time indicates the time required by the AC drive to accelerate from 0 Hz to "Acceleration/Deceleration base frequency" (P0-25), that is, t1 in Figure 8-2.

Deceleration time indicates the time required by the AC drive to decelerate from "Acceleration/Deceleration base frequency" (P0-25) to 0 Hz, that is, t2 in Figure 8-2.

Figure 8-2 Acceleration/Deceleration time




The 9600 series provides totally four groups of acceleration/deceleration time for selection. You can perform switchover by using a X terminal.

- Group 1: P0-17, P0-18
- Group 2: P8-03, P8-04
- Group 3: P8-05, P8-06
- Group 4: P8-07, P8-08

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-19 | Acceleration/Deceleration time unit | 0:1s<br>1: 0.1s<br>2: 0.01s | 1 |

To satisfy requirements of different applications, the 9600 series provides three acceleration/deceleration time units, 1s, 0.1s and 0.01s.

**Note**

Modifying this parameter will make the displayed decimal places change and corresponding acceleration/deceleration time also change.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-21 | Frequency offset of auxiliary frequency source for X and Y operation | 0.00 Hz to maximum frequency (P0-10) | 0.00 Hz |

This parameter is valid only when the frequency source is set to "X and Y operation". The final frequency is obtained by adding the frequency offset set in this parameter to the X and Y operation result.





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-22 | Frequency reference resolution | 1: 0.1 Hz<br>2: 0.01 Hz | 2 |

It is used to set the resolution of all frequency-related parameters.

If the resolution is 0.1 Hz, the 9600 series can output up to 3200 Hz. If the resolution is 0.01 Hz, the 9600 series can output up to 650.00 Hz.

**Note**

- Modifying this parameter will make the decimal places of all frequency-related parameters change and corresponding frequency values change.
- This parameter is not resumed when factory setting is resumed.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-23 | Retentive of digital setting frequency upon power failure | 0: Not retentive<br>1: Retentive | 0 |

This parameter is valid only when the frequency source is digital setting.

If P0-23 is set to 0, the digital setting frequency value resumes to the value of P0-08 (Preset frequency) after the AC drive stops. The modification by using keys △ and ▽ or the terminal UP/DOWN function is cleared.

If P0-23 is set to 1, the digital setting frequency value is the set frequency at the moment when the AC drive stops. The modification y using keys △ and ▽ or the terminal UP/DOWN function remains effective.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-24 | Motor parameter group selection | 0: Motor parameter group 1<br>1: Motor parameter group 2<br>2: Motor parameter group 3<br>3: Motor parameter group 4 | 0 |

The 9600 series can drive four motors at different time. You can set the motor nameplate parameters respectively, independent motor auto-tuning, different control modes, and parameters related to running performance respectively for the four motors.

Motor parameter group 1 corresponds to groups P1 and P2. Motor parameter groups 2, 3 and 4 correspond to groups A2, A3 and A4 respectively.

You can select the current motor parameter group by using P0-24 or perform switchover between the motor parameter groups by means of a X terminal. If motor parameters selected by means of P0-24 conflict with those selected by means of X terminal, the selection by X is preferred.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-25 | Acceleration/Deceleration time base frequency | 0: Maximum frequency (P0-10)<br>1: Set frequency<br>2: 100 Hz | 0 |

The acceleration/deceleration time indicates the time for the AC drive to increase from 0 Hz to the frequency set in P0-25. If this parameter is set to 1, the acceleration/deceleration time is related to the set frequency. If the set frequency changes frequently, the motor's acceleration/deceleration also changes.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-26 | Base frequency for UP/DOWN modification during running | 0: Running frequency<br>1: Set frequency | 0 |

This parameter is valid only when the frequency source is digital setting.

It is used to set the base frequency to be modified by using keys △ and ▽ or the terminal UP/DOWN function. If the running frequency and set frequency are different, there will be a large difference between the AC drive's performance during the acceleration/deceleration process.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-27 | Binding command source to frequency source | Unit's digit (Binding operation panel command to frequency source) | 000 |
| | | 0: No binding<br>1: Frequency source by digital setting<br>2: AI1<br>3: AI2<br>4: AI3<br>5: Pulse setting (X5/X6)<br>6: Multi-reference<br>7: Simple PLC<br>8: PID<br>9: Communication setting | |
| | | Ten's digit (Binding terminal command to frequency source) | |
| | | 0–9, same as unit's digit | |
| | | Hundred's digit (Binding communication command to frequency source) | |
| | | 0–9, same as unit's digit) | |

It is used to bind the three running command sources with the nine frequency sources, facilitating to implement synchronous switchover.

For details on the frequency sources, see the description of P0-03 (Main frequency source X selection). Different running command sources can be bound to the same frequency source.





If a command source has a bound frequency source, the frequency source set in P0-03 to P0-07 no longer takes effect when the command source is effective.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-28 | Serial communication protocol | 0: Modbus protocol<br>1: PROFIBUS-DP bridge<br>2: CANopen bridge | 0 |

The 9600 series supports Modbus, PROFIBUS-DP bridge and CANopen bridge. Select a proper protocol based on the actual requirements.

## Group P1 Motor 1 Parameters

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P1-00 | Motor type selection | 0: Common asynchronous motor<br>1: Variable frequency asynchronous motor<br>2: Permanent magnetic synchronous motor | 1 |
| P1-01 | Rated motor power | 0.1–1000.0 kW | Model dependent |
| P1-02 | Rated motor voltage | 1–2000 V | Model dependent |
| P1-03 | Rated motor current | 0.01–655.35 A (AC drive power ≤ 55 kW)<br>0.1–6553.5 A (AC drive power > 55 kW) | Model dependent |
| P1-04 | Rated motor frequency | 0.01 Hz to maximum frequency | Model dependent |
| P1-05 | Rated motor rotational speed | 1–65535 RPM | Model dependent |

Set the parameters according to the motor nameplate no matter whether V/F control or vector control is adopted.

To achieve better V/F or vector control performance, motor auto-tuning is required. The motor auto-tuning accuracy depends on the correct setting of motor nameplate parameters.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P1-06 | Stator resistance (asynchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent |
| P1-07 | Rotor resistance (asynchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent |
| P1-08 | Leakage inductive reactance (asynchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P1-09 | Mutual inductive reactance (asynchronous motor) | 0.1–6553.5 mH (AC drive power ≤ 55 kW)<br>0.01–-655.35 mH (AC drive power > 55 kW) | Model dependent |
| P1-10 | No-load current (asynchronous motor) | 0.01 to P1-03 (AC drive power ≤ 55 kW)<br>0.1 to P1-03 (AC drive power > 55 kW) | Model dependent |

The parameters in P1-06 to F-10 are asynchronous motor parameters. These parameters are unavailable on the motor nameplate and are obtained by means of motor auto-tuning. Only P1-06 to P1-08 can be obtained through static motor auto-tuning. Through complete motor auto-tuning, encoder phase sequence and current loop PI can be obtained besides the parameters in P1-06 to P1-10.

Each time "Rated motor power" (P1-01) or "Rated motor voltage" (P1-02) is changed, the AC drive automatically restores values of P1-06 to P1-10 to the parameter setting for the common standard Y series asynchronous motor.

If it is impossible to perform motor auto-tuning onsite, manually input the values of these parameters according to data provided by the motor manufacturer.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P1-16 | Stator resistance (synchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent |
| P1-17 | Shaft D inductance (synchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent |
| P1-18 | Shaft Q inductance (synchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent |
| P1-20 | Back EMF (synchronous motor) | 0.1–6553.5 V | Model dependent |

P1-16 to F-20 are synchronous motor parameters. These parameters are unavailable on the nameplate of most synchronous motors and can be obtained by means of "Synchronous motor no-load auto-tuning". Through "Synchronous motor with-load auto-tuning", only the encoder phase sequence and installation angle can be obtained.

Each time "Rated motor power" (P1-01) or "Rated motor voltage" (P1-02) is changed, the AC drive automatically modifies the values of P1-16 to P1-20.

You can also directly set the parameters based on the data provided by the synchronous motor manufacturer.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P1-27 | Encoder pulses per revolution | 1–65535 | 1024 |

This parameter is used to set the pulses per revolution (PPR) of ABZ or UVW incremental encoder. In FVC mode, the motor cannot run properly if this parameter is set incorrectly.





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P1-28 | Encoder type | 0: ABZ incremental encoder<br>1: UVW incremental encoder<br>2: Resolver<br>3: SIN/COS encoder<br>4: Wire-saving UVW encoder | 0 |

The 9600 series supports multiple types of encoder. Different PG cards are required for different types of encoder. Select the appropriate PG card for the encoder used. Any of the five encoder types is applicable to synchronous motor. Only ABZ incremental encoder and resolver are applicable to asynchronous motor.

After installation of the PG card is complete, set this parameter properly based on the actual condition. Otherwise, the AC drive cannot run properly.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P1-30 | A/B phase sequence of ABZ incremental encoder | 0: Forward<br>1: Reserve | 0 |

This parameter is valid only for ABZ incremental encoder (P1-28 = 0) and is used to set the A/B phase sequence of the ABZ incremental encoder.

It is valid for both asynchronous motor and synchronous motor. The A/B phase sequence can be obtained through "Asynchronous motor complete auto-tuning" or "Synchronous motor no-load auto-tuning".

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P1-31 | Encoder installation angle | 0.0°–359.9° | 0.0° |

This parameter is applicable only to synchronous motor. It is valid for ABZ incremental encoder, UVW incremental encoder, resolver and wire-saving UVW encoder, but invalid for SIN/COS encoder.

It can be obtained through synchronous motor no-load auto-turning or with-load auto-tuning. After installation of the synchronous motor is complete, the value of this parameter must be obtained by motor auto-tuning. Otherwise, the motor cannot run properly.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P1-32 | U, V, W phase sequence of UVW encoder | 0: Forward<br>1: Reverse | 0 |
| P1-33 | UVW encoder angle offset | 0.0°–359.9° | 0.0° |

These two parameters are valid only when the UVW encoder is applied to a synchronous motor. They can be obtained by synchronous motor no-load auto-tuning or with-load auto-tuning. After installation of the synchronous motor is complete, the values of these two parameters must be obtained by motor auto-tuning. Otherwise, the motor cannot run properly.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P1-34 | Number of pole pairs of resolver | 1–65535 | 1 |

If a resolver is applied, set the number of pole pairs properly.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P1-36 | Encoder wire-break fault detection time | 0.0s: No action<br>0.1–10.0s | 0.0s |

This parameter is used to set the time that a wire-break fault lasts. If it is set to 0.0s, the AC drive does not detect the encoder wire-break fault. If the duration of the encoder wire-break fault detected by the AC drive exceeds the time set in this parameter, the AC drive reports Err20.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P1-37 | Auto-tuning selection | 0: No auto-tuning<br>1: Asynchronous motor static auto-tuning<br>2: Asynchronous motor complete auto-tuning<br>11: Synchronous motor with-load auto-tuning<br>12: Synchronous motor no-load auto-tuning | 0 |

- 0: No auto-tuning

  Auto-tuning is prohibited.

- 1: Asynchronous motor static auto-tuning

  It is applicable to scenarios where complete auto-tuning cannot be performed because the asynchronous motor cannot be disconnected from the load.

  Before performing static auto-tuning, properly set the motor type and motor nameplate parameters of P1-00 to P1-05 first. The AC drive will obtain parameters of P1-06 to P1-08 by static auto-tuning.

  Set this parameter to 1, and press RUN(FWD) . Then, the AC drive starts static auto-tuning.

- 2: Asynchronous motor complete auto-tuning

  To perform this type of auto-tuning, ensure that the motor is disconnected from the load. During the process of complete auto-tuning, the AC drive performs static auto-tuning first and then accelerates to 80% of the rated motor frequency within the acceleration time set in P0-17. The AC drive keeps running for a certain period and then decelerates to stop within deceleration time set in P0-18.

  Before performing complete auto-tuning, properly set the motor type, motor nameplate parameters of P1-00 to P1-05, "Encoder type" (P1-28) and "Encoder pulses per revolution" (P1-27) first.

  The AC drive will obtain motor parameters of P1-06 to P1-10, "A/B phase sequence of ABZ incremental encoder" (P1-30) and vector control current loop PI parameters of P2-13 to P2-16 by complete auto-tuning.





  Set this parameter to 2, and press RUN(FWD) . Then, the AC drive starts complete auto-tuning.

- 11: Synchronous motor with-load auto-tuning

  It is applicable to scenarios where the synchronous motor cannot be disconnected from the load. During with-load auto-tuning, the motor rotates at the speed of 10 PRM.

  Before performing with-load auto-tuning, properly set the motor type and motor nameplate parameters of P1-00 to P1-05 first.

  By with-load auto-tuning, the AC drive obtains the initial position angle of the synchronous motor, which is a necessary prerequisite of the motor's normal running. Before the first use of the synchronous motor after installation, motor auto-tuning must be performed.

  Set this parameter to 11, and press RUN(FWD) . Then, the AC drive starts with-load auto-tuning.

- 12: Synchronous motor no-load auto-tuning

  If the synchronous motor can be disconnected from the load, no-load auto-tuning is recommended, which will achieve better running performance compared with with-load auto-tuning.

  During the process of no-load auto-tuning, the AC drive performs with-load auto-tuning first and then accelerates to 80% of the rated motor frequency within the acceleration time set in P0-17. The AC drive keeps running for a certain period and then decelerates to stop within the deceleration time set in P0-18.

  Before performing no-load auto-tuning, properly set the motor type, motor nameplate parameters of P1-00 to P1-05, "Encoder type" (P1-28) and "Encoder pulses per revolution" (P1-27) and "Number of pole pairs of resolver" (P1-34) first.

  The AC drive will obtain motor parameters of P1-16 to P1-20, encoder related parameters of P1-30 to P1-33 and vector control current loop PI parameters of P2-13 to P2-16 by no-load auto-tuning.

  Set this parameter to 12, and press RUN(FWD) . Then, the AC drive starts no-load auto-tuning.

**Note**

Motor auto-tuning can be performed only in operation panel mode.

## Group P2 Vector Control Parameters

Group P2 is valid for vector control, and invalid for V/F control.

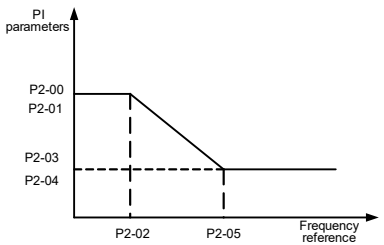
| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P2-00 | Speed loop proportional gain 1 | 0–100 | 30 |
| P2-01 | Speed loop integral time 1 | 0.01–10.00s | 0.50s |
| P2-02 | Switchover frequency 1 | 0.00 to P2-05 | 5.00 Hz |
| P2-03 | Speed loop proportional gain 2 | 0–100 | 20 |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P2-04 | Speed loop integral time 2 | 0.01–10.00s | 1.00s |
| P2-05 | Switchover frequency 2 | P2-02 to maximum output frequency | 10.00 Hz |

Speed loop PI parameters vary with running frequencies of the AC drive.

- If the running frequency is less than or equal to "Switchover frequency 1" (P2-02), the speed loop PI parameters are P2-00 and P2-01.
- If the running frequency is equal to or greater than "Switchover frequency 2" (P2-05), the speed loop PI parameters are P2-03 and P2-04.
- If the running frequency is between P2-02 and P2-05, the speed loop PI parameters are obtained from the linear switchover between the two groups of PI parameters, as shown in Figure 8-3.

Figure 8-3 Relationship between running frequencies and PI parameters




The speed dynamic response characteristics in vector control can be adjusted by setting the proportional gain and integral time of the speed regulator.

To achieve a faster system response, increase the proportional gain and reduce the integral time. Be aware that this may lead to system oscillation.

The recommended adjustment method is as follows:

If the factory setting cannot meet the requirements, make proper adjustment. Increase the proportional gain first to ensure that the system does not oscillate, and then reduce the integral time to ensure that the system has quick response and small overshoot.

**Note**

Improper PI parameter setting may cause too large speed overshoot, and overvoltage fault may even occur when the overshoot drops.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P2-06 | Vector control slip gain | 50%–200% | 100% |

For SVC, it is used to adjust speed stability accuracy of the motor. When the motor with load runs at a very low speed, increase the value of this parameter; when the motor with load runs at a very large speed, decrease the value of this parameter.





For FVC, it is used to adjust the output current of the AC drive with same load.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P2-07 | Time constant of speed loop filter | 0.000–0.100s | 0.000s |

In the vector control mode, the output of the speed loop regulator is torque current reference. This parameter is used to filter the torque references. It need not be adjusted generally and can be increased in the case of large speed fluctuation. In the case of motor oscillation, decrease the value of this parameter properly.

If the value of this parameter is small, the output torque of the AC drive may fluctuate greatly, but the response is quick.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P2-08 | Vector control over-excitation gain | 0–200 | 64 |

During deceleration of the AC drive, over-excitation control can restrain rise of the bus voltage to avoid the overvoltage fault. The larger the over-excitation gain is, the better the restraining effect is.

Increase the over-excitation gain if the AC drive is liable to overvoltage error during deceleration. Too large over-excitation gain, however, may lead to an increase in output current. Therefore, set this parameter to a proper value in actual applications.

Set the over-excitation gain to 0 in applications of small inertia (the bus voltage will not rise during deceleration) or where there is a braking resistor.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P2-09 | Torque upper limit source in speed control mode | 0: P2-10<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting (X5/X6)<br>5: Communication setting | 0 |
| P2-10 | Digital setting of torque upper limit in speed control mode | 0.0%–200.0% | 150.0% |

In the speed control mode, the maximum output torque of the AC drive is restricted by P2-09. If the torque upper limit is analog, pulse or communication setting, 100% of the setting corresponds to the value of P2-10, and 100% of the value of P2-10 corresponds to the AC drive rated torque.

For details on the AI1, AI2 and AI3 setting, see the description of the AI curves in group P4.

For details on the pulse setting, see the description of P4-28 to P4-32.

When the AC drive is in communication with the master, if P2-09 is set to 5 “communication setting”, P2-10 “Digital setting of torque upper limit in speed control mode” can be set via communication from the master.

In other conditions, the host computer writes data -100.00% to 100.00% by the communication address 0x1000, where 100.0% corresponds to the value of P2-10. The communication protocol can be Modbus, CANopen, CANlink or PROFIBUS-DP.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P2-13 | Excitation adjustment proportional gain | 0–60000 | 2000 |
| P2-14 | Excitation adjustment integral gain | 0–60000 | 1300 |
| P2-15 | Torque adjustment proportional gain | 0–60000 | 2000 |
| P2-16 | Torque adjustment integral gain | 0–60000 | 1300 |

These are current loop PI parameters for vector control. These parameters are automatically obtained through "Asynchronous motor complete auto-tuning" or "Synchronous motor no-load auto-tuning", and need not be modified

The dimension of the current loop integral regulator is integral gain rather than integral time.

Note that too large current loop PI gain may lead to oscillation of the entire control loop. Therefore, when current oscillation or torque fluctuation is great, manually decrease the proportional gain or integral gain here.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P2-18 | Field weakening mode of synchronous motor | 0: No field weakening<br>1: Direct calculation<br>2: Automatic adjustment | 1 |
| P2-19 | Field weakening depth of synchronous motor | 50%–500% | 100% |
| P2-20 | Maximum field weakening current | 1%–300% | 50% |
| P2-21 | Field weakening automatic adjustment gain | 10%–500% | 100% |
| P2-22 | Field weakening integral multiple | 2–10 | 2 |

These parameters are used to set field weakening control for the synchronous moto .

If P2-18 is set to 0, field weakening control on the synchronous motor is disabled. In this case, the maximum rotational speed is related to the AC drive bus voltage. If the motor's maximum rotational speed cannot meet the requirements, enable the field weakening function to increase the speed.

The 9600 series provides two field weakening modes: direct calculation and automatic adjustment.

- In direct calculation mode, directly calculate the demagnetized current and manually adjust the demagnetized current by means of P2-19. The smaller the demagnetized current is, the smaller the total output current is. However, the desired field weakening effect may not be achieved.
- In automatic adjustment mode, the best demagnetized current is selected automatically. This may influence the system dynamic performance or cause instabilit .

The adjustment speed of the field weakening current can be changed by modifying the values of P2-21 and P2-22. A very quick adjustment may cause instability. Therefore, generally do not modify them manually.





## Group P3 V/F Control Parameters

Group P3 is valid only for V/F control.

The V/F control mode is applicable to low load applications (fan or pump) or applications where one AC drive operates multiple motors or there is a large difference between the AC drive power and the motor power.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P3-00 | V/F curve setting | 0: Linear V/F<br>1: Multi-point V/F<br>2: Square V/F<br>3: 1.2-power V/F<br>4: 1.4-power V/F<br>6: 1.6-power V/F<br>8: 1.8-power V/F<br>9: Reserved<br>10: V/F complete separation<br>11: V/F half separation | 0 |

- 0: Linear V/F

  It is applicable to common constant torque load.

- 1: Multi-point V/F

  It is applicable to special load such as dehydrator and centrifuge. Any such V/F curve can be obtained by setting parameters of P3-03 to P3-08.

- 2: Square V/F

  It is applicable to centrifugal loads such as fan and pump.

- 3 to 8: V/F curve between linear V/F and square V/F

- 10: V/F complete separation

  In this mode, the output frequency and output voltage of the AC drive are independent. The output frequency is determined by the frequency source, and the output voltage is determined by "Voltage source for V/F separation" (P3-13).

  It is applicable to induction heating, inverse power supply and torque motor control.

- 11: V/F half separation

  In this mode, V and F are proportional and the proportional relationship can be set in P3-13. The relationship between V and F are also related to the rated motor voltage and rated motor frequency in Group P1.

  Assume that the voltage source input is X (0 to 100%), the relationship between V and F is:

  V/F = 2 x X x (Rated motor voltage)/(Rated motor frequency)

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P3-01 | Torque boost | 0.0%–30% | Model dependent |
| P3-02 | Cut-off frequency of torque boost | 0.00 Hz to maximum output frequency | 50.00 Hz |

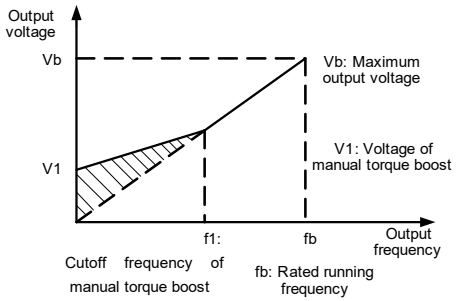
To compensate the low frequency torque characteristics of V/F control, you can boost the output voltage of the AC drive at low frequency by modifying P3-01.

If the torque boost is set to too large, the motor may overheat, and the AC drive may suffer overcurrent.

If the load is large and the motor startup torque is insufficient, increase the value of P3-01. If the load is small, decrease the value of P3-01. If it is set to 0.0, the AC drive performs automatic torque boost. In this case, the AC drive automatically calculates the torque boost value based on motor parameters including the stator resistance.

P3-02 specifies the frequency under which torque boost is valid. Torque boost becomes invalid when this frequency is exceeded, as shown in the following figure.

Figure 8-4 Manual torque boost




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P3-03 | Multi-point V/F frequency 1 (F1) | 0.00 Hz to P3-05 | 0.00 Hz |
| P3-04 | Multi-point V/F voltage 1 (V1) | 0.0%–100.0% | 0.0% |
| P3-05 | Multi-point V/F frequency 2 (F2 | P3-03 to P3-07 | 0.00 Hz |
| P3-06 | Multi-point V/F voltage 2 (V2) | 0.0%–100.0% | 0.0% |
| P3-07 | Multi-point V/F frequency 3 (F3 | P3-05 to rated motor frequency (P1-04) Note:The rated frequencies of motors 2, 3, and 4 are respectively set in A2-04, A3-04, and A4-04. | 0.00 Hz |
| P3-08 | Multi-point V/F voltage 3 (V3) | 0.0%–100.0% | 0.0% |





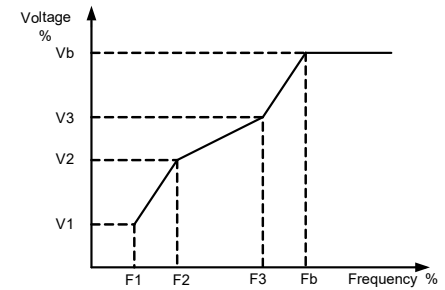
These six parameters are used to define the multi-point V/F curve

The multi-point V/F curve is set based on the motor's load characteristic. The relationship between voltages and frequencies is:

V1 < V2 < V3, F1 < F2 < F3

At low frequency, higher voltage may cause overheat or even burnt out of the motor and overcurrent stall or overcurrent protection of the AC drive.

Figure 8-5 Setting of multi-point V/F curve




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P3-09 | V/F slip compensation gain | 0%–200.0% | 0.0% |

This parameter is valid only for the asynchronous motor.

It can compensate the rotational speed slip of the asynchronous motor when the load of the motor increases, stabilizing the motor speed in case of load change. If this parameter is set to 100%, it indicates that the compensation when the motor bears rated load is the rated motor slip. The rated motor slip is automatically obtained by the AC drive through calculation based on the rated motor frequency and rated motor rotational speed in group P1.
Generally, if the motor rotational speed is different from the target speed, slightly adjust this parameter.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P3-10 | V/F over-excitation gain | 0–200 | 64 |

During deceleration of the AC drive, over-excitation can restrain rise of the bus voltage, preventing the overvoltage fault. The larger the over-excitation is, the better the restraining result is.

