HD3Z Series

Mining Inverter

User Manual

HD3Z Series
Mining Inverter

V1.2 2018.11

FORWARD

Thank you for purchasing HD3Z series mining inverter manufactured by Shenzhen Hpmont Technology Co., Ltd.

This User Manual describes how to use HD3Z series mining inverter 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: 2018/11

Version: V1.2

Revised chapter	Revised contents
	• V1.2 published.

HD3Z Quick Start Guide

Note:

Some of the parameters are factory setting, user mayn't need to set them when first time using the product.

(1). Start / Stop HD3Z and set running frequency via keypad

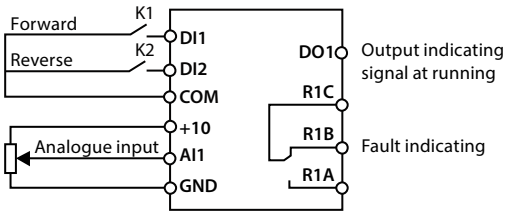
1. Power on HD3Z. Use keypad to set below parameter.

Ref. Code	Function	Setting	Description
F00.10	Frequency setting channel selection	0 (default)	Running frequency set by keypad digital setting
F00.11	Command setting channel selection	0 (default)	Keypad runs command channel
F00.13	Running frequency digital setting	-	Running frequency, adjust according to actual
F03.01 / F03.02	Acc. / Dec. time 1	-	Acc. / Dec. time, adjust according to actual
F08.00 - F08.04	Rated parameter of motor	-	Set according to motor nameplate

2. Press **RUN** on keypad to start HD3Z. Press ▲ / ▼ key to increase / decrease setting frequency. Press **STOP** to stop HD3Z.

(2). To use terminal to start / stop HD3Z, and analogue value to set running frequency

1. DI1 is forward signal input, DI2 is reverse signal input. Below is the connection.



2. Power on HD3Z. Set function codes according to connection.

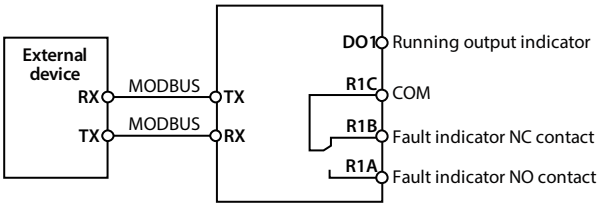
Ref. Code	Function	Setting	Description
F00.10	Select frequency setting channel	3	Set by analogue value
F00.11	Select command setting channel	1	Terminal
F03.01 / F03.02	Acc. / Dec. time 1	-	Acc. / Dec. time 1, adjust according to actual
F08.00 - F08.04	Rated parameter of motor	-	Set according to motor nameplate
F15.00	DI1 function selection	2 (default)	FWD (DI FWD signal input)
F15.01	DI2 function selection	3 (default)	REV (DI REV signal input)
F16.01	AI1 function selection	2 (default)	Frequency setting channel (set by AI1)

3. Adjust AI1 to set running frequency.

4. Connect K1, motor will forward run. Disconnect it, motor stops running. Connect K2, motor reverse run. Disconnect K2, motor stops running. Connect or disconnect both K1 and K2, motor stops running.

(3). Use communication to start / stop HD3Z and set running frequency

1. Connect as per below figure.



2. Power on, and set function code according to below table.

Ref. Code	Function	Setting	Meaning
F00.10	Select frequency setting channel	2	Set by SCI
F00.11	Select command setting channel	2	Running command set by terminal
F03.01	Acc. time 1	-	Acc. time, adjust according to actual
F03.02	Dec. time 1	-	Dec. time, adjust according to actual
F08.00 - F08.04	Rated parameter of motor	-	Set according to motor nameplate
F17.00	Data format	0 (default)	1-8-2 format, no parity, RTU
F17.01	Baut rate	3 (default)	9600bps
F17.02	Local address	2 (default)	

3. SCI code 0x06 reads to register 0x3200 to start / stop inverter which local address = 2.

E.g.: Set FWD command:

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

E.g.: Set decelerates to stop command:

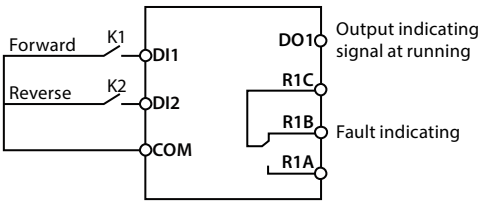
	Address	Code	Register address		Register content		Checksum	
Command / Response frame	0x02	0x06	0x32	0x00	0x10	0x04	0x8B	0x42

4. SCI code 0x06 reads to register 0x3201 to change running frequency. E.g: Set running frequency of local address 2 = 45.00Hz:

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

(4). To use terminal to control timing start / stop HD3Z

1. Check that HD3Z is installed properly. DI1: Forward signal input; DI2: Reverse signal input. Below is the connection.



2. Power on, and set function parameters as per below table:

Ref. Code	Function	Setting	Meaning
F00.10	To select frequency setting channel	0 (default)	Set by keypad digital setting
F00.11	To select command setting channel	1	Running command set by terminal
F00.13	Running frequency digital setting	-	Running frequency, set according to actual
F03.01 / F03.02	Acc. / Dec. time 1	-	Acc. / Dec. time, adjust according to actual
F15.00	DI1 function selection	2 (default)	FWD (DI FWD signal input)
F15.01	DI2 function selection	3 (default)	REV (DI REV signal input)

3. Check present time and date (D01.00 - D01.02). If not synchronize with real time, reset time (P00.00 - P00.02).

Ref. Code	Function	Setting	Meaning
D01.00	Present year	-	Present year by system
D01.01	Present MM/DD	-	Present MM/DD by system
D01.02	Present time	-	Present time by system
P00.00	Year	-	Set year (according to actual)
P00.01	MM/DD	-	Set MM/DD (according to actual)
P00.02	Time	-	Set Hr/Min (according to actual)

4. Enable timing start / stop (P01.00) and set timing start / stop time (P01.01 - P01.08) according to actual needs. For instance: Set inverter start at 8:00, stop at 12:00, start at 14:00, stop at 17:30. Refer to below:

Ref. Code	Function	Setting	Meaning
P01.00	Timing start and stop selection	1	Valid, enable timing start and stop
P01.01	Timing start 1	8.00	Start
P01.02	Timing stop 1	12.00	Stop
P01.03	Timing start 2	14.00	Start
P01.04	Timing stop 2	17.30	Stop

5. Connect K1 or K2 to enable timing start or stop function. Inverter will auto controls motor to run FWD or REV or stop according to time sequence in above table. Disconnect K1 or K2, motor stops running, inverter exits timing start / stop function.

6. Set F00.13 or press ▲ / ▼ on keypad to increase / decrease setting frequency.

(5). To use terminal to control timing frequency switch

1. Refer to step 1-3 in "(4). To use terminal to control timing start / stop of HD3Z".

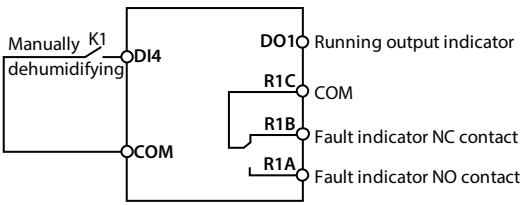
2. Enable timing frequency switch (P01.09) and set time and value of timing frequency switch. For instance, set frequency = 50.00Hz after 8:00, and 35.00Hz after 14:00:

Ref. Code	Function	Setting	Meaning
P01.09	Timing frequency switch selection	1	Valid
P01.10	Time 1 of timing frequency switch	8.00	Min/Sec
P01.11	Value 1 of timing frequency switch	50.00Hz	Frequency
P01.12	Time 2 of timing frequency switch	14.00	Min/Sec
P01.13	Value 2 of timing frequency switch	35.00Hz	Frequency

3. Connect K1 or K2, motor runs FWD or Rev, and control motor according tofrequency sequence in above table. Disconnect K2 or K2, motor stops running.

(6). To use terminal to manually dehumidify motor

1. Below is the connection. DI4 is manually dehumidifying input.



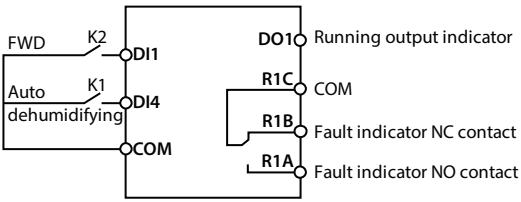
2. Power on and set below parameter:

Ref. Code	Function	Setting	Meaning
F15.03	DI4 function selection	90	Manually dehumidifying (signal input)
F19.42	Motor dehumidifying current	10% (default)	Set dehumidifying current
F19.43	Dehumidifying time when current of motor rises	30.0min	Set dehumidifying time when current of motor rises

3. Make sure running signal of inverter is disconnected, and connect K1. Inverter starts to dehumidify according to dehumidifying current. Disconnect K1, inverter stops dehumidifying.

(7). To use terminal to dehumidify motor automatically

1. Below is the connection. DI4 is auto dehumidifying input.



2. Power on and set below parameter.

Ref. Code	Function	Setting	Meaning
F00.11	Command setting channel	1	Terminal settin channel
F15.00	DI1 function	2 (default)	FWD
F15.03	DI4 function	91	Auto dehumidifying
F16.00	AI1 function	22	Detect motor humidity
F19.42	Motor dehumidifying current	10% (default)	Set dehumidifying current
F19.43	Dehumidifying time when current of motor rises	30.0min	Set dehumidifying time when current of motor rises
F19.44	Auto dehumidifying selection	0 (default)	According to humidity
F19.45	Motor auto dehumidifying humidity	80% (default)	Motor auto dehumidifying humidity
F19.46	Motor auto dehumidifying humidity delay	5% (default)	Motor auto dehumidifying humidity delay

3. Connect K1, inverter inputs auto dehumidifying signal; Disconnect K2, inverter inputs running signal.

When present motor humidity d00.53 > F19.45, inverter starts dehumidifying according to setting current; When present motor humidity d00.53 < F19.45 - F19.46, inverter stops dehumidifying and motor starts running.

CONTENTS

Chapter 1 Safety Information and Precautions

Safety Definition

Pay attention to below marks on products / user manual.

