HD09 Series

Smart Inverter

User Manual

Single-phase 220 - 240V, 0.25 - 2.2kW

Three-phase 380 - 460V, 0.4 - 5.5kW

V1.1 2018.07

FOREWORD

Thank you for purchasing HD09 series smart inverter manufactured by Shenzhen Hpmont Technology Co., Ltd.

This User Manual describes how to use HD09 series inverters and their installation wiring, parameter setting, troubleshooting and daily maintenance etc.

Before using the product, please read through this User Manual carefully. In addition, please do not use this product until you have fully understood safety precautions.

Note:

- Preserve this Manual for future use.
- If you need the User Manual due to damage, loss or other reasons, please contact the regional distributor of our company or directly contact our company Technical Service Center.
- If you still have some problems during use, please contact our company Technical Service Center.
- Due to product upgrade or specification change, and for the purpose of improving convenience and accuracy of this manual, this manual's contents may be modified.
- Email address: **overseas_1@hpmont.com**

Version and Revision Records

Time: 2018/7

Version: V1.1

Revised chapter	Revised contents
	• Add F04.06 (Integral upper limit), F04.13 - F04.15 (PID regulator) • F15.19 / F15.20 (DO / Relay function) add: Overload signal (30) • AddF18.00 (Language selection), F19.38 (Phase short circuit detection action selection), F20.01 / F20.02 (overload pre-alarm function)

CONTENTS

Chapter 1 Safety Information

Safety Definition

Pay attention to contents with following marks in the user manual or on the product.

Danger

Danger: A Danger contains information which is critical for avoiding safety hazard.

Warning

Warning: A Warning contains information which is essential for avoiding a risk of damage to products or other equipements..

Note

Note: A Note contains information which helps to ensure correct operation of the product.

Professional Staff

Only qualified electrical engineer can perform electrical installation.

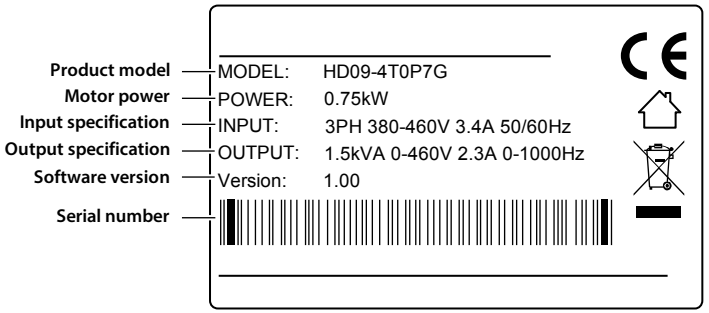
Only professional staff that received special training and authorized can carry out maintenances.

Chapter 2 Product Information

2.1 Nameplate

Nameplate Label

Name plate label is pasted on right side of the product. Its contents are shown in the following figure.

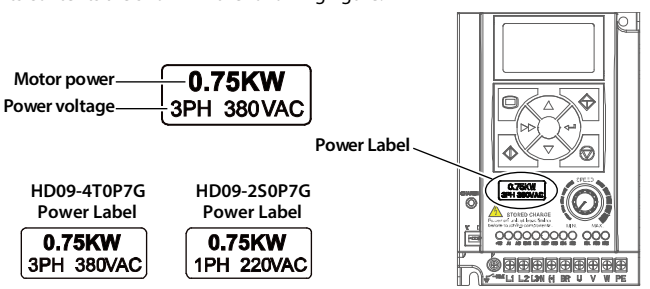


Power Label

Power label is below the keypad for recognizing the products easily and quickly.

Power label includes motor power and supply voltage. See 2.2 Rated Value, page 4.

Its contents are shown in the following figure.



2.2 Rated Value

Single-phase: 200 - 240V, 50/60Hz

Size	Model	Motor power (kW)	Rated input current (A)	Rated volume (kVA)	Rated output current (A)
Size A	HD09-2S0P2G	0.25	4.3	0.6	1.7
Size A	HD09-2S0P4G	0.4	5.8	1.0	2.5
Size A	HD09-2S0P7G	0.75	10.5	1.5	4.0
Size A	HD09-2S1P5G	1.5	18.5	2.8	7.5
Size A	HD09-2S2P2G	2.2	24.1	3.8	10.0

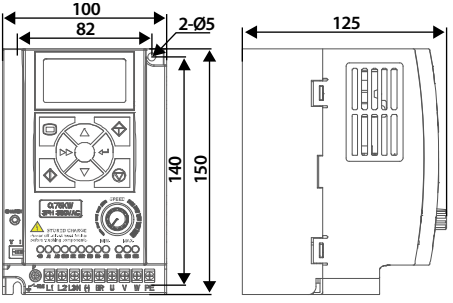
Three-phase: 380 - 460V, 50/60Hz

Size	Model	Motor power (kW)	Rated input current (A)	Rated volume (kVA)	Rated output current (A)
Size A	HD09-4T0P4G	0.4	1.8	1.0	1.4
Size A	HD09-4T0P7G	0.75	3.4	1.5	2.3
Size A	HD09-4T1P5G	1.5	5.2	2.5	3.8
Size A	HD09-4T2P2G	2.2	7.3	3.4	5.1
Size B	HD09-4T4P0G	4.0	11.9	5.9	9.0
Size B	HD09-4T5P5G	5.5	15.0	8.5	13.0

Chapter 3 Machenical Installation

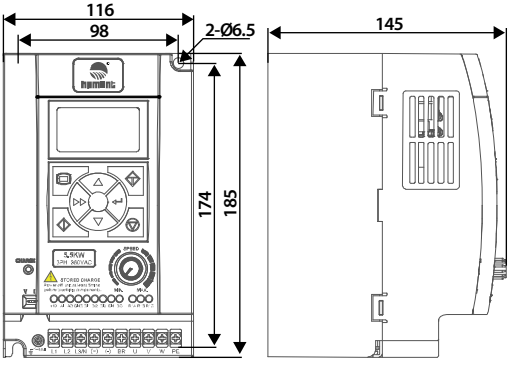
Danger	• After opening the package, if damage or incompleteness is found, please do not install it and contact our distributor or us for solutions. • When conveying the inverter, please employ suitable tools according to its weight. Please avoid scratch to the product. Be careful: Rollover and drop may cause hurt. • Avoid scaps of the drill slip into the inverter during installation. • For inverter with more than 2 year's storage, please use regulator to power it slowly.

3.1 Dimension and Weight



Size A:

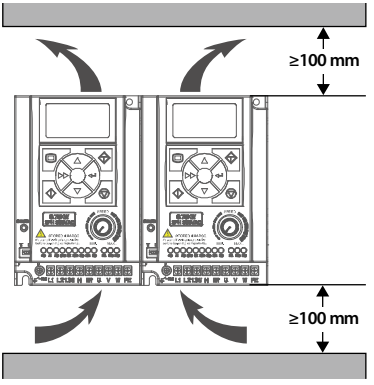
Dimension: 100 × 150 × 125 mm
Mounting dimension: 82 × 140 mm
Mounting aperture: 5 mm
G.W.: 1.5 kg



Size B:

Dimension: 116 × 185 × 145 mm
Mounting dimension: 98 × 174 mm
Mounting aperture: 6.5 mm
G.W.: 2.7 kg

3.2 Requirement for the Installation Site



Ensure the installation site meets the following requirements:

- Do not install at the direct sunlight, moisture, water droplet location;
- Do not install at the flammability, explosive, corrosive gas and liquid locations;
- Do not install at the oily dust, fiber and metal powder location;
- Be vertical installation on fire-retardant material with a strong support;
- Install at where the humidity is less than 95%RH and non-condensing location;
- Install at where the vibration is 3.5m/s^2 in 2 - 9Hz, 10m/s^2 in 9 - 200Hz (IEC60721-3-3);
- This inverter meets IP20, and Pollution Degree level 2 (Dry, Non conducting dust pollution);
- Make sure adequate cooling space for the inverter so as to keep the ambient temperature between -10 - 40°C, as shown in the figure at the left;
  It needs derating use if the inverter operation temperature exceeds 40°C. The derating value of the output current of the inverter shall be 2% for each degree centigrade, Max. allowed temperature is 50°C.

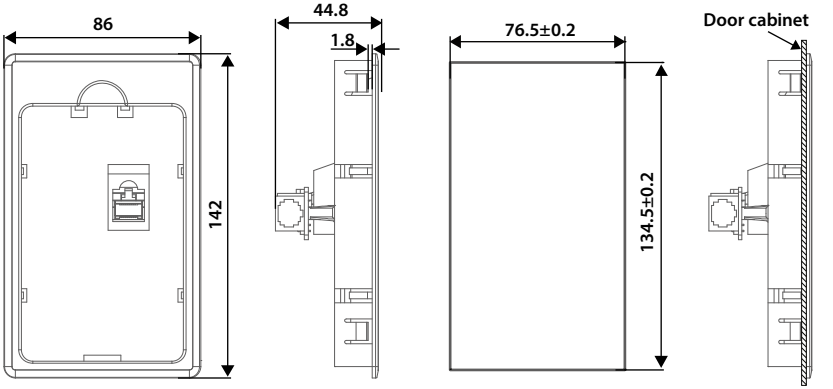
3.3 Installation of Exterior Keypad

HD09 allows installing the optional keypad on the keypad of control door cabinet. The optional keypads are HD-LED-P and HD-LED-S.

3.3.1 Installation of HD-LED-P

HD-LED-P needs a mounting base HD-KMB for installation. Firstly install the base on the keypad of control door cabinet, and then install HD-LED-P inside the base.

The HD-KMB base and mounting aperture sizes are shown in the following figure (unit: mm).



HD-KMB size Mounting aperture size Installation

3.3.2 Installation of HD-LED-P-S

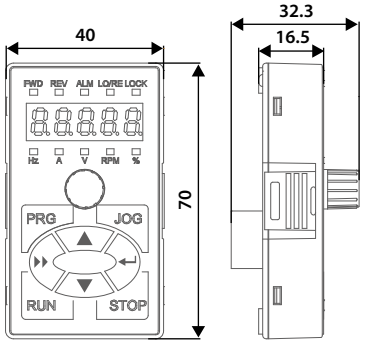
There are 2 installation methods selectable for HD-LED-P-S: Install with screws or a mounting base.

Packing contents: Mounting base, keypad, 2 pieces of M3x5 screws, 1 meter extension cable.

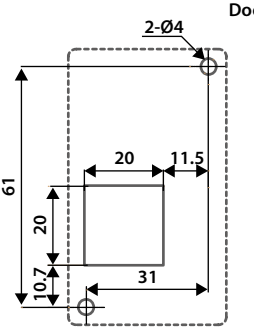
To Install with Screws

Install the HD-LED-P-S on the keypad of control door cabinet with screws.

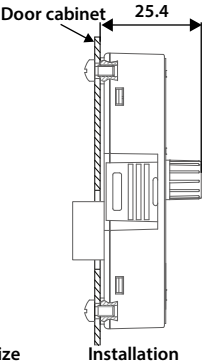
Dimension and mounting aperture sizes are shown in the following figure (unit: mm).



HD-LED-P-S dimension



Mounting aperture size

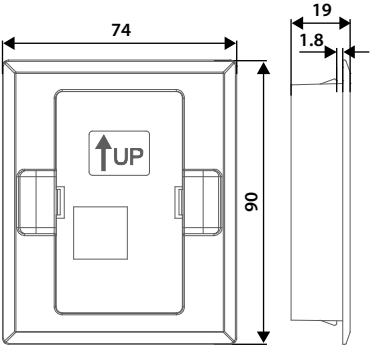


Installation

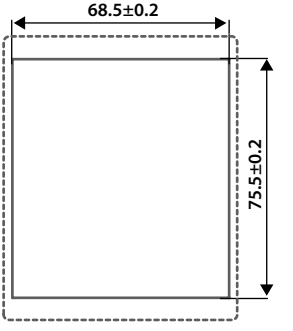
To Install with a Mounting Base

Firstly install the mounting base HD-KMB-S on the keypad of control door cabinet, and then install HD-LED-S inside the base.

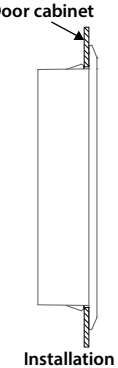
The HD-KMB-S base and mounting aperture sizes are shown in the following figure (unit: mm).



HD-KMB-S size



Mounting aperture size



Installation

Chapter 4 Electrical Installation

Danger	• Only qualified electrical engineer can perform wiring job. • Only when the power supply switch is completely off can you do the wiring job. • Check that the operation is effective and reliable after conneting to the emergency stop terminal of external power supply. • You must wrap the bare metal part of the power terminal with insulating tape. • Do not touch the wire terminals of the inverter when it is live.

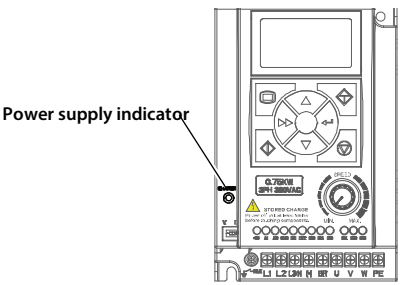
Ensure the power supply is completely off

Only when the power supply switch is completely off can you do the wiring job.

Steps:

First, disconnect the power supply of the inverter.

Second, wait till the internal power supply indicator goes out (its position shown in the following figure) or wait until 5 minutes later.



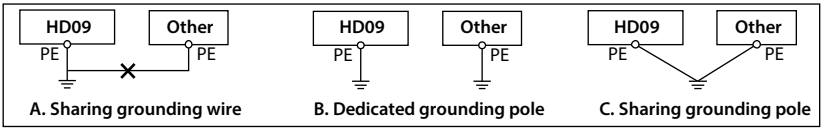
4.1 Electric Requirements

4.1.1 Grounding Requirements

Danger
Before grounding, the ground terminal of the inverter must be grounded reliably.

There is leakage current to the inverter, ground terminal PE must be grounded, and with the grounding point as close as possible, grounding area as large as possible, and to ensure that the grounding resistance is less than 10Ω.

Do not share the ground wire (A) with other power equipment. It is best to have a special grounding pole (B), but you can also share the ground (C).



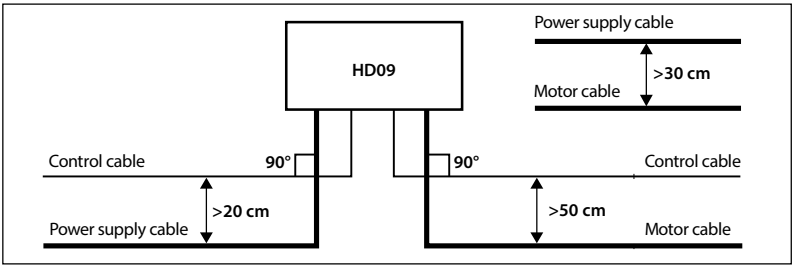
If you use several inverters at the same time, you can take a special grounding or common ground way grounding.

4.1.2 Wiring Requirements

To avoid coupling, the power cables, motor cables and control cables must be installed separately and ensure a sufficient distance, especially when the cables are installed in parallel and the extension distance is long.

If the signal cable must pass through the power cable or motor cable, it must pass vertically (90°), as shown in the following figure.

The power cables, motor cables and control cables should be distributed in different pipelines.



4.1.3 Power Cable

Warning

- Do not connect the input power cord to the output U / V / W terminal.
- Do not connect the phase-shifting capacitor to the output circuit.
- Make sure that the AC input source voltage matches the rated input voltage of the inverter.

For the selection of the power cable, refer to Section 5.1 Peripheral Accessories Selection, page 19.

4.1.4 Motor Cable

Selection of motor cables, see Section 5.1 Peripheral Accessories Selection, page 19.

The longer the motor cable, the higher the carrier frequency, the higher the harmonic leakage current on the cable. Leakage current can adversely affect the frequency converter and nearby equipment.

When the motor cable exceeds 100 meters, it is recommended to install the AC output reactor, and refer to the following table to set the carrier frequency (F23.00).

Motor cable length	< 30 m	30 - 50 m	50 - 100 m	> 100 m
Carrier frequency setting	Below 15 kHz	Below 10 kHz	Below 5 kHz	Below 2 kHz

When the motor cable is too long or the cable cross-section is too large, the derating is reduced by about 5% for each additional stroke in the recommended cross-sectional area.

Because the larger the cross-sectional area of the cable, the greater the capacitance to ground, the greater the leakage current.

4.1.5 Control Cable

To reduce the interference and attenuation of the control signal, the length of the control cable should be limited to 50 meters.