Increase the over-excitation gain if the AC drive is liable to overvoltage error during deceleration. However, too large over-excitation gain may lead to an increase in the output current. Set P3-09 to a proper value in actual applications.

Set the over-excitation gain to 0 in the applications where the inertia is small and the bus voltage will not rise during motor deceleration or where there is a braking resistor.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P3-11 | V/F oscillation suppression gain | 0–100 | Model dependent |

Set this parameter to a value as small as possible in the prerequisite of efficient oscillation suppression to avoid influence on V/F control

Set this parameter to 0 if the motor has no oscillation. Increase the value properly only when the motor has obvious oscillation. The larger the value is, the better the oscillation suppression result will be.

When the oscillation suppression function is enabled, the rated motor current and no-load current must be correct. Otherwise, the V/F oscillation suppression effect will not be satisfactory.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P3-13 | Voltage source for V/F separation | 0: Digital setting (P3-14)<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting (X5/X6)<br>5: Multi-reference<br>6: Simple PLC<br>7: PID<br>8: Communication setting<br>100.0% corresponds to the rated motor voltage (P1-02, A4-02, A5-02, A6-02). | 0 |
| P3-14 | Voltage digital setting for V/F separation | 0 V to rated motor voltage | 0 V |

V/F separation is generally applicable to scenarios such as induction heating, inverse power supply and motor torque control.

If V/F separated control is enabled, the output voltage can be set in P3-14 or by means of analog, multi-reference, simple PLC, PID or communication. If you set the output voltage by means of non-digital setting, 100% of the setting corresponds to the rated motor voltage. If a negative percentage is set, its absolute value is used as the effective value.

- 0: Digital setting (P3-14)

  The output voltage is set directly in P3-14.
- 1: AI1; 2: AI2; 3: AI3

  The output voltage is set by AI terminals.
- 4: Pulse setting (X5/X6)

  The output voltage is set by pulses of the terminal X5/X6.





Pulse setting specification: voltage range 9–30 , frequency range 0–100 kHz

- 5: Multi-reference

  If the voltage source is multi-reference, parameters in group P4 and PC must be set to determine the corresponding relationship between setting signal and setting voltage. 100.0% of the multi-reference setting in group PC corresponds to the rated motor voltage.
- 6: Simple PLC

  If the voltage source is simple PLC mode, parameters in group PC must be set to determine the setting output voltage.
- 7: PID

  The output voltage is generated based on PID closed loop. For details, see the description of PID in group PA.
- 8: Communication setting

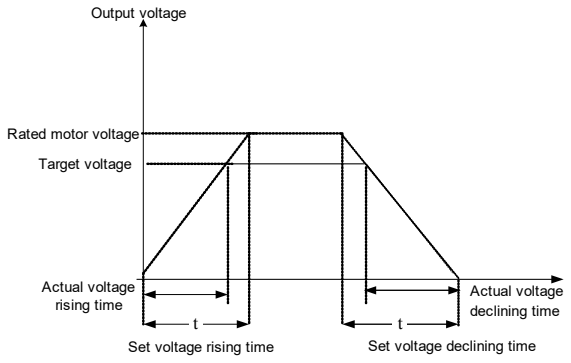
  The output voltage is set by the host computer by means of communication.

The voltage source for V/F separation is set in the same way as the frequency source. For details, see P0-03. 100.0% of the setting in each mode corresponds to the rated motor voltage. If the corresponding value is negative, its absolute value is used.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P3-15 | Voltage rise time of V/F separation | 0.0–1000.0s | 0.0s |

P3-15 indicates the time required for the output voltage to change from 0 V to the rated motor voltage shown as t in the following figure.

Figure 8-6 Voltage of V/F separation



## Group P4 Input Terminals

The 9600 series provides six X terminals (X5/X6 can be used for high-speed pulse input) and two analog input (AI) terminals. The optional extension card provides another four X terminals (X6 to X10) and an AI terminal (AI3).

| Function Code | Parameter Name | Default | Remark |
|---|---|---|---|
| P4-00 | X1 function selection | 0 | Standard |
| P4-01 | X2 function selection | 0 | Standard |
| P4-02 | X3 function selection | 9: Fault reset (RESET) | Standard |
| P4-03 | X4 function selection | 12: Multi-reference terminal 1 | Standard |
| P4-04 | X5 function selection | 1 | Standard |
| P4-05 | X6 function selection | 2 | Extended |
| P4-06 | X7 function selection | 0 | Extended |
| P4-07 | X8 function selection | 0 | Extended |
| P4-08 | X9 function selection | 0 | Extended |
| P4-09 | X10 function selection | 0 | Extended |

The following table lists the functions available for the X terminals.

Table 6-1 Functions of X terminals

| Value | Function | Description |
|---|---|---|
| 0 | No function | Set 0 for reserved terminals to avoid malfunction. |
| 1 | Forward RUN (FWD) | The terminal is used to control forward or reverse RUN of the AC drive. |
| 2 | Reverse RUN (REV) | |
| 3 | Three-line control | The terminal determines three-line control of the AC drive. For details, see the description of P4-11. |
| 4 | Forward JOG (FJOG) | FJOG indicates forward JOG running, while RJOG indicates reverse JOG running. The JOG frequency, acceleration time and deceleration time are described respectively in P8-00, P8-01 and P8-02. |
| 5 | Reverse JOG (RJOG) | |
| 6 | Terminal UP | If the frequency is determined by external terminals, the terminals with the two functions are used as increment and decrement commands for frequency modification.<br>When the frequency source is digital setting, they are used to adjust the frequency. |
| 7 | Terminal DOWN | |
| 8 | Coast to stop | The AC drive blocks its output, the motor coasts to rest and is not controlled by the AC drive. It is the same as coast to stop described in P6-10. |
| 9 | Fault reset (RESET) | The terminal is used for fault reset function, the same as the function of RESET key on the operation panel. Remote fault reset is implemented by this function. |





| Value | Function | Description |
|---|---|---|
| 10 | RUN pause | The AC drive decelerates to stop, but the running parameters are all memorized, such as PLC, swing frequency and PID parameters. After this function is disabled, the AC drive resumes its status before stop. |
| 11 | Normally open (NO) input of external fault | If this terminal becomes ON, the AC drive reports Err15 and performs the fault protection action. For more details, see the description of P9-47. |
| 12 | Multi-reference terminal 1 | The setting of 16 speeds or 16 other references can be implemented through combinations of 16 states of these four terminals. |
| 13 | Multi-reference terminal 2 | |
| 14 | Multi-reference terminal 3 | |
| 15 | Multi-reference terminal 4 | |
| 16 | Terminal 1 for acceleration/deceleration time selection | Totally four groups of acceleration/deceleration time can be selected through combinations of two states of these two terminals. |
| 17 | Terminal 2 for acceleration/deceleration time selection | |
| 18 | Frequency source switchover | The terminal is used to perform switchover between two frequency sources according to the setting in P0-07. |
| 19 | UP and DOWN setting clear (terminal, operation panel) | If the frequency source is digital setting, the terminal is used to clear the modification by using the UP/DOWN function or the increment/decrement key on the operation panel, returning the set frequency to the value of P0-08. |
| 20 | Command source switchover terminal | If the command source is set to terminal control (P0-02 = 1), this terminal is used to perform switchover between terminal control and operation panel control.<br>If the command source is set to communication control (P0-02 = 2), this terminal is used to perform switchover between communication control and operation panel control. |
| 21 | Acceleration/Deceleration prohibited | It enables the AC drive to maintain the current frequency output without being affected by external signals (except the STOP command). |
| 22 | PID pause | PID is invalid temporarily. The AC drive maintains the current frequency output without supporting PID adjustment of frequency source. |
| 23 | PLC status reset | The terminal is used to restore the original status of PLC control for the AC drive when PLC control is started again after a pause. |
| 24 | Swing pause | The AC drive outputs the central frequency, and the swing frequency function pauses. |
| 25 | Counter input | This terminal is used to count pulses. |
| 26 | Counter reset | This terminal is used to clear the counter status. |
| 27 | Length count input | This terminal is used to count the length. |
| 28 | Length reset | This terminal is used to clear the length. |

| Value | Function | Description |
|---|---|---|
| 29 | Torque control prohibited | The AC drive is prohibited from torque control and enters the speed control mode. |
| 30 | Pulse input (enabled only for X5/X6) | If X5/X6 is used for pulse input,X1,X2 can be set to 1, 2 as FWD and REV |
| 31 | Reserved | Reserved. |
| 32 | Immediate DC braking | After this terminal becomes ON, the AC drive directly switches over to the DC braking state. |
| 33 | Normally closed (NC) input of external fault | After this terminal becomes ON, the AC drive reports Err15 and stops. |
| 34 | Frequency modification forbidden | After this terminal becomes ON, the AC drive does not respond to any frequency modification. |
| 35 | Reverse PID action direction | After this terminal becomes ON, the PID action direction is reversed to the direction set in PA-03. |
| 36 | External STOP terminal 1 | In operation panel mode, this terminal can be used to stop the AC drive, equivalent to the function of the STOP key on the operation panel. |
| 37 | Command source switchover terminal 2 | It is used to perform switchover between terminal control and communication control. If the command source is terminal control, the system will switch over to communication control after this terminal becomes ON. |
| 38 | PID integral pause | After this terminal becomes ON, the integral adjustment function pauses. However, the proportional and differentiation adjustment functions are still valid. |
| 39 | Switchover between main frequency source X and preset frequency | After this terminal becomes ON, the frequency source X is replaced by the preset frequency set in P0-08. |
| 40 | Switchover between auxiliary frequency source Y and preset frequency | After this terminal is enabled, the frequency source Y is replaced by the preset frequency set in P0-08. |
| 41 | Motor selection terminal 1 | Switchover among the four groups of motor parameters can be implemented through the four state combinations of these two terminals. |
| 42 | Motor selection terminal 2 | |
| 43 | PID parameter switchover | If the PID parameters switchover performed by means of X terminal (PA-18 = 1), the PID parameters are PA-05 to PA-07 when the terminal becomes OFF; the PID parameters are PA-15 to PA-17 when this terminal becomes ON. |
| 44 | User-defined fault 1 | If these two terminals become ON, the AC drive reports Err27 and Err28 respectively, and performs fault protection actions based on the setting in P9-49. |
| 45 | User-defined fault 2 | |
| 46 | Speed control/Torque control switchover | This terminal enables the AC drive to switch over between speed control and torque control. When this terminal becomes OFF, the AC drive runs in the mode set in A0-00. When this terminal becomes ON, the AC drive switches over to the other control mode. |





| Value | Function | Description |
|---|---|---|
| 47 | Emergency stop | When this terminal becomes ON, the AC drive stops within the shortest time. During the stop process, the current remains at the set current upper limit. This function is used to satisfy the requirement of stopping the AC drive in emergency state. |
| 48 | External STOP terminal 2 | In any control mode (operation panel, terminal or communication), it can be used to make the AC drive decelerate to stop. In this case, the deceleration time is deceleration time 4. |
| 49 | Deceleration DC braking | When this terminal becomes ON, the AC drive decelerates to the initial frequency of stop DC braking and then switches over to DC braking state. |
| 50 | Clear the current running time | When this terminal becomes ON, the AC drive's current running time is cleared. This function must be supported by P8-42 and P8-53. |
| 51 | Switchover between two-line mode and three-line mode | It is used to perform switchover between two-line control and three-line control. If P4 -11 is set to Two-line mode 1, the system switches over to three-line mode 1 when the X allocated with this function becomes ON |

The four multi-reference terminals have 16 state combinations, corresponding to 16 reference values, as listed in the following table.

Table 6-2 State combinations of the four multi-reference terminals

| K4 | K3 | K2 | K1 | Reference Setting | Corresponding Parameter |
|---|---|---|---|---|---|
| OFF | OFF | OFF | OFF | Reference 0 | PC-00 |
| OFF | OFF | OFF | ON | Reference 1 | PC-01 |
| OFF | OFF | ON | OFF | Reference 2 | PC-02 |
| OFF | OFF | ON | ON | Reference 3 | PC-03 |
| OFF | ON | OFF | OFF | Reference 4 | PC-04 |
| OFF | ON | OFF | ON | Reference 5 | PC-05 |
| OFF | ON | ON | OFF | Reference 6 | PC-06 |
| OFF | ON | ON | ON | Reference 7 | PC-07 |
| ON | OFF | OFF | OFF | Reference 8 | PC-08 |
| ON | OFF | OFF | ON | Reference 9 | PC-09 |
| ON | OFF | ON | OFF | Reference 10 | PC-10 |
| ON | OFF | ON | ON | Reference 11 | PC-11 |
| ON | ON | OFF | OFF | Reference 12 | PC-12 |
| ON | ON | OFF | ON | Reference 13 | PC-13 |
| ON | ON | ON | OFF | Reference 14 | PC-14 |
| ON | ON | ON | ON | Reference 15 | PC-15 |

If the frequency source is multi-reference, the value 100% of PC-00 to PC-15 corresponds to the value of P0-10 (Maximum frequency).

Besides the multi-speed function, the multi-reference can be also used as the PID setting source or the voltage source for V/F separation, satisfying the requirement on switchover of different setting values.

Two terminals for acceleration/deceleration time selection have four state combinations, as listed in the following table.

Table 6-3 State combinations of two terminals for acceleration/deceleration time selection

| Terminal 2 | Terminal 1 | Acceleration/Deceleration Time Selection | Corresponding Parameters |
|---|---|---|---|
| OFF | OFF | Acceleration/Deceleration time 1 | P0-17, P0-18 |
| OFF | ON | Acceleration/Deceleration time 2 | P8-03, P8-04 |
| ON | OFF | Acceleration/Deceleration time 3 | P8-05, P8-06 |
| ON | ON | Acceleration/Deceleration time 4 | P8-07, P8-08 |

Two motor selection terminals have four state combinations, corresponding to four motors, as listed in the following table.

Table 6-4 State combinations of two motor selection terminals

| Terminal 2 | Terminal 1 | Selected Motor | Corresponding Parameters |
|---|---|---|---|
| OFF | OFF | Motor 1 | Group P1 Group P2 |
| OFF | ON | Motor 2 | Group A2 |
| ON | OFF | Motor 3 | Group A3 |
| ON | ON | Motor 4 | Group A4 |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-10 | X filter time | 0.000–1.000s | 0.010s |

It is used to set the software filter time of X terminal status. If X terminals are liable to interference and may cause malfunction, increase the value of this parameter to enhance the anti-interference capability. However, increase of X filter time will reduce the response of X terminals.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-11 | Terminal command mode | 0: Two-line mode 1<br>1: Two-line mode 2<br>2: Three-line mode 1<br>3: Three-line mode 2 | 0 |

This parameter is used to set the mode in which the AC drive is controlled by external terminals. The following uses X5, X6 and X3 among X1 to X10 as an example, with allocating functions of X5, X6 and X3 by setting P4-04 to P4-05.





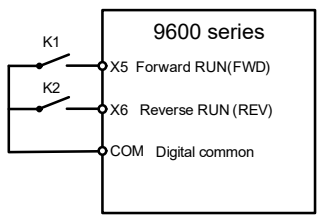
- 0: Two-line mode 1

  It is the most commonly used two-line mode, in which the forward/reverse rotation of the motor is decided by X5 and X6. The parameters are set as below:

| Function Code | Parameter Name | Value | Function Description |
|---|---|---|---|
| P4-11 | Terminal command mode | 0 | Two-line 1 |
| P4-04 | X5 function selection | 1 | Forward RUN (FWD) |
| P4-05 | X6 function selection | 2 | Reverse RUN (REV) |

Figure 8-7 Setting of two-line mode 1

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




As shown in the preceding figure, when only K1 is ON, the AC drive instructs forward rotation. When only K2 is ON, the AC drive instructs reverse rotation. When K1 and K2 are ON or OFF simultaneously, the AC drive stops.

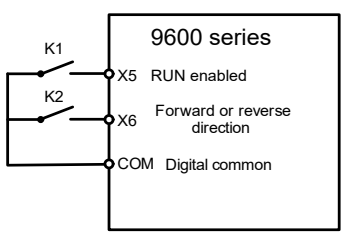
- 1: Two-line mode 2

  In this mode, X5 is RUN enabled terminal, and X6 determines the running direction. The parameters are set as below:

| Function Code | Parameter Name | Value | Function Description |
|---|---|---|---|
| P4-11 | Terminal command mode | 1 | Two-line 2 |
| P4-04 | X5 function selection | 1 | RUN enabled |
| P4-05 | X6 function selection | 2 | Forward or reverse direction |

Figure 8-8 Setting of two-line mode 2

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



As shown in the preceding figure, if K1 is ON, the AC drive instructs forward rotation when K2 is OFF, and instructs reverse rotation when K2 is ON. If K1 is OFF, the AC drive stops.

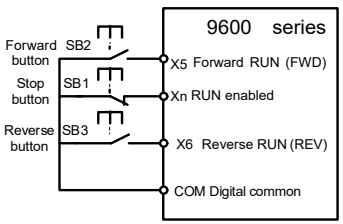
- 2: Three-line mode 1

In this mode, Xn is RUN enabled terminal, and the direction is decided by X5 and X6.

The parameters are set as below:

| Function Code | Parameter Name | Value | Function Description |
|---|---|---|---|
| P4-11 | Terminal command mode | 2 | Three-line 1 |
| P4-04 | X5 function selection | 1 | Forward RUN (FWD) |
| P4-05 | X6 function selection | 2 | Reverse RUN (REV) |
| P4-02 | Xn function selection | 3 | Three-line control |

Figure 8-9 Setting of three-line mode 1




As shown in the preceding figure, if SB1 is ON, the AC drive instructs forward rotation when SB2 is pressed to be ON and instructs reverse rotation when SB3 is pressed to be ON. The AC drive stops immediately after SB1 becomes OFF. During normal startup and running, SB1 must remain ON. The AC drive's running state is determined by the final actions on SB1, SB2 and SB3

- 3: Three-line mode 2

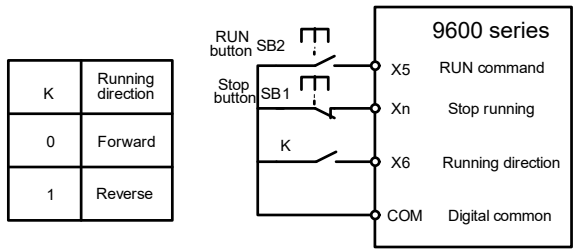
In this mode, Xn is RUN enabled terminal. The RUN command is given by X5 and the direction is decided by X6. The parameters are set as below:

| Function Code | Parameter Name | Value | Function Description |
|---|---|---|---|
| P4-11 | Terminal command mode | 3 | Three-line 2 |
| P4-04 | X5 function selection | 1 | RUN enabled |
| P4-05 | X6 function selection | 2 | Forward or reverse direction |
| P4-02 | Xn function selection | 3 | Three-line control |





Figure 8-10 Setting of three-line mode 2




As shown in the preceding figure, if SB1 is ON, the AC drive starts running when SB2 is pressed to be ON; the AC drive instructs forward rotation when K is OFF and instructs reverse rotation when K is ON. The AC drive stops immediately after SB1 becomes OFF. During normal startup and running, SB1 must remain ON. The AC drive's running state is determined by the final actions of SB1, SB2 and K

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-12 | Terminal UP/DOWN rate | 0.01–65.535 Hz/s | 1.00 Hz/s |

It is used to adjust the rate of change of frequency when the frequency is adjusted by means of terminal UP/DOWN.

- If P0-22 (Frequency reference resolution) is 2, the setting range is 0.001–65.535 Hz/s.
- If P0-22 (Frequency reference resolution) is 1, the setting range is 0.01–655.35 Hz/s.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-13 | AI curve 1 minimum input | 0.00 V to P4-15 | 0.00 V |
| P4-14 | Corresponding setting of AI curve 1 minimum input | -100.00%–100.0% | 0.0% |
| P4-15 | AI curve 1 maximum input | P4-13 to 10.00 V | 10.00 V |
| P4-16 | Corresponding setting of AI curve 1 maximum input | -100.00%–100.0% | 100.0% |
| P4-17 | AI1 filter time | 0.00–10.00s | 0.10s |

These parameters are used to define the relationship between the analog input voltage and the corresponding setting. When the analog input voltage exceeds the maximum value (P4-15), the maximum value is used. When the analog input voltage is less than the minimum value (P4-13), the value set in P4-34 (Setting for AI less than minimum input) is used.

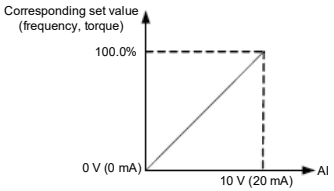
When the analog input is current input, 1 mA current corresponds to 0.5 V voltage.

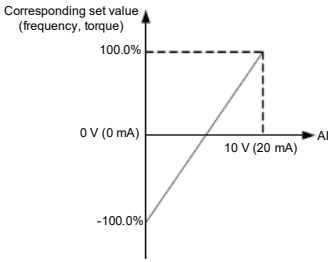
P4-17 (AI1 filter time) is used to set the software filter time of AI1. If the analog input is liable to interference, increase the value of this parameter to stabilize the detected analog input. However, increase of the AI filter time will slow the response of analog detection. Set this parameter properly based on actual conditions.

In different applications, 100% of analog input corresponds to different nominal values. For details, refer to the description of different applications.

Two typical setting examples are shown in the following figure.

Figure 8-11 Corresponding relationship between analog input and set values




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-18 | AI curve 2 minimum input | 0.00 V to P4-20 | 0.00 V |
| P4-19 | Corresponding setting of AI curve 2 minimum input | -100.00%–100.0% | 0.0% |
| P4-20 | AI curve 2 maximum input | P4-18 to 10.00 V | 10.00 V |
| P4-21 | Corresponding setting of AI curve 2 maximum input | -100.00%–100.0% | 100.0% |
| P4-22 | AI2 filter time | 0.00–10.00s | 0.10s |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-23 | AI curve 3 minimum input | 0.00 V to P4-25 | -10.00 V |
| P4-24 | Corresponding setting of AI curve 3 minimum input | 0.00%–100.0% | 0.0% |
| P4-25 | AI curve 3 maximum input | P4-23 to 10.00 V | 8.00 V |
| P4-26 | Corresponding setting of AI curve 3 maximum input | -100.00%–100.0% | 100.0% |
| P4-27 | AI3 filter time | 0.00–10.00s | 0.10s |

The method of setting AI2 and AI3 functions is similar to that of setting AI1 function.





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-28 | Pulse minimum input | 0.00 kHz to P4-30 | 0.00 kHz |
| P4-29 | Corresponding setting of pulse minimum input | -100.00%–100.0% | 0.0% |
| P4-30 | Pulse maximum input | P4-28 to 50.00 kHz | 50.00 kHz |
| P4-31 | Corresponding setting of pulse maximum input | -100.00%–100.0% | 100.0% |
| P4-32 | Pulse filter time | 0.00–10.00s | 0.10s |

These parameters are used to set the relationship between X5/X6 pulse input and corresponding settings. The pulses can only be input by X5/X6. The method of setting this function is similar to that of setting AI1 function.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-33 | AI curve selection | Unit's digit (AI1 curve selection) | 321 |
| | | Curve 1 (2 points, see P4-13 to P4-16) | |
| | | Curve 2 (2 points, see P4-18 to P4-21) | |
| | | Curve 3 (2 points, see P4-23 to P4-26) | |
| | | Curve 4 (4 points, see A6-00 to A6-07) | |
| | | Curve 5 (4 points, see A6-08 to A6-15) | |
| | | Ten's digit (AI2 curve selection) | |
| | | Curve 1 to curve 5 (same as AI1) | |
| | | Hundred's digit (AI3 curve selection) | |
| | | Curve 1 to curve 5 (same as AI1) | |

The unit's digit, ten's digit and hundred's digit of this parameter are respectively used to select the corresponding curve of AI1, AI2 and AI3. Any of the five curves can be selected for AI1, AI2 and AI3.

Curve 1, curve 2 and curve 3 are all 2-point curves, set in group P4. Curve 4 and curve 5 are both 4-point curves, set in group A6.

The 9600 series provides two AI terminals as standard. AI3 is provided by an optional extension card.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-34 | Setting for AI less than minimum input | Unit's digit (Setting for AI1 less than minimum input) | 000 |
| | | 0: Minimum value<br>1: 0.0% | |
| | | Ten's digit (Setting for AI2 less than minimum input) | |
| | | 0, 1 (same as AI1) | |
| | | Hundred's digit (Setting for AI3 less than minimum input) | |
| | | 0, 1 (same as AI1) | |

This parameter is used to determine the corresponding setting when the analog input voltage is less than the minimum value. The unit's digit, ten's digit and hundred's digit of this parameter respectively correspond to the setting for AI2, AI2 and AI3.

If the value of a certain digit is 0, when analog input voltage is less than the minimum input, the corresponding setting of the minimum input (P4-14, P4-19, P4-24) is used.

If the value of a certain digit is 1, when analog input voltage is less than the minimum input, the corresponding value of this analog input is 0.0%.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-35 | X1 delay time | 0.0–3600.0s | 0.0s |
| P4-36 | X2 delay time | 0.0–3600.0s | 0.0s |
| P4-37 | X3 delay time | 0.0–3600.0s | 0.0s |

These parameters are used to set the delay time of the AC drive when the status of X terminals changes.