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 personnel

Only qualified electrical engineer can perform electrical wiring.

Only a trained and authorized professional person can maintain the product.

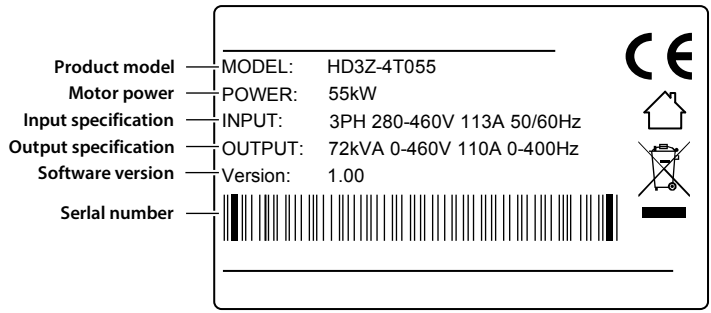
Braking

Warning

HD3Z has in-built braking unit and braking resistor, applying to braking load occasions that braking is less than 10% only.

Chapter 2 Product Information

2.1 Model



2.2 Rated Value

Refer to section 3.5 Dimensions and Mounting Size, page 9 for size information.

Model	Motor (kW)	Rated capacity (kVA)	Rated input current (A)	Rated output current (A)	Size
HD3Z-4T055	55	72	113	110	Frame A
HD3Z-4T075	75	100	156	152	Frame A
HD3Z-4T090	90	116	180	176	Frame A
HD3Z-4T110	110	138	214	210	Frame B
HD3Z-4T132	132	167	256	253	Frame B
HD3Z-4T160	160	200	307	304	Frame B
HD3Z-4T200	200	250	385	380	Frame C
HD3Z-4T220	220	280	430	426	Frame C
HD3Z-4T250	250	309	475	470	Frame C

2.3 Technical Data

Electrical	
Input voltage	Rated voltage: Three phase 380V Range: Three phase: 280 - 460V Imbalance rate < 3%
Input frequency	50/60Hz ± 5%
Output voltage	0 - input vlotage
Output frequency	0 - 400.00Hz
Performance	
Maximum current	150% rated output current for 2 minutes 180% rated output current for 10 seconds
Control mode	V/f
Running command	Keypad; External terminal; SCI communication
Speed setting	Digital; Analogue / Pulse; SCI communication
Speed resulotion	Digital setting: 0.01Hz Analogue setting: 1‰ × max. frequency
Characteristic Functions	
Parameter copy function	Copy 2 sets of parameters from MCB of inverter to keypad and vise versa
Programmableinput / output terminal	Programmableinput / output terminal
Process PID adjustment function	In-built process PID module
Timing start / stop function	Can set 4 sets of timing start / stop
Timing frequency switch function	Can set 8 timing frequency switch
Communication protocol	MODBUS protocol
Protection Functions	
Auto-limit current protection	Output current can auto-limit against overcurrent fault
Overload pre-alarm and alarm	Overload early pre-alarm and protect
Input / Output voltage phase loss protection	Input / Output voltage phase loss auto-detect and alarm function
PID commands and feedback loss detection	PID can auto-identify whether loss the setting and feedback or the alarm function
Power output grounding fault protection	Power output grounding fault protection is enabled
Power output short circuit protection	Power output short circuit protection is enabled
Input / Output	
External analogue power supply	+10V, max. 100mA
External digital power supply	+24V, max. 200mA
Analogue input	AI1 voltage 0 - 10V, AI2 current 0 - 20mA
Analogue output	AO1 voltage 0 - 10V, AO2 current 0 - 20mA
Digital input	DI1 - DI6, DI6 can be selected as high speed pulse signal
Digital output	DO1

Input / Output	
Relay output	R1A / R1B / R1C, R2A / R2C - R7A / R7C Contact rating 250VAC / 3A or 30VDC / 1A
Communication	Optical, TX / RX, MODBUS protocol HD3Z has in-built optical transceiver single fiber mode. User optical flange interface is ST type.
Keypad	
LCD display	Display in Chinese Display setting frequency, output frequency, output voltage, output current, motor rpm, output torque, parameter for start and stop, status parameter and fault code.
Parameter copy	Achieve quick parameter copy
Environment	
Running temperature	-10 - +55°C
Storage temperature	-40 - +70°C
Location for use	In factory and mine (no corrosive gas, inflammable gas, oil mist and water drip), may cause conducting pollution caused by dust and condensation
Humidity	Less than 95%RH, non-condensing
Oscillation	2 -3.5m/s^2 when 2-9Hz; 10m/s^2 (when 9 - 200Hz (IEC60721-3-3)
Protection class	IP54
Pollution degree	Degree 3 (dry conductive pollution)

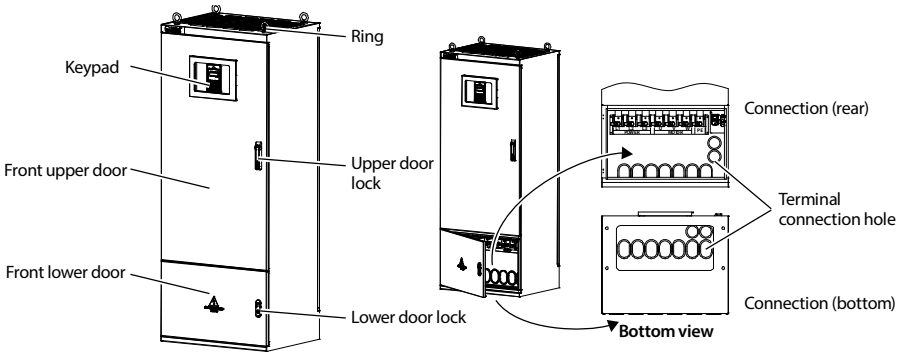
2.4 Reactor Selection

Refer to Table 2-1 for selection of AC input reactor and AC output reactor.

Table 2-1 Reactor selection

Model	AC input reactor		AC output reactor	
	Model	Para. (mH/A)	Model	Para. (mH/A)
HD3Z-4T055	HD-AIL-4T055	0.13/115	HD-AOL-4T055	0.04/125
HD3Z-4T075	HD-AIL-4T075	0.093/150	HD-AOL-4T075	0.035/160
HD3Z-4T090	HD-AIL-4T090	0.08/180	HD-AOL-4T090	0.03/200
HD3Z-4T110	HD-AIL-4T110	0.067/210	HD-AOL-4T110	0.02/225
HD3Z-4T132	HD-AIL-4T132	0.055/255	HD-AOL-4T132	0.016/280
HD3Z-4T160	HD-AIL-4T160	0.046/305	HD-AOL-4T160	0.013/320
HD3Z-4T200	HD-AIL-4T200	0.037/380	HD-AOL-4T200	0.011/400
HD3Z-4T220	HD-AIL-4T220	0.034/415	HD-AOL-4T220	0.01/450
HD3Z-4T250	HD-AIL-4T250	0.026/530	HD-AOL-4T250	0.009/560

2.5 Parts of Inverter



Chapter 3 Machenical Installation

3.1 Precautions

Danger

- Do not install if HD3Z is incomplete or impaired.
- When conveying HD3Z, please employ suitable tools according to its weight. Avoid scratch to the product. Be careful: Rollover and drop may cause hurt.
- Make sure that HD3Z is far from explosive and flammable things.
- Do not do wiring operation until power supply is cut off for more than 10 minutes, the internal charge indicator of HD3Z is off.

Warning

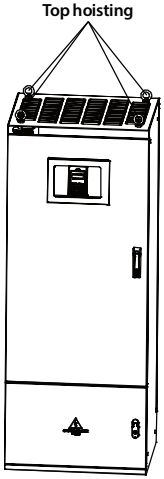
- Do not let wires, screws or residues fall into HD3Z when installing.

3.2 Hoisting and Handling Instructions

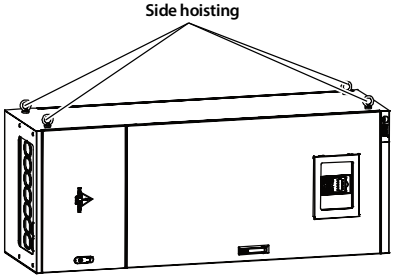
The hoisting processes of HD3Z can be divided into top hoisting, side hoisting and front hoisting, as shown in the following figure.

Four M12 rings are factory-installed on the top of the chassis, and the rings can be selectively installed on the left and right sides according to site requirements.

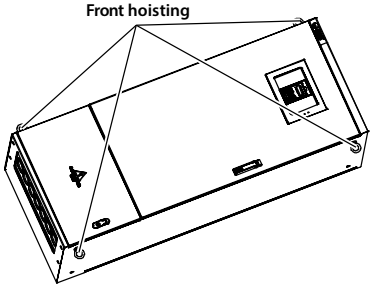
Top hoisting



Side hoisting



Front hoisting



3.3 Installation Site Requirement

Ensure the installation site meets the following requirements:

- Do not install at flammable, explosive, corrosive gas and liquid location;
- Do not install at oily dust, fiber and metal powder location;
- Be vertical installed on fire-retardant material with a strong support;
- Make sure adequate cooling space for HD3Z so as to keep ambient temperature between - 10 - + 40°C;
- Install on solid material where osilation meets requirement (3.5m/s^{2}when 2 - 9Hz; 10m/s^2 when 9 - 200Hz) (IEC60721-3-3);
- Install at where the humidity is less than 95%RH and non-condensing location;
- Protection level of HD3Z is IP54 and pollution degree is 3.

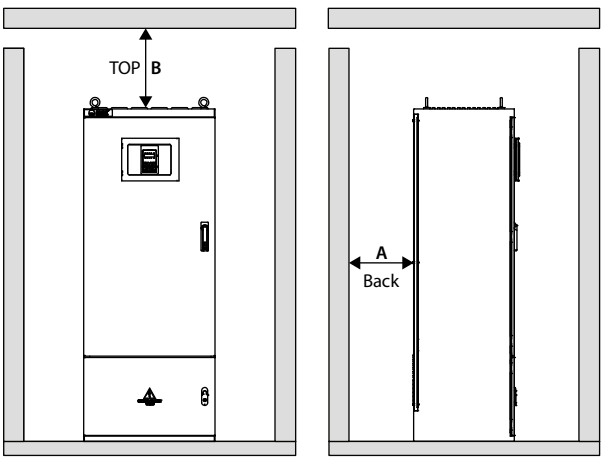
3.4 Installation Direction and Space

To achieve good cooling efficiency, install HD3Z perpendicularly and always provide the following space from walls or barriers to allow normal heat dissipation. The space are shown in Table 3-1.