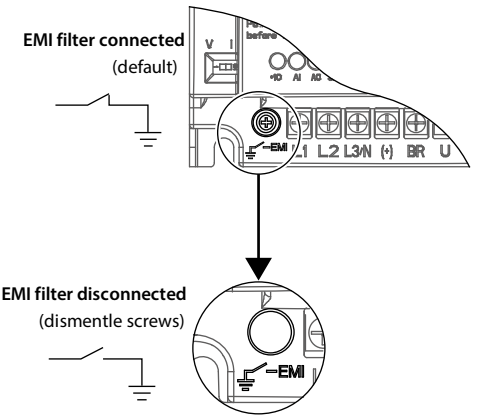
The control cable must be a shielded cable, and the analog signal cable should be twisted shielded.

Shielded cables should use high-frequency low-impedance shielded cables, such as braided copper mesh, aluminum wire mesh or barbed wire.

4.1.6 Leakage protection switch

HD09 inverter built-in EMI filter, the inverter can be connected to the case of power protection can reduce the external radio frequency interference, while the protection of the ground to produce 10mA AC leakage current.

In the case of low leakage current applications, the connection between the built-in EMI filter and the protective ground wire can be disconnected, and the leakage current from the protective ground wire is less than 1mA AC after disconnection. Disconnect the built-in EMI filter as shown below.



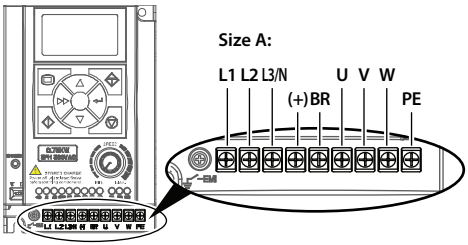
The leakage current protection switch (ELCB / RCD) is installed on the input side of the inverter, disconnect the built-in EMI filter to prevent mistake action of the ELCB / RCD.

The ELCB / RCD action is related to the fault current waveform it detects, and there are three types:

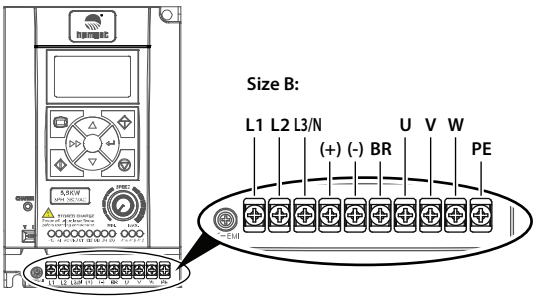
- AC type: Detects AC fault current and is not suitable for frequency converters.
- Type A: Detects AC fault current and pulsating DC fault current, only applies to single-phase power input inverter.
- Type B: Detection of AC fault current, pulsating DC fault current and smooth DC fault current, three-phase power input required that type.

4.2 Power Terminals and Connection

Power Terminal Description



Terminal	Description
L1, L2, L3/N	Three-phase AC power input terminals
L1, L3/N	One-phase AC power input terminals
U, V, W	Output terminals, connect to AC motor
(+), BR	Braking resistor connection terminals
PE	Ground terminal, connect to the ground

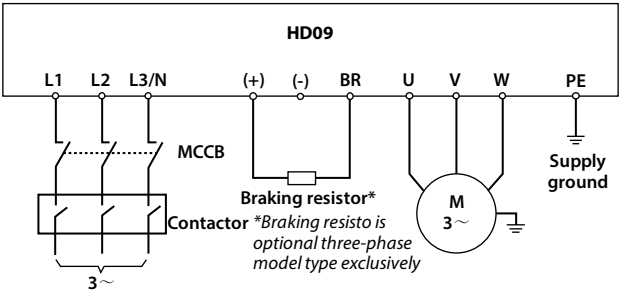


Terminal	Description
L1, L2, L3/N	Three-phase AC power input terminals
L1, L3/N	One-phase AC power input terminals
U, V, W	Output terminals, connect to AC motor
(+), BR	Braking resistor connection terminals
(+), (-)	DC supply input terminals
PE	Ground terminal, connect to the ground

Power Terminal Connection

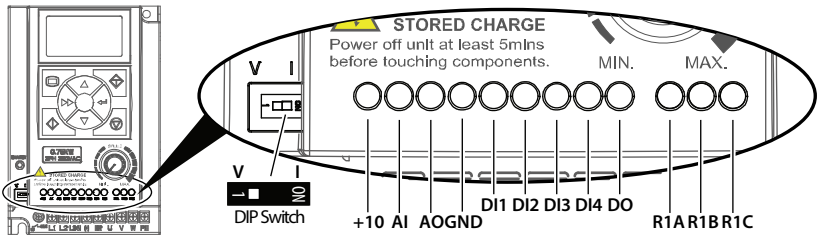
Power Terminal Wiring is as shown in following figure.

For selection of contactor, MCBB, power supply cable, motor cable, ground cable and braking resistor, please refer to section 5.1.1 Wiring Specifications of Input and Output, page 19.



4.3 Control Terminals and Connection

Control Terminals Description



Terminal		Description
+10	External power	Max. output current 100mA
AI	Analogue input	The DIP switch decides the voltage input or current input • Voltage 0 - 10V, impedance 32kΩ (Factory setting) • Current 0 - 20mA, impedance 500Ω
	Digital input (DI function)	When AI is used as DI, switch signals above 6V can be received • Function F15.44 is the same with DI1 - DI3 (F15.00 - F15.02)
AO	Analogue output	Voltage 0 - 10V
GND	Power ground	Analogue and digital site, 0V

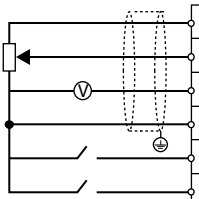
Terminal		Description
DI1, DI2, DI3	Digital input	Effective with GND short circuit
DI4	Digital input	Effective with GND short circuit or High frequency input (F15.03 set as No.53 function) • Max. frequency 50.0kHz (F16.17 setting)
DO	Digital output	Open collector output • External voltage 10 - 30VDC, max. current 50mA or High frequency input (F15.19 set as No. 38 function) • Max. frequency 50.0kHz (F16.26 setting)
R1A, R1B, R1C	Relay output	• Contact rating: 250VAC / 3A or 30VDC / 1A • R1B, R1C: Normally closed; R1A, R1C: Normally open

Note:

Limit the current within 3A if the relay terminal is to connect to AC 220V voltage signal.

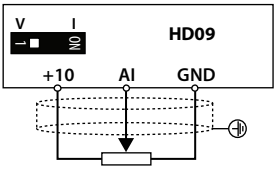
Control Terminals Connection

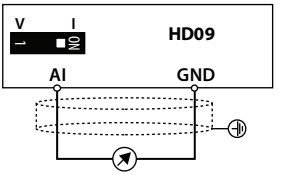
The following figure shows wire connection of control terminal (factory setting).



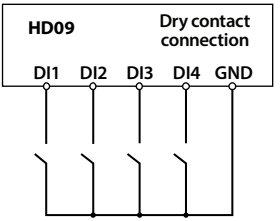
+10	External power: +10V, Max. output current 100mA
AI	**Frequency setting sources : Refer to F16.01**
AO	**Reference frquency: Refer to F16.19**
GND	Power ground: 0V, analogue and digital site
DI1	**REV function: Refer to F15.00**
DI2	**REV function: Refer to F15.01**
DI3	Unused
DI4	Unused
DO	**Inverter is running: Refer to F15.19**
R1A **R1B** **R1C**	Relay output **Inverter fault: Refer to F15.20**

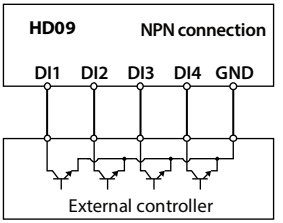
Analogue Input Connection



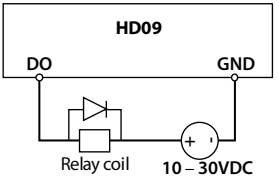


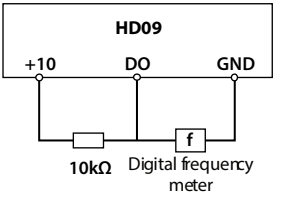
Digital Input Connection





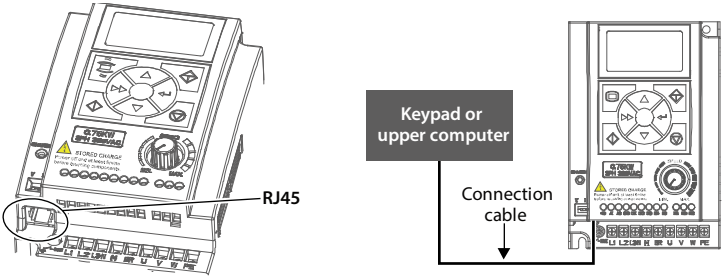
Digital Output Connection

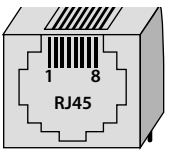




4.4 External Keypad or Upper Computer

The RJ45 terminal can connect the optional keypad or upper computer, as shown in the following figure.



RJ45		**Pin**	**Definition**
		1, 3	+5V
		2	485+
		4, 5, 6	GND
		7	485-
		8	Unused
Keypad	Can connect the optional keypad to realize keypad control • Refer to section 6.1 Keypad, page 23		
Upper Computer	Can connect the upper computer to realize communication control • The upper computer includes PLC, touch screen, PC, etc.		
Connection Cable	• 1m conncection cable [HD-CAB-1M] • 2m conncection cable [HD-CAB-2M] • 3m conncection cable [HD-CAB-3M] • 6m conncection cable [HD-CAB-6M]		

Chapter 5 Technical Data

5.1 Peripheral Accessories Selection

5.1.1 Wiring Specifications of Input and Output

The AC supply to the drive must be installed with suitable protection against overload and short-circuits, i.e. MCCB (molded case circuit breaker) or equivalent device.

The recommended specification of MCCB, contactor & cables were shown as following tables.

The size of earth wire should not be smaller than the requirement in 4.3.5.4 of IEC61800-5-1.

Size	Model	MCCB (A)	Contactor (A)	Power Cable (mm^2)	Motor Cable (mm^2)	Ground Cable (mm^2)
Size A	HD09-2S0P2G	16	10	0.5	0.2	2.5
Size A	HD09-2S0P4G	16	10	0.75	0.5	2.5
Size A	HD09-2S0P7G	16	10	2.5	0.5	2.5
Size A	HD09-2S1P5G	20	16	6.0	1.5	6.0
Size A	HD09-2S2P2G	32	20	6.0	2.5	6.0
Size A	HD09-4T0P4G	10	10	0.5	0.2	2.5
Size A	HD09-4T0P7G	10	10	0.5	0.5	2.5
Size A	HD09-4T1P5G	16	10	1.0	0.5	2.5
Size A	HD09-4T2P2G	16	10	1.5	0.75	2.5
Size B	HD09-4T4P0G	25	16	2.5	2.5	2.5
Size B	HD09-4T5P5G	32	25	4.0	4.0	4.0

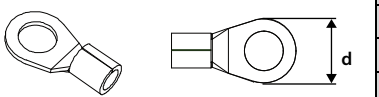
Note:

1. Please select braking resistor based on the above table.
Bigger resistor can protect the braking system in fault condition, but oversized resistor may bring a capacity decrease, lead to over voltage protection.

2. The braking resistor should be mounted in a ventilated metal housing to prevent inadevertent contact during it works, for the temperature is high.

5.1.2 Power Terminal Lug

The wiring lugs of the power terminals (round bare terminals) can be selected according to the terminal wiring specifications, screw size, and the maximum outside diameter of the wiring lugs.



Size	Size A	Size B
Screw size	M3	M3.5
Tightening torque (N. M)	0.6 - 0.8	0.8 - 1.2
Max. outer diameter of lug d (mm)	6.1	7

5.2 Braking Resistor

Model	Resistance Value (Ω)	Resistance Power (W)
HD09-4T0P4G	300 - 400	80
HD09-4T0P7G	250 - 350	100
HD09-4T1P5G	200 - 300	200
HD09-4T2P2G	150 - 250	250
HD09-4T4P0G	100 - 150	300
HD09-4T5P5G	80 - 100	500

Note:

Braking unit is built in three-phase model type exclusively.

5.3 Technical Data

Electrical	
Inout voltage	HD09-2S■P■G: Single-phase 200 - 240V HD09-4T■P■G: Three-phase 380 - 460V Fluctuating within ±10%, imbalance rate < 3%
Input frequency	50/60Hz ± 5%
Output voltage	0 - input voltage
Output frequency	0 - 1000Hz
Specification	
Control mode	V/f
Maximum current	150% rated output current 2 minutes; 180% rated output current 10 seconds
Speed resolution	Digital setting: 0.1Hz; Analogue setting: 0.1% × maximum frequency
Wave frequency	Default setting: 4kHz; Setting range: 1 - 16kHz; 4 - 16kHz: The derating value of wave frequency shall be 2% for each more than 1kHz
Environment	
Operation temperature	-10 - +40°C, no ferating; 40 - 50°C, the derating value of the output current shall be 2% for each more than 1°C
Storage temperature	-40 - +70°C
Location for use	Indoor, preveting from direct sunlight, no dust, corrosive, flammable gases, oil mist, water vaper, dripping or salt etc.
Altitude	Less than 1000m, no ferating; Otherwise shouldbe serating use
Humidity	Less than 95%RH, non-condensing
Vibration Resistance	It is 3.5m/s^2 in 2 - 9Hz, it is 10m/s^2 (IEC60721-3-3) in 9 - 200Hz
Protection level	IP20
Pollution degree	Level 2 (Dry, Non conducting dust pollution)
Accessories	
Keypad	HD-LED-P: LED keypad with potentiometer, matched with HD-KMB mounting base HD-LED-P-S: Small size keypad, matched with HD-KMB-S mounting base
Connection cable	1m / 2m / 3m / 6m connection cable [HD-CAB-1M / 2M / 3M / 6M]

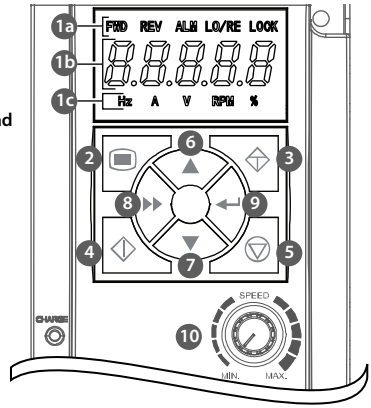
Chapter 6 Operation

6.1 Keypad

HD09 can either installed with LCD display keypad (standard), or LED display keypad (optional).

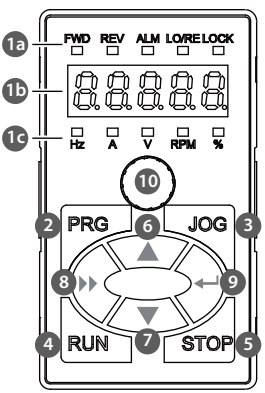
LCD display keypad

Standard

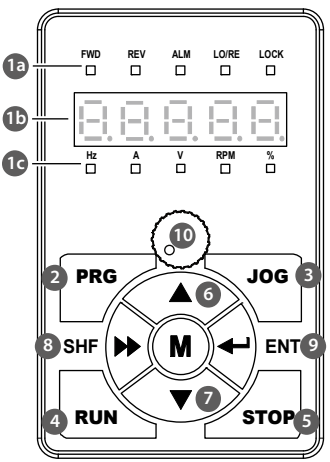


LED display keypad

Optional



HD-LED-P-S



HD-LED-P

No.	Description	
1	The standard keypad contains LCD display, while the optional keypad contains LED nixie tubedisplay. • Three status: Lighting, flashing and lightless. • Do not remove the standard LCD keypad. a. **Status indicator: Indicating current status.** • FWD (Forward status): Motor is forward running (standard LCD) / lighting (optional LED) • REV (Reverse status): Motor is reverse running (standard LCD) / lighting (optional LED) • ALM (Alarm status): Motor is faulty (standard LCD) / lighting (optional LED) • LO / RE (Local / Remote status): Inverter is in terminal or communication control mode (standard LCD) / lighting (optional LED) • LOCK (Password locked status): User password lock of the inverter is avail (standard LCD) / lighting (optional LED) b. **Display area: Normal: Displays parameter. Faulty: Displays error code when the inverter is faulty.** • If a value is flashing, it mean that the value is revisable. c. **Unit indicator: Display unit of the current value.** • Include: Hz (frequency), A (current), V (voltage), RPM (rotate speed), % (percentage)	
2	PRG	**Program / Exit button**: Entry or programming button
3	JOG	**Jog button**: In the keypad control, jog start the inverter
4	RUN	**Run button**: In the keypad control, press this button to run the inverter
5	STOP	**Stop / Reset button**: In the keypad control, to stop the inverter and reset the fault
6	▲	**Increment button**: In selecting parameter status, press it to increass the value of parameter; In setting parameter status, press it to incress the setting value.
7	▼	**Decrement button**: In selecting parameter status, press it to decreass the value of parameter; In setting parameter status, press it to decress the setting value.
8	▶▶	**SHE shift button**: In selecting pr setting parameter status, shift 1 bit.
9	↵	**ENT enter/confirm button**: Enter lower menu; In setting parameter status, confirm and save the data.
10	**Potentiometer**: In setting parameter status, anti-clockwise means decrease, while clockwise means increase.	

