# POWER DRIVE 

# POWER DRIVE High Performance Vector Control Invetrer PD 1000 

200V (3-phase power supply) $0.4-75 \mathrm{~kW}$
200 V (single-phase power supply)0.4-5.5kW
400V (3-phase power supply) $0.75-355 \mathrm{~kW}$

## User Manual

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## Chapter 1 Product Introduction

### 1.1 Product Introduction

Thank you for purchasing POWER DRIVE inverter, which is a general purpose current torque vector control inverter characterized by high performance and ultra low noise. For the best use of this inverter and for your safety, please read this manual carefully. If you encounter any problems not described in the manual during use, please contact your local dealer or our technical personnel of Engineering Department. Our professionals are always pleased to serve you. You can feel ease to continue to use PD 1000 inverter.

## [Notice for Use]:

PD 1000 inverter is developed by POWER DRIVE manual, "Danger" and "Caution" paragraphs contain important safety precautions that shall be paid attention to during transportation, installation, operation and examination of the inverter.
[Danger]: Incorrect use of this inverter may result in personal injury and death. Do not dismount or install inverter or change its internal connection, wiring or component by yourself.
[Caution]: Incorrect use of this product may cause damages to the inverter or its mechanical systems.

## [Danger]:

- After turning off the power, do not touch circuit board or components before

CHARGE indicator goes off.

- Do not dismount or install inverter or change its internal connection, wiring or component by yourself.
- Make sure the power is off before wiring; do not check components, parts or signals on the circuit board while the inverter is running.
- Earthing terminals of the inverter must be grounded properly. Three grounding modes for 220 V , special earthing for 440 V .


## [Caution]:

- Never perform withstanding voltage test for components or parts in the inverter, otherwise this may cause damages to these semi-conductor parts due to high voltage.
- Never wire output terminals $\mathrm{U}, \mathrm{V}$ and W of the inverter to input terminals (R, S, T) of AC power sup ${ }_{r}^{\text {POW., }}$.
- Component COMOSIC of inverter circuit board is susceptible to static electricity influence and damages. Do not touch the main circuit board.


## [During operation ]:

| Danger |
| :--- |
| - Never remove front cover under power-on state to avoid personal injury due to electric shock; |
| $\bullet$ Never get close to the machine to avoid danger after motor stops working as it will automatically |

restart again if automatic restart function is enabled.

- Stop switch will be effected only after setting. Please note that it is different from emergency stop switch in usage.


## Caution

- Never touch heating elements like heat sink and braking resistance to avoid electric shock; otherwise, it may cause personal injury.
- The inverter can be easily changed from low speed to high speed. Please input the allowable range of motor and machinery.
- When using brake, etc., please pay attention to relevant setting.
- Never check signals of circuit board when the inverter is running.
- Inverter has been set in the factory, so do not adjust it arbitrarily.


### 1.2 Nameplate

Take 11 kw 380 V as an example


### 1.3 Model Numbering Description



### 1.4 Application Environment

As the installation environment has direct influence on the performance and service life of the inverter, following conditions must be met.

- Ambient environment: Open installation in switchboard $\left(-10-45^{\circ} \mathrm{C} /+14-113^{\circ} \mathrm{F}\right)$ Closed wall-mounted type $\left(-10-40^{\circ} \mathrm{C} /+14-104^{\circ} \mathrm{F}\right)$
- Avoid rain or humid environment.
- Prevent erosion of oil mist and salt.
- Avoid direct sunlight.
- Prevent dust, batting and metal powder from entering the inverter.
- Away from radioactive substance and combustible material.
- Prevent electromagnetic interference (welding machine, power machine).
- Prevent vibration (punch press). If it is unavoidable, please install a shockproof gasket to reduce vibration.
- When multiple inverters are installed in a control cabinet, install them at proper positions for heat dissipation. In addition, please install a heat radiation fan to make the ambient temperature around the inverter lower than $45^{\circ} \mathrm{C}$.

- Installing the inverter with its front surface forward and top part upward for heat radiation.
- Installation space must be in accordance with following regulations: When the inverter is installed inside the switchboard or if conditions permit, remove upper dustproof cover of the inverter for cooling and heat radiation.



## Chapter 2 Wiring Description

### 2.1 Basic Wiring Diagram

- Wiring schematic diagram of 3-phase inverter
$\qquad$


Wiring Schematic Diagram of 3-phase Inverter

## Note:

1) 

 refers to main circuit terminal, O. refers to control circuit terminal.
2) Select braking resistance as required by users. Please refer to Braking Resistance Selection Guide for detail.

### 2.2 Terminal \& Wiring of Main Circuit

| 1. Make sure that the power switch is OFF before wiring so as to avoid electric hazard! |
| :--- |
| 2. Wiring must be performed by qualified and trained personnel so as to avoid inverter damage |
| and personnel injury! |
| 3. Earthing terminals must be grounded reliably to avoid electrical hazard and fire! |

## Caution

1. Confirm that input power's rated values are identical to that of the inverter; otherwise, it may result in inverter damage!
2. Confirm that motor matches to the inverter; otherwise, it may damage motor or trigger inverter protection!
3. Never connect power supply to terminals $\mathrm{U}, \mathrm{V}$ and W to avoid inverter damage!
4. Do not connect braking resistance to DC bus terminals $(+) \&(-)$ directly; otherwise this may cause fire!

- Wiring of main circuit

This part introduces main circuit I/O wiring and grounding wire.
Wiring on input side of main circuit

## Installation of wiring circuit breaker

A wiring circuit breaker (MCCB) corresponding to inverter power is required between the power supply and the input terminals.

- Choose a MCCB with a capacity of 2 times that of the rated current of the inverter.
- The time characteristics of MCCB must meet the time characteristics of the overheating protection of the inverter ( $150 \%$ of rated output current/1 minute).
- If single MCCB is shared by two or more inverters or other device, the contact of fault output shall be connected to contractor, so that the power supply will be turned off by the fault signals.

* When 400 V level is selected, $400 / 200 \mathrm{~V}$ transformer should be connected.


## Setting Wiring Circuit Breaker

- Functions of Main Circuit Terminal

| Function | Terminal | PD 1000 |
| :--- | :--- | :--- |
| Power input of main circuit | $\mathrm{R}, \mathrm{S}, \mathrm{T}$ | $0.4 \mathrm{kw}-355 \mathrm{KW}$ |
| Inverter output | $\mathrm{U}, \mathrm{V}, \mathrm{W}$ | $0.4 \mathrm{kw}-355 \mathrm{KW}$ |
| Connecting to braking resistance | $\mathrm{B} 1, \mathrm{~B} 2(\mathrm{~PB},+)$ | $0.4 \mathrm{kw}-30 \mathrm{KW}$ |
| Connecting to DC reactor | $\mathrm{P} 1, \oplus$ | $132 \mathrm{kw}-355 \mathrm{KW}$ |
| Connecting baking unit | $\oplus, \ominus$ | $18.5 \mathrm{kw}-355 \mathrm{kw}$ |
| Grounding | $\bigoplus \quad$ | $0.4 \mathrm{kw}-355 \mathrm{kw}$ |


resistance
Example:PD 1000-011-43A

### 2.3 Terminals \& Wiring of Control Circuit :

1) Layout drawing of control circuit terminals is as follows:

2) Function of control circuit terminals:

| Type | Terminal Symbol | Terminal Name | Terminal Function |
| :---: | :---: | :---: | :---: |
| Power supply | +10V-GND | External+10V | Offers +10 V power source. Maximum output current: 10 mA ; generally used as a working power supply for external potentiometer. Resistance range of potentiometer: $\mathbf{1 k} \boldsymbol{\Omega}-\mathbf{5 k} \boldsymbol{\Omega}$ |
|  | +24V-COM | External+24V | Offers +24 power source, generally used as a working power supply for numeric input and output terminals and an external sensor power supply. Maximum output current: 200 mA . |
|  | EV | External power supply input terminal | The default is to connect to 24 V power supply. <br> When driving DI1 and D15 with external power supply, connect it to the external power supply and pull out the connector between EV and +24 V connector. |
| Analog input | AI1-GND | Analog input terminal 1 | 1. Input voltage range: DC OV-10V <br> 2. Input impedance: 22k $\boldsymbol{\Omega}$ |
|  | AI2-GND | Analog input terminal 2 | 1. Input range: DC OV 10V/4mA- 20mA, determined by jumper wire J8 on control board. <br> 2. Input impedance: voltage input $\mathbf{2 2 k} \boldsymbol{\Omega}$, |


|  |  |  | current input $500 \Omega$. |
| :---: | :---: | :---: | :---: |
|  | AI3-GND | Analog input terminal 3 | 1. Input voltage range: DC 0V-10V <br> 2. Input impedance: $\mathbf{2 2 k} \boldsymbol{\Omega}$ |
| Numerical input | DI1 | Numerical input 1 | 1. Optocoupler isolation, compatible with bipolar input <br> 2. Input impedance: $\mathbf{2 . 4 k \boldsymbol { \Omega }}$ <br> 3. Voltage range under level input: $\mathbf{9 V}-\mathbf{3 0 V}$ |
|  | DI2 | Numerical input 2 |  |
|  | DI3 | Numerical input 3 |  |
|  | DI4 | Numerical input 4 |  |
|  | DI5 | High-speed pulse input terminal | In addition to features of DI1-DI14, it can be used as high-speed pulse input channel as well. Maximum input frequency: 100 kHZ |
|  | DI6 | Numerical input 6 | 1. Optocoupler isolation, compatible with bipolar input <br> 2. Input impedance: $\mathbf{2 . 4} \mathbf{k} \boldsymbol{\Omega}$ <br> 3.Voltage range under level input: $\mathbf{9 V - 3 0 V}$ |
| Analog output | A01-GND | Analog output 1 | Determine voltage or current output by the jumper wire on control board. <br> Output voltage range: 0V-10V <br> Output current range: $\mathbf{0 m A} \mathbf{- 2 0 m A}$ |
|  | AO2-GND | Analog output 2 |  |
| Numeric output | DO1-CME | Numeric output 1 | 1. Optocoupler isolation, bipolar open collector output <br> 2. Output voltage range: $\mathbf{0 V - 2 4 V}$ <br> 3. Output current range: $\mathbf{0 m A}-\mathbf{5 0 m A}$ |
|  | FM-CME | High-speed pulse output | Subject to the function code P5-00 " FM Terminal Output Mode Options". <br> When used as high-speed pulse output, maximum frequency is up to 100 kHz ; <br> When used as open collector output, its specification is same with DO1. |
| Relay output | T/A1-T/C1 | NO terminal | Contact driving capacity: AC250V, 3A, $\operatorname{COS} \Phi=0.4$. <br> DC 30V, 1A |
|  | T/B1-T/C1 | NC terminal |  |
|  | T/A2-T/C2 | NO terminal | Contact driving capacity: AC250V, 3A, $\operatorname{COS} \Phi=0.4$ <br> DC 30V, 1A |
|  | T/B2-T/C2 | NC terminal |  |
| Communicati on | 485+ | 485 differential signal ( + ) | Standard RS485 communication port |
|  | 485 - | 485 differential signal ( - ) |  |

3) Wiring of control circuit terminals:

- For inductive loads like coil for driving relay, please be sure to insert bypass diode as shown in the figure below.
- Separate control circuit cables from cables of main circuit and other power cables or power supply cables in wiring.

- Please use twisted shielded cables or twisted pair cables to avoid malfunctions caused by interference. Please refer to the figure below for cable end treatment. The wiring distance should be less than 50 m
- Please connect shielded net cables to earthing terminal (E).
- Wrap shielded net cables with insulating tape to prevent shielded net cables from contacting other signal cables and device housing.

Connect shielded net cables to the connection terminal(earthing terminal (E)) of A-1000 shielded net cables


Wrapping ends of shielded twisted pair cables

## Chapter 3 Operation \& Display

### 3.1 Introduction to Operation and Display Interface

A user may operate PD 1000 inverter by the operation panel through parameter setting, status monitoring, start/stop operation, etc. Its outlook and function zones area as follows:


Keypad Menu
Keypad button description

| Button | Name | Function |
| :--- | :--- | :--- |
| PRG | Programmable | Enter and exit the level 1 menu. |
| ENTER | Enter | Enter the menu step by step, set and enter parameters. |
| $\square$ | Up | Increase figure or function code progressively. |
| $\square$ | Shift | Reduce figure or function code progressively. |
| RUN | Select the parameters to be displayed circularly under stop <br> status and running status; when modifying parameters, it can <br> be used to select the bit of parameters. |  |
| STOP/RES | Stop/Reset | Press this button to start the inverter if the keypad control is <br> enabled. |
| Press this button to stop the inveter under running status or |  |  |
| reset the operation in fault alarm status. This key is restricted |  |  |
| by function code P7-02. |  |  |

Description of function indicator lamp:

| Indicator lamp | Description |  |
| :--- | :--- | :---: |
| RUN | Running status indicator lamp: |  |


|  | Off: It means the inverter is in stop status; <br> On: It means the inverter is in running status; |
| :---: | :---: |
| TUNE/ERR | Tune/torque control/error indicator lamp. On: It means under torque control mode; when it flashes slowly, it means the elevator is in tuning status; rapid flashing of this lamp means fault. |
| FWD/REV | Forward/reverse indicator lamp: <br> On: it means forward status; off: it means reverse status. |
| UNIT/D.L.C | When the indicator is on, it means that the inverter is under operation panel control mode. Otherwise, it means that the inverter is under terminal control mode. |
| Hz | Frequency indicator lamp. Unit: Hz |
| A | Current indicator lamp; unit: A |
| V | Voltage indicator lamp, unit: V |
| RPM | when both Hz and A are on, it means rotation speed indicator lamp, unit: rotation per min (RPM) |
| \% | when both A and V are on, it means percentage, unit: \%. |

### 3.2 Description of Digital Manipulator

PD 1000 inverter adopts three-level menu to set parameters.
3-level menu: Function parameter group (level 1) $\rightarrow$ function codes (level 2) $\rightarrow$ function code setting(level 3). See the figure below for operation procedure.


3-level Menu Operation Flow Diagram
Description: Under the level 3 menu, user can press PRG or ENTER to back to the level 2 menu. The difference is that by pressing ENTER, it saves the setting parameter before getting back to the level 2 menu and then it enters the next function code automatically; by pressing PRG, it will directly return to the level 2 menu without saving parameters.

### 3.3 Methods to View Status Parameter

Under stop or running status, through the shift key " $D$ ", multiple status parameters can be displayed. User can select whether to display the parameter according to binary bit selection
through function code P7-03 (running parameter 1), P7-04 (running parameter 2) and P7-05 (stop parameter).

Under stopping status, 16 stopping parameters can be displayed in sequence according to selection, which respectively are: Setting frequency, bus voltage, DI input status, DO output status, analog input AI1 voltage, analogy input AI2 voltage, analogy input AI3 voltage, actual count value, actual length, PLC running steps, load speed display, PID setting, PULSE input pulse frequency and 3 not used parameters.

Under running status, there are five default parameters of running status to be displayed: Running frequency, setting frequency, bus voltage, output voltage and output current. Besides, users can select to display other parameters, including output power, output torque, DI input status, DO output status, analog input AI1 voltage, analog input AI2 voltage, analog input AI3 voltage, actual count valve, actual length, linear speed, PID setting and PID feedback by bit of function code P7-03 and P7-04 (changed into binary bit). These parameters can be displayed in sequence.

When the inverter is powered on again after power failure, the default parameters displayed are parameters selected before power failure.

### 3.4 Password Setting

The inverter provides password protection for parameters. When $16-00$ is set as non-zero, the password protection is enabled after exiting the function code editing status. By pressing PRG again, "-----" is displayed. At this time, users are required to enter correct user password to enter into the general menu.

To display the password protection function, user can enter the menu by inputting password and set $16-00$ as 0 .

## Chapter 4 Autotuning

## Motor parameter autotuning

When the elevator is in vector control mode, motor nameplate parameters shall be entered correctly before inverter operation so that the inverter can select standard motor parameter according to the nameplate parameter; vector control mode is highly dependent on motor parameters. Therefore, to acquire good control performance, correct motor parameters are required.

Perform the following steps to enable motor parameters autotuning:
(1) Firstly, select the command source ( $\mathrm{P} 0-01$ ) as the operation panel command channel.
(2) Then, input the following six parameters according to actual motor parameters:

| P1-00: Motor type options | P1-01: Motor rated power |
| :--- | :--- |
| P1-02: Motor rated voltage | P1-03: Motor rated current |
| P1-04: Motor rated frequency | P1-05: Motor rated rotation speed |

(3) For induction motor

According to the motor load condition:
The best tuning mode is idling dynamic tuning; If conditions do not permit, on-load
stationary tuning mode can be adopted;

1) Dynamic autotuning:

When the motor is disconnected to load completely, set P1-37 as 2 and press ENTER to confirm. At this time, the keypad displays as:

Then, by pressing RUN on the keypad panel, the inverter will drive the motor to conduct acceleration/deceleration and forward/reverse running; moreover, the running indicator lamp is on. It takes about 2 min to finish autotuning motor parameters. When above information disappears and returns to normal parameter display, it means autotuning is completed.

After autotuning, the inverter can calculate following motor parameters automatically:
P1-06: Stator resistance of induction motor P1-07: Rotor resistance of induction motor
P1-08: Leakage inductance of induction motor P1-09: Mutual inductance of induction motor
P1-10: Idling current of induction motor
2) Stationary autotuning:

If the motor can't be disconnected to load completely, select $\mathbf{P 1 - 3 7}$ as $\mathbf{1 / 3}$ and then press ENTER to confirm. At this time, the keypad displays:

Then, press RUN. After the inverter executes motor parameter tuning, motor parameter autotuning can be completed.

After autotuning, the inverter can calculate the following motor parameters automatically:
P1-06: Stator resistance of induction motor
P1-07: Rotor resistance of induction motor
P1-08: Leakage inductance of induction motor

## Chapter 5 Function Parameter Table

| Function <br> Code | Name | Setting Range | Minimum <br> Unit | Default |  |
| :--- | :--- | :--- | :--- | :--- | :---: |
| P0 Group: Basic Parameter |  |  |  |  |  |
| P0-00 | Motor Type Display | 1: G type (constant torque load) | 1 | 1 |  |
| P0-01 | Control Mode Options | 0: Sensorless vector control (SVC) <br> 1: Feedback Vector control (FVC) <br> 2: V/F control | 1 | 0 |  |
| P0-02 | Start/Stop Control Options | 0: Operation panel (LED off) <br> 1: Terminal (LED on) <br> 2: Serial port communication (LED <br> flashing) | 1 | 0 |  |


| P0-03 | Main Frequency Command Source A | 0: Numeric setting (pre-setting frequency $\mathrm{P} 0-08$, which can be modified by pressing UP/DOWN and won't be memorized after power failure) <br> 1: Numeric setting (pre-setting frequency P0-08, which can be modified by pressing UP/DOWN and memorized after power failure). <br> 2: AI1 <br> 3: AI2 <br> 4: AI3 <br> 5: PULSE setting (DI5) <br> 6: Preset speed command <br> 7: Simple PLC <br> 8: PID <br> 9: Communication setting <br> 10: Potentiometer | 1 | 10 |
| :---: | :---: | :---: | :---: | :---: |
| P0-04 | Auxiliary Frequency Command Source B | Same with P0-03 (Main frequency command source A) | 1 | 0 |
| P0-05 | Superposing Auxiliary  <br> Frequency Source B <br> Range   | 0 : With respect to the maximum frequency <br> 1: With respect to main frequency command source A | 1 | 0 |
| P0-06 | Superposing Auxiliary <br> Frequency Command B <br> Range Selection | 0\%-150\% | 1\% | 100\% |
| P0-07 | Frequency Source <br> Superposing Options | Ones place: Frequency source options <br> 0 : Main frequency source A <br> 1: Main \& auxiliary arithmetic results (arithmetic relation is determined by tens place) <br> 2: Switching between main frequency source A and auxiliary frequency source <br> B <br> 3: Switching between main frequency source A and main \& auxiliary arithmetic results. <br> 4: Switching between auxiliary frequency source $B$ and main \& auxiliary arithmetic results. <br> Tens place: Main \& auxiliary arithmetic results. <br> 0 : Main frequency source+ auxiliary | 11 | 00 |


|  |  | frequency source <br> 1: Main frequency source -auxiliary frequency source <br> 2: The bigger of main frequency source $A$ and auxiliary frequency source $B$ <br> 3: The smaller of main frequency source A and auxiliary frequency source B |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P0-08 | Main Frequency Setting of Digital Manipulator | 0.00 Hz -maximum frequency P0-10 | 0.01 Hz | 50.00 Hz |
| P0-09 | Running Direction | 0: Same <br> 1: Reverse | 1 | 0 |
| P0-10 | Maximum Frequency | $50.00 \mathrm{~Hz}-500.00 \mathrm{~Hz}$ | 0.01 Hz | 50.00 Hz |
| P0-11 | Upper Limit Frequency Source Options | $\begin{aligned} & \text { 0: P0-12 setting } \\ & \text { 1: AI1 } \\ & \text { 2: AI2 } \\ & \text { 3: AI3 } \\ & \text { 4: PULSE pulse setting } \\ & \text { 5: Communication setting } \end{aligned}$ | 1 | 0 |
| P0-12 | Upper Limit Frequency | Lower limit frequency P0-14 -maximum frequency P0-10 | 0.01 Hz | 50.00 Hz |
| P0-13 | Upper Limit Frequency Offset | 0.00 Hz -maximum frequency P0-10 | 0.01 Hz | 0.00 Hz |
| P0-14 | Lower Limit Frequency | 0.00Hz-Upper Limit Frequency P0-12 | 0.01 Hz | 0.00 Hz |
| P0-15 | Carrier Frequency | $0.5 \mathrm{kH}-16.0 \mathrm{kHz}$ | 0.01 kHz | Up to specific model |
| P0-16 | Carrier Frequency Adjustment Along With Temperature | 0: Disabled <br> 1: Enabled | 1 | 1 |
| P0-17 | Acceleration Time 1 | 0.00s-65000s | 0.01s | Up to specific model |
| P0-18 | Deceleration Time 1 | 0.00s-65000s | 0.01s | Up to specific model |
| P0-19 | Acceleration/Deceleration Time Unit | $\begin{aligned} & 0: 1 \mathrm{~s} \\ & 1: 0.1 \mathrm{~s} \\ & 2: 0.01 \mathrm{~s} \end{aligned}$ | 1 | 1 |
| P0-20 | Not Used | - | - | - |
| P0-21 | Offset Frequency of Auxiliary Frequency at Superposing | 0.00 Hz - maximum frequency P0-10 | 0.01 Hz | 0.00 Hz |
| P0-22 | Frequency Command Decimal Point | 2: 0.01 Hz | 1 | 2 |
| P0-23 | Stop Memory Options of Digital Setting Frequency | 0: Disabled 1: Enabled | 1 | 0 |


| P0-24 | Motor Options | $\begin{aligned} & 0: \text { Motor } 1 \\ & \text { 1: Motor } 2 \end{aligned}$ |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P0-25 | Acceleration/Deceleration <br> Time <br> Reference <br> Frequency | $\begin{aligned} & \text { 0: Maximum frequency }(\mathrm{P} 0-10) \\ & \text { 1: Setting frequency } \\ & \text { 2: } 100 \mathrm{~Hz} \end{aligned}$ | 1 | 0 |
| P0-26 | Frequency Command <br> UP/DOWN Quantity <br> during Operation  | 0 : Running frequency <br> 1: Setting frequency |  | 0 |
| P0-27 | Command Source Binding <br> Frequency Source | Ones place: Binding frequency source options of operation panel command <br> 0 : No binding <br> 1: Digital setting frequency <br> 2: AI1 <br> 3: AI2 <br> 4: AI3 <br> 5: PULSE setting (DI5) <br> 6: Preset speed <br> 7: Simple PLC <br> 8: PID <br> 9: Communication setting <br> Tens place: Binding frequency source options of terminal command <br> Hundreds place: Binding frequency source options of communication command | 1 | 0000 |
| P0-28 | Serial Port <br> Communication Protocol Options | 0: Modbus protocol <br> 1: Profibus-DP or CANOPEN protocol | 1 | 0 |
| P1 Group: Motor Parameters |  |  |  |  |
| P1-00 | Motor Type Options | 0: Common induction motor <br> 1: Inverter induction motor | 1 | 0 |
| P1-01 | Motor Rated Power | $0.1 \mathrm{~kW}-1000.0 \mathrm{~kW}$ | 0.1 kW | Up to specific model |
| P1-02 | Motor Rated Voltage | 0V-2000V | 1V | Up to specific model |
| P1-03 | Motor Rated Current | $\begin{aligned} & 0.01 \mathrm{~A}-655.35 \mathrm{~A} \text { (inverter power < } \\ & =55 \mathrm{~kW} \text { ) } \\ & 0.1 \mathrm{~A}-655.35 \mathrm{~A} \text { (inverter power }>55 \mathrm{~kW} \text { ) } \end{aligned}$ | 0.01 A | Up to specific model |
| P1-04 | Motor Rated Frequency | 0.00 Hz -maximum frequency | 0.01 Hz | Up to specific model |
| P1-05 | Motor Rated Rotation Speed | Orpm-65535rpm | 1 rpm | Up to specific model |
| P1-06 | Stator Resistance of Induction Motor | $0.001-65.535$ (inverter power $<=55 \mathrm{~kW}$ ) <br> 0.0001-6.5535(inverter power $>$ | 0.001 | Up to specific model |


|  |  | $=55 \mathrm{~kW}$ ) |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P1-07 | Rotor Resistance of Induction Motor | 0.001-65.535(inverter power $<=55 \mathrm{~kW}$ ) 0.0001-6.5535(inverter power $>$ $=55 \mathrm{~kW}$ ) | 0.001 | Up to specific model |
| P1-08 | Leakage Inductance of Induction Motor | $\begin{aligned} & 0.01 \mathrm{mH}-655.35 \mathrm{mH} \text { (inverter power }< \\ & =55 \mathrm{~kW}) \\ & 0.01 \mathrm{mH}-65.535 \mathrm{mH} \text { (inverter power }> \\ & 55 \mathrm{~kW}) \end{aligned}$ | 0.01 mH | Up to specific model |
| P1-09 | Mutual Inductance of Induction Motor | $\begin{aligned} & 0.1 \mathrm{mH}-6553.5 \mathrm{mH} \text { (inverter } \text { power }< \\ & =55 \mathrm{~kW} \text { ) } \\ & 0.01 \mathrm{mH}-655.35 \mathrm{mH} \text { (inverter power }> \\ & 55 \mathrm{~kW} \text { ) } \end{aligned}$ | 0.01 mH | Up to specific model |
| P1-10 | Idling Current of Induction Motor | $\begin{aligned} & 0.01 \mathrm{~A}-\mathrm{P} 1-03 \text { (inverter power }<=55 \mathrm{~kW} \text { ) } \\ & 0.1 \mathrm{~A}-\mathrm{P} 1-03 \text { (inverter power }>55 \mathrm{~kW} \text { ) } \end{aligned}$ | 0.01 | Up to specific model |
| P1-27 | Encoder Line Number | 1-65535 | 1 | 1024 |
| P1-28 | Encoder Type | 0 : ABZ Incremental encoder <br> 2: Rotary transformer |  | 0 |
| P1-30 | ABZ Incremental Encoder <br> Ab Phase Sequence | 0: Forward <br> 1: Reverse |  | 0 |
| P1-34 | Rotary Transformer  <br> Pole-Pairs  | 1-65535 |  |  |
| P1-36 | Speed Feedback PG Disconnection Detection Time | $\begin{aligned} & 0.0 \mathrm{~s}: \text { Disabled } \\ & 0.1 \mathrm{~s}-10.0 \mathrm{~s} \end{aligned}$ |  | 0.0s |
| P1-37 | Autotuning Options | 0 : No autotuning <br> 1: Stationary tuning of induction motor <br> 2: Full tuning of induction motor <br> 3: Stationary tuning 2 of induction motor |  | 0 |
| P2 Group: Motor Vector Control Parameters |  |  |  |  |
| P2-00 | Speed Loop Proportional Gain 1 | 1-100 | 1 | 30 |
| P2-01 | Speed Loop Integral Time 1 | 0.01s-10.00s | 0.01s | 0.50s |
| P2-02 | Switching Frequency 1 | 0.00-P2-05 | 0.01 Hz | 5.00 Hz |
| P2-03 | Speed Loop Proportional Gain 2 | 1-100 | 1 | 20 |
| P2-04 | Speed Loop Integral Time $2$ | 0.01s-10.00s | 0.01 s | 1.00s |
| P2-05 | Switching Frequency 2 | P2-02-Maximum frequency | 0.01 Hz | 10.00 Hz |
| P2-06 | Slip Compensation Gain Factor | 50\%-200\% | 1\% | 100\% |