Currently, only X1, X2 and X3 support the delay time function.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-38 | X valid mode selection 1 | Unit's digit (X1 valid mode) | 00000 |
| | | 0: High level valid<br>1: Low level valid | |
| | | Ten's digit (X2 valid mode) | |
| | | 0, 1 (same as X1) | |
| | | Hundred's digit (X3 valid mode) | |
| | | 0, 1 (same as X1) | |
| | | Thousand's digit (X4 valid mode) | |
| | | 0, 1 (same as X1) | |
| | | Ten thousand's digit (X5 valid mode) | |
| | | 0, 1 (same as X1) | |
| P4-39 | X valid mode selection 2 | Unit's digit (X6 valid mode) | 00000 |
| | | 0, 1 (same as X1) | |
| | | Ten's digit (X7 valid mode) | |
| | | 0, 1 (same as X1) | |
| | | Hundred's digit (X8 state) | |
| | | 0, 1 (same as X1) | |
| | | Thousand's digit (X9 valid mode) | |
| | | 0, 1 (same as X1) | |
| | | Ten thousand's digit (X10 valid mode) | |
| | | 0, 1 (same as X1) | |





These parameters are used to set the valid mode of X terminals.

- 0: High level valid
  The X terminal is valid when being connected with COM, and invalid when being disconnected from COM.
- 1: Low level valid
  The X terminal is invalid when being connected with COM, and invalid when being disconnected from COM.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-40 | AI2 input signal selection | 0: Voltage signal<br>1: Current signal | 0 |

AI2 supports voltage/current output, which is determined by jumper. After setting the jumper, perform corresponding setting in P4-40.

## Group P5 Output Terminals

The 9600 series provides an analog output (AM) terminal, a digital output (DO1) terminal, a relay terminal and a DO2 terminal (used for high-speed pulse output or open-collector switch signal output) as standard. If these output terminals cannot satisfy requirements, use an optional I/O extension card that provides an AM terminal (AO2), a relay terminal (relay 2) and a DO terminal (DO3).

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P5-00 | DO2 terminal output mode | 0: Pulse output (FMP)<br>1: Switch signal output (FMR) | 0 |

The DO2 terminal is programmable multiplexing terminal. It can be used for high-speed pulse output (FMP), with maximum frequency of 50 kHz. Refer to P5-06 for relevant functions of FMP. It can also be used as open collector switch signal output (FMR).

| Function Code | Parameter Name | Default |
|---|---|---|
| P5-01 | DO2 function (open-collector output terminal) | 0 |
| P5-02 | Relay function (TA-TB-TC) | 2 |
| P5-03 | Extension card relay function (P/A-P/B-P/C) | 0 |
| P5-04 | DO1 function selection (open-collector output terminal) | 1 |
| P5-05 | Extension card DO3 function | 4 |

These five parameters are used to select the functions of the five digital output terminals. DO3 and P/A-P/B-P/C are respectively the relays on the control board and the extension card.

The functions of the output terminals are described in the following table.

Table 6-5 Functions of output terminals

| Value | Function | Description |
|---|---|---|
| 0 | No output | The terminal has no function. |
| 1 | AC drive running | When the AC drive is running and has output frequency (can be zero), the terminal becomes ON. |
| 2 | Fault output (stop) | When the AC drive stops due to a fault, the terminal becomes ON. |
| 3 | Frequency-level detection FDT1 output | Refer to the descriptions of P8-19 and P8-20. |
| 4 | Frequency reached | Refer to the descriptions of P8-21. |
| 5 | Zero-speed running (no output at stop) | If the AC drive runs with the output frequency of 0, the terminal becomes ON. If the AC drive is in the stop state, the terminal becomes OFF. |
| 6 | Motor overload pre-warning | The AC drive judges whether the motor load exceeds the overload pre-warning threshold before performing the protection action. If the pre-warning threshold is exceeded, the terminal becomes ON. For motor overload parameters, see the descriptions of P9-00 to P9-02. |
| 7 | AC drive overload pre-warning | The terminal becomes ON 10s before the AC drive overload protection action is performed. |
| 8 | Set count value reached | The terminal becomes ON when the count value reaches the value set in PB-08. |
| 9 | Designated count value reached | The terminal becomes ON when the count value reaches the value set in PB-09. |
| 10 | Length reached | The terminal becomes ON when the detected actual length exceeds the value set in PB-05. |
| 11 | PLC cycle complete | When simple PLC completes one cycle, the terminal outputs a pulse signal with width of 250 ms. |
| 12 | Accumulative running time reached | If the accumulative running time of the AC drive exceeds the time set in P8-17, the terminal becomes ON. |
| 13 | Frequency limited | If the set frequency exceeds the frequency upper limit or lower limit and the output frequency of the AC drive reaches the upper limit or lower limit, the terminal becomes ON. |
| 14 | Torque limited | In speed control mode, if the output torque reaches the torque limit, the AC drive enters the stall protection state and meanwhile the terminal becomes ON. |
| 15 | Ready for RUN | If the AC drive main circuit and control circuit become stable, and the AC drive detects no fault and is ready for RUN, the terminal becomes ON. |
| 16 | AI1 larger than AI2 | When the input of AI1 is larger than the input of AI2, the terminal becomes ON. |
| 17 | Frequency upper limit reached | If the running frequency reaches the upper limit, the terminal becomes ON. |
| 18 | Frequency lower limit reached (no output at stop) | If the running frequency reaches the lower limit, the terminal becomes ON. In the stop state, the terminal becomes OFF. |





| Value | Function | Description |
|---|---|---|
| 19 | Undervoltage state output | If the AC drive is in undervoltage state, the terminal becomes ON. |
| 20 | Communication setting | Refer to the communication protocol. |
| 21 | Reserved | Reserved. |
| 22 | Reserved | Reserved. |
| 23 | Zero-speed running 2 (having output at stop) | If the output frequency of the AC drive is 0, the terminal becomes ON. In the state of stop, the signal is still ON. |
| 24 | Accumulative power-on time reached | If the AC drive accumulative power-on time (P7-13) exceeds the value set in P8-16, the terminal becomes ON. |
| 25 | Frequency level detection FDT2 output | Refer to the descriptions of P8-28 and P8-29. |
| 26 | Frequency 1 reached | Refer to the descriptions of P8-30 and P8-31. |
| 27 | Frequency 2 reached | Refer to the descriptions of P8-32 and P8-33. |
| 28 | Current 1 reached | Refer to the descriptions of P8-38 and P8-39. |
| 29 | Current 2 reached | Refer to the descriptions of P8-40 and P8-41. |
| 30 | Timing reached | If the timing function (P8-42) is valid, the terminal becomes ON after the current running time of the AC drive reaches the set time. |
| 31 | AI1 input limit exceeded | If AI1 input is larger than the value of P8-46 (AI1 input voltage upper limit) or lower than the value of P8-45 (AI1 input voltage lower limit), the terminal becomes ON. |
| 32 | Load becoming 0 | If the load becomes 0, the terminal becomes ON. |
| 33 | Reverse running | If the AC drive is in the reverse running state, the terminal becomes ON. |
| 34 | Zero current state | Refer to the descriptions of P8-28 and P8-29. |
| 35 | Module temperature reached | If the heatsink temperature of the inverter module (P7-07) reaches the set module temperature threshold (P8-47), the terminal becomes ON. |
| 36 | Software current limit exceeded | Refer to the descriptions of P8-36 and P8-37. |
| 37 | Frequency lower limit reached (having output at stop) | If the running frequency reaches the lower limit, the terminal becomes ON. In the stop state, the signal is still ON. |
| 38 | Alarm output | If a fault occurs on the AC drive and the AC drive continues to run, the terminal outputs the alarm signal. |
| 39 | Motor overheat warning | If the motor temperature reaches the temperature set in P9-58 (Motor overheat warning threshold), the terminal becomes ON. You can view the motor temperature by using U0-34. |
| 40 | Current running time reached | If the current running time of AC drive exceeds the value of P8-53, the terminal becomes ON. |

| Function Code | Parameter Name | Default |
|---|---|---|
| P5-06 | DO2 function selection | 0 |
| P5-07 | AM function selection | 0 |
| P5-08 | AO2 function selection | 1 |

The output pulse frequency of the DO2 terminal ranges from 0.01 kHz to "Maximum DO2 output frequency" (P5-09). The value of P5-09 is between 0.01 kHz and 100.00 kHz.

The output range of AM and AO2 is 0–10 V or 0–20 mA. The relationship between pulse and analog output ranges and corresponding functions is listed in the following table.

Table 6-6 Relationship between pulse and analog output ranges and corresponding functions

| Value | Function | Range (Corresponding to Pulse or Analog Output Range 0.0%–100.0%) |
|---|---|---|
| 0 | Running frequency | 0 to maximum output frequency |
| 1 | Set frequency | 0 to maximum output frequency |
| 2 | Output current | 0 to 2 times of rated motor current |
| 3 | Output torque (absolute value) | 0 to 2 times of rated motor torque |
| 4 | Output power | 0 to 2 times of rated power |
| 5 | Output voltage | 0 to 1.2 times of rated AC drive voltage |
| 6 | Pulse input | 0.01–100.00 kHz |
| 7 | AI1 | 0–10 V |
| 8 | AI2 | 0–10 V (or 0–20 mA) |
| 9 | AI3 | 0–0 V |
| 10 | Length | 0 to maximum set length |
| 11 | Count value | 0 to maximum count value |
| 12 | Communication setting | 0.0%–100.0% |
| 13 | Motor rotational speed | 0 to rotational speed corresponding to maximum output frequency |
| 14 | Output current | 0.0–1000.0 A |
| 15 | Output voltage | 0.0–000.0 V |
| 16 | Output torque (actual value) | -2 times of rated motor torque to 2 times of rated motor torque |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P5-09 | Maximum DO2 output frequency | 0.01–100.00 kHz | 50.00 kHz |

If the DO2 terminal is used for pulse output, this parameter is used to set the maximum frequency of pulse output.





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P5-10 | AM offset coefficient | -100.0%–100.0% | 0.0% |
| P5-11 | AM gain | -10.00–10.00 | 1.00 |
| P5-12 | AO2 offset coefficient | -100.0%–100.0% | 0.00% |
| P5-13 | AO2 gain | -10.00–10.00 | 1.00 |

These parameters are used to correct the zero drift of analog output and the output amplitude deviation. They can also be used to define the desired AO curve

If "b" represents zero offset, "k" represents gain, "Y" represents actual output, and "X" represents standard output, the actual output is: Y = kX + b.

The zero offset coefficient 100% of AM and AO2 corresponds to 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 to 10 V (or 0 to 20 mA) with no zero offset or gain adjustment.

For example, if the analog output is used as the running frequency, and it is expected that the output is 8 V when the frequency is 0 and 3 V at the maximum frequency, the gain shall be set to -0.50, and the zero offset shall be set to 80%.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P5-17 | DO2 output delay time | 0.0–3600.0s | 0.0s |
| P5-18 | TA-TB-TC output delay time | 0.0–3600.0s | 0.0s |
| P5-19 | Relay 2 output delay time | 0.0–3600.0s | 0.0s |
| P5-20 | DO1 output delay time | 0.0–3600.0s | 0.0s |
| P5-21 | DO3 output delay time | 0.0–3600.0s | 0.0s |

These parameters are used to set the delay time of output terminals DO2, relay TA-TB-TC, relay 2, DO1,DO2 and DO3 from status change to actual output.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P5-22 | DO valid mode selection | Unit's digit (DO2 valid mode)<br>0: Positive logic<br>1: Negative logic<br>Ten's digit (Relay TA-TB-TC valid mode)<br>0, 1 (same as DO2)<br>Hundred's digit (Relay 2 valid mode)<br>0, 1 (same as DO2)<br>Thousand's digit (DO1 valid mode)<br>0, 1 (same as DO2)<br>Ten thousand's digit (DO3 valid mode)<br>0, 1 (same as DO2) | 00000 |

It is used to set the logic of output terminals DO2, relay TA-TB-TC, relay 2, DO1 and DO3.

- 0: Positive logic

  The output terminal is valid when being connected with COM, and invalid when being disconnected from COM.

- 1: Positive logic

  The output terminal is invalid when being connected with COM, and valid when being disconnected from COM.

## Group P6 Start/Stop Control

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P6-00 | Start mode | 0: Direct start<br>1: Rotational speed tracking restart<br>2: Pre-excited start (asynchronous motor) | 0 |

- 0: Direct start
  - If the DC braking time is set to 0, the AC drive starts to run at the startup frequency.
  - If the DC braking time is not 0, the AC drive performs DC braking first and then starts to run at the startup frequency. It is applicable to small-inertia load application where the motor is likely to rotate at startup.
- 1: Rotational speed tracking restart

  The AC drive judges the rotational speed and direction of the motor first and then starts at the tracked frequency. Such smooth start has no impact on the rotating motor. It is applicable to the restart upon instantaneous power failure of large-inertia load. To ensure the performance of rotational speed tracking restart, set the motor parameters in group P1 correctly.

- 2: Pre-excited start (asynchronous motor)

  It is valid only for asynchronous motor and used for building the magnetic field before the motor runs. For pre-excited current and pre-excited time, see parameters of P6-05 and P6-06.
  - If the pre-excited time is 0, the AC drive cancels pre-excitation and starts to run at startup frequency.
  - If the pre-excited time is not 0, the AC drive pre-excites first before startup, improving the dynamic response of the motor.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P6-01 | Rotational speed tracking mode | 0: From frequency at stop<br>1: From zero speed<br>2: From maximum frequency | 0 |

To complete the rotational speed tracking process within the shortest time, select the proper mode in which the AC drive tracks the motor rotational speed.





- 0: From frequency at stop

  It is the commonly selected mode.

- 1: From zero frequency

  It is applicable to restart after a long time of power failure.

- 2: From the maximum frequency

  It is applicable to the power-generating load.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P6-02 | Rotational speed tracking speed | 1–100 | 20 |

In the rotational speed tracking restart mode, select the rotational speed tracking speed. The larger the value is, the faster the tracking is. However, too large value may cause unreliable tracking.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P6-03 | Startup frequency | 0.00–10.00 Hz | 0.00 Hz |
| P6-04 | Startup frequency holding time | 0.0–100.0s | 0.0s |

To ensure the motor torque at AC drive startup, set a proper startup frequency. In addition, to build excitation when the motor starts up, the startup frequency must be held for a certain period.

The startup frequency (P6-03) is not restricted by the frequency lower limit. If the set target frequency is lower than the startup frequency, the AC drive will not start and stays in the standby state.

During switchover between forward rotation and reverse rotation, the startup frequency holding time is disabled. The holding time is not included in the acceleration time but in the running time of simple PLC.

Example 1:

| | |
|---|---|
| P0-03 = 0 | The frequency source is digital setting. |
| P0-08 = 2.00 Hz | The digital setting frequency is 2.00 Hz. |
| P6-03 = 5.00 Hz | The startup frequency is 5.00 Hz. |
| P6-04 = 2.0s | The startup frequency holding time is 2.0s. |

In this example, the AC drive stays in the standby state and the output frequency is 0.00 Hz.

Example 2:

| | |
|---|---|
| P0-03 = 0 | The frequency source is digital setting. |
| P0-08 = 10.0 0 Hz | The digital setting frequency is 10.00 Hz. |
| P6-03 = 5.00 Hz | The startup frequency is 5.00 Hz. |
| P6-04 = 2.0s | The startup frequency holding time is 2.0s. |

In this example, the AC drive accelerates to 5.00 Hz, and then accelerates to the set frequency 10.00 Hz after 2s.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P6-05 | Startup DC braking current/Pre-excited current | 0%–100% | 0% |
| P6-06 | Startup DC braking time/Pre-excited time | 0.0–100.0s | 0.0s |

Startup DC braking is generally used during restart of the AC drive after the rotating motor stops. Pre-excitation is used to make the AC drive build magnetic field for the asynchronous motor before startup to improve the responsiveness.

Startup DC braking is valid only for direct start (P6-00 = 0). In this case, the AC drive performs DC braking at the set startup DC braking current. After the startup DC braking time, the AC drive starts to run. If the startup DC braking time is 0, the AC drive starts directly without DC braking. The larger the startup DC braking current is, the larger the braking force is.

If the startup mode is pre-excited start (P6-00 = 3), the AC drive builds magnetic field based on the set pre-excited current. After the pre-excited time, the AC drive starts to run. If the pre-excited time is 0, the AC drive starts directly without pre-excitation.

The startup DC braking current or pre-excited current is a percentage relative to the base value.

- If the rated motor current is less than or equal to 80% of the rated AC drive current, the base value is the rated motor current.
- If the rated motor current is greater than 80% of the rated AC drive current, the base value is 80% of the rated AC drive current.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P6-07 | Acceleration/ Deceleration mode | 0: Linear acceleration/deceleration<br>1: S-curve acceleration/deceleration A<br>2: S-curve acceleration/deceleration B | 0 |

It is used to set the frequency change mode during the AC drive start and stop process.

- 0: Linear acceleration/deceleration
  The output frequency increases or decreases in linear mode. The 9600 series provides four group of acceleration/deceleration time, which can be selected by using P4-00 to P4-08.
- 1:S-Curve acceleration/deceleration A

  The output frequency increases or decreases along the S curve. This mode is generally used in the applications where start and stop processes are relatively smooth, such as elevator and conveyor belt. P6-08 and P6-09 respectively define the time proportions of the start segment and the end segment.
- 2: S-curve acceleration/deceleration B

  In this curve, the rated motor frequency $f_b$ is always the inflexion point. This mode is usually used in applications where acceleration/deceleration is required at the speed higher than the rated frequency.





When the set frequency is higher than the rated frequency, the acceleration/ deceleration time is:

$$t=(\frac{4}{9}\times(\frac{f^2}{f_b})+\frac{5}{9})\times T$$

In the formula, $f$ is the set frequency, $f_b$ is the rated motor frequency and $T$ is the acceleration time from 0 Hz to $f_b$.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P6-08 | Time proportion of S-curve start segment | 0.0% to (100.0% – P6-09) | 30.0% |
| P6-09 | Time proportion of S-curve end segment | 0.0% to (100.0% – P6-08) | 30.0% |

These two parameters respectively define the time proportions of the start segment and the end segment of S-curve acceleration/deceleration. They must satisfy the requirement: P6-08 + P6-09 ≤ 100.0%.

In Figure 8-12, t1 is the time defined in P6-08, within which the slope of the output frequency change increases gradually. t2 is the time defined in P6-09, within which the slope of the output frequency change gradually decreases to 0. Within the time between t1 and t2, the slope of the output frequency change remains unchanged, that is, linear acceleration/deceleration.

Figure 8-12 S-curve acceleration/deceleration A

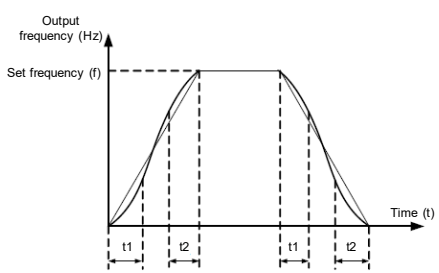
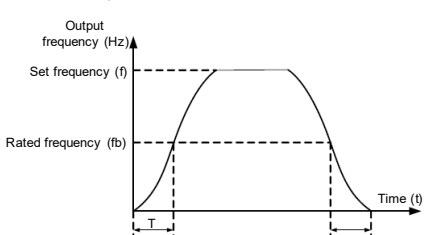



Figure 8-13 S-curve acceleration/deceleration B



| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P6-10 | Stop mode | 0: Decelerate to stop<br>1: Coast to stop | 0 |

- 0: Decelerate to stop

  After the stop command is enabled, the AC drive decreases the output frequency according to the deceleration time and stops when the frequency decreases to zero.

- 1: Coast to stop

  After the stop command is enabled, the AC drive immediately stops the output. The motor will coast to stop based on the mechanical inertia.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P6-11 | Initial frequency of stop DC braking | 0.00 Hz to maximum frequency | 0.00 Hz |
| P6-12 | Waiting time of stop DC braking | 0.0–36.0s | 0.0s |
| P6-13 | Stop DC braking current | 0%–100% | 0% |
| P6-14 | Stop DC braking time | 0.0–36.0s | 0.0s |

- P6-11 (Initial frequency of stop DC braking)

  During the process of decelerating to stop, the AC drive starts DC braking when the running frequency is lower than the value set in P6-11.

- P6-12 (Waiting time of stop DC braking)

  When the running frequency decreases to the initial frequency of stop DC braking, the AC drive stops output for a certain period and then starts DC braking. This prevents faults such as overcurrent caused due to DC braking at high speed.

- P6-13 (Stop DC braking current)

  This parameter specifies he output current at DC braking and is a percentage relative to the base value.

  – If the rated motor current is less than or equal to 80% of the rated AC drive current, the base value is the rated motor current.

  – If the rated motor current is greater than 80% of the rated AC drive current, the base value is 80% of the rated AC drive current.



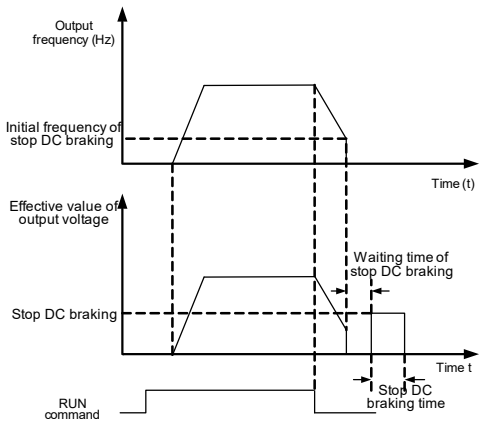


- P6-14 (Stop DC braking time)

  This parameter specifies he holding time of DC braking. If it is set to 0, DC braking is cancelled.

The stop DC braking process is shown in the following figure.

Figure 8-14 Stop DC braking process




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P6-15 | Brake use ratio | 0%–100% | 100% |

It is valid only for the AC drive with internal braking unit and used to adjust the duty ratio of the braking unit. The larger the value of this parameter is, the better the braking result will be. However, too larger value causes great fluctuation of the AC drive bus voltage during the braking process.

## Group P7 Operation Panel and Display

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-01 | MF.K Key function selection | 0: MF.K key disabled<br>1: Switchover between operation panel control and remote command control (terminal or communication)<br>2: Switchover between forward rotation and reverse rotation<br>3: Forward JOG<br>4: Reverse JOG | 0 |

MF.K key refers to multifunctional key. You can set the function of the MF.K key by using this parameter. You can perform switchover by using this key both in stop or running state.

- 0: MF.K key disabled

  This key is disabled.

- 1: Switchover between operation panel control and remote command control (terminal or communication)

  You can perform switchover from the current command source to the operation panel control (local operation). If the current command source is operation panel control, this key is invalid.

- 2: Switchover between forward rotation and reverse rotation

  You can change the direction of the frequency reference by using the MF.K key. It is valid only when the current command source is operation panel control.

- 3: Forward JOG

  You can perform forward JOG (FJOG) by using the MF.K key.

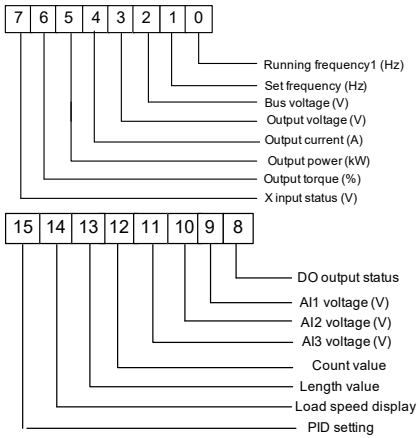
- 4: Reverse JOG

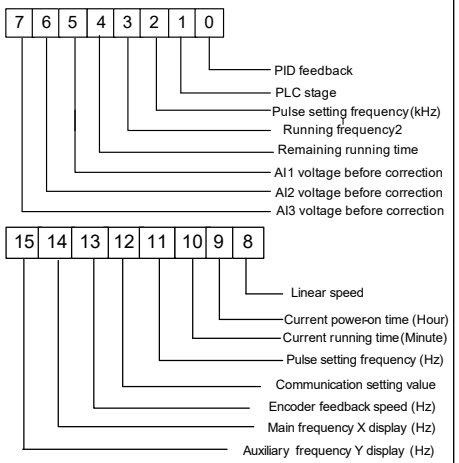
  You can perform reverse JOG (FJOG) by using the MF.K key.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-02 | STOP/RESET key function | 0: STOP/RESET key enabled only in operation panel control<br>1: STOP/RESET key enabled in any operation mode | 1 |





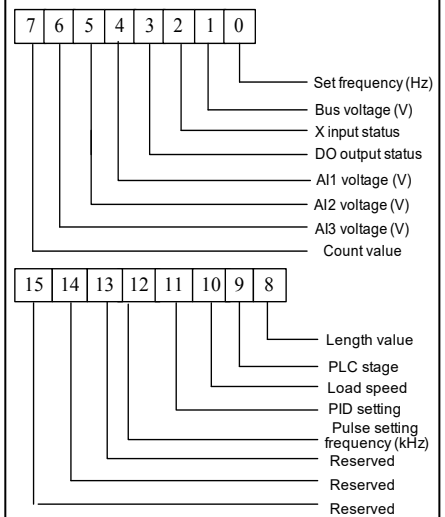
| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-03 | LED display running parameters 1 | 0000–FFFF<br>  <br><br>If a parameter needs to be displayed during the running, set the corresponding bit to 1, and set P7-03 to the hexadecimal equivalent of this binary number. | 1F |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-04 | LED display running parameters 2 | 0000–FFFF<br>  <br>If a parameter needs to be displayed during the running, set the corresponding bit to 1, and set P7-03 to the hexadecimal equivalent of this binary number. | 0 |

These two parameters are used to set the parameters that can be viewed when the AC drive is in the running state. You can view a maximum of 32 running state parameters that are displayed from the lowest bit of P7-03.