6.2 Shutdown and Operating Status Parameters

HD09 Inverter in the state of stop / run, press the key ▶▶ to cycle display the stop / run status parameter.

- Stop status parameter: F18.08 Set frequency, DC bus voltage, AI input voltage, potentiometer input voltage, input terminal status, output terminal status.
- Operating status parameter: F18.02 Given frequency (after acceleration and deceleration), set frequency, output frequency, output voltage, output current, DC bus voltage.

6.3 Keypad Control Operation

In operation under keypad control (F00.11 = 0), the inverter can be started and operated directly with keypad.

Steps are as follows:

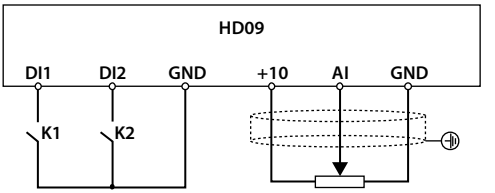
1. Turn on the input power.
2. Set the motor parameters according to the motor nameplate: F08.00 (rated power), F08.01 (rated voltage), F08.02 (rated current), F08.03 (rated frequency), F08.04 (rated speed).
3. Set the operating frequency: F00.13, range 0.0 - 50.0Hz.
4. Set acceleration / deceleration time: F03.01 (acceleration time), F03.02 (deceleration time).
5. Press Key ◇ (standard) / key RUN (optional), the inverter starts.
6. Press key ▽ (standard) / key STOP (optional), the inverter stops.

6.4 Terminal Control Running

When the terminal controls the operation (F00.11 = 1), the inverter can be started and stopped directly with the terminal, and the running frequency and the motor running direction.

As follows:

1. After wiring as shown below, turn on the input power.



2. Set the command channel to terminal control (F00.11 = 1).

3. Set the AI setting frequency (F00.10 = 3, F16.01 = 2).

3. Set DI1 terminal forward (F15.00 = 2), DI2 terminal reverse (F15.01 = 3).

4. Set the motor parameters according to the motor nameplate: F08.00 (rated power), F08.01 (rated voltage), F08.02 (rated current), F08.03 (rated frequency), F08.04 (rated speed).

6. Set acceleration / deceleration time: F03.01 (acceleration time), F03.02 (deceleration time).

7. When the K1 is closed, the motor is running; When K2 is closed, the motor is running in reverse.

8. K1, K2 are closed or disconnected at the same time, the inverter stops.

6.5 Communication Control Operation

In communication control operation (F00.11 = 2), the function parameters, state parameters, and control commands of the converter can be read and written by the host computer.

In communication, converter is in the slave mode.

Please see section 4.4 External Keypad or Upper Computer, page 17.

For details, see Chapter 9 MODBUS Communication Protocol, page61.

For specific settings, see section 9.6 Application Examples, page 68.

Chapter 7 Detailed Function Introduction

7.1 F00: Basic Parameter

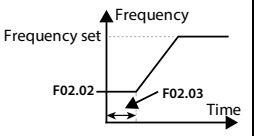
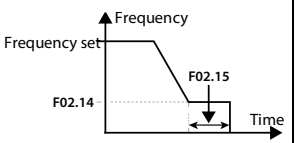
Ref. Code	Function Description	Setting Range [Default]
F00.06	**Max.output frequency**	**50.0 - 1000.0 [50.0Hz]**
	Define converter max. permissible output frequency. • Shall be setted reasonably in according with motor nameplate and actual running situation.	
F00.08	**Maximum operating frequency**	**0.0 - F00.06 [50.0Hz]**
F00.09	**Minimum operating frequency**	**0.0 - Max.frequency [0.0Hz]**
F00.10	**Frequency setting access selection**	**0 - 4 [0]**
	0: Keypad digital setting. 1: Terminal digital setting. 2: SCI communication setting. 3: Analogue setting. 4: Terminal impulse setting.	
F00.11	**Operation command access selection**	**0 - 2 [0]**
	0: Keypad operation command 1: Terminal operation command. 2: SCI communication command.	
F00.13	**Original operation frequency digital setting**	**0.0 - Max.frequency [50.0Hz]**
F00.14	**Frequency setting control**	**0000 - 1111 [1001]**
	Enable only when F00.10 = 0,1. When F00.13 is changed, the new value will replace current setted frequency. **Units: Selection of frequency save when power off** • 0: No. • 1: Save. **Tens: Setted frequency when stopping** • 0: Keep setted frequency in stopping • 1: Recover to F00.13 in stopping. **Hundreds: Selection of frequency save when communicating** • 0: No. • 1: Save. **Thousands: Selection of frequency save when change frequency access** • 0: No. • 1: Save.When frequency setted access is changed from keypad to terminal digital and back to keypad, the keypad frequency is still keeping the last changed frequency.	
F00.15	**Inching operation frequency digital setting**	**0.0 - Max. frequency [5.0Hz]**

Ref. Code	Function Description	Setting Range [Default]
F00.17	**Running direction selection**	**0,1 [0]**
	0: Same direction. 1: Contrary direction.	
F00.19	**Dead time between positive and negative rotation**	**0.0 - 3600.0 [0.0s]**
	Define transient time when output frequency is 0 in rotation.	
F00.20	**External keypad enable**	**00 - 21 [00]**
	Units: Buttons enable • 0: Enable. When convertere is connected with keypad, button operating can be done • 1: Invalid. When convertere is connected with keypad, button operating can not be done. **Tens: Potentiometer enable** • 0: External keypad potentiometer precedence. When converter is connected with keypad via communication interface, its input voltage is right in keypad. After removing external keypad, voltage is right in its own keypad. • 1: Build-in keypad potentiometer. When converter is connected with keypad via communication interface. Potentiometer input voltage is right in build-in keypad and external one's potentiometer is invalid. • 2: External keypad potentiometer. When converter is connected with external keypad via communication interface. Potentiometer input voltage is right in external keypad and build-in one's potentiometer is invalid.	
F00.21	**Hibernation function enable**	**0 - 2 [0]**
	0: Forbidden. This function is invalid. 1: Enable 1. Under running status, when setted frequency ≤ Min.running frequency (F00.09), after hibernating delay time (F00.24), converter will stop freely and enter into hibernating status. 2: Enable 2. Under running status, when setted frequency ≤ hibernating frequency (F00.25), after hibernating delay time (F00.24), converter will stop freely and enter into hibernating status.	
F00.22	**Hibernation awaking time**	**0.0 - 360.0 [0.0s]**
	When converer is in hibernation status and setted frequency > Min. running frequency (F00.09) or hibernating frequency (F00.25), besides, sustaining time reaches F00.22 setted time. Converter will awake up and work from hibernating status.	
F00.24	**Hibernating delay**	**0.0 - 3600.0 [0.0s]**
F00.25	**Hibernating frequency**	**0.00 - Max. frequency [0.50Hz]**

7.2 F01: Parameter Protection function

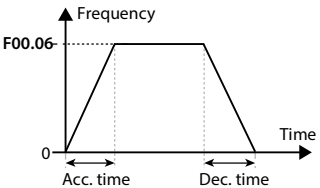
Ref. Code	Function Description	Setting Range [Default]
F01.00	**User password**	**00000 - 65535 [00000]**
	XXXXX: After user password setted (any but not zero), password will be valid. • After setting the password, enter the correct password when entering the parameter setting state again; Otherwise all parameters cannot be changed by keypad, can only view. • After entering the correct password, press ▣ / PRG exit to the main interface of the stop / run status or keypad button is not detected within 5 minutes, and the user password is automatically activated. To modify the parameters, you need to enter the correct password. If keypad button is detected within 5 minutes, the 5-minute timer restarts. 00000: The factory setting of HD09 means no user password. • If the user password has been set (any number other than zero), firstly enter the correct password (unlock the password), and then set to 00000, the user password is cleared. Otherwise, it is invalid.	
F01.01	**Menu mode selection**	**0,1 [0]**
	0: Standard menu mode. Display all parameter. 1: Verifying menu mode. Only display parameters different from default setting.	
F01.02	**Function code parameter initialization (parameter download)**	**0 - 4 [0]**
	0: No action. 1: Restore the factory parameter. • **Restore the factory parameter:** Set F01.02 = 1, press ↵ and it is restoring the factory parameter when "rESEt" displayed on keypad. 2: Cope the storaged parameter 1 of keypad to controller board for current function code value updating. 3: Cope the storaged parameter 2 of keypad to controller board for current function code value updating. 4: Clear out fault records. Clear out the recorded fault information in F20.21 - F20.33 *Note:* *1. F01.00, F01.02, F01.03, group F08, F19.19, F19.24, F20.21 - F20.37, F23.00 and group y not be copied.* *2. Parameter copying is valid only in external keypad.*	
F01.03	**Upload parameter to keypad**	**0 - 2 [0]**
	0: No action. Converter is in normal reading status. 1: Current function code value is copied to keypad storage parameter 1. 2: Current function code value is copied to keypad storage parameter 2. *Note:* *1. F01.00, F01.02, F01.03, group F08,19.19, F19.24, F20.21 - F20.37, F23.00 and group y not be copied.* *2. Parameter copying is valid only in external keypad.*	

7.3 F02: Start and Stop Controlling Parameter

Ref. Code	Function Description	Setting Range [Default]
F02.02	**Frequency setting of DWELL starting**	0.0 - Max. frequency [0.0Hz]
F02.03	**Frequency keeping time of DWELL starting**	0.00 - 10.00 [0.00s]
	F02.02 define DWELL frequency when converter starting. F02.03 means DWELL frequency of keeping running during starting. • When F02.02 = 0 or F02.03 = 0, DWELL frequency in starting is not valid. 	
F02.04	**DC brake current setting**	0 - 100% (converter rated current) [50%]
F02.05	**Starting DC braking time**	0.00 - 60.00 [0.00s]
	F02.04 defines current value in starting DC braking and stopping DC braking. • If F02.04 > 10 × motor rated current, then: Braking current = 10 × motor rated current. • When F02.05 = 0, no DC braking procedure.	
F02.13	**Stoping mode selection**	1,2 [2]
	1: Stop freely. Converter will stop output after receiving stopping order, machine will be freely stopped via mechanical inertia. 2: Decelerate to stop. After receiving stopping order, converter will be stopped by decelration time (F03.02).	
F02.14	**DWELL frequency setting in stopping**	0.0 - Max. frequency [0.0Hz]
F02.15	**DWELL frequency keeping time in stopping**	0.00 - 10.00 [0.00s]
	F02.14 defines DWELL frequency of converter stoping F02.15 means keeping time of running in stopping DWELL frequency (F02.14) during converter stopping. • When F02.14 = 0 or F02.15 = 0, stopping DWELL frequency is invalid. • When F02.13 = 2 (deceleration stopping) and F02.14, F02.15 are all not zero, stopping DWELL frequency is valid. 	
F02.16	**Starting frequency of stopping DC braking**	0.0 - 50.0 [0.5Hz]
F02.18	**Stopping DC braking time**	0.00 - 60.00 [0.00s]

	During stopping, when running frequency decreased to F02.16, DC braking will start.
	• F02.13 = 2 (decelerating stop) and F02.14 - F02.16, F02.18 are all not zero:
	  • If F02.14 ≥ F02.16, first to keep stopping DWELL frequency and keeping time reaches F02.15, DC braking will start.
	  • If F02.14 < F02.16, running frequency decreased to F02.16, DC braking will start directly.
	• When F02.18 = 0, no DC braking procedure.	

7.4 F03: Acceleration and Deceleration Parameter

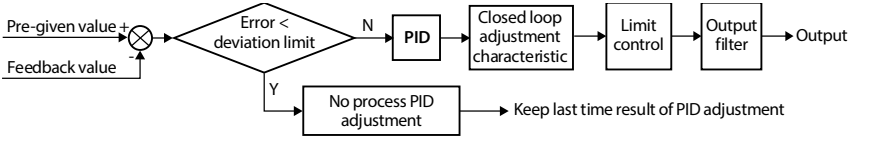
Ref. Code	Function Description	Setting Range [Default]
F03.01	**Acc. time 1**	**0.01 - 600.00 [10.00s]**
F03.02	**Dec. time 1**	
F03.03	**Acc. time 2**	
F03.04	**Dec. time 2**	
F03.05	**Acc. time 3**	
F03.06	**Dec. time 3**	
F03.07	**Acc. time 4**	
F03.08	**Dec. time 4**	
	Acc. time means converter accelerating time from 0 to F00.06 (Max. output frequency) in line mode. Dec. time means converter decelerating time from F00.06 (Max. output frequency) to 0 in line mode. **Acc. and Dec. time switchover**: During converter running, DI terminals 26 and 27 or F03.09, F03.10 can be used to set Acc. And Dec. time.  *Note: If brake resistor not installed correctly, sudden deceleration or huge load inertia deceleration, converter may be in over voltage fault.* *In order to aviod over voltage, it is better to choose correct brake resistor, increas Dec. time and adjust F19.18, F19.19.*	
F03.09	**Frequency switchover of Acc. time 2 and 1**	**0.0 - Max. frequency [0.0Hz]**
	When running frequency is lower than F03.09, accelerats in Acc.time 2; Otherwise, speed up in Acc. time 1. • It is invalid when terminals are chosed to Acc. and Dec. time (DI terminals are setted as function 26 and 27)	
F03.10	**frequency switchover of Dec. time 2 and 1**	**0.0 - Max. frequency [0.0Hz]**
	When running frequency is lower than F03.10, speed up in Dec.time 2; Otherwise, speed down in Dec. time 1. • It is invalid when terminals are chosed to Acc. and Dec. time (DI terminals are setted as function 26 and 27).	
F03.15	**Inching Acc.time**	**0.01 - 600.00 [6.00s]**
F03.16	**Inching Dec.time**	**0.01 - 600.00 [6.00s]**
	F03.15, F03.16 define Acc. and Dec. time in inching running.	

7.5 F04: Process PID Controlling Parameter

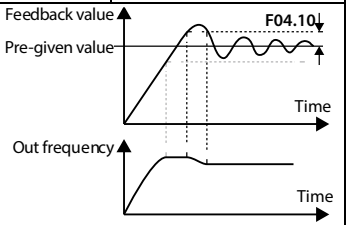
Process PID control is commonly used to measure site pressure, liquid level and temperature and such as physicals.

AI Max. analogue input or DI4 Max. input impulse frequency (F16.17) is corresponding to Max. output frequency (F00.06).

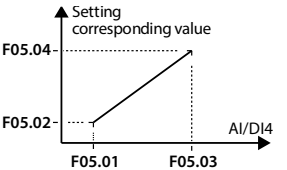
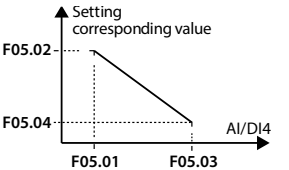
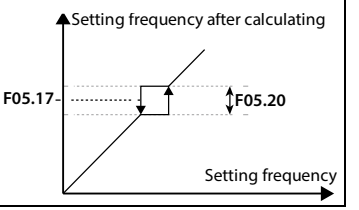
Process is shown as below diagram:



Ref. Code	Function Description	Setting Range [Default]
F04.00	**Process PID function selection**	**0,1 [0]**
	0: PID control invalid. 1: PID control valid.	
F04.02	**Feedback access selection**	**0,1 [0]**
	0: Analogue feedback. Feedback via terminal AI (F16.01 = 5). 1: Terminal impulse feedbac. Feedback via DI4 terminal (F15.03 = 53).	
F04.03	**Given Ref. Code digital setting**	**0 - 100.0 [0.0%]**
F04.04	**Proportional gain (P)**	**0.00 - 10.00 [2.00]**
F04.05	**Integral time (I)**	**0.01 - 10.00 [1.00s]**
F04.06	**Integral upper limit**	**0.0 - Max. frequency [50.0Hz]**
F04.07	**Derivative time (D)**	**0.00 - 10.00 [0.00s]**
F04.08	**Differential limiting values**	**0.0 - Max. frequency [20.0Hz]**
F04.09	**Sampling period (T)**	**0.01 - 50.00 [0.10s]**
	F04.03 define PID regulator preset. F04.04, F04.05, F04.07 define process PID parameter. F04.08 define proces PID differential terms up limit. F04.09 define sampling period for feedback quantit. PID regulator will work one time during each period. • F04.07 = 0, differential items invalid.	