| P2-07 | Filter Time Constant of SVC Speed Feedback | 0.000s-0.100s | 0.001 | 0.015 s |
| :---: | :---: | :---: | :---: | :---: |
| P2-09 | Upper Limit Source of Speed Control (Drive) Torque | 0 : set through function code P2-10 <br> 1: AI1 <br> 2: AI2 <br> 3: AI3 <br> 4: PULSE setting <br> 5: Communication setting <br> 6: MIN (AI1, AI2) <br> 7: MAX (AI1, AI2) <br> Full ranges of options 1 to 7 correspond to P2-10 | 1 | 0 |
| P2-10 | Upper Limit Numeric Setting of Speed Control Torque | 0.0\%-200.0\% | 0.1\% | 150.0\% |
| P2-11 | Torque Upper Limit <br> Command Options  <br> (Electricity Generation)  <br> under Speed Control <br> Mode   | 0: Function code P2-12 setting (no difference between electrically driven and Electricity Generation) <br> 1: AI1 <br> 2: AI2 <br> 3: AI3 <br> 4: PULSE setting <br> 5: Communication setting <br> 6: MIN (AI1, AI2) <br> 7: MAX (AI1, AI2) <br> 8: Function code P2-12 setting <br> Full ranges of options 1 to 7 correspond to P2-12 | 1 | 0 |
| P2-12 | Torque Upper Limit under Speed Control Mode | 0.0\%-200\% | 0.1\% | 150.0\% |
| P2-13 | Excitation Adjustment <br> Proportional Gain | 0-60000 | 1 | 2000 |
| P2-14 | $\begin{aligned} & \text { Excitation Adjustment } \\ & \text { Integral Gain } \end{aligned}$ | 0-60000 | 1 | 1300 |
| P2-15 | Torque Adjustment <br> Proportional Gain | 0-60000 | 1 | 2000 |
| P2-16 | $\begin{aligned} & \text { Torque } \quad \text { Adjustment } \\ & \text { Integral Gain } \end{aligned}$ | 0-60000 | 1 | 1300 |
| P2-17 | Speed Loop Integral Property | Ones place: Integral separation; 0: disabled; 1: enabled | 1 | 0 |
| P2-21 | Maximum Torque Factor of Field Weakening Zone | 50-200\% |  | 200\% |
| P2-22 | Electricity Generation <br> Function Limit Enable | 0: Disabled <br> 1:Enabled |  | 0 |


| P2-23 | Electricity Generation Power Upper Limit | 0.0-200.0\% |  | Up to specific model |
| :---: | :---: | :---: | :---: | :---: |
| P3 Group: V/F Control Parameters |  |  |  |  |
| P3-00 | V/F Curve Setting | 0: Straight V/F curve <br> 1: Multi-point V/F curve <br> 2: Square V/F curve <br> 3: $1.2^{\text {th }} \mathrm{V} / \mathrm{F}$ curve <br> 4: $1.4^{\text {th }} \mathrm{V} / \mathrm{F}$ curve <br> 6: $1.6^{\text {th }} \mathrm{V} / \mathrm{F}$ curve <br> 8: $1.8^{\text {th }} \mathrm{V} / \mathrm{F}$ curve <br> 9: Not used <br> 10: VF complete split mode <br> 11: VF half-split mode | 1 | 0 |
| P3-01 | Torque Boost | $0.0 \%$ : (no torque boost) $0.1 \%-30.0 \%$ | 0.1\% | Up to specific model |
| P3-02 | Torque Boost End Frequency | 0.00 Hz - maximum frequency | 0.01 | 50 Hz |
| P3-03 | Multipoint VF Frequency <br> Point 1 | 0.0Hz-P3-05 | 0.01 Hz | 0.00 Hz |
| P3-04 | Multipoint VF Voltage Point 1 | 0.0\%-100.0\% | 0.1\% | 0.0\% |
| P3-05 | Multipoint VF Frequency Point 2 | P3-03-P3-07 | 0.01 Hz | 0.00 Hz |
| P3-06 | Multipoint VF Voltage Point 2 | 0.0\%-100.0\% | 0.1\% | 0.0\% |
| P3-07 | Multipoint VF Frequency Point 3 | P3-05- motor rated frequency (P1-04) | 0.01 Hz | 0.00 Hz |
| P3-08 | Multipoint VF Voltage Point 3 | 0.0\%-100.0\% | 0.1\% | 0.0\% |
| P3-10 | VF Overexcitation Gain | 0-200 | 1 | 64 |
| P3-11 | Oscillation Suppression Gain | 0-100 | 1 | Up to specific model |
| P3-13 | VF Separation Voltage | 0: Numeric setting (P3-14) <br> 1: AI1 <br> 2: AI2 <br> 3: AI3 <br> 4: PULSE setting (DI5) <br> 5: Preset speed command <br> 6: Simple PLC <br> 7: PID <br> 8: Communication setting <br> $100.0 \%$ corresponds to motor rated voltage |  | 0 |
| P3-14 | Numeric Setting of VF | 0V- Motor rated voltage |  |  |


|  | Separation Voltage |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P3-15 | Voltage Rise Time of VF Separation | $0.0 \mathrm{~s}-1000.0 \mathrm{~s}$ <br> Refers to the time from 0 V to motor rated voltage |  |  |
| P3-16 | Deceleration Time of VF <br> Separation Voltage | 0.0s-1000.0s | 0.0s | 0 |
| P3-17 | Stop Mode Options of VF Separation | 0: Frequency/voltage reduces to 0 independently <br> 1: Frequency reduces after the voltage reduces to 0 |  | 0 |
| P3-18 | Overcurrent Stall Action Current | 50-200\% |  | 150\% |
| P3-19 | Overcurrent Stall Enable | 0: Disabled 1: Enabled |  | 1 Enabled |
| P3-20 | Overcurrent Stall Suppression Gain | 0-100 |  | 20 |
| P3-21 | Multiple Overcurrent Stall <br> Action <br> Current <br> Compensation Factor | 50-200\% |  | 50\% |
| P3-22 | Overvoltage Stall Action Voltage | 650.0V-800.0V |  | 760.0 V |
| P3-23 | Overvoltage Stall Enable | 0: Disabled 1: Enabled |  | 1 Enabled |
| P3-24 | Overvoltage Stall <br> Suppression Frequency <br> Gain  | 0-100 |  | 30 |
| P3-25 | Overvoltage Stall Suppression Voltage Gain | 0-100 |  | 30 |
| P3-26 | Overvoltage Stall Maximum Rise Frequency Limit | $0-50 \mathrm{~Hz}$ |  | 5 Hz |
| P4 Group: Input Terminal |  |  |  |  |
| P4-00 | DI1 Terminal Function Options | 0 : No function <br> 1: Forward running <br> : Reverse running <br> 3: 3-wire running control <br> 4: Forward JOG (FJOG) <br> 5: Reverse JOG (RJOG) <br> 6: Terminal UP <br> 7: Terminal DOWN <br> 8: Coast-to-Stop <br> 9: Fault reset (RESET) <br> 10: Running pause <br> 11: External fault NO input <br> 12: Preset command terminal 1 <br> 13: Preset command terminal 2 | 1 | 1 |
| P4-01 | DI2 Terminal Function Options |  |  | 2 |
| P4-02 | DI3 Terminal Function Options |  |  | 9 |
| P4-03 | DI4 Terminal Function Options |  |  | 12 |
| P4-04 | DI5 Terminal Function Options |  |  | 13 |
| P4-05 | DI6 Terminal Function Options |  |  | 14 |
| P4-06 | DI7 Terminal Function Options |  |  | 0 |


| P4-07 | DI8 Terminal Function Options | 14: Preset command terminal 3 <br> 15: Preset command terminal 4 | 0 |
| :---: | :---: | :---: | :---: |
| P4-08 | DI9 Terminal Function Options | 16: Acceleration/deceleration options terminal 1 <br> 17: Acceleration/deceleration options terminal 1 <br> 18: Frequency source switching <br> 19: UP/DOWN setting clear (terminal, keypad) <br> 20: Running command switching terminal 1 <br> 21: Acceleration/deceleration prohibited <br> 22: PID pause <br> 23: PLC status reset <br> 24: Wobbulation parameter <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 (pulse) frequency input (only works for DI5) <br> 31: Not used <br> 32: Immediate DC stop <br> 33: External fault NC input <br> 34: Frequency setting onset terminal (when this terminal function hasn't been set, the default is to enable) <br> If this terminal is set, terminal onset frequency can be modified through this terminal. <br> 35: PID direction reverse terminal <br> When this terminal is enabled, PID is opposite to the direction set by 10-03. <br> 36: External stop terminal 1 <br> Keypad control. This terminal can be used to stop the elevator, which is equal to the STOP key on the keypad <br> 37: Control command switch terminal 2 : <br> It is used to switch between terminal control and communication control. When this terminal is enabled, if $\mathrm{P} 0-02$ | 0 |


|  |  | is set as terminal control, then it switches to communication control; if $\mathrm{P} 0-02$ is set as communication control, it switches to terminal control. <br> 38: PID integral pause terminal hen this terminal is enabled, the integral adjustment function of PID pauses, but the proportional adjustment and the differential adjustment of PID are still enabled. <br> 39: Switching terminal of frequency source A and preset frequency. <br> When this terminal is enabled, frequency source $A$ is replaced by preset frequency (P0-08). <br> 40: Switching terminal of frequency source A and preset frequency <br> When this terminal is enabled, frequency source $B$ is replaced by preset frequency ( $\mathrm{P} 0-08$ ). <br> 41: Motor terminal options <br> 42: Not used <br> 43: PID parameter switching terminal <br> 44: Not used <br> 45: Not used <br> 46: Speed control/torque control switching <br> 47: Emergency stop <br> 48: External stop terminal 2 <br> This terminal can be used to stop the elevator at the deceleration time 4 under any control mode. <br> 49: Deceleration DC brake <br> 50: Current running time clear <br> 51: 2-wire/3-wire switching <br> 52: Reverse frequency prohibited <br> 53-59: Not used |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P4-10 | DI Filter Time | 0.000s-1.000s | 0.001s | 0.010s |
| P4-11 | Terminal Command Mode | $\begin{array}{ll} \hline \text { 0: } 2 \text {-wire 1 } & \text { 2: } 3 \text {-wire 1 } \\ \text { 1: } 2 \text {-wire 2 } & \text { 3: } 3 \text {-wire 2 } \end{array}$ | 1 | 0 |
| P4-12 | Change Rate Per Second of Terminal UP/DOWN | $0.001 \mathrm{~Hz}-65.535 \mathrm{~Hz}$ | 0.001 Hz | 1.00 Hz |
| P4-13 | AI1 Minimum Input | 0.00V-P4-15 | 0.01 V | 0.00 V |
| P4-14 | Corresponding Setting of | -100.0\% - + 100.0\% | 0.1\% | 0.0\% |


|  | AI1 Minimum Input |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P4-15 | AI1 Maximum Input | P4-13-+10.00V | 0.01 V | 10.00 V |
| P4-16 | Corresponding Setting of AI1 Maximum Input | -100.0\% - + 100.0\% | 0.1\% | 100.0\% |
| P4-17 | AI1 Filter Time | 0.00s-10.00s | 0.01 s | 0.10s |
| P4-18 | AI2 Minimum Input | 0.00V-P4-20 | 0.01 V | 0.00 V |
| P4-19 | Corresponding Setting of AI2 Minimum Input | -100.0\% -+ 100.0\% | 0.1\% | 0.0\% |
| P4-20 | AI2 Maximum Input | P4-18-+ 10.00 V | 0.01 V | 10.00 V |
| P4-21 | Corresponding Setting of AI2 Maximum Input | -100.0\% -+ 100.0\% | 0.1\% | 100.0\% |
| P4-22 | AI2 Filter Time | 0.00s-10.00s | 0.01 s | 0.10s |
| P4-23 | AI3 Minimum Input | -10.00V-P4-25 | -10.00V | -10.00V |
| P4-24 | Corresponding Setting of AI3 Minimum Input | -100.0\% - + 100.0\% | -100.0\% | -100.0\% |
| P4-25 | AI3 Maximum Input | P4-23-+10.00V | -10.00V | -10.00V |
| P4-26 | Corresponding Setting of AI3 Maximum Input | -100.0\% -+ 100.0\% | -100.0\% | -100.0\% |
| P4-27 | AI3 Filter Time | 0.00s-10.00s | 0.10s | 0.10s |
| P4-28 | PULSE Minimum Input | $0.00 \mathrm{kHz}-\mathrm{P} 4-30$ | 0.01 kHz | 0.00 kHz |
| P4-29 | Corresponding Setting of PULSE Minimum Input | -100.0\% -+ 100.0\% | 0.1\% | 0.0\% |
| P4-30 | PULSE Maximum Input | P4-28-100.00kHz | 0.01 kHz | 50.00 kHz |
| P4-31 | PULSE Maximum Input Setting | -100.0\%-100.0\% | 0.1\% | 100.0\% |
| P4-32 | PULSE Filter Time | 0.00s-10.00s | 0.01 s | 0.10s |
| P4-33 | AI Setting Curve Options | Ones place: AI1 curve option <br> 1: Curve 1 (2 points, see P4-13-P4-16) <br> 2: Curve 2 (2 points, see P4-18-P4-21) <br> 3: Curve 3 (2 points, see P4-23-P4-26) <br> 4: Not used <br> 5: Not used <br> Tens place: AI2 curve options, same as above <br> Hundreds place:AI3 curve options, same as above | 1 | 321 |
| P4-34 | AI Lower Than Minimum Input Setting Options | Ones place: AI Lower Than Minimum Input Setting Options <br> 0 : Corresponding setting of minimum input $1: 0.0 \%$ <br> Tens place: AI2 lower than minimum input setting options, same as above <br> Hundreds place: AI3 lower than | 1 | 000 |


|  |  | minimum input setting options, same as above |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P4-35 | DI1 Delay Time | 0.0s-3600.0s | 0.1s | 0.0s |
| P4-36 | DI2 Delay Time | 0.0s-3600.0s | 0.1s | 0.0s |
| P4-37 | DI3 Delay Time | 0.0s-3600.0s | 0.1s | 0.0 s |
| P4-38 | DI Input Terminal Active Status Setting 1 | 0: High level <br> 1: Low level <br> Ones place: DI1 <br> Tens place: DI2 <br> Hundreds place: DI3 <br> Thousands place: DI4 <br> Tens thousands place: DI5 | 1 | 00000 |
| P4-39 | DI Terminal Active Mode Options 2 | 0: High level <br> 1: Low level <br> Ones place: DI6 <br> Tens place: DI7 <br> Hundreds place: DI8 <br> Thousands place: DI9 | 1 | 00000 |
| P5 Group: Output Terminal |  |  |  |  |
| P5-00 | $F M$ Terminal Output Options | 0: Pulse output (FMP) <br> Open collector switching quantity output (FMR) | 1 | 0 |
| P5-01 | FMR Output Function Options | 0 : No output <br> 1: Inverter running | 1 | 0 |
| P5-02 | Control Board Relay <br> Output Options <br> (T/A1-T/B1-T/C1) <br> RELAY 1 | 2: Fault output (stop upon fault) <br> 3: Frequency level detection FDT1 output <br> 4: Frequency reach | 1 | 2 |
| P5-03 | Control Board Relay Output Options 2 <br> (T/A1-T/B1-T/C1) <br> RELAY 2 | 5: Run at zero speed (stop, no output) <br> 6: Motor overload pre-warning <br> 7: Inverter overload pre-warning <br> 8: Set count value reach | 1 | 1 |
| P5-04 | DO1 Output Options | 9: Designated count value reach | 1 | 1 |
| P5-05 | Expansion Card DO2 Output Options | 10: Length Reach <br> 11: PLC Cycle Finished <br> 12: Accumulated Running Time Reach <br> 13: Frequency limit <br> 14: Torque limit <br> 15: Running ready <br> 16: AII > AI2 <br> 17: Upper limit frequency reach <br> 18: Lower limit frequency reach (related to running) <br> 19: Undervoltage status output | 1 | 4 |


|  |  | 20: Communication setting <br> 21: Not used <br> 22: Not used <br> 23: Run 2 at zero speed (output at stop) <br> 24: Accumulated power-on time reach <br> 25: Frequency level detection FDT2 output <br> 26: Frequency reach 1 output <br> 27: Frequency reach 2 output <br> 28: Current reach 1 output <br> 29: Current reach 2 output <br> 30: Timed reach output <br> 31: AI1 input exceeds upper and lower limit <br> 32: Offload <br> 33: Reverse running <br> 34: Zero current detection <br> 35: Module temperature reach <br> 36: Software overcurrent output <br> 37: Lower limit frequency reach (irrespective to running) <br> 38: Fault output (continue to run) <br> 39: Motor overtemperature pre-warning <br> 40: Current running time reach <br> 41: Fault output (no output upon undervoltage) |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P5-06 | FMP Output Options | 0 : Running frequency |  | 0 |
| P5-07 | AO1 Output Options | 1: Setting frequency |  | 0 |
| P5-08 | Expansion Card AO2 Output Options | 2: Output current <br> 3: Output torque <br> 4: Output power <br> 5: Output voltage <br> 6: PULSE input ( $100.0 \%$ corresponds <br> to 100.0 kHz ) <br> 7: AI1 <br> 8: AI2 <br> 9: AI3 <br> 10: Length <br> 11: Count value <br> 12: Communication setting <br> 13: Motor rotation speed <br> 14: Output current (100.0\% <br> corresponds to 1000.0 A ) <br> 15: Output voltage $(100.0 \%$ | 1 |  |


|  |  | corresponds to 1000.0 V ) <br> 16: Output torque |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P5-09 | FMP Output Maximum Frequency | $0.01 \mathrm{kHz}-100.00 \mathrm{kHz}$ | 0.01 kHz | 50.00 kHz |
| P5-10 | AO1 Zero Offset Factor | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| P5-11 | AO1 Gain | -10.00-10.00 | 0.01 | 1.00 |
| P5-12 | AO2 Zero Offset Factor | -100.0\%-100.0\% |  |  |
| P5-13 | AO2 Gain | -10.00-10.00 |  |  |
| P5-17 | FMR Output Delay Time | 0.0s-3600.0s | 0.1s | 0.0s |
| P5-18 | RELAY 1 Output Delay <br> Time | 0.0s-3600.0s | 0.1s | 0.0s |
| P5-19 | RELAY 2 Output Delay Time | 0.0s-3600.0s | 0.1s | 0.0s |
| P5-20 | DO1 Output Delay Time | 0.0s-3600.0s | 0.1s | 0.0s |
| P5-21 | DO2 Output Delay Time | 0.0s-3600.0s | 0.1s | 0.0s |
| P5-22 | DO Output Terminal Active Status Options | 0 - positive logic; 1 - negative logic <br> Ones place: FMR <br> Tens place: RELAY 1 <br> Hundreds place: RELAY 2 <br> Thousands place: DO1 <br> Tens thousands place: DO2 | 11111 | 00000 |
| P6 Group: Start/Stop Control |  |  |  |  |
| P6-00 | Start Mode | 0: Direct start <br> 1: Speed tracking start <br> 2: Pre-excitation start of induction motor <br> 3: SVC quick start | 1 | 0 |
| P6-01 | Rotation Speed Tracking Mode | 0 : Start from stopping frequency <br> 1: Start from industrial frequency <br> 2: Start from maximum frequency |  | 0 |
| P6-02 | Rotation Speed Tracking Fast/Slow | 1-100 | 1 | 20 |
| P6-03 | Start Frequency | $0.00 \mathrm{~Hz}-10.00 \mathrm{~Hz}$ | 0.00 | 0.00 |
| P6-04 | Start Frequency Holding Time | 0.0s-100.0s | 0.1s | 0.0s |
| P6-05 | Start DC <br> Brake/Pre-excitation <br> Current | 0\%-100\% | 1\% | 0\% |
| P6-06 | Start DC Brake/Pre-excitation Time | 0.0s-100.0s | 0.1s | 0.0s |
| P6-07 | Acceleration/Deceleration <br> Mode | 0: Linear acceleration/deceleration <br> 1: Static $S$ curve deceleration <br> 2: Dynamic $S$ curve deceleration | 1 | 0 |
| P6-08 | S Curve Start Section | 0.0\%-(100.0\%-P6-09) | 0.1\% | 30.0\% |


|  | Time Proportion |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P6-09 | S Curve End Section Time Proportion | 0.0\%-(100.0\%-P6-08) | 0.1\% | 30.0\% |
| P6-10 | Stop Mode | 0: Ramp-to-stop 1: Coast-to-stop | 1 | 0 |
| P6-11 | DC Brake Start Frequency at Stop | 0.00 Hz - maximum frequency | 0.01 Hz | 0.00 Hz |
| P6-12 | DC Brake Waiting Time at Stop | 0.0s-100.0s | 0.1s | 0.0s |
| P6-13 | DC Brake Current at Stop | 0\%-100\% | 1\% | 0\% |
| P6-14 | DC Brake Time at Stop | 0.0s-100.0s | 0.1s | 0.0s |
| P6-15 | Brake Duty Ratio | 0\%-100\% | 1\% | 100\% |
| P6-18 | Rotation Speed Tracking Current | 30\%-200\% | Up to <br> specific model |  |
| P6-21 | Demagnetizing Time | 0.00-5.00s | 1.00s |  |
| P7 Group: Keypad \& Display |  |  |  |  |
| P7-01 | APP Key Function Options | 0: APP disabled <br> 1: Switching of operation panel command and remote command (terminal command or serial port communication command) <br> 2: Switching of forward and reverse running <br> 3: Forward JOG <br> 4: Reverse JOG | 1 | 0 |
| P7-02 | STOP/RESET Key Function | 0 : This key can only be valid under keypad control mode. <br> 1: This key is valid under all control modes | 1 | 1 |
| P7-03 | LED Running Display Parameter 1 | 0000-FFFF <br> Bit00: Running frequency (Hz) <br> Bit01: Setting 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: DI 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 | 1111 | 1F |


|  |  | Bit14: Load speed display <br> Bit15: PID setting |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P7-04 | LED Running Display Parameter 2 | 0000-FFFF <br> Bit00: PID feedback <br> Bit01: PLC stage <br> Bit02: PULSE input pulse frequency, unit: kHz <br> Bit03: Running frequency (Hz) <br> Bit04: Remaining running time <br> Bit05: AI1 Voltage before calibration <br> Bit06: AI2 Voltage before calibration <br> Bit07: AI3 Voltage before calibration <br> Bit08: Linear speed <br> Bit09: Current power-on time <br> Bit10: Current running time <br> Bit11: PULSE input pulse frequency, unit: 1 Hz <br> Bit12: Communication setting <br> Bit13: Encoder feedback speed (Hz) <br> Bit14: Main frequency A display <br> Bit15: Auxiliary frequency B display | 1111 | 0 |
| P7-05 | $\begin{aligned} & \text { LED Stop Display } \\ & \text { Parameter } \end{aligned}$ | 0000-FFFF <br> Bit00: Setting frequency ( Hz ) <br> Bit01: Bus voltage (V) <br> Bit02: DI 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 <br> Bit09: PLC stage <br> Bit10: Load speed display <br> Bit11: PID setting <br> Bit12: PULSE input pulse frequency, unit kHz | 1111 | 33 |
| P7-06 | Load Speed Display Factor | 0.0001-6.5000 | 0.0001 | 1.0000 |
| P7-07 | Inverter Module Radiator Temperature | $0.0^{\circ} \mathrm{C}-100^{\circ} \mathrm{C}$ | $0.1{ }^{\circ} \mathrm{C}$ | - |
| P7-08 | Not Used |  |  | - |
| P7-09 | Accumulated Running Time | 0h-65535h | 1h | - |
| P7-10 | Not Used | - |  | - |


| P7-11 | Software Version | - |  | - |
| :---: | :---: | :---: | :---: | :---: |
| P7-12 | Decimal Places of Load Speed Displayed | ```Ones place: Number of decimal places of d0-14 0: 0 1: 1 2: 2 3: 3 Tens place: d0-19/d0-29 number of decimal places 1:1 2: 2``` | H. 111 | 1 |
| P7-13 | Accumulated Power-on Time | 0h-65535h | 1h | - |
| P7-14 | Accumulated Energy <br> Consumption | $0-65535^{\circ}$ | $1^{\circ}$ | - |
| P8 Group: Auxiliary Function |  |  |  |  |
| P8-00 | JOG Running Frequency | 0.00 Hz -maximum frequency | 0.01 Hz | 2.00 Hz |
| P8-01 | JOG Acceleration Time | 0.0s-6500.0s | 0.1s | 20.0s |
| P8-02 | JOG Deceleration Time | 0.0s-6500.0s | 0.1 s | 20.0s |
| P8-03 | Acceleration Time 2 | 0.0s-6500.0s | 0.1 s | Up to specific model |
| P8-04 | Deceleration Time 2 | 0.0s-6500.0s | 0.1s | Up to specific model |
| P8-05 | Acceleration Time 3 | 0.0s-6500.0s | 0.1s | Up to specific model |
| P8-06 | Deceleration Time 3 | 0.0s-6500.0s | 0.1 s | Up to specific model |
| P8-07 | Acceleration Time 4 | 0.0s-6500.0s | 0.1 s | Up to specific model |
| P8-08 | Deceleration Time 4 | 0.0s-6500.0s | 0.1 s | Up to specific model |
| P8-09 | Hopping Frequency 1 | 0.00 Hz - maximum frequency | 0.01 Hz | 0.00 Hz |
| P8-10 | Hopping Frequency 2 | 0.00 Hz - maximum frequency | 0.01 Hz | 0.00 Hz |
| P8-11 | Hopping Frequency <br> Amplitude  | 0.00 Hz - maximum frequency | 0.01 Hz | 0.01 Hz |
| P8-12 | Forward/Reverse Deadband Time | 0.0s-3000.0s | 0.1s | 0.0s |
| P8-13 | Reverse Control | 0: Reverse permitted 1: Reverse prohibited | 1 | 0 |
| P8-14 | Control Mode of Set <br> Frequency Lower Than Lower Limit Frequency | 0 : Run at lower limit frequency <br> 1: Stop <br> 2: Run at zero speed | 1 | 0 |
| P8-15 | Sagging Control | $0.00 \mathrm{~Hz}-10.00 \mathrm{~Hz}$ | 0.01 Hz | 0.00 Hz |
| P8-16 | Set Accumulated | 0h-65000h | 1h | 0h |


|  | Power-On Time Reach |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P8-17 | Set Accumulated Run Time Reach | 0h-65000h | 1h | 0h |
| P8-18 | Enable Protection Options | 0: Disabled 1:Enabled |  |  |
| P8-19 | $\begin{array}{ll}\text { Frequency } & \text { Detection } \\ \text { Value (FDT1) }\end{array}$ | 0.00 Hz - maximum frequency | 0.01 Hz | 50.00 Hz |
| P8-20 | Frequency Detection Hysteresis Value (FDT1) | 0.0\%-100.0\% (FDT1 level) | 0.1\% | 5.0\% |
| P8-21 | Frequency Reach <br> Detection Bandwidth | 0.0\%-100.0\% (maximum frequency) | 0.1\% | 0.0\% |
| P8-22 | Enable Hopping <br> Frequency during <br> Acceleration/Deceleration  <br> Process  | 0: Disabled 1: Enabled |  | 0 |
| P8-25 | Switching Frequency <br> Point of Acceleration Time 1/2 | 0.00 Hz - maximum frequency | 0.01 Hz | 0.00 Hz |
| P8-26 | Switching Frequency <br> Point of Deceleration Time 1/2 | 0.00 Hz - maximum frequency | 0.01 Hz | 0.00 Hz |
| P8-27 | Terminal Jog Priority | 0: Disabled 1: Enabled |  | 0 |
| P8-28 | $\begin{aligned} & \text { Frequency } \quad \text { Detection } \\ & \text { Value }(F D T 2) \end{aligned}$ | 0.00 Hz - maximum frequency | 0.01 Hz | 50.00 Hz |
| P8-29 | Frequency Detection Hysteresis Value (FDT2) | 0.0\%-100.0\% (FDT2 level) | 0.1\% | 5.0\% |
| P8-30 | Any Reach Frequency Detection Value 1 | 0.00 Hz - maximum frequency | 0.01 Hz | 50.00 Hz |
| P8-31 | Any Reach Frequency Detection Amplitude 1 | 0.0\%-100.0\% (maximum frequency) | 0.1\% | 0.0\% |
| P8-32 | Any Reach Frequency Detection Value 2 | 0.00 Hz - maximum frequency | 0.01 Hz | 50.00 Hz |
| P8-33 | Any Reach Frequency <br> Detection Amplitude 2 | 0.0\%-100.0\% (maximum frequency) | 0.1\% | 0.0\% |
| P8-34 | Zero Current Detection Level | $0.0 \%-300.0 \%$ <br> $100.0 \%$ corresponds to motor rated current | 0.1\% | 5.0\% |
| P8-35 | Zero Current Detection Delay Time | 0.01s-600.00s | 0.01 s | 0.10s |
| P8-36 | Software Overcurrent <br> Point | $0.0 \%$ (no detection) <br> $0.1 \%-300.0 \%$ (Motor rated current) | 0.1\% | 200.0\% |
| P8-37 | Software Overcurrent Detection Delay Time | 0.00s-600.00s | 0.01 s | 0.00s |
| P8-38 | Any Reach Current 1 | 0.0\%-300.0\% (motor rated current) | 0.1\% | 100.0\% |
| P8-39 | Any Reach Current 1 | 0.0\%-300.0\% (motor rated current) | 0.1\% | 0.0\% |