Table 3-1 Installation space

A	≥ 700mm
B	≥ 350mm

It is recommended to A is 700mm at least for maintenance purpose.



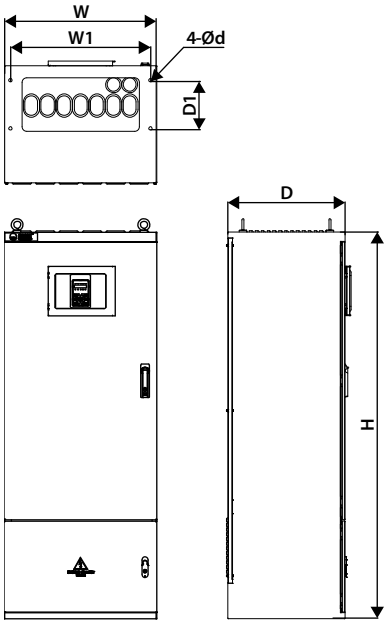
3.5 Dimensions and Mounting Size

The dimensions and mounting size of HD3Z are shown in Table 3-2.

For the corresponding model of the mounting size, refer to section 2.2 Rated Value, page 3.

Table 3-2 HD3Z Mounting Size

Size	Dimension (mm)			Mounting size (mm)		
	W	H	D	W1	D1	d
Frame A	550	1650	500	497	206	14
Frame B	650	1650	500	597	206	14
Frame C	850	1650	500	797	206	14



Outline view

3.6 Open / Close Door Lock

Upper door lock

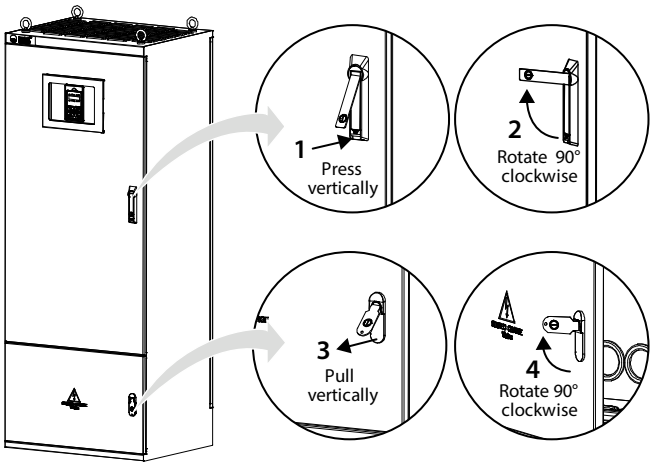
Open: Press the button vertically (step 1), and handknob opens. Rotate handknob clockwise 90° and door will open (step 2).

Close: Rotate handknob 90° anticlockwise to initial position, press it vertically to lock the door.

Lower door lock

Open: Pull the handknob vertically (step 3), rotate handknob clockwise 90° (step 4) and door will open.

Close: Rotate handknob 90° anticlockwise to initial position, press it vertically to lock the door.



Chapter 4 Electrical Installation

4.1 Precautions

Danger

- Only qualified electrical engineer can perform wiring job.
- To facilitate the input side over-current protection and outage maintenance, connect HD3Z with power supply via the MCCB or fuse.
- Do not dismantle HD3Z or do wiring operation until the power is cut-off for more than 10 minutes, the internal charge indicator of HD3Z is off.
- Check the wiring carefully before connecting emergency stop or safety circuit.
- There is more than 3mA leakage current in HD3Z grounding, depending on the running conditions. To ensure safety, HD3Z and the motor must connect to separate and independent grounding wire, so as to ground reliably. It must use Type B mode when utilize ground leakage protection devices (ELCB / RCD).
- Do not touch the wire terminals of HD3Z when it is live. The main circuit terminals are neither allowed connecting to the enclosure nor short-circuiting.

Warning

- Do not do dielectric strength test on HD3Z.
- For HD3Z with more than 2 year's storage, please use regulator to power it slowly.
- Do wiring connection of the braking resistor or the braking unit according to the wiring figure.
- Make sure the terminals are fixed tightly.
- Do not connect the AC supply cable to the output terminals U/V/W of HD3Z.
- Do not connect the phase-shifting capacitors to the output circuit.
- Switch motor or do variable and industrial frequency when HD3Z is in stop status.

4.2 Peripheral Accessories Selection

4.2.1 Wiring Specifications of Input and Output

The AC supply to HD3Z 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 are shown as Table 4-2.

The size of ground wire should accord with the requirement in 4.3.5.4 of IEC61800-5-1, as shown in Table 4-1.

Table 4-1 Sectional area of ground protective conductor

Sectional area S of phase conductor (power supply cable) while installing (mm^2)	$S \le 2.5$	$2.5 < S \le 16$	$16 < S \le 35$	$S > 35$
Min. sectional area Sp of relative protective conductor (ground cable) (mm^2)	2.5	S	16	S/2

Table 4-2 Input / Ouput wiring specification

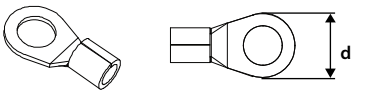
Model	MCCB (A)	Contactor (A)	Supply Cable (mm^2)	Motor Cable (mm^2)	Ground cable (mm^2)	Size
HD3Z-4T055	200	125	50	50	25	Frame A
HD3Z-4T075	250	160	50	50	25	Frame A
HD3Z-4T090	250	160	95	70	50	Frame A
HD3Z-4T110	350	350	120	120	70	Frame B
HD3Z-4T132	400	400	120	120	70	Frame B
HD3Z-4T160	500	400	185	185	95	Frame B
HD3Z-4T200	600	600	240	240	120	Frame C
HD3Z-4T220	600	600	120*2(1)	120*2(1)	120	Frame C
HD3Z-4T250	800	600	120*2(1)	120*2(1)	120	Frame C
(1): *2 indicates that two power lines or motor lines are connected in parallel.						

4.2.2 Power Terminal Lug

Select the lug of power terminal according to the size of terminal, screw size and max. outer diameter of lug. Refer to Table 4-3.

Take the round naked terminal as an example.

Table 4-3 Selection of power terminal lug



Size	Frame A	Frame B / C
Screw size	M10	M12
Tighting torque (N. M)	17.6 - 22.5	31.4 - 31.2
Max. outer diameter d (mm)	30	35

4.3 Main Circuit

Danger

- The bare portions of the power cables must be bound with insulation tapes.

Warning

- Ensure that AC supply voltage is the same as rated input voltage of HD3Z.

4.3.1 Power Terminal

Open the front lower door of HD3Z to check power terminal. See Figure 4-1.

- L1, L2, L3: Three-phase AC power input terminals
- U, V, W: Output terminals, connect to three-phase AC motor
- PE: Ground terminal, connect to the ground

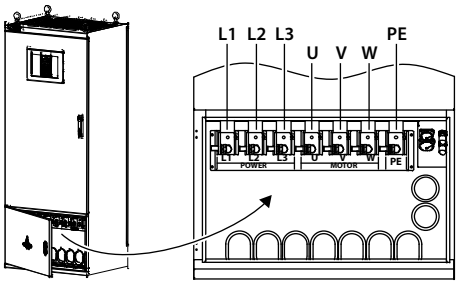


Figure 4-1 Supply and motor terminal

4.3.2 Supply and Motor Connection

During trial running, make sure HD3Z runs forward when the forward command is enabled.

If not, switch any two of the output terminals (U/V/W) or modify F00.17 to change the motor direction.

The supply and motor connection are shown as Figure 4-2. Connect the cables from the back or bottom of control panel, refer to section 2.5 Parts of Inverter, page 6.

- Refer to section 4.2 Peripheral Accessories Selection, page 11 for contactor, supply cable, motor cable and ground cable.
- Refer to 2.4 Reactor Selection, page 5 for reator options.

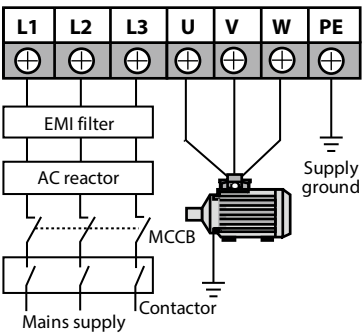


Figure 4-2 Supply and motor connection

4.4 Control Board

Danger

- The control circuit and power circuit are basically insulated. Do not touch HD3Z after it is powered.

Warning

- If the control circuit is connected to the external devices with live touchable port, it should increase an additional is olating barrier to ensure that classification of external devices not be changed.
- Only connect the relay terminal to AC 220V voltage signal. Other control terminal are strictly forbiden for this connection.

4.4.1 Control Terminal

Control terminals of HD3Z are concluded into 3pcs of IP68 air plugs. Refer to Figure 4-3 and Table 4-4 for their position and pin definition. Plug 3 is unused.