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-05 | LED display stop parameters | 0000–FFFF<br>  <br>If a parameter needs to be displayed during the running, set the corresponding bit to 1, and set P7-05 to the hexadecimal equivalent of this binary number. | 0 |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-06 | Load speed display coefficient | 0.0001–6.5000 | 1.0000 |

This parameter is used to adjust the relationship between the output frequency of the AC drive and the load speed. For details, see the description of P7-12.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-07 | Heatsink temperature of inverter module | 0.0–100.0° C | - |

It is used to display the insulated gate bipolar transistor (IGBT) temperature of the inverter module, and the IGBT overheat protection value of the inverter module depends on the model.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-08 | Temporary software version | 0.0–100.0° C | - |

IIt is used to display the temporary software version of the control board.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-09 | Accumulative running time | 0–65535 h | - |

It is used to display the accumulative running time of the AC drive. After the accumulative running time reaches the value set in P8-17, the terminal with the digital output function 12 becomes ON.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-10 | Product number | AC drive product number | - |
| P7-11 | Software version | Software version of control board | - |
| P7-12 | Number of decimal places for load speed display | 0: 0 decimal place<br>1: 1 decimal place<br>2: 2 decimal places<br>3: 3 decimal places | 1 |

P7-12 is used to set the number of decimal places for load speed display. The following gives an example to explain how to calculate the load speed:

Assume that P7-06 (Load speed display coefficient) is 2.000 and P7-12 is 2 (2 decimal places). When the running frequency of the AC drive is 40.00 Hz, the load speed is 40.00 x 2.000 = 80.00 (display of 2 decimal places).

If the AC drive is in the stop state, the load speed is the speed corresponding to the set frequency, namely, "set load speed". If the set frequency is 50.00 Hz, the load speed in the stop state is 50.00 x 2.000 = 100.00 (display of 2 decimal places).

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-13 | Accumulative power-on time | 0–65535 h | 0 h |

It is used to display the accumulative power-on time of the AC drive since the delivery. If the time reaches the set power-on time (P8-17), the terminal with the digital output function 24 becomes ON.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-14 | Accumulative power consumption | 0–65535 kWh | / |

It is used to display the accumulative power consumption of the AC drive until now.

## Group P8 Auxiliary Functions

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-00 | JOG running frequency | 0.00 Hz to maximum frequency | 2.00 Hz |
| P8-01 | JOG acceleration time | 0.0–6500.0s | 20.0s |
| P8-02 | JOG deceleration time | 0.0–6500.0s | 20.0s |

These parameters are used to define the set frequency and acceleration/deceleration time of the AC drive when jogging. The startup mode is "Direct start" (P6-00 = 0) and the stop mode is "Decelerate to stop" (P6-10 = 0) during jogging.





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-03 | Acceleration time 2 | 0.0–6500.0s | Model dependent |
| P8-04 | Deceleration time 2 | 0.0–6500.0s | Model dependent |
| P8-05 | Acceleration time 3 | 0.0–6500.0s | Model dependent |
| P8-06 | Deceleration time 3 | 0.0–6500.0s | Model dependent |
| P8-07 | Acceleration time 4 | 0.0–6500.0s | Model dependent |
| P8-08 | Deceleration time 4 | 0.0–6500.0s | Model dependent |

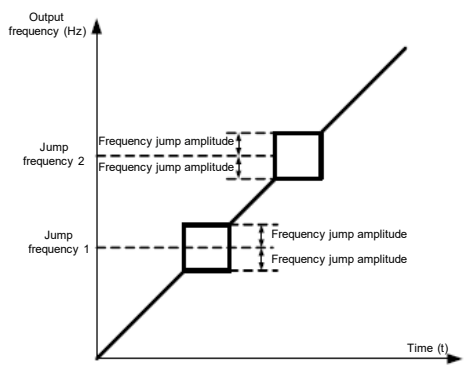
The 9600 series provides a total of four groups of acceleration/deceleration time, that is, the preceding three groups and the group defined by P0-17 and P0-18. Definitions of four groups are completely the same. You can switch over between the four groups of acceleration/deceleration time through different state combinations of X terminals. For more details, see the descriptions of P4-01 to P4-05.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-09 | Jump frequency 1 | 0.00 Hz to maximum frequency | 0.00 Hz |
| P8-10 | Jump frequency 2 | 0.00 Hz to maximum frequency | 0.00 Hz |
| P8-11 | Frequency jump amplitude | 0.00 Hz to maximum frequency | 0.00 Hz |

If the set frequency is within the frequency jump range, the actual running frequency is the jump frequency close to the set frequency. Setting the jump frequency helps to avoid the mechanical resonance point of the load.

The 9600 series supports two jump frequencies. If both are set to 0, the frequency jump function is disabled. The principle of the jump frequencies and jump amplitude is shown in the following figure.

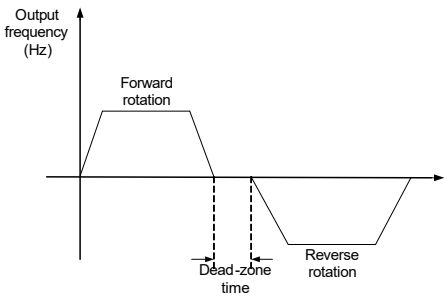
Figure 8-15 Principle of the jump frequencies and jump amplitude



| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-12 | Forward/Reverse rotation dead-zone time | 0.0–3000.0s | 0.0s |

It is used to set the time when the output is 0 Hz at transition of the AC drive forward rotation and reverse rotation, as shown in the following figure.

Figure 8-16 Forward/Reverse rotation dead-zone time




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-13 | Reverse control | 0: Enabled<br>1: Disabled | 0 |

It is used to set whether the AC drive allows reverse rotation. In the applications where reverse rotation is prohibited, set this parameter to 1.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-14 | Running mode when set frequency lower than frequency lower limit | 0: Run at frequency lower limit<br>1: Stop<br>2: Run at zero speed | 0 |

It is used to set the AC drive running mode when the set frequency is lower than the frequency lower limit. The 9600 series provides three running modes to satisfy requirements of various applications.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-15 | Droop control | 0.00–10.00 Hz | 0.00 Hz |

This function is used for balancing the workload allocation when multiple motors are used to drive the same load. The output frequency of the AC drives decreases as the load increases. You can reduce the workload of the motor under load by decreasing the output frequency for this motor, implementing workload balancing between multiple motors.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-16 | Accumulative power-on time threshold | 0–65000 h | 0 h |





If the accumulative power-on time (P7-13) reaches the value set in this parameter, the corresponding DO terminal becomes ON.

For example, combining virtual X/DO functions, to implement the function that the AC drive reports an alarm when the actual accumulative power-on time reaches the threshold of 100 hours, perform the setting as follows:

1) Set virtual X1 to user-defined fault 1: A1-00 = 44.
2) Set that the valid state of virtual X1 is from virtual DO1: A1-05 = 0000.
3) Set virtual DO1 to power-on time reached: A1-11= 24.
4) Set the accumulative power-on time threshold to 100 h: P8-16 = 100 h.

Then, the AC drive reports Err29 when the accumulative power-on time reaches 100 hours.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-17 | Accumulative running time threshold | 0–65000 h | 0 h |

It is used to set the accumulative running time threshold of the AC drive. If the accumulative running time (P7-09) reaches the value set in this parameter, the corresponding DO terminal becomes ON.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-18 | Startup protection | 0: No<br>1: Yes | 0 |

This parameter is used to set whether to enable the safety protection. If it is set to 1, the AC drive does not respond to the run command valid upon AC drive power-on (for example, an input terminal is ON before power-on). The AC drive responds only after the run command is cancelled and becomes valid again.

In addition, the AC drive does not respond to the run command valid upon fault reset of the AC drive. The run protection can be disabled only after the run command is cancelled.

In this way, the motor can be protected from responding to run commands upon power-on or fault reset in unexpected conditions.

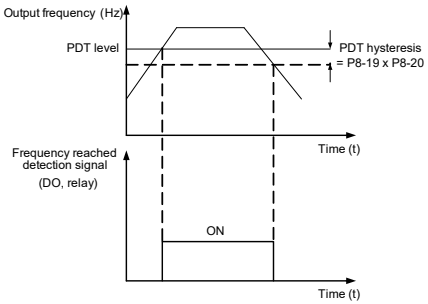
| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-19 | Frequency detection value (PDT1) | 0.00 Hz to maximum frequency | 50.00 Hz |
| P8-20 | Frequency detection hysteresis (PDT hysteresis 1) | 0.0%–100.0% (FDT1 level) | 5.0% |

If the running frequency is higher than the value of P8-19, the corresponding DO terminal becomes ON. If the running frequency is lower than value of P8-19, the DO terminal goes OFF

These two parameters are respectively used to set the detection value of output frequency and hysteresis value upon cancellation of the output. The value of P8-20 is a percentage of the hysteresis frequency to the frequency detection value (P8-19).

The PDT function is shown in the following figure.

Figure 8-17 PDT level

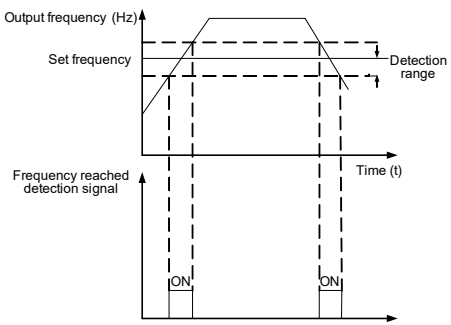



| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-21 | Detection range of frequency reached | 0.00–100% (maximum frequency) | 0.0% |

If the AC drive running frequency is within the certain range of the set frequency, the corresponding DO terminal becomes ON.

This parameter is used to set the range within which the output frequency is detected to reach the set frequency. The value of this parameter is a percentage relative to the maximum frequency. The detection range of frequency reached is shown in the following figure.

Figure 8-18 Detection range of frequency reached





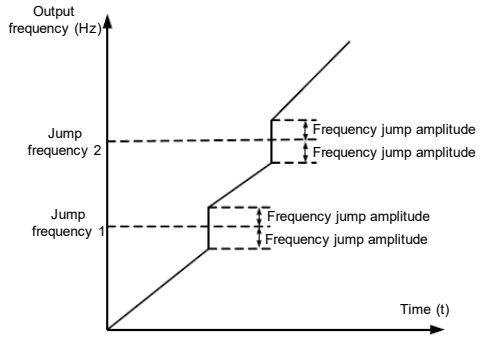



| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-22 | Jump frequency during acceleration/deceleration | 0: Disabled<br>1: Enabled | 0 |

It is used to set whether the jump frequencies are valid during acceleration/deceleration.

When the jump frequencies are valid during acceleration/deceleration, and the running frequency is within the frequency jump range, the actual running frequency will jump over the set frequency jump amplitude (rise directly from the lowest jump frequency to the highest jump frequency). The following figure shows the diagram when the jump frequencies are valid during acceleration/deceleration.

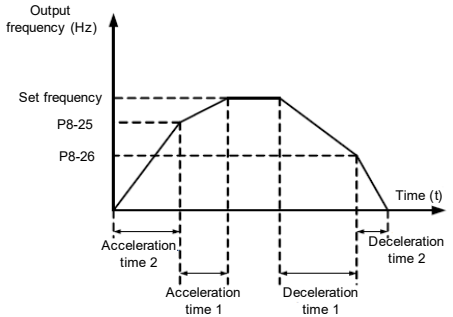
Figure 8-19 Diagram when the jump frequencies are valid during acceleration/deceleration




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-25 | Frequency switchover point between acceleration time 1 and acceleration time 2 | 0.00 Hz to maximum frequency | 0.00 Hz |
| P8-26 | Frequency switchover point between deceleration time 1 and deceleration time 2 | 0.00 to maximum frequency | 0.00 Hz |

This function is valid when motor 1 is selected and acceleration/deceleration time switchover is not performed by means of X terminal. It is used to select different groups of acceleration/deceleration time based on the running frequency range rather than X terminal during the running process of the AC drive.

Figure 8-20 Acceleration/deceleration time switchover




During acceleration, if the running frequency is smaller than the value of P8-25, acceleration time 2 is selected. If the running frequency is larger than the value of P8-25, acceleration time 1 is selected.

During deceleration, if the running frequency is larger than the value of P8-26, deceleration time 1 is selected. If the running frequency is smaller than the value of P8-26, deceleration time 2 is selected.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-27 | Terminal JOG preferred | 0: Disabled<br>1: Enabled | 0 |

It is used to set whether terminal JOG is preferred.

If terminal JOG is preferred, the AC drive switches to terminal JOG running state when there is a terminal JOG command during the running process of the AC drive.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-28 | Frequency detection value (PDT2) | 0.00 to maximum frequency | 50.00 Hz |
| P8-29 | Frequency detection hysteresis (PDT hysteresis 2) | 0.0%–100.0% (PDT2 level) | 5.0% |

The frequency detection function is the same as PDT1 function. For details, refer to the descriptions of P8-19 and P8-20.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-30 | Any frequency reaching detection value 1 | 0.00 Hz to maximum frequency | 50.00 Hz |
| P8-31 | Any frequency reaching detection amplitude 1 | 0.0%–100.0% (maximum frequency) | 0.0% |
| P8-32 | Any frequency reaching detection value 2 | 0.00 Hz to maximum frequency | 50.00 Hz |



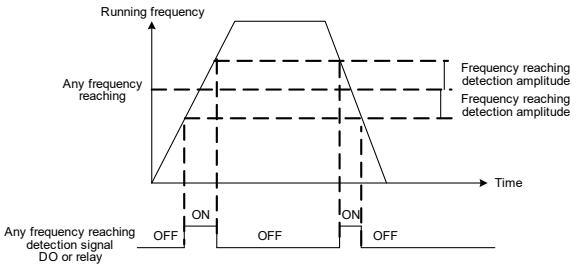


| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-33 | Any frequency reaching detection amplitude 2 | 0.0%–100.0% (maximum frequency) | 0.0% |

If the output frequency of the AC drive is within the positive and negative amplitudes of the any frequency reaching detection value, the corresponding DO becomes ON.

The 9600 series provides two groups of any frequency reaching detection parameters, including frequency detection value and detection amplitude, as shown in the following

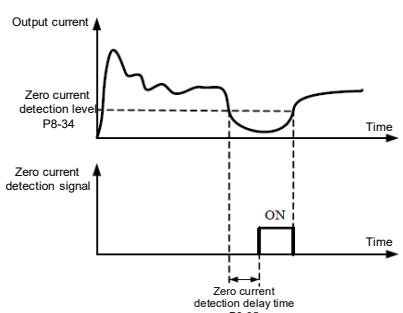
Figure 8-21 Any frequency reaching detection




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-34 | Zero current detection level | 0.0%–300.0% (rated motor current) | 5.0% |
| P8-35 | Zero current detection delay time | 0.00–600.00s | 0.10s |

If the output current of the AC drive is equal to or less than the zero current detection level and the duration exceeds the zero current detection delay time, the corresponding DO becomes ON. The zero current detection is shown in the following figure.

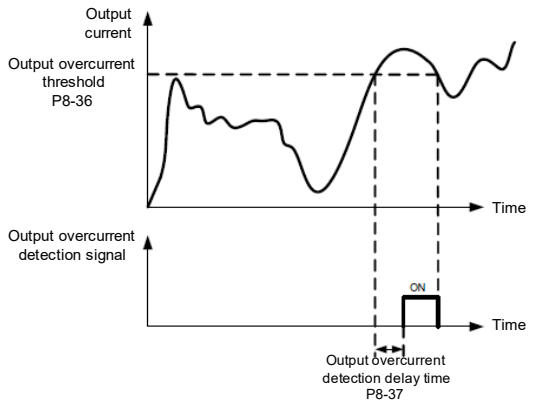
Figure 8-22 Zero current detection



| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-36 | Output overcurrent threshold | 0.0% (no detection)<br>0.1%–300.0% (rated motor current) | 200.0% |
| P8-37 | Output overcurrent detection delay time | 0.00–600.00s | 0.00s |

If the output current of the AC drive is equal to or higher than the overcurrent threshold and the duration exceeds the detection delay time, the corresponding DO becomes ON. The output overcurrent detection function is shown in the following figure.

Figure 8-23 Output overcurrent detection




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-38 | Any current reaching 1 | 0.0%–300.0% (rated motor current) | 100.0% |
| P8-39 | Any current reaching 1 amplitude | 0.0%–300.0% (rated motor current) | 0.0% |
| P8-40 | Any current reaching 2 | 0.0%–300.0% (rated motor current) | 100.0% |
| P8-41 | Any current reaching 2 amplitude | 0.0%–300.0% (rated motor current) | 0.0% |

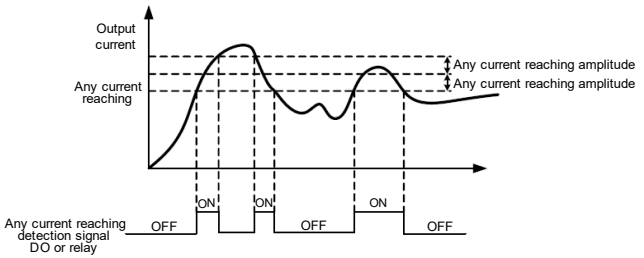
If the output current of the AC drive is within the positive and negative amplitudes of any current reaching detection value, the corresponding DO becomes ON.

The 9600 series provides two groups of any current reaching detection parameters, including current detection value and detection amplitudes, as shown in the following figure.





Figure 8-24 Any current reaching detection




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-42 | Timing function | 0: Disabled<br>1: Enabled | 0 |
| P8-43 | Timing duration source | 0: P8-44<br>1: AI1<br>2: AI2<br>3: AI3<br>(100% of analog input corresponds to the value of P8-44) | 0 |
| P8-44 | Timing duration | 0.0–6500.0 min | 0.0 min |

These parameters are used to implement the AC drive timing function.

If P8-42 is set to 1, the AC drive starts to time at startup. When the set timing duration is reached, the AC drive stops automatically and meanwhile the corresponding DO becomes ON.

The AC drive starts timing from 0 each time it starts up and the remaining timing duration can be queried by U0-20.

The timing duration is set in P8-43 and P8-44, in unit of minute.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-45 | AI1 input voltage lower limit | 0.00 V to P8-46 | 3.10 V |
| P8-46 | AI1 input voltage upper limit | P8-45 to 10.00 V | 6.80 V |

These two parameters are used to set the limits of the input voltage to provide protection on the AC drive. When the AI1 input is larger than the value of P8-46 or smaller than the value of P8-45, the corresponding DO becomes ON, indicating that AI1 input exceeds the limit.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-47 | Module temperature threshold | 0–75 °C | 75 °C |

When the heatsink temperature of the AC drive reaches the value of this parameter, the corresponding DO becomes ON, indicating that the module temperature reaches the threshold.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-48 | Cooling fan control | 0: Fan working during running<br>1: Fan working continuously | 0 |

It is used to set the working mode of the cooling fan. If this parameter is set to 0, the fan works when the AC drive is in running state. When the AC drive stops, the cooling fan works if the heatsink temperature is higher than 40°C, and stops working if the heatsink temperature is lower than 40°C.

If this parameter is set to 1, the cooling fan keeps working after power-on.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-49 | Wakeup frequency | Dormant frequency (P8-51) to maximum frequency (P0-10) | 0.00 Hz |
| P8-50 | Wakeup delay time | 0.0–6500.0s | 0.0s |
| P8-51 | Dormant frequency | 0.00 Hz to wakeup frequency (P8-49) | 0.00 Hz |
| P8-52 | Dormant delay time | 0.0–6500.0s | 0.0s |

These parameters are used to implement the dormant and wakeup functions in the water supply application.

When the AC drive is in running state, the AC drive enters the dormant state and stops automatically after the dormant delay time (P8-52) if the set frequency is lower than or equal to the dormant frequency (P8-51).

When the AC drive is in dormant state and the current running command is effective, the AC drives starts up after the wakeup delay time (P8-50) if the set frequency is higher than or equal to the wakeup frequency (P8-49).

Generally, set the wakeup frequency equal to or higher than the dormant frequency. If the wakeup frequency and dormant frequency are set to 0, the dormant and wakeup functions are disabled.

When the dormant function is enabled, if the frequency source is PID, whether PID operation is performed in the dormant state is determined by PA-28. In this case, select PID operation enabled in the stop state (PA-28 = 1).

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-53 | Current running time reached | 0.0–6500.0 min | 0.0 min |

If the current running time reaches the value set in this parameter, the corresponding DO becomes ON, indicating that the current running time is reached.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-54 | Output power correction coefficient | 0.00%–200 .0% | 100.0% |

When the output power (U0-05) is not equal to the required value, you can perform linear correction on output power by using this parameter.





## Group P9 Fault and Protection

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-00 | Motor overload protection selection | 0: Disabled<br>1: Enabled | 1 |
| P9-01 | Motor overload protection gain | 0.20–10.00 | 1.00 |

- P9-00 = 0

  The motor overload protective function is disabled. The motor is exposed to potential damage due to overheating. A thermal relay is suggested to be installed between the AC drive and the motor.

- P9-00 = 1

  The AC drive judges whether the motor is overloaded according to the inverse time-lag curve of the motor overload protection.

  The inverse time-lag curve of the motor overload protection is:

  220% x P9-01 x rated motor current (if the load remains at this value for one minute, the AC drive reports motor overload fault), or

  150% x P9-01 x rated motor current (if the load remains at this value for 60 minutes, the AC drive reports motor overload fault)

Set P9-01 properly based on the actual overload capacity. If the value of P9-01 is set too large, damage to the motor may result because the motor overheats but the AC drive does not report the alarm.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-02 | Motor overload warning coefficient | 50%–100% | 80% |

This function is used to give a warning signal to the control system via DO before motor overload protection. This parameter is used to determine the percentage, at which pre-warning is performed before motor overload. The larger the value is, the less advanced the pre-warning will be.

When the accumulative output current of the AC drive is greater than the value of the overload inverse time-lag curve multiplied by P9-02, the DO terminal on the AC drive allocated with function 6 (Motor overload pre-warning) becomes ON.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-03 | Overvoltage stall gain | 0 (no stall overvoltage)–100 | 0 |
| P9-04 | Overvoltage stall protective voltage | 120%–150% | 130% |

When the DC bus voltage exceeds the value of P9-04 (Overvoltage stall protective voltage during deceleration of the AC drive, the AC drive stops deceleration and keeps the present running frequency. After the bus voltage declines, the AC drive continues to decelerate.

P9-03 (Overvoltage stall gain) is used to adjust the overvoltage suppression capacity of the AC drive. The larger the value is, the greater the overvoltage suppression capacity will be.

In the prerequisite of no overvoltage occurrence, set P9-03 to a small value.

For small-inertia load, the value should be small. Otherwise, the system dynamic response will be slow. For large-inertia load, the value should be large. Otherwise, the suppression result will be poor and an overvoltage fault may occur.

If the overvoltage stall gain is set to 0, the overvoltage stall function is disabled. The overvoltage stall protective voltage setting 100% corresponds to the base values in the following table:

Table 8-7 Overvoltage stall protective voltage setting 100% corresponds to base values

| Voltage Class | Corresponding Base Value |
|---|---|
| Single-phase 220 V | 290 V |
| Three-phase 220 V | 290 V |
| Three-phase 380 V | 530 V |
| Three-phase 480 V | 620 V |
| Three-phase 690 V | 880 V |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-05 | Overcurrent stall gain | 0–100 | 20 |
| P9-06 | Overcurrent stall protective current | 100%–200% | 150% |

When the output current exceeds the overcurrent stall protective current during acceleration/deceleration of the AC drive, the AC drive stops acceleration/deceleration and keeps the present running frequency. After the output current declines, the AC drive continues to accelerate/decelerate.

P9-05 (Overcurrent stall gain) is used to adjust the overcurrent suppression capacity of the AC drive. The larger the value is, the greater the overcurrent suppression capacity will be. In the prerequisite of no overcurrent occurrence, set tF9-05 to a small value.

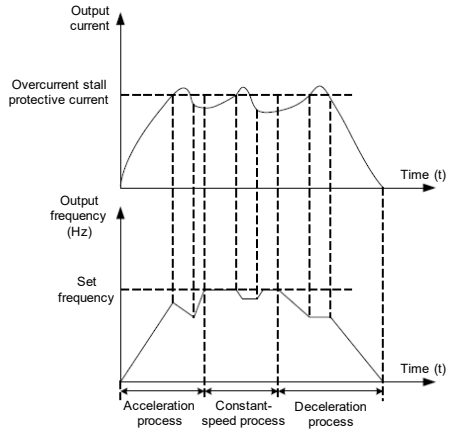
For small-inertia load, the value should be small. Otherwise, the system dynamic response will be slow. For large-inertia load, the value should be large. Otherwise, the suppression result will be poor and overcurrent fault may occur.

If the overcurrent stall gain is set to 0, the overcurrent stall function is disabled.