|  | Width |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P8-40 | Any Reach Current 2 | 0.0\%-300.0\% (motor rated current) | 0.1\% | 100.0\% |
| P8-41 | Any Reach Current 2 Width | 0.0\%-300.0\% (motor rated current) | 0.1\% | 0.0\% |
| P8-42 | Timed Function Options | 0: Disabled 1: Enabled | 1 | 0 |
| P8-43 | Timed Running Time Options | 0: P8-44 setting 1: AI1 2: AI2 3: AI3 Analog input range corresponds to P8-44 | 1 | 0 |
| P8-44 | Timed Running Time | 0.0Min-6500.0Min | 0.1Min | 0.0Min |
| P8-45 | AI1 Input Voltage Protection Value Lower Limit | $0.00 \mathrm{~V}-\mathrm{P} 8-46$ | 0.01 V | 3.10 V |
| P8-46 | AI1 Input Voltage Protection Value Upper Limit | P8-45-10.00V | 0.01 V | 6.80 V |
| P8-47 | $\begin{aligned} & \text { Module Temperature } \\ & \text { Reach } \end{aligned}$ | $0^{\circ} \mathrm{C}-100^{\circ} \mathrm{C}$ | $1^{\circ} \mathrm{C}$ | $75^{\circ} \mathrm{C}$ |
| P8-48 | Radiation Fan Control | 0: Motor running radiation fan running <br> 1: Radiation fan runs all the time after being powered on | 1 | 0 |
| P8-49 | Awakening Frequency | Sleep frequency (P8-51) - maximum frequency (P0-10) | 0.01 Hz | 0.00 Hz |
| P8-50 | Awakening Delay Time | 0.0s-6500.0s | 0.1s | 0.0s |
| P8-51 | Sleep Frequency | 0.00 Hz -awakening frequency (P8-49) | 0.01 Hz | 0.00 Hz |
| P8-52 | Sleep Delay Time | 0.0s-6500.0s | 0.1 s | 0.0s |
| P8-53 | Set Current Running Reach Time | 0.0Min-6500.0Min | 0.1Min | 0.0Min |
| P8-54 | Output Power Calibration Factor | 0.00\%-200.0\% |  | 100.0\% |
| P9 Group: Fault and Protection |  |  |  |  |
| P9-00 | Motor Overload <br> Protection Options | 0: Prohibited 1: Permitted |  | 1 |
| P9-01 | Motor Overload <br> Protection Gain | 0.20-10.00 | 0.01 | 1.00 |
| P9-02 | Motor Overload <br> Pre-warning Factor | 50\%-100\% | 1\% | 80\% |
| P9-03 | Overvoltage Stall Gain | 0-100 |  | 30 |
| P9-04 | Overvoltage Stall <br> Protection Voltage  | $650-800 \mathrm{~V}$ |  | 760 V |


| P9-07 | Short Circuit to Ground Protection Options upon Power-on | Ones place: Short circuit to ground protection options upon power-on <br> 0: Disabled <br> 1: Enabled <br> Tens place: Short circuit to ground protection options upon power-on before operation <br> 0: Disabled <br> 1: Enabled |  | 01 |
| :---: | :---: | :---: | :---: | :---: |
| P9-08 | Braking Unit Action Start Voltage | 700-800V |  | 780 V |
| P9-09 | Automatic Reset Times of Fault | 0-20 | 1 | 0 |
| P9-10 | Fault DO Action Options during Fault Automatic Reset Period | 0: Disabled <br> 1: Enabled |  | 0 |
| P9-11 | Fault Automatic Reset Interval | 0.1s-100.0s |  | 1.0s |
| P9-12 | Input Phase <br> Loss/Contactor On <br> Protection Options  | Ones place: Input phase loss protection options <br> Tens place: Contactor on protection options <br> 0: Disabled <br> 1: Enabled |  | 11 |
| P9-13 | Output Phase Loss <br> Protection Options | Ones place: Output phase loss protection options <br> 0: Disabled 1: Enabled <br> Tens place: Output phase loss protection options before running <br> 0: Disabled 1: Enabled |  | 1 |
| P9-14 | First Fault Type | No fault | - | - |
| P9-15 | Second Fault Type | Not used | - | - |
| P9-16 | Third Fault(Latest) Type | Acceleration overcurrent (OCA) <br> Deceleration overcurrent (OCD) <br> Constant speed overcurrent (OCN) <br> Acceleration overvoltage (OUA) <br> Deceleration overvoltage (OUD) <br> Constant speed overvoltage (OUN) <br> Buffer resistance overload (UU) <br> Undervoltage (LU) <br> Inverter overload (OL2) <br> Motor overload (OL1) <br> Input phase loss (PF) <br> Output phase loss (LF) | - | - |


|  |  | Module overheating (OH1) <br> External fault (EF) <br> Communication error (CE) <br> Contactor abnormality (RL) <br> Current detection abnormality (CC) <br> Motor tuning abnormality (ER) <br> Encoder/PG card abnormality (PG) <br> Parameter read-write abnormality (EP) <br> Inverter hardware abnormality (EH) <br> Motor short circuited to the ground <br> (GF) <br> Not used <br> Not used <br> Running time reach (OT1) <br> Not used <br> Not used <br> Power-on time reach (OT2) <br> Offload (LL) <br> PID feedback loss during running (PD) <br> Rapid current limit overtime (LC) <br> Switching motor during running (TRE) <br> Large speed offset (DEV) <br> Motor overspeed (OS) <br> Motor overtemperature ( OH 2 ) <br> Initial position error (1NE) <br> Slave motor failure under master and slave control (MS) |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P9-17 | Third Fault(Latest) <br> Frequency  | - |  |  |
| P9-18 | Third Fault(Latest) Current | - |  | - |
| P9-19 | Third Fault(Latest) Bus Voltage | - |  | - |
| P9-20 | Third Fault(Latest) Input Terminal Status | - | - | - |
| P9-21 | Third Fault(Latest) Output Terminal Status | - | - | - |
| P9-22 | Third (Latest)Fault Inverter Status | - | - | - |
| P9-23 | Third (Latest) Fault Time <br> (Calculated From Current <br> Power-on Time) | - | - | - |
| P9-24 | Third (Latest) Fault Time <br> (Calculated <br> From | - | - | - |


|  | Running ) |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P9-27 | Second Fault Frequency | - | - | - |
| P9-28 | Second Fault Current | - | - | - |
| P9-29 | Second Fault Bus Voltage | - | - | - |
| P9-30 | Second Fault Input Terminal Status | - | - | - |
| P9-31 | Second Fault Output Terminal Status | - | - | - |
| P9-32 | Second Fault Inverter <br> Status | - | - | - |
| P9-33 | Second Fault Time (Calculated from Current Power-on) | - | - | - |
| P9-34 | Second Fault Time (Calculated from Current Running) | - | - | - |
| P9-37 | First Fault Frequency | - | - | - |
| P9-38 | First Fault Current | - | - | - |
| P9-39 | First Fault Bus Voltage | - | - | - |
| P9-40 | First Fault Input Terminal Status | - | - | - |
| P9-41 | First Fault Output Terminal Status | - | - | - |
| P9-42 | First Fault Inverter Status | - | - | - |
| P9-43 | First Fault Time (Calculated from Current Power-on) | - | - | - |
| P9-44 | First Fault Time (Calculated from Current Running) | - | - | - |
| P9-47 | Fault Protection Action Options 1 | Ones place: Motor overload (OL1) <br> 0: Coast-to-stop <br> 1: Stop according to the stopping mode <br> 2: Continue to run <br> Tens place: Not used <br> Hundreds place: Not used <br> Thousands place: External fault (EF) <br> Ten thousands place: Communication error (CE) | 11111 | 00000 |
| P9-48 | Fault Protection Action Options 2 | Ones place: Encoder/PG card abnormality $(P G)$ <br> 0: Coast-to-stop <br> Tens place: Function code read \& write abnormality ( $E P$ ) | 11111 | 00000 |


|  |  | 0: Coast to stop <br> 1: Stop according to the stopping mode Hundreds place: Inverter overload fault action options (OL2) <br> 0 : Coast to stop <br> 1: Derating <br> Thousands places: Motor overheat (OH2) <br> Ten thousands place: Running time reach $(O T)$ |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P9-49 | Fault Protection Action Options 3 | Ones place: Not used <br> 0 : Coast to stop <br> 1: Stop according to the stopping mode <br> 2: Continue to run <br> Tens place: Not used <br> 0 : Coast to stop <br> 1: Stop according to the stopping mode <br> 2: Continue to run <br> Hundreds place: Power-on time reach <br> (UT) <br> 0 : Coast to stop <br> 1: Stop according to the stopping mode <br> 2: Continue to run <br> Ten thousands place: Offload ( $L L$ ) <br> 0 : Coast to stop <br> 1: Stop according to the stopping mode <br> 2: Reduce to $7 \%$ of motor rated frequency and then continue to run. <br> When there is no offload, automatically restore to setting frequency for running <br> Ten thousands place: PID feedback loos during running ( $P D$ ) <br> 0 : Coast to stop <br> 1: Stop according to the stopping mode <br> 2: Continue to run | 11111 | 00000 |
| P9-50 | Fault Protection Action Options 4 | Ones place: Large speed offset (DEV) <br> 0 : Coast to stop <br> 1: Stop according to the stopping mode <br> 2: Continue to run <br> Tens place: Motor overspeed (OS) <br> Hundreds place: Initial position error | 11111 | 00000 |
| P9-54 | Continuous Running <br> Frequency Options at <br> Fault  | 0 : Run at current running frequency <br> 1: Run at the set frequency <br> 2: Run at the upper limit frequency | 1 | 0 |


|  |  | 3: Run at the lower limit frequency <br> 4: Run at the spare frequency under abnormality |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P9-55 | Spare Frequency Setting under Abnormality | $60.0 \%-100.0 \%$ (current targeted frequency) | 0.1\% | 100.0\% |
| P9-56 | $\begin{aligned} & \text { Motor } \\ & \text { Semperature } \\ & \text { Sensor Type } \end{aligned}$ | $\begin{aligned} & \text { 0: No temperature sensor } \\ & \text { 1: PT100 } \\ & \text { 2: PT1000 } \end{aligned}$ | 0 | 0 |
| P9-57 | Motor Overheating <br> Protection Threshold | $0^{\circ} \mathrm{C}-200^{\circ} \mathrm{C}$ | $1^{\circ} \mathrm{C}$ | $110^{\circ} \mathrm{C}$ |
| P9-58 | Motor Overheating <br> Pre-warning Threshold | $0^{\circ} \mathrm{C}-200^{\circ} \mathrm{C}$ | $1^{\circ} \mathrm{C}$ | $90^{\circ} \mathrm{C}$ |
| P9-59 | Instantaneous Stop <br> Non-stop Enable  | 0: Disabled <br> 1: Constant control of bus voltage <br> 2: Ramp-to-stop |  | 0 |
| P9-60 | Instantaneous Stop Non-stop Reset Voltage | 60\%-100\% |  | 85\% |
| P9-61 | Voltage Judgment Time under Non-stop Action upon Instantaneous Power Failure | 0.0-100.0s |  | 0.5 s |
| P9-62 | Bus Voltage of Non-stop <br> Action upon <br> Instantaneous Power <br> Failure | 60\%-100\% |  | 80\% |
| P9-63 | Offload Protection Options | 0: Disabled <br> 1: Enabled | 1 | 0 |
| P9-64 | Offload Detection Level | 0.0-100.0\% | 0.1\% | 10.0\% |
| P9-65 | Offload Detection Time | 0.0-60.0s | 0.1s | 1.0s |
| P9-67 | Overspeed Detection Value | 0.0\%-50.0\% (maximum frequency) | 0.1\% | 20.0\% |
| P9-68 | Overspeed Detection Time | 0.0s: No detection; 0.1-60.0s | 0.1s | 0.1s |
| P9-69 | Larger Speed Offset Detection Value | 0.0\%-50.0\% (maximum frequency) | 0.1\% | 20.0\% |
| P9-70 | Larger Speed Offset Detection Time | 0.0s: No detection; 0.1-60.0s | 0.1s | 5.0s |
| P9-71 | Gain KP for Non-stop upon Instantaneous Power Failure | 0-100 |  | 40 |
| P9-72 | Instantaneous Non-stop <br> Integral Factor ki for <br> Non-stop upon <br> Instantaneous Power | 0-100 |  | 30 |


|  | Failure |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P9-73 | Non-stop Action Deceleration Time upon Instantaneous Power Failure | 0-300.0s |  | 20.0s |
| Group 10: PID Function |  |  |  |  |
| 10-00 | PID Setting Source | 0 : Function code 10-01 setting <br> 1: AI1 <br> 2: AI2 <br> 3: AI3 <br> 4: PULSE setting (DI5) <br> 5: Communication setting <br> 6: Preset commands setting | 1 | 0 |
| 10-01 | PID Value Setting | 0.0\%-100.0\% | 0.1\% | 50.0\% |
| 10-02 | PID Feedback Source | 0: AII <br> 1: AI2 <br> 2: AI3 <br> 3: AI1-AI2 <br> 4: PULSE setting (DI5) <br> 5: Communication setting <br> 6: AI1+AI2 <br> 7: MAX (\|AI1|, |AI2|) <br> 8: MIN (\|AI1|, |AI2|) | 1 | 0 |
| 10-03 | PID Action Direction | 0: Positive <br> 1: Negative |  | 0 |
| 10-04 | PID Setting Feedback <br> Range | 0-65535 | 1 | 1000 |
| 10-05 | Proportional Gain P1 | 0.0-100.0 | 0.1 | 20.0 |
| 10-06 | Integral Time I1 | 0.01s-10.00s | 0.01 s | 2.00s |
| 10-07 | Differential Time D1 | 0.000s-10.000s | 0.001s | 0.000s |
| 10-08 | PID Reverse End Frequency | 0.00-maximum frequency | 0.01 Hz | 2.00 Hz |
| 10-09 | PID Offset Limit | 0.0\%-100.0\% | 0.1\% | 0.0\% |
| 10-10 | PID Differential Limit | 0.0\%-100.0\% | 0.01\% | 0.10\% |
| 10-11 | PID Setting Change Time | 0.00-650.00s | 0.01s | 0.00s |
| 10-12 | PID Feedback Filter Time | 0.00-60.00s | 0.01s | 0.00s |
| 10-13 | PID Output Filter Time | 0.00-60.00s | 0.01s | 0.00s |
| 10-15 | Proportional Gain P2 | 0.0-100.0 | 0.1 | 20.0 |
| 10-16 | Integral Time I2 | 0.01s-10.00s | 0.01 s | 2.00s |
| 10-17 | Differential Time D2 | 0.000s-10.000s | 0.001 s | 0.000s |
| 10-18 | PID Parameter Switching Condition | 0 : No switching <br> 1: DI terminal <br> 2: Automatic switching by offset <br> 3: Automatic switching by running |  | 0 |


|  |  | frequency |  |  |
| :---: | :---: | :---: | :---: | :---: |
| 10-19 | PID Parameter Switching Offset 1 | 0.0\%-10-20 | 0.1\% | 20.0\% |
| 10-20 | PID Parameter Switching Offset 2 | 10-19-100.0\% | 0.1\% | 80.0\% |
| 10-21 | PID Initial Value | 0.0\%-100.0\% | 0.1\% | 0.0\% |
| 10-22 | PID Initial Value Holding Time | 0.00-650.00s | 0.01 s | 0.00s |
| 10-23 | Forward Maximum Value of Twice Output Offset | 0.00\%-100.00\% | 0.01\% | 1.00\% |
| 10-24 | Reverse Maximum Value of Twice Output | 0.00\%-100.00\% | 0.01\% | 1.00\% |
| 10-25 | PID Integral Property | Ones place: Integral separation <br> 0 -disabled; 1-enabled <br> Tens place: Whether to stop integral when output reaches to limit 0 -continue the integral; 1-stop integral | 11 | 00 |
| 10-26 | PID Feedback Loss <br> Detection Time | 0.0s-20.0s | 0.1s | 1.0s |
| 10-27 | PID Feedback Loss Detection Value PID | $0.0 \%$ : No judgement of feedback loss $0.1 \%-100.0 \%$ | 0.1 | 20.0\% |
| 10-28 | Arithmetic at Stop | 0: Disabled <br> 1: Enabled | 1\% | 0 |
| 11 Group: Wobbulation, Fixed Length and Count |  |  |  |  |
| 11-00 | Wobbulation Setting Mode | 0 : With respective to center frequency <br> With respective to the maximum frequency | 1 | 0 |
| 11-01 | Wobbulation Amplitude | 0.0\%-100.0\% | 0.1\% | 0.0\% |
| 11-02 | Hopping Frequency <br> Amplitude  | 0.0\%-50.0\% | 0.1\% | 0.0\% |
| 11-03 | Wobbulation Cycle | 0.1s-3000.0s | 0.1s | 10.0s |
| 11-04 | Wobbulation Triangular Wave Rise Time | 0.1\%-100.0\% | 0.1\% | 50.0\% |
| 11-05 | Set Length | 0m-65535m | 0m | 1000m |
| 11-06 | Actual Length | 0m-65535m | 0m | 0m |
| 11-07 | Pulse Count Per Meter | 0.1-6553.5 | 0.1 | 100.0 |
| 11-08 | Set Count Value | 1-65535 | 1 | 1000 |
| 11-09 | Designated Count Value | 1-65535 | 1 | 1000 |
| 12 Group: Preset Command and Simple PLC |  |  |  |  |
| 12-00 | Preset Command 0 | $-100.0 \%-100.0 \%$ <br> ( $100.0 \%$ corresponds to the maximum frequency P0-10) | 0.1\% | 0.0\% |
| 12-01 | Preset Command 1 | -100.0\%-100.0\% | 0.1\% | 0.0\% |


| 12-02 | Preset Command 2 | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| :---: | :---: | :---: | :---: | :---: |
| 12-03 | Preset Command 3 | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| 12-04 | Preset Command 4 | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| 12-05 | Preset Command 5 | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| 12-06 | Preset Command 6 | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| 12-07 | Preset Command 7 | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| 12-08 | Preset Command 8 | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| 12-09 | Preset Command 9 | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| 12-10 | Preset Command 10 | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| 12-11 | Preset Command 11 | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| 12-12 | Preset Command 12 | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| 12-13 | Preset Command 13 | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| 12-14 | Preset Command 14 | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| 12-15 | Preset Command 15 | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| 12-16 | Simple PLC Running <br> Mode   | 0 : Stop after single running <br> 1: Holding last value at stop after single running <br> 2: Continuous cycle | 1 | 0 |
| 12-17 | Simple PLC Power <br> Failure Memory Options | Ones place: Power failure memory <br> 0: Disabled <br> 1: Enabled <br> Tens place: Stop memory <br> 0: Disabled <br> 1: Enabled | 11 | 00 |
| 12-18 | Running Time of PLC Preset Command 0 | 0.0s(h)-6553.5s (h) | 0.1s(h) | 0.0s(h) |
| 12-19 | Acceleration/Deceleration Time Options of PLC Preset Command 0 | 0-3 | 1 | 0 |
| 12-20 | Running Time of PLC Preset Command 1 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-21 | Acceleration/Deceleration Time Options of PLC Preset Command 1 | 0-3 | 1 | 0 |
| 12-22 | Running Time of PLC Preset Command 2 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-23 | Acceleration/Deceleration Time Options of PLC Preset Command 2 | 0-3 | 1 | 0 |
| 12-24 | Running Time of PLC Preset Command 3 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-25 | Acceleration/Deceleration Time Options of PLC | 0-3 | 1 | 0 |


|  | Preset Command 3 |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| $12-26$ | Running Time of PLC <br> Preset Command 4 | $0.0 \mathrm{~s}(\mathrm{~h})-6553.5 \mathrm{~s}(\mathrm{~h})$ | $0.1 \mathrm{~s}(\mathrm{~h})$ | $0.0 \mathrm{~s}(\mathrm{~h})$ |
| $12-27$ | Acceleration/Deceleration <br> Time Options of PLC <br> Preset Command 4 | $0-3$ | 1 | 0 |
| $12-28$ | Running Time of PLC <br> Preset Command 5 | $0.0 \mathrm{~s}(\mathrm{~h})-6553.5 \mathrm{~s}(\mathrm{~h})$ | $0.1 \mathrm{~s}(\mathrm{~h})$ | $0.0 \mathrm{~s}(\mathrm{~h})$ |
| $12-29$ | Acceleration/Deceleration <br> Time Options of PLC <br> Preset Command 5 | $0-3$ | 1 | 0 |
| $12-30$ | Running Time of PLC <br> Preset Command 6 | $0.0 \mathrm{~s}(\mathrm{~h})-6553.5 \mathrm{~s}(\mathrm{~h})$ | $0.1 \mathrm{~s}(\mathrm{~h})$ | $0.0 \mathrm{~s}(\mathrm{~h})$ |
| $12-31$ | Acceleration/Deceleration <br> Time Options of PLC <br> Preset Command 6 | $0-3$ | 1 | 0 |
| $12-42-43$ | Acceleration/Deceleration | $0-3$ | $0.1 \mathrm{~s}(\mathrm{~h})$ | $0.0 \mathrm{~s}(\mathrm{~h})$ |
|  | Running Time of PLC <br> Preset Command 7 <br> Preset Command 11 | $0.0 \mathrm{~s}(\mathrm{~h})-6553.5 \mathrm{~s}(\mathrm{~h})$ |  |  |
| Time Options of PLC |  |  |  |  |
| Preset Command 11 |  |  |  |  |


|  | Time Options of PLC Preset Command 12 |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| 12-44 | Running Time of PLC Preset Command 13 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-45 | Acceleration/Deceleration Time Options of PLC Preset Command 13 | 0-3 | 1 | 0 |
| 12-46 | Running Time of PLC Preset Command 14 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-47 | Acceleration/Deceleration Time Options of PLC Preset Command 14 | 0-3 | 1 | 0 |
| 12-48 | Running Time of PLC Preset Command 15 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-49 | Acceleration/Deceleration <br> Time Options of PLC <br> Preset Command 15 | 0-3 | 1 | 0 |
| 12-50 | Unit of PLC Running Time | $\begin{aligned} & \text { 0:s (second) } \\ & \text { 1: h (hour) } \end{aligned}$ | 1 | 0 |
| 12-51 | Preset Command 0 <br> Setting Mode | ```0 : Function code 12-00 setting 1: AI1 2: AI2 3: AI3 4: PULSE 5: PID 6: Preset frequency (P0-08) setting, modified by UP/DOWN``` | 1 | 0 |
| 13 Group: Communication Parameter |  |  |  |  |
| 13-00 | $\begin{aligned} & \text { Communication Baud } \\ & \text { Rate } \end{aligned}$ | Ones place: MODBUS <br> 0: 300BPS <br> 1: 600BPS <br> 2: 1200BPS <br> 3: 2400BPS <br> 4: 4800BPS <br> 5: 9600BPS <br> 6: 19200BPS <br> 7: 38400BPS <br> 8: 57600BPS <br> 9: 115200BPS <br> Tens place: Profibus-DP <br> 0: 115200BPs <br> 1: 208300BPs <br> 2: 256000BPs <br> 3: 512000 BPs | 1 | 50005 |

$\qquad$

|  |  | Hundreds place: Not used <br> Thousands place: CANLink baud rate <br> 0: 20 <br> 1: 50 <br> 2: 100 <br> 3: 125 <br> 4: 250 <br> 5: 500 <br> 6: 1M |  |  |
| :---: | :---: | :---: | :---: | :---: |
| 13-01 | Data Format | 0 : No parity (8-N-2) <br> 1: Even parity (8-E-1) <br> 2: Odd parity $(8-0-1)$ <br> 3: Disabled (8-N-1)(MODBUS valid) | 1 | 0 |
| 13-02 | Local Inverter Address | 0 : Broadcasting address <br> 1-247 (MODBUS, Profibus-DP, <br> CANLink valid) | 1 | 1 |
| 13-03 | MODBUS Response <br> Delay | $0-20 \mathrm{~ms}$ <br> (MODBUS valid) |  | 20 ms |
| 13-04 | Communication Overtime | 0.0: Disabled <br> 0.1-60.0s <br> (MODBUS, Profibus-DP and CANLink valid) |  | 0.0 |
| 13-05 | (MODBUS, Profibus-DP <br> Communication s Data <br> Format | Ones place: MODBUS <br> 0: Non-standard MODBUS protocol <br> 1: Standard MODBUS protocol <br> Tens place: Profibus-DP <br> 0: PP01 <br> 1: PP02 <br> 2: PP03 <br> 3: PP05 |  | 30 |
| 13-06 | $\begin{aligned} & \text { Communication Read } \\ & \text { Current Resolution } \end{aligned}$ | $\begin{aligned} & 0: 0.01 \mathrm{~A} \\ & 1: 0.1 \mathrm{~A} \end{aligned}$ |  | 0 |
| 13-08 | Expansion Card <br> (PROFIBUS CANOPEN) <br> Disconnection Detection Time | $\begin{aligned} & \hline 0.0 \text { disabled } \\ & 0.1 \mathrm{~s}-60.0 \end{aligned}$ |  | 0 |
| 16 Group: User Password |  |  |  |  |
| 16-00 | User Password | 0-65535 | 1 | 0 |
| 16-01 | Parameter Initialization | 0: No operation <br> 01: Reset the default, excluding motor parameter <br> 02: Clear record information | 1 | 0 |
| b0 Group: Torque Control Parameter |  |  |  |  |
| b0-00 | Speed/Torque Control | 0: Speed control | 1 | 0 |


|  | Mode Options | 1: Torque control |  |  |
| :---: | :---: | :---: | :---: | :---: |
| b0-01 | Torque Setting Source <br> Options under Torque <br> Control Mode | 0 : Numeric setting 1(b0-03) <br> 1: AI1 <br> 2: AI2 <br> 3: AI3 <br> 4: PULSE <br> 5: Communication setting <br> 6: MIN (AI1, AI2) <br> 7: MAX (AI1, AI2) <br> (full range of options 1 to 7 correspond <br> to the numeric setting of b0-03) | 1 | 0 |
| b0-03 | Torque Numeric Setting under Torque Control Mode | -200.0\%-200.0\% | 0.1\% | 150.0\% |
| b0-05 | Torque Control Forward Maximum Frequency | 0.00 Hz -maximum frequency | 0.01 Hz | 50.00 Hz |
| b0-06 | Torque Control Reverse Maximum Frequency | 0.00 Hz -maximum frequency | 0.01 Hz | 50.00 Hz |
| b0-07 | Torque Control <br> Acceleration Time | 0.00s-65000s | 0.01s | 0.00s |
| b0-08 | Torque Control Deceleration Time | 0.00s-65000s | 0.01 s | 0.00s |
| B2 Group: Control of Motor 2 |  |  |  |  |
| b2-00 | Motor Type Options | 0: Common induction motor <br> 1: Inverter induction motor |  | 0 |
| b2-01 | Motor Rated Power | $0.1 \mathrm{~kW}-1000.0 \mathrm{~kW}$ |  | Up to specific model |
| b2-02 | Motor Rated Voltage | 1V-2000V |  | Up to specific model |
| b2-03 | Motor Rated Current | $\begin{aligned} & 0.01 \mathrm{~A}-655.35 \mathrm{~A} \text { (inverter power } \leq 55 \mathrm{~kW} \text { ) } \\ & 0.1 \mathrm{~A}-655.35 \mathrm{~A} \text { (inverter power }>55 \mathrm{~kW} \text { ) } \end{aligned}$ |  | Up to specific model |
| b2-04 | Motor Rated Frequency | $0.01 \mathrm{~Hz}-$ maximum frequency |  | Up to specific model |
| b2-05 | Motor Rpated Speedation | 1rpm-65535rpm |  | Up to specific model |
| b2-06 | Stator Resistance of Induction Motor | $0.001 \Omega-65.535 \Omega$ power $\leq 55 \mathrm{~kW}$ ) |  | Up to specific model |
| b2-07 | Rotor Resistance of Induction Motor | $0.001 \Omega-65.535 \Omega$   <br> power $\leq 55 \mathrm{~kW}$ )   <br> $0.0001 \Omega-6.5535 \Omega$ (inverter  <br> 55 kW )   |  | Up to specific model |
| b2-08 | Leakage Inductance of Induction Motor | $0.01 \mathrm{mH}-655.35 \mathrm{mH}$ (inverter <br> power $\leq 55 \mathrm{~kW}$ ) <br> $0.001 \mathrm{mH}-65.535 \mathrm{mH}$ (inverter power> |  | Up to specific model |


|  |  | 55kW) |  |
| :---: | :---: | :---: | :---: |
| b2-09 | Mutual Inductance of Induction Motor | ```0.1mH-6553.5mH(inverter power<55kW) 0.01mH-655.35mH (inverter power> 55kW)``` | Up to specific model |
| b2-10 | Idling Current of Induction Motor | $0.01 \mathrm{~A}-\mathrm{A} 2-03$ (inverter power $\leq 55 \mathrm{~kW}$ ) <br> $0.1 \mathrm{~A}-\mathrm{A} 2-03$ (inverter power $>55 \mathrm{~kW}$ ) | Up to specific model |
| b2-27 | Encoder Line Number | 1-65535 | 1024 |
| b2-28 | Encoder Type | 0 : ABZ Incremental encoder <br> 2: Rotary transformer | 0 |
| b2-29 | $\begin{aligned} & \text { Speed } \\ & \text { Opeedback } \end{aligned} \quad \text { PG }$ | 0: Local PG <br> 1: Expansion PG <br> 2: Pulse input (DI5) | 0 |
| b2-30 | ABZ Incremental Encoder AB Phase Sequence | 0 : Forward <br> 1: Reverse | 0 |
| b2-31 | Installation Angle of Encoder | 0.0-359.9 ${ }^{\circ}$ | $0.0^{\circ}$ |
| b2-34 | Rotary Transformer <br> Pole-Pairs | 1-65535 | 1 |
| b2-36 | Speed Feedback PG Disconnection Detection Time | $\begin{aligned} & \text { 0.0: No action } \\ & 0.1 \mathrm{~s}-10.0 \mathrm{~s} \end{aligned}$ | 0.0 |
| b2-37 | Tuning Options | 0: No tuning <br> 1: Tuning of stationary parameters of induction motor <br> 2: Dynamic full tuning of induction motor <br> 3: Stationary full tuning of induction motor | 0 |
| b2-38 | Speed Loop Proportional Gain 1 | 1-100 | 30 |
| b2-39 | Speed Loop Integral Time 1 | 0.01s-10.00s | 0.50 s |
| b2-40 | Switching Frequency 1 | 0.00-b2-43 | 5.00 Hz |
| b2-41 | Speed Loop Proportional Gain 2 | 1-100 | 20 |
| b2-42 | Speed Loop Integral Time 2 | 0.01s-10.00s | 1.00 s |
| b2-43 | Switching Frequency 2 | b2-40- maximum frequency | 10.00 Hz |
| b2-44 | Vector Control Slip Gain | 50\%-200\% | 100\% |
| b2-45 | SVC Torque Filter Constant | 0.000s-0.100s | 0.000s |
| b2-47 | Upper Limit Source of Speed Control Torque | $\begin{aligned} & \text { 0: b2-48 } \\ & \text { 1: AI1 } \end{aligned}$ | 0 |