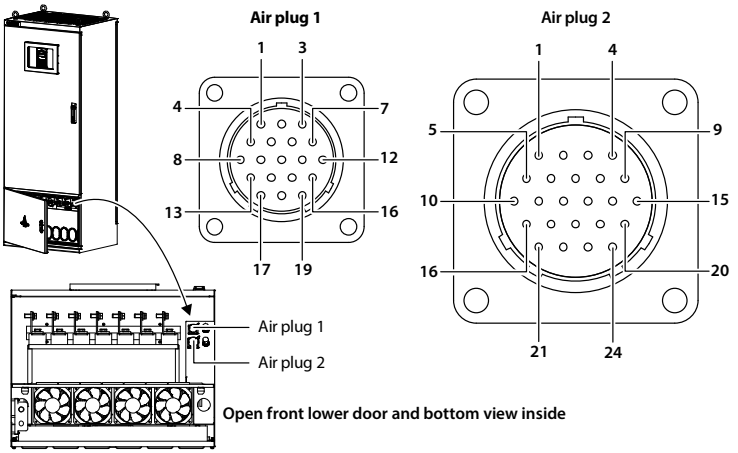


Figure 4-3 Control terminal

Table 4-4 Air plug description

Plug 1 pin definition						Plug 2 pin definition					
1	DI1	8	+10	15	R1A	1	DI5	8	R3A	15	Unused
2	DI2	9	AI1	16	R1B	2	DI6	9	R3C	16	R6C
3	DI3	10	AI2	17	R1C	3	GND	10	R4A	17	R7A
4	DI4	11	AO1	18	R2A	4	DO1	11	R4C	18	R7C
5	GND	12	AO2	19	R2C	5	CME	12	R5A	19	Unused
6	Unused	13	P24			6	Unused	13	R5C		
7	Unused	14	GND			7	Unused	14	R6A		

Table 4-5 Control signal description

Control signal		Signal description
+10, GND	Analogue supply	Analogue input use +10V power supply, max. output current is 100mA
AI1, AI2	Analogue input	AI1 input voltage 0 - 10V (input impedance: 32kΩ) AI2 input current 0 - 20mA (input impedance: 500Ω)
AO1, AO2	Analogue output	AO1 output voltage: 0 - 10V (output impedance: 32kΩ) AO2 output current: 0 - 20mA (output impedance: 500Ω)
GND	Analogue ground	
DI1 - DI6	Digital input	Input signal: low level is valid Input voltage: 0 - 30VDC DI1 - DI5 input impetance 4.7kΩ, DI6 input impedance 1.6kΩ DI6 can be selectable for high-frequency input, max. frequency 50kHz
P24	Digital supply	Digital input use +24V power supply, max. output current 200mA
DO1, CME	Digital output	Programmable optical-couple isolation, open collector output Voltage range: 0 - 30VDC, max. current 50mA • CME is isolated to GND, connect to GND by default

Control signal		Signal description
R1A / R1B / R1C R2A / R2C - R7A / R7C	Relay output	Programmable output, contact rating: 250VAC / 3A or 30VDC / 1A • RB, RC: normally closed; RA, RC: normally open

Note:

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

4.4.2 Control Terminal Wiring

To reduce the interference and attenuation of control signal, length of control cable should limit within 50m. There should be more than 0.3m between the control cable and the motor cable.

The control cable must be shielded cable. The analogue signal cable must be shielded twisted pair.

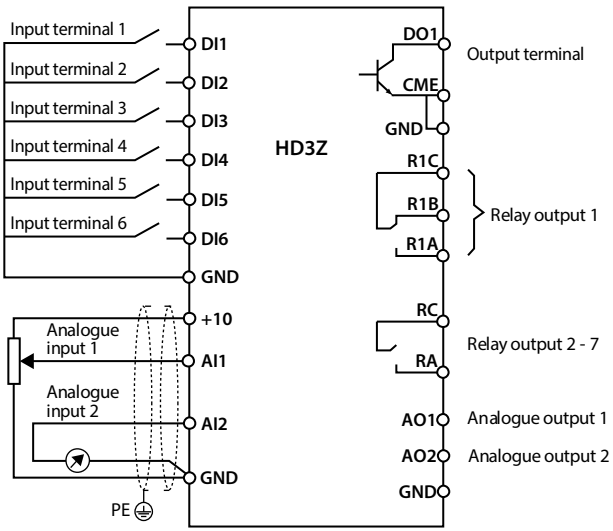


Figure 4-4 HD3Z control board conection

Digital input (DI) connection

Dry contact

Refer to Figure 4-5.

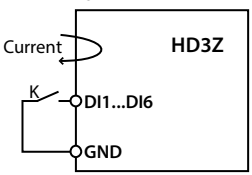


Figure 4-5 Dry contact connection

NPN contact

Refer to Figure 4-6 for NPN connection in which external controller is common emitter output.

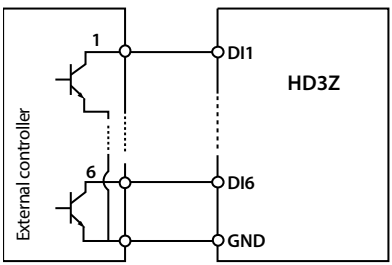


Figure 4-6 NPN connection

Analogue Input (AI) Connection

The AI1 is voltage input and the range is 0 - 10V, as shown in Figure 4-7.

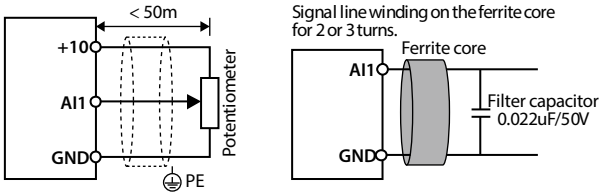


Figure 4-7 AI1 connection

Note:

1. To reduce the interference and attenuation of control signal, length of control cable should limit within 50m, and the shield should be reliably grounded.

2. In serious interference occasions, the analogue input signal should add filter capacitor and ferrite core, as shown in Figure 4-7.

AI2 is current input and range is 0 - 20mA, refer to Figure 4-8.

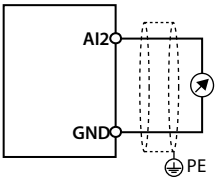


Figure 4-8 AI2 connection

Digital Output (DO) Connection

DO1 is open collective output. DO1 can use internal 24V power supply of HD3Z or external power supply. The connection is shown in Figure 4-9.

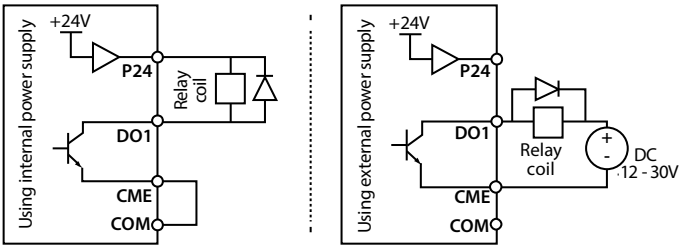


Figure 4-9 DO1 connection

4.5 Optical Fiber Communication Decsription

HD3Z adopts optical fiber communication interface and MODBUS communication protocol. It can communicate from ultra long distance. The interfaces are shown in Figure 4-10.

HD3Z has in-built optical transceiver single fiber mode. User optical flange interface is ST type.

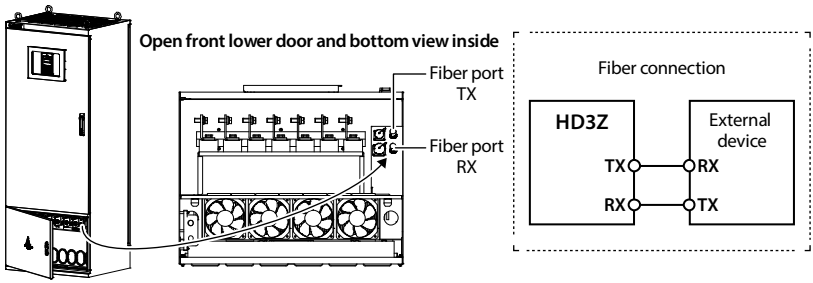


Figure 4-10 Optical fiber interface

4.6 Wiring Requirement

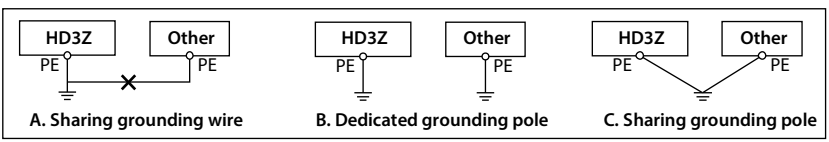
Ground Connection

Danger

The grounding terminals must be connected to ground properly before power up HD3Z.

The grounding terminals PE must be connected to ground properly. The grounding cable should be as short as possible (the grounding point should be as close to the inverter as possible) and the grounding area should be as large as possible. The grounding resistance should be less than 10Ω.

Do not share the grounding wire with other devices (A). HD3Z can share grounding pole with other devices (C). It achieves the best effect if HD3Z and other devices use dedicated grounding poles (B).



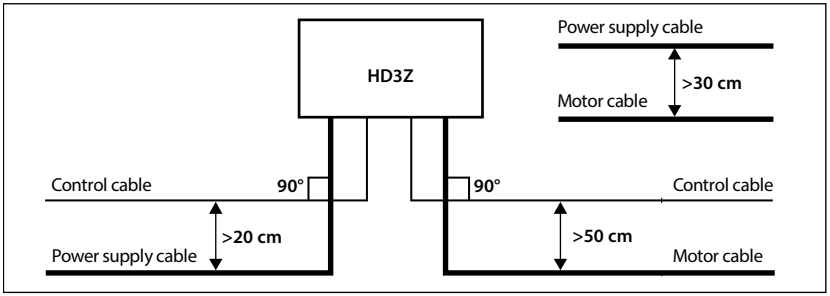
When using more than one inverter, adopt B or C.

Wiring Requirement

In order to avoid interference intercoupling, it is recommended to separate the power supply cables, motor cables and the control cables, and keep enough distance among them, especially when the cables are laid in parallel and are long enough.

The signal cables should cross the power supply cables or motor cables, keep it perpendicular (90°) as shown in below figure.

Distribute the power supply cables, motor cables and control cables in different pipelines.



Supply Cable

Warning

- Do not connect the AC supply cable to the output terminals U/V/W of HD3Z.
- Do not connect the phase-shifting capacitors to the output circuit.
- Ensure that AC supply voltage is the same as rated input voltage of HD3Z.

Refer to section 4.2 Peripheral Accessories Selection, page 11 for power cable selection.

Motor Connection

Refer to section 4.2 Peripheral Accessories Selection, page 11 for motor cable selection.

The longer cable between the controller and the motor is, the higher frequency leakage current will be, causing the controller output current to increase as well. This may affect peripheral devices.

When the cable length is longer than 100 meters, it is recommended to install AC output reactor and adjust the carrier frequency according to carrier frequency (F23.00).

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

The controller should be derated if motor cables are too long or their CSA is too large. The current should be decreased by 5% when per level of CSA is increased. If the CSA increase, so do the current to ground and capacitance.

Control Cable

To reduce the interference and attenuation of control signal, length of control cable should limit within 50m.

The control cable must be shielded cable. The analogue signal cable must be shielded twisted pair.