Figure 8-25 Diagram of the overcurrent stall protection function




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-07 | Short-circuit to ground upon power-on | 0: Disabled<br>1: Enabled | 1 |

It is used to determine whether to check the motor is short-circuited to ground at power-on of the AC drive. If this function is enabled, the AC drive's UVW will have voltage output a while after power-on.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-09 | Fault auto reset times | 0–20 | 0 |

It is used to set the times of fault auto resets if this function is used. After the value is exceeded, the AC drive will remain in the fault state.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-10 | DO action during fault auto reset | 0: Not act<br>1: Act | 0 |

It is used to decide whether the DO acts during the fault auto reset if the fault auto reset function is selected.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-11 | Time interval of fault auto reset | 0.1s–100.0s | 1.0s |

It is used to set the waiting time from the alarm of the AC drive to fault auto reset.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-12 | Input phase loss protection/contactor energizing protection selection | Unit's digit: Input phase loss protection<br>Ten's digit: Contactor energizing protection<br>0: Disabled<br>1: Enabled | 11 |

It is used to determine whether to perform input phase loss or contactor energizing protection.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-13 | Output phase loss protection selection | 0: Disabled<br>1: Enabled | 1 |

It is used to determine whether to perform output phase loss protection.

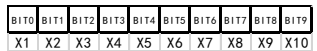
| Function Code | Name | Setting Range |
|---|---|---|
| P9-14 | 1st fault type | 0–99 |
| P9-15 | 2nd fault type | |
| P9-16 | 3rd (latest) fault type | |

It is used to record the types of the most recent three faults of the AC drive. 0 indicates no fault. For possible causes and solution of each fault, refer to Chapter 8.

| Function Code | Parameter Name | Description |
|---|---|---|
| P9-17 | Frequency upon 3rd fault | It displays the frequency when the latest fault occurs. |
| P9-18 | Current upon 3rd fault | It displays the current when the latest fault occurs. |
| P9-19 | Bus voltage upon 3rd fault | It displays the bus voltage when the latest fault occurs. |





| Function Code | Parameter Name | Description |
|---|---|---|
| P9-20 | X status upon 3rd fault | It displays the status of all X terminals when the latest fault occurs.<br>The sequence is as follows:<br>  <br>If a X is ON, the setting is 1. If the X is OFF, the setting is 0. The value is the equivalent decimal number converted from the X status.. |
| P9-21 | Output terminal status upon 3rd fault | It displays the status of all output terminals when the latest fault occurs.<br>The sequence is as follows:<br>  <br>If an output terminal is ON, the setting is 1. If the output terminal is OFF, the setting is 0. The value is the equivalent decimal number converted from the X statuses. |
| P9-22 | AC drive status upon 3rd fault | Reserved |
| P9-23 | Power-on time upon 3rd fault | It displays the present power-on time when the latest fault occurs. |
| P9-24 | Running time upon 3rd fault | It displays the present running time when the latest fault occurs. |
| P9-27 | Frequency upon 2nd fault | Same as P9-17–P9-24. |
| P9-28 | Current upon 2nd fault | |
| P9-29 | Bus voltage upon 2nd fault | |
| P9-30 | X status upon 2nd fault | |
| P9-31 | Output terminal status upon 2nd fault | |
| P9-32 | Frequency upon 2nd fault | |
| P9-33 | Current upon 2nd fault | |
| P9-34 | Bus voltage upon 2nd fault | |
| P9-37 | X status upon 1st fault | Same as P9-17–P9-24. |
| P9-38 | Output terminal status upon 1st fault | |
| P9-39 | Frequency upon 1st fault | |
| P9-40 | Current upon 1st fault | |
| P9-41 | Bus voltage upon 3rd fault | |
| P9-42 | X status upon 1st fault | |
| P9-43 | Output terminal status upon 1st fault | |
| P9-44 | Frequency upon 1st fault | |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-47 | Fault protection action selection 1 | Unit's digit (Motor overload, Err11) | 00000 |
| | | 0: Coast to stop<br>1: Stop according to the stop mode<br>2: Continue to run | |
| | | Ten's digit (Power input phase loss, Err12) | |
| | | Same as unit's digit | |
| | | Hundred's digit (Power output phase loss, Err13) | |
| | | Same as unit's digit | |
| | | Thousand's digit (External equipment fault, Err15) | |
| | | Same as unit's digit | |
| | | Ten thousand's digit (Communication fault, Err16) | |
| | | Same as unit's digit | |
| P9-48 | Fault protection action selection 2 | Unit's digit (Encoder fault, Err20) | 00000 |
| | | 0: Coast to stop<br>1: Switch over to V/F control, stop according to the stop mode<br>2: Switch over to V/F control, continue to run | |
| | | Ten's digit (EEPROM read-write fault, Err21) | |
| | | 0: Coast to stop<br>1: Stop according to the stop mode | |
| | | Hundred's digit: reserved | |
| | | Thousand's digit (Motor overheat, Err25) | |
| | | Same as unit's digit in P9-47 | |
| | | Ten thousand's digit (Accumulative running time reached) | |
| | | Same as unit's digit in P9-47 | |





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-49 | Fault protection action selection 3 | Unit's digit (User-defined fault 1, Err27) | 00000 |
| | | Same as unit's digit in P9-47 | |
| | | Ten's digit (User-defined fault 2, Err28) | |
| | | Same as unit's digit in P9-47 | |
| | | Hundred's digit (Accumulative power-on time reached, Err29) | |
| | | Same as unit's digit in P9-47 | |
| | | Thousand's digit (Load becoming 0, Err30) | |
| | | 0: Coast to stop<br>1: Stop according to the stop mode<br>2: Continue to run at 7% of rated motor frequency and resume to the set frequency if the load recovers | |
| | | Ten thousand's digit (PID feedback lost during running, Err31) | |
| | | Same as unit's digit in P9-47 | |
| P9-50 | Fault protection action selection 4 | Unit's digit (Too large speed deviation, Err42) | 00000 |
| | | Same as unit's digit in P9-47 | |
| | | Ten's digit (Motor over-speed, Err43) | |
| | | Same as unit's digit in P9-47 | |
| | | Hundred's digit (Initial position fault, Err51) | |
| | | Same as unit's digit in P9-47 | |
| | | Thousand's digit (Speed feedback fault, Err52) | |
| | | Same as unit's digit in P9-47 | |
| | | Ten thousand's digit: Reserved | |

If "Coast to stop" is selected, the AC drive displays Err** and directly stops.

- If "Stop according to the stop mode" is selected, the AC drive displays A** and stops according to the stop mode. After stop, the AC drive displays Err**.
- If "Continue to run" is selected, the AC drive continues to run and displays A**. The running frequency is set in P9-54.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-54 | Frequency selection for continuing to run upon fault | 0: Current running frequency<br>1: Set frequency<br>2: Frequency upper limit<br>3: Frequency lower limit<br>4: Backup frequency upon abnormality | 0 |
| P9-55 | Backup frequency upon abnormality | 0.0%–100.0% (maximum frequency) | 100.0% |

If a fault occurs during the running of the AC drive and the handling of fault is set to "Continue to run", the AC drive displays A** and continues to run at the frequency set in P9-54.

The setting of P9-55 is a percentage relative to the maximum frequency.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-56 | Type of motor temperature sensor | 0: No temperature sensor<br>1: PT100<br>2: PT1000 | 0 |
| P9-57 | Motor overheat protection threshold | 0–200° C | 110° C |
| P9-58 | Motor overheat warning threshold | 0–200° C | 90° C |

The signal of the motor temperature sensor needs to be connected to the optional I/O extension card. AI3 on the extension card can be used for the temperature signal input. The motor temperature sensor is connected to AI3 and PGND of the extension card. The AI3 terminal of the 9600 series supports both PT100 and PT1000. Set the sensor type correctly during the use. You can view the motor temperature via U0-34.

If the motor temperature exceeds the value set in P9-57, the AC drive reports an alarm and acts according to the selected fault protection action.

If the motor temperature exceeds the value set in P9-58, the DO terminal on the AC drive allocated with function 39 (Motor overheat warning) becomes ON.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-59 | Action selection at instantaneous power failure | 0: Invalid<br>1: Decelerate<br>2: Decelerate to stop | 0 |
| P9-60 | Action pause judging voltage at instantaneous power failure | 80.0%–100.0% | 90.0% |
| P9-61 | Voltage rally judging time at instantaneous power failure | 0.00–100.00s | 0.50s |
| P9-62 | Action judging voltage at instantaneous power failure | 60.0%–100.0% (standard bus voltage) | 80.0% |

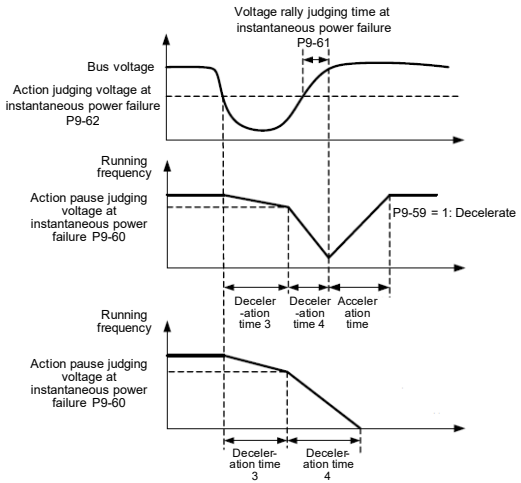
Upon instantaneous power failure or sudden voltage dip, the DC bus voltage of the AC drive reduces. This function enables the AC drive to compensate the DC bus voltage reduction with the load feedback energy by reducing the output frequency so as to keep the AC drive running continuously.

- If P9-59 = 1, upon instantaneous power failure or sudden voltage dip, the AC drive decelerates. Once the bus voltage resumes to normal, the AC drive accelerates to the set frequency. If the bus voltage remains normal for the time exceeding the value set in P9-61, it is considered that the bus voltage resumes to normal.
- If P9-59 = 2, upon instantaneous power failure or sudden voltage dip, the AC drive decelerates to stop.





Figure 8-26 AC drive action diagram upon instantaneous power failure




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-63 | Protection upon load becoming 0 | 0: Disabled<br>1: Enabled | 0 |
| P9-64 | Detection level of load becoming 0 | 0.0%–100.0% (rated motor current) | 10.0% |
| P9-65 | Detection time of load becoming 0 | 0.0–60.0s | 1.0s |

If protection upon load becoming 0 is enabled, when the output current of the AC drive is lower than the detection level (P9-64) and the lasting time exceeds the detection time (P9-65), the output frequency of the AC drive automatically declines to 7% of the rated frequency. During the protection, the AC drive automatically accelerates to the set frequency if the load resumes to normal.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-67 | Over-speed detection value | 0.0%–50.0% (maximum frequency) | 20.0% |
| P9-68 | Over-speed detection time | 0.0–60.0s | 1.0s |

This function is valid only when the AC drive runs in the FVC mode.

If the actual motor rotational speed detected by the AC drive exceeds the maximum frequency and the excessive value is greater than the value of P9-67 and the lasting time exceeds the value of P9-68, the AC drive reports Err43 and acts according to the selected fault protection action.

If the over-speed detection time is 0.0s, the over-speed detection function is disabled.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-69 | Detection value of too large speed deviation | 0.0%–50.0% (maximum frequency) | 20.0% |
| P9-70 | Detection time of too large speed deviation | 0.0–60.0s | 5.0s |

This function is valid only when the AC drive runs in the FVC mode.

If the AC drive detects the deviation between the actual motor rotational speed detected by the AC drive and the set frequency is greater than the value of P9-69 and the lasting time exceeds the value of P9-70, the AC drive reports Err42 and according to the selected fault protection action.

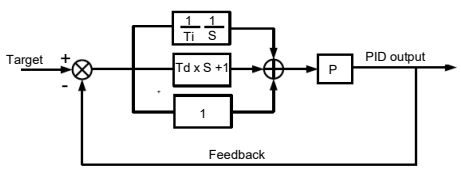
If P9-70 (Detection time of too large speed deviation) is 0.0s, this function is disabled.

## Group PA Process Control PID Function

PID control is a general process control method. By performing proportional, integral and differential operations on the difference between the feedback signal and the target signal, it adjusts the output frequency and constitutes a feedback system to stabilize the controlled counter around the target value.

It is applied to process control such as flow control, pressure control and temperature control. The following figure shows the principle block diagram of PID control.

Figure 8-27 Principle block diagram of PID control




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-00 | PID setting source | 0: PA-01<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting (X5/X6)<br>5: Communication setting<br>6: Multi-reference | 0 |
| PA-01 | PID digital setting | 0.0%–100.0% | 50.0% |

PA-00 is used to select the channel of target process PID setting. The PID setting is a relative value and ranges from 0.0% to 100.0%. The PID feedback is also a relative value. The purpose of PID control is to make the PID setting and PID feedback equal.





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-02 | PID feedback source | 0: AI1<br>1: AI2<br>2: AI3<br>3: AI1 – AI2<br>4: Pulse setting (X5/X6)<br>5: Communication setting<br>6: AI1 + AI2<br>7: MAX (\|AI1\|, \|AI2\|)<br>8: MIN (\|AI1\|, \|AI2\|) | 0 |

This parameter is used to select the feedback signal channel of process PID.

The PID feedback is a relative value and ranges from 0.0% to 100.0%.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-03 | PID action direction | 0: Forward action<br>1: Reverse action | 0 |

- 0: Forward action

  When the feedback value is smaller than the PID setting, the AC drive's output frequency rises. For example, the winding tension control requires forward PID action.

- 1: Reverse action

  When the feedback value is smaller than the PID setting, the AC drive's output frequency reduces. For example, the unwinding tension control requires reverse PID action.

  Note that this function is influenced by the X function 35 "Reverse PID action direction".

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-04 | PID setting feedback range | 0–65535 | 1000 |

This parameter is a non-dimensional unit. It is used for PID setting display (U0-15) and PID feedback display (U0-16).

Relative value 100% of PID setting feedback corresponds to the value of PA-04. If PA-04 is set to 2000 and PID setting is 100.0%, the PID setting display (U0-15) is 2000.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-05 | Proportional gain Kp1 | 0.0–100.0 | 20.0 |
| PA-06 | Integral time Ti1 | 0.01–10.00s | 2.00s |
| PA-07 | Differential time Td1 | 0.00–10.000 | 0.000s |

- PA-05 (Proportional gain Kp1)

  It decides the regulating intensity of the PID regulator. The higher the Kp1 is, the larger the regulating intensity is. The value 100.0 indicates when the deviation between PID feedback and PID setting is 100.0%, the adjustment amplitude of the PID regulator on the output frequency reference is the maximum frequency.

- PA-06 (Integral time Ti1)

  It decides the integral regulating intensity. The shorter the integral time is, the larger the regulating intensity is. When the deviation between PID feedback and PID setting is 100.0%, the integral regulator performs continuous adjustment for the time set in PA-06. Then the adjustment amplitude reaches the maximum frequency.

- PA-07 (Differential time Td1)

  It decides the regulating intensity of the PID regulator on the deviation change. The longer the differential time is, the larger the regulating intensity is. Differential time is the time within which the feedback value change reaches 100.0%, and then the adjustment amplitude reaches the maximum frequency.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-08 | Cut-off frequency of PID reverse rotation | 0.00 to maximum frequency | 2.00 Hz |

In some situations, only when the PID output frequency is a negative value (AC drive reverse rotation), PID setting and PID feedback can be equal. However, too high reverse rotation frequency is prohibited in some applications, and PA-08 is used to determine the reverse rotation frequency upper limit.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-09 | PID deviation limit | 0.0%–100.0% | 0.0% |

If the deviation between PID feedback and PID setting is smaller than the value of PA-09, PID control stops. The small deviation between PID feedback and PID setting will make the output frequency stabilize, effective for some closed-loop control applications.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-10 | PID differential limit | 0.00%–100.00% | 0.10% |

It is used to set the PID differential output range. In PID control, the differential operation may easily cause system oscillation. Thus, the PID differential regulation is restricted to a small range.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-11 | PID setting change time | 0.00–650.00s | 0.00s |

The PID setting change time indicates the time required for PID setting changing from 0.0% to 100.0%. The PID setting changes linearly according to the change time, reducing the impact caused by sudden setting change on the system.





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-12 | PID feedback filter time | 0.00–60.00s | 0.00s |
| PA-13 | PID output filter time | 0.00–60.00s | 0.00s |

PA-12 is used to filter the PID feedback, helping to reduce interference on the feedback but slowing the response of the process closed-loop system.

PA-13 is used to filter the PID output frequency, helping to weaken sudden change of the AC drive output frequency but slowing the response of the process closed-loop system.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-15 | Proportional gain Kp2 | 0.0–100.0 | 20.0 |
| PA-16 | Integral time Ti2 | 0.01–10.00s | 2.00s |
| PA-17 | Differential time Td2 | 0.000–10.000s | 0.000s |
| PA-18 | PID parameter switchover condition | 0: No switchover<br>1: Switchover via X 2: Automatic switchover based on deviation | 0 |
| PA-19 | PID parameter switchover deviation 1 | 0.0% to PA-20 | 20.0% |
| PA-20 | PID parameter switchover deviation 2 | PA-19 to 100.0% | 80.0% |

In some applications, PID parameters switchover is required when one group of PID parameters cannot satisfy the requirement of the whole running process.

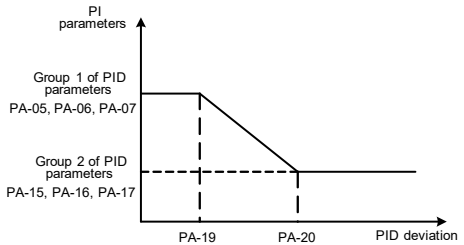
These parameters are used for switchover between two groups of PID parameters. Regulator parameters PA-15 to PA-17 are set in the same way as PA-05 to PA-07.

The switchover can be implemented either via a X terminal or automatically implemented based on the deviation.

If you select switchover via a X terminal, the X must be allocated with function 43 "PID parameter switchover". If the X is OFF, group 1 (PA-05 to PA-07) is selected. If the X is ON, group 2 (PA-15 to PA-17) is selected.

If you select automatic switchover, when the absolute value of the deviation between PID feedback and PID setting is smaller than the value of PA-19, group 1 is selected. When the absolute value of the deviation between PID feedback and PID setting is higher than the value of PA-20, group 2 is selected. When the deviation is between PA-19 and PA-20, the PID parameters are the linear interpolated value of the two groups of parameter values.

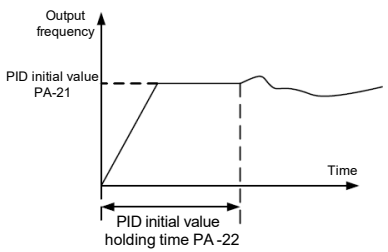
Figure 8-28 PID parameters switchover




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-21 | PID initial value | 0.0%–100.0% | 0.0% |
| PA-22 | PID initial value holding time | 0.00–650.00s | 0.00s |

When the AC drive starts up, the PID starts closed-loop algorithm only after the PID output is fixed to the PID initial value (PA-21) and lasts the time set in PA-22.

Figure 8-29 PID initial value function




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-23 | Maximum deviation between two PID outputs in forward direction | 0.00%–100.00% | 1.00% |
| PA-24 | Maximum deviation between two PID outputs in reverse direction | 0.00%–100.00% | 1.00% |

This function is used to limit the deviation between two PID outputs (2 ms per PID output) to suppress the rapid change of PID output and stabilize the running of the AC drive.

PA-23 and PA-24 respectively correspond to the maximum absolute value of the output deviation in forward direction and in reverse direction.





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-25 | PID integral property | Unit's digit (Integral separated)<br>0: Invalid<br>1: Valid<br>Ten's digit (Whether to stop integral operation when the output reaches the limit)<br>0: Continue integral operation<br>1: Stop integral operation | 00 |

- Integral separated

  If it is set to valid, , the PID integral operation stops when the X allocated with function 38 "PID integral pause" is ON In this case, only proportional and differential operations take effect.

  If it is set to invalid, integral separated remains invalid no matter whether the X allocated with function 38 "PID integral pause" is ON or not.

- Whether to stop integral operation when the output reaches the limit

  If "Stop integral operation" is selected, the PID integral operation stops, which may help to reduce the PID overshoot.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-26 | Detection value of PID feedback loss | 0.0%: Not judging feedback loss<br>0.1%–100.0% | 0.0% |
| PA-27 | Detection time of PID feedback loss | 0.0–20.0s | 0.0s |

These parameters are used to judge whether PID feedback is lost.

If the PID feedback is smaller than the value of PA-26 and the lasting time exceeds the value of PA-27, the AC drive reports Err31 and acts according to the selected fault protection action.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-28 | PID operation at stop | 0: No PID operation at stop<br>1: PID operation at stop | 0 |

It is used to select whether to continue PID operation in the state of stop. Generally, the PID operation stops when the AC drive stops.

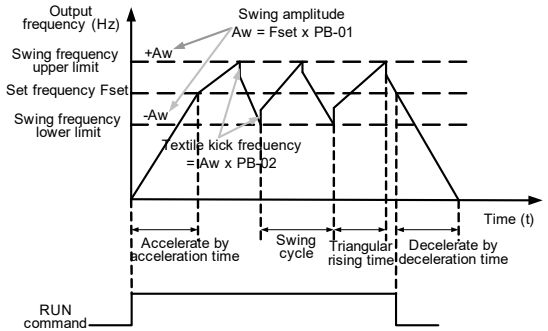
## Group PB: Swing Frequency, Fixed Length and Count

The swing frequency function is applied to the textile and chemical fiber fields and the applications where traversing and winding functions are required.

The swing frequency function indicates that the output frequency of the AC drive swings up and down with the set frequency as the center. The trace of running frequency at the time axis is shown in the following figure

The swing amplitude is set in PB-00 and PB-01. When PB-01 is set to 0, the swing amplitude is 0 and the swing frequency does not take effect.

Figure 8-30 Swing frequency control




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PB-00 | Swing frequency setting mode | 0: Relative to the central frequency<br>1: Relative to the maximum frequency | 0 |

This parameter is used to select the base value of the swing amplitude.

- 0: Relative to the central frequency (P0-07 frequency source selection)

  It is variable swing amplitude system. The swing amplitude varies with the central frequency (set frequency).

- 1: Relative to the maximum frequency (P0-10 maximum output frequency)

  It is fixed swing amplitude system. The swing amplitude is fixed.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PB-01 | Swing frequency amplitude | 0.0%–100.0% | 0.0% |
| PB-02 | Jump frequency amplitude | 0.0%–50.0% | 0.0% |

This parameter is used to determine the swing amplitude and jump frequency amplitude. The swing frequency is limited by the frequency upper limit and frequency lower limit.

- If relative to the central frequency (PB-00 = 0), the actual swing amplitude AW is the calculation result of P0-07 (Frequency source selection) multiplied by PB-01.
- If relative to the maximum frequency (PB-00 = 1), the actual swing amplitude AW is the calculation result of P0-10 (Maximum frequency) multiplied by PB-01.

Jump frequency = Swing amplitude AW x PB-02 (Jump frequency amplitude).

- If relative to the central frequency (PB-00 = 0), the jump frequency is a variable value.
- If relative to the maximum frequency (PB-00 = 1), the jump frequency is a fixed value.

The swing frequency is limited by the frequency upper limit and frequency lower limit.





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PB-03 | Swing frequency cycle | 0.0–3000.0s | 10.0s |
| PB-04 | Triangular wave rising time coefficient | 0.0%–100.0% | 50.0% |

PB-03 specifies the time of a complete swing frequency cycle.

PB-04 specifies the time percentage of triangular wave rising time to PB-03 (Swing frequency cycle).

- Triangular wave rising time = PB-03 (Swing frequency cycle) x PB-04 (Triangular wave rising time coefficient, unit: s
- Triangular wave falling time = PB-03 (Swing frequency cycle) x (1 – PB-04 Triangular wave rising time coefficient ,unit: s

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PB-05 | Set length | 0–65535 m | 1000 m |
| PB-06 | Actual length | 0–65535 m | 0 m |
| PB-07 | Number of pulses per meter | 0.1–6553.5 | 100.0 |

The preceding parameters are used for fixed length control

The length information is collected by X terminals. PB-06 (Actual length) is calculated by dividing the number of pulses collected by the X terminal by PB-07 (Number of pulses each meter).

When the actual length PB-06 exceeds the set length in PB-05, the DO terminal allocated with function 10 (Length reached) becomes ON.

During the fixed length control, the length reset operation can be performed via the X terminal allocated with function 28. For details, see the descriptions of P4-00 to P4-09.

Allocate corresponding X terminal with function 27 (Length count input) in applications. If the pulse frequency is high, X5/X6 must be used.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PB-08 | Set count value | 1–65535 | 1000 |
| PB-09 | Designated count value | 1–65535 | 1000 |

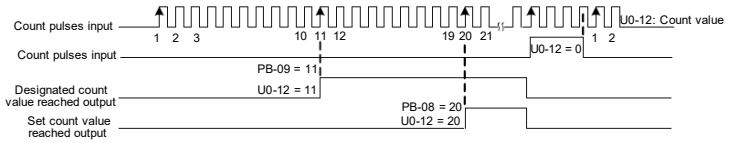
The count value needs to be collected by X terminal. Allocate the corresponding X terminal with function 25 (Counter input) in applications. If the pulse frequency is high, X5/X6 must be used.

When the count value reaches the set count value (PB-08), the DO terminal allocated with function 8 (Set count value reached) becomes ON. Then the counter stops counting.