|  |  | 2: AI2 <br> 3: AI3 <br> 4: PULSE |  |  |
| :--- | :--- | :--- | :--- | :--- |
|  |  | 5: Communication setting <br> 6: MIN (AI1, AI2) |  |  |
|  |  | 7: MAX (AI1, AI2) <br> (full range of options 1 to 7 correspond <br> to the numeric setting of b2-48) |  |  |
|  |  | Numeric Setting of <br> Torque Upper Limit under <br> Speed Control Mode | 0.0\%-200.0\% |  |


|  |  | 1: Feedback vector control (FVC) <br> 2: V/F control |  |
| :---: | :---: | :---: | :---: |
| b2-63 | Acceleration/Deceleration Time Options of Motor 2 | 0 : Same with motor 1 <br> 2: Acceleration/deceleration time 2 <br> 3: Acceleration/deceleration time 3 <br> 4: Acceleration/deceleration time 4 | 0 |
| b2-64 | Torque Boost of Motor 2 | $0.0 \%$ : Automatic torque boost $0.1 \%-30.0 \%$ | Up to specific model |
| b2-66 | Oscillation Suppression Gain of Motor 2 | 0-100 | 40 |
| b5 Group: Optimized Parameter for Control |  |  |  |
| b5-00 | DPWM Switching Upper Limit Frequency | 5.00 Hz -maximum frequency | 8.00 Hz |
| b5-01 | PWM Modulation Mode | 0: Asynchronous modulation <br> 1: Synchronous modulation | 0 |
| b5-02 | Deadband Compensation Mode Options | 0: No compensation <br> 1: Compensation mode 1 | 1 |
| b5-03 | Random PWM Depth | 0: Random PWM disabled <br> 1-10: PWM carrier frequency random depth | 0 |
| b5-04 | Enable Rapid Current Limit | 0: Disabled <br> 1: Enabled | 1 |
| b5-05 | Maximum Output Voltage Factor | 100-110\% | 105\% |
| b5-06 | Undervoltage Point Setting | $210-420 \mathrm{~V}$ | 350 V |
| b5-08 | Deadband Time Adjustment | 100\%-200\% | 150\% |
| b5-09 | Overvoltage Point Setting | $200.0 \mathrm{~V}-2500.0 \mathrm{~V}$ | Up to specific model |
| b8 Group: Point-to-Point Communication |  |  |  |
| b8-00 | Point-to-Point <br> Communication Function Options | 0: Disabled <br> 1: Enabled | 0 |
| b8-01 | Master-Slave Options | 0: Master <br> 1: Slave | 0 |
| b8-02 | Slave $\quad$ Command  <br> Following $\quad$ Master-Slave  <br> Information Interaction | Ones place: Slave command following <br> 0: Slave doesn't follow the master running command <br> 1: Slave follows the master running command <br> Tens place: Slave fault information transmission <br> 0 : No transmission of slave fault | 011 |


|  |  | information <br> 1: Transmission of slave fault information <br> Hundreds place: Master displays slave offline <br> 0 : Master doesn't report fault at slave offline <br> 1: Master reports fault at slave offline |  |
| :---: | :---: | :---: | :---: |
| b8-03 | Slave Receiving Data Action Options | 0 : Torque setting <br> 1: Frequency setting | 0 |
| b8-04 | Received Data Zero Offset (Torque) | -100.00\%-100.00\% | 0.00\% |
| b8-05 | Received Data Gain <br> (Torque) | -10.00\%-100.00\% | 1.00 |
| b8-06 | Point-to-Point <br> Communication <br> Disconnection Detection <br> Time | 0.0-10.0s | 1.0s |
| b8-07 | Point-to-Point <br> Communication Master <br> Data Sending Period | 0.001-10.000s | 0.001 s |
| b8-08 | Received Data Zero Offset (Frequency) | -100.00\%-100.00\% | 0.00\% |
| b8-09 | Received Data Gain (Frequency) | -10.00-100.00 | 1.0\% |
| b8-10 | Anti-slip Factor | 0.00\%-100.00\% | 10.00\% |


| U Group: Summary Table of Monitoring Parameters |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :---: | :---: |
| Function Code | Name |  | Minimum Unit |  | Communication Address |
| D0asic Monitoring Parameters |  |  |  |  |  |
| D0-00 | Running Frequency (Hz) | 0.01 Hz | 7000 H |  |  |
| D0-01 | Setting Frequency (Hz) | 0.01 Hz | 7001 H |  |  |
| D0-02 | Bus Voltage (V) | 0.1 V | 7002 H |  |  |
| D0-03 | Output Voltage (V) | 1 V | 7003 H |  |  |
| D0-04 | Output Current (A) | 0.01 A | 7004 H |  |  |
| D0-05 | Output Power (kW) | 0.1 kW | 7005 H |  |  |
| D0-06 | Output Torque (\%) | $0.1 \%$ | 7006 H |  |  |
| D0-07 | DI Input Status | 1 | 7007 H |  |  |
| D0-08 | DO Output Status | 1 | 7008 H |  |  |
| D0-09 | AI1 Voltage (V) | 0.01 V | 7009 H |  |  |
| D0-10 | AI2 Voltage (V)/Current (mA) | $0.01 \mathrm{~V} / 0.01 \mathrm{~mA}$ | 700 AH |  |  |
| D0-11 | AI3 Voltage (V) | 0.01 V | 700 BH |  |  |


| D0-12 | Count Value | 1 | 700CH |
| :---: | :---: | :---: | :---: |
| D0-13 | Length | 1 | 700DH |
| D0-14 | Load Speed Display | 1 | 700EH |
| D0-15 | PID Setting | 1 | 700FH |
| D0-16 | PID Feedback | 1 | 7010H |
| D0-17 | PLC Stage | 1 | 7011H |
| D0-18 | PULSE Input Pulse Frequency $(\mathrm{Hz})$ | 0.01 kHz | 7012H |
| D0-19 | Feedback Speed (Hz) | 0.01 Hz | 7013H |
| D0-20 | Remaining Running Time | 0.1 Min | 7014H |
| D0-21 | AI1 Voltage Before Calibration | 0.001 V | 7015H |
| D0-22 | AI2 Voltage/Current (mA) <br> Before Calibration | $0.001 \mathrm{~V} / 0.01 \mathrm{~mA}$ | 7016H |
| D0-23 | AI3 Voltage Before Calibration | 0.001 V | 7017H |
| D0-24 | Linear Speed | $1 \mathrm{~m} / \mathrm{Min}$ | 7018H |
| D0-25 | Current Power-on Time | 1Min | 7019H |
| D0-26 | Current Running Time | 0.1 Min | 701 AH |
| D0-27 | PULSE Input Pulse Frequency | 1 Hz | 701BH |
| D0-28 | Communication Setting | 0.01\% | 701 CH |
| D0-29 | Encoder Feedback Speed | 0.01 Hz | 701DH |
| D0-30 | Main Frequency X Display | 0.01 Hz | 701EH |
| D0-31 | Auxiliary Frequency Y Display | 0.01 Hz | 701FH |
| D0-32 | View Any Memory Address | 1 | 7020H |
| D0-34 | Motor Temperature | $1^{\circ} \mathrm{C}$ | 7022H |
| D0-35 | Target Torque (\%) | 0.1\% | 7023H |
| D0-36 | Rotary Transformer Position | 1 | 7024H |
| D0-37 | Power Factor Angle | $0.1^{\circ}$ | 7025H |
| D0-38 | ABZ Position | 1 | 7026H |
| D0-39 | VF Separation Target Voltage | 1 V | 7027H |
| D0-40 | VF Separation Output Voltage | 1V | 7028H |
| D0-41 | DI Input Status Visual Display | 1 | 7029H |
| D0-42 | DO Input Status Visual Display | 1 | 702AH |
| D0-43 | DI Function Status Visual Display 1(Function 01-Function 40) | 1 | 702BH |
| D0-44 | DI Function Status Visual Display 2(Function 41-Function 80) | 1 | 702CH |
| D0-45 | Fault Information | 1 | 702DH |
| D0-58 | Z Signal Counter | 1 | 703AH |
| D0-59 | Setting Frequency (\%) | 0.01\% | 703BH |
| D0-60 | Running Frequency (\%) | 0.01\% | 703CH |
| D0-61 | Inverter Status | 1 | 703DH |


| D0-62 | Current Fault Code | 1 | 703EH |
| :---: | :---: | :---: | :---: |
| D0-63 | Sending Data for Point-to-Point Master Communication | 0.01\% | 703FH |
| D0-64 | Number of Slave | 0.01\% | 7040H |
| D0-65 | Torque Upper Limit | 0.1\% | 7041H |
| D0-66 | Model of Communication Expansion Card | 100: CANopen <br> 200: Profibus-DP <br> 300: CANLink | 7042H |
| D0-67 | $\begin{aligned} & \text { Communication } \quad \text { Expansion } \\ & \text { Card Version } \end{aligned}$ | Display range | - |
| D0-68 | Dp Card Inverter Status | bit0-running status <br> bit1-running direction <br> bit2-inveter fault or not <br> bit3-target frequency <br> reach <br> bit4- bit7- Not used <br> bit8-bit15- fault code | 7043H |
| D0-69 | DP Card Transmission Speed / $0.01 \mathrm{~Hz}$ | $0.00-\quad$ maximum frequency | 7044H |
| D0-70 | Rotation Speed for DP Card Transmission/RMP | 0 -motor rated rotation speed | 7045H |
| D0-71 | Special Current Display for Communication Card | Display range | - |
| D0-72 | Communication Card Error Status | Display range | - |
| D0-73 | Motor Serial Number | $\begin{aligned} & 0: \text { Motor } 1 \\ & 1: \text { Motor } 2 \end{aligned}$ | 7046H |
| D0-74 | Motor Actual Output Torque | -100-100\% | 7047H |

## Chapter 6 Description of Function Parameters

| P0 Group : Basic Function |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :---: |
| Function Code | Name | Setting Range | Minimum Unit | Default |  |
| P0-00 | Model Display | 1: Constant torque load | 1 | 1 |  |
| P0-01 Mode | Control <br> Options <br> Oprless vector control (SVC) <br> 1: Feedback Vector control (FVC) <br> 2: V/F control | 1 | 0 |  |  |

0: Sensorless vector control (SVC
One inverter could only drive one motor. Inverters under the sensorless vector control are
usually applied to high-performance control occasions and can calculate the motor rotation speed and complete compensation slip through motor model and thus realize large torque at low frequency and high dynamic response. It can realize direct control on output torque, such as machine tool, wire-drawing machine, unwinding and rewinding and others.
1: Feedback vector control
It refers to closed-loop vector control. In addition to installing an encoder for motor, EM600 inverter under FVC control mode must select a PG card matched with the encoder. It is suitable for high-accuracy speed control or torque control. An inverter can drive one motor only, for example high-speed paper making machine, hoisting machine, elevator and other loads.

## 2: V/F control

The inverter can be applied to occasions without higher requirements on dynamic response, such as the belt machine, textile machinery and translation equipment with rapid start/stop. It can serve constant torque or variable torque load. Single inverter is able to serve multiple motors, high-speed motor and other special motors.

| P0-02 | Start/Stop <br> Options | Command | 0: Operation panel command channel (LED off) <br> 1: Terminal command channel (LED on) <br> 2: Serial port communication command channel <br> (LED flashing) | 1 | 0 |
| :--- | :--- | :--- | :--- | :--- | :--- |

Select the running command source of the inverter:
Inverter running commands include: Start, stop, forward, reverse, JOG and fault reset commands.
0 : Keypad command channel:
Start, stop, fault reset and other commands of the inverter can be realized through RUN, STOP/RESET key on the keypad.
1: Terminal command channel:
Multi-function input terminals control the forward, reverse, forward JOG, reverse JOG and other commands.
2: Communication command channel:
Running commands are set through the PC by means of communication.

| P0-03 | Main Frequency <br> Command Source A | 0: Numeric setting (Presetting frequency P0-08, modified through UP/DOWN, power failure memory disabled) <br> 1: Numeric setting(Presetting frequency P0-08, modified through UP/DOWN, power failure memory) <br> 2: AI1 <br> 3: AI2 <br> 4: AI3 <br> 5: PULSE setting (DI5) <br> 6: Preset command | 1 | 10 |
| :---: | :---: | :---: | :---: | :---: |


|  |  | 7:Simple PLC <br> 8: PID <br> 9: Communication setting 10: <br> Potentiometer |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P0-04 | Auxiliary Frequency Command Source B | Same with P0-03 (main frequency command source A) | 1 | 0 |

Respectively select the source of A and B group of frequency command:
0 : Set by function code P0-08:
User can directly set the target frequency by setting function code P0-08. Fine adjustment of frequency command can be realized through $U P / D O W N$ action. Power failure memory is disabled. 1: Set by function code P0-08:

User can directly set the target frequency by setting function code P0-08. Fine adjustment of frequency command can be realized through $U P / D O W N$ action. Power failure memory is disabled. 2: AI1 setting, 3: AI2 setting 4: AI3 setting:

Setting the frequency command through analogy. AI1 and AI3 support voltage input; AI2 supports voltage or current input; the relation between AI2 input voltage (current) and setting frequency can be set flexibly. Refer to function code P4-13-P4-22.

## 5: PULSE-IN Pulse setting:

Set the target frequency through DI5 terminal input pulse frequency. Support $0.00 \mathrm{kHz}-100.00 \mathrm{kHz}$ pulse input. Refer to function codes P4-28-P4-31 for details.
6: Preset speed command:
Through four numeric DI inputs (P4-00-P4-04), any one of 16 frequency commands can be selected as the target frequency. Refer to function code group 12.

## 7: Simple PLC setting:

Through simple PLC, the target frequency can be switched between 1 to 16 any frequency. Respective running time and acceleration/deceleration time of 1 to 16 frequency commands can be set separately. Refer to function code group 12.
8: PID control setting:
Select the process PID control as frequency source. It is generally applied to process closed-loop control, such as closed-loop of pressure and temperature. Refer to function code group 10.

9: Communication setting:
Frequency command is directly set by PC through communication setting. Refer to function code group 13 for details.
10: Keypad potentiometer setting:
User can change the setting frequency through the potentiometer knob on the rotary panel, thus realizing the adjustment from 0.00 Hz to the maximum output frequency P0-10.


| P0-05 | Superposing Auxiliary <br> Frequency Command <br> Source B Range Options | 0 : With respect to maximum frequency <br> 1: With respect to main frequency command source A | 1 | 0 |
| :---: | :---: | :---: | :---: | :---: |
| P0-06 | $\begin{array}{lr}\text { Superposing } & \text { Auxiliary } \\ \text { Frequency } & \text { Command }\end{array}$ <br> Source B Range | 0\%-150\% | 1\% | 100\% |
| P0-07 | Frequency Source <br> Superposing Options | Ones place: Frequency source options <br> 0 : Main frequency source $A$ <br> 1: Main and auxiliary arithmetic results (arithmetic relation is determined by tens place) <br> 2: Switching between main frequency source A and auxiliary frequency source B <br> 3: Switching between main frequency source $A$ and main \& auxiliary arithmetic results <br> 4: Switching between auxiliary frequency source $B$ and main \& auxiliary arithmetic results <br> Tens place: main \& auxiliary arithmetic relation of frequency source <br> 0 : Main frequency source $A+$ auxiliary frequency source $B$ <br> 1: Main frequency source A - auxiliary frequency source $B$ <br> 2: The bigger of main frequency source A and auxiliary frequency source $B$ <br> 3: The smaller of main frequency source A and auxiliary frequency source B | 11 | 00 |
| P0-08 | Main Frequency Setting of Digital Manipulator | 0.00 Hz - maximum frequency P0-10 | 0.01 Hz | 50.00 Hz |
| P0-09 | Running Direction | 0: Same <br> 1: Reverse | 1 | 0 |
| P0-10 | Maximum Frequency | $50.00 \mathrm{~Hz}-500.0 \mathrm{~Hz}$ | 0.01 Hz | 50.00 Hz |

The maximum frequency is taken as a reference for relative quantity of all frequency, such as pulse input, analog terminal and preset speed. Their percentages respectively correspond to the maximum output frequency. For example, the analog input 10 V is converted into $100 \%$ and correspond to $(\mathbf{1 0 0 \%} \times \mathbf{P 0} \mathbf{- 1 0}) \mathrm{Hz}$.
When $\mathrm{P} 0-22$ is selected as 2 , the frequency resolution is 0.01 Hz . At this time, the setting range of $\mathrm{P} 0-10$ is $50.00 \mathrm{~Hz}-500.00 \mathrm{~Hz}$;

Notes: The output frequency of all operations won't exceed the maximum output frequency.

| P0-11 | Upper Limit Frequency Source Options | 0 : P0-12 setting <br> 1: AI1 <br> 2: AI2 <br> 3: AI3 <br> 4: PULSE setting <br> 5: Communication setting | 1 | 0 |
| :---: | :---: | :---: | :---: | :---: |
| P0-12 | Upper Limit Frequency | Lower limit frequency P0-14 maximum frequency $\mathrm{P} 0-10$ | 0.01 Hz | 50.00 Hz |
| P0-13 | Upper Limit Frequency Offset | 0.00 Hz - maximum frequency P0-10 | 0.01 Hz | 0.00 Hz |
| P0-14 | Lower Limit Frequency | 0.00 Hz - maximum frequency P0-12 | 0.01 Hz | 0.00 Hz |
| P0-15 | Carrier Frequency | $0.5 \mathrm{kHz}-16.0 \mathrm{kHz}$ | 0.01 kHz | Up to specific model |
| P0-16 | Carrier Frequency <br> Adjustment Along with <br> Temperature  | 0: Disabled <br> 1: Enabled | 1 | 1 |
| P0-17 | Acceleration Time 1 | 0.00s-65000s | 0.01s | Up to specific model |
| P0-18 | Deceleration Time 1 | 0.00s-65000s | 0.01s | Up to specific model |

Acceleration/deceleration time refers to the time required for the frequency going from 0.00 Hz to the maximum frequency, which is used to set the slope for frequency change. PD 1000 provides 4 groups of acceleration/deceleration times that are selected through the numeric input terminal(see P4 group of parameters):

| Selected Terminal 2 | Selected Terminal 1 | Selected Acceleration/Deceleration Time Group |
| :--- | :--- | :--- |
| Disabled | Disabled | Acceleration/deceleration time 1 |
| Disabled | Enabled | Acceleration/deceleration time 2 |
| Enabled | Disabled | Acceleration/deceleration time 3 |
| Enabled | Enabled | Acceleration/deceleration time 4 |

If no acceleration/deceleration time option function is enabled, the terminal is invalid. Acceleration/deceleration time corresponds to the first group.


Acceleration/Deceleration Time Schematic Diagram

| P0-19 | Acceleration/Deceleration Time Unit | $\begin{aligned} & 0: 1 \mathrm{~s} \\ & 1: 0.1 \mathrm{~s} \\ & 2: 0.01 \mathrm{~s} \end{aligned}$ | 1 | 1 |
| :---: | :---: | :---: | :---: | :---: |
| P0-20 | Not Used | - | - | - |
| P0-21 | Auxiliary Frequency Source Offset Frequency at Superposition | 0.00 Hz - maximum frequency P0-10 | 0.01 Hz | 0.00 Hz |
| P0-22 | Decimal Point of Frequency Command | $2: 0.01 \mathrm{~Hz}$ <br> When changing the decimal points, pay attention to changing the maximum frequency, upper limit frequency and others. | 1 | 2 |
| P0-23 | Stop Memory Options of Numeric Setting Frequency | 0: Disabled 1: Enabled | 1 | 0 |
| P0-24 | Motor Options | $\begin{aligned} & 0: \text { Motor } 1 \\ & 1: \text { Motor } 2 \end{aligned}$ |  |  |
| P0-25 | Reference Frequency of Acceleration/Deceleration Time | $\begin{aligned} & \text { 0: Maximum frequency }(\mathrm{P} 0-10) \\ & \text { 1: Setting frequency } \\ & \text { 2: } 100 \mathrm{H} \end{aligned}$ | 1 | 0 |
| P0-26 | UP/DOWN Reference of Frequency Command during Running | $\begin{aligned} & \text { 0: Running frequency } 1 \text { : Setting } \\ & \text { frequency } \end{aligned}$ |  |  |
| P0-27 | Binding Frequency  <br> Source to Command <br> Source   | Ones place: Binding frequency source options of operation panel command <br> 0: Disabled <br> 1: Numeric setting frequency source | 1 | 000 |


|  |  | 2: AI1 <br> 3: AI2 <br> 4: AI3 <br> 5: PULSE pulse setting (DI5) <br> 6: Preset command <br> 7: Simple PLC <br> 8: PID <br> 9: Communication setting <br> Tens place: Binding frequency source options of terminal commands ( $0-9$, same to ones place) <br> Hundreds place: Binding frequency source options of communication commands ( $0-9$, same to ones place) |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P0-28 | Serial Port <br> Communication Protocol <br> Options  | 0: Modbus <br> 1: Profibus-DP bridge or CANopen protocol | 1 | 0 |

These function codes define the binding combination of three kinds of running command channels and nine kinds of frequency setting channels, making it convenient to realize synchronous switching.

The definition of above frequency setting channel is same to P0-03 "main frequency source A options". Please refer to the description of function code P0-03.

Different running command channels can be bound to same frequency setting channel.
When the command source has been bound to the frequency source and during the active period of such command source, the set frequency source of $\mathrm{P} 0-03$ to $\mathrm{P} 0-07$ don't work.

| P1 Motor Parameter |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P0 Group: Basic Parameter |  |  |  |  |
| P1-00 | Motor Type Options | 0: Common induction motor <br> 1: Inverter induction motor | 1 | 0 |
| P1-01 | Motor Rated Power | $0.1 \mathrm{~kW}-1000.0 \mathrm{~kW}$ | 0.1 kW | Up to specific model |
| P1-02 | Motor Rated Voltage | 0V-2000V | 1 V | Up to specific model |
| P1-03 | Motor Rated Current | $\begin{aligned} & 0.01 \mathrm{~A}-655.35 \mathrm{~A} \text { (inverter power }< \\ & =55 \mathrm{~kW} \text { ) } \\ & 0.1 \mathrm{~A}-6553.5 \mathrm{~A} \text { (inverter power }>55 \mathrm{~kW} \text { ) } \end{aligned}$ | 0.01 A | Up to specific model |
| P1-04 | Motor Rated Frequency | 0.00 Hz -maximum frequency | 0.01 Hz | Up to specific model |
| P1-05 | Motor Rated Rotation Speed | 0rpm-65535rpm | 1 rpm | Up to specific model |

Function codes mentioned above are nameplate parameters of motor. It is required to set the parameters above as per motor nameplate, regardless of the control mode, VF control mode or
vector control mode.
To acquire better VF or vector control performance, it is required to carry out motor parameter tuning and the correctness of tuning result is closely related to correct setting of motor nameplate parameters.

| P1-06 | Stator Resistance of Induction Motor | 0.001-65.535(inverter power $<=55 \mathrm{~kW}$ ) <br> 0.0001-6.5535(inverter power $>$ $=55 \mathrm{~kW}$ ) | 0.001 | Up to specific model |
| :---: | :---: | :---: | :---: | :---: |
| P1-07 | Rotor Resistance of Induction Motor | $\begin{aligned} & 0.001-65.535 \text { (inverter power }<=55 \mathrm{~kW} \text { ) } \\ & 0.0001-6.5535(\text { inverter power }> \\ & =55 \mathrm{~kW} \text { ) } \end{aligned}$ | 0.001 | Up to specific model |
| P1-08 | Leakage Inductance of Induction Motor | $\begin{aligned} & 0.01 \mathrm{mH}-655.35 \mathrm{mH} \text { (inverter power }< \\ & =55 \mathrm{~kW}) \\ & 0.01 \mathrm{mH}-65.535 \mathrm{mH} \text { (inverter power }> \\ & 55 \mathrm{~kW}) \end{aligned}$ | 0.01 mH | Up to specific model |
| P1-09 | Mutual Inductance of Induction Motor | $\begin{aligned} & 0.1 \mathrm{mH}-6553.5 \mathrm{mH} \text { (inverter power }< \\ & =55 \mathrm{~kW}) \\ & 0.01 \mathrm{mH}-655.35 \mathrm{mH} \text { (inverter power }> \\ & 55 \mathrm{~kW} \text { ) } \end{aligned}$ | 0.1 mH | Up to specific model |
| P1-10 | Idling Current of Induction Motor | $\begin{aligned} & 0.01 \mathrm{~A}-\mathrm{P} 1-03 \text { (inverter power }<=55 \mathrm{~kW} \text { ) } \\ & 0.1 \mathrm{~A}-\mathrm{P} 1-03 \text { (inverter power }>55 \mathrm{~kW} \text { ) } \end{aligned}$ | 0.01 | Up to specific model |

P1-06 - P1-10 are parameters of induction motor. However, user could not get these parameters through the motor nameplate generally. Please autotune motor parameters through the inverter. "Stationary tuning of induction motor" can only acquire three parameters P1-06 to P1-08 while "full tuning of induction motor" can get encoder phase sequence, current loop PI and otehr parameters in addition to above five parameters.
After motor rated power (P1-01) or motor rated voltage (P1-02) is modified, the inverter will modify the parameters of P1-06 to P1-10 automatically and restore such five parameters to the command standard Y -series motor parameters.
P1-16 to F1-20 are parameters of synchronous motor. Some synchronous motor nameplates may provide partial parameters but most nameplates won't provide above parameters, which shall be acquired by inverter autotuning. Moreover, idling tuning of synchronous motor must be selected because P1-16, F1-17, F1-18 and F1-20 can be acquired through such tuning while "on-load tuning of synchronous motor" can only get the encoder phase sequence of synchronous motor, installation angle, etc.
When motor rated power (P1-01) or motor rated voltage (P1-02) is modified, the inverter will automatically modify P1-16 to P1-12. Please pay attention.

With regards to above parameters of synchronous motor, users can directly set corresponding function codes according to the data provided by the manufacturer.

| P1-27 | Encoder Line Number | $1-65535$ |  | 1024 |
| :--- | :--- | :--- | :--- | :--- |


| P1-28 | Encoder Type | 0: ABZ Incremental encoder <br> $1:$ Rotary transformer |  |  |
| :--- | :--- | :--- | :--- | :--- |

PD 1000 inverter supports multiple types of encoders. Different encoders should be equipped with different PG cards, so please select a correct PG card. However, induction motor generally selects ABZ incremental encoder and rotary transformer.

After installation of PG card, set P1-28 correctly according to specific conditions, otherwise the inverter may run abnormally.

| P1-30 | ABZ Incremental Encoder <br> Ab Phase Sequence | 0 : Forward <br> $1:$ Reverse | 0 |
| :--- | :--- | :--- | :--- | :--- |

This function code only works for ABZ incremental encoder, that is to say it is only enabled when P1-28=0. It is used to set $A B$ signal phase sequence of $A B Z$ incremental encoder.

| P1-34 | Rotary Transformer <br> Pole-Pairs | 1-65535 | 1 |  |
| :--- | :--- | :--- | :--- | :--- |
| P1-36 | Speed <br> Disconnection <br> Time | Feedback | 0.0s: Disabled <br> 0.1s-10.0s | 0.0 s |
| P1-37 | Autotuning Options | 0: No autotuning <br> 1: Stationary tuning of induction motor <br> 2: Full tuning of induction motor <br> 3: Stationary tuning 2 of induction <br> motor | 0 |  |


| P2 Group: Motor Vector Control Parameters |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| P2-00 | Speed Loop Proportional <br> Gain 1 | $1-100$ | 1 | 30 |
| P2-01 | Speed Loop Integral Time <br> 1 | $0.01 \mathrm{~s}-10.00 \mathrm{~s}$ | 0.01 s | 0.50 s |
| P2-02 | Switching Frequency 1 | $0.00-\mathrm{P} 2-05$ | 0.01 Hz | 5.00 Hz |
| P2-03 | Speed Loop Proportional <br> Gain 2 | $1-100$ | 1 | 20 |
| P2-04 | Speed Loop Integral Time <br> 2 | $0.01 \mathrm{~s}-10.00 \mathrm{~s}$ | 0.01 s | 1.00 s |
| P2-05 | Switching Frequency 2 | P2-02-Maximum frequency | 0.01 Hz | 10.00 Hz |

The above parameters are used to set vector control speed loop PI parameters. Two groups of parameters can be set, which are respectively applied to low-frequency and high-frequency running. Two groups of parameters can be switched smoothly according to switching frequency 1 and switching frequency 2 , as shown below:


Speed Loop Parameter Switching Schematic Diagram

Speed loop proportional gain (P2-00, P2-03):
Please adjust this parameter according to the load inertia of motor. When there is larger load inertia, increase the proportional gain; while for lower load inertia, reduce the proportional gain appropriately. Although larger speed loop proportional gain can quicken the response speed, excessive value may result in oscillation of motor rotation speed and over regulation; on the contrary, insufficient proportional gain may result in slow control response and long time to adjust the speed to a stable value, as shown in the figure below.