Shielded / armoured cable: High frequency low impedance shielded cable should be used.
For example: Copper net, aluminum net or iron net.

Chapter 5 Operation Instructions

Danger

- Only when the terminal cover of HD3Z has been fitted can you switch on AC power source. Do not remove the cover after power is switched on.
- Ensure the motor and the mechnical device are in the use application before HD3Z starts.
- Keep away from HD3Z if the auto-restart function is enabled at power outage.
- To change the main control PCBA, correctly set the parameters before operating.

Warning

- Do not check or detect the signal during HD3Z running.
- Do not randomly change parameter setting of HD3Z.
- Please thoroughly complete all control debugging and testing, make all adjustments and conduct a full safety assessment before switching the run command source of HD3Z.

5.1 Function Description

Note:

In the following sections, you may encounter control, running and status of HD3Z description many times. Please read this section. It will help you to correctly understand and use the functions to be discussed.

5.1.1 Operation Mode

F00.11 and DI terminal can select command of HD3Z (start, running, stop and jog start):

Operation mode	Description
Keypad control	Use **RUN**, **STOP**, **JOG** on keypad to start / stop / jog start HD3Z.
Control terminal	Use control terminal to start / stop HD3Z.
SCI communication	Use SCI to start / stop HD3Z.

5.1.2 Frequency Setting Channel

The final setting frequency of HD3Z is set by main frequency setting channel (F00.10) and aux frequency setting channel (F19.00) calculated by (F19.01). When aux setting channel = main setting channel (except analogue setting), main setting channel set the frequency.

Main frequency setting channel (F00.10)	Aux frequency setting channel (F19.00)	Note
/	0: No channel	
0: Keypad; F00.13 sets the initial value	1: Keypad; F19.03 sets the initial value	Press ▲, ▼on keypad to set
11: Terminal; F00.13 sets the initial value	2: Terminal; F19.03 sets the initial value	Use UP / DN terminal to set
2: SCI; Initial value: 0	3: SCI; Initial value: 0	
3: Analogue	4: Analogue	
4: Pulse	5: Pulse	F15.05 set DI6 = 53

Main frequency setting channel (F00.10)	Aux frequency setting channel (F19.00)	Note
/	6: PID output	
6-7: AI1 - AI2	7-8: AI1 - AI2	

5.1.3 Operation Status

Operation status	Description
Stop status	After HD3Z is initialized, if no command inputs or stop command is given, there will be output from U/V/W of HD3Z and keypad displays STOP.
Run status	When HD3Z receives running command, U/V/W terminal outputs, keypad displays RUN.
Motor parameter auto-tuning	F08.06 = 1 or 2, after receiving running command, HD3Z enters motor parameter auto-tuning. It stops when auto-tuning finished.

5.1.4 Running Modes

Running modes	Description
Jog start	In keypad control mode, press JOG to jog start frequency running (set F00.15, F03.15 and F03.16). In terminal control mode, when receiving DI jog start command (No.20 - 25 function), HD3Z runs according to relative frequency (set F00.15, F03.15, F03.16 and F05.21).
PID adjustment running	PID adjustment function is valid (F04.00 = 1), HD3Z runs in PID mode. Process PID adjusts according to setting and feedback (need setting F04). • Disable process PID by DI terminal (No.33 function) and switch to other running modes.
Multi-speed running	With logic combination of DI terminal (No.13 - 16 function), select multi-speed frequency 1-15 (F06.00 - F06.14) running.

5.2 Operation Instruction

5.2.1 Keypad Description

HD3Z is equipped with LCD. Refer to Table 5-1 for buttons and functions.

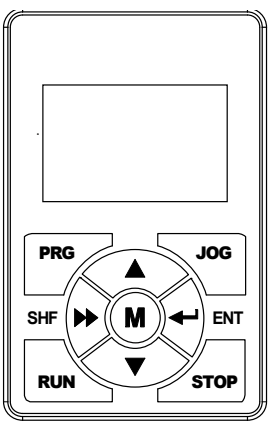


Table 5-1 Button description

Button	Description
PRG	Enter or exit
JOG	Jog start HD3Z in keypad control mode
RUN	Start HD3Z in keypad control mode
STOP	a. Stop HD3Z in keypad mode b. Reset fault when fault occurs
M	F00.12 sets definite function
▲	Increase parameter or value
▼	Decrease parameter or value
▶▶	a. Select setting parameter and shift bit b. Stop in loop / display the parameter during running
↵	a. Enter lower menu b. Confirm saving the data

5.2.2 Display Status

HD3Z keypad diaplays status at stop / run, setting and fault alarm.

Note:

1. LCD anti-color displays: White on black, sush as STOP, RUN, F03: , 05 0.00 Hz *etc.*

2. If the parameter or the setting value is in anti-color displaying, it is changeable. Take 05 0.00 Hz *for example; The units of setting value can be changed.*

3. If the status is in anti-color displaying, it means that it is in this status. Take RUN *for example, it means that HD3Z is in run status.*

Parameter display status at stop / run

When HD3Z is in stop / run status, the keypad will display stop or run status and its parameters, as shown in Figure 5-1.

Other parameters (F18.08 - F18.13) / (F18.02 - F18.07) can be displayed in loop by pressing ▶▶.

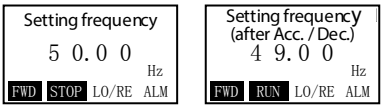


Figure 5-1 Display status parameter

Function parameter editing status

At stop, run or fault alarm status, press PRG to enter function parameter edit status (see F01.00 and section 5.2.3 Keypad Operation Examples), as shown in Figure 5-2.

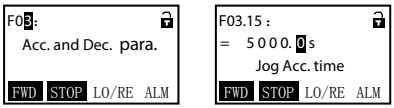


Figure 5-2 Parameter editing status

Fault alarming status

If HD3Z detects a fault signal, the keypad will enter the fault alarm status and LCD will display the fault code and name and anti-color display ALM, as shown in Figure 5-3.

The fault history can be checked by entering group F17.

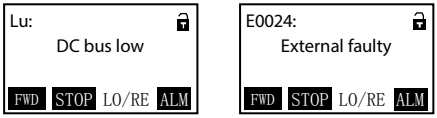


Figure 5-3 Fault alarming status

The reset at fault can be achieved by pressing STOP key and external terminal.

5.2.3 Keypad Operation Examples

Four-level menu switching operation

The keypad uses four-level menu configuration for parameter setting or other operations.

Configuring mode can be displayed in 4-level menu: **mode setting (first-level)→function parameter group setting (second-level)→function parameter setting (third-level)→parameter setting (fourth-level)**. The operation process is shown in Figure 5-4 and the description of the keys is shown in Table 5-2.

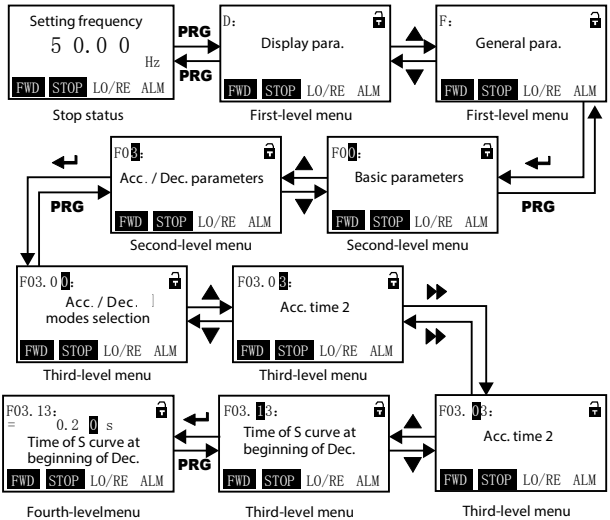


Figure 5-4 Four-level operation process

Table 5-2 Switching four-level description of the key

Key	First-level menu	Second-level menu	Third-level menu	Fourth-level menu
PRG	Fault, return to fault display; Fault cleared, return to run or stop status display	Return to first-level menu	Return to second-level menu	Do not save the present value and return to third-level
↵	Enter second-level menu	Enter third-level menu	Enter fourth-level menu	Save the present value and return to third-level
▲	Select function group. Cycle according to d-F-P	Modify No. function. Increase by 1 when press this key one time	Modify the internal No. of function group. Increase by 1 according to the present modified bit	Modify function value. Increase by 1 according to the present modified bit
▼	Select function group. Cycle according to P-F-d	Modify No. function. Decrease by 1 when press this key one time	Modify the internal No. of function group. Decrease by 1 according to the present modified bit	Modify function value. Decrease by 1 according to the present modified bit
▶▶	Invalid	Invalid	Switch units and tens	Switch units , ten thousands, thousands, hundreds, tens

Parameter setting

For example: To modify the setting value of F00.06 from 50.00Hz to 55.00Hz, refer to Figure 5-5.

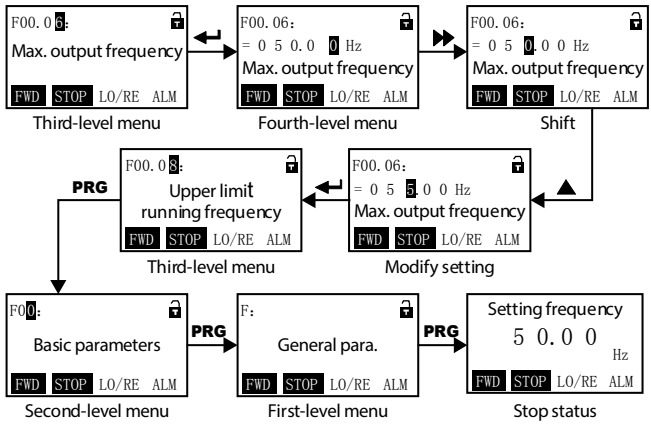


Figure 5-5 Parameter setting

When setting fourth-level menu, if the parameter is not in anti-color displaying, it indicates that this parameter can't be modified. The possible reasons are as follows:

- The function parameter can't be modified, such as the actual detected parameters or recorded parameters etc.
- Only when the controller stops can the function parameter be modified.
- Only input the correct password can it edit the function parameter.

Switching display parameters at stop status

The keypad can display six parameter of run status (F18.08 - F18.13) in loop. Take the default parameter as an example, Figure 5-6 shows the switching process at stop status.