When the counting value reaches the designated counting value (PB-09), the DO terminal allocated with function 9 (Designated count value reached) becomes ON. Then the counter continues to count until the set count value is reached.

PB-09 should be equal to or smaller than PB-08.

Figure 8-31 Reaching the set count value and designated count value




## Group PC Multi-Reference and Simple PLC Function

The 9600 series multi-reference has many functions. Besides multi-speed, it can be used as the setting source of the V/F separated voltage source and setting source of process PID. In addition, the multi-reference is relative value.

The simple PLC function is different from the 9600 series user programmable function. Simple PLC can only complete simple combination of multi-reference, while the user programmable function is more practical. For details, see the descriptions of group A7.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PC-00 | Reference 0 | -100.0%–100.0% | 0.0% |
| PC-01 | Reference 1 | -100.0%–100.0% | 0.0% |
| PC-02 | Reference 2 | -100.0%–100.0% | 0.0% |
| PC-03 | Reference 3 | -100.0%–100.0% | 0.0% |
| PC-04 | Reference 4 | -100.0%–100.0% | 0.0% |
| PC-05 | Reference 5 | -100.0%–100.0% | 0.0% |
| PC-06 | Reference 6 | -100.0%–100.0% | 0.0% |
| PC-07 | Reference 7 | -100.0%–100.0% | 0.0% |
| PC-08 | Reference 8 | -100.0%–100.0% | 0.0% |
| PC-09 | Reference 9 | -100.0%–100.0% | 0.0% |
| PC-10 | Reference 10 | -100.0%–100.0% | 0.0% |
| PC-11 | Reference 11 | -100.0%–100.0% | 0.0% |
| PC-12 | Reference 12 | -100.0%–100.0% | 0.0% |
| PC-13 | Reference 13 | -100.0%–100.0% | 0.0% |
| PC-14 | Reference 14 | -100.0%–100.0% | 0.0% |
| PC-15 | Reference 15 | -100.0%–100.0% | 0.0% |

Multi-reference can be the setting source of frequency, V/F separated voltage and process PID. The multi-reference is relative value and ranges from -100.0% to 100.0%.

As frequency source, it is a percentage relative to the maximum frequency. As V/F separated voltage source, it is a percentage relative to the rated motor voltage. As process PID setting source, it does not require conversion.

Multi-reference can be switched over based on different states of X terminals. For details, see the descriptions of group P4.





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PC-16 | Simple PLC running mode | 0: Stop after the AC drive runs one cycle<br>1: Keep final values after the AC drive runs one cycle<br>2: Repeat after the AC drive runs one cycle | 0 |

- 0: Stop after the AC drive runs one cycle

  The AC drive stops after running one cycle, and will not start up until receiving another command.

- 1: Keep final values after the AC drive runs one cycle

  The AC drive keeps the final running frequency and direction after running one cycle

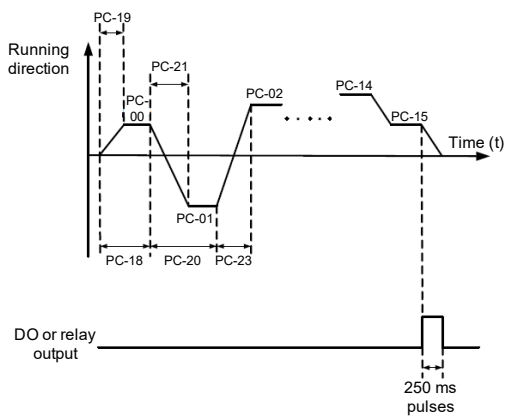
- 2: Repeat after the AC drive runs one cycle

  The AC drive automatically starts another cycle after running one cycle, and will not stop until receiving the stop command.

Simple PLC can be either the frequency source or V/F separated voltage source.

When simple PLC is used as the frequency source, whether parameter values of PC-00 to PC-15 are positive or negative determines the running direction. If the parameter values are negative, it indicates that the AC drive runs in reverse direction.

Figure 8-32 Simple PLC when used as frequency source



| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PC-17 | Simple PLC retentive selection | Unit's digit (Retentive upon power failure)<br>0: No<br>1: Yes<br>Ten's digit (Retentive upon stop)<br>0: No<br>1: Yes | 00 |

PLC retentive upon power failure indicates that the AC drive memorizes the PLC running moment and running frequency before power failure and will continue to run from the memorized moment after it is powered on again. If the unit's digit is set to 0, the AC drive restarts the PLC process after it is powered on again.

PLC retentive upon stop indicates that the AC drive records the PLC running moment and running frequency upon stop and will continue to run from the recorded moment after it starts up again. If the ten's digit is set to 0, the AC drive restarts the PLC process after it starts up again.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PC-18 | Running time of simple PLC reference 0 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-19 | Acceleration/deceleration time of simple PLC reference 0 | 0–3 | 0 |
| PC-20 | Running time of simple PLC reference 1 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-21 | Acceleration/deceleration time of simple PLC reference 1 | 0–3 | 0 |
| PC-22 | Running time of simple PLC reference 2 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-23 | Acceleration/deceleration time of simple PLC reference 2 | 0–3 | 0 |
| PC-24 | Running time of simple PLC reference 3 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-25 | Acceleration/deceleration time of simple PLC reference 3 | 0–3 | 0 |
| PC-26 | Running time of simple PLC reference 4 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-27 | Acceleration/deceleration time of simple PLC reference 4 | 0–3 | 0 |
| PC-28 | Running time of simple PLC reference 5 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-29 | Acceleration/deceleration time of simple PLC reference 5 | 0–3 | 0 |
| PC-30 | Running time of simple PLC reference 6 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-31 | Acceleration/deceleration time of simple PLC reference 6 | 0–3 | 0 |
| PC-32 | Running time of simple PLC reference 7 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-33 | Acceleration/deceleration time of simple PLC reference 7 | 0–3 | 0 |





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PC-34 | Running time of simple PLC reference 8 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-35 | Acceleration/deceleration time of simple PLC reference 8 | 0–3 | 0 |
| PC-36 | Running time of simple PLC reference 9 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-37 | Acceleration/deceleration time of simple PLC reference 9 | 0–3 | 0 |
| PC-38 | Running time of simple PLC reference 10 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-39 | Acceleration/deceleration time of simple PLC reference 10 | 0–3 | 0 |
| PC-40 | Running time of simple PLC reference 11 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-41 | Acceleration/deceleration time of simple PLC reference 11 | 0–3 | 0 |
| PC-42 | Running time of simple PLC reference 12 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-43 | Acceleration/deceleration time of simple PLC reference 12 | 0–3 | 0 |
| PC-44 | Running time of simple PLC reference 13 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-45 | Acceleration/deceleration time of simple PLC reference 13 | 0–3 | 0 |
| PC-46 | Running time of simple PLC reference 14 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-47 | Acceleration/deceleration time of simple PLC reference 14 | 0–3 | 0 |
| PC-48 | Running time of simple PLC reference 15 | 0.0–6553.5s (h) | 0.0s (h) |
| PC-49 | Acceleration/deceleration time of simple PLC reference 15 | 0–3 | 0 |
| PC-50 | Time unit of simple PLC running | 0: s (second)<br>1: h (hour) | 0 |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PC-51 | Reference 0 source | 0: Set by PC-00<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting<br>5: PID<br>6: Set by preset frequency (P0-08), modified via terminal UP/DOWN. | 0 |

It determines the setting channel of reference 0. You can perform convenient switchover between the setting channels. When multi-reference or simple PLC is used as frequency source, the switchover between two frequency sources can be realized easily.

## Group PD User-defined Parameters

## Group PE User-Defined Function Codes

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PE-00 | User-defined function code 0 | P0-00 to PP-xx, A0-00 to Ax-xx, U0-xx | P0-00 |
| PE-01 | User-defined function code 1 | Same as PE-00 | P0-02 |
| PE-02 | User-defined function code 2 | Same as PE-00 | P0-03 |
| PE-03 | User-defined function code 3 | Same as PE-00 | P0-07 |
| PE-04 | User-defined function code 4 | Same as PE-00 | P0-08 |
| PE-05 | User-defined function code 5 | Same as PE-00 | P0-17 |
| PE-06 | User-defined function code 6 | Same as PE-00 | P0-18 |
| PE-07 | User-defined function code 7 | Same as PE-00 | P3-00 |
| PE-08 | User-defined function code 8 | Same as PE-00 | P3-01 |
| PE-09 | User-defined function code 9 | Same as PE-00 | P4-00 |
| PE-10 | User-defined function code 10 | Same as PE-00 | P4-01 |
| PE-11 | User-defined function code 11 | Same as PE-00 | P4-02 |
| PE-12 | User-defined function code 12 | Same as PE-00 | P5-04 |
| PE-13 | User-defined function code 13 | Same as PE-00 | P5-07 |
| PE-14 | User-defined function code 14 | Same as PE-00 | P6-00 |
| PE-15 | User-defined function code 15 | Same as PE-00 | P6-10 |
| PE-16 | User-defined function code 16 | Same as PE-00 | P0-00 |
| PE-17 | User-defined function code 17 | Same as PE-00 | P0-00 |
| PE-18 | User-defined function code 18 | Same as PE-00 | P0-00 |
| PE-19 | User-defined function code 19 | Same as PE-00 | P0-00 |
| PE-20 | User-defined function code 20 | Same as PE-00 | P0-00 |
| PE-21 | User-defined function code 21 | Same as PE-00 | P0-00 |
| PE-22 | User-defined function code 22 | Same as PE-00 | P0-00 |
| PE-23 | User-defined function code 23 | Same as PE-00 | P0-00 |
| PE-24 | User-defined function code 24 | Same as PE-00 | P0-00 |
| PE-25 | User-defined function code 25 | Same as PE-00 | P0-00 |
| PE-26 | User-defined function code 26 | Same as PE-00 | P0-00 |
| PE-27 | User-defined function code 27 | Same as PE-00 | P0-00 |
| PE-28 | User-defined function code 28 | Same as PE-00 | P0-00 |
| PE-29 | User-defined function code 29 | Same as PE-00 | P0-00 |

PE is user-defined parameter group. You can select the required parameters from all 9600 series functions codes and add them into this group, convenient for view and modification.



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Group PE provides a maximum of 30 user-defined parameters. If "PE-00" is displayed, it indicates that group PE is null. After you enter user-defined function code mode, the displayed parameters are defined by PE-00 to PE-31 and the sequence is consistent with that in group PE.

## Group PP User Password

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PP-00 | User password | 0–65535 | 0 |

If it is set to any non-zero number, the password protection function is enabled. After a password has been set and taken effect, you must enter the correct password in order to enter the menu. If the entered password is incorrect you cannot view or modify parameters.

If PP-00 is set to 00000, the previously set user password is cleared, and the password protection function is disabled.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PP-01 | Restore default settings | 0: No operation<br>1: Restore factory settings except motor parameters<br>2: Clear records<br>4: Reserved<br>501: Reserved | 0 |

- 1: Restore default settings except motor parameters

  If PP-01 is set to 1, most function codes are restored to the default settings except motor parameters, frequency reference resolution (P0-22), fault records, accumulative running time (P7-09), accumulative power-on time (P7-13) and accumulative power consumption (P7-14).

- 2: Clear records

  If PP-01 is set to 2, the fault records, accumulative running time (P7-09), accumulative power-on time (P7-13) and accumulative power consumption (P7-14) are cleared.

- 501: Reserved

- 4: Reserved

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PP-02 | AC drive parameter display property | Unit's digit (Group U display selection)<br>0: Not display<br>1: Display<br>Ten's digit (Group A display selection)<br>0: Not display<br>1: Display | 11 |
| PP-03 | Individualized parameter display property | Unit's digit (User-defined parameter display selection)<br>0: Not display<br>1: Display<br>Ten's digit (User-modified parameter display selection)<br>0: Not display<br>1: Display | 00 |

The setting of parameter display mode aims to facilitate you to view different types of parameters based on actual requirements. The 9600 series provides the following three parameter display modes.

Table 6-9 Three parameter display modes provided by 9600 series

| Name | Description |
|---|---|
| AC drive parameter display | Display function codes of the AC drive in sequence of P0 to PF, A0 to AF and U0 to UF. |
| User-defined parameter display | Display a maximum of 32 user-defined parameters included in group PE |
| User-modified parameter display | Display the parameters that are modified. |

If one digit of PP-03 is set to 1, you can switch over to different parameter display modes by pressing key QUICK. By default, the AC drive parameter display mode is used.

The display codes of different parameter types are shown in the following table.

Table 6-10 Display codes of different parameter types

| Parameter Type | Display Code |
|---|---|
| AC drive parameter | -bASE |
| User-defined parameter | -USEr |
| User-modified parameter | --C-- |





The 9600 series provides display of two types of individualized parameters: user-defined parameters and user-modified parameters

- You-defined parameters are included in group PE. You can add a maximum of 32 parameters, convenient for commissioning.

  In user-defined parameter mode, symbol "u" is added before the function code. For example, P1-00 is displayed as uP1-00.

- You-modified parameters are grouped together, convenient for on-site troubleshooting. In you-modified parameter mode, symbol "c" is added before the function code. For example, P1-00 is displayed as cP1-00.

| Function Code | Name | Setting Range | Default |
|---|---|---|---|
| PP-04 | Parameter modification property | 0: Modifiable<br>1: Not modifiable | 0 |

It is used to set whether the parameters are modifiable to avoid mal-function. If it is set to 0, all parameters are modifiable. If it is set to 1, all parameters can only be viewed.

## Group A0: Torque Control and Restricting Parameters

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A0-00 | Speed/Torque control selection | 0: Speed control<br>1: Torque control | 0 |

It is used to select the AC drive's control mode: speed control or torque control.

The 9600 series provides X terminals with two torque related functions, function 29 (Torque control prohibited) and function 46 (Speed control/Torque control switchover). The two X terminals need to be used together with A0-00 to implement speed control/torque control switchover.

If the X terminal allocated with function 46 (Speed control/Torque control switchover) is OFF, the control mode is determined by A0-00. If the X terminal allocated with function 46 is ON, the control mode is reverse to the value of A0-00.

However, if the X terminal with function 29 (Torque control prohibited) is ON, the AC drive is fixed to run in the speed control mode

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A0-01 | Torque setting source in torque control | 0: Digital setting (A0-03)<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting (X5/X6)<br>5: Communication setting<br>6: MIN (AI1, AI2)<br>7: MAX (AI1, AI2) | 0 |
| A0-03 | Torque digital setting in torque control | -200.0%–+200.0% | 150.0% |

A0-01 is used to set the torque setting source. There are a total of eight torque setting sources.

The torque setting is a relative value. 100.0% corresponds to the AC drive's rated torque. The setting range is -200.0% to 200.0%, indicating the AC drive's maximum torque is twice of the AC drive's rated torque.

If the torque setting is positive, the AC drive rotates in forward direction. If the torque setting is negative, the AC drive rotates in reverse direction.

- 0: Digital setting (A0-03)

  The target torque directly uses the value set in A0-03.

- 1: AI1
- 2: AI2
- 3: AI3

  The target torque is decided by analog input. The 9600 series control board provides two AI terminals (AI1, AI2). Another AI terminal (AI3) is provided by the I/O extension card. AI1 is 0–10 V voltage input, AI2 is 0–10 V voltage input or 4–20 mA current input decided by jumper J8 on the control board, and AI3 is -10 V to +10 V voltage input.

  The 9600 series provides five curves indicating the mapping relationship between the input voltage of AI1, AI2 and AI3 and the target frequency, three of which are linear (point-point) correspondence and two of which are four-point correspondence curves. You can set the curves by using function codes P4-13 to P4-27 and function codes in group A6, and select curves for AI1, AI2 and AI3 in P4-33.

  When AI is used as frequency setting source, the corresponding value 100% of voltage/current input corresponds to the value of A0-03.

- 4: Pulse setting (X5/X6)

  The target torque is set by X5/X6 (high-speed pulse). The pulse setting signal specification is 9–30 V (voltage range) and 0–100 kHz (frequency range). The pulse can only be input via X5/X6. The relationship (which is a two-point line) between X5/X6 input pulse frequency and the corresponding value is set in P4-28 to P4-31. The corresponding value 100.0% of pulse input corresponds to the value of A0-03.

- 5: Communication setting

  The target torque is set by means of communication.

  If the AC drive is a slave in point-point communication and receives data as torque source, data transmitted by the master is used as the setting value. For details, see the description of group A8.

  If PROFIBUS-DP communication is valid and PZD1 is used for torque setting, data transmitted by PDZ1 is directly used as the torque source. The data format is -100.00% to 100.00%. 100% corresponds to the value of A0-03.

  In other conditions, data is given by host computer through the communication address 0x1000. The data format is -100.00% to 100.00%. 100% corresponds to the value of A0-03.

  The 9600 series supports four host computer communication protocols: Modbus, PROFIBUS-DP, CANopen and CANlink. They cannot be used simultaneously.

  If the communication mode is used, a communication card must be installed. The 9600 series provides four optional communication cards and you can select one based on actual requirements. If the communication protocol is Modbus, PROFIBUS-DP or CANopen, the corresponding serial communication protocol needs to be selected based on the setting of P0-28.

  The CANlink protocol is always valid.





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A0-05 | Forward maximum frequency in torque control | 0.00 Hz to maximum frequency （P0-10） | 50.00 Hz |
| A0-06 | Reverse maximum frequency in torque control | 0.00 Hz to maximum frequency （P0-10） | 50.00 Hz |

two parameters are used to set the maximum frequency in forward or reverse rotation in torque control mode.

In torque control, if the load torque is smaller than the motor output torque, the motor's rotational speed will rise continuously. To avoid runaway of the mechanical system, the motor maximum rotating speed must be limited in torque control.

You can implement continuous change of the maximum frequency in torque control dynamically by controlling the frequency upper limit.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A0-07 | Acceleration time in torque control | 0.00–65000s | 0.00s |
| A0-08 | Deceleration time in torque control | 0.00–65000s | 0.00s |

In torque control, the difference between the motor output torque and the load torque determines the speed change rate of the motor and load. The motor rotational speed may change quickly and this will result in noise or too large mechanical stress. The setting of acceleration/deceleration time in torque control makes the motor rotational speed change softly.

However, in applications requiring rapid torque response, set the acceleration/deceleration time in torque control to 0.00s. For example, two AC drives are connected to drive the same load. To balance the load allocation, set one AC drive as master in speed control and the other as slave in torque control. The slave receives the master's output torque as the torque command and must follow the master rapidly. In this case, the acceleration/deceleration time of the slave in torque control is set to 0.0s.

## Group A1: Virtual X (VX)/Virtual DO (VDO)

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A1-00 | VX1 function selection | 0–59 | 0 |
| A1-01 | VX2 function selection | 0–59 | 0 |
| A1-02 | VX3 function selection | 0–59 | 0 |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A1-03 | VX4 function selection | 0–59 | 0 |
| A1-04 | VX5 function selection | 0–59 | 0 |

VX1 to VX5 have the same functions as X terminals on the control board and can be used for digital input. For more details, see description of P4-00 to P4-09.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A1-05 | VX state setting mode | Unit's digit (VX1)<br>0: Decided by state of VDOx<br>1: Decided by A1-06<br>Ten's digit (VX2)<br>0, 1 (same as VX1)<br>Hundred's digit (VX3)<br>0, 1 (same as VX1)<br>Thousand's digit (VX4)<br>0, 1 (same as VX1)<br>Ten thousand's digit (VX5)<br>0, 1 (same as VX1) | 00000 |
| A1-06 | VX state selection | Unit's digit (VX1)<br>0: Invalid<br>1: Valid<br>Ten's digit (VX2)<br>0, 1 (same as VX1)<br>Hundred's digit (VX3)<br>0, 1 (same as VX1)<br>Thousand's digit (VX4)<br>0, 1 (same as VX1)<br>Ten thousand's digit (VX5)<br>0, 1 (same as VX1) | 00000 |

Different from X terminals, VX state can be set in two modes, selected in A1-05:

- Decided by state of VDOx

  Whether the state a VX is valid is determined by the state of the corresponding VDO and VXx is uniquely bound to VDOx (x is between 1 and 5). For example, to implement the function that the AC drive reports an alarm and stops when the AI1 input exceeds the limit, perform the following setting:

  1) Allocate VX1 with function 44 "User-defined fault 1" (A1-00 = 44).
  2) Set A1-05 to xxx0.
  3) Allocate VDO1 with function 31 "AI1 input limit exceeded" (A1-11 = 31).





When the AI1 input exceeds the limit, VDO1 becomes ON. At this moment, VX1 becomes ON and the AC drive receives you-defined fault 1. Then the AC drive reports Err27 and stops.

- Decided by A1-06

  The VX state is determined by the binary bit of A1-06. For example, to implement the function that the AC drive automatically enters the running state after power-on, perform the following setting:

  1) Allocate VX1 with function 1 "Forward RUN (FWD)" (A1-00 = 1).
  2) Set A1-05 to xxx1: The state of VX1 is decided by A1-06.
  3) Set A1-06 to xxx1: VX1 is valid.
  4) Set P0-02 to 1: The command source to terminal control.
  5) Set P8-18 to 0: Startup protection is not enabled.

  When the AC drive completes initialization after power-on, it detects that VX1 is valid and VX1 is allocated with the function of forward RUN. That is, the AC drive receives the forward RUN command from the terminal. Therefore, The AC drive starts to run in forward direction.

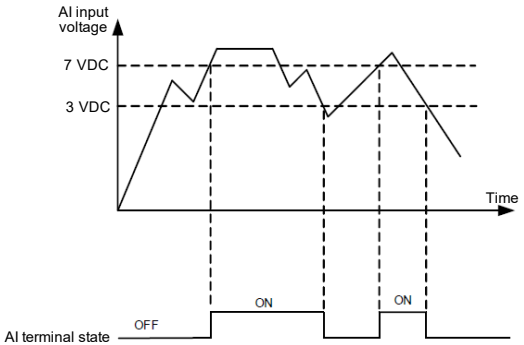
| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A1-07 | Function selection for AI1 used as X | 0–59 | 0 |
| A1-08 | Function selection for AI2 used as X | 0–59 | 0 |
| A1-09 | Function selection for AI3 used as X | 0–59 | 0 |
| A1-10 | State selection for AI used as X | Unit's digit (AI1)<br>0: High level valid<br>1: Low level valid<br>Ten's digit (AI2)<br>0, 1 (same as unit's digit)<br>Hundred's digit (AI3)<br>0, 1 (same as unit's digit) | 000 |

The functions of these parameters are to use AI as X. When AI is used as X, the AI state is high level if the AI input voltage is 7 V or higher and is low level if the AI input voltage is 3 V or lower. The AI state is hysteresis if the AI input voltage is between 3 V and 7 V. A1-10 is used to determine whether high level valid or low level valid when AI is used as X.

The setting of AIs (used as X) function is the same as that of Xs. For details, see the descriptions of group P4.

The following figure takes AI input voltage as an example to describe the relationship between AI input voltage and corresponding X state.

Figure 8-33 Relationship of AI input voltage and corresponding X status




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A1-11 | VDO1 function selection | 0: Short with physical Xx internally<br>1–40: Refer to function selection of physical DO in group P5 | 0 |
| A1-12 | VDO2 function selection | 0: Short with physical Xx internally<br>1–40: Refer to function selection of physical DO in group P5 | 0 |
| A1-13 | VDO3 function selection | 0: Short with physical Xx internally<br>1–40: Refer to function selection of physical DO in group P5 | 0 |
| A1-14 | VDO4 function selection | 0: Short with physical Xx internally<br>1–40: Refer to function selection of physical DO in group P5 | 0 |
| A1-15 | VDO5 function selection | 0: Short with physical Xx internally<br>1–40: Refer to function selection of physical DO in group P5 | 0 |
| A1-16 | VDO1 output delay | 0.0–3600.0s | 0.0s |
| A1-17 | VDO2 output delay | 0.0–3600.0s | 0.0s |
| A1-18 | VDO3 output delay | 0.0–3600.0s | 0.0s |
| A1-19 | VDO4 output delay | 0.0–3600.0s | 0.0s |
| A1-20 | VDO5 output delay | 0.0–3600.0s | 0.0s |





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A1-21 | VDO state selection | Unit's digit (VDO1)<br>0: Positive logic<br>1: Reverse logic<br>Ten's digit (VDO2)<br>0, 1 (same as unit's digit)<br>Hundred's digit (VDO3)<br>0, 1 (same as unit's digit)<br>Thousand's digit (VDO4)<br>0, 1 (same as unit's digit)<br>Ten thousand's digit (VDO5)<br>0, 1 (same as unit's digit) | 00000 |

VDO functions are similar to the DO functions on the control board. The VDO can be used together with VXx to implement some simple logic control.

- If VDO function is set to 0, the state of VDO1 to VDO5 is determined by the state of X1 to X5 on the control board. In this case, VDOx and DIx are one-to-one mapping relationship.
- If VDO function is set to non-0, the function setting and use of VDOx are the same as DO in group P5.

The VDOx state can be set in A1-21. The application examples of VXx involve the use of VDOx, and see the examples for your reference.

## Group A2 to A4: Motor 2 to Motor 4 Parameters

The 9600 series can switch over the running among four motors. For the four motors, you can:

- Set motor nameplate parameters respectively
- Perform motor parameter auto-tuning respectively
- Select V/F control or vector control respectively
- Set encoder-related parameters respectively
- Set parameters related to V/F control or vector control independently

Groups A2, A3 and A4 respectively correspond to motor 2, motor 3 and motor 4. The parameters of the three groups are the same. Here we just list the parameters of group A2 for reference.