Ref. Code	Function Description	Setting Range [Default]
F04.10	**Deviation limit**	0.0 - 20.0 [2.0%]
	Define maximum allowable deviation value. Compared between the system output value and the process PID value. • When feedback is within F04.10, PID regulator stop working. See as right diagram. • Setting up appropriate F04.10 helps to balance the system output accuracy and stability. 	
F04.13	**PID regulator upper limit value**	0.0 - Max. frequency [50.0Hz]
F04.14	**PID regulator lower limit value**	0.0 - Max. frequency [0.0Hz]
	It defines that the process PID regulator output digital setting value of upper limit or lower limit.	
F04.15	**PID regulator characteristic**	0,1 [0]
	0: Positive. The motor RPM is required to increase with the increase of the reference. 1: Negative. The motor RPM is required to decrease with the increase of the reference.	
F04.16	**Integral item selection adjustment**	0,1 [0]
	0: Reach upper and lower limit of the integral item and stop points. 1: Reach upper and lower limit of the integral item and continue points.	
F04.17	**PID output filter time**	0.01 - 10.00 [0.05s]
	Define process PID output filtering time.	
F04.18	**PID output reverse choice**	0,1 [0]
	0: PID adjust the inversion is prohibited. 0 to limit when PID output is negative. 1: PID output is allowed to reversal.	
F04.19	**PID output inversion frequency limit**	0.0 - Max. frequency [50.0Hz]
	The upper limit of frequency defined PID inversion. • F04.18 = 1 (PID adjust the allow reversal) valid.	

7.6 F05: External Given Curve Parameters

Ref. Code	Function Description	Setting Range [Default]
F05.01	Line min. given	0.0 - F05.03 [0.0%]
F05.02	Line min. given corresponding	0.0 - 100.0 [0.0%]
F05.03	Line max. given	F05.01 - 100.0 [100.0%]
F05.04	Line max. given corresponding	0.0 - 100.0 [100.0%]
	F05.01 - F05.04 define AI and DI line, positive feature (left below diagram) and negetive feature (right below diagram) can be realized.   In diagram: • AI is analogue preset, DI4 is impuse preset. • When AI analogue preset is 100%, 10V or 20mA is correspionding. • DI4 impulse preset is 100%, F16.17 (DI4 input terminal Max. impulse frequency) is corresponding.	
F05.17	Hopping frequency	F00.09 - Max. frequency [0.0Hz]
F05.20	Hopping frequency range	0.0 - 30.0 [0.0Hz]
	Hopping frequency setting can let converter output frequency avoid mechanical load resonance frequency points. • Converter's setted frequency can hop running near F05.17 point by right diagram. • During Acc. and Dec. running process, go through hopping frequency area in continous output frequency, but can not constant running in hpping arez. • Frequency setting is hopping and output is continous. 	

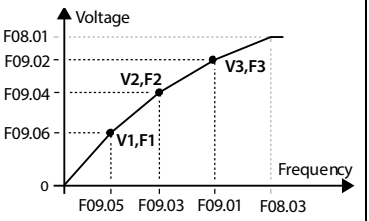
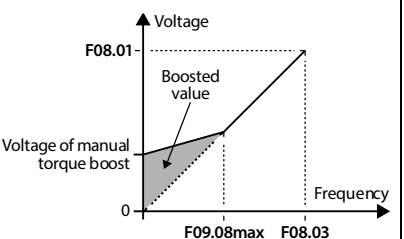
7.7 F06: Multistage Speed Function

Ref. Code	Function Description	Setting Range [Default]
F06.00	Multiple frequency instruction 1	F00.09 - Max. frequency [5.0Hz]
F06.01	Multiple frequency instruction 2	F00.09 - Max. frequency [5.0Hz]
F06.02	Multiple frequency instruction 3	F00.09 - Max. frequency [5.0Hz]
F06.03	Multiple frequency instruction 4	F00.09 - Max. frequency [5.0Hz]
F06.04	Multiple frequency instruction 5	F00.09 - Max. frequency [5.0Hz]
F06.05	Multiple frequency instruction 6	F00.09 - Max. frequency [5.0Hz]
F06.06	Multiple frequency instruction 7	F00.09 - Max. frequency [5.0Hz]
	Define the multistage speed operation mode in the speed of initial value.	

7.8 F08: Motor Parameter

Ref. Code	Function Description	Setting Range [Default]
F08.00	Motor rated power	0.2 - 5.5kW [Type confirmed]
F08.01	Motor rated voltage	0V - Inverter rated voltage [Type confirmed]
F08.02	Motor rated current	0.01 - 99.99A [Type confirmed]
F08.03	Motor rated frequency	1 - 1000 [50Hz]
F08.04	Motor rated RPM	1 - 24000rpm [Type confirmed]
	F08.00 - F08.04 Motor rated parameters need to be in accordance with the motor nameplate.	
F08.06	Motor parameters self-tuning	0,1 [0]
	0: No action. 1: Motor static self-tuning. • Motor in static state, the automatic measurement of motor stator resistance, and the measured value write F08.07 automatically. • Only under keypad mode (F00.11 = 0), motor parameters self-tuning can be done. **Motor parameters self-tuning setps:** 1. Set F08.00 - F08.04 in according to motor nameplate. 2. F08.06 = 1, press ◄┘, press ◇ or RUN to start self-tuning, "tunE" displayed on keypad. 3. When FWD or REV indicator flashing, self-tuning is ended, F08.06 recovered to 0 automatically.	
F08.07	Motor stator resistance	0.00 - 99.99Ω [Type confirmed]

7.9 F09: V/f Controlling Parameter

Ref. Code	Function Description	Setting Range [Default]
F09.01	Motor V/f frequency values F3	F09.03 - 100.0 (F08.03) [100.0%]
F09.02	Motor V/f voltage values V3	F09.04 - 100.0 (F08.01) [100.0%]
F09.03	Motor V/f frequency values F2	F09.05 - F09.01 (F08.03) [0.0%]
F09.04	Motor V/f voltage values V2	F09.06 - F09.02 (F08.01) [0.0%]
F09.05	Motor V/f frequency values F1	0.0 - F09.03 (F08.03) [0.0%]
F09.06	Motor V/f voltage values V1	0.0 - F09.04 (F08.01) [0.0%]
	F09.01 - F09.06 is customized V/f curve. • Using V1 / f1, V2 / f2, V3 / f3 three-point line way to define V/f curve, in order to apply to special load characteristic. • According to the actual working condition, setting up reasonable curve, in order to conform to the characteristics of the load to the greatest extent. • F09.01, F09.03, F09.05 is percentage compared to motor rated frequency (F08.03). • F09.02, F09.04, F09.06 is percentage compared to motor rated fvoltage (F08.01). 	
F09.07	The motor torque incrase	0.0 - 30.0 [2.0%]
F09.08	Cut-off points of motor torque increase manually	0.0 - 50.0 (F08.03) [30.0%]
	To compensate for the low frequency torque characteristics, we can make some improvement on output voltage compensation. F09.07 is manual torque way to ascend. • In 0, means automatic torque said. Should be in accordance with the motor nameplate parameters and set up correctly rated frequency (F08.03). F09.08 is percentage cpmpared to motor rated frequency (F08.03). • F09.08 max. = F08.03 × 50%. 	
F09.09	Motor slip compensation gain	0.0 - 300.0 [0.0%]
F09.10	Motor slip compensation filtering time	0.01 - 10.00 [0.10s]
F09.11	Motor slip compensation limit	0.0 - 250.0 [200.0%]
F09.12	Motor to compensate normal time	0.1 - 25.0 [2.0s]

Ref. Code	Function Description	Setting Range [Default]
F09.14	**AVR function (automatic voltage rugulator)**	**0 - 2 [1]**
	0: No action. 1: Constant action. 2: Only deceleration and no action. • When the input voltage is deviated from rated value, output voltage can be kept constantby AVR function. As a result, AVR should act usually, especially when the input voltage is higher than the rated. • When slowing down, the energy feedbacks to inverter from load, busbar voltage rise, F09.14 = 0 or 2, running current is larger; F09.14 = 1, motor slowdown and steady, running current is smaller.	
F09.15	**Inhibition mode of motor oscillation**	**0,1 [0]**
	0: Inhibite oscillation mode 1. 1: Inhibite oscillation mode 2.	
F09.16	**Inhibition factor of motor oscillation**	**0 - 200 [50]**
	Used to suppress the inherent oscillation when converter is working with motor. • If constant output current load runtime changes repeatedly, setting can be done on the basis of F09.16 the factory value to eliminate the oscillation and make the motor run smoothly.	

7.10 F15: Digital Input / Output Terminals Parameter

Ref. Code	Function Description	Setting Range [Default]
F15.00	**DI1 function selection**	**0 - 51 [2]**
F15.01	**DI2 function selection**	**0 - 51 [3]**
F15.02	**DI3 function selection**	**0 - 51 [0]**
F15.03	**DI4 function selection**	**0 - 53 [0]**
	0: Reserved. Set terminal in a non-functional state, even if there is signal. • Unused DI terminals can be set to 0 (reserved), in case of error or false action. 1: Converter enable. • Enable, the inverter can work. Invalid, prohibit operation in stop condition and stop freely. • DI terminal set to 1 (enable inverter), the default frequency converter is effective. 2,3: Forward / reverse enable. • DI termials can be set freely for forward/reverse terminal to control frequency converter start-stop, specific see F15.16. • Only valid under terminal control mode (F00.11 = 1). 4: Three-wire system operation control. • Specific see F15.16. 8: Frequency switched to the simulation. • Effective, frequency setting channel is forced to be switched to the simulation setting. • Frequency set the channel selection priority: Frequency switched to simulation (function 8) > Multistage frequency terminal 1-3 (function 13-15) > F00.10 set frequency set channels.	

Ref. Code	Function Description	Setting Range [Default]

11: Command switching terminals.

- Enable, running command channel is forced to be switched to the terminal running command channel.
- Running command channel selection priority: command switched to the terminal (function 11) > F00.11 set running command channel.

13 - 15: Multistage frequency terminals 1 - 3 (K1 - K3).

- Through DI terminal logic combination, at most 7 segment speed running curve can be defined. Detailed in the table below.
- Set up three DI terminal function to achieve 7 period of switching operation control.
- Set up two DI terminal function to achieve 3 period of switching operation control.
- Set one DI terminal function to realize switching work from F00.10 (frequency setting channel) frequency to multiple frequency.

K3 (No 15)	K2 (No 14)	K1 (No 13)	Frequency setting
0	0	0	F00.10set frequency
0	0	1	Multistage frequency1 (F06.00)
0	1	0	Multistage frequency 2 (F06.01)
0	1	1	Multistage frequency 3 (F06.02)
1	0	0	Multistage frequency 4 (F06.03)
1	0	1	Multistage frequency 5 (F06.04)
1	1	0	Multistage frequency 6 (F06.05)
1	1	1	Multistage frequency 7 (F06.06)

17,18: Increasing (UP) / decreasing frequency (DN) instructions.

- By controlling the DI terminal to realize the frequency increasing or decreasing, replace keypad for remoting control, see the table below.
- The rate of increase or decrease is set by F15.12.
- Frequency (F00.10 = 1) is valid only through the terminal setting frequency (F00.10 = 1).

UP (No 17)	DN (No 18)	The frequency change trend
0	0	Keep the current set frequency
0	1	Set frequency decrease
1	0	Set frequency increased
1	1	Keep the current set frequency

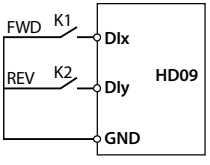
19: Auxiliary setting frequency reset.

- Effectively, to set the auxiliary frequency Settings, set frequency determined by the main set completely.

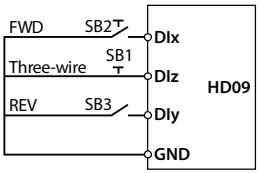
20,21: Forward / reverse point move command control input (JOGF / JOGR).

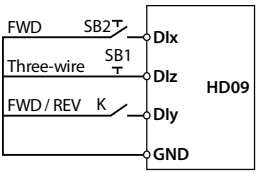
- Use terminal control to realize the dynamic running of point control, need to set F00.15 running frequency (point).

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td></td><td colspan="2">26,27: Acc. / Dec. time choose terminals 1, 2.
• Deceleration time priority: Terminal 26, 27 function determine the deceleration time > F03.09, F03.10 deceleration time is determined.
• Through the deceleration time terminals 1, 2, logical combination, can realize deceleration time 1 - 4 choices. See the table below.
• Set 2 deceleration time terminal function, can realize the choice of four groups of deceleration time.
• Set a deceleration time terminal function, can realize the choice of 2 groups of deceleration time.
<table>
<tr><th>Acc. / Dec. terminal 2 (No 27)</th><th>Acc. / Dec. terminal 1(No 26)</th><th>Acc. and Dec. time selection</th></tr>
<tr><td>0</td><td>0</td><td>Acc. and Dec. time 1</td></tr>
<tr><td>0</td><td>1</td><td>Acc. and Dec. time 2</td></tr>
<tr><td>1</td><td>0</td><td>Acc. and Dec. time 3</td></tr>
<tr><td>1</td><td>1</td><td>Acc. and Dec. time 4</td></tr>
</table>
41,42: Free down normally open / closed input.
• Frequency converter receiving terminal command, immediately put an end to the output, load stop freely according to the mechanical inertia.
44,45: The external input fault normally open / closed.
• Fault signal has two kinds of input mode whichare normally open or normally closed, frequency converter can detect peripheral equipment fault signal via controlling the terminals.
• After receiving an external fault signal, converter will stop freely down, at the same time, display external equipment failure (E0024).
46: External reset input.
• When the fault alarm is occurred in inverter, this DI terminal can reset fault.
50: Counter reset signal input.
• 51 function should be used together to reset converter built-in counter.
51: Counter trigger signal input.
• Built-in counter counts pulse input port, when power off, the current count valuecan be stored.
• The highest frequency pulse: 200Hz. Specific see F15.37, F15.38.
53: Pulse frequency input (DI4).
• DI4 terminal can receive the pulse signal as a frequency setting, the relationship between input pulse frequency and the set frequency see F05.01 - F05.04.</td></tr>
<tr><td rowspan="2">F15.12</td><td>Terminal UP / DOWN of the rate of acceleration and deceleration</td><td>0.0 - 99.9 [1.0Hz/s]</td></tr>
<tr><td colspan="2">Define DI terminals as the UP / DN terminals (17/18 function), modified chaneing rate of set frequency.</td></tr>
<tr><td rowspan="2">F15.14</td><td>Number of terminal detection filter</td><td>0 - 10000 [2]</td></tr>
<tr><td colspan="2">Delay, confirm DI terminal signals to prevent DI terminal misoperation.</td></tr>
</table>

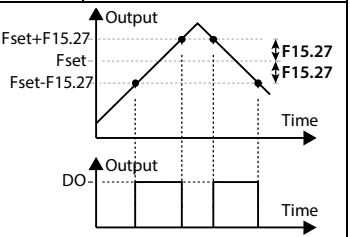
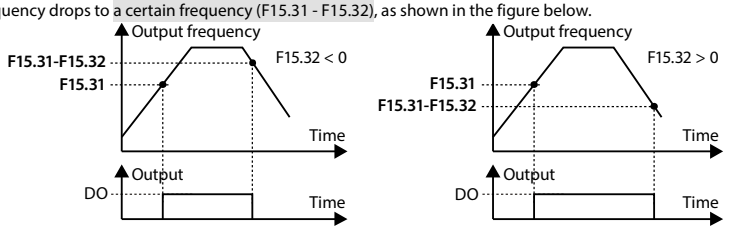
<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>F15.15</td><td colspan="2">Positive and negative terminal input logic setting 0000 - 100F [0000]
Define positive and negative logic of DI terminal, each unit (binary) of F15.15 represents different DI terminals, shown in the following table.
• 0: Positive logic:
• DI terminal and the corresponding public ones are valid in connection and invalid in disconnection.
• Alinput voltage ≥ 6V, input is valid, Alinput voltage ≤ 4V, invalid.
• 1: Negetive logic:
• DI terminal and the corresponding public ones are valid in disconnection and valid in connection.
• AI input voltage ≥ 6V, input is invalid, alinput voltage ≤ 4V, valid.
<table>
<tr><th>Bit12</th><th>Bit3</th><th>Bit2</th><th>Bit1</th><th>Bit0</th></tr>
<tr><td>AI</td><td>DI4</td><td>DI3</td><td>DI2</td><td>DI1</td></tr>
</table>
</td></tr>
<tr><td>F15.16</td><td colspan="2">Forward / reverse operation mode setting 0 - 3 [0]
Define four different ways of DI terminal control converter.
• F15.00 - F15.03 set as 2, mean DI terminal as "forward" function, indicates in Dlc below diagram.
• F15.00 - F15.03 set as 3, mean DI terminal as "reverse" function, indicates in Dly below diagram.
• F15.00 - F15.03 set as 4, mean DI terminal as "Three-wire system operation control " function, indicates in Dlz below diagram.
0,1: Two line operation mode 1, 2.
• Under terminal control mode, although DI terminal is effective, but when the stop command is produced by other sources (DI terminal set as 41, 42, 44, 45 function) to stop the inverter when, even if terminal forward / reverse is still valid, running will not be ordered.
• If you want to run inverter again, it is necessary to trigger again for DI terminal forward / reverse effective state, shown in the diagram below.
 