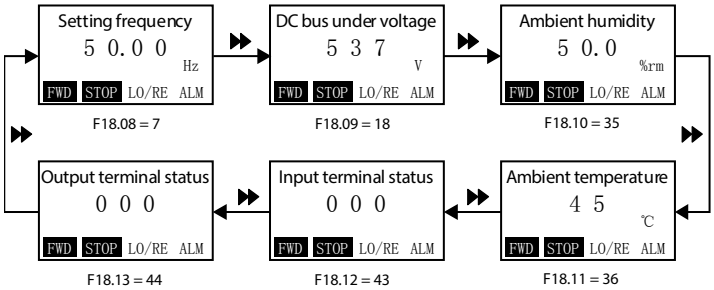


Figure 5-6 Switching display parameters at stop status

Unlock user password

User password has been set if displays on keypad.

Set F01.00 = correct password, keypad displays "unlock successfully" and icon.

Modify user password

If no password, directly modify the value of F01.00. If there is password, unlock the password first, when displays, user can modify password.

When the password is valid, the lock identification will be .

Clear user password

If password has been set, unlock it first and will display.

Then set F01.00 = 00000, keypad displays "PW has been cleared".

Upload and download parameters

Upload: When F01.03 = 1/2, it uploads parameter to keypad. When finished, keypad displays F01.00.

Download: When F01.02 = 2/3/5/6, it downloads parameter from keypad. When finished, keypad displays F01.03.

The upload and download parameters are as shown in Figure 5-7.

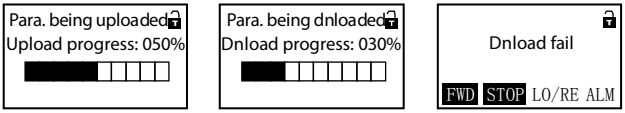


Figure 5-7 Display upload and download parameters

Note:

1. When downloading parameters, it displays "dFAiL" (Figure 5-7) which means that EEPROM storage parameters of keypad do not mathc with function parameters of HD3Z (Figure 5-7). First upload correct function code to keypad and then download to control board.

2. When copying parameter, keypad displays "E0022 (keypad EEPROM fault)". It will jump to next function code 10s later. The troubleshooting is in section7.1, page 63.

Chapter 6 Function Introduction

6.1 Display Parameter

Group d is status display parameter.

6.1.1 d00: Status Display Parameter

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>d00.00</td><td>HD3Z series</td><td>[Actual value]</td></tr>
<tr><td>d00.01</td><td>Software version of HD3Z</td><td>[Actual value]</td></tr>
<tr><td>d00.03</td><td>Non-standard software version of HD3Z</td><td>[Actual value]</td></tr>
<tr><td>d00.05</td><td>Software version of keypad</td><td>[Actual value]</td></tr>
<tr><td>d00.06</td><td>Customized serial number</td><td>[Actual value]</td></tr>
<tr><td>d00.08</td><td>Rated current of HD3Z (A)</td><td>[Actual value]</td></tr>
<tr><td>d00.10</td><td>Inverter status</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Displays the inverter status, as following:
<table>
<tr><td>Thousand</td><td>Bit15: Frequency switch mode
0: Not timing
1: Timing</td><td>Bit14: Timing start / stop mode
0: Not timing
1: Timing</td><td>Bit13: Auto current restriction
0: Do not restrict
1: Restrict</td><td>Bit12: Stall overvoltage
0: Invalid
1: Valid</td></tr>
<tr><td>Hundred</td><td>Bit11: Dehumidifing status of motor
0: Not started
1: Under way</td><td>Bit10: Speed limitation
0: Below limitation
1: Above limitation</td><td>Bit9: Unused</td><td>Bit8: Unused</td></tr>
<tr><td>Ten</td><td>Bit7: DC brake
0: Invalid
1: Valid</td><td>Bit6: Unused</td><td colspan="2">Bit5&Bit4: Acc. / Dec. / Constant
00: Constant 01: Acc.
11: Constant 10: Dec.</td></tr>
<tr><td>Unit</td><td>Bit3: Zero speed
0: Invalid
1: Valid</td><td>Bit2: Forward / Reverse
0: Forward
1: Reverse</td><td>Bit1: Run / Stop
0: Stop
1: Run</td><td>Bit0: Inverter fault
0: Normal
1: Faulty</td></tr>
</table></td></tr>
<tr><td>d00.11</td><td>Main setting frequency channel</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">0: Keypad. 3: Analogue. 7: AI2.
1: Terminal. 4: Terminal pulse. 11: PID.
2: Communication. 6: AI1. 12: Multi-speed.
14: Timing frequency.</td></tr>
<tr><td>d00.12</td><td>Main setting frequency (Hz)</td><td>[Actual value]</td></tr>
<tr><td>d00.13</td><td>Aux setting frequency (Hz)</td><td>[Actual value]</td></tr>
<tr><td>d00.14</td><td>Setting frequency (Hz)</td><td>[Actual value]</td></tr>
<tr><td>d00.15</td><td>Setting frequency (after Acc. / Dec.) (Hz)</td><td>[Actual value]</td></tr>
<tr><td>d00.16</td><td>Output frequency (Hz)</td><td>[Actual value]</td></tr>
<tr><td>d00.17</td><td>Setting rpm (rpm)</td><td>[Actual value]</td></tr>
<tr><td>d00.18</td><td>Running rpm (rpm)</td><td>[Actual value]</td></tr>
<tr><td>d00.20</td><td>Output voltage (V)</td><td>[Actual value]</td></tr>
<tr><td>d00.21</td><td>Output current (A)</td><td>[Actual value]</td></tr>
<tr><td>d00.23</td><td>Output torque (%)</td><td>[Actual value]</td></tr>
</table>

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>d00.24</td><td>Output power (kW)</td><td>[Actual value]</td></tr>
<tr><td>d00.25</td><td>DC busbar voltage (V)</td><td>[Actual value]</td></tr>
<tr><td>d00.27</td><td>AI1 input (%)</td><td>[Actual value]</td></tr>
<tr><td>d00.28</td><td>AI1 input (after calculating) (%)</td><td>[Actual value]</td></tr>
<tr><td>d00.29</td><td>AI2 input (%)</td><td>[Actual value]</td></tr>
<tr><td>d00.30</td><td>AI2 input (after calculating) (%)</td><td>[Actual value]</td></tr>
<tr><td>d00.35</td><td>DI6 terminal pulse input frequency (Hz)</td><td>[Actual value]</td></tr>
<tr><td>d00.36</td><td>AO1 output (%)</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">AO1 is voltage output, 0.0% corresponds to 0V, 100.0% corresponds to 10V.</td></tr>
<tr><td>d00.37</td><td>AO2 output (%)</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">AO2 is current output, 0.0% corresponds to 0mA, 100.0% corresponds to 20mA.</td></tr>
<tr><td>d00.39</td><td>Heatsink temperature (°C)</td><td>[Actual value]</td></tr>
<tr><td>d00.42</td><td>Ambient humidity (%rm)</td><td>[Actual value]</td></tr>
<tr><td>d00.43</td><td>Ambient temperature (°C)</td><td>[Actual value]</td></tr>
<tr><td>d00.44</td><td>PID setting (%)</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display PID setting relative to full scale percentage.</td></tr>
<tr><td>d00.45</td><td>PID feedback (%)</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display PID feedback relative to full scale percentage.</td></tr>
<tr><td>d00.46</td><td>PID tolerance (%)</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display PID tolerance relative to full scale percentage.</td></tr>
<tr><td>d00.47</td><td>PID integral item (%)</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display PID integral item tolerance relative to percentage of max. output frequency.</td></tr>
<tr><td>d00.48</td><td>PID output (%)</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display PID output relative to percentage of max. output frequency.</td></tr>
<tr><td>d00.50</td><td>Input terminal status</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display input terminal status. Each bit (binary) of this parameter stands for different physical channels which are in below table.
• 0: Input terminals disconnect with common terminals.
• 1: Input terminals connect with common terminals.
<table>
<tr><td>123Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td>-</td><td>-</td><td>DI6</td><td>DI5</td><td>DI4</td><td>DI3</td><td>DI2</td><td>DI1</td></tr>
</table></td></tr>
<tr><td>d00.51</td><td>Output terminal status</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display output terminal status. Each bit (binary) of this parameter stands for different physical channels which are in the below table.
• 0: Output terminals disconnect with common terminals.
• 1: Output terminals connect with common terminals.
<table>
<tr><td>Bit11</td><td>Bit10</td><td>Bit9</td><td>Bit8</td><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td>-</td><td>-</td><td>-</td><td>RLY7</td><td>RLY6</td><td>RLY5</td><td>RLY4</td><td>RLY3</td><td>RLY2</td><td>RLY1</td><td>Unused</td><td>DO1</td></tr>
</table></td></tr>
<tr><td>d00.52</td><td>MODBUS communication status</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display MODBUS communication status.
0: Normal.
1: Communication timeout.
2: Wrong data frame head.
4: Wrong data frame content.</td></tr>
</table>

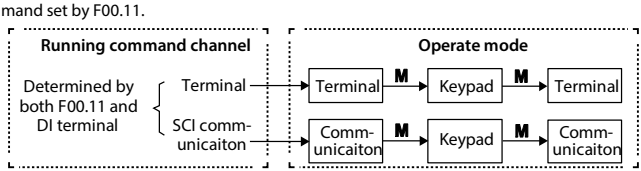
Ref. Code	Function Description	Setting Range [Default]
d00.53	Motor humidity (%rm)	[Actual value]
d00.54	Motor temperature (℃)	[Actual value]
d00.55	Total power up time (h)	[Actual value]
d00.56	Total running time (h)	[Actual value]
d00.57	Total energy consumption high bit of motor (k kW.h)	[Actual value]
d00.58	Total energy consumption low bit of motor (kW.h)	[Actual value]
d00.59	Present energy consumption high bit (k kW.h)	[Actual value]
d00.60	Present energy consumption low bit (kW.h)	[Actual value]
d00.61	Present fault	[Actual value]
	Display 100: Means under-voltage.	