Speed loop integral time (P2-01, P2-04):
Like the proportional gain, shorter speed loop integral time may quicken the response speed but may result in oscillation and unsteadiness. When the integral time is excessive, the system has a slow response characteristics and it requires a long time to eliminate the speed Offset. Therefore, it is required to adjust this parameter according to the load condition. See the figure below:


| P2-06 | Filter Time Constant of <br> Speed Loop | $0.000 \mathrm{~s}-0.100 \mathrm{~s}$ | 0.001 | 0.000 s |
| :--- | :--- | :--- | :--- | :--- |
| P2-07 | Vector Control Slip <br> Compensation | $50 \%-200 \%$ | $1 \%$ | $100 \%$ |
| P2-08 | Over-excitation Gain of <br> Vector Control | $0-200$ | 1 | 64 |


| P2-09 | Upper Limit of Speed Control (Drive) Torque | 0: Function code P2-10 setting <br> 1: AI1 <br> 2: AI2 <br> 3: AI3 <br> 4: PULSE setting <br> 5: Communication setting <br> 6: MIN (AI1, AI2) <br> 7: MAX (AI1, AI2) <br> Full ranges of options 1 to 7 correspond to P2-10 | 1 | 0 |
| :---: | :---: | :---: | :---: | :---: |
| P2-10 | Upper Limit Numeric Setting of Speed Control Torque | 0.0\%-200.0\% | 0.1\% | 150.0\% |
| P2-11 | Torque Upper Limit <br> Command Options  <br> (Electricity Generation)  <br> under Speed Control <br> Mode   | 0 : Set by function code P2-12 (no difference between electrically driven and Electricity Generation) <br> 1: AI1 <br> 2: AI2 <br> 3: AI3 <br> 4: PULSE setting <br> 5: Communication setting <br> 6: MIN (AI1, AI2) <br> 7: MAX (AI1, AI2) <br> 8: Function code P2-12 setting <br> Full ranges of options 1 to 7 correspond to P2-10 | 1 | 0 |
| P2-12 | Numeric Setting <br> (Electricity Generation) of Torque Upper Limit under Speed Control Mode | 0.0\%-200\% | 0.1\% | 150.0\% |
| P2-13 | Excitation Adjustment <br> Proportional Gain | 0-60000 | 1 | 2000 |
| P2-14 | $\begin{aligned} & \text { Excitation Adjustment } \\ & \text { Integral Gain } \end{aligned}$ | 0-60000 | 1 | 1300 |
| P2-15 | $\begin{aligned} & \text { Torque Adjustment } \\ & \text { Proportional Gain } \end{aligned}$ | 0-60000 | 1 | 2000 |
| P2-16 | $\begin{array}{lr} \hline \text { Torque } \quad \text { Adjustment } \\ \text { Integral Gain } \end{array}$ | 0-60000 | 1 | 1300 |
| P2-17 | Speed Loop Integral Property | Ones place: Integral separation; 0 : disabled; 1: enabled | 1 | 0 |
| P2-21 | Maximum Torque Factor of Field Weakening Zone | 50-200\% |  | 100\% |
| P2-22 | Electricity Generation <br> Function Limit Enable | 0: Disabled <br> 1: Enabled |  | 0 |


| P2-23 | Electricity Generation <br> Power Upper Limit | $0.0-200.0 \%$ | Up to specific <br> model |
| :--- | :--- | :--- | :--- | :--- |


| P3 Group: V/F Control Parameters |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P3-00 | V/F Curve Setting | 0: Straight V/F curve <br> 1: Multi-point V/F curve <br> 2: Square V/F curve <br> 3: 1.2 $2^{\text {th }} \mathrm{V} / \mathrm{F}$ curve <br> 4: $1.4^{\text {th }} \mathrm{V} / \mathrm{F}$ curve <br> 6: $1.6^{\text {th }} \mathrm{V} / \mathrm{F}$ curve <br> 8: $1.8^{\text {th }} \mathrm{V} / \mathrm{F}$ curve <br> 9: Not used <br> 10: VF Complete split mode <br> 11: VF half-split mode | 1 | 0 |
| P3-01 | Torque Boost | $0.0 \%$ : (automatic torque boost) $0.1 \%-30.0 \%$ | 0.1\% | Up to specific model |

When the inverter runs under V/F control mode, to make up the voltage loss of motor stator resistance, it is required to compensate a certain voltage value manually by setting the function code P3-01, as shown in the figure below. Compensation value $100.0 \%$ is equivalent to the motor rated voltage, which shall not exceed $10.0 \%$. The larger the load is, the larger required boost value is. However, excessive value may result in overcurrent, thus burning the motor.


Torque Boost Schematic Diagram

| P3-02 | Torque Boost End Frequency | 0.00 Hz -maximum frequency | 0.01 | 50 Hz |
| :--- | :--- | :--- | :--- | :--- |

When this parameter is set as 1 , the frequency and voltage of each section are set by above function codes. See the following figure for details.

The first point is 0.00 Hz and the output voltage corresponds to the manual torque boost
(P3-01) voltage. The five point is the rated frequency and output voltage is the rated voltage. Other voltage is formed by 5-point linear interpolation. Multiple-section V/F is applied to occasion that users have special requirements on the output voltage and to solving resonant oscillation appeared on some frequency points.


Multipoint V/F Schematic Diagram

| P3-03 | Multipoint VF frequency point 1 | $0.00 \mathrm{~Hz}-\mathrm{P} 3-05$ | 0.01 Hz | 0.00 Hz |
| :---: | :---: | :---: | :---: | :---: |
| P3-04 | Multipoint VF voltage point 1 | $0.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |
| P3-05 | Multipoint VF frequency point 2 | P3-03-P3-07 | 0.01 Hz | 0.00 Hz |
| P3-06 | Multipoint VF voltage point 2 | $0.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |
| P3-07 | Multipoint VF frequency point 3 | P3-03-motor rated <br> frequency (P1-04) | 0.01 Hz | 0.00 Hz |
| P3-08 | Multipoint VF voltage point 3 | $0.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |
| P3-10 | VF Overexcitation gain | $0-200$ | 1 | 64 |

During deceleration of inverter, overexcitation control can suppress the rise of bus voltage to avoid overvoltage fault. The bigger the overexcitation gain is, the better the inhibitory effect is.

For occasions where overvoltage alarm is easy to produce during inverter deceleration, it is required to improve the overexcitation gain. But excessive overexcitation may result in large output current. Please note this during application.

For occasions with smaller inertia, there would be no voltage rise during deceleration, so it is recommended to set the overexcitation gain as 0 ; this is also applied to occasions with braking resistance.

| P3-11 | Oscillation Suppression Gain | $0-100$ | 1 | Up to specific model |
| :--- | :--- | :--- | :--- | :--- |

Set this value as smaller as possible on the condition that oscillation can be suppressed effectively to avoid causing adverse effects on VF running. Please set this gain as 0 if there is no motor oscillation. It is required to increase this gain appropriately only when there exists obvious motor oscillation. The higher the gain is, the better the oscillation suppression effect will be.

When oscillation suppression function is enabled, it is required to set motor rated current and idling current correctly. Otherwise, VF oscillation suppression effect will be poor.

| P3-13 | VF Separation Voltage | 0 : Numeric setting (P3-14) <br> 1: AI1 <br> 2: AI2 <br> 3: AI3 <br> 4: PULSE setting (DI5) <br> 5: Preset speed command <br> 6: Simple PLC <br> 7: PID <br> 8: Communication setting <br> $100.0 \%$ corresponds to motor rated voltage (P1-02) | 1 | 0 |
| :---: | :---: | :---: | :---: | :---: |
| P3-14 | Numeric Setting of VF Separation Voltage | 0 V - Motor rated voltage |  | 0 |

VF separation mode is generally used for occasions such as induction heating, inversion power supply and torque motor control.

After having selected the VF separation control, the output voltage can be set by either P3-14, or analog quantity, preset command, PLC, PID or communication setting. When they are used for nonnumeric setting, $100 \%$ corresponds to motor rated voltage; when the percentages of the set values of the analog quantity is a negative number, then the absolute value of the set value will be recognized as a valid value effectively.

| P3-15 | Voltage Rise Time of VF Separation | $0.0 \mathrm{~s}-1000.0 \mathrm{~s}$ |  | 0 |
| :--- | :--- | :--- | :--- | :--- |

The voltage rise time of VF separation is the time that the voltage increases from 0 to motor rated voltage, as shown in the figure below:


| P3-16 | Deceleration Time of VF <br> Separation Voltage | $0.0 \mathrm{~s}-1000.0 \mathrm{~s}$ | 0 |
| :--- | :--- | :--- | :--- | :--- |


| P3-17 | Stop Mode Options of VF Separation | 0 : Frequency/voltage reduces to 0 independently <br> 1: Frequency reduces after the voltage reduces to 0 | 0 |
| :---: | :---: | :---: | :---: |
| P3-18 | Overcurrent Stall Action Current | 50-200\% | 150\% |
| P3-19 | Overcurrent Stall Enable | 0: Disabled 1: Enabled | 1 Enabled |
| P3-20 | Overcurrent Stall Suppression Gain | 0-100 | 20 |
| P3-21 | Multiple Overcurrent Stall <br> Action <br> Current <br> Compensation Factor | 50-200\% | 50\% |
| P3-22 | Overvoltage Stall Action Voltage | 650.0V-800.0V | 760.0 V |
| P3-23 | Overvoltage Stall Enable | 0: Disabled 1: Enabled | 1 Enabled |
| P3-24 | Overvoltage Stall <br> Suppression Frequency <br> Gain  | 0-100 | 30 |
| P3-25 | Overvoltage Stall Suppression Voltage Gain | 0-100 | 30 |
| P3-26 | Overvoltage Stall <br> Maximum Rise Frequency <br> Limit | $0-50 \mathrm{~Hz}$ | 5 Hz |
| P3-27 | Slip Compensation Time Constant | 0.1-10.0s | 0.5s |


| P4 Group: Input Terminal |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P4-00 | DI1 Terminal Function Options | 0 : No function <br> 1: Forward running (FWD) |  | 1 |
| P4-01 | DI2 Terminal Function Options | 2: Reverse running (REV) <br> 3: 3 -wire running control |  | 2 |
| P4-02 | DI3 Terminal Function Options | 4: Forward JOG (FJOG) <br> 5: Reverse JOG (RJOG) | 1 | 9 |
| P4-03 | DI4 Terminal Function Options | 6: Terminal UP <br> 7: Terminal DOWN |  | 12 |
| P4-04 | DI5 Terminal Function Options | 8: Coast-to-Stop <br> 9: Fault reset (RESET) |  | 13 |
| P4-05 | DI6 Terminal Function Options | 10: Running pause <br> 11: External fault NO input |  | 14 |
| P4-06 | DI7 Terminal Function Options | 12: Preset command terminal 1 <br> 13: Preset command terminal 2 |  | 0 |
| P4-07 | DI8 Terminal Function Options | 14: Preset command terminal 3 <br> 15: Preset command terminal 4 |  | 0 |


| P4-08 | DI9 Terminal Function Options | 16: Acceleration/deceleration options terminal 1 <br> 17: Acceleration/deceleration options terminal 2 <br> 18: Frequency source switching <br> 19: UP/DOWN setting clear (terminal, keypad) <br> 20: Running command switching terminal 1 <br> 21:Acceleration/deceleration prohibited <br> 22: PID pause <br> 23: PLC status reset <br> 24: Wobbulation pause <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 frequency input (only works for DI5) <br> 31: Not used <br> 32: Immediate DC stop <br> 33: External fault NC input <br> 34: Frequency setting onset terminal (when this terminal function hasn't been set, the default is to be enabled) <br> If this terminal is set, terminal onset frequency can be modified through this terminal. <br> 35: PID direction reverse terminal <br> When this terminal is enabled, PID is opposite to the direction set by 10-03. <br> 36: External stop terminal 1 <br> Keypad control. This terminal can be used to stop the elevator, which is equal to the STOP key on the keypad <br> 37: Control command switch terminal <br> 2: <br> It is used to switch between terminal control and communication control. When this terminal is enabled, if P0-02 is set as terminal control, then it switches to communication control; if $\mathrm{P} 0-02$ is set as communication control, | 0 |
| :---: | :---: | :---: | :---: |



Function Description of Preset Speed Command

| $\mathrm{K}_{4}$ | $\mathrm{~K}_{3}$ | $\mathrm{~K}_{2}$ | $\mathrm{~K}_{1}$ | Command setting | Corresponding <br> parameter |
| :---: | :---: | :---: | :---: | :---: | :---: |
| OFF | OFF | OFF | OFF | Preset speed 0 | $12-00$ |
| OFF | OFF | OFF | ON | Preset speed 1 | $12-01$ |
| OFF | OFF | ON | OFF | Preset speed 2 | $12-02$ |
| OFF | OFF | ON | ON | Preset speed 3 | $12-03$ |


| OFF | ON | OFF | OFF | Preset speed 4 | $12-04$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| OFF | ON | OFF | ON | Preset speed 5 | $12-05$ |
| OFF | ON | ON | OFF | Preset speed 6 | $12-06$ |
| OFF | ON | ON | ON | Preset speed 7 | $12-07$ |
| ON | OFF | OFF | OFF | Preset speed 8 | $12-08$ |
| ON | OFF | OFF | ON | Preset speed 9 | $12-09$ |
| ON | OFF | ON | OFF | Preset speed 10 | $12-10$ |
| ON | OFF | ON | ON | Preset speed 11 | $12-11$ |
| ON | ON | OFF | OFF | Preset speed 12 | $12-12$ |
| ON | ON | OFF | ON | Preset speed 13 | $12-13$ |
| ON | ON | ON | OFF | Preset speed 14 | $12-14$ |
| ON | ON | ON | ON | Preset speed 15 | $12-15$ |

4 preset command terminals can combine 16 statues that respectively correspond to 16 command setting values, as indicated in the table above. Preset speed commands can not only be used for preset speed function but also can be used as PID setting source to meet the requirement to switch between different setting values.

When the frequency source is selected as preset speed, $100.00 \%$ of function code 12-00-12-15 corresponds to the maximum output frequency P0-10.
When the preset command source is set as PID setting source, $100.0 \%$ of $12-00-12-15$ corresponds to $100 \%$ of PID feedback range, i.e., the full range of feedback instrument.

Function Description of Acceleration/Deceleration Time Options Terminal

| Terminal 2 | Terminal 1 | Acceleration/deceleration <br> time options | Corresponding parameter |
| :--- | :--- | :--- | :--- |
| OFF | OFF | Acceleration/deceleration <br> time 1 | P0-17, P0-18 |
| OFF | ON | Acceleration/deceleration <br> time 2 | P8-03, P8-04 |
| ON | OFF | Acceleration/deceleration <br> time 3 | P8-05, P8-06 |
| ON | ON | Acceleration/deceleration <br> time 3 | P8-07, P8-08 |


| P4-10 | DI Filter Time | 0.000 s -1.000s | 0.001 s | 0.010 s |
| :--- | :--- | :--- | :--- | :--- |
| P4-11 | Terminal Command Mode | $0: 2$-wire 1 | 1 | 0 |
|  |  | $1: 2$-wire 2 |  |  |
|  |  | $2: 3$-wire 1 |  |  |
|  |  | $3: 3$-wire 2 |  |  |

This parameter defines four terminal control modes.
0: 2-wire mode 1: This mode is most frequently used. Forward and reverse running of motor are determined by DIx and DIy. Terminal functions are set as follows:

| Terminal | Setting value | Description |
| :---: | :---: | :---: |
| DIx | 1 | Forward（FWD） |
| DIy | 2 | Reverse（REV） |

DIx and DIy are multi－function digital quantity input terminal of DI1－DI5 and HDI1 and on at the level．

| K1 | K2 | Run command |  | PD 1000DIx 正转运行（FWD）DIy 反转运行（REV）COM 数字量公共端 |
| :---: | :---: | :---: | :---: | :---: |
| 0 | 0 | Stop | ， |  |
| 1 | 0 | Forward |  |  |
| 0 | 1 | Reverse | External <br> control circuit |  |
| 1 | 1 | Stop |  |  |

2－wire Mode 1
1：2－wire mode 2：When this mode is used，DIx terminal is the running enabled terminal while DIy terminal is used to determine the running direction．Terminal functions are set as follows：

| Terminal | Setting value | Description |
| :--- | :--- | :--- |
| DIx | 1 | Running |
| DIy | 2 | Forward／Reverse mode（FWD／REV） |

DIx and DIy are multi－function digital quantity input terminal of DI1－DI5 and HDI1 and on at the level．

| K1 | K2 | Run command |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 0 | 0 | Stop | K1 | DIx forward（FWD） |  |
| 1 | 0 | Forward | K2 | DIy reverse（REV） |  |
| 0 | 1 | Stop |  | COM digital quantity |  |
| 1 | 1 | Reverse | External control circuit |  |  |

2－wire Mode 2
2：3－wire control mode 1：Under this mode，DIn refers to the enable terminal and the running directions are respectively controlled by DIx and DIy．Terminal functions are as follows：

| Terminal | Setting value | Description |
| :--- | :--- | :--- |
| DIx | 1 | Forward（FWD） |
| DIy | 2 | Reverse（REV） |
| DIn | 3 | 3－wire running control 1 |

$\oplus$ For running，firstly close DIn terminal to realize motor forward or reverse control through DIx or DIy pulse signal；
－For stopping the inverter，it is required to cut off DIn terminal signal；
©DIx，DIy and DIn are multi－function digital quantity input terminal of DI1－DI5；DIx，DIy，DIn are to enable pulse．


## 3-wire Control Mode 1

$\oplus$ Including: SB1: Stop button SB2: Forward button SB3: Reverse button
3: 3-wire control mode 2: The enable terminal of this mode is DIn; running command is given by DIx and the direction is determined by DIy status. The terminal function setting is as follows:

| Terminal | Setting value | Description |
| :---: | :---: | :---: |
| DIx | 1 | Run |
| DIy | 2 | Forward/Reverse (FWD/REV) |
| DIn | 3 | 3-wire running control 2 |

© For running, firstly close DIn terminal; motor running signal is produced through the pulse rising edge of DIx while DIy status will produce the motor direction signal.

- For stopping the inverter, it is required to cut off DIn terminal signal;
© DIx, DIy and DIn are multi-function digital quantity input terminal of DI1-DI5 and HDI1;
DIx is to enable pulse. DIy and DIn are on at the level.

| K | Run command |  |  |
| :---: | :---: | :---: | :---: |
| 0 | Forward |  | PD 1000 <br> DIn 3-wire control mode 1 <br> DIx forward (FWD) <br> DIy reverse (REV) <br> COM digital quantity common terminal |
| 1 | Reverse | SB 2 T <br> K  <br>   <br> External <br> circuit  control |  |

3-wire Control Mode 2
$\oplus$ Including: SB1: Stop button SB2: Running button K: Forward/Reverse switch

| P4-12 | Change Rate Per Second <br> of Terminal UP/DOWN | $0.001 \mathrm{~Hz}-65.535 \mathrm{~Hz}$ | 0.01 Hz | 1.00 Hz |
| :--- | :--- | :--- | :--- | :--- |

This parameter defines the frequency change rate when using UP/DOWN key to adjust the setting frequency, i.e., the frequency change rate per second.

| P4-13 | AI1 Minimum Input | $0.00 \mathrm{~V}-\mathrm{P} 4-15$ | 0.01 V | 0.00 V |
| :--- | :--- | :--- | :--- | :--- |
| P4-14 | Corresponding Setting of <br> AI1 Minimum Input | $-100.0 \%-+100.0 \%$ | $0.1 \%$ | $0.0 \%$ |
| P4-15 | AI1 Maximum Input | $\mathrm{P} 4-13-+10.00 \mathrm{~V}$ | 0.01 V | 10.00 V |
| P4-16 | Corresponding Setting of <br> AI1 Maximum Input | $-100.0 \%-+100.0 \%$ | $00.1 \%$ | $100.0 \%$ |
| P4-17 | AI1 Filter Time | $0.00 \mathrm{~s}-10.00 \mathrm{~s}$ | 0.01 s | 0.10 s |

These function codes define the relationship of analogy input voltage and its represented setting value.

When the analog input voltage is greater than or lower than the set upper limit (P4-15) or lower limit (P4-13), calculate according to the upper limit (P4-15) or lower limit (P4-13).

AI1 input filter time is used to set the software filter time of AI1. If the field analog is easy to be interfered, increase the filter time to make the detected analogy become more stable. However, excessive filter time may result in slow response to analogy detection. So it is required to set this parameter according to actual condition.

Definitions of nominal value corresponding to $100.0 \%$ of analogy are different from application to application. For details, refer to description of all application parts.

The following figures are two typical setting:

$\qquad$

| P4-18 | AI2 Minimum Input | 0.00V-P4-20 | 0.01 V | 0.00 V |
| :---: | :---: | :---: | :---: | :---: |
| P4-19 | Corresponding Setting of AI2 <br> Minimum Input | -100.0\% -+ 100.0\% | 0.1\% | 0.0\% |
| P4-20 | AI2 Maximum Input | P4-18-+ 10.00 V | 0.01 V | 10.00 V |
| P4-21 | Corresponding Setting of AI2 <br> Maximum Input | -100.0\% -+ 100.0\% | 0.1\% | 100.0\% |
| P4-22 | AI2 Filter Time | 0.00s-10.00s | 0.01s | 0.10s |
| P4-23 | AI3 Minimum Input | 0.00s- -P4-25 |  | 0.00 V |
| P4-24 | Corresponding Setting of AI3 <br> Minimum Input | -100.00\% -+ 100.0\% |  | 0.0\% |
| P4-25 | AI3 Maximum Input | P4-23-+10.00V |  | 10.00 V |
| P4-26 | Corresponding Setting of AI3 <br> Maximum Input | -100.0\%-100.0\% |  | 100.0\% |
| P4-27 | AI3 Filter Time | 0.00s-10.00s |  | 0.10s |
| P4-28 | PULSE Minimum Input | $0.00 \mathrm{kHz}-\mathrm{P} 4-30$ | 0.01 kHz | 0.00 kHz |
| P4-29 | Corresponding Setting of PULSE Minimum Input | -100.0\% - 100.0\% | 0.1\% | 0.0\% |
| P4-30 | PULSE Maximum Input | P4-28-100.00kHz | 0.01 kHz | 50.00 kHz |
| P4-31 | PULSE Maximum Input Setting | -100.0\%-100.0\% | 0.1\% | 100.0\% |
| P4-32 | PULSE Filter Time | 0.00s-10.00s | 0.01s | 0.10s |
| P4-33 | AI Setting Curve Options | Ones place: AI1 curve option <br> 1: Curve 1 (2 points, see P4-13 -P4-16) <br> 2: Curve 2 ( 2 points, see P4-18 -P4-21) <br> 3: Curve 3 ( 2 points, see P4-23 -P4-26) <br> 4: Not used <br> 5: Not used <br> Tens place: AI2 curve options, same as above <br> Hundreds place:AI3 curve options, same as above | 1 | 321 |
| P4-34 | AI Lower Than Minimum Input Setting Options | Ones place: AI1 lower than minimum input setting options <br> 0 : Corresponding setting of minimum input <br> 1: 0.0\% <br> Tens place: AI2 lower than minimum input setting options, same as above <br> Hundreds place: Not used | 1 | 000 |
| P4-35 | DI1 Delay Time | 0.0s-3600.0s | 0.1s | 0.0s |


| P4-36 | DI2 Delay Time | 0.0s-3600.0s | 0.1s | 0.0s |
| :---: | :---: | :---: | :---: | :---: |
| P4-37 | DI3 Delay Time | 0.0s-3600.0s |  |  |
| P4-38 | DI Input Terminal Active Status Setting 1 | 0 : High level <br> 1: Low level <br> Ones place: DI1 <br> Tens place: DI2 <br> Hundreds place: DI3 <br> Thousands place: DI4 <br> Tens thousands place: DI5 | 1 | 00000 |
| P4-39 | DI Terminal Active Mode Options 2 | Ones place: DIT terminal enable status setting <br> 0 : Active on high level <br> 1: Active on low level <br> Tens place: DI7 terminal enable status setting ( $0-1$, same as above) <br> Hundreds place: DI8 terminal enable status setting ( $0-1$, same as above) <br> Thousands place: DI9 terminal enable status setting (0-1, same as above) <br> Ten thousands place: DI10 terminal enable status setting (0-1, same as above) | 1 | 00000 |
| P5 Group Output Terminal |  |  |  |  |
| P5-00 | FM Terminal Output Options | 0 : Pulse output (FMP) <br> 1: Open collector switching quantity output (FMR) | 1 | 0 |
| P5-01 | FMR Output Function Options | 0 : No output <br> 1: Inverter running <br> 2: Fault output (stop upon fault) <br> 3: Frequency level detection FDT1 output <br> 4: Frequency reach <br> 5: Run at zero speed (stop, no output) <br> 6: Motor overload pre-warning <br> 7: Inverter overload pre-warning <br> 8: Set count value reach <br> 9: Designated count value reach <br> 10: Length reach <br> 11: PLC cycle finished <br> 12: Accumulated running time reach <br> 13: Frequency limit <br> 14: Torque limit | 1 | 0 |
| P5-02 | Control Board Relay Output Options <br> (T/A1-T/B1-T/C1) RELAY 1 |  | 1 | 2 |
| P5-03 | Control Board Relay Output Options 2 <br> (T/A1-T/B1-T/C1) RELAY $2$ |  | 1 | 1 |
| P5-04 | DO1 Output Options |  | 1 | 1 |
| P5-05 | Expansion Card DO2 Output Options |  | 1 | 4 |



|  |  | 9: Not used <br> 10: Length <br> 11: Count <br> 12: Communication setting <br> 13: Motor rotation speed <br> 14: Output current (100.0\% corresponds to 1000.0 A ) <br> 15: Output voltage (100.0\% corresponds to 1000.0 V ) <br> 16: Output torque |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P5-09 | FMP Output Maximum Frequency | $0.01 \mathrm{kHz}-100.00 \mathrm{kHz}$ | 0.01 kHz | 50.00 kHz |
| P5-10 | AO1 Zero Offset Factor | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| P5-11 | AO1 Gain | -10.00-10.00 | 0.01 | 1.00 |
| P5-12 | Zero Offset Factor of AO2 <br> Expansion Card | -100.0\%-100.0\% | 0.1\% | 0.0\% |
| P5-13 | Expansion Card AO2 Gain | -10.00-10.00 | 0.01 | 1.00 |
| P5-17 | $F M$ Output Delay Time | 0.0s-3600.0s | 0.1s | 0.0s |
| P5-18 | RELAY 1 Output Delay Time | 0.0s-3600.0s | 0.1s | 0.0s |
| P5-19 | RELAY 2 Output Delay Time | 0.0s-3600.0s | 0.1s | 0.0s |
| P5-20 | DO1 Output Delay Time | 0.0s-3600.0s | 0.1s | 0.0s |
| P5-21 | DO2 Output Delay Time | 0.0s-3600.0s | 0.1s | 0.0s |
| P5-22 | DO Output Terminal Active Status Options | 0 - positive logic; 1- negative logic <br> Ones place: FMR <br> Tens place: RELAY 1 <br> Hundreds place: RELAY 2 <br> Thousands place: DO1 <br> Tens thousands place: DO2 | 11111 | 00000 |
| P5-23 | Ao Output Signal Options | 0 : Voltage signal 1: Current signal |  | 0 |
| P6 Group: Start/Stop Control |  |  |  |  |
| P6-00 | Start Mode | 0: Direct start <br> 1: Speed tracking start <br> 2: Pre-excitation start of induction motor | 1 | 0 |
| P6-01 | Rotation Speed Tracking Mode | 0 : Start from stopping frequency <br> 1: Start from industrial frequency <br> 2: Start from maximum frequency | 1 | 0 |
| P6-02 | Rotation Speed Tracking Fast/Slow | 1-100 | 1 | 20 |
| P6-03 | Start Frequency | $0.00 \mathrm{~Hz}-10.00 \mathrm{~Hz}$ | 0.01 | 0.00 |
| P6-04 | Start Frequency Holding Time | 0.0s-100.0s | 0.1s | 0.0s |

Start frequency refers to the initial frequency when the inverter starts, as shown in the figure. Start frequency holding time refers to the running time under the start frequency. Start frequency is generally set about $1 \mathrm{~Hz}-2 \mathrm{~Hz}$ and shall be set larger for small power condition.

For occasions with small power, setting start frequency can establish slip quickly, which is helpful for starting the motor quickly; for occasions with large power or heavy load, extend the start frequency holding time appropriately can realize motor pre-excitation, reduce the start current and improve the start torque. If the motor still runs when started, the inverter can decelerate the motor first and then re-accelerate it.