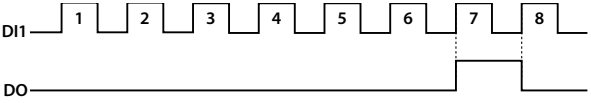
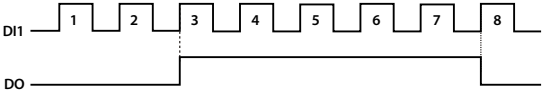
<table>
<tr><th colspan="2">Terminal disconnected is 0, closed is 1</th><th colspan="2">Run command</th></tr>
<tr><th>K2</th><th>K1</th><th>F15.16 = 0</th><th>F15.16 = 1</th></tr>
<tr><td>0</td><td>0</td><td>Stop</td><td>Stop</td></tr>
<tr><td>1</td><td>0</td><td>Reversal</td><td>Stop</td></tr>
<tr><td>0</td><td>1</td><td>Forward</td><td>Forward</td></tr>
<tr><td>1</td><td>1</td><td>Stop</td><td>Reversal</td></tr>
</table>
2: Three line operation mode 1.
• No effective transformation occurs in SB2, SB3, maintain the current running direction.
3: Three line operation mode 2.
• SB2 is from effective to invalid, frequency converter running state remains unchanged.</td></tr>
</table>

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td></td><td colspan="2">
F15.16 = 2


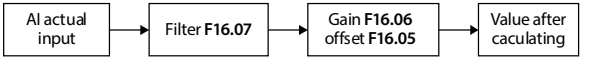
• SB1: Normally closed stopping button (falling edge effective)
• SB2: Normally open forward button (rising edge effective)
• SB3: Normally open reverse button (rising edge effective)
F15.16 = 3


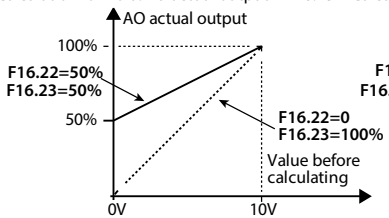
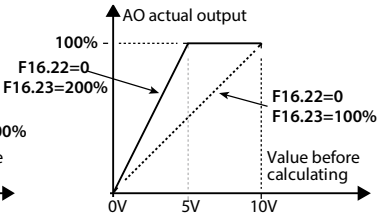
• K: Direction selection terminals (PMCSx)
• K = 0 (Forward); K = 1 (Reverse)
• SB1: Normally closed stopping button (falling edge effective)
• SB2: Normally open running button (rising edge effective)
</td></tr>
<tr><td>F15.19</td><td>DO function selection</td><td>0 - 38 [2]</td></tr>
<tr><td>F15.20</td><td>Relay function</td><td>0 - 31 [31]</td></tr>
<tr><td></td><td colspan="2">
0: Reserved.
• So that the output terminal in a non-functional state, nor make any action.
2: The inverter is running.
• When the inverter is running, the indicator output.
3: The inverter is running forward.
• When the inverter is running forward, the output signal output.
4: The inverter is running reversely.
• When the inverter is running in reverse, the output signal output.
5: DC brake.
• When the inverter is in DC braking, the output signal output.
9: Frequency level detection signal (FDT).
• See, for example, F15.31, F15.32.
11: Frequency arrival (FAR).
• See F15.27 for details.
20: Data output by SCI communication.
• There is a SCI communication that directly controls the DO or relay output indication signal.
21: Set run time arrive.
• See F15.36 for details.
23: Set the count value arrive.
• See F15.37, F15.38 for details.
24: Specifies the count value arrive.
• See F15.37, F15.38 for details.
</td></tr>
</table>

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td></td><td colspan="2">30: Overload signal (OL).
• The indicating signal can be output when the inverter's output current value is higher than that defined by F20.01 (overload pre-alarm detection threshold) and the overload time is longer than that defined by F20.02 (overload pre-alarm detection time).
31: Inverter failure.
• When the inverter is failed, the indicator output.
38: Pulse output (DO only).
• DO as a pulse output, see F16.21 for details.</td></tr>
<tr><td>F15.27</td><td>Frequency reach (FAR) width detection</td><td>0.0 - 100.0 [2.5Hz]</td></tr>
<tr><td></td><td colspan="2">When the output frequency of converter is within plus or minus detection width of setting frequency (right diagram Fset). DO output pulse signal is shown in the picture on the right.
 
</td></tr>
<tr><td>F15.31</td><td>FDT electrical level</td><td>0.0 - F00.06 [50.0Hz]</td></tr>
<tr><td>F15.32</td><td>FDT delay</td><td>-F00.06 - F00.06 [1.0Hz]</td></tr>
<tr><td></td><td colspan="2">When the output frequency exceeds F15.31 frequency, the DO output indicating signals, until the output frequency drops to a certain frequency (F15.31 - F15.32), as shown in the figure below.
 
</td></tr>
<tr><td>F15.36</td><td>Set running time</td><td>0 - 65535 [0h]</td></tr>
<tr><td></td><td colspan="2">When running total time of the inverter reaches F15.36, DO or relay will output 500ms width pulse guiding signal.</td></tr>
</table>

Ref. Code	Function Description	Setting Range [Default]
F15.37	**Setted count value reach preset**	**F15.38 - 9999 [0]**
F15.38	**Specified count value reach preset**	**0 - F15.37 [0]**
	F15.37 define the number of pulses entered by the DI terminal (function No. 51). The DO or relay outputs an indication signal and the external counter is automatically cleared. F15.38 define the number of pulses entered by the DI terminal (function No. 51). The DO or relay outputs an indication signal until the set count value is reached. Example: F15.37 is set to 7, F15.38 is set to 3, DI1 is set as counter trigger signal input function (F15.00 = 51). • DO is set to set the counter arrival function (F15.19 = 23). When DI1 inputs the 7th pulse, DO outputs an indication signal. When DI1 inputs the 8th pulse, the DO output signal returns to low level, as shown in the following figure.  • DO is set to the specified counter arrival function (F15.19 = 24). When DI1 inputs the third pulse, DO outputs an indication signal until the set count reaches 7, as shown in the following figure.  	
F15.43	**The output terminal delay**	**0.0 - 100.0 [0.0s]**
F15.44	**AI terminals (ADI) option**	**0 - 51 [0]**
	Function the same as the DI1 - DI3 terminals (F15.00 - F15.02). • When F15.44 is not 0, the ADI function is valid and 0 is only AI function.	

7.11 F16: Analogue Input / Output Terminal Parameter

Ref. Code	Function Description	Setting Range [Default]
F16.00	**Keypad potentiometer function selection**	**0 - 5 [0]**
F16.01	**AI function Selection**	**0 - 5 [2]**
	0: Resevered. 2: Frequency setting. 3: Auxiliary frequency setting. 5: PID feedback process.	
F16.05	**AIpolarization**	**-100.0 - 100.0 [0.0%]**
F16.06	**AI gain**	**0.00 - 10.00 [1.00]**
F16.07	**AI filter time**	**0.01 - 10.00 [0.05s]**
	AI input is selected as open-loop frequency setting channel, the analog input needs to be filtered, offset, gain calculation processed, only to get the actual analog, as shown below. • The relationship between the AI input and the set frequency is set by F05.01 - F05.04. • Calculation formula: Calculated value = F16.06 × AI Actual input + F16.05.  F16.07 defines the filter time of the channel and filters the input signal. • The longer the filtering time, the stronger the anti-interference ability, but the slower the response. The shorter the filtering time is, the faster the response time becomes.	
F16.17	**DI4 the largest terminal input pulse frequency**	**0.0 - 50.0 [10.0kHz]**
	Define DI4 terminals as the maximum input pulse frequency when the input pulse.	
F16.18	**DI4 terminal input pulse filtering time**	**0 - 500 [10ms]**
	To filter the DI4 terminals of the input pulse frequency, to filter out pulse frequency of small fluctuations.	
F16.19	**AO function selection**	**0 - 12 [2]**
F16.21	**DO function selection**	**0 - 12 [0]**
	0: Reserved. 2: Preset frequency (0 - maximum output frequency). 3: Motor rpm (0 - the maximum output frequency corresponds to the speed). 5: Output current (0 -2 times the motor rated current). 11: Output voltage (0 - 1.2 times the inverter rated voltage). 12: DC bus voltage (0 - 2.2 times the inverter rated voltage).	

Ref. Code	Function Description	Setting Range [Default]
F16.22	**AO polarization**	**-100.0 - 100.0 [0.0%]**
F16.23	**AO gain**	**0.0 - 200.0 [100.0%]**
	If the user needs to adjust the AO output proportional relationship, can be achieved through the output gain, as shown below. • Calculation formula: AO actual output = F16.23 × Calculated value + F16.22.  	
F16.26	**DO terminal output maximum pulse frequency**	**0.1 - 50.0 [10.0kHz]**
	Defines the DO terminal for the largest output pulse frequency pulse output.	

7.12 F17: SCI Communication Parameter

Ref. Code	Function Description	Setting Range [Default]
F17.00	**Data format**	**0 - 2 [0]**
	0: 1-8-2 format, no parity, RTU. 1-8-2 format indicates that the communication format is 1 bit start bit, 8 bits data bit, 2 bit stop bit. 1: 1-8-1 format, even parity, RTU. 1-8-1 format indicates that the communication format is: 1 bit start bit, 8 bits data bit, 1 bit stop bit. 2: 1-8-1 format, odd parity, RTU. 1-8-1 format indicates that the communication format is: 1 bit start bit, 8 bits data bit, 1 bit stop bit.	
F17.01	**Baud rate choice**	**0 - 5 [3]**
	0: 1200bps. 3: 9600bps. 1: 2400bps. 4: 19200bps. 2: 4800bps. 5: 38400bps.	
F17.02	**The machine address**	**0 - 247 [2]**
	When set to 0, it is represented as a broadcast address.	
F17.03	**This machine response time**	**0 - 1000 [1ms]**
F17.04	**LAN communication timeout detection time**	**0.0 - 1000.0 [0.0s]**
	When the time interval between the two returns to the local data continues to exceed F17.04, the E0028 fault (SCI communication timeout) is reported and the inverter continues to run. • F17.04 = 0, the drive does not detect the communication timeout.	

Ref. Code	Function Description	Setting Range [Default]
F17.05	**Communication error detection time**	**0.0 - 1000.0 [0.0s]**
	When the communication error occurs more than F17.05, reported E0029 failure (SCI communication error), the inverter continues to run. • F17.05 = 0, the inverter does not detect communication error.	
F17.09	**Communication write function parameter saving EEPROM choice**	**00 - 11 [01]**
	Used to select communication modification parameter, whether it is stored in the EEPROM. **Bits: Except of F00.13, F19.03 function parameter, communication EEPROM storage options** **Ten: F00.13, F19.03 function parameter communication EEPROM storage options** 0: Not save. 1: Save. *Note:* *1. When ten = 1, it may damage the inverter. Please exercise caution.* *2. Only when using the communication function parameters, the function code is 0x06 or 0x10 is valid, see Chapter 9 MODBUS communication protocol.*	
F17.10	**Network communication timeout detection time**	**0.0 - 1000.0 [0.0s]**
	The frequency converter reports that E0028 is faulty (SCI communication time-out) after the interval between two received correct data (including local or non-local) continues to exceed F17.10. • F17.10 = 0, do not detecte fault time.	

7.13 F18: Display Control Parameter

Ref. Code	Function Description	Setting Range [Default]
F18.00	**Language selection**	**0,1 [0]**
	Only when using LCD keypad will F18.00 be enabled. 0: Chinese. 1: English.	
F18.02	**Running display parameter 1 setting**	**0 - 49 [8]**
F18.08	**Stopping display parameter 1 setting**	**0 - 49 [7]**
	Defines display contents of keypad. The operating parameters or the stop parameters can be cycled display through the key of the keypad. 0: Reserved. 1: Inverter rated current. 3: Inverter status. • See d00.10 for details. 4: Main set frequency channel. 5: Main set frequency. 7: Set frequency. 8: Given frequency (after acceleration and deceleration). 9: Output frequency. • The Hz lamp flashes while running. 10: Set the speed. 11: Running rpm. • The RPM lamp flashes while running. 13: Output voltage. 14: Output current. 15: Torque reference. 16: Output torque. 17: Output power. 18: DC bus voltage. 19: Keypad potentiometer input voltage. 20: AI input voltage. 21: AI input voltage (after processing). 28: DI4 terminal pulse input frequency. 29: AO output. 32: Radiator temperature. 33: Set the line speed. 34: Given line speed. 42: External count value 43: Input terminal status. • Bit0 - Bit3 corresponds to DI1 - DI4. • Bit12 corresponds to AI. 44: Output terminal status. • Bit0 - Bit2 corresponds to reserved, DO, RLY. 48: Power-on time accumulated (hours). 49: Run time accumulated (hours).	
F18.14	**Frequency displaygain**	**0.1 - 160.0 [1.0]**
F18.15	**Maximum line velocity**	**0 - 65535 [1000]**
F18.16	**Line speed display accuracy**	**0 - 3 [0]**
	0: Integer. 1: A decimal. 2: Two decimal places. 3: Three decimal places. *Note: The maximum linear velocity must be newly set after the display accuracy is changed.*	
F18.17	**LCD backlit screen saver mode**	**0,1 [0]**
	0: Current mode. 1: When the external signal input changes, the screen saver is canceled. • External signal input change: Refers to the set frequency or operating frequency, running state changes.	

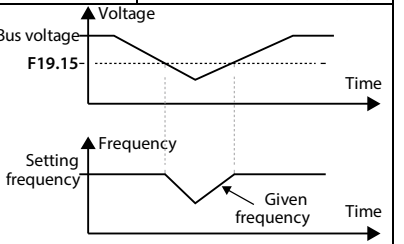
7.14 F19: Enhancement Parameters

Fan control function (F19.07, F19.08)

Ref. Code	Function Description	Setting Range [Default]
F19.07	**Cooling fan control options**	0 - 2 [0]
F19.08	**Cooling fan control delay time**	0.0 - 600.0 [30.0s]
	F19.07 defines the control mode of the cooling fan. If there is over-temperature protection, the fan keeps running. 0: Auto stop mode. • When the inverter is running and the fan shut downtime reaches the time set by F19.08, if no overtemperature protection occurs, the fan will stop automatically. 1: Immediate stop mode. • When the inverter is running, the fan is running and the fan stops immediately after shutdown. 2: The fan is runningwith power on. • The fan keeps running when the inverter is powered . *Note: F19.07, F19.08 fan control function only for 380V models, other models fan keeps running with power.*	

The non-stop function in instantaneous electric (F19.12 - F19.15)

In the voltage drop or instantaneous undervoltage, the inverter automatically low voltage compensation, appropriate to reduce the output frequency, through the load feedback energy, to achieve the inverter does not trip.

Ref. Code	Function Description		Setting Range [Default]
F19.12	**The non-stop function selection in instantaneous electric**		0,1 [0]
	If the inverter is momentarily lost during operation (main circuit DC bus voltage VDC < F19.15), the inverter maintains the DC bus voltage by reducing the output frequency to avoid undervoltage shutdown. 0: No. 1: Enable.		
F19.13	**Deceleration time in non-stop function**		0.01 - 600.00 [5.00s]
	Set too large, the load feedback energy is small, can not be used for low voltage compensation. Set too small, the load feedback energy is large, will cause overvoltage protection.		
F19.14	**Voltage picks up judgment time**		0.00 - 10.00 [0.10s]
F19.15	**Action judgment time**	**220V converter:**	0 - 999 [248V]
		380V converter:	0 - 999 [430V]

Overvoltage stall function (F19.18, F19.19)

Ref. Code	Function Description	Setting Range [Default]
F19.18	**Overvoltage stall selection**	**0,1 [1]**
	0: No. This condition is recommended to install the braking resistor. 1: Allow. During the slowdown of the inverter, the bus voltage is compared with F19.19. • If the detected bus voltage exceeds F19.19, the inverter output frequency will stop falling and be detected again. If the bus voltage is lower than F19.19, the inverter will continue to slow down. *Note: When the overvoltage stall condition is held for more than 1 minute, the inverter reports an overvoltage stall failure (E0007) and stops the output.*	
F19.19	**Overvoltage speed lose point**	**0 - 999V [Type confirmed]**

Automatic current limit function (F19.20 - F19.22)

Ref. Code	Function Description	Setting Range [Default]
F19.20	**Automatic current limit selection**	**0 - 2 [1]**
	0: Invalid. 1: Effective acceleration and deceleration, constant speed is invalid. 2: Deceleration, constant speed are effective.	
F19.21	**Automatic current limit level**	**20.0 - 200.0 [150.0%]**
	The current threshold for the automatic current limiting operation is defined as the percentage relative to the rated current of the drive. • If the F19.21 setting is low when the automatic current limit is active, the inverter overload capacity may be affected.	
F19.22	**Automatic current limit deceleration time**	**0.00 - 600.00 [0.00s]**
	Defines the rate at which the output frequency is adjusted when the automatic current limiting action is performed. • If the setting is too large, it may be in an automatic current limit for a long time to cause an overload fault. • When the setting is too small, the frequency adjustment will increase, which may cause the inverter to be over-voltage protected for a long time. • When F19.22 = 0, the current limit does not slow down.	