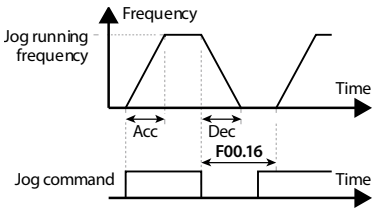
6.1.2 d01: Timing Display Parameter

Ref. Code	Function Description	Setting Range [Default]
d01.00	Present year	[Actual value]
d01.01	Present MM/DD	[Actual value]
d01.02	Present Min/Sec	[Actual value]
d01.04	Last time stop year	[Actual value]
d01.05	Last time stop MM/DD	[Actual value]
d01.06	Last time stop Min/Sec	[Actual value]
d01.07	Last time stop interval	[Actual value]
d01.08	System calibration time year	[Actual value]
d01.09	System calibration time MM/DD	[Actual value]
	d01.08, d01.09 is used to correct the clock chip parameters when powering up. • Once change P00.00 and P00.01 manually, d00.07 and d00.08 will update accordingly. • When clock parameter is faulty and timing frequrncy switching function is enabled, inverter reports E0034 (clock fault), inverter will exit timing functions (timing start / stop and frequency switching) and start normally.	

6.2 General Parameters

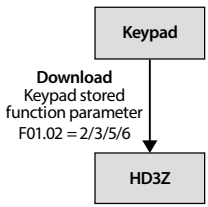
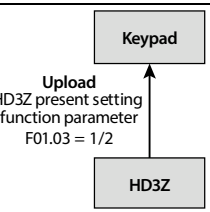
6.2.1 F00: Basic Parameters

Ref. Code	Function Description	Setting Range [Default]
F00.06	**Max. output frequency of HD3Z**	**50.00 - 400.00 [50.00Hz]**
	Defines the max. frequency that HD3Z is allowed to output.	
F00.08	**Upper limit of running frequency**	**0.00 - F00.06 [50.00Hz]**
	F00.07 = 0, the upper limit frequency is set by F00.08.	
F00.09	**Lower limit of running frequency**	**0.00 - F00.08 [0.00Hz]**
F00.10	**Frequency setting channels**	**0 - 7 [0]**
	0: Keypad. Change the value by pressing ▲ , ▼ button on keypad. Initial value is set by F00.13. 1: Terminal. Change the value by using UP/DN. Initial value is set by F00.13. 2: SCI communication. Change the setting frequency by SCI command. • The initial value of the SCI frequency is 0. 3: Analogue. Set by analogue input voltage, refer to group F16. • Refer to group F16. • Refer to group F05 for the corresponding relationship between the analogue value and the running frequency of HD3Z. 4: DI pulse. • Refer to group F05 for the corresponding relationship between the pulse terminal frequency and the running frequency of HD3Z. 6: AI1. 7: AI2.	
F00.11	**Command setting channel**	**0 - 2 [0]**
	0: Keypad. Start and stop HD3Z by pressing RUN, STOP,JOG. 1: Terminal. Start and stop by using corresponding external terminals. • DI treminal is set as FWD (DI = 2), REV (DI = 3), JOGF1 (DI = 20), JOGR1 (DI = 21), JOGF2 (DI = 22) and JOGR2 (DI = 23), refer to group F15. 2: SCI. Start and stop by SCI port according to communication protocol.	
F00.12	**M key function**	**0 - 2 [2]**
	0: Switch running direction. Switch running direction by M button. • F00.11 = 0, it is valid. Do not save when power is off. • Direction can be switched only when keypad displays status parameter. 1: Switch local and remote control. Switch the local and remote control by M The logic is shown in below figure. • F00.11 = 0: LOCAL. • F00.11 =1,2: REMOTE. • Channel priority: Local / Remote > command channel set by DI terminal (No.9, 10, 11 function) > command set by F00.11.  2: M key invalid.	

Ref. Code	Function Description	Setting Range [Default]
F00.13	**Starting frequency digital setting**	**0.00 - Upper limit frequency [50.00Hz]**
	F00.10 = 0 or 1, F00.13 sets the initial frequency value.	
F00.14	**Frequency setting control**	**0000 - 1111 [1001]**
	Units and tens are valid only when F00.10 = 0 or 1. The current setting frequency value will be replaced by a new one when F00.13 has been changed. **Unit: Save selection of frequency setting at power outage** • 0: Do not save at power outage. • 1: Save at power outage. **Ten: Control selection of frequency setting at stop** • 0: Do not restore to F00.13 at stop. • 1: Restore to F00.13 at stop. **Hundred: Save selection of communication setting frequency** • 0: Do not save when power is off. • 1: Save to F00.13 when power is off. **Thousand: Save selection of frequency setting when switching frequency channel** • 0: Do nto save. • 1: Save. When frequency setting channel swicthes from keypad -> terminal digital setting –> keypad, setting on keypad do not change.	
F00.15	**Jog running frequency digital setting 1**	**0.00 - Upper limit frequency [5.00Hz]**
F00.16	**Interval of jog running**	**0.0 - 100.0 [0.0s]**
	After cancel jog command, HD3Z will not respond to jog command within F00.16. • After the interval of jog is completed, it immediately executes the arrived jog command. As show in figure. 	
F00.17	**Running direction**	**0,1 [0]**
	0: The same as running command. 1: Opposite to running command.	
F00.18	**Reverse**	**0,1 [0]**
	This function is valid when F00.11 = 0,1,2. 0: Permitted. 1: Prohibitted. • HD3Z responds to FWD command only. If frequency < 0Hz, HD3Z will run at zero-frequency. • HD3Z will not respond to REV commands at stop status; During running, if HD3Z receives REV command, it will accelerates to stop status.	
F00.19	**Dead time of direction switch**	**0.0 - 3600.0 [0.0s]**
	Defines the dead time of direction switch, namely, the time of zero-frequency output in the process of direction switch.	
F00.21	**Dormant function**	**0,1 [0]**
	0: Disabled. This function is invalid. 1: Enable.	

Ref. Code	Function Description	Setting Range [Default]
F00.22	**Dormancy wake up time**	**0.0 - 6000.0 [1.0s]**
F00.24	**Dormancy delay time**	**0.0 - 6000.0 [1.0s]**
F00.25	**Dormancy frequency**	**0.00 - Upper limit frequency [0.00Hz]**
	F00.21 - F00.25 is used for dormancy and wake up. • If HD3Z is in dormant status and receive run command, and setting frequency ≥ F00.25, when F00.22 (dormancy wake up time) is finished, HD3Z wakes up from dormancy status and starts running; • During running, and setting frequency < F00.25, when F00.24 (dormancy delay time) is finished, HD3Z enters dormancy status (RUN displays on keypad) and stop running.	
F00.26	**Action selection of HD3Z at zero-speed**	**00 - 12 [11]**
	Unit: Action selection of zero-speed under V/f control 0: Do not process. 1: HD3Z does not output. 2: HD3Z runs at DC brake. **Ten: Unused**	
F00.27	**Command channel binding frequency channel**	**000 - ddd [000]**
	Valid only for main frequency. When command channel is bound to frequency channel, frequnecy channel set by F00.10 will be invalid during this binding. **Unit: Keypad binds to frequency channel**	
	Ten: Terminal binds to frequency channel **Hundred: SCI binds to frequency channel** • 0: No binding. • 1: Keypad digital setting. • 2: Terminal digital setting. • 3: SCI setting. • 5: Terminal pulse setting. • 7: AI1. • 8: AI2. • C: PID. • D: Multi-speed.	
F00.28	**Function of STOP button**	**0,1 [0]**
	0: Valid in keypad control mode only. 1: Valid in all control modes.	

6.2.2 F01: Protection of Parameters

Ref. Code	Function Description	Setting Range [Default]
F01.00	**User password**	**00000 - 65535 [00000]**
	XXXXX: To enable the password protection function, set any non-zero number as the password. • Once the password is set, to change any parameter, input correct password. Otherwise, all the parameters cannot be changed but only read. • When input correct password, by pressing **PRG** button to exit to stop / run display status or by detecting no press on the keypad within 5 minutes, the user's password will be valid. To change parameters, input correct password. It will restart when there is no press on the keypad within 5 minutes. 00000: The factory setting of F01.00 is 00000, namely the password protection function is disabled. • If user unlocks the password, it means clearing the user's password. • Refer to section 5.2.3 for more information about unlock / modify and clear password.	
F01.01	**Menu mode**	**000 - 111 [010]**
	Unit: • 0: Full menu mode. Display all function parameters. • 1: Checking menu mode. Only parameters different from factory setting can be displayed. **Hundred:** • 0: group F can check after setting password. • 1: group F can not check after setting password.	
F01.02	**Function code parameter initialization (download)**	**0 - 6 [0]**
	0: No operation. HD3Z is in regular parameter read / write status. • Whether can change the parameter depends on user password status and the actual running condition of HD3Z. 1: Restore to factory settings. • Except F01.00, F01.02, F01.03, group F08, F19.15, F19.19, F19.24, F20.08, F20.09, F20.21 - F20.37 and F23.00. • **Steps:** If set F01.02 = 1, press ↵ to ensure and the parameters are restored to factory settings. Then the keypad will display parameters in stop status after finish restoring to factory setting. 2: Download the keypad EEPROM parameter 1 to the current function code settings. 3: Download the keypad EEPROM parameter 2 to the current function code settings. 4: Clear fault information. The fault history of F20.21 - F20.37 will be cleared. 5: Copy the keypad EEPROM parameter 1 to the current function code settings (including the motor parameters). 6: Copy the keypad EEPROM parameter 2 to the current function code settings (including the motor parameters). *Note: F01.00, F01.02, F01.03 and F20.21 - F20.37 can not be copied.*	
F01.03	**Copy parameter to keypad (upload)**	**0 - 2 [0]**
	0: No operation. HD3Z is in regular parameter read / write status. 1: Copy the current function code settings to keypad EEPROM parameter 1. 2: Copy the current function code settings to keypad EEPROM parameter 2. *Note: F01.00, F01.02, F01.03 and F20.21 - F20.37 can not be copied.*	