Start Frequency Schematic Diagram

| P6-05 | Start DC Brake/Pre-excitation <br> Current | $0 \%-100 \%$ | $1 \%$ | $0 \%$ |
| :--- | :--- | :--- | :--- | :--- |
| P6-06 | Start DC Brake/Pre-excitation Time | $0.0 \mathrm{~s}-100.0 \mathrm{~s}$ | 0.1 s | 0.0 s |

DC brake before startup is a period of DC current output before motor rotation; P6-05 sets the injection DC current and $100.0 \%$ is respective to the inverter rated current. P6-06 defines the DC current injection time. Injection of DC current realizes electromagnetic brake and pre-excitation effect of motor. For occasions with large power and heavy load, pre-excitation can increase the start torque and lower down impact current.


| P6-07 | Acceleration/Deceleration <br> Mode | 0: Linear acceleration/deceleration <br> 1: S curve acceleration/deceleration A | 1 | 0 |
| :--- | :--- | :--- | :--- | :--- |

This parameter is used to select the frequency change mode of servo driver under start/stop process.

## 0: Linear acceleration/deceleration

The output frequency increases or decreases in a straight line progressively. .PD 1000 provides four kinds of acceleration/deceleration time that can be selected through multi-function numeric input terminal (P4-00 -P4-05).

## 1: S curve acceleration/deceleration A

The output frequency increases or decreases like a $S$ curve. $S$ curve is generally applied to occasions of smooth start and stop, for example elevator and conveyor.

Function code P6-08 and P6-09 respectively define the time proportion of S curve during the acceleration/deceleration start section and end section.

2: S curve acceleration/deceleration B
During acceleration/deceleration $B$ of $S$ curve, motor rated frequency $f_{b}$ is always the inflexion of $S$ curve, as shown in the figure below. It is generally applied to high-speed zone where frequency is above the rated frequency and rapid acceleration/deceleration is required.

When the setting frequency is greater than the rated frequency, the acceleration/deceleration time is :

$$
t=\left(\frac{4}{9} \times\left(\frac{f}{f_{b}}\right)^{\gamma}+\frac{5}{9}\right) \times T
$$

Of which, f is the setting frequency, $\mathrm{f}_{\mathrm{b}}$ is motor rated frequency and T is time requiring from frequency 0 to rated frequency $f_{b}$.


## Schematic Diagram of S Curve Acceleration/Deceleration B

| P6-08 | S Curve Start Section <br> Time Proportion | $0.0 \%$-(100.0\%-P6-09) | $0.1 \%$ | $30.0 \%$ |
| :--- | :--- | :--- | :--- | :--- |
| P6-09 | S Curve End Section <br> Time Proportion | $0.0 \%$-(100.0\%-P6-08) | $0.1 \%$ | $30.0 \%$ |

P6-08 and P6-09 respectively define the time proportion of $S$ curve at the acceleration/deceleration A start section and end section. Two function codes shall meet the requirement: P6-08+P6-09 $\leq 100.0 \%$.

In the figure below, t 1 is defined by P6-08. during this period, the change gradient of output frequency increases gradually. t 2 is the time defined by P6-09. During this period, the change gradient of output frequency gradually changes to 0 . Within the time between tl and t 2 , the output frequency change gradient is fixed. During this section, the inverter adopts linear acceleration/deceleration.


Curve Acceleration/Deceleration Schematic Diagram

| P6-10 | Stop Mode | 0 : Ramp-to-stop 1: Coast-to-stop | 1 | 0 |
| :--- | :--- | :--- | :--- | :--- |
| P6-11 | DC Brake Start Frequency <br> at Stop | 0.00 Hz - maximum frequency | 0.01 Hz | 0.00 Hz |
| P6-12 | DC Brake Waiting Time <br> at Stop | $0.0 \mathrm{~s}-100.0 \mathrm{~s}$ | 0.1 s | 0.0 s |
| P6-13 | DC Brake Current at Stop | $0 \%-100 \%$ | $1 \%$ | $0 \%$ |
| P6-14 | DC Brake Time at Stop | $0.0 \mathrm{~s}-100.0 \mathrm{~s}$ | 0.1 s | 0.0 s |

During deceleration process, when the frequency decelerates to P6-11, after the time set by P6-12, the inverter starts to inject DC current into the motor to quicken braking process. The injection current is set by P6-13 and $100.0 \%$ corresponds to rated inverter current. DC current injection time is set by P6-14. If the braking time is 0 , this process doesn't exist. As shown in the
figure below:


DC Brake Schematic Diagram at Stop
During DC brake stage, the motor rotor maintains a certain retention force to prevent rotor steadiness or creeping motion after stop.

| P6-15 | Brake Duty Ratio | $0 \%-100 \%$ | $1 \%$ | $100 \%$ |
| :--- | :--- | :--- | :--- | :--- |
| P6-18 | Rotation Speed Tracking Current | $30 \%-200 \%$ |  | Up to specific model |
| P6-21 | Demagnetizing Time | $0.00-5.00 \mathrm{~s}$ |  | 1.00 s |



Output torque (\%)
DI input status (V)


|  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P7-06 | Load Speed Display <br> Factor | 0.0001-6.5000 | 0.0001 | 1.0000 |
| P7-07 | Inverter <br> Module <br> Radiator <br> Temperature | $0.0^{\circ} \mathrm{C}-100^{\circ} \mathrm{C}$ | $0.1{ }^{\circ} \mathrm{C}$ | - |
| P7-08 | Not Used |  |  | - |
| P7-09 | Accumulated <br> Running Time | 0h-65535h | 1h | - |
| P7-10 | Not Used | - |  | - |
| P7-11 | Software <br> Version | - |  | - |
| P7-12 | Decimal <br> Places of <br> Load Speed <br> Displayed | Ones place: Number of decimal places of d0-14 <br> 0: 0 <br> 1:1 <br> 2: 2 <br> 3: 3 <br> Tens place: d0-19/d0-29 number of decimal places <br> 1: 1 <br> 2: 2 | H. 111 | 1 |
| P7-13 | Accumulated <br> Power-on <br> Time | 0h-65535h | 1h | - |
| P7-14 | Accumulated <br> Energy <br> Consumption | 0-655350 | $1^{\circ}$ | - |


| Function <br> Code | Name | Setting Range | Minimum <br> Unit | Default |
| :--- | :--- | :--- | :--- | :--- |
| P8 Group: Auxiliary Function |  |  |  |  |
| P8-00 | JOG Running Frequency | 0.00 Hz -maximum frequency | 0.01 Hz | 2.00 Hz |


| P8-01 | JOG Acceleration Time | $0.0 \mathrm{~s}-6500.0 \mathrm{~s}$ | 0.1 s | 20.0 s |
| :--- | :--- | :--- | :--- | :--- |
| P8-02 | JOG Deceleration Time | $0.0 \mathrm{~s}-6500.0 \mathrm{~s}$ | 0.1 s | 20.0 s |
| P8-03 | Acceleration Time 2 | $0.0 \mathrm{~s}-6500.0 \mathrm{~s}$ | 0.1 s | Up to specific <br> model |
| P8-04 | Deceleration Time 2 | $0.0 \mathrm{~s}-6500.0 \mathrm{~s}$ | 0.1 s | Up to specific <br> model |
| P8-05 | Acceleration Time 3 | $0.0 \mathrm{~s}-6500.0 \mathrm{~s}$ | 0.1 s | Up to specific <br> model |
| P8-06 | Deceleration Time 3 | $0.0 \mathrm{~s}-6500.0 \mathrm{~s}$ | 0.1 s | Up to specific <br> model |
| P8-07 | Acceleration Time 4 | $0.0 \mathrm{~s}-6500.0 \mathrm{~s}$ | Up to specific <br> model |  |
| P8-08 | Deceleration Time 4 | $0.0 \mathrm{~s}-6500.0 \mathrm{~s}$ | Up to specific <br> model |  |
| P8-09 | Hopping Frequency 1 | 0.00 Hz - maximum frequency | 0.01 Hz | 0.00 Hz |
| P8-10 | Hopping Frequency 2 | 0.00 Hz - maximum frequency | 0.01 Hz | 0.00 Hz |
| P8-11 | Hopping <br> Amplitude | Frequency | $0.00 \mathrm{~Hz}-$ maximum frequency | 0.01 Hz |

When the setting frequency is within the hopping frequency range, the inverter will run at the hopping frequency that is closer to the setting frequency. The hopping frequency function can protect the inverter from the mechanical resonance with the mechanical load.

PD 1000 can set two hopping frequency points. If these two hopping frequency are set as 0 , the hopping frequency function is disabled.

The following is the schematic diagram of hopping frequency and hopping frequency amplitude.


Hopping Frequency Schematic Diagram

| P8-12 | Forward/Reverse <br> Deadband Time | $0.0 \mathrm{~s}-3000.0 \mathrm{~s}$ | 0.1 s | 0.0 s |
| :--- | :--- | :--- | :--- | :--- |
| P8-13 | Reverse Control | 0: Reverse permitted 1: Reverse <br> prohibited | 1 | 0 |
| P8-14 | Control Mode of Set <br> Frequency Lower Than <br> Lower Limit Frequency | 0: Run at lower limit frequency <br> 1: Stop <br> 2: Run at zero speed | 1 | 0 |
| P8-15 | Sagging Control | $0.00 \mathrm{~Hz}-10.00 \mathrm{~Hz}$ | 0.01 Hz | 0.00 Hz |

This function is usually applied to the load distribution when multiple motors bear one load.
Sagging control means that the inverter output frequency goes down as the load increases; when multiple motors bear same one load, motor output frequency for the load will decrease more, thus reducing the load of motor and realizing the even load of multiple motors.

This parameter refers to the decline of the output frequency when the inverter is in rated load output.

| P8-16 | Set Accumulated <br> Power-On Reach Time | 0h-65000h | 1 h | 0 h |
| :--- | :--- | :--- | :--- | :--- |
| P8-17 | Set Accumulated Run <br> Time Reach | $0 \mathrm{~h}-65000 \mathrm{~h}$ | 1 h | 0 h |
| P8-18 | Enable Protection Options | 0: Disabled 1:Enabled | 1 | 0 |
| P8-19 | Frequency Detection <br> Value (FDT1) | 0.00 Hz - maximum frequency | 0.01 Hz | 50.00 Hz |
| P8-20 | Frequency Detection <br> Hysteresis Value (FDT1) | $0.0 \%-100.0 \%$ (FDT1 level) | $0.1 \%$ | $5.0 \%$ |

Frequency detection FDT function: When the output frequency exceeds the setting frequency detection value, DO indicator signal FDT output is enabled until the output frequency reduces to lower than the detection value and the difference exceeds the hysteresis. At this time, the DO indicator signal FDT output is enabled. Maximum two FDT detection points can be set at the same time.

FDT hysteresis amplitude $=$ FDT hysteresis $\times$ FDT detection value


FDT Signal Schematic Diagram

| P8-21 | Frequency Reach Detection <br> Bandwidth | $0.0 \%-100.0 \%$ (maximum frequency) | $0.1 \%$ | $0.0 \%$ |
| :--- | :--- | :--- | :--- | :--- |


| P8-22 | Enable Hopping Frequency <br> During <br> Acceleration/Deceleration <br> Process | 0: Disabled 1: Enabled | 1 | 0 |
| :--- | :--- | :--- | :--- | :--- |
| P8-25 | Switching Frequency Point <br> of Acceleration Time $1 / 2$ | 0.00 Hz - maximum frequency | 0.01 Hz | 0.00 Hz |
| P8-26 | Switching Frequency Point <br> of Deceleration Time $1 / 2$ | 0.00 Hz - maximum frequency | 0.01 Hz | 0.00 Hz |

This terminal is enabled when acceleration/deceleration time is selected not by DI terminal. During inverter running, it selects different acceleration/deceleration time according to the running frequency range other than DI terminal.


Acceleration/Deceleration Time Switching Schematic Diagram

The above is the acceleration/deceleration time switching schematic diagram. If the running frequency is less than P8-25 during acceleration process, select acceleration time 2; if the running frequency is greater than P8-25, select acceleration time 1.

During deceleration, if the running frequency is greater than P8-26, select deceleration time 1 ; if the running frequency is lower than P8-26, select deceleration time 2.

| P8-27 | Terminal Jog Priority | 0: Disabled 1: Enabled | 1 | 0 |
| :--- | :--- | :--- | :--- | :--- |
| P8-28 | Frequency Detection <br> Value (FDT2) | 0.00 Hz - maximum frequency | 0.01 Hz | 50.00 Hz |
| P8-29 | Frequency Detection <br> Hysteresis Value (FDT2) | $0.0 \%-100.0 \%$ (FDT2 level) | $0.1 \%$ | $5.0 \%$ |
| P8-30 | Any Reach Frequency <br> Detection Value 1 | 0.00 Hz - maximum frequency | 0.01 Hz | 50.00 Hz |
| P8-31 | Any Reach Frequency <br> Detection Amplitude 1 | $0.0 \%-100.0 \%$ (maximum frequency) | $0.1 \%$ | $0.0 \%$ |
| P8-32 | Any Reach Frequency | $0.00 \mathrm{~Hz}-$ maximum frequency | 0.01 Hz | 50.00 Hz |


|  | Detection Value 2 |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| P8-33 | Any Reach Frequency <br> Detection Amplitude 2 | $0.0 \%-100.0 \%$ (maximum frequency) | $0.1 \%$ | $0.0 \%$ |

When the inverter is within the positive/negative range of frequency reach detection
P8-30 $\pm$ P8-31
( $\mathrm{P} 8-32 \pm \mathrm{P} 8-33$ ), DO signal reach outputs ON; otherwise, it outputs OFF.


Frequency Reach Detection Function Schematic Diagram

| P8-34 | Zero Current Detection <br> Level | $0.0 \%-300.0 \%$ <br> $100.0 \%$ corresponds to motor rated <br> current | $0.1 \%$ | $5.0 \%$ |
| :--- | :--- | :--- | :--- | :--- |
| P8-35 | Zero Current Detection <br> Delay Time | $0.01 \mathrm{~s}-600.00 \mathrm{~s}$ | 0.01 s | 0.10 s |
| P8-36 | Software Overcurrent <br> Point | $0.0 \%$ (no detection) <br> $0.1 \%-300.0 \% ~(M o t o r ~ r a t e d ~ c u r r e n t) ~$ | $0.1 \%$ | $200.0 \%$ |
| P8-37 | Software Overcurrent <br> Detection Delay Time | $0.00 \mathrm{~s}-600.00 \mathrm{~s}$ | 0.01 s | 0.00 s |
| P8-38 | Any Reach Current 1 | $0.0 \%-300.0 \%$ (motor rated current) | $0.1 \%$ | $100.0 \%$ |
| P8-39 | Any Reach Current 1 <br> Width | $0.0 \%-300.0 \%$ (motor rated current) | $0.1 \%$ | $0.0 \%$ |
| P8-40 | Any Reach Current 2 | $0.0 \%-300.0 \%$ (motor rated current) | $0.1 \%$ | $100.0 \%$ |
| P8-41 | Any Reach Current 2 <br> Width | $0.0 \%-300.0 \%$ (motor rated current) | $0.1 \%$ | $0.0 \%$ |

When the inverter is within the positive/negative range of frequency reach detection P8-38 $\pm$ P8-39
( ${ }^{\text {P8-40 }} \pm$ P8-41 $)$, DO signal reach outputs ON; otherwise, it outputs OFF.


Frequency Reach, Current Reach Detection Function Schematic Diagram

| P8-42 | Timed Function Options | 0: Disabled 1: Enabled | 1 | 0 |
| :---: | :---: | :---: | :---: | :---: |
| P8-43 | Timed Running Time Options | $\begin{aligned} & \text { 0: P8-44 setting } \\ & \text { 1: AI1 } \\ & \text { 2: AI2 } \\ & \text { 3: AI3 } \end{aligned}$ <br> Analog input range corresponds to P8-44 | 1 | 0 |
| P8-44 | Timed Running Time | 0.0Min-6500.0Min | 0.1Min | 0.0Min |
| P8-45 | AI1 Input Voltage Protection Value Lower Limit | 0.00V-P8-46 | 0.01 V | 3.10 V |
| P8-46 | AI1 Input Voltage Protection Value Upper Limit | P8-45-10.00V | 0.01 V | 6.80 V |
| P8-47 | Module Temperature <br> Reach | $0^{\circ} \mathrm{C}-100^{\circ} \mathrm{C}$ | $1{ }^{\circ} \mathrm{C}$ | $75^{\circ} \mathrm{C}$ |
| P8-48 | Radiation Fan Control | 0 : Radiation fan runs when the motor runs <br> 1: Radiation fan runs all the time after being powered on | 1 | 0 |
| P8-49 | Awakening Frequency | Sleep frequency (P8-51) - maximum frequency ( $\mathrm{P} 0-10$ ) | 0.01 Hz | 0.00 Hz |
| P8-50 | Awakening Delay Time | 0.0s-6500.0s | 0.1 s | 0.0s |
| P8-51 | Sleep Frequency | 0.00 Hz -awakening frequency (P8-49) | 0.01 Hz | 0.00 Hz |
| P8-52 | Sleep Delay Time | 0.0s-6500.0s | 0.1 s | 0.0s |

This group of parameters are used to realize the sleep and awakening function during water supply application.

When the inverter runs, if the setting frequency is less than or equal to the sleep frequency set by P8-51, the inverter goes into sleep status and stops automatically after the delay time set by

## P8-52.

When the inverter is in sleep status and current running command is enabled, the inverter starts after the delay time set by P8-50 if the setting frequency is greater than or equal to awakening frequency set by P8-49.

Generally, the awakening frequency shall be greater than the sleep frequency. If both two frequency are set as 0.00 Hz , sleep and awakening function are disabled.

When sleep function is enabled, if the frequency source adopts PID, PID arithmetic during sleep status is subject to function code $10-28$. At this time, enable arithmetic at PID stop (10-28=1).

| P8-53 | Set Current Running <br> Reach Time | $0.0 \mathrm{Min-6500.0Min}$ | 0.1 Min | 0.0 Min |  |
| :--- | :--- | :--- | :--- | :--- | :---: |
| P8-54 | Output Power Calibration <br> Factor | $0.00 \%-200.0 \%$ | 0 |  |  |
| P9 Group: Fault and Protection |  |  |  |  |  |
| P9-00 Overload | Motor <br> Protection Options | Prohibited 1: Permitted | 1 | 1 |  |
| P9-01 | Motor <br> Protection Gain | $0.20-10.00$ | 0.01 | 1.00 |  |
| P9-02 | Motor <br> Pre-warning Factor | $50 \%-100 \%$ | $1 \%$ | $80 \%$ |  |

When $\mathrm{P} 9-00=0$, if the motor overload software protection function is disabled, it may pose a hazard of motor overheating. It is strongly recommended to install a thermal relay between the inverter and motor to protect the motor.

When $\mathrm{P} 9-01=1$, start the motor overload software protection function. The inverter adopts inverse-time curve for the motor overload protection to judge if there exists motor overload.

The inverse-time curve for motor overload protection defaults to: Send motor overload fault alarm when $220 \%$ motor rated current lasts for 1 min ; send alarm for motor overload when $150 \%$ motor rated current lasts for 60 min . Users can translate the motor overload curve through function code P9-01 to meet the actual condition of specific motor.


Motor Overload Curve

P9-02 is used to send a prewarning signal to the control system through DO before enabling the motor overload fault protection. This prewarning factor is used to determine what degree prior to motor overload protection will trigger an alarm. The higher this factor is, the smaller the advance time of the pre-alarm will be

| P9-03 | Overvoltage Stall Gain | 0-100 |  | 30 |
| :---: | :---: | :---: | :---: | :---: |
| P9-04 | Overvoltage Stall Protection Voltage | $650 \mathrm{~V}-800 \mathrm{~V}$ |  | 760 V |
| P9-07 | Short Circuit to Ground Protection Options upon Power-on | Ones place: Short circuit to ground protection options upon power-on <br> 0: Disabled <br> 1: Enabled <br> Tens place: Short circuit to ground protection options upon power-on before operation <br> 0: Disabled <br> 1: Enabled | 1 | 1 |
| P9-08 | Braking Unit Action Start Voltage | 700-800V |  | 780V |
| P9-09 | Automatic Reset Times of Fault | 0-20 | 1 | 0 |
| P9-10 | Fault DO Action Options during Fault Automatic Reset Period | 0: Disabled <br> 1: Enabled | 1 | 0 |
| P9-11 | Fault Automatic Reset Interval | 0.1s-100.0s | 0.1 s | 1.0s |
| P9-12 | Input Phase <br> Loss/Contactor On <br> Protection Options  | Ones place: Input phase loss protection options <br> Tens place: Contactor on protection options <br> 0: Disabled <br> 1: Enabled |  | 11 |
| P9-13 | Output Phase Loss <br> Protection Options | 0: Disabled 1: Enabled |  | 1 |
| P9-14 | First Fault Type | No fault | - | - |
| P9-15 | Second Fault Type | Not used | - | - |
| P9-16 | Third Fault(Latest) Type | Acceleration overcurrent (OCA) <br> Deceleration overcurrent (OCD) <br> Constant speed overcurrent (OCN) <br> Acceleration overvoltage (OUA) <br> Deceleration overvoltage (OUD) <br> Constant speed overvoltage (OUN) <br> Buffer resistance overload (UU) <br> Undervoltage (LU) <br> Inverter overload (0L2) | - | - |


|  |  | Motor overload (OL1) <br> Input phase loss (PF) <br> Output phase loss (LF) <br> Module overheating ( 0 H 1 ) <br> External fault (EF) <br> Communication error (CE) <br> Contactor abnormality (RL) <br> Current detection abnormality (CC) <br> Motor tuning abnormality (ER) <br> Encoder/PG card abnormality (PG) <br> Parameter read-write abnormality (EP) <br> Inverter hardware abnormality (EH) <br> Motor short circuited to the ground (GF) <br> Not used <br> Not used <br> Running time reach (OT1) <br> Not used <br> Not used <br> Power-on time reach (OT2) <br> Offload (LL) <br> PID feedback loss during running (PD) <br> Rapid current limit overtime (LC) <br> Switching motor during running (TRE) <br> Large speed offset (DEV) <br> Motor overspeed (OS) <br> Motor overtemperature ( OH 2 ) <br> Initial position error (1NE) <br> Slave motor failure under master and slave control (MS) |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P9-17 | Third Fault(Latest) <br> Frequency  | - |  | - |
| P9-18 | Third $\quad$ Fault(Latest) Current | - |  | - |
| P9-19 | Third Fault(Latest) Bus Voltage | - | - | - |
| P9-20 | Third Fault(Latest) Input Terminal Status | - | - | - |
| P9-21 | Third Fault(Latest) Output Terminal Status | - | - | - |
| P9-22 | Third (Latest)Fault Inverter Status | - | - | - |
| P9-23 | Third (Latest) Fault Time (Calculated From Current | - | - | - |


|  | Power-on Time) |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| P9-24 | Third (Latest) Fault Time (Calculated From Running ) | - | - | - |
| P9-27 | Second Fault Frequency | - | - | - |
| P9-28 | Second Fault Current | - | - | - |
| P9-29 | Second Fault Bus Voltage | - | - | - |
| P9-30 | Second Fault Input Terminal Status | - | - | - |
| P9-31 | Second Fault Output <br> Terminal Status  | - | - | - |
| P9-32 | Second Fault Inverter Status | - | - | - |
| P9-33 | Second Fault Time (Calculated from Current Power-on) | - | - | - |
| P9-34 | Second Fault Time <br> (Calculated from Current <br> Running) | - | - | - |
| P9-37 | First Fault Frequency | - | - | - |
| P9-38 | First Fault Current | - | - | - |
| P9-39 | First Fault Bus Voltage | - | - | - |
| P9-40 | First Fault Input Terminal Status | - | - | - |
| P9-41 | First Fault Output Terminal Status | - | - | - |
| P9-42 | First Fault Inverter Status | - | - | - |
| P9-43 | First Fault Time (Calculated from Current Power-on) | - | - | - |
| P9-44 | First Fault Time <br> (Calculated from Current <br> Running) | - | - | - |
| P9-45 | Not Used | - | - | - |
| P9-46 | Not Used | - | - | - |
| P9-47 | Fault Protection Action Options 1 | Ones place: Motor overload (OL1) <br> 0: Coast-to-stop <br> 1: Stop according to the stopping mode <br> 2: Continue to run <br> Tens place: Not used <br> Hundreds place: Not used <br> Thousands place: External fault (EF) <br> Ten thousands place: Communication error (CE) | 11111 | 00000 |


| P9-48 | Fault Protection Action Options 2 | Ones place: Encoder/PG card abnormality $(P G)$ <br> 0: Coast-to-stop <br> Tens place: Function code read \& write abnormality ( $E P$ ) <br> 0 : Coast to stop <br> 1: Stop according to the stopping mode <br> Hundreds place: Inverter overload fault action options (OL2) <br> 0 : Coast to stop <br> 1: Derating <br> Thousands places: Motor overheating (OH2) <br> Ten thousands place: Running time reach $(O T)$ | 11111 | 00000 |
| :---: | :---: | :---: | :---: | :---: |
| P9-49 | Fault Protection Action Options 3 | Ones place: Not used <br> 0 : Coast to stop <br> 1: Stop according to the stopping mode <br> 2: Continue to run <br> Tens place: Not used <br> 0 : Coast to stop <br> 1: Stop according to the stopping mode <br> 2: Continue to run <br> Hundreds place: Power-on time reach <br> (UT) <br> 0 : Coast to stop <br> 1: Stop according to the stopping mode <br> 2: Continue to run <br> Ten thousands place: Offload ( $L L$ ) <br> 0 : Coast to stop <br> 1: Stop according to the stopping mode <br> 2: Reduce to $7 \%$ of motor rated frequency and then continue to run. <br> When there is no offload, automatically <br> restore to setting frequency for running <br> Ten thousands place: PID feedback loos <br> during running ( $P D$ ) <br> 0: Coast to stop <br> 1: Stop according to the stopping mode <br> 2: Continue to run | 11111 | 00000 |
| P9-50 | Fault Protection Action Options 4 | Ones place: Large speed Offset (DEV) <br> 0 : Coast to stop <br> 1: Stop according to the stopping mode <br> 2: Continue to run | 11111 | 00000 |


|  |  | Tens place: Motor overspeed (OS) <br> Hundreds place: Initial position error |  |  |
| :--- | :--- | :--- | :--- | :--- |
| P9-54 | Continuous Running <br> Frequency Options at <br> Fault | 0: Run at current running frequency <br> 1: Run at the set frequency <br> 2: Run at the upper limit frequency <br> 3: Run at the lower limit frequency <br> 4: Run at the spare frequency under <br> abnormality | 1 | 0 |
| P9-55 | Spare Frequency Setting <br> under Abnormality | $60.0 \%-100.0 \%$ (current targeted <br> frequency) | $0.1 \%$ | $100.0 \%$ |
| P9-56 | Motor Temperature <br> Sensor Type | 0: No temperature sensor <br> 1: PT100 <br> 2: PT1000 | 0 |  |
| P9-57 | Motor Overheating <br> Protection Threshold | $0^{\circ} \mathrm{C}-200^{\circ} \mathrm{C}$ | $110^{\circ} \mathrm{C}$ |  |
| P9-58 | Motor Overheating <br> Pre-warning Threshold | $0^{\circ} \mathrm{C}-200^{\circ} \mathrm{C}$ | $90^{\circ} \mathrm{C}$ |  |

The analog input AI3 of temperature signal of motor temperature sensor can be used for motor temperature sensor input. Motor temperature sensor signal is connected to AI3 and GND terminal.

AI3 analogy input terminal of A1000 supports PT100 and PT1000 motor temperature sensor. During use, set the sensor type correctly. Motor temperature is displayed in d0-34.

If motor temperature is greater than motor overheating pre-warning threshold P9-57, the inverter will give an alarm about motor fault and start corresponding protection action.

When motor temperature is greater than motor overheating pre-warning threshold P9-58, the multi-function numeric DO of inverter outputs "motor overload pre-warning" ON signal.

| P9-59 | Enable Non-stop under Instantaneous <br> Power Failure | 0: Disabled <br> 1: Constant control of bus voltage <br> 2: Ramp-to-stop | 0 |
| :---: | :---: | :---: | :---: |
| P9-60 | Reset Voltage for Non-stop under Instantaneous Power Failure | 60\%-100\% | 85\% |
| P9-61 | Voltage Judgment Time under Non-stop upon Instantaneous Power Failure | 01-10.0s | 0.5 s |
| P9-62 | Bus Voltage of Non-stop Action upon Instantaneous Power Failure | 60\%-85\% | 80\% |

When this function is enabled, in case of instantaneous power failure or subsequent voltage reduction, the inverter will lower down output rotation speed and uses load feedback energy to
make up DC bus voltage of inverter so as to maintain inverter running.
If P9-59=1, in the event of instantaneous power failure or subsequent voltage reduction, the inverter will decelerate; when bus voltage returns to normal, the inverter will accelerate normally to the setting frequency. If the bus voltage is normal and lasts for the time greater than the time set by P9-61, it can be judged that the bus voltage returns to normal.