All parameters in group A2 have the same definition and usage as parameters of motor 1. For more details, refer to the descriptions of motor 1 parameters.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A2-00 | Motor type selection | 0: Common asynchronous motor<br>1: Variable frequency asynchronous motor<br>2: Permanent magnetic synchronous motor | 0 |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A2-01 | Rated motor power | 0.1–1000.0 kW | Model dependent |
| A2-02 | Rated motor voltage | 1–2000 V | Model dependent |
| A2-03 | Rated motor current | 0.01–655.35 A (AC drive power ≤ 55 kW)<br>0.1–6553.5 A (AC drive power > 55 kW) | Model dependent |
| A2-04 | Rated motor frequency | 0.01 Hz to maximum frequency | Model dependent |
| A2-05 | Rated motor rotational speed | 1–65535 RPM | Model dependent |
| A2-06 | Stator resistance (asynchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent |
| A2-07 | Rotor resistance (asynchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent |
| A2-08 | Leakage inductive reactance (asynchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent |
| A2-09 | Mutual inductive reactance (asynchronous motor) | 0.1–6553.5 mH (AC drive power ≤ 55 kW)<br>0.01–655.35 mH (AC drive power > 55 kW) | Model dependent |
| A2-10 | No-load current (asynchronous motor) | 0.01 A to A2-03 (AC drive power ≤ 55 kW)<br>0.1 A to A2-03 (AC drive power > 55 kW) | Model dependent |
| A2-16 | Stator resistance (synchronous motor) | 0.001–65.535 Ω (AC drive power ≤ 55 kW)<br>0.0001–6.5535 Ω (AC drive power > 55 kW) | Model dependent |
| A2-17 | Shaft D inductance (synchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent |
| A2-18 | Shaft Q inductance (synchronous motor) | 0.01–655.35 mH (AC drive power ≤ 55 kW)<br>0.001–65.535 mH (AC drive power > 55 kW) | Model dependent |
| A2-20 | Back EMF (synchronous motor) | 0.1–6553.5 V | Model dependent |
| A2-27 | Encoder pulses per revolution | 1–65535 | 1024 |
| A2-28 | Encoder type | 0: ABZ incremental encoder<br>1: UVW incremental encoder<br>2: Resolver<br>3: SIN/COS encoder<br>4: Wire-saving UVW encoder | 0 |
| A2-30 | A, B phase sequence of ABZ incremental encoder | 0: Forward<br>1: Reserve | 0 |





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A2-31 | Encoder installation angle | 0.0°–359.9° | 0.0° |
| A2-32 | U, V, W phase sequence of UVW encoder | 0: Forward<br>1: Reverse | 0 |
| A2-33 | UVW encoder angle offset | 0.0°–359.9° | 0.0° |
| A2-34 | Number of pole pairs of resolver | 1–65535 | 1 |
| A2-36 | Encoder wire-break fault detection time | 0.0s: No action<br>0.1–10.0s | 0.0s |
| A2-37 | Auto-tuning selection | 0: No auto-tuning<br>1: Asynchronous motor static auto-tuning<br>2: Asynchronous motor complete auto-tuning<br>11: Synchronous motor with-load auto-tuning<br>12: Synchronous motor no-load auto-tuning | 0 |
| A2-38 | Speed loop proportional gain 1 | 0–100 | 30 |
| A2-39 | Speed loop integral time 1 | 0.01–10.00s | 0.50s |
| A2-40 | Switchover frequency 1 | 0.00 to A2-43 | 5.00 Hz |
| A2-41 | Speed loop proportional gain 2 | 0–100 | 15 |
| A2-42 | Speed loop integral time 2 | 0.01–10.00s | 1.00s |
| A2-43 | Switchover frequency 2 | A2-40 to maximum output frequency | 10.00 Hz |
| A2-44 | Vector control slip gain | 50%–200% | 100% |
| A2-45 | Time constant of speed loop filter | 0.000–0.100s | 0.000s |
| A2-46 | Vector control over-excitation gain | 0–200 | 64 |
| A2-47 | Torque upper limit source in speed control mode | 0: A2-48<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Pulse setting (X5/X6)<br>5: Via communication<br>6: MIN(AI1,AI2)<br>7: MIN(AI1,AI2) | 0 |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A2-48 | Digital setting of torque upper limit in speed control mode | 0.0%–200.0% | 150.0% |
| A2-51 | Excitation adjustment proportional gain | 0–20000 | 2000 |
| A2-52 | Excitation adjustment integral gain | 0–20000 | 1300 |
| A2-53 | Torque adjustment proportional gain | 0–20000 | 2000 |
| A2-54 | Torque adjustment integral gain | 0–20000 | 1300 |
| A2-55 | Speed loop integral property | Unit's digit: Integral separated<br>0: Disabled<br>1: Enabled | 0 |
| A2-56 | Field weakening mode of synchronous motor | 0: No field weakening<br>1: Direct calculation<br>2: Adjustment | 0 |
| A2-57 | Field weakening degree of synchronous motor | 50%–500% | 100% |
| A2-58 | Maximum field weakening current | 1%–300% | 50% |
| A2-59 | Field weakening automatic adjustment gain | 10%–500% | 100% |
| A2-60 | Field weakening integral multiple | 2–10 | 2 |
| A2-61 | Motor 2 control mode | 0: Sensorless flux vector control (SVC )<br>1: Closed-loop vector control (FVC) 2: Voltage/Frequency (V/F) control | 0 |
| A2-62 | Motor 2 acceleration/ deceleration time | 0: Same as motor 1<br>1: Acceleration/Deceleration time 1<br>2: Acceleration/Deceleration time 2<br>3: Acceleration/Deceleration time 3<br>4: Acceleration/Deceleration time 4 | 0 |
| A2-63 | Motor 2 torque boost | 0.0%: Automatic torque boost<br>0.1%–30.0% | Model dependent |
| A2-65 | Motor 2 oscillation suppression gain | 0–100 | Model dependent |





## Group A5: Control Optimization Parameters

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A5-00 | DPWM switchover frequency upper limit | 0.00–15.00 Hz | 12.00 Hz |

This parameter is valid only for V/F control.

It is used to determine the wave modulation mode in V/F control of asynchronous motor. If the frequency is lower than the value of this parameter, the waveform is 7-segment continuous modulation. If the frequency is higher than the value of this parameter, the waveform is 5-segment intermittent modulation.

The 7-segment continuous modulation causes more loss to switches of the AC drive but smaller current ripple. The 5-segment intermittent modulation causes less loss to switches of the AC drive but larger current ripple. This may lead to motor running instability at high frequency. Do not modify this parameter generally.

For instability of V/F control, refer to parameter P3-11. For loss to AC drive and temperature rise, refer to parameter P0-15.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A5-01 | PWM modulation mode | 0: Asynchronous modulation<br>1: Synchronous modulation | 0 |

This parameter is valid only for V/F control.

Synchronous modulation indicates that the carrier frequency varies linearly with the change of the output frequency, ensuring that the ratio of carrier frequency to output frequency remains unchanged. Synchronous modulation is generally used at high output frequency, which helps improve the output voltage quality.

At low output frequency (100 Hz or lower), synchronous modulation is not required. This is because asynchronous modulation is preferred when the ratio of carrier frequency to output frequency is high.

Synchronous modulation takes effect only when the running frequency is higher than 85 Hz. If the frequency is lower than 85 Hz, asynchronous modulation is always used.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A5-02 | Dead zone compensation mode selection | 0: No compensation<br>1: Compensation mode 1<br>2: Compensation mode 2 | 1 |

Generally, you need not modify this parameter. Try to use a different compensation mode only when there is special requirement on the output voltage waveform quality or oscillation occurs on the motor.

For high power AC drive, compensation mode 2 is recommended.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A5-03 | Random PWM depth | 0: Random PWM invalid<br>1–10 | 0 |

The setting of random PWM depth can make the shrill motor noise softer and reduce the electromagnetic interference. If this parameter is set to 0, random PWM is invalid.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A5-04 | Rapid current limit | 0: Disabled<br>1: Enabled | 1 |

The rapid current limit function can reduce the AC drive's overcurrent faults at maximum, guaranteeing uninterrupted running of the AC drive.

However, long-time rapid current limit may cause the AC drive to overheat, which is not allowed. In this case, the AC drive will report Err40, indicating the AC drive is overloaded and needs to stop.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A5-05 | Current detection compensation | 0–100 | 5 |

It is used to set the AC drive current detection compensation. Too large value may lead to deterioration of control performance. Do not modify it generally.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A5-06 | Undervoltage threshold | 60.0%–140.0% | 100.0% |

It is used to set the undervoltage threshold of Err09. The undervoltage threshold 100% of the AC drive of different voltage classes corresponds to different nominal values, as listed in the following table.

Table 6-11 Undervoltage nominal values for different voltage

| Voltage Class | Nominal Value of Undervoltage threshold |
|---|---|
| Single-phase 220 V | 200 V |
| Three-phase 220 V | 200 V |
| Three-phase 380 V | 350 V |
| Three-phase 480 V | 450 V |
| Three-phase 690 V | 650 V |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A5-07 | SVC optimization mode selection | 0: No optimization<br>1: Optimization mode 1<br>2: Optimization mode 2 | 1 |

- 1: Optimization mode 1

  It is used when the requirement on torque control linearity is high.

- 2: Optimization mode 2

  It is used for the requirement on speed stability is high.





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A5-08 | Dead-zone time adjustment | 100%–200% | 150% |

It is only valid for 1140 V voltage class.

You can modify the value of this parameter to improve the voltage utilization rate. Too small value may system instability. Do not modify it generally.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A5-09 | Overvoltage threshold | 200.0–2500.0 V | 2000.0 V |

It is used to set the overvoltage threshold of the AC drive. The default values of different voltage classes are listed in the following table.

Table 6-12 Overvoltage thresholds for different voltage classes

| Voltage Class | Default Overvoltage Threshold |
|---|---|
| Single-phase 220 V | 400.0 V |
| Three-phase 220 V | 400.0 V |
| Three-phase 380 V | 810.0 V |
| Three-phase 480 V | 890.0 V |
| Three-phase 690 V | 1300.0 V |

**Note**

The default value is also the upper limit of the AC drive's internal overvoltage protection voltage. The parameter becomes effective only when the setting of A5-09 is lower than the default value. If the setting is higher than the default value, use the default value.

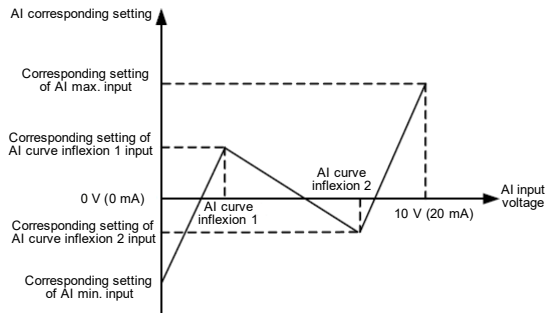
## Group A6: AI Curve Setting

| Function Code | Name | Setting Range | Default |
|---|---|---|---|
| A6-00 | AI curve 4 minimum input | -10.00 V to A6-02 | 0.00 V |
| A6-01 | Corresponding setting of AI curve 4 minimum input | -100.0%–100.0% | 0.0% |
| A6-02 | AI curve 4 inflexion 1 input | A6-00 to A6-04 | 3.00 V |
| A6-03 | Corresponding setting of AI curve 4 inflexion 1 input | -100.0%–100.0% | 30.0% |
| A6-04 | AI curve 4 inflexion 1 input | A6-02 to A6-06 | 6.00 V |
| A6-05 | Corresponding setting of AI curve 4 inflexion 1 input | -100.0%–100.0% | 60.0% |
| A6-06 | AI curve 4 maximum input | A6-06 to 10.00 V | 10.00 V |
| A6-07 | Corresponding setting of AI curve 4 maximum input | -100.0%–100.0% | 100.0% |
| A6-08 | AI curve 5 minimum input | -10.00 V to A6-10 | 0.00 V |

| Function Code | Name | Setting Range | Default |
|---|---|---|---|
| A6-09 | Corresponding setting of AI curve 5 minimum input | -100.0%–100.0% | 0.0% |
| A6-10 | AI curve 5 inflexion 1 input | A6-08 to A6-12 | 3.00 V |
| A6-11 | Corresponding setting of AI curve 5 inflexion 1 input | -100.0%–100.0% | 30.0% |
| A6-12 | AI curve 5 inflexion 1 input | A6-10 to A6-14 | 6.00 V |
| A6-13 | Corresponding setting of AI curve 5 inflexion 1 input | -100.0%–100.0% | 60.0% |
| A6-14 | AI curve 5 maximum input | A6-14 to 10.00 V | 10.00 V |
| A6-15 | Corresponding setting of AI curve 5 maximum input | -100.0%–100.0% | 100.0% |

The function of curve 4 and curve 5 is similar to that curve 1 to curve 3, but curve 1 to curve 3 are lines, and curve 4 and curve 5 are 4-point curves, implementing more flexible corresponding relationship. The schematic diagram of curve 4 and curve 5 is shown in the following figure.

Figure 8-34 Schematic diagram curve 4 and curve 5




When setting curve 4 and curve 5, note that the curve's minimum input voltage, inflexion 1 voltage, inflexion 2 voltage and maximum voltage must be in increment orde .

P4-34 (AI curve selection) is used to select curve for AI1 to AI3.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A6-16 | Jump point of AI1 input corresponding setting | -100.0%–100.0% | 0.0% |
| A6-17 | Jump amplitude of AI1 input corresponding setting | 0.0%–100.0% | 0.5% |
| A6-18 | Jump point of AI2 input corresponding setting | -100.0%–100.0% | 0.0% |
| A6-19 | Jump amplitude of AI2 input corresponding setting | 0.0%–100.0% | 0.5% |





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A6-20 | Jump point of AI3 input corresponding setting | -100.0%–100.0% | 0.0% |
| A6-21 | Jump amplitude of AI3 input corresponding setting | 0.0%–100.0% | 0.5% |

The AI terminals (AI1 to AI3) of the 9600 series all support the corresponding setting jump function, which fixes the AI input corresponding setting at the jump point when AI input corresponding setting jumps around the jump range.

For example, AI1 input voltage jumps around 5.00 V and the jump range is 4.90–5.10 V. AI1 minimum input 0.00 V corresponds to 0.0% and maximum input 10.00 V corresponds to 100.0%. The detected AI1 input corresponding setting varies between 49.0% and 51.0%.

If you set A6-16 to 50.0% and A6-17 to 1.0%, then the obtained AI1 input corresponding setting is fixed to 50.0%, eliminating the fluctuation effect.

## Group A7: User Programmable Function

## Group A8: Point-point Communication

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A8-00 | Point-point communication selection | 0: Disabled<br>1: Enabled | 0 |

It is used to decide whether to enable point-point communication.

Point-point communication indicates direct communication between two or more 9600 series AC drives by using CANlink. The master gives target frequency or target torque to one or multiple slaves according to its own frequency or torque signal.

If multiple AC drives are connected by using CANlink cards, the terminal resistor of the CANlink card connected to the end AC drive shall be switched on.

If point-point communication is enabled, the CANlink communication addresses of the AC drives are automatically matched without special setting.

The point-point communication rate is set in PD-00.

| Function Code | Name | Setting Range | Default |
|---|---|---|---|
| A8-01 | Master and slave selection | 0: Master<br>1: Slave | 0 |

This parameter is used to determine whether the AC drive is master or slave.

At point-point communication, you only need to set the CANlink communication baud rate. The communication addresses are allocated automatically based on whether the AC drive is master or slave.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A8-02 | Slave following master command selection | 0: Slave not following running commands of the master<br>1: Slave following running commands of the master | 0 |

When A8-01 (Master and slave selection) is set to 1 (Slave) and P0-02 (Command source selection) is set to 2 (Communication control), if A8-02 is set to 1, the salve follows the master to start or stop.

| Function Code | Name | Setting Range | Default |
|---|---|---|---|
| A8-03 | Usage of data received by slave | 0: Torque setting<br>1: Frequency setting | 0 |

It is used to determine whether the slave uses data received from the master for torque setting or frequency setting. This function can be used only when the frequency source or torque source must be communication setting.

When the AC drive is a slave in point-point communication and receives data for torque setting, 100.00% of the received data corresponds to 200.0% of torque setting, unrelated to A0-03. If zero offset of the slave is 0.00% and the gain is 1.00, it means that the slave directly takes the output torque of the master as the target torque.

When the AC drive is a slave in point-point communication and receives data for frequency setting, 100.00% of the received data corresponds to the value of P0-10 (Maximum frequency).

For example, to balance the load, do the following settings.

Table 6-14 Settings for balancing the load

| Master | Slave |
|---|---|
| A0-00 = 0: Speed control | A0-00 = 1: Torque control |
| A8-00 = 1: Point-point communication enabled | A8-00 = 1: Point-point communication enabled |
| A8-01 = 0: Master in point-point communication | A8-01 = 1: Slave in point-point communication |
| A8-02 = 0: Data source from master being output torque | A8-03 = 0: Slave receiving data for torque setting |
| | A0-01 = 5: Torque source in torque control set to communication setting |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A8-04 | Zero offset of received data (torque) | -100.00%–100.00% | 0.00% |
| A8-05 | Gain of received data (torque) | -10.00–10.00 | 1.00 |

These two parameters are used to adjust data received from the master and define the torque reference relationship between the master and the slave.





If "b" expresses the zero offset of received data, "k" expresses the gain, and "y" expresses the actually used data. The actually used data can be obtained based on the formula:

y = kx + b

The value y ranges from -100.00% to 100.00%.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A8-06 | Point-point communication interruption detection time | 0.0–10.0s | 1.0s |

It is used to set the point-point communication interruption time at which this fault is detected. If it is set to 0, it indicates no detection.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A8-07 | Master data sending cycle | 0.001–10.000s | 0.001s |

It is used to set the data sending cycle of the master in point-point communication.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A8-08 | Zero offset of received data (frequency) | -100.00%–100.00% | 0.00% |
| A8-09 | Gain of received data (frequency) | -10.00–10.00 | 1.00 |

These two parameters are used to adjust data received from the master and define the frequency reference relationship between the master and the slave.

If "b" expresses the zero offset of received data, "k" expresses the gain, and "y" expresses the actually used data. The actually used data can be obtained based on the formula:

y = kx + b

The value y ranges from -100.00% to 100.00%.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A8-10 | Runaway prevention coefficient | 0.00%–100.00% | 10.00% |

When the slave is set to troque control and follows the master to output torque to implement load allocation, this parameter becomes active.

If it is set to 0.00%, it indicates that the runaway prevention function is disabled. If it is set to another value, the system can effectively detects whether the slave is in the runaway state and performs efficient protection. The recommended value range is 5.00%–20.00%.

## Group AC: AM/AO2/AO Correction

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| AC-00 | AI1 measured voltage 1 | 0.500–4.000 V | Factory-corrected |
| AC-01 | AI1 displayed voltage 1 | 0.500–4.000 V | Factory-corrected |
| AC-02 | AI1 measured voltage 2 | 6.000–9.999 V | Factory-corrected |
| AC-03 | AI1 displayed voltage 2 | 6.000–9.999 V | Factory-corrected |
| AC-04 | AI2 measured voltage 1 | 0.500–4.000 V | Factory-corrected |
| AC-05 | AI2 displayed voltage 1 | 0.500–4.000 V | Factory-corrected |
| AC-06 | AI2 measured voltage 2 | 6.000–9.999 V | Factory-corrected |
| AC-07 | AI2 displayed voltage 2 | -9.999–10.000 V | Factory-corrected |
| AC-08 | AI3 measured voltage 1 | -9.999–10.000 V | Factory-corrected |
| AC-09 | AI3 displayed voltage 1 | -9.999–10.000 V | Factory-corrected |
| AC-10 | AI3 measured voltage 2 | -9.999–10.000 V | Factory-corrected |
| AC-11 | AI3 displayed voltage 2 | -9.999–10.000 V | Factory-corrected |

These parameters are used to correct the AI to eliminate the impact of AI zero offset and gain.

They have been corrected upon delivery. When you resume the factory values, these parameters will be restored to the factory-corrected values. Generally, you need not perform correction in the applications.

Measured voltage indicates the actual output voltage value measured by instruments such as the multimeter. Displayed voltage indicates the voltage display value sampled by the AC drive. For details, refer to U0-21, U0-22 and U0-23.

During correction, send two voltage values to each AI terminal, and save the measured values and displayed values to the function codes AC-00 to AC-11. Then the AC drive will automatically perform AI zero offset and gain correction.

If the input voltage and the actual voltage sampled by the AC drive are inconsistent, perform correction on site. Take AI1 as an example. The on-site correction is as follows:

1) Send a voltage signal (approximately 2 V) to AI1.
2) Measure the AI1 voltage and save it to AC-00.
3) View the displayed value of U0-21 and save the value to AC-01.
4) Send a voltage signal (approximately 8 V) to AI1.
5) Measure AI1 voltage and save it to AC-02.
6) View the displayed value of U0-21 and save the value to AC-03.

At correction of AI2 and AI3, the actually sampled voltage is respectively queried in U0-22 and U0-23.

For AI1 and AI2, 2 V and 8 V are suggested as the correction voltages. For AI3, -8 V and 8 V are suggested.





| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| AC-12 | AM target voltage 1 | 0.500–4.000 V | Factory-corrected |
| AC-13 | AM measured voltage 1 | 0.500–4.000 V | Factory-corrected |
| AC-14 | AM target voltage 2 | 6.000–.999 V | Factory-corrected |
| AC-15 | AM measured voltage 2 | 6.000–9.999 V | Factory-corrected |
| AC-16 | AO2 target voltage 1 | 0.500–4.000 V | Factory-corrected |
| AC-17 | AO2 measured voltage 1 | 0.500–4.000 V | Factory-corrected |
| AC-18 | AO2 target voltage 2 | 6.000–9.999 V | Factory-corrected |
| AC-19 | AO2 measured voltage 2 | 6.000–9.999 V | Factory-corrected |

These parameters are used to correct the AM and AO.

They have been corrected upon delivery. When you resume the factory values, these parameters will be restored to the factory-corrected values. You need not perform correction in the applications.

Target voltage indicates the theoretical output voltage of the AC drive. Measured voltage indicates the actual output voltage value measured by instruments such as the multimeter.

## Group U0: Monitoring Parameters

Group U0 is used to monitor the AC drive's running state. You can view the parameter values by using operation panel, convenient for on-site commissioning, or from the host computer by means of communication (address: 0x7000-0x7044).

U0-00 to U0-31 are the monitoring parameters in the running and stop state defined by P7-03 and P7-04. For more details, see Table 6-1.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-00 | Running frequency | 0.00–650.00 Hz (P0-22 = 2) |
| U0-01 | Set frequency | 0.00–3200.0 Hz (P0-22 = 1) |

These two parameters display the absolute value of theoretical running frequency and set frequency. For the actual output frequency of the AC drive, see U0-19.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-02 | Bus voltage | 0.0–3000.0 V |

It displays the AC drive's bus voltage.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-03 | Output voltage | 0–1140 V |

It displays the AC drive's output voltage in the running state.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-04 | Output current | 0.00–655.35 A (AC drive power ≤ 55 kW)<br>0.0–6553.5 A (AC drive power > 55 kW) |

It displays the AC drive's output current in the running state.

| Function Code | Name | Display Range |
|---|---|---|
| U0-05 | Output power | 0–32767 |

It displays the AC drive's output power in the running state.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-06 | Output torque | -200.0%–200.0% |

It displays the AC drive's output torque in the running state.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-07 | X state | 0–32767 |

It displays the current state of X terminals. After the value is converted into a binary number, each bit corresponds to a X. "1" indicates high level signal, and "0" indicates low level signal. The corresponding relationship between bits and DIs is described in the following table.

| Bit0 | Bit1 | Bit2 | Bit3 | Bit4 | Bit5 | Bit6 | Bit7 | Bit8 | Bit9 |
|---|---|---|---|---|---|---|---|---|---|
| X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 |
| Bit10 | Bit11 | Bit12 | Bit13 | Bit10 | Bit11 | Bit12 | Bit13 | Bit14 | Bit15 |
| VX1 | VX2 | VX3 | VX4 | VX1 | VX2 | VX3 | VX4 | VX5 | |

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-08 | DO state | 0–1023 |

It indicates the current state of DO terminals. After the value is converted into a binary number, each bit corresponds to a DO. "1" indicates high level signal, and "0" indicates low level signal. The corresponding relationship between bits and DOs is described in the following table.

Table 6-15 Corresponding relationship between bits and DOs

| Bit0 | Bit1 | Bit2 | Bit3 | Bit4 | Bit5 |
|---|---|---|---|---|---|
| DO3 | Relay 1 | Relay 2 | DO1 | DO2 | VDO1 |
| Bit6 | Bit7 | Bit8 | Bit9 | Bit10 | Bit11 |
| VDO2 | VDO3 | VDO4 | VDO5 | | |





| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-10 | AI2 voltage (V)/current (mA) | 0.00–10.57 V<br>0.00–20.00 mA |

When P4-40 is set to 0, AI2 samplin g data is displayed in the unit of V.