Terminal detection (F19.23)

Ref. Code	Function Description	Setting Range [Default]
F19.23	**Electric instant terminal detection**	**0,1 [0]**
	0: Rising edge effective. • Suitable for use after power-on, in the absence of human intervention and does not allow automatic operation, to prevent damage to equipment and protect personal safety. • These situations need to be started when the inverter is powered on and the run command is completed. 1: Electrical level. • Suitable for ensured equipment and personal safety, in order to improve the automation and efficiency of equipment, the need for the inverter to run immediately on power. • In these cases, the drive will operate immediately as long as the command is given to the terminal, regardless of whether the run command is given before the inverter is powered up or after power-up.	

Braking function (F19.24)

Ref. Code	Function Description	Setting Range [Default]
F19.24	**Action voltage of brake unit**	**630 - 750V [Type confirmed]**
	Note: It is valid only when the inverter is running.	

Frequency adjustment range (F19.37)

Ref. Code	Function Description	Setting Range [Default]
F19.37	**Frequency adjustment range**	**000 - 101 [100]**
	Bits: The main frequency calculation • 0: 0 to Max. • 1: Minus to Max. **Ten: Reserved** **Hundred: Synthesis of frequency calculation** • 0: 0 to Max. • 1: Minus to Max.	

Short detection (F19.38)

Ref. Code	Function Description	Setting Range [Default]
F19.38	**Phase short circuit detection action selection**	**0,1 [1]**
	Used to select whether or not to detect a short circuit between each run. 0: No detection. 1: Detection.	

Input voltage selection (F19.39)

Ref. Code	Function Description	Setting Range [Default]
F19.39	**Input voltage selection**	**00 - 12 [00]**
	Bits: Model 380V input voltage selection • 0: 380 - 460V. • 1: 260 - 460V. • 2: 200 - 460V. **Ten: Model 220V input voltage selection** • 0: 200 - 240V. • 1: 140 - 240V. *Note: Low voltage input, the inverter needs to derate the use, the actual output current does not exceed the rated output current of the inverter.*	

LCD back screen display (F19.44)

Ref. Code	Function Description	Setting Range [Default]
F19.44	**LCD display time**	**0.0 - 999.9 [5.0min]**
	Defines the display time of keypad LCD backlight when there is no operation. • Normally on in 0. • Normally on in fault. • In no fault, more than F19.44 time, LCD backlight will be off. If any button press operation panel at this time, only to open the backlight and not execute the command.	

7.15 F20: Fault Protection Parameter

Overload protection (F20.00)

Ref. Code	Function Description	Setting Range [Default]
F20.00	**Overload protection**	**00000 - 10000 [00000]**
	00000: Enable. 10000: Shielding.	
F20.01	**Overload pre-alarm detection threshold**	**20.0 - 200.0 [150.0%]**
	Defines the current threshold for overload pre-alarm protection. The setting range is a percentage value of the motor's or the inverter's rated current.	
F20.02	**Overload pre-alarm detection time**	**0.0 – 60.0 [5.0s]**
	When the inverter output current is greater than the overload pre-alarm detection level (F20.01) and the duration is greater than the overload pre-alarm detection time (F20.02), the inverter reports E0017 fault (inverter overload) or E0019 fault (motor overload).	

Output phase fault (F20.10, F20.11)

Ref. Code	Function Description	Setting Range [Default]
F20.10	**Detecting datum for output phase fault**	**0 - 50 [20%]**
F20.11	**Detecting time for output phase fault**	**0.00 - 20.00 [3.00s]**
	F20.10 is percentage compared to rated current. when the inverter output detects current has not reached a certain phase detecting datum (F20.10), and duration is greater than the testing time (F20.11), frequency converter will give E0016 (output phase fault). • F20.10 = 0 or F20.11 = 0, converter do not detect output phase fault.	

Fault self-recovery function and fault relay action (F20.18, F20.19)

The function can recovery fault occurred in running and which is set in times (F20.18) and interval (F20.19) automatically. In interval, output is locked and after finishing recovering, if running command is valid, automatic running will start.

No recovery function in below fault:

E0008: Power module failure
E0013: Electricity buffer relay not suck
E0014: The current detection circuit fault
E0021: Control board EEPROM reading and writing fault
E0024: External fault

Ref. Code	Function Description	Setting Range [Default]
F20.18	**Automatic reset number**	**0 - 100 [0]**
	When set to 0, it means that automatic reset is disabled and fault protection is performed immediately. • The fault auto reset count is automatically cleared when no fault is detected within 5 minutes. • When an external fault is reset, the fault auto reset count is cleared.	
F20.19	**Automatic reset interval**	**2.0 - 20.0 [5.0s/times]**

Ref. Code	Function Description	Setting Range [Default]
F20.21	Of the third (the lastest) failure type	[Actual]
F20.22	Preset frequency of the latest failure	
F20.23	Running frequency of the latest failure	
F20.24	DC bus voltage of the latest failure	
F20.25	Output voltage of the latest failure	
F20.26	Output current of the latest failure	
F20.29	Interval time of the latest failure	
F20.30	Fault type of second time	
F20.31	Interval time of the second time failure	
F20.32	Fault type of first time	
F20.33	Interval time of the first time failure	
	F20.22 - F20.29 Record inverter state parameters in the latest failure moment. F20.30 - F20.33 Record fault type of the last four times and interval times of each fault. Time interval unit is 0.1 hour.	

7.16 F23: PWM Controlling Parameter

Ref. Code	Function Description	Setting Range [Default]
F23.00	Carrier frequency setting	1 - 16 [4kHz]
	Define carrier frequency of converter output PWM wave. • Carrier frequency will affect motor running noise. Higher the carrier frequency, less noise. Please set it reasonably. • If F23.00 > 4kHz, each1kHz added, converter should be derated by 5%.	

Chapter 8 Troubleshooting and Maintenance

8.1 Troubleshooting

HD09 series inverter has inbuilt protective and warning self-diagnostic functions. If a fault occurs, the fault code will be displayed on the display keypad. At the same time, fault relay acts, accordingly the inverter stops outputand the motor coasts to stop.

When fault or alarm occurs, please record the fault details and take proper actions according to the below table. If you need some technical help, please contact to the suppliers or directly call Shenzhen Hpmont Technology Co., Ltd.

After the fault is eliminated, please reset the inverter by any of the following methods:

1. Display keypad. Press ▽ (standard) / STOP (optional).

2. External reset terminal (multi-function terminal set as No.46 function).

3. Communication.

4. Switching on the inverter after switching off.

Fault		Fault reasons	Counter-measures
-Lu-	DC bus undervoltage	• At the begining of powering on and at the end of powering off • Input voltage is too low • Improper wiring leads to undervoltage of hardware	• It is normal status of powering on and powering off • Please check input power voltage • Please check wiring and wire the inverter properly
E0001	Inverter acceleration overcurrent	• Improper connection between inverter and motor • Improper motor parameters • The rating of the used inverter is too small • Acceleration / deceleration time is too short	• Connect the inverter and motor properly • Please set correct motor parameters (F08.00 - F08.03) • Select inverter with higher rating Please set proper acceleration time and deceleration time (F03.01, F03.02)
E0002	Inverter deceleration overcurrent		
E0003	Inverter constant speed overcurrent		
E0004	DC bus acceleration over voltage	• Input voltage is too high • Deceleartion time is too short • Improper wiring leads to overvoltage of hardware • Improper selection of the braking devices	• Please check power input • Please set a proper value for deceleration time (F03.02) • Please check wiring and wire the inverter properly • Select according to the recommended braking devices of section 5.2 Braking Resistor, page 20
E0005	DC bus deceleration over voltage		
E0006	DC bus constant speed over voltage		

Fault		Fault reasons	Counter-measures
E0007	Stall overvoltage	• Bus voltage is too high • The setting of stall overvoltage is too low	• Please check power input or the function of brake • Set the value of stall overvoltage properly (F19.19)
E0008	Fault of power module	• Short circuit between phases output • Short circuit to the ground • Output current is too high • Power module is damaged	• Please check the connection and connect the wire properly • Please check the connection and connect the wire properly • Please check the connection and mechanism • Please contact the supplier for repairing
E0009	Heatsink overheat	• Ambient temperature is too high • Inverter external ventilation is not good • Fan fault • Fault occurs to temperature detection circuit	• Please use inverter with higher power capacity • Improve the ventilation around the inverter • Replace the cooling fan • Please seek technical support
E0011	CPU fault	• CPU abnormal	• Please detect at power on after completely power outage • Please seek technical support
E0012	Parameters auto-tuning fault	• Parameter auto-tuning is time out	• Please check the motor's connection • Input the correct motor parameters (F08.01 - F08.03) • Please seek technical support
E0013	Contactor is not actuated	• Contactor fault • Fault of control circuit	• Replace the contactor • Please seek technical support
E0014	Fault of current detection circuit	• Current detection circuit is damaged	• Please contact the supplier for repairing
E0016	Fault of output phase	• Output phase disconnectionor loss • Heavy imbalance of inverter's three-phase load	• Please check the connection between inverter and motor • Please check the quality of motor
E0017	Inverter overload	• Acceleration time is too short • Improper setting of V/f curve or torque boost leads to over current • Mains supply voltage is too low • Motor load is too high	• Adjust acceleration time (F03.01) • Adjust V/f curve (F09.01 - F09.06) or torque boost (F09.07, F09.08) • Please check mains supply voltage • Please use inverter with proper power rating

Fault		Fault reasons	Counter-measures
E0019	Motor overload	• Improper setting of V/f curve • Mains supply voltage is too low • Normal motor runs for a long time with heavy load at low speed • Motor runs with blocked torque or load is too heavy	• Adjust thesetting of V/f curve (F09.01 - F09.06) • Check the power input • Please use special motor • Please check the load and mechanical transmission devices
E0021	Access fault of Control board EEPROM	• Memory circuit fault of control board EEPROM	• Please contact the supplier for repairing
E0024	Fault of external equipment	• Fault terminal of external equipment operates	• Please check external equipment
E0028	SCI communication time-out	• Connection fault of communication cable • Disconnected or not well connected	• Please check the connection
E0029	SCI communication error	• Connection fault of communication cable • Disconnected or not well connected • Communication setting error • Communication data error	• Please check the connection • Please check the connection • Please correctly set the communication format (F17.00), and the baud rate (F17.01)

Note:

If E0028 or E0029 are displayed on the keypad, there is no need to stop the inverter.

8.2 Maintenance

Danger

- Must be maintained by professionally trained and authorized professionals.
- Before the inverter is inspected and maintained, the input power of the inverter is completely disconnected. See Check that the input power is fully disconnected, page 9.

Warning

- For a converter with a storage time of more than 2 years, the power supply should be boosted by the regulator.
- Do not leave metal objects such as wires, tools, screws, etc. inside the drive.
- Do not modify the inverter internally.
- Do not touch the IC device with static-sensitive IC device inside the inverter.

Daily Maintenance

HD09 must be operated in the specified environment, see section 3.2 Requirement for the Installation Site, page 6.

Users should follow the table below to do routine maintenance work in order to detect abnormal phenomena in time to extend the life of the inverter.

Items	Content	Criteria
Running environment	Temperature andhumidity	-10 - +40℃, derating at40 - 50℃ Less than 95%RH, non-condensing
	Dust and water dripping	No conductive dust accumulating, no water dripping
	Gas	No strange smell
HD09	Oscillation and heating	Stable oscillation and proper temperature
	Noise	No abnormal sound
Motor	Heating	No overheat
	Noise	Low and regular noise
Running status parameters	Output current	Within rated range
	Output voltage	Within rated range

Periodical Maintenance

According to the environment, the user can inspect for each 3 - 6 months on the HD09 a regular routine to eliminate the hidden dangers to ensure long-term high-performance equipment and stable operation.

Check the contents:

- The control terminal screws are not loosened and, if loosened, use the available torque and the appropriate screwdriver to tighten;
- Strong contact of power terminals, no overheating traces at copper or cable connections;
- Damage of power cable, control cable, especially surface in contact with the metal whether have cutting traces;
- The nose of power cord and control signal line, insulation tape does not fall off or rupture;
- Clean the dust on the circuit board and duct, and better to use a vacuum cleaner.

Note:

1. Inverter factory has passed the pressure test, the user does not have to do the pressure test, or improper test will damage the inverter.

2. When the motor is tested for insulation, the U / V / W terminal of the inverter must be disconnected and the motor should be tested separately. Otherwise, the inverter will be damaged.

3. Long-term storage of the inverter must be carried out within 2 years of a power test. Use the regulator to slowly raise the input voltage of the inverter to the rated value for at least 5 hours.

Chapter 9 MODBUS Communication Protocol

9.1 Overview

HD09 provides one RJ45 terminal, using standard MODBUS communication protocol.

Users can use the host computer (including computers, PLC and other communications equipment) to do the following: Read and write inverter function parameters, read the status parameters, write control commands, including communication when the HD09 in the slave mode.

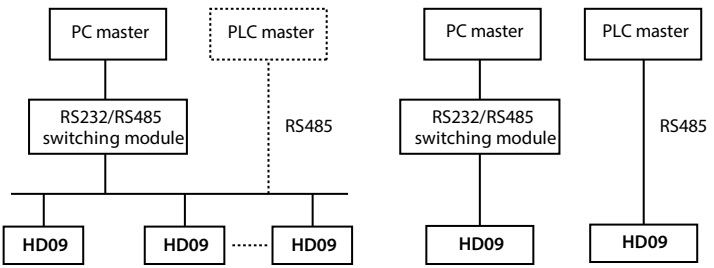
9.1.1 RJ45 Terminal

RJ45 terminal position, pin definition see section 4.4 External Keypad or Upper Computer, page 17.

The transmission mode is shown in the table below.

Interface	Asynchronous, half duplex
Format	1-8-2 (1-bit start bit, 8-bit data bit, 2-bit stop bit)
Baud rate	9600bps
Related parameter settings	See F17: SCI Communication Parameter, page 45

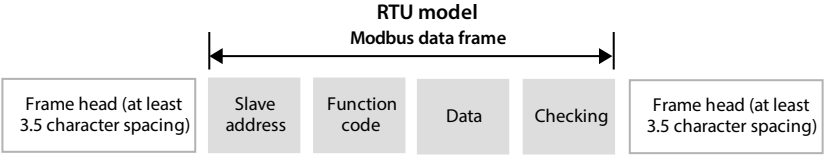
9.1.2 Networking Mode



Single-master and multi-slave **Single-master and single-slave**

9.1.3 MODBUS Protocol Format

MODBUS protocol only supports RTU mode, the corresponding frame format is as follows:



MODBUS uses "Big Endian" encoding, first send high byte, and then low byte.

- Head and end Frames are defined by the bus idle time of not less than 3.5 bytes.
- When the slave address is set to 0, it indicates the broadcast address.
- Data check using CRC-16, the entire information involved in the verification.

9.2 Calibration Relationship of Transfer Value Corresponding

Please refer to the "minimum unit" of the parameter list to determine the calibration relationship of the function parameters. See the list of the last function parameters of this manual.

Note:

1. F16.05, F16.22 communication data 0 - 2000 corresponds to data -1000- + 1000.

2. In status parameter groups, progress PID feedback (0x332D), process PID error (0x332E), the process PID integral (0x332F), and the process PID output (0x3330) the communication data 0 - 2000 corresponds to -1000- + 1000.

9.3 Protocol Functions

9.3.1 Support Functions

MODBUS protocol supports the following functions:

Supported function	Code	Instructions
Read the drive function parameters or status parameters	0x03	
Rewrite the inverter with a single function parameter or control parameter	0x06	Power-down is saved by F17.09
Read the drive function parameters or status parameters	0x10	Power-down is saved by F17.09

9.3.2 Read the Inverter Function Parameters or Status Parameters

Function code 0x03, request frame and response frame see table below.