If P9-59=2, the inverter decelerates until stop in case of instantaneous power failure or subsequent voltage reduction.


| P9-63 | Offload Protection <br> Options | 0: Disabled <br> 1: Enabled | 1 | 0 |
| :--- | :--- | :--- | :--- | :--- |
| P9-64 | Offload Detection Level | $0.0-100.0 \%$ | $0.1 \%$ | $10.0 \%$ |
| P9-65 | Offload Detection Time | $0.0-60.0 \mathrm{~s}$ | 0.1 s | 1.0 s |
| P9-67 | Overspeed Detection <br> Value | $0.0 \%-50.0 \%$ (maximum frequency) | $0.1 \%$ | $20.0 \%$ |
| P9-68 | Overspeed Detection <br> Time | 0.0 s : No detection; 0.1-60.0s | 0.1 s | 0.1 s |
| P9-69 | Greater Speed Offset <br> Detection Value | $0.0 \%-50.0 \%$ (maximum frequency) | $0.1 \%$ | $20.0 \%$ |
| P9-70 | Large Speed Offset <br> Detection Time | 0.0 s : No detection; 0.1-60.0s | 0.1 s | 5.0 s |


| P9-71 | Gain KP for Non-stop <br> under Instantaneous <br> Power Failure | $0-100$ | 40 |
| :--- | :--- | :--- | :--- | :--- |
| P9-72 | Integral Factor ki for <br> Non-stop <br> Instantaneous under <br> Failure | $0-100$ | 30 |
| P9-73 | Action Deceleration Time <br> for Non-stop under <br> Instantaneous Power <br> Failure | $0-300.0 \mathrm{~s}$ | 20.0 s |

Process PID closed-loop control is to adopt the regulator with three calculation factors, i.e., P (proportional), I (integral) and D (differential) to gradually reduce the offset between feedback value and command value. It is applied to process control of flow, pressure and temperature.

Proportional control (P)
Control quantity proportionate to the offset.
Integral control (I)
Controlled quantity proportionate to the integral value of offset can eliminate the stable error.
Differential control (D)
The controlled quantity that is directly proportional with the offset change rate could predicate the trend of error changes and respond to intense changes to improve the dynamic characteristics. However, it is easy to lead in and amplify the interference signal and result system unsteadiness. Please apply this mode carefully.


PID Control Schematic Diagram

| 10-00 | PID Setting Source | 0: Function code 10-01 setting | 1 | 0 |
| :--- | :--- | :--- | :--- | :--- |
|  |  | 1: AI1 |  |  |
|  |  | 2: AI2 |  |  |
|  |  | 3: AI3 |  |  |
|  |  | 4: PULSE setting (DI5) |  |  |
|  |  | 5: Communication setting |  |  |
|  |  | 6: Preset commands setting |  |  |
| $10-01$ | 7: Potentiometer setting |  |  |  |
|  |  | $0.0 \%-100.0 \%$ | $0.1 \%$ | $50.0 \%$ |

These parameters are used to set the PID command source. When select the default value 0 , it
means to set PID target quantity by 10-01. The setting target quantity of process PID is relative and $100 \%$ of the setting value correspond to $100 \%$ of the full range of feedback signal of controlled system. The system will execute arithmetic according to relative value ( $0.0 \%-100.0 \%$ ). Notes: When the command source selects PID output (for example, P0-03 or P0-04 is set as 8 ), process PID control is enabled.

| 10-02 | PID Feedback Source | $\begin{aligned} & \text { 0: AI1 } \\ & \text { 1: AI2 } \\ & \text { 2: AI3 } \\ & \text { 3: AI1-AI2 } \\ & \text { 4: PULSE setting (DI5) } \\ & \text { 5: Communication setting } \\ & \text { 6: AI1+AI2 } \\ & \text { 7: MAX (\|AI1\|, \|AI2\|) } \\ & \text { 8: MIN (\|AI1\|, \|AI2\|) } \end{aligned}$ | 1 | 0 |
| :---: | :---: | :---: | :---: | :---: |
| 10-03 | PID Action Direction | 0: Positive <br> 1: Negative |  | 0 |
| 10-04 | PID Setting Feedback Range | 0-65535 | 1 | 1000 |
| 10-05 | Proportional Gain P1 | 0.0-100.0 | 0.1 | 20.0 |
| 10-06 | Integral Time I1 | $0.01 \mathrm{~s}-10.00 \mathrm{~s}$ | 0.01s | 2.00s |
| 10-07 | Differential Time D1 | $0.000 \mathrm{~s}-10.000 \mathrm{~s}$ | 0.001s | 0.000s |
| 10-08 | PID Reverse End Frequency | 0.00-maximum frequency | 0.01 Hz | 2.00 Hz |
| 10-09 | PID Offset Limit | 0.0\%-100.0\% | 0.1\% | 0.0\% |
| 10-21 | PID Initial Value | 0.0\%-100.0\% | 0.1\% | 0.0\% |
| 10-22 | PID Initial Value Holding Time | 0.00-650.00s | 0.01 s | 0.00s |

After PID running, the frequency will firstly accelerate to the PID preset frequency according to the acceleration/deceleration time and the inverter will continue to run at this frequency for the time set by 10-22. Afterwards, the inverter proceeds with the PID output regulation.


| $10-23$ | Forward Maximum Value <br> of Twice Output Offset | $0.00 \%-100.00 \%$ | $0.01 \%$ | $1.00 \%$ |
| :--- | :--- | :--- | :--- | :--- |
| $10-24$ | Reverse Maximum Value <br> of Twice Output | $0.00 \%-100.00 \%$ | $0.01 \%$ | $1.00 \%$ |
| $10-25$ | PID Integral Property | Ones place: Integral separation <br> 0 -disabled; 1- enabled <br> Tens place: Whether to stop integral <br> when output reaches to limit <br> 0 -continue the integral; 1- stop integral | 11 | 00 |
| $10-26$ | PID Feedback Loss <br> Detection Time | 0.0 s-20.0s | 0.1 s | 1.0 s |
| $10-27$ | PID Feedback Loss <br> Detection Value PID | $0.0 \%:$ No judgement of feedback loss <br> $0.1 \%-100.0 \%$ | 0.1 | $20.0 \%$ |
| $10-28$ | Arithmetic at Stop | $0:$ Disabled <br> $1:$ Enabled | $1 \%$ | 0 |


| 11 Group: Wobbulation, Fixed Length and Count |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :---: |
| $11-00$ | Wobbulation Setting <br> Mode | 0: With respective to center frequency <br> $1:$ With respective to the maximum <br> frequency | 1 | 0 |  |
| $11-01$ | Wobbulation Amplitude | $0.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |  |
| $11-02$ | Hopping Frequency <br> Amplitude | $0.0 \%-50.0 \%$ | $0.1 \%$ | $0.0 \%$ |  |
| $11-03$ | Wobbulation Cycle | $0.1 \mathrm{~s}-3000.0 \mathrm{~s}$ | 0.1 s | 10.0 s |  |
| $11-04$ | Wobbulation Triangular <br> Wave Rise Time | $0.1 \%-100.0 \%$ | $0.1 \%$ | $50.0 \%$ |  |
| $11-05$ | Set Length | $0 \mathrm{~m}-65535 \mathrm{~m}$ | 0 m | 1000 m |  |
| $11-06$ | Actual Length | $0 \mathrm{~m}-65535 \mathrm{~m}$ | 0 m | 0 m |  |
| $11-07$ | Pulse Count Per Meter | $0.1-6553.5$ | 0.1 | 100.0 |  |

The above function codes are used to control the fixing length.
Length information shall be collected through multi-function numeric input terminal. By dividing the number of pulse by the pulse count per meter 11-07, actual length 11-06 can be calculated. When the actual length is greater than the set length 11-05, multi-function numeric DO outputs "length reach" On signal.

During fixing length control process, length reset operation can be realized through multi-function DI terminal. Refer to P4-00-P4-09 for details.

During application, it is required to set corresponding input terminal function as "length count input". Make sure to use DI5 port for higher pulse frequency.

When the offset between PID command and feedback is lower than the setting value of this function code, PID regulator stops regulation and PID output remains unchanged. For some occasions, increase PID regulation stability.

The correspondence between the offset limit and output frequency is as shown in the figure below:


PID Offset Limit Schematic Diagram

| $10-10$ | PID Differential Limit | $0.0 \%-100.0 \%$ | $0.01 \%$ | $0.10 \%$ |
| :--- | :--- | :--- | :--- | :--- |
| $10-11$ | PID Setting Change Time | $0.00-650.00 \mathrm{~s}$ | 0.01 s | 0.00 s |
| $10-12$ | PID Feedback Filter Time | $0.00-60.00 \mathrm{~s}$ | 0.01 s | 0.00 s |
| $10-13$ | PID Output Filter Time | $0.00-60.00 \mathrm{~s}$ | 0.01 s | 0.00 s |
| $10-15$ | Proportional Gain P2 | $0.0-100.0$ | 0.1 | 20.0 |
| $10-16$ | Integral Time I2 | $0.01 \mathrm{~s}-10.00 \mathrm{~s}$ | 0.01 s | 2.00 s |
| $10-17$ | Differential Time D2 | $0.000 \mathrm{~s}-10.000 \mathrm{~s}$ | 0.001 s | 0.000 s |
| $10-18$ | PID Parameter Switching <br> Condition | 0: No switching <br> 1: DI terminal <br> 2: Automatic switching by offset <br> 3: Automatic switching by running <br> frequency | 1 | 0 |
| $10-19$ | PID Parameter Switching <br> Offset 1 | $0.0 \%-10-20$ | $0.1 \%$ | $20.0 \%$ |
| $10-20$ | PID Parameter Switching <br> Offset 2 | $10-19-100.0 \%$ | $0.1 \%$ | $80.0 \%$ |

By setting 10-18, two groups of independent PID control parameters can't be switched, or can be switched by DI terminal or automatically. When automatic switching is enabled for PID parameters, if the absolute value of offset value between the setting value and feedback is lower than PID parameter switching offset 1, PID control parameter selects PID parameter as 1 ; if the absolute value of offset value between the setting value and feedback is lower than PID parameter switching offset 2, PID control parameter selects PID parameter as 2; when the absolute value of the offset between the setting value and feedback is within PID switching offset 1 and PID switching offset 2, PID control parameter is the linear interpolation. See the figure below:


Automatic Switching Schematic Diagram of PID Parameters

| $11-08$ | Set Count Value | $1-65535$ | 1 | 1000 |
| :--- | :--- | :--- | :--- | :--- |
| $11-09$ | Designated Count Value | $1-65535$ | 1 | 1000 |

The count value shall be collected through the multi-function numeric input terminal. During application, it is required to set corresponding input terminal function as "counter input" (function code 25). Use DI5 port when there exists higher pulse frequency.
When the count value reaches to the set count value(11-08), multi-function numeric DO outputs "set count value reach" ON signal and then the counter stops counting.
When the count value reaches to the set count value (11-09), multi-function numeric DO outputs "set count value reach" ON signal and the counter continues to counting until reaching to the "set count value".

The designated count value 11-09 shall not be greater than the set count value 11-08. The following the schematic diagram of set count value reach and designated count value reach function.


Schematic Diagram for Setting of Set Count Value and Designated Count Vale

| P12 Group: Preset Command and Simple PLC |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :---: |
| $12-00$ | Preset Command 0 | $-100.0 \%-100.0 \%$ <br> $(100.0 \%$ corresponds to the maximum <br> frequency P0-10) | $0.1 \%$ | $0.0 \%$ |  |
| $12-01$ | Preset Command 1 | $-100.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |  |
| $12-02$ | Preset Command 2 | $-100.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |  |
| $12-03$ | Preset Command 3 | $-100.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |  |
| $12-04$ | Preset Command 4 | $-100.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |  |
| $12-05$ | Preset Command 5 | $-100.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |  |
| $12-06$ | Preset Command 6 | $-100.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |  |
| $12-07$ | Preset Command 7 | $-100.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |  |
| $12-08$ | Preset Command 8 | $-100.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |  |


| $12-09$ | Preset Command 9 | $-100.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |
| :--- | :--- | :--- | :--- | :--- |
| $12-10$ | Preset Command 10 | $-100.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |
| $12-11$ | Preset Command 11 | $-100.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |
| $12-12$ | Preset Command 12 | $-100.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |
| $12-13$ | Preset Command 13 | $-100.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |
| $12-14$ | Preset Command 14 | $-100.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |
| $12-15$ | Preset Command 15 | $-100.0 \%-100.0 \%$ | $0.1 \%$ | $0.0 \%$ |
| $12-16$ | Simple PLC Running <br> Mode | 0: Stop after single running <br> $1:$ Holding last value at stop after single <br> running <br> 2: Continuous cycle | 1 | 0 |
| $12-17$ | Simple PLC Power <br> Failure Memory Options | Ones place: Power failure memory <br> $0:$ Disabled <br> $1:$ Enabled <br> Tens place: Stop memory <br> $0:$ Disabled <br> $1:$ Enabled | 11 | 00 |

Simple PLC has two purposes: It can be used as frequency source or the voltage source of VF separation.

The following figure is the schematic diagram when simple PLC is used as frequency source. When it is used as frequency source, positive and negative value of 12-00-12-15 determine the running direction. When it is negative, the inverter runs at the reverse direction.


Simple PLC Schematic Diagram
When it is used as frequency source, PLC has three running modes below; but when it is used
as voltage source of VF separation, these three modes don't applicable.
0 : Stop after single running
The inverter stops running automatically after one single running cycle and can be started again upon receiving running command.

1: Holding last value at stop after single running
After one single running cycle, the inverter automatically maintains the running frequency and direction of the last section.

2: Continuous cycle
The inverter automatically enters the next cycle after one cycle and won't stop until receiving the stop command.

| 12-18 | Running Time of PLC Preset Command 0 | 0.0s(h)-6553.5s (h) | 0.1s(h) | 0.0s(h) |
| :---: | :---: | :---: | :---: | :---: |
| 12-19 | Acceleration/Deceleration Time Options of PLC Preset Command 0 | 0-3 | 1 | 0 |
| 12-20 | Running Time of PLC Preset Command 1 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-21 | Acceleration/Deceleration Time Options of PLC Preset Command 1 | 0-3 | 1 | 0 |
| 12-22 | Running Time of PLC Preset Command 2 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-23 | Acceleration/Deceleration Time Options of PLC Preset Command 2 | 0-3 | 1 | 0 |
| 12-24 | Running Time of PLC Preset Command 3 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-25 | Acceleration/Deceleration Time Options of PLC Preset Command 3 | 0-3 | 1 | 0 |
| 12-26 | Running Time of PLC Preset Command 4 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-27 | Acceleration/Deceleration Time Options of PLC Preset Command 4 | 0-3 | 1 | 0 |
| 12-28 | Running Time of PLC Preset Command 5 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-29 | Acceleration/Deceleration Time Options of PLC Preset Command 5 | 0-3 | 1 | 0 |
| 12-30 | Running Time of PLC Preset Command 6 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-31 | Acceleration/Deceleration | 0-3 | 1 | 0 |


|  | Time Options of PLC Preset Command 6 |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| 12-32 | Running Time of PLC Preset Command 7 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-33 | Acceleration/Deceleration Time Options of PLC Preset Command 7 | 0-3 | 1 | 0 |
| 12-34 | Running Time of PLC Preset Command 8 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-35 | Acceleration/Deceleration <br> Time Options of PLC <br> Preset Command 8 | 0-3 | 1 | 0 |
| 12-36 | Running Time of PLC Preset Command 9 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-37 | Acceleration/Deceleration Time Options of PLC Preset Command 9 | 0-3 | 1 | 0 |
| 12-38 | Running Time of PLC Preset Command 10 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-39 | Acceleration/Deceleration Time Options of PLC Preset Command 10 | 0-3 | 1 | 0 |
| 12-40 | Running Time of PLC Preset Command 11 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-41 | Acceleration/Deceleration Time Options of PLC Preset Command 11 | 0-3 | 1 | 0 |
| 12-42 | Running Time of PLC Preset Command 12 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-43 | Acceleration/Deceleration <br> Time Options of PLC <br> Preset Command 12 | 0-3 | 1 | 0 |
| 12-44 | Running Time of PLC Preset Command 13 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-45 | Acceleration/Deceleration <br> Time Options of PLC <br> Preset Command 13 | 0-3 | 1 | 0 |
| 12-46 | Running Time of PLC Preset Command 14 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |
| 12-47 | Acceleration/Deceleration <br> Time Options of PLC <br> Preset Command 14 | 0-3 | 1 | 0 |
| 12-48 | Running Time of PLC Preset Command 15 | 0.0s(h)-6553.5s(h) | 0.1s(h) | 0.0s(h) |


| $12-49$ | Acceleration/Deceleration <br> Time Options of PLC <br> Preset Command 15 | $0-3$ | 1 | 0 |
| :--- | :--- | :--- | :--- | :--- |
| $12-50$ | Unit of PLC Running <br> Time | 0:s (second) <br> 1: h (hour) | 1 | 0 |
| $12-51$ | Preset Command <br> Setting Mode | 0: Function code 12-00 setting <br> 1: AI1 <br> 2: AI2 <br> 3: AI3 <br> 4: PULSE <br> 5: PID <br> 6: Preset frequency (P0-08) setting, <br> modified by UP/DOWN | 1 | 0 |


| 13 Group: Communication Parameter |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| 13-00 | Communication Baud <br> Rate | Ones place: MODBUS <br> 0: 300BPS <br> 1: 600BPS <br> 2: 1200BPS <br> 3: 2400BPS <br> 4: 4800BPS <br> 5: 9600BPS <br> 6: 19200BPS <br> 7: 38400BPS <br> 8: 57600BPS <br> 9: 115200BPS <br> Tens place: Profibus-DP <br> 0: 115200BPs <br> 1: 208300BPs <br> 2: 256000BPs <br> 3: 512000BPs <br> Hundreds place: Not used <br> Thousands place: CANLink baud rate <br> 0: 20 <br> 1: 50 <br> 2: 100 <br> 3: 125 <br> 4: 250 <br> 5: 500 <br> 6: 1M | 1 | 5005 |
| 13-01 | Data Format | 0 : No parity (8-N-2) <br> 1: Even parity (8-E-1) <br> 2: Odd parity ( $8-0-1$ ) <br> 3: Disabled (8-N-1)(works for | 1 | 0 |


|  |  | MODBUS) |  |  |
| :---: | :---: | :---: | :---: | :---: |
| 13-02 | Local Inverter Address | 0 : Broadcasting address <br> 1-247 (works for MODBUS, <br> Profibus-DP, CANLink) | 1 | 1 |
| 13-03 | MODBUS Response Delay | $0-20 \mathrm{~ms}$ <br> (works for MODBUS) |  | 20 ms |
| 13-04 | Communication Overtime | 0.0s: Disabled <br> 0.1-60.0s <br> (works for MODBUS, Profibus-DP and CANLink) |  | 0.0 |
| 13-05 | (MODBUS, Profibus-DP <br> Communication s Data <br> Format | Ones place: MODBUS <br> 0 : Non-standard MODBUS protocol <br> 1: Standard MODBUS protocol <br> Tens place: Profibus-DP <br> 0: PP01 <br> 1: PP02 <br> 2: PP03 <br> 3: PP05 |  | 30 |
| 13-06 | Communication Read Current Resolution | $\begin{aligned} & 0: 0.01 \mathrm{~A} \\ & 1: 0.1 \mathrm{~A} \end{aligned}$ |  | 0 |
| 13-08 | Expansion Card <br> (PROFIBUS CANOPEN) <br> Disconnection Detection <br> Time  | $\begin{aligned} & 0.0 \text { disabled } \\ & 0.1 \mathrm{~s}-60.0 \end{aligned}$ |  | 0 |
| 16 Group: User Password |  |  |  |  |
| 16-00 | User Password | 0-65535 | 1 | 0 |
| 16-01 | Parameter Initialization | 0 : No operation <br> 01: Reset the default, excluding motor parameter <br> 02: Clear record information | 1 | 0 |


| b0 Group: Torque Control and Limit Parameter |  |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :---: | :---: |
| b0-00 | Speed/Torque <br> Mode Options | Control | 0: Speed control <br> $1:$ Torque control | 1 |  |  |

The control mode of inverter is selected by these two function codes: Speed control or torque control.

PD 1000 multi-function numeric DI terminal has two functions related to torque control: Torque control disabled (function 29), speed control/torque control switching (function 46). These two terminals must be used together with b0-00 to realize switching between the speed control and torque torque.

When the speed control/torque control switching terminal is disabled, the control mode is determined by b0-00; if the speed control/torque control switching terminal is enabled, the control
mode is the reverse of b0-00.
Under all conditions, when the torque control disabled terminal is enabled, the control mode of inverter is fixed as the speed control mode.

| b0-01 | Torque Setting Source Options under Torque Control Mode | 0 : Numeric setting 1(b0-03) <br> 1: AI1 <br> 2: AI2 <br> 3: AI3 <br> 4: PULSE <br> 5: Communication setting <br> 6: MIN (AI1, AI2) <br> 7: MAX (AI1, AI2) | 1 | 0 |
| :---: | :---: | :---: | :---: | :---: |
| b0-03 | Torque Numeric Setting under Torque Control Mode | -200.0\%-200.0\% |  | 0 |

b0-01 is used to select the torque setting source. There are eight torque setting modes.
Torque setting adopts the relative value and $100.00 \%$ corresponds to the inverter rated torque. Its setting range is $-200.0 \%-200.0 \%$, which means the maximum torque of the inverter is twice of the inverter rated torque.

When the torque setting adopts mode 1 to $7,100 \%$ of communication, analog input and pulse input correspond to b0-03.

| b0-05 | Torque Control Forward <br> Maximum Frequency | 0.00 Hz -maximum frequency (P0-10) | 50.00 Hz |
| :--- | :--- | :--- | :--- | :--- |
| b0-06 | Torque Control Reverse <br> Maximum Frequency | 0.00 Hz -maximum frequency (P0-10) | 50.00 Hz |

The upper limit frequency for torque control is used to set the maximum forward or reverse running frequency of inverter under the torque control mode

In the torque control mode, if the load torque is less than motor output torque, motor speed will rise continuously. The maximum speed of motor must be limited in this mode to prevent any runaway accident of the mechanical system.

| b0-07 Control | Torque <br> Acceleration Time | $0.00 \mathrm{~s}-65000 \mathrm{~s}$ | 0.00 s |
| :--- | :--- | :--- | :--- | :--- |
| b0-08 Control | Torque <br> Deceleration Time | $0.00 \mathrm{~s}-65000 \mathrm{~s}$ | 0.00 s |

Under the torque control mode, the difference of motor output torque and the load torque determines the speed change rate of motor and load. Therefore, the motor rotation speed may change quickly, thus causing noise or excessive mechanical stress. Setting torque control acceleration/deceleration time could make the motor speed change smoothly.

For occasions requiring rapid response of torque, it is required to set the torque control acceleration/deceleration time as 0.00 s.

For example: To ensure uniform load distribution when two motors bear one load, set one inverter as the master that adopts speed control mode while the other inverter is set as slave adopting the torque control mode. The actual output torque of master is used as the torque
command of slave. At this time, the torque of slave shall follow the master quickly so the torque control acceleration/deceleration time of slave is 0.00 s.

| b2 Group : Optimized Parameter for Motor 2 Control |  |  |  |
| :---: | :---: | :---: | :---: |
| b2-00 | Motor Type Options | 0: Common induction motor <br> 1: Inverter induction motor | 0 |
| b2-01 | Motor Rated Power | $0.1 \mathrm{~kW}-1000.0 \mathrm{~kW}$ | Up to specific model |
| b2-02 | Motor Rated Voltage | 1V-2000V | Up to specific model |
| b2-03 | Motor Rated Current | $0.01 \mathrm{~A}-655.35 \mathrm{~A}$ (inverter power $\leq 55 \mathrm{~kW}$ ) <br> $0.1 \mathrm{~A}-655.35 \mathrm{~A}$ (inverter power $>55 \mathrm{~kW}$ ) | Up to specific model |
| b2-04 | Motor Rated Frequency | 0.01 Hz -maximum frequency | Up to specific model |
| b2-05 | Motor Rated Rotation Speed | 1rpm-65535rpm | Up to specific model |
| b2-06 | Stator Resistance of Induction Motor | $0.001 \Omega-65.535 \Omega$ $\quad$ (inverter <br> power $\leq 55 \mathrm{~kW}$ )  <br> $0.0001 \Omega-6.5535 \Omega$ (inverter power $>$ <br> 55 kW )  | Up to specific model |
| b2-07 | Rotor Resistance of Induction Motor | $0.001 \Omega-65.535 \Omega$   <br> power $\leq 55 \mathrm{~kW}$ )   <br> $0.0001 \Omega-6.5535 \Omega$ (inverter  <br> 55 kW )   | Up to specific model |
| b2-08 | Leakage Inductance of Induction Motor | ```0.01mH-655.35mH(inverter power }\leq55\textrm{kW} 0.001mH-65.535mH (inverter power> 55kW)``` | Up to specific model |
| b2-09 | Mutual Inductance of Induction Motor | ```0.1mH-6553.5mH(inverter power\leq55kW) 0.01mH-655.35mH (inverter power > 55kW)``` | Up to specific model |
| b2-10 | Idling Current of Induction Motor | $0.01 \mathrm{~A}-\mathrm{A} 2-03$ (inverter power $\leq 55 \mathrm{~kW}$ ) <br> $0.1 \mathrm{~A}-\mathrm{A} 2-03$ (inverter power $>55 \mathrm{~kW}$ ) | Up to specific model |
| b2-27 | Encoder Line Number | 1-65535 | 1024 |
| b2-28 | Encoder Type | 0: ABZ Incremental encoder <br> 2: Rotary transformer | 0 |
| b2-29 | Speed Feedback PG <br> Options   | $\begin{aligned} & \text { 0: Local PG } \\ & \text { 1: Expansion PG } \\ & \text { 2: Pulse input (DI5) } \end{aligned}$ | 0 |
| b2-30 | ABZ Incremental Encoder <br> AB Phase Sequence | 0: Forward <br> 1: Reverse | 0 |
| b2-31 | Installation Angle of Encoder | 0.0-359.9 ${ }^{\circ}$ | $0.0{ }^{\circ}$ |
| b2-34 | Rotary Transformer | 1-65535 | 1 |


|  | Pole-Pairs |  |  |
| :---: | :---: | :---: | :---: |
| b2-36 | Speed Feedback PG Disconnection Detection Time | $\begin{aligned} & \text { 0.0: No action } \\ & 0.1 \mathrm{~s}-10.0 \mathrm{~s} \end{aligned}$ | 0.0 |
| b2-37 | Tuning Options | 0: No operation <br> 1: Tuning of stationary parameters of induction motor <br> 2: Dynamic full tuning of induction motor <br> 3: Stationary full tuning of induction motor | 0 |
| b2-38 | Speed Loop Proportional Gain 1 | 1-100 | 30 |
| b2-39 | Speed Loop Integral Time 1 | 0.01s-10.00s | 0.50s |
| b2-40 | Switching Frequency 1 | 0.00-b2-43 | 5.00 Hz |
| b2-41 | Speed Loop Proportional Gain 2 | 1-100 | 20 |
| b2-42 | Speed Loop Integral Time $2$ | 0.01s-10.00s | 1.00s |
| b2-43 | Switching Frequency 2 | b2-40- maximum frequency | 10.00 Hz |
| b2-44 | Vector Control Slip Gain | 50\%-200\% | 100\% |
| b2-45 | SVC Torque Filter Constant | 0.000s-0.100s | 0.000s |
| b2-47 | Upper Limit of Speed Control Torque |  | 0 |
| b2-48 | Numeric Setting of Torque Upper Limit under Speed Control Mode | 0.0\%-200.0\% | 150.0\% |
| b2-49 | Torque Upper Limit Command Options under Speed Control (Electricity Generation) | ```0 : Function code P2-10 setting 1: AI1 2: AI2 3: AI3 4: PULSE 5: Communication setting 6: MIN (AI1, AI2) 7: MAX (AI1, AI2)``` |  |



|  |  | depth |  |
| :---: | :---: | :---: | :---: |
| b5-04 | Enable Rapid Current Limit | 0: Disabled <br> 1: Enabled | 1 |
| b5-05 | Maximum Output Voltage Factor | 100-110\% | 105\% |
| b5-06 | Undervoltage Point Setting | $210-420 \mathrm{~V}$ | 350 V |
| b5-07 | SVC Optimized Mode Options | 1: Optimized mode 1 <br> 2: Optimized mode 2 | 1 |
| b5-08 | Deadband Time Adjustment | 100\%-200\% | 150\% |
| b5-09 | Overvoltage Point Setting | $200.0 \mathrm{~V}-2500.0 \mathrm{~V}$ | Up to specific model |
| b8 Group: Point-to-Point Communication |  |  |  |
| b8-00 | Point-to-Point <br> Communication Function <br> Options | 0: Disabled <br> 1: Enabled | 0 |
| b8-01 | Master-Slave Options | 0: Master <br> 1: Slave | 0 |
| b8-02 | Slave $r$ Command <br> Following Master-Slave <br> Information Interaction | Ones place: Slave command following <br> 0 : Slave doesn't follow the master running command <br> 1: Slave follows the master running command <br> Tens place: Slave fault information transmission <br> 0 : No transmission of slave fault information <br> 1: Transmission of slave fault information <br> Hundreds place: Master displays slave offline <br> 0 : Master doesn't report fault at slave offline <br> 1: Master reports fault at slave offline | 011 |
| b8-03 | Slave Receiving Data Action Options | 0 : Torque setting <br> 1: Frequency setting | 0 |
| b8-04 | Received Data Zero Offset (Torque) | -100.00\%-100.00\% | 0.00\% |
| b8-05 | Received Data Gain <br> (Torque) | -10.00\%-100.00\% | 1.00 |
| b8-06 | Point-to-Point <br> Communication | 0.0-10.0s | 1.0s |


|  | Disconnection Detection <br> Time |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| b8-07 | Point-to-Point <br> Communication Master <br> Data Sending Period | $0.001-10.000 \mathrm{~s}$ | 0.001 s |  |
| b8-08 | Received Data Zero <br> Offset (Frequency) | $-100.00 \%-100.00 \%$ | $0.00 \%$ |  |
| b8-09 | Received Data Gain <br> (Frequency) | $-10.00-100.00$ | $1.0 \%$ |  |
| b8-10 | Anti-slip Factor | $0.00 \%-100.00 \%$ | $10.00 \%$ |  |