When P4-40 is set to 1, AI2 sampling data is displayed in the unit of mA.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-14 | Load speed | 0–65535 |

For more details, see the description of P7-12.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-15 | PID setting | 0–65535 |
| U0-16 | PID feedback | 0–65535 |

They display the PID setting value and PID feedback value.

- PID setting = PID setting (percentage) x PA-04
- PID feedback = PID feedback (percentage) x PA-04

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-18 | Input pulse frequency | 0.00–100.00 kHz |

It displays the high-speed pulse sampled frequency of X5/X6, in minimum unit of 0.01 kHz.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-19 | Feedback speed | -650.00–650.00 Hz<br>-3200.0–3200.0 Hz |

It displays the actual output frequency of the AC drive.

- If P0-22 (Frequency reference resolution) is set to 1, the display range is -3200.00–3200.00 Hz.
- If P0-22 (Frequency reference resolution) is set to 2, the display range is -650.00Hz–650.00 Hz.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-20 | Remaining running time | 0.0–6500.0 min |

It displays the remaining running time when the timing operation is enabled. For details on timing operation, refer to P8-42 to P8-44.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-21 | AI1 voltage before correction | 0.00–10.57 V |
| U0-22 | AI2 voltage (V)/ current (mA) before correction | 0.00–10.57 V<br>0.00–20.00 mA |
| U0-23 | AI3 voltage before correction | -10.57–10.57 V |

They display the AI sampleding voltage/current value of AI. The actually used voltage/current is obtained after linear correction to reduce the deviation between the sampled voltage/current and the actual input voltage/current.

For actual corrected voltage, see U0-09, U0-10 and U0-11. Refer to group AC for the correction mode.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-24 | Linear speed | 0–65535 m/min |

It displays the linear speed of the X5/X6 high-speed pulse sampling. The unit is meter/minute. The linear speed is obtained according to the actual number of pulses sampled per minute and PB-07 (Number of pulses per meter).

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-27 | Pulse input frequency | 0–65535 Hz |

It displays the X5/X6 high-speed pulse sampling frequency, in minimum unit of 1 Hz. It is the same as U0-18, except for the difference in units.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-28 | Communication setting value | -100.00%–100.00% |

It displays the data written by means of the communication address 0x1000.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-29 | Encoder feedback speed | -650.00–650.00 Hz<br>-3200.0–3200.0 Hz |

It displays the motor running frequency measured by the encoder.

- If P0-22 (Frequency reference resolution) is 1, the display range is -3200.0–3200.0 Hz.
- If P0-22 (Frequency reference resolution) is 2, the display range is -650.00–650.00 Hz.

| Function Code | Name | Display Range |
|---|---|---|
| U0-30 | Main frequency X | 0.00–650.00 Hz<br>0.0–3200.0 Hz |

It displays the setting of main frequency X.

- If P0-22 (Frequency reference resolution) is 1, the display range is -3200.0–3200.0 Hz.
- If P0-22 (Frequency reference resolution) is 2, the display range is -650.00–650.00 Hz.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-31 | Auxiliary frequency Y | 0.00–650.00 Hz<br>0.0–3200.0 Hz |

It displays the setting of auxiliary frequency Y.





- If P0-22 (frequency reference resolution) is 1, the display range is -3200.0–3200.0 Hz.
- If P0-22 (frequency reference resolution) is 2, the display range is -650.00–650.00 Hz.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-33 | Synchronous motor rotor position | 0.0°–359.9° |

It displays the rotor position of the synchronous motor.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-34 | Motor temperature | 0–200 °C |

It displays the motor temperature obtained by means of AI3 sampling. For the motor temperature detection, see P9-56.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-35 | Target torque | -200.0%–200.0% |

It displays the current torque upper limit.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-36 | Resolver position | 0–4095 |

It displays the current resolver position.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-37 | Power factor angle | - |

It displays the current power factor angle.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-38 | ABZ position | 0–65535 |

It displays the phase A and B pulse counting of the current ABZ or UVW encoder. This value is four times the number of pulses that the encoder runs. For example, if the display is 4000, the actual number of pulses that the encoder runs is 4000/4 = 1000.

The value increase when the encoder rotates in forward direction and decreases when the encoder rotates in reverse direction. After increasing to 65535, the value starts to increase from 0 again. After decreasing to 0, the value starts to decrease from 65535 again.

You can check whether the installation of the encoder is normal by viewing U0-38.

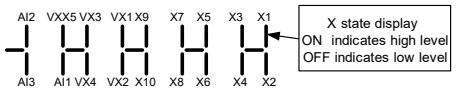
| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-39 | Target voltage upon V/F separation | 0 V to rated motor voltage |
| U0-40 | Output voltage upon V/F separation | 0 V to rated motor voltage |

They display the target output voltage and current actual output voltage in the V/F separation state. For V/F separation, see the descriptions of group P3.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-41 | X state visual display | - |

It displays the X state visually and the display format is shown in the following

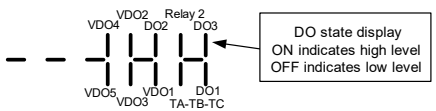
figure. Figure 8-34 Display format of the X state




| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-42 | DO state visual display | - |

It displays the DO state visually and the display format is shown in the following figure.

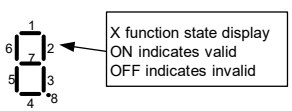
Figure 8-35 Display format of the DO state




| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-43 | X function state visual display 1 | - |

It displays whether the X functions 1-40 are valid. The operation panel has five 7-segment LEDs and each 7-segment LED displays the selection of eight functions. The 7-segment LED is defined in the following figure.

Figure 8-36 Definition of 7-segment LED




The 7-segment LED display functions 1-8, 9-16, 17-24, 25-32 and 33-40 respectively from right to left.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-44 | X function state visual display 2 | - |

It displays whether the X functions 41–59 are valid. The display format is similar to U0-43. The 7-segment LEDs display functions 41–48, 49–56 and 57–59, respectively from right to left.





| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-58 | Phase Z counting | 0–65535 |

It displays the phase Z counting of the current ABZ or UVW encoder. The value increases or decreases by 1 every time the encoder rotates one revolution forwardly or reversely.

You can check whether the installation of the encoder is normal by viewing U0-58.

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-59 | Current set frequency | -100.00%–100.00% |
| U0-60 | Current running frequency | -100.00%–100.00% |

It displays the current set frequency and running frequency. 100.00% corresponds to the AC drive's maximum frequency (P0-10).

| Function Code | Parameter Name | Display Range |
|---|---|---|
| U0-61 | AC drive running state | 0–65535 |

It displays the running state of the AC drive. The data format is listed in the following table:

| | | |
|---|---|---|
| U0-61 | Bit0 | 0: Stop<br>1: Forward<br>2: Reverse |
| | Bit1 | |
| | Bi2 | 0: Constant<br>1: Accelerate<br>2: Decelerate |
| | Bit3 | |
| | Bit4 | 0: Bus voltage normal<br>1: Undervoltage |

| Function Code | Name | Display Range |
|---|---|---|
| U0-62 | Current fault code | 0–99 |

It displays the current fault code.

| Function Code | Name | Display Range |
|---|---|---|
| U0-63 | Sent value of point-point communication | -100.00%–100.00% |
| U0-64 | Received value of point-point communication | -100.00%–100.00% |

It displays the data at point-point communication. U0-63 is the data sent by the master, and U0-64 is the data received by the slave.

| Function Code | Name | Display Range |
|---|---|---|
| U0-65 | Torque upper limit | -200.00%–200.00% |

It displays the current setting torque upper limit.

# Chapter 9:Maintenance and Troubleshooting

## 9.1 Routine Repair and Maintenance of the 9600 series

### 9.1.1 Routine Maintenance

The influence of the ambient temperature, humidity, dust and vibration will cause the aging of the devices in the AC drive, which may cause potential faults or reduce the service life of the AC drive. Therefore, it is necessary to carry out routine and periodic maintenance.

Routine maintenance involves checking:

- Whether the motor sounds abnormally during running
- Whether the motor vibrates excessively during running
- Whether the installation environment of the AC drive changes.
- Whether the AC drive's cooling fan works normally
- Whether the AC drive overheats

Routine cleaning involves:

- Keep the AC drive clean all the time.
- Remove the dust, especially metal powder on the surface of the AC drive, to prevent the dust from entering the AC drive.
- Clear the oil stain on the cooling fan of the AC drive.

### 9.1.2 Periodic Inspection

Perform periodic inspection in places where inspection is difficult.

Periodic inspection involves:

Check and clean the air duct periodically.

Check whether the screws become loose.

Check whether the AC drive is corroded.

Check whether the wiring terminals show signs of arcing;

Main circuit insulation test

**Prompt**

Before measuring the insulating resistance with megameter (500 VDC megameter recommended), disconnect the main circuit from the AC drive. Do not use the insulating resistance meter to test the insulation of the control circuit. The high voltage test need not be performed again because it has been completed before delivery.





### 9.1.3 Replacement of Vulnerable Components

The vulnerable components of the AC drive are cooling fan and filter electrolytic capacitor. Their service life is related to the operating environment and maintenance status. Generally, the service life is shown as follows:

| Component | Service Life | Possible Damage Reason | Judging Criteria |
|---|---|---|---|
| Fan | 2 to 3 years | • Bearing worn<br>• Blade aging | • Whether there is crack on the blade<br>• Whether there is abnormal vibration noise upon startup |
| Electrolytic capacitor | 4 to 5 years | • Input power supply in poor quality<br>• High ambient temperature<br>• Frequent load jumping<br>• Electrolytic aging | • Whether there is liquid leakage.<br>• Whether the safe valve has projected.<br>• Measure the static capacitance.<br>• Measure the insulating resistance. |

### 9.1.4 Storage of the AC Drive

For storage of the AC drive, pay attention to the following two aspects:

1) Pack the AC drive with the original packing box provided by our company.
2) Long-term storage degrades the electrolytic capacitor. Thus, the AC drive must be energized once every 2 years, each time lasting at least 5 hours. The input voltage must be increased slowly to the rated value with the regulator.

## 9.2 Warranty Agreement

1) Free warranty only applies to the AC drive itself.
2) Our company will provide 12-month warranty (starting from the leave-factory date as indicated on the barcode) for the failure or damage under normal use conditions. If the equipment has been used for over 12 months, reasonable repair expenses will be charged.
3) Reasonable repair expenses will be charged for the damages due to the following causes:
   - Improper operation without following the instructions
   - Fire, flood or abnormal voltage.
   - Using the AC drive for non-recommended function
4) The maintenance fee is charged according to Inovance's uniform standard. If there is an agreement, the agreement prevails.

## 9.3 Faults and Solutions

The 9600 series provides a total of 24 pieces of fault information and protective functions. After a fault occurs, the AC drive implements the protection function, and displays the fault code on the operation panel (if the operation panel is available).

Before contacting us for technical support, you can first determine the fault type, analyze the causes, and perform troubleshooting according to the following tables. If the fault cannot be rectified, contact the agent or Inovance.

Err22 is the AC drive hardware overcurrent or overvoltage signal. In most situations, hardware overvoltage fault causes Err22.

Figure 8-1 Solutions to the faults of the 9600 series

| Fault Name | Display | Possible Causes | Solutions |
|---|---|---|---|
| Inverter unit protection | Err01 | 1: The output circuit is grounded or short circuited.<br>2: The connecting cable of the motor is too long.<br>3: The module overheats.<br>4: The internal connections become loose.<br>5:The main control board is faulty.<br>6: The drive board is faulty.<br>7: The inverter module is faulty. | 1: Eliminate external faults.<br>2: Install a reactor or an output filter.<br>3: Check the air filter and the cooling fan.<br>4: Connect all cables properly.<br>5: Contact the agent or our company. |
| Overcurrent during acceleration | Err02 | 1: The output circuit is grounded or short circuited.<br>2: Motor auto-tuning is not performed.<br>3: The acceleration time is too short.<br>4: Manual torque boost or V/F curve is not appropriate.<br>5: The voltage is too low.<br>6: The startup operation is performed on the rotating motor.<br>7: A sudden load is added during acceleration.<br>8: The AC drive model is of too small power class. | 1: Eliminate external faults.<br>2: Perform the motor auto-tuning.<br>3: Increase the acceleration time.<br>4: Adjust the manual torque boost or V/F curve.<br>5: Adjust the voltage to normal range.<br>6: Select rotational speed tracking restart or start the motor after it stops.<br>7: Remove the added load.<br>8: Select an AC drive of higher power class. |
| Overcurrent during deceleration | Err03 | 1: The output circuit is grounded or short circuited.<br>2: Motor auto-tuning is not performed.<br>3: The deceleration time is too short.<br>4: The voltage is too low.<br>5: A sudden load is added during deceleration.<br>6: The braking unit and braking resistor are not installed. | 1: Eliminate external faults.<br>2: Perform the motor auto-tuning.<br>3: Increase the deceleration time.<br>4: Adjust the voltage to normal range.<br>5: Remove the added load.<br>6: Install the braking unit and braking resistor. |





| Fault Name | Display | Possible Causes | Solutions |
|---|---|---|---|
| Overcurrent at constant speed | Err04 | 1: The output circuit is grounded or short circuited.<br>2: Motor auto-tuning is not performed.<br>3: The voltage is too low.<br>4: A sudden load is added during operation.<br>5: The AC drive model is of too small power class. | 1: Eliminate external faults.<br>2: Perform the motor auto-tuning.<br>3: Adjust the voltage to normal range.<br>4: Remove the added load.<br>5: Select an AC drive of higher power class. |
| Overvoltage during acceleration | Err05 | 1: The input voltage is too high.<br>2: An external force drives the motor during acceleration.<br>3: The acceleration time is too short.<br>4: The braking unit and braking resistor are not installed. | 1: Adjust the voltage to normal range.<br>2: Cancel the external force or install a braking resistor.<br>3: Increase the acceleration time.<br>4: Install the braking unit and braking resistor. |
| Overvoltage during deceleration | Err06 | 1: The input voltage is too high.<br>2: An external force drives the motor during deceleration.<br>3: The deceleration time is too short.<br>4: The braking unit and braking resistor are not installed. | 1: Adjust the voltage to normal range.<br>2: Cancel the external force or install the braking resistor.<br>3: Increase the deceleration time.<br>4: Install the braking unit and braking resistor. |
| Overvoltage at constant speed | Err07 | 1: The input voltage is too high.<br>2: An external force drives the motor during deceleration. | 1: Adjust the voltage to normal range.<br>2: Cancel the external force or install the braking resistor. |
| Control power supply fault | Err08 | The input voltage is not within the allowable range. | Adjust the input voltage to the allowable range. |
| Undervoltage | Err09 | 1: Instantaneous power failure occurs on the input power supply.<br>2: The AC drive's input voltage is not within the allowable range.<br>3: The bus voltage is abnormal.<br>4: The rectifier bridge and buffer resistor are faulty.<br>5: The drive board is faulty.<br>6: The main control board is faulty. | 1: Reset the fault.<br>2: Adjust the voltage to normal range.<br>3: Contact the agent or our company. |
| AC drive overload | Err10 | 1: The load is too heavy or locked-rotor occurs on the motor.<br>2: The AC drive model is of too small power class. | 1: Reduce the load and check the motor and mechanical condition.<br>2: Select an AC drive of higher power class. |

| Fault Name | Display | Possible Causes | Solutions |
|---|---|---|---|
| Motor overload | Err11 | 1: P9-01 is set improperly.<br>2: The load is too heavy or locked-rotor occurs on the motor.<br>3: The AC drive model is of too small power class. | 1: Set P9-01 correctly.<br>2: Reduce the load and check the motor and the mechanical condition.<br>3: Select an AC drive of higher power class. |
| Power input phase loss | Err12 | 1: The three-phase power input is abnormal.<br>2: The drive board is faulty.<br>3: The lightening board is faulty.<br>4: The main control board is faulty. | 1: Eliminate external faults.<br>2: Contact the agent or our company. |
| Power output phase loss | Err13 | 1: The cable connecting the AC drive and the motor is faulty.<br>2: The AC drive's three-phase outputs are unbalanced when the motor is running.<br>3: The drive board is faulty.<br>4: The module is faulty. | 1: Eliminate external faults.<br>2: Check whether the motor three-phase winding is normal.<br>3: Contact the agent or our company. |
| Module overheat | Err14 | 1: The ambient temperature is too high.<br>2: The air filter is blocked.<br>3: The fan is damaged.<br>4: The thermally sensitive resistor of the module is damaged.<br>5: The inverter module is damaged. | 1: Lower the ambient temperature.<br>2: Clean the air filter.<br>3: Replace the damaged fan.<br>4: Replace the damaged thermally sensitive resistor.<br>5: Replace the inverter module. |
| External equipment fault | Err15 | 1: External fault signal is input via X.<br>2: External fault signal is input via virtual I/O. | Reset the operation. |
| Communication fault | Err16 | 1: The host computer is in abnormal state.<br>2: The communication cable is faulty.<br>3: P0-28 is set improperly.<br>4: The communication parameters in group PD are set improperly. | 1: Check the cabling of host computer.<br>2: Check the communication cabling.<br>3: Set P0-28 correctly.<br>4: Set the communication parameters properly. |
| Contactor fault | Err17 | 1: The drive board and power supply are faulty.<br>2: The contactor is faulty. | 1: Replace the faulty drive board or power supply board.<br>2: Replace the faulty contactor. |





| Fault Name | Display | Possible Causes | Solutions |
|---|---|---|---|
| Current detection fault | Err18 | 1: The HALL device is faulty.<br>2: The drive board is faulty. | 1: Replace the faulty HALL device.<br>2: Replace the faulty drive board. |
| Motor auto-tuning fault | Err19 | 1: The motor parameters are not set according to the nameplate.<br>2: The motor auto-tuning times out. | 1: Set the motor parameters according to the nameplate properly.<br>2: Check the cable connecting the AC drive and the motor. |
| Encoder fault | Err20 | 1: The encoder type is incorrect.<br>2: The cable connection of the encoder is incorrect.<br>3: The encoder is damaged.<br>4: The PG card is faulty. | 1: Set the encoder type correctly based on the actual situation.<br>2: Eliminate external faults.<br>3: Replace the damaged encoder.<br>4: Replace the faulty PG card. |
| EEPROM read-write fault | Err21 | The EEPROM chip is damaged. | Replace the main control board. |
| AC drive hardware fault | Err22 | 1: Overvoltage exists.<br>2: Overcurrent exists. | 1: Handle based on overvoltage.<br>2: Handle based on overcurrent. |
| Short circuit to ground | Err23 | The motor is short circuited to the ground. | Replace the cable or motor. |
| Accumulative running time reached | Err26 | The accumulative running time reaches the setting value. | Clear the record through the parameter initialization function. |
| User-defined fault 1 | Err27 | 1: The user-defined fault 1 signal is input via X.<br>2: User-defined fault 1 signal is input via virtual I/O. | Reset the operation. |
| User-defined fault 2 | Err28 | 1: The user-defined fault 2 signal is input via X.<br>2: The user-defined fault 2 signal is input via virtual I/O. | Reset the operation. |
| Accumulative power-on time reached | Err29 | The accumulative power-on time reaches the setting value. | Clear the record through the parameter initialization function. |
| Load becoming 0 | Err30 | The AC drive running current is lower than P9-64. | Check that the load is disconnected or the setting of P9-64 and P9-65 is correct. |
| PID feedback lost during running | Err31 | The PID feedback is lower than the setting of PA-26. | Check the PID feedback signal or set PA-26 to a proper value. |

| Fault Name | Display | Possible Causes | Solutions |
|---|---|---|---|
| Pulse-by-pulse current limit fault | Err40 | 1: The load is too heavy or locked-rotor occurs on the motor.<br>2: The AC drive model is of too small power class. | 1: Reduce the load and check the motor and mechanical condition.<br>2: Select an AC drive of higher power class. |
| Motor switchover fault during running | Err41 | Change the selection of the motor via terminal during running of the AC drive. | Perform motor switchover after the AC drive stops. |
| Too large speed deviation | Err42 | 1: The encoder parameters are set incorrectly.<br>2: The motor auto-tuning is not performed.<br>3: P9-69 and P9-70 are set incorrectly. | 1: Set the encoder parameters properly.<br>2: Perform the motor auto-tuning.<br>3: Set P9-69 and P9-70 correctly based on the actual situation. |
| Motor over-speed | Err43 | 1: The encoder parameters are set incorrectly.<br>2: The motor auto-tuning is not performed.3: P9-69 and P9-70 are set incorrectly. | 1: Set the encoder parameters properly.<br>2: Perform the motor auto-tuning.<br>3: Set P9-69 and P9-70 correctly based on the actual situation. |
| Motor overheat | Err45 | 1: The cabling of the temperature sensor becomes loose.<br>2: The motor temperature is too high. | 1: Check the temperature sensor cabling and eliminate the cabling fault.<br>2: Lower the carrier frequency or adopt other heat radiation measures. |
| Initial position fault | Err51 | The motor parameters are not set based on the actual situation. | Check that the motor parameters are set correctly and whether the setting of rated current is too small. |
| Speed feedback fault | Err52 | Unable to identify encoder. | Reconfirm whether the connection of the encoder is correct. |

## 9.4 Common Faults and Solutions

You may come across the following faults during the use of the AC drive. Refer to the following table for simple fault analysis.





Table 9-2 Troubleshooting to common faults of the AC drive

| SN | Fault | Possible Causes | Solutions |
|---|---|---|---|
| 1 | There is no display at power-on. | 1: There is no power supply to the AC drive or the power input to the AC drive is too low.<br>2: The power supply of the switch on the drive board of the AC drive is faulty.<br>3: The rectifier bridge is damaged.<br>4: The control board or the operation panel is faulty.<br>5: The cable connecting the control board and the drive board and the operation panel breaks. | 1: Check the power supply.<br>2: Check the bus voltage.<br>3: Re-connect the 8-core and 28-core cables.<br>4: Contact the agent or our company for technical support. |
| 2 | “HC” is displayed at power-on. | 1: The cable between the drive board and the control board is in poor contact.<br>2: Related components on the control board are damaged.<br>3: The motor or the motor cable is short circuited to the ground.<br>4: The HALL device is faulty.<br>5: The power input to the AC drive is too low. | 1: Re-connect the 8-core and 28-core cables.<br>2: Contact the agent or our company for technical support. |
| 3 | “Err23” is displayed at power-on. | 1: The motor or the motor output cable is short-circuited to the ground.<br>2: The AC drive is damaged. | 1: Measure the insulation of the motor and the output cable with a megger.<br>2: Contact the agent or our company for technical support. |
| 4 | The AC drive display is normal upon power-on. But “HC” is displayed after running and stops immediately. | 1:The cooling fan is damaged or locked-rotor occurs.<br>2: The external control terminal cable is short circuited. | 1: Replace the damaged fan.<br>2: Eliminate external fault. |
| 5 | Err14 (module overheat) fault is reported frequently. | 1: The setting of carrier frequency is too high.<br>2: The cooling fan is damaged, or the air filter is blocked.<br>3: Components inside the AC drive are damaged (thermal coupler or others). | 1: Reduce the carrier frequency (P0-15).<br>2: Replace the fan and clean the air filter.<br>3: Contact the agent or our company for technical support. |

| SN | Fault | Possible Causes | Solutions |
|---|---|---|---|
| 6 | The motor does not rotate after the AC drive runs. | 1: Check the motor and the motor cables.<br>2: The AC drive parameters are set improperly (motor parameters).<br>3: The cable between the drive board and the control board is in poor contact.<br>4: The drive board is faulty. | 1: Ensure the cable between the AC drive and the motor is normal.<br>2: Replace the motor or clear mechanical faults.<br>3: Check and re-set motor parameters. |
| 7 | The X terminals are disabled. | 1: The parameters are set incorrectly.<br>2: The external signal is incorrect.<br>3: The jumper bar across OP and +24 V becomes loose.<br>4: The control board is faulty. | 1: Check and reset the parameters in group P4.<br>2: Re-connect the external signal cables.<br>3: Re-confirm the jumper bar across OP and +24 V.<br>4: Contact the agent or our company for technical support. |
| 8 | The motor speed is always low in CLVC mode. | 1: The encoder is faulty.<br>2: The encoder cable is connected incorrectly or in poor contact.<br>3: The PG card is faulty.<br>4: The drive board is faulty. | 1: Replace the encoder and ensure the cabling is proper.<br>2: Replace the PG card.<br>3: Contact the agent or our company for technical support. |
| 9 | The AC drive reports overcurrent and overvoltage frequently. | 1: The motor parameters are set improperly.<br>2: The acceleration/deceleration time is improper.<br>3: The load fluctuates. | 1: Re-set motor parameters or re-perform the motor auto-tuning.<br>2: Set proper acceleration/ deceleration time.<br>3: Contact the agent or our company for technical support. |
| 10 | Err17 is reported upon power-on or running. | The soft startup contactor is not picked up. | 1: Check whether the contactor cable is loose.<br>2: Check whether the contactor is faulty.<br>3: Check whether 24 V power supply of the contactor is faulty.<br>4: Contact the agent or our company for technical support. |
| 11 | 88888 is displayed upon power-on. | Related component on the control board is damaged. | Replace the control board. |





# Product Warranty Card

| | | |
|---|---|---|
| Customer information | Add. of unit: | |
| | Name of unit:<br>P.C.: | Contact person:<br>Tel.: |
| Product information | Product model: | |
| | Body barcode (Attach here): | |
| | Name of agent: | |
| Failure information | (Maintenance time and content):<br><br>Maintenance personnel: | |