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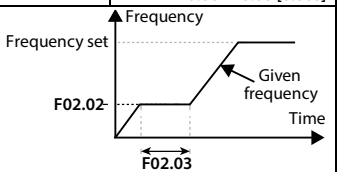
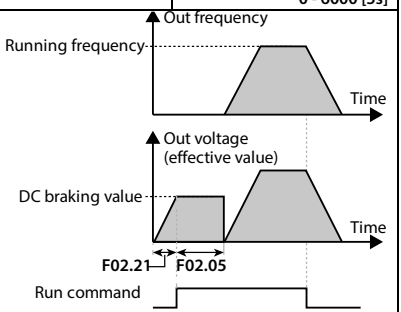
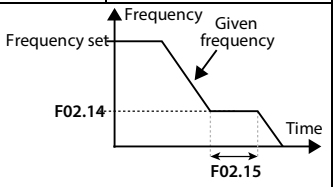
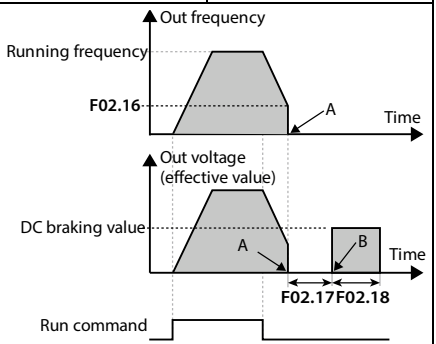
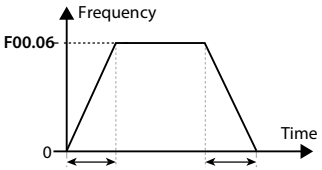
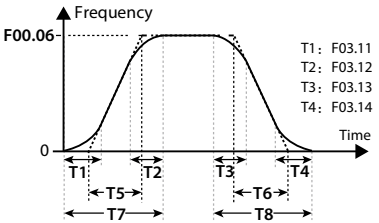
6.2.3 F02: Parameters for Start and Stop

Ref. Code	Function Description	Setting Range [Default]
F02.00	**Start mode**	**0 - 2 [0]**
	0: Start from starting DWELL frequency. • Refer to F02.02 and F02.03 for starting DWELL frequency. 1: Brake and then start from starting DWELL frequency. 2: Rotate speed tracking re-start. • When the result is lower than F02.02, HD3Z starts from starting DWELL frequency. • Tracks the rotate speed and direction of motor automatically, smooth and low impact is applied to motor which is rotating.	
F02.01	**Start delay time**	**0.00 - 10.00 [0.00s]**
	On receiving run conmand, HD3Z will wait until F02.01 is finished and run.	
F02.02	**Starting DWELL frequency setting**	**0.00 - Upper limit frequency [0.00Hz]**
F02.03	**Starting DWELL retention time**	**0.00 - 10.00 [0.00s]**
	During acceleration, when setting frequency = F02.02, output frequency goes through the time of F02.03 and then continue to accelerate. • F02.02 / F02.03 = 0, starting DWELL frequency is invalid. *Note: DWELL is invalid in PID running.* 	
F02.04	**Current at DC brake**	**0 - 100 (rated current of inverter) [50%]**
F02.05	**DC brake starting time 1**	**0 - 6000 [5s]**
	F02.04 is percentage to rated current of HD3Z. It sets current value of starting DC brake and stop DC brake. • If setting DC brake current is 5 times higher than rated current of motor, the inputing current will be 5 times rated current of motor. • DC brake current is valid for both start and stop DC brake. • If F02.21 ≠ 0, HD3Z starts linear brake according to F02.04. When brake time is finished, if F02.05 ≠ 0, HD3Z starts DC current brake according to F02.04. • F02.05 and F02.21 is valid only when F02.00 = 1. 	
F02.06	**Compensation for full speed tracking**	**0.000 - 2.000 [0.000Hz]**
F02.13	**Stop modes at speed control**	**0 - 2 [0]**
	0: Decelerate to stop. • On receiving stop command, HD3Z decrease output frequency according to Dec. time. When output frequency = F02.14 and wait till F02.15 is finished, HD3Z stops. Refer to figure in F02.14, F02.15. 1: Coast to stop. • On receiving stop command, HD3Z stops output. The load coast to stop according to mechanical inertia. 2: Decelerate to stop + DC brake. • On receiving stop command, HD3Z decrease the output frequency according to Dec. time. When output frequency = F02.16, DC brake starts. • Refer to F02.16 - F02.18 for DC brake stop. Refer to F03.00 - F03.08 for Dec. time.	

Ref. Code	Function Description	Setting Range [Default]
F02.14	**Stop DWELL frequency setting**	**0.00 - Upper limit frequency [0.00Hz]**
F02.15	**Stop DWELL frequency retention time**	**0.00 - 10.00 [0.00s]**
	• Valid only when F02.13 = 0. • During deceleration, when setting frequency = F02.14, output frequency goes through the time of F02.16 and then continue to decelerate. • F02.14 / F02.15 = 0, stop DWELL frequency is invalid. *Note: Starting DWELL function is invalid in PID running.* 	
F02.16	**Starting frequency of stop DC brake**	**0.00 - 50.00 [0.50Hz]**
F02.17	**Waiting time of stop DC brake**	**0.00 - 60.00 [0.00s]**
F02.18	**Stop DC brake time**	**0.00 - 60.00 [0.50s]**
	F02.17 means the interval from A (running frequency = F02.16) to B (DC brake is added) during stop process. • HD3Z does not output during waiting time of stop brake. F02.17 can avoid overshoot at point B (start time of brake) of high power motor. • F02.04 sets the current at DC brake. F02.18 = 0, there is no DC brake acting. • F02.16 - F02.18 is valid only when F02.13 = 2. 	
F02.19	**Jog control mode**	**00 - 11 [10]**
	Unit: 0: Can not jog the start and stop function. • When jog run, start mode (F02.00) and stop mode (F02.13) is invalid; When jog command is valid, HD3Z starts directly. When jog command is invalid, HD3Z decelerate to stop. 1: Can jog the start and stop function. • When jog run, HD3Z starts according to F02.00 and stops according to F02.13. **Ten:** 0: Terminal jog is not preferred. Under terminal control, the terminal do not respond to jog command. 1: Terminal jog is preferred.	
F02.21	**DC brake starting time 2**	**0 - 6000 [0s]**

6.2.4 F03: Acc. / Dec. Parameter

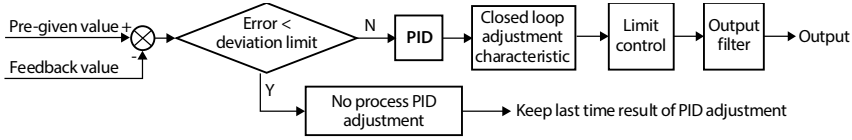
Ref. Code	Function Description	Setting Range [Default]
F03.00	**Acc. / Dec. modes selection**	**00 - 11 [00]**
	Unit: Acc. / Dec. modes selection 0: Linear Acc. / Dec. Output frequency increase or decrease according to constant slope. 1: S curve Acc. / Dec. Output frequency increase or decrease accoring to S curve. • T5: Setting Acc. time; T7: Actual Acc. time. T6: Setting Dec. time; T8: Actual Dec. time.   **Ten: Reference frequency for Acc. / Dec. time** 0: Max frequency (F00.06). 1: Setting frequency.	
F03.01	**Acc. time 1**	**0.0 - 6000.0s [Depend on model]**
F03.02	**Dec. time 1**	
F03.03	**Acc. time 2**	
F03.04	**Dec. time 1**	
F03.05	**Acc. time 3**	
F03.06	**Dec. time 1**	
F03.07	**Acc. time 4**	
F03.08	**Dec. time 1**	
	Acc. time is the time that HD3Z accelerates from 0Hz to reference frequency in linear form. Dec. time is the time that HD3Z decelerates from reference frequency to 0Hz in linear form. • Reference frequency is set by tens of F03.00. It supports Acc. time or Dec. time only, refer to figure in F03.00. Switching of Acc. / Dec. time: • Select Acc. / Dec. time by No.26/27 of DI terminal or F03.09 / F03.10 when HD3Z is running. Switching of Acc. / Dec. mode: • The Acc. / Dec. modes (linear or S curve) can be set by F03.00 or No 28 function of DI terminal.	
F03.09	**Switching frequency of Acc. time 1 and 2**	**0.00 - Upper limit frequency [0.00Hz]**
	When running frequency is lower than F03.09, Acc. time 2 is adopted; Otherwise Acc. time 1 is adopted. • This function is invalid when Acc. / Dec. time is selected by DI terminal (DI = 26/27).	
F03.10	**Switching frequency of Dec. time 2 and 1**	**0.00 - Upper limit frequency [0.00Hz]**
	When running frequency is lower than 03.10, Dec. time 2 is adopted; Otherwise Dec. time 1 is adopted. • This function is invalid when Acc. / Dec. time is selected by DI terminal (DI = 26/27).	

Ref. Code	Function Description	Setting Range [Default]
F03.11	Characteristic time of S curve at beginning of Acc.	0.00 - 2.50 [0.20s]
F03.12	Characteristic time of S curve at end of Acc.	0.00 - 2.50 [0.20s]
F03.13	Characteristic time of S curve at beginning of Dec.	0.00 - 2.50 [0.20s]
F03.14	Characteristic time of S curve at end of Dec.	0.00 - 2.50 [0.20s]
	Refer to figure in F03.00.	
F03.15	Jog Acc. time	0.1 - 6000.0 [6.0s]
F03.16	Jog Dec. time	0.1 - 6000.0 [6.0s]
F03.17	Dec. time for EMR stop	0.1 - 6000.0 [10.0s]

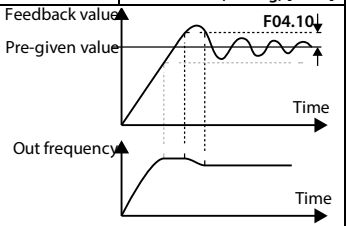
6.2.5 F04: Process PID Control

Both analogue setting and feedback or pulse setting and feedback can form closed loop. Generally PID is used for physical control, such as pressure, water level and temperature.

Below is the process:



Ref. Code	Function Description	Setting Range [Default]
F04.00	Process PID control selection	0,1 [0]
	0: PID control is disabled. 1: PID control is enabled. *Note: Set F04.00 = 0 when using aux PID.*	
F04.01	Setting channel selection	0 - 4 [0]
	0: Digital. Set by F04.03. 1: Analogue. • Set by analogue input voltage. Max. analogue