## Chapter 7 Fault Diagnosis \& Troubleshooting

## Fault diagnosis \& troubleshooting

The inverter has multiple warning information and protection functions, such as overvoltage, undervoltage and overcurrent. In case of abnormality, the inverter enables protection function and stops output. Abnormal contact acts and the motor will roast to stop. Please refer to corresponding fault cause and handling methods.

| Fault | Operatio <br> n panel <br> display | Fault cause | Troubleshooting |
| :---: | :---: | :---: | :---: |
| Overcurrent under constant speed | OCN | 1. Output circuit of inverter grounded or short circuited <br> 2. Vector control mode and without parameter tuning <br> 3. The voltage is too low <br> 4. If there exists impact load during running <br> 5. Inverter power is too small | 1. Troubleshoot external fault <br> 2. Carry out motor parameter tuning <br> 3. Adjust the voltage to normal range <br> 4. Cancel the impact load <br> 5. Select the inverter of higher power level |
| Overvoltage under constant speed | OUN | 1. High input voltage <br> 2. During running, there exists external force driving the motor | 1. Adjust the voltage to normal range <br> 2. Cancel the external power or install braking resistor |
| Inverter unit protection | SC | 1. Output circuit of inverter is short circuited <br> 2. Wiring of motor and inverter is too long <br> 3. Module overheating <br> 4. Internal wiring of inverter looses <br> 5. Master control board abnormality <br> 6. Driver board abnormality <br> 7. Variable module abnormality | 1. Troubleshoot external fault <br> 2. Install inductor or output filter <br> 3. Check if the duct is blocked, if the fan runs normally and troubleshoot existing problems <br> 4. Connect all wires properly <br> 5. Ask for technical support <br> 6. Ask for technical support <br> 7. Ask for technical support |
| Overvoltage | OUA | 1.Input voltage is too high | 1. Adjust the voltage to normal range |


| under acceleration |  | 2. During running, there exists external force driving the motor <br> 3. Too short acceleration time <br> 4. There is no braking unit and braking resistor | 2. Cancel the external power or instal braking resistor <br> 3. Increase the acceleration time <br> 4. Install braking unit and resistor. |
| :---: | :---: | :---: | :---: |
| Overcurrent under deceleration | OCD | 1. Output circuit of inverter grounded or short circuited <br> 2. Vector control mode and without parameter tuning <br> 3. Short deceleration time <br> 4. Too low voltage <br> 5. Impact load during running <br> 6. There is no braking unit and braking resistor | 1. Troubleshoot external fault <br> 2. Carry out motor parameter tuning <br> 3. Increase the deceleration time <br> 4. Adjust the voltage to normal range <br> 5. Cancel the impact load <br> 6. Install braking unit and resistor. |
| Overcurrent <br> under <br> acceleration | OCA | 1. Output circuit grounded or short circuited <br> 2. Vector control mode and without parameter tuning <br> 3. Too short acceleration time <br> 4. Manual torque boost or V/F curve is not applicable <br> 5. Too low voltage <br> 6. Start the motor in rotation <br> 7. There exists impact load during acceleration process <br> 8. Inverter power is too small | 1. Troubleshoot external fault <br> 2. Carry out motor parameter tuning <br> 3. Increase the acceleration time <br> 4. Adjust the manual boost torque or V/F curve <br> 5. Adjust the voltage to normal range <br> 6. Select the rotation speed tracking staart or restart after the motor stops. <br> 7. Cancel the impact load. <br> 8. Select the inverter with higher power level |
| Overvoltage under deceleration | OUD | 1.Input voltage is too high <br> 2. During running, there exists external force driving the motor <br> 3. Too short acceleration time <br> 4. There is no braking unit and braking resistor | 1. Adjust the voltage to normal range <br> 2. Cancel the external power or instal braking resistor <br> 3. Increase the acceleration time <br> 4. Install braking unit and resistor. |
| Motor load | OL1 | 1. If motor protection parameter P9-01 is set properly <br> 2. If the load is too large or there exists motor stalling <br> 3. The inverter power is too small | 1. Set this parameter correctly <br> 2. Reduce the load and check the motor and mechanical conditions <br> 3. Select the inverter with higher power level |
| Control power fault | UU | 1. The input voltage is not within the specified range | 1. Adjust the voltage to the range specified by the specification |
| Module overheating | OH1 | 1. Ambient temperature is too high <br> 2. Air duct is blocked <br> 3.Fan damaged <br> 4. Module thermistor is damaged | 1.Lower the ambient temperature <br> 2. Clean the air duct <br> 3.Replace the fan <br> 4. Replace the thermistor |


|  |  | 5. Inverter module is damaged | 5. Replace the inverter module |
| :---: | :---: | :---: | :---: |
| Undervoltage fault | LU | 1. Instantaneous power failure <br> 2. Input voltage of inverter is not within the range specified by the specification <br> 3. Bus voltage is unabnormal <br> 4. Rectifier bridge and buffer resistor run abnormally <br> 5. Driving failure <br> 6. Control board failure | 1. Reset the fault <br> 2. Adjust the range to normal range <br> 3. Ask for technical support <br> 4. Ask for technical support <br> 5. Ask for technical support <br> 6. Ask for technical support |
| Inverter overload | OL2 | 1. The load is too large <br> 2. The inverter power is too small | 1. Reduce the load and check the motor and mechanical conditions <br> 2. Select the inverter with higher power level |
| EEPROM read failure | EP | 1. EEPROM chip is damaged | 1. Replace the master control board |
| Accumulated power-on time reach fault | UT | 1. Accumulated power-on time reaches to the setting value | 1. Enable parameter initialization function to clear the record information. |
| External equipment fault | EF | 1. Input external fault signal through multi-function terminal DI <br> 2. Input external fault signal through virtual IO function | 1. Reset running <br> 2. Reset running |
| Inverter <br> hardware fault | EH | 1. There exists overvoltage <br> 2. There exists overcurrent | 1. Troubleshoot according to overvoltage fault <br> 2. Troubleshoot according to overcurrent fault |
| Communicatio n fault | CE | 1. PC runs abnormally <br> 2. Communication wire runs abnormally <br> 3. 13 group of communication parameters are incorrect | 1. Check the PC wiring <br> 2. Check the communication wiring <br> 3. Set communication parameters correctly |
| Accumulated running time reach fault | OT | 1. Accumulated running time reaches to the setting value | 1. Use parameter initialization function to clear the record information. |
| Offload fault | LL | 1. Inverter running current is lower than the value set by P9-64 | 1. Confirm if motor is disconnected from the load or P9-64 and P9-65 conform to actual running condition. |
| Contactor fault | RL | 1. Driver board and power supply failure <br> 2. Contactor failure | 1. Replace the driver board or power panel <br> 2. Replace the contactor |
| Motor tuning fault | ER | 1. Motor parameters aren't set according to the nameplate <br> 2. Overtime of parameter tuning | 1. Set motor parameters correctly according to the nameplate <br> 2. Check the leading wire from inverter to |


|  |  | process | the motor |
| :---: | :---: | :---: | :---: |
| Motor overtemperatur e fault | OH 2 | 1. Temperature sensor wiring looses <br> 2. Motor overtemperature | 1. Detect the temperature sensor wiring and troubleshoot fault <br> 2. Lower down the carrier frequency or take other radiation measures to cool down the motor |
| Current detection fault | CC | 1. Check hall element abnormality <br> 2. Driving board failure | 1. Replace hall elements <br> 2. Replace the driving board |
| Short circuited to ground failure | GF | 1. Motor short circuited to the ground | 1. Replace cable or motor |
| PID feedback loss fault during running | PD | 1. PD feedback is lower than the setting value of 10-28 | 1. Check the PID feedback signal or set 10-28 properly |
| High speed offset fault | DEV | 1. Encoder parameters are set incorrectly <br> 2. No parameter tuning | 1. Set encoder parameter correctly <br> 2. Carry out motor parameter tuning <br> 3. Set detection parameter reasonably according to actual condition. |
| Encoder fault | PG | 1. Encoder model doesn't match <br> 2. Encoder wiring is wrong <br> 3. Encoder is damaged <br> 4. PG card abnormality | 1. Set the encode type correctly according to actual condition <br> 2. Troubleshoot the wire fault <br> 3. Replace the encoder <br> 4. Replace PG card |
| Motor overspeed fault | OS | 1. Encoder parameters are set incorrectly <br> 2. No parameter tuning <br> 3. Detection parameter of motor overspeed P6-69 and P6-60 | 1. Set the encoder parameter correctly <br> 2. Carry out motor parameter tuning <br> 3. Set detection parameter reasonably according to actual condition. |
| $\begin{aligned} & \text { Output phase } \\ & \text { loss } \end{aligned}$ | LF | 1. The leading wire from the inverter to the motor is abnormal <br> 2. 3-phase output unbalance during motor running <br> 3. Driver board abnormality <br> 4. Module abnormality | 1. Troubleshoot external fault <br> 2. Check if the 3 -phse winding of motor runs normally and troubleshoot the fault <br> 3. Ask for technical support <br> 4. Ask for technical support |
| Pulse-by-pulse current limit | LC | 1. If there exists large load or motor stalling <br> 2. The inverter power is too low | 1. Reduce the load and check the motor and mechanical conditions <br> 2. Select the inverter with higher power level |

Chapter 8 Specification

## Standard specification

| Model PD 1000 |  | Specification |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 220 V | Motor <br> capacity <br> (HP) | 0.5 | 1 | 2 | 3 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 75 | 100 |  |  |  |  |  |  |  |  |  |
|  | Rated <br> power <br> (KW) | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 |  |  |  |  |  |  |  |  |  |
|  | Rated capacity (KVA) | 1.5 | 3.0 | 4.0 | 5.9 | 8.9 | 17 | 21 | 30 | 40 | 57 | 69 | 85 | 114 | 134 | 160 | 231 |  |  |  |  |  |  |  |  |  |
|  | Rated current <br> (A) | 2.1 | 3.8 | 4.8 | 9.0 | 13 | 25 | 32 | 45 | 60 | 75 | 91 | 112 | 150 | 176 | 210 | 304 |  |  |  |  |  |  |  |  |  |
| 380 V | Motor capacity (HP) |  | 1 | 2 | 3 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 75 | 100 | 120 | 150 | 180 | 200 | 270 | 300 | 340 | 380 | 428 |
|  | Rated <br> power <br> (KW) |  | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | 132 | 160 | 200 | 220 | 250 | 280 | 315 |
|  | Rated capacity |  | 1.5 | 3.0 | 4.0 | 5.9 | 8.9 | 11 | 17 | 21 | 24 | 30 | 40 | 57 | 69 | 85 | 114 | 134 | 160 | 192 | 231 | 250 | 280 | 355 | 396 | 445 |

$\qquad$


| Personalized function | Rapid current limit function | Minimize overcurrent fault to ensure the inverter run normally |
| :---: | :---: | :---: |
|  | Torque limit and control | With characteristics of "excavator", automatically restrict the torque during running to frequent overcurrent from causing overvoltage tripping |
|  | Safety self-inspection of peripheral equipment upon power on | The inverter can carry out safety detection against peripheral equipment upon power on, such as grounding, short circuit. |
|  | Common DC bus function | Common DC bus function can be shared by multiple inverters. |
|  | Textile wobble control | Multiple triangular wave frequency control function |
|  | Timed control | Timed control function: Setting time range 0h-65535h |
| Running | Running command channel | 3 channels: Operation panel setting, control terminal setting, serial communication port setting, which can be switched by multiple modes. |
|  | Frequency source | 10 frequency sources in total: Numeric setting, analog voltage setting, analog current setting, pulse setting, serial port setting, which can be switched by multiple modes. |
|  | Auxiliary frequency source | 10 kinds of auxiliary frequency sources. It can flexibly realize fine tuning and frequency synthesis of auxiliary frequency. |
|  | Input terminal | 6 numeric input terminals; one of them can be used as high-pulse input, with the maximum value up to 100 KHz . 3 analog input terminals; two of them are used as voltage input while another is used as voltage or current input. |
|  | Output terminal | One high-speed pulse output terminal (can be selected as open collector); $0 \mathrm{kHz}-100 \mathrm{kHz}$ square wave signal output. It can realize output of physical quantity, such as the setting frequency and output frequency. <br> 1 numeric output terminals <br> 2 Relay output terminals <br> 1 analog output terminal. $0 / 4 \mathrm{~mA}-20 \mathrm{~mA}$ or $0 / 2-10 \mathrm{~V}$ optional respectively. Setting frequency, output frequency and physical quantity output can be realized. |
| Environment | Operation place | Indoor, without direct sunlight, dust, corrosive gas, flammable gas, oil mist, vapor, water drop or salt, etc. |
|  | Altitude | Lower than 1000 m |
|  | Ambient temperature | $-10^{\circ} \mathrm{C}-+40^{\circ} \mathrm{C}$ (ambient temperature is within $40^{\circ} \mathrm{C}-50^{\circ} \mathrm{C}$, it must be derated) |
|  | Humidity | Lower than $95 \%$ RH, no water condenses |
|  | Vibration | Less than $5.9 \mathrm{~m} / \mathrm{s}^{2}(0.6 \mathrm{~g})$ |
|  | Storage temperature | $-20^{\circ} \mathrm{C}-+60^{\circ} \mathrm{C}$ |

## Chapter 9 Appendix

## Appendix I: Overall Dimension

Dimension of $0.4 \mathrm{kw}-3.7 \mathrm{~kW}$ model (mm)


| Model |  | Voltage grade | H | H1 | W | W1 | D | D1 | D2 | Pore <br> diameter |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| PD 1000-0R4 | PD 1000-0R7 |  |  |  |  |  |  |  |  |  |
| PD 1000-1R5 | PD 1000-2R2 | AC220V |  |  |  |  |  |  |  |  |
| PD 1000-0R7 | PD 1000-1R5 | AC440V | 185 | 173.25 | 125 | 115 | 163.5 | 160.5 | 81.5 | M4 |
| PD 1000-2R2 | PD 1000-3R7 |  |  |  |  |  |  |  |  |  |

Dimension of $5.5 \mathrm{kw}-7.5 \mathrm{kw}$ model (mm)
$\qquad$


Dimension of $11 \mathrm{kw}-15 \mathrm{kw}$ model (mm)


| Model | Voltage <br> grade | H | H1 | W | W1 | D | D1 | D2 | Pore <br> diameter |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| PD 1000-7R5 |  | AC220V | 330 | 314 | 221 | 195 | 213.5 | 205.5 |  | M6 |
|  |  |  |  |  |  |  |  |  |  |  |

$\qquad$

Dimension of $18.5 \mathrm{kw}-132 \mathrm{kw}$ model (mm)


| Model |  | Voltage grade | H | H1 | W | W1 | D | D1 | Pore diameter |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| PD 1000-018 | PD 1000-022 | AC440V | 463 | 447 | 285 | 225 | 232 | 223 | M8 |
| PD 1000-030 |  |  |  |  |  |  |  |  |  |
| PD 1000-037 | PD 1000-045 |  | 692 | 589 | 329.5 | 179.5 | 276.5 | 266.5 | M8 |
| PD 1000-055 |  |  |  |  |  |  |  |  |  |
| PD 1000-075 |  |  | 727 | 687 | 375 | 225 | 307 | 297 | M8 |
| PD 1000-090 | PD 1000.110 |  | 782 | 742 | 460 | 310 | 345 | 335 | M8 |
| PD 1000-132 |  |  |  |  |  |  |  |  |  |

Dimension of $160 \mathrm{kw}-185 \mathrm{kw}$ model (wall-mounted) (mm)


Notes: External wall-mounted DC reactor

| Model | Voltage <br> grade | H | H1 | W | W1 | W2 | D | D1 | Pore <br> diameter |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| PD 1000160 | AC440V | 1063 | 1048 | 490 | 290 |  | 376 | 366 | M10 |
| PD 1000-185 |  |  |  |  |  |  |  |  |  |

Dimension of $160 \mathrm{kw}-185 \mathrm{kw}$ model (cabinet-mounted ) (mm)
$\qquad$


Dimension of 200kw-355kw model (wall-mounted) (mm)


Notes: External DC reactor

| Model | Voltage <br> grade | H | H1 | W | W1 | D | D1 | Pore <br> diameter |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $y$ PD 1000-200 | PD 1000-220 | AC440V | 1110 | 1095 | 690 | 240 | 390 | 380 | M12 |
| PD 1000-250 | PD 1000-280 |  |  |  |  |  |  |  |  |
| PD 1000-315 | PD 1000-355 |  |  |  |  |  |  |  |  |

Dimension of $200 \mathrm{kw}-355 \mathrm{kw}$ model (cabinet-mounted) (mm)


| Model | Voltage <br> grade | H | H1 | W | W1 | W2 | D | D1 | D2 | Pore <br> diameter |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| PD 1000-200 | PD 1000-220 | AC440V | 1410 | 1395 | 690 | 240 | 630 | 390 | 380 | 307 | M12 |
| PD 1000-250 | PD 1000-280 |  |  |  |  |  |  |  |  |  |  |
| PD 1000-315 | PD 1000-355 |  |  |  |  |  |  |  |  |  |  |

## Appendix II: List of Optional Braking Resistors

Increasing external resistor can increase braking torque and the required braking torque depends on actual usage condition. Please select appropriate resistor from the following table according to inverter purpose and capacity:

| Inverter |  |  | Braking Unit |  | Braking Resistor |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Voltage | Maximum applicable <br> motor capacity | Inverter <br> model | Model <br> CDBR | Number of <br> units used | Resistor <br> specification | Number of <br> resistor |  |
|  | 0.4 | 0 P 44 |  |  | 70 W | $750 \Omega$ | 1 |
|  | 0.75 | 0 P 74 |  |  | 70 W | $750 \Omega$ | 1 |
|  | 1.5 | 0144 |  |  | 260 W | $400 \Omega$ | 1 |
|  | 2.2 | 0244 |  |  | 260 W | $250 \Omega$ | 1 |
|  | 3.7 | 0344 |  |  | 500 W | $150 \Omega$ | 1 |
|  | 5.5 | 0544 |  |  | 1000 W | $100 \Omega$ | 1 |
|  | 7.5 | 0744 |  |  | 1000 W | $75 \Omega$ | 1 |

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| 400 V | 15 | 1544 |  |  | 1000W | $80 \Omega$ | 2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 18.5 | 1844 | 4022B | 1 | 2500W | $64 \Omega$ | 2 |
|  | 22 | 2244 | 4030B | 1 | 2500W | $54.4 \Omega$ | 2 |
|  | 30 | 3044 | 4030B | 1 | 1500W | $80 \Omega$ | 4 |
|  | 37 | 3744 | 4045V | 1 | 2500W | $64 \Omega$ | 4 |
|  | 45 | 4544 | 4045B | 1 | 2500W | $54.4 \Omega$ | 4 |
|  | 55 | 5544 | 4055 V | 1 | 3000W | $50 \Omega$ | 5 |
|  | 75 | 7544 | 4075B | 1 | 2500W | $48 \Omega$ | 8 |
|  | 90 | 9044 | 4110 V | 1 | 2500W | $40 \Omega$ | 10 |
|  | 110 | 1104 | 4110 V | 1 | 2500W | $40 \Omega$ | 10 |
|  | 132 | 1324 | 4160B | 1 | 2500W | $48 \Omega$ | 12 |
|  | 160 | 1604 | 4160B | 1 | 2500W | $64 \Omega$ | 16 |
|  | 185 | 1854 | 4220B | 1 | 2500W | $80 \Omega$ | 20 |
|  | 220 | 2204 | 4220B | 1 | 2500W | $70 \Omega$ | 20 |
|  | 315 | 3154 | 4220B | 1 | 2500W | $56 \Omega$ | 32 |

## Appendix III: Optional Parts

| Code | Name | Model | Function |
| :--- | :--- | :--- | :--- |
| A | I/O expansion card | PD 1000IO | Three numerical input can be increased |
| B |  |  |  |
| C | CANopen communication <br> expansion card | PD 1000CAN <br> open | PD 1000 CANopen communication adapter <br> card |
| D | Profubs-DP communication <br> card | PD 1000PD | PD 1000)PD communication card |
| E | PG card of rotary <br> transformer | PD 1000 PG1 | Applicable to rotary encoder, excitation <br> frequency 10kHz, DB9 interface |
| F | PG card of UVW encoder | PD 1000IPG2 | Applicable to UVW differential encoder, <br> and applied to synchronous motor, <br> adapter power supply 5V |
| G | PG card of differential <br> encoder | PD 1000PG3 | Differential electrode encoder PG card, <br> adapter power supply 5V |
| H | PG card of open collector <br> encoder | PD 1000PG4 | PG card of open collector encoder, with <br> $1: 1$ frequency dividing output, adapter <br> 15 V power supply. |

A. I/O expansion card PD 1000 IO

1. Outlook of I/O expansion card

2. Function of control terminal

| Type | Terminal <br> Symbol | Terminal Name | Terminal Function |
| :--- | :--- | :--- | :--- |
| Power supply | +24 V -COM | External+24V | Offers +24 power source, generally used as <br> a working power supply for numeric input <br> and output terminals and an external sensor <br> power supply. Maximum output current: <br> 200mA. |
|  | Ev2 | Numeric input <br> power supply <br> terminal | EV2 has no power supply connection when <br> delivery. It is required to connect to <br> external power supply or +24V power <br> supply |


| Type | Terminal Symbol | Terminal Name | Terminal Function |
| :---: | :---: | :---: | :---: |
| Functional numeric input terminal | DI7-Ev2 | Numeric input 6 | 1. Optocoupler isolation, compatible with bipolar input <br> 2. Input impedance: $33 \mathrm{k} \Omega$ for DI7, DI8; $2.4 \mathrm{k} \Omega$ for DI8 <br> 3. Voltage range under level input: $9 \mathrm{~V}-30 \mathrm{~V}$ <br> 4. DI7 and DI8 are common input terminal, with input frequency $<100 \mathrm{~Hz}$; <br> DI9 is high-speed pulse input terminal, with maximum input frequency 100 kHz |
|  | DI8-Ev2 | Numeric input 7 |  |
|  | DI9-Ev2 | Numeric input 8 |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

C. CANopen communication expansion card PD 1000 CANopen

1. Outlook of CANopen communication expansion card

2. Function description of control terminal

| Type | Terminal Symbol | Terminal Name | Terminal Function |
| :--- | :--- | :--- | :--- |
| CAN <br> communication | CANH/CANL | Communication port <br> terminal | CANlink communication input <br> terminal |
|  | COM | CAN communication <br> power ground | Connecting to +24V ground <br> common mode choke |
| Program <br> burn-in | Sw1 program |  |  |

3. Description of jumper wire:

| Jumper wire no. | Description |
| :---: | :---: |
| J2 | terminal Select a matched end resistor <br> for CAN |

Notes: when using CAN communication, connect to the terminal resistance (jumper wire J2) for the inverter at the end.
4. Definition of dial code

| Actual dial code |  |  |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| ON SAB | 2 | 3 | 4 | 1 | ON SAB |  |  |
| 1 | 2 | Signal definition |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| 1 | 2 | 3 | 4 | 5 | 6 | 3 | 4 |

Description of dial code

| No. | Function | Description |  |  |
| :--- | :--- | :---: | :---: | :---: |
| $1-2$ | CAN bus baud rate | Bit 1 | Bit 2 | Baud rate |
|  |  | 0 | 0 | $125 \mathrm{~kb} / \mathrm{s}$ |
|  |  | 0 | 1 | $250 \mathrm{~kb} / \mathrm{s}$ |
|  |  | 1 | 0 | $500 \mathrm{~kb} / \mathrm{s}$ |
|  |  | 1 | 1 | $1000 \mathrm{~kb} / \mathrm{s}$ |
| $3-8$ | CANopen network ID number | 6-bit binary number forms 64 addresses, with |  |  |


|  |  | range $0-63$ |  |  |
| :--- | :--- | :--- | :--- | :--- |
|  |  | Address | switch setting |  |
|  | 0 | 00 | 0000 |  |
|  | 7 | 00 | 0111 |  |
|  | 20 | 01 | 0100 |  |

Notes: toggle the switch downward and this position is 1 ; otherwise, it is cleared
D. Profibus-DP communication expansion card PD 1000 PD

1. Outlook of Profibus-DP communication expansion card

2. Function of control terminal

| Type | Terminal Symbol | Terminal Name | Terminal Function |
| :--- | :--- | :--- | :--- |
| Profibus-DP <br> communication <br> terminal (J2) | 3 | B data cable | Anode of data cable |
|  | 4 | RTS | Request to send signal |
|  | 5 | GNDISO | Isolated 5V power ground |
|  | 6 | +5V-ISO | Isolated 5V power supply |
| CAN <br> communication <br> (J3, J9) <br> Program <br> burning | +5 V -ISO | CANH | Power supply |
|  | CANL | CAN positive input | Isolated 5V power supply |
|  | GND-ISO | CAN negative input |  |
|  | Sw1 | Power ground | Isolated 5V power ground |

3. Description of jumper wire:

| Jumper wire no. | Description |
| :---: | :---: |
| J6 | Select a matched end resistor for CAN |
| J8 | Select a matched end resistor for |
|  | Profibus |

4. Definition of dial code

| No. | Function | Description |  |  |
| :--- | :--- | :---: | :---: | :---: |
| 1 1-2 | Baud rate option of PG card and | Bit 1 | Bit 2 | Baud rate |
|  | inverter communication bus | OFF | OFF | $9.6 \mathrm{~kb} / \mathrm{s}$ |
|  |  | OFF | ON | $100 \mathrm{~kb} / \mathrm{s}$ |
|  |  | On | OFF | $200 \mathrm{~kb} / \mathrm{s}$ |
|  |  | ON | ON | $600 \mathrm{~kb} / \mathrm{s}$ |
| 8 | Profibus-DP communication slave | 6-bit binary number forms 64 addresses. Other |  |  |
|  | station address | addresses can only be set by function code. |  |  |
|  |  | The following lists some slave station address |  |  |
|  |  | and switch setting |  |  |
|  |  | Address | switch setting |  |
|  |  | 0 | 00 | 0000 |
|  |  | 7 | 00 | 0111 |
|  |  | 20 | 01 | 0100 |

5. Definition of LED indicator lamp

| LED indicator <br> lamp | Function definition | Description |
| :--- | :--- | :--- |
| Green | Power supply <br> indicator lamp | If DP card is connected to the inverter interface properly, <br> this LED indicator lamp shall be in normally-on status <br> after the inverter is powered on |
| Red | Indicator lamp for <br> connection of Dp <br> card and the <br> inverter serial port | When the DP card is connected to the inverter properly, <br> this indicator lamp is in normally-on status. When this <br> lamp flashes, it mean intermittent connection(there <br> exists interference); when it is off, it means Dp card <br> hasn't been connected to the inverter serial port properly <br> (check the setting of baud rate). |
| Yellow | Indicator lamp for <br> connection of Dp <br> card and Profibus <br> station | When DP card is connected to Profibus master station <br> normally, this lamp is in normally-on status; When this <br> lamp flashes, it means intermittent connection(there <br> exists interference); when it is off, it means Dp card <br> hasn't been connected to Profibus master station <br> (check the slave station address, data format and <br> Profibus cable connection). |

E. PG card A1000PG1 of rotary transformer

1. Outlook of PG card of rotary transformer

2. Description of specification and definition of wiring terminal signal

| PG card of rotary transformer |  |  |
| :--- | :--- | :--- |
| Specification |  |  |
| User interface | Terminal description |  |
| Symbol |  | DP9 female |
| No. | COS | Rotary transformer feedback COS + |
| 1 | - |  |
| 2 | SINLO | Rotary transformer feedback SIN - |
| 3 | EXC1 | Excitation - of rotary transformer |
| 4 | - |  |
| 5 | COSLO | Rotary transformer feedback COS- |
| 6 | SIN | Rotary transformer feedback SIN + |
| 7 | - |  |
| 8 | EXC | Rotary transformer excitation + |
| 9 |  |  |

G. PG card PD 1000 PG 3 of differential encoder

1. Outlook of PG card of differential encoder

2. Description of specification and definition of wiring terminal signal

|  | Differential PG card |
| :--- | :--- |
| Specification |  |
| User interface | Inclined terminal block |


| Definition of wiring terminal signal |  |  |
| :--- | :--- | :--- |
| No. | Symbol | Description |
| 1 | A+ | Encoder output A signal + |
| 2 | A- | Encoder output A signal - |
| 3 | B+ | Encoder output B signal + |
| 4 | B- | Encoder output B signal - |
| 5 | Z+ | Encoder output Z signal + |
| 6 | Z- | Encoder output Z signal - |
| 7 | +5 V | Offers 5V/100mA power supply |
| 8 | COM | Power ground |
| 9 | PE | Shielded wiring terminal |

H. PG card PD 1000)PG4 of open collector encoder

1. Outlook of PG card of open collector encoder

2. Description of specification and definition of wiring terminal signal

| Differential PG card |  |  |
| :--- | :--- | :--- |
| Specification |  |  |
| User interface | Inclined terminal block |  |
|  |  | Sefinition of wiring terminal signal |
| No. | A | Description |
| 1 | B | Encoder output signal A |
| 2 | Z | Encoder output signal B |
| 3 | 15 V | Encoder output signal Z |
| 4 | COM | Offers 5V/100mA power supply |
| 5 | COM | Power ground |
| 6 | A1 | Power ground |
| 7 | B1 | PG card 1:1 feedback output signal A |
| 8 | PE | PG card 1:1 feedback output signal B |
| 9 |  | Shielded wiring terminal |