Request frame	Add	Function code	Start register address	Number of registers	CRC check
Number of data frame bytes	1	1	2	2	2
Value or range	0 - 247	0x03	0x0000 - 0xFFFF	0x0001 - 0x000C	

Response frame	Add	Function code	Answer number of bytes	Number of registers	CRC check
Number of data frame bytes	1	1	1	2* Noof registers	2
Value or range	1 - 247	0x03	2* No of registers		

9.3.3 Rewrite the Inverter a Single Function Parameters or Control Parameters

Function code 0x06 (power-down is set by F17.09), request frame and response frame see table below.

Request frame	Add	Function code	register address	Content of registers	CRC check
Number of data frame bytes	1	1	2	2	2
Value or range	0 - 247	0x06	0x0000 - 0xFFFF	0x0000 - 0xFFFF	

Response frame	Add	Function code	register address	Content of registers	CRC check
Number of data frame bytes	1	1	2	2	2
Value or range	1 - 247	0x06	0x0000 - 0xFFFF	0x0000- 0xFFFF	

9.3.4 Rewrite the Inverter Multiple Functional Parameters or Control Parameters

Function code 0x10 (power-down is saved by F17.09 set), request frame and response frame see table below.

Request frame	Add	Function code	Start register address	No of operation registers	Register contents bytes	Register contents	CRC check
No of data frame bytes	1	1	2	2	1	2* No of operation registers	2
Value or range	0- 247	0x10	0x0000 - 0xFFFF	0x0001 - 0x0004	2* No of operation registers		

Response frame	Add	Function code	Start register address	No of operation registers	CRC check
No of data frame bytes	1	1	2	2	2
Value or range	1 - 247	0x10	0x0000 - 0xFFFF	0x0001 – 0x0004	

The request rewrites the contents of the contiguous data unit starting from the starting register address.

Register address mapping for the inverter function parameters and control parameters, see section 9.4 Address Mapping Relationship, page 65.

9.3.5 Error and Exception Code

If the operation request fails, the answer is an error code, the error code is function code + 0x80.
The exception code is shown in the table below.

Exception code	Instructions
0x01	Illegal function parameters.
0x02	Illegal register address.
0x03	Data fault. Data is exceeded the upper/lower limit.
0x04	Slave operation fails (including fault caused by data invalid).
0x16	Unsupported operation (unsupported to read the attributes, factory default and upper / lower limit for the control parameter and status parameter).
0x17	The register number of command frame is fault.
0x18	Incorrect information frame, including incorrect information length and incorrect checking.
0x20	Parameters cannot be modified.

Exception code	Instructions
0x21	Parameters are unchangeable when the controller is in running status.
0x22	Parameters are protected by password.

For example: Write slave 2 frequency setting channel selection F00.10 (range 0x00-0x04), register contents write 0x08 is overrun. The error code is 0x86 (0x06 + 0x80) and the exception code should be 0x03.

	Address	Code	Register address		Register contents		Checksum	
Request frame	0x02	0x06	0x00	0x0A	0x00	0x08	0xa8	0x3D

	Address	Error code	Exception code	Checksum	
Response frame	0x02	0x86	0x03	0xF2	0x61

9.4 Address Mapping Relationship

The function parameters, control parameters and status parameters of the HD09 can be mapped to MODBUS read and write registers.

9.4.1 Function Parameters Address Mapping

The group number of the HD09 function parameter is mapped to the high byte of the register address. The correspondence relationship is shown in the following table. The intra-group index is mapped to the low byte of the register address. The index of the function parameter F00 - F23 refers to the user manual.

Register address high byte	Group No	Register address high byte	Group No	Register address high byte	Group No
0x00	F00	0x06	F06	0x12	F18
0x01	F01	0x08	F08	0x13	F19
0x02	F02	0x09	F09	0x14	F20
0x03	F03	0x0f	F15	0x17	F23
0x04	F04	0x10	F16		
0x05	F05	0x11	F17		

For example, the register address of function parameter F03.02 is 0x0302 and the register address of function parameter F16.01 is 0x1001.

9.4.2 Control Parameters (0x32) Address Mapping

Inverter control parameters to complete the inverter start, stop, set the operating frequency and other functions, by retrieving the inverter status parameters to obtain the inverter running frequency, output current and other parameters.

The control group number (0x32) is mapped to the high byte of the register address, and the index in the group is as follows:

Register address	Parameter	Saving or not when power off
0x3200	Control commnad	No
0x3201	Running frequency setting	No
0x3204	Analogue terminals control setting	No

Control commnad (0x3200) byte definition

Register contents can be defined as control commands, see table below.

Register content	Control command	Register address	Parameter name
0x1001	Forward command	0x1020	External fault shutdown
0x1003	Reverse command	0x1040	Jog forward
0x1004	Deceleration downtime	0x1080	Jog reverse
0x1010	Free stop	0x1100	Fault reset

Virtual terminal control setting (0x3204) word bit definition

Control word	Value and meaning	
Bit1	1: DO is valid	0:DO is invalid
Bit2	1: RLY is valid	0:RLY is valid

9.4.3 Status Parameter (0x33) Address Mapping

The group number (0x33) of the status parameter is mapped to the high byte of Register address. The index of the group is shown in the following table:

Address	Parameter	Address	Parameter
0x3300	Inverter series	0x331A	Keypad potentiometer input voltageM
0x3301	U1 board software version	0x331B	AI input voltage
0x3302	I1 board software version	0x331C	AI input voltage (after processing)
0x3303	U1 board software non-standard version	0x3323	DI4 terminal pulse input frequency
0x3304	I1 board software non-standard version	0x3324	AO output
0x3305	Operation panel software version	0x3326	High speed output pulse frequency
0x3306	Customized serial number	0x3327	Radiator temperature
0x3308	Inverter rated current	0x332C	Process PID given
0x330A	Inverter rated current	0x332D	Process PID feedback
0x330B	Main reference frequency channel	0x332E	Process PID error
0x330C	Main set frequency	0x332F	Process PID integral term
0x330D	Auxiliary set frequency	0x3330	Process PID output
0x330E	Set frequency	0x3331	External count value
0x330F	Given frequency (after Acc. / Dec.)	0x3332	Input terminal status
0x3310	Output frequency	0x3333	Output terminal status
0x3311	Set Rpm	0x3334	MODBUS communicaiton status
0x3312	Running Rpm	0x3337	Power-on time accumulated (hours)
0x3314	The output voltage	0x3338	Run time accumulated (hours)
0x3315	Output current	0x333D	Current fault
0x3319	DC bus voltage		

9.5 Special Instructions

1. The host machine can read but cannot change the inverter parameters: F08 group (asynchronous motor), F17 group (SCI communication), keep the parameters.

2. The host machine communication cannot change F01.00 (user password), but you can write F01.00 verify the user password, the host machine gets the function parameters of the inverter, after the change, by writing invalid the password to F01.00 and make the host machine no permission to change the function parameters of the inverter.

3. Various multi-function input terminal function settings will lead to the same function, through the MODBUS protocol to modify the multi-function terminal function to avoid this situation.

9.6 Application Examples

When using the communication to control the inverter, please make sure the hardware connection is correct. At the same time, set the communication data format, baud rate and communication address of the inverter correctly.

1. Slave 2 frequency setting should be changed in communication setting

Request frame	Address	Code	Register address		Register content		Checksum	
	0x02	0x06	0x00	0x0A	0x00	0x02	0x28	0x3A
Response frame	**Address**	**Code**	**Register address**		**Register content**		**Checksum**	
	0x02	0x06	0x00	0x0A	0x00	0x02	0x28	0x3A

2. Write slave 2 set the operating frequency, power-down save (such as: set the operating frequency of 45.00Hz), register contents0x11,0x94

Request frame	Address	Code	Register address		Register content		Checksum	
	0x02	0x06	0x32	0x01	0x11	0x94	0xDB	0x7E
Response frame	**Address**	**Code**	**Register address**		**Register content**		**Checksum**	
	0x02	0x06	0x32	0x01	0x11	0x94	0xDB	0x7E

3. The command channel (F00.11) changes to the communication giving

Request frame	Address	Code	Register address		Register content		Checksum	
	0x02	0x06	0x00	0x0B	0x00	0x02	0x79	0xFA
Response frame	**Address**	**Code**	**Register address**		**Register content**		**Checksum**	
	0x02	0x06	0x00	0x0B	0x00	0x02	0x79	0xFA

4. The forward run of slave 2

Request frame	Address	Code	Register address		Register content		Checksum	
	0x02	0x06	0x32	0x00	0x10	0x01	0x4B	0x41
Response frame	**Address**	**Code**	**Register address**		**Register content**		**Checksum**	
	0x02	0x06	0x32	0x00	0x10	0x01	0x4B	0x41

5. Reserve run of slave 2

Request frame	Address	Code	Register address		Register content		Checksum	
	0x02	0x06	0x32	0x00	0x10	0x03	0xCA	0x80
Response frame	**Address**	**Code**	**Register address**		**Register content**		**Checksum**	
	0x02	0x06	0x32	0x00	0x10	0x03	0xCA	0x80

6. Slave 2 deceleration stop command

Request frame	Address	Code	Register address		Register content		Checksum	
	0x02	0x06	0x32	0x00	0x10	0x04	0x8B	0x42
Response frame	Address	Code	Register address		Register content		Checksum	
	0x02	0x06	0x32	0x00	0x10	0x04	0x8B	0x42

7. Slave 2 fault reset

Request frame	Address	Code	Register address		Register content		Checksum	
	0x02	0x06	0x32	0x00	0x11	0x00	0x8B	0x11
Response frame	Address	Code	Register address		Register content		Checksum	
	0x02	0x06	0x32	0x00	0x11	0x00	0x8B	0x11

8. Read from the salve 2 inverter output current (such as: Inverter output current of 12.5A), register contents0x00,0x7D

Request frame	Address	Code	Register address		Read bytes		Checksum	
	0x02	0x03	0x33	0x15	0x00	0x01	0x9A	0xB9
Response frame	Address	Code	Response bytes		Register content		Checksum	
	0x02	0x03	0x02		0x00	0x7D	0x3C	0x65

9. Read the output frequency of slave 2 (such as: Inverter output frequency of 50.00Hz), register contents0x13,0x88

Request frame	Address	Code	Register address		Read bytes		Checksum	
	0x02	0x03	0x33	0x10	0x00	0x01	0x64	0x38
Response frame	Address	Code	Response bytes		Register content		Checksum	
	0x02	0x03	0x02		0x13	0x88	0xF1	0x12

10. Read the slave bus 2 bus voltage (state parameter), the response should be 537V

Request frame	Address	Code	Register address		Read bytes		Checksum	
	0x02	0x03	0x33	0x19	0x00	0x01	0x5A	0xBA
Response frame	Address	Code	Response bytes		Register content		Checksum	
	0x02	0x03	0x02		0x02	0x19	0x3C	0xEE

11. The setting frequency of the slave 2 (F00.13) is 45.00Hz, and the power is saved

Request frame	Address	Code	Register address		Register content		Checksum	
	0x02	0x06	0x00	0x0D	0x11	0x94	0x15	0xC5
Response frame	Address	Code	Register address		Register content		Checksum	
	0x02	0x06	0x00	0x0D	0x11	0x94	0x15	0xC5

12. Slave 2 free stop command (F00.11 = 2)

Request frame	Address	Code	Register address		Register content		Checksum	
	0x02	0x06	0x32	0x00	0x10	0x10	0x8B	0x4D
Response frame	Address	Code	Register address		Register content		Checksum	
	0x02	0x06	0x32	0x00	0x10	0x10	0x8B	0x4D

Chapter 10 Parameter

Attributes are changed:

"X": It denotes that the setting of this parameter cannot be modified when the inverter is in run status.

"O": It denotes that the setting of this parameter can be modified when the inverter is in run status.

"*": It denotes that the value of this parameter is the actual value which cannot be modified.

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F00: Basic Parameter						
F00.06	Inverter max. output frequency	50.0 - 1000.0Hz	50.0Hz	0.1Hz	×	
F00.08	Upper limit of operation frequency	0.0 - F00.06	50.0Hz	0.1Hz	×	
F00.09	Lower limit of operation frequency	0.0 - F00.08	0.0Hz	0.1Hz	×	
F00.10	Frequency setting sources selection	0: Keypad digital setting 1: Terminal digital setting 2: SCI communication setting 3: AI analogue setting 4: Terminal pulse setting	0	1	×	
F00.11	Command setting source selection	0: Keypad running source 1: Terminal running source 2: SCI communication running source	0	1	×	
F00.13	Starting frequency digital setting	0.0 - F00.08	50.0Hz	0.1Hz	○	
F00.14	UP / DOWN digital setting control	Units: Frequency setting save selection at power outage 0: Not save in power off 1: Save in power off Tens: Frequency setting control selection at stop 0: Set frequency keeping in stop 1: Rcovery frequency to F00.13 in stop Hundreds: Communication setting frequency storage selection 0: Not save in power off 1: Save in power off	1001	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		Thousands: Switch the frequency channel to the analogue selection 0: Not save 1: Save				
F00.15	Jog operation frequency digital setting	0.0 - up limitation (F00.08)	5.0Hz	0.1Hz	○	
F00.17	Running direction selection	0: Same direction 1:Reserved direction	0	1	×	
F00.19	Dead time of direction switch	0.0 - 3600.0s	0.0s	0.1s	×	
F00.20	Keypad enbale	Unit: Button enbale 0: Enable 1: Disable Ten: Potentiometer enbale 0: Potentiometer priority for keypad 1: Potentiometer with keypad 2: Potentiometer with external keypad	00	1	○	
F00.21	Sleep function enbale	0: Disable 1: Enable 1 2: Enable 2	0	1	×	
F00.22	Dormant wake time	0.0 - 360.0s	0.0s	0.1s	×	
F00.24	Sleep delay	0.0 - 3600.0s	0.0s	0.1s	×	
F00.25	Sleep frequency	0.0Hz - F00.08	0.5Hz	0.1Hz	○	
F01: Parameter Protection function						
F01.00	User's password	00000 - 65535	00000	1	○	
F01.01	Menu mode selection	0: Full menu mode 1: Checking menu mode	0	1	○	
F01.02	Function codeparameter initialization (parameter download)	0: No operation 1: Restore to factory settings 2/3: Keypad stored parameter 1/2 iscopied to control board and update current function value 4: Clear fault information	0	1	×	
F01.03	Copy parameter to keypad (parameter uploading)	0: No operation 1/2: Current function values are copied to keypad stored parameter 1/2	0	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F02: Start and Stop Controlling Parameter						
F02.02	Start DWELL frequency setting	0.0 - F00.08	0.0Hz	0.1Hz	×	
F02.03	Retention time of starting DWELL frequency	0.00 - 10.00s	0.00s	0.01s	×	
F02.04	DC braking current setting	0 - 100%	50%	1%	×	
F02.05	DC braking time at start	0.00 - 60.00s	0.00s	0.01s	×	
F02.13	Stop mode selection	1: Coast to stop 2: Decelerate to stop	2	1	×	
F02.14	DWELL frequency setting at stop	0.0 - F00.08	0.0Hz	0.1Hz	×	
F02.15	Retention time of DWELL frequency at stop	0.00 - 10.00s	0.00s	0.01s	×	
F02.16	DC braking initial frequency at stop	0.0 - 50.0Hz	0.5Hz	0.1Hz	×	
F02.18	DC braking time at stop	0.00 - 60.00s	0.00s	0.01s	×	
F03: Acceleration and Deceleration Parameter						
F03.01	Acceleration time 1	0.01 - 600.00s	10.00s	0.01s	○	
F03.02	Deceleration time 1	0.01 - 600.00s	10.00s	0.01s	○	
F03.03	Acceleration time 2	0.01 - 600.00s	10.00s	0.01s	○	
F03.04	Deceleration time 2	0.01 - 600.00s	10.00s	0.01s	○	
F03.05	Acceleration time 3	0.01 - 600.00s	10.00s	0.01s	○	
F03.06	Deceleration time 3	0.01 - 600.00s	10.00s	0.01s	○	
F03.07	Acceleration time 4	0.01 - 600.00s	10.00s	0.01s	○	
F03.08	Deceleration time 4	0.01 - 600.00s	10.00s	0.01s	○	
F03.09	Ace. time 2 and 1 switch frequency	0.0 - up limitation	0.0Hz	0.0Hz	×	
F03.10	Dec. time 2 and 1 switch frequency	0.0 - up limitation	0.0Hz	0.0Hz	×	
F03.15	Spot Ace. time	0.01 - 600.00s	6.00s	0.01s	○	
F03.16	Spot Dec. time	0.01 - 600.00s	6.00s	0.01s	○	
F04: Process PID Controlling Parameter						
F04.00	Process PID control selection	0: PID control is disabled 1: PID control is enabled	0	1	×	
F04.02	Feedback source selection	0: AI analogue feedback 1: Terminal pulse feedback	0	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F04.03	Setting digital reference	0.0 - 100.0%	0.0%	0.1%	○	
F04.04	Proportional gain (P)	0.00 - 10.00	2.00	0.01	○	
F04.05	Integral time (I)	0.01 - 10.00s	1.00s	0.01s	○	
F04.06	Integral upper limit	0.0 - F00.08	50.0Hz	0.1Hz	○	
F04.07	Differential time (D)	0.00 - 10.00s	0.00s	0.01s	○	
F04.08	Differential amplitude limit value	0.0 - F00.08	20.0Hz	0.1Hz	○	
F04.09	Sampling cycle (T)	0.01 - 50.00s	0.10s	0.01s	○	
F04.10	Bias limit	0.0 - 20.0%	2.0%	0.1%	○	
F04.13	PID regulator upper limit value	0.0 - F00.08	50.0Hz	0.1Hz	×	
F04.14	PID regulator lower limit value	0.0 - F00.08	0.0Hz	0.1Hz	×	
F04.15	PID regulator characteristic	0: Positive characteristic 1: Negative characteristic	0	1	×	
F04.16	Integral regulation selection	0: Stop integral regulation when the frequency reaches the upper or lower limit 1: Continue the integral regulation when the frequency reaches the upperor lower limit	0	1	×	
F04.17	PID output filter time	0.01 - 10.00s	0.05s	0.01s	○	
F04.18	PID output reverse selection	0: PID regulation disable reverse (when PID output is negative, 0 is the limit) 1: PID regulation enable reverse	0	1	×	
F04.19	PID output reverse frequency's upper limit	0.0 - F00.08	50.0Hz	0.1Hz	×	
F05: External Given Curve Parameters						
F05.01	Minimum reference of line	0.0% - F05.03	0.0%	0.1%	○	
F05.02	Minimum reference corresponding value of line	0.0 - 100.0%	0.0%	0.1%	○	
F05.03	Maximum reference of line	F05.01 - 100.0%	100.0%	0.1%	○	
F05.04	Maximum reference corresponding value of line	0.0 - 100.0%	100.0%	0.1%	○	
F05.17	Skip frequency	F00.09 - F00.08	0.0Hz	0.1Hz	×	
F05.20	Range of skip frequency	0.0 - 30.0Hz	0.0Hz	0.1Hz	×	
F06: Multistage Speed Function						

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F06.00	Multi-step frequency Command 1	F00.09 - F00.08	5.0Hz	0.1Hz	○	
F06.01	Multi-step frequency Command 2	F00.09 - F00.08	5.0Hz	0.1Hz	○	
F06.02	Multi-step frequency Command 3	F00.09 - F00.08	5.0Hz	0.1Hz	○	
F06.03	Multi-step frequency Command 4	F00.09 - F00.08	5.0Hz	0.1Hz	○	
F06.04	Multi-step frequency Command 5	F00.09 - F00.08	5.0Hz	0.1Hz	○	
F06.05	Multi-step frequency Command 6	F00.09 - F00.08	5.0Hz	0.1Hz	○	
F06.06	Multi-step frequency Command 7	F00.09 - F00.08	5.0Hz	0.1Hz	○	
F08: Motor Parameter						
F08.00	Rated power of motor	0.2 - 5.5kW	Dependent on HD09	0.1kW	×	
F08.01	Rated voltage of motor	0V - inverter's rated voltage		1V	×	
F08.02	Rated current of motor	0.01 - 99.99A		0.01A	×	
F08.03	Rated frequency of motor	1 - 1000Hz	50Hz	1Hz	×	
F08.04	Rated Rpm of motor	1 - 24000rpm	Dependent on HD09	1rpm	×	
F08.06	Parameter auto-tuning of motor	0: Auto-tuning is disabled 1: Stationary auto-tuning	0	1	×	
F08.07	Stator resistance of motor	0.00 - 99.99Ω	Dependent on HD09	0.01Ω	×	
F09: V/f Controlling Parameter						
F09.01	V/f frequency value F3	F09.03 - 100.0% (F08.03)	100.0%	0.1%	×	
F09.02	V/fvoltage valueV3	F09.04 - 100.0% (F08.01)	100.0%	0.1%	×	
F09.03	V/f frequency value F2	F09.05 - F09.01 (F08.03)	0.0%	0.1%	×	
F09.04	V/f voltage value V2	F09.06 - F09.02 (F08.01)	0.0%	0.1%	×	
F09.05	V/f frequency value F1	0.0% - F09.03 (F08.03)	0.0%	0.1%	×	
F09.06	V/f voltage value V1	0.0% - F09.04 (F08.01)	0.0%	0.1%	×	
F09.07	Torque boost	0.0 - 30.0%	2.0%	0.1%	×	
F09.08	Cut-off point used formanual torque boost	0.0 - 50.0% (F08.03)	30.0%	0.1%	○	
F09.09	Motor transfer compensation gain	0.0 - 300.0%	0.0%	0.1%	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F09.10	Compensation filtering time for motor transfer	0.01 - 10.00s	0.10s	0.01s	○	
F09.11	Differential compensation for motor differential	0.0 - 250.0%	200.0%	0.1%	×	
F09.12	The time constant of the motor compensation	0.1 - 25.0s	2.0s	0.1s	○	
F09.14	AVR (automatic voltage regulation) function	0: No action 1: Keep acting 2: No action only in Dec.	1	1	○	
F09.15	Oscillation-suppression mode	0: Oscillation-suppression mode 1 1: Oscillation-suppression mode 2	0	1	○	
F09.16	Oscillation-suppression coefficient	0 - 200	50	1	○	
F15: Digital Input / Output Terminals Parameter						
F15.00	DI1 function	0: Unused 1: Inverter enabled 2,3: FWD / REV function 4: Three-wire operation mode 8: AI to be the frequency source 11: Terminal control mode to be the run command source	2	1	×	
F15.01	DI2 function	13 - 15: Multi-step frequency terminal 1 - 3 17: Frequency ramp (UP) 18: Frequency ramp (DN) 19: Clearing auxiliary frequency setting 20,21: Forward and reverse jog command control input (JOGF / JOGR)	3	1	×	
F15.02	DI3 function	26,27: Selection terminals in Ace. and Dec. time 1, 2 41: Coast to stop (normally-open input) 42: Coast to stop (normally-closed input) 44: External fault signal (normally-open input)	0	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F15.03	DI4 function	45: External fault signal (normally-closed input) 46: External resetinput (RST) 50: Clearing the counter to zero 51: Counter's triggering signal input 53: Pulse frequency input (only DI4 terminal is enabled) *ADI is valid when F15.44 is not as 0. As 0, only AI is valid.*	0	1	×	
F15.44	AI terminal (ADI function) selection		0	1	×	
F15.12	Acc. / Dec. rate of UP / DN terminal	0.0 - 99.9Hz/s	1.0Hz/s	0.1 Hz/s	×	
F15.14	Terminal detecting filter number	0 - 10000	2	1	○	
F15.15	Terminal input positive and negative logic setting	Bit0 - Bit3 is corresponding to DI1 - DI4 Bit12 is corresponding toAI Bitx: Dly terminal input positive and negative logic 0: Positive logic 1: Negative logic	0	1	○	
F15.16	FWD / REV operation mode	0: Two-wire operation mode1 1: Two-wire operation mode2 2: Three-wire operation mode 1 3: Three-wire operation mode 2	0	1	×	
F15.19	DO function	0: Unused 2: Inverter is running (RUN) 3: Inverter is forward running 4: Inverter is reverse running 5: Inverter is DC braking 9: Frequency detection threshold (FDT) 11: Frequency arriving signal (FAR) 20: Output data from SCI communication 21: Preset operating time out 23: Preset counting value reach 24: Indicating counting value reach 30: Overload signal (OL) 31: Inverter fault 38: High-frequency output (only DO)	2	1	×	
F15.20	Relay function		31	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F15.27	FAR range	0.0 - 100.0Hz	2.5Hz	0.1Hz	○	
F15.31	FDT level	0.0 - F00.06	50.0Hz	0.1Hz	○	
F15.32	FDT lag	- F00.06 - F00.06	1.0Hz	0.1Hz	○	
F15.36	Preset operating time	0 - 65535h *0: Preset operating time is disabled*	0h	1h	○	
F15.37	Preset counting value arriving	F15.38 - 9999	0	1	○	
F15.38	Specified counting value arriving	0 - F15.37	0	1	○	
F15.43	Terminal output delay	0.0 - 100.0s	0.0s	0.1s	×	
F16: Analogue Input / Output Terminal Parameter						
F16.00	Keypad with potentiometer function	0: Unused 2: Frequency setting source 3: Auxiliary frequency reference 5: Process PID feedback	0	1	×	
F16.01	AI function		2	1	×	
F16.05	AI bias	-100.0 - 100.0%	0.0%	0.1%	○	
F16.06	AI gain	0.00 - 10.00	1.00	0.01	○	
F16.07	AI input filtering time	0.01 - 10.00s	0.05s	0.01s	○	
F16.17	DI4 max. input pulse frequency	0.0 - 50.0kHz	10.0kHz	0.1kHz	○	
F16.18	DI4 input pulse filtering time	0 - 500ms	10ms	1ms	○	
F16.19	AO function	0: Unused 2: Reference frquency (0 - max. output frequency) 3: Motor speed (0 - max. output frequency corresponding to speed) 5: Output current (0 - twice motor's rated current) 11: Output voltage (0 - 1.2 times inverter's rated voltage) 12: Bus voltage (0 - 2.2 times inverter's rated voltage)	2	1	○	
F16.21	DO function		0	1	○	
F16.22	AO bias	-100.0 - 100.0%	0.0%	0.1%	○	
F16.23	AO gain	0.0 - 200.0%	100.0%	0.1%	○	
F16.26	DO max. output pulse frequency	0.1 - 50.0kHz	10.0kHz	0.1kHz	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F17: SCI Communication Parameter						
F17.00	Data format	0: 1-8-2 format, no parity, RTU 1: 1-8-1 format, even parity, RTU 2: 1-8-1 format, odd parity, RTU	0	1	×	
F17.01	Baud rate selection	0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps	3	1	×	
F17.02	Local address	0 - 247	2	1	×	
F17.03	Host PC response time	0 - 1000ms	1ms	1ms	×	
F17.04	Time threshold for detecting communication status	0.0 - 1000.0ms *0.0: Not detecting communicaiton over time*	0.0s	0.1s	×	
F17.05	Detecting time at communication error	0.0 - 1000.0ms *0.0: Not detecting communicaiton error*	0.0s	0.1s	×	
F17.09	Communication write function parameter of storage EEPROM method selection	Units: Communication write function parameter of storage EEPROM method selection (Except for F00.13 and F19.03) Tens: Communication write function parameter ofstorage EEPROM method selection for F00.13 and F19.03 0: Without storage EEPROM 1: Storage EEPROM	01	1	×	
F17.10	Detecting time when network communication over time	0.0 - 600.0s *0.0: Not detecting communicaiton error*	0.0s	0.1s	×	
F18: Display Control Parameter						
F18.00	Language selection	0: Chinese 1: English	0	1	○	
F18.02	Running display parameter 1 setting	0: Reserved 1: Inverter rated current 3: Inverter status 4: Main setting frequency channel 5: Main setting frequency 7: Setting frequency	8	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F18.08	Stop display parameter 1 setting	8: Given frequency (after Dec. and Ace.) 9: Output frequency 10: Setting RPM 11: Running rpm 13: Output voltage 14: Output current 15: Torque given 16: Output torque 17: Output power 18: DC bus voltage 19: Keypad potentiometer input voltage 20: AI input voltage 21: AI input voltage (after handling) 28: DI4 terminal pulse input frequency 29: AO output 32: Heat sink temperature 33: Given line speed 34: Given line speed 42: External value 43: Input terminals statues 44: Output terminals status 48: Total power time accumulates (hours) 49: Total running time accumulates (hours)	7	1	○	
F18.14	Frequency display gain	0.1 - 160.0	1.0	0.1	○	
F18.15	Max. line speed	0 - 65535	1000	1	○	
F18.16	Line speed display accuracy	0: Integer 1: A decimal 2: Two decimals 3: Three decimals	0	1	×	
F18.17	LCD Backlighting screen saver mode	0: Current mode 1: External signal input changed, cancenl backlighting screen	0	1	○	
F19: Enhancement Parameters						
F19.07	Control selection of cooling fan	0: Auto stop mode 1: Immediate stop mode	0	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		2: The fan runs continuously when power on				
F19.08	Cooling fan controls delaying time	0.0 - 600.0s	30.0s	0.1s	×	
F19.12	Instantaneous loss of power and no stop function selection	0: Disable instantaneous loss and no stop 1: Enbale instantaneous loss and no stop	0	1	×	
F19.13	Instant stop function deceleration time	0.01 - 600.00s	5.00s	0.01s	○	
F19.14	Voltage rerise judgement time for Instantaneous loss of power and no downtime	0.00 - 10.00s	0.10s	0.01s	○	
F19.15	Voltage judgement for Instantaneous loss of power and no downtime	0 - 999V	220V inverter: 248V 380V inverter: 430V	1V	×	
F19.18	Protection of stall overvoltage	0: Disabled (with braking resistance) 1: Enabled	1	1	×	
F19.19	Stall overvoltage point	0 - 999V	Dependent on HD09	1V	×	
F19.20	Auto current limiting selection	0: Disabled 1: Enabled in Acc. / Dec. running process, but disabled in constant speed runnng process 2: Enabled both in Acc. / Dec. and in constant speed running proces	1	1	×	
F19.21	Auto current limiting threshold	20.0 - 200.0%	150.0%	0.1%	×	
F19.22	Deceleration time at auto current limiting	0.00 - 600.00s	0.00s	0.01s	×	
F19.23	Enabled mode of terminal run command	0: Rise edge enabled mode 1: Level enabled mode	0	1	○	
F19.24	Action voltage of braking unit	630 - 750V	Dependent on HD09	1V	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F19.37	Frequency adjust range selection	Unit: Main frequency range 0: 0- max. frequency 1: Negative maximum frequency to maximum frequency Ten: Unused Hundreds: The range of synthetic frequencies 0: 0 - up limitation frequency 1: Negative upper limit frequency to upper limit frequency	100	1	○	
F19.38	Phase short circuit detection action selection	0: No detection 1: Detection	1	1	○	
F19.39	Input voltage selection	Unit : 380V input voltage 0: 380 - 460V 1: 260 - 460V 2: 200 - 460V Ten: 220V input voltage selection 0: 200 - 240V 1: 140 - 240V	00	1	×	
F19.44	LCD Backlight display time	0.0 - 999.9min	5.0min	0.1 min	○	
F20: Fault Protection Parameter						
F20.00	Selection for overload prediction police check out	00000: Enbale overload protection 10000: Disbale overload protection	00000	1	○	
F20.02	Overload pre-alarm detection time	0.0 - 60.0s	5.0s	0.1s	○	
F20.10	Output phase loss detection reference	0 - 50%	20%	1%	×	
F20.11	Output phase loss detection time	0.00 - 20.00s	3.00s	0.01s	×	
F20.18	Auto reset times	0 - 100	0	1	×	
F20.19	Auto reset interval	2.0 - 20.0s / times	5.0s / times	0.1s / times	×	
F20.21	Type of third latest (the last) fault	-Lu-: DC bus undervoltage E0001: Acc overcurrent E0002: Dec overcurrent	0	1	*	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		E0003: Costant overcurrent E0004: Acc overvoltage E0005: Dec overvoltage E0006: Constant overvoltage E0007: Stall overvoltage E0008: Fault of powermodule E0009: Heatsink overheat E0011: CPU fault E0012: Parameters auto-tuning fault E0013: Contactor is not actuated E0014: Fault of current detection circuit E0016: Fault of output phase E0017: Inverter overload E0019: Motor overload E0021: Access fault of control board EEPROM E0024: Fault of external equipment E0028: SCI communication time-out E0029: SCI communication error				
F20.22	Setting frequency at the last fault	0.0 - 1000.0Hz	0.0Hz	0.1Hz	*	
F20.23	Running frequency at the last fault	0.0 - 1000.0Hz	0.0Hz	0.1Hz	*	
F20.24	Bus voltage at the last fault	0 - 999V	0V	1V	*	
F20.25	Output voltage at the last fault	0 - 999V	0V	1V	*	
F20.26	Output current at the last fault	0.00 - 99.99A	0.00A	0.01A	*	
F20.29	Interval of third latest fault	0.0 - 6553.5h	0.0h	0.1h	*	
F20.30	Type of second latest fault	0 - 99	0	1	*	
F20.31	Interval of second latest fault	0.0 - 6553.5h	0.0h	0.1h	*	
F20.32	Type of first latest fault	0 - 99	0	1	*	
F20.33	Interval of first latest fault	0.0 - 6553.5h	0.0h	0.1h	*	
F23: PWM Controlling Parameter						
F23.00	Set the carrier frequency	1 - 16kHz	4kHz	1kHz	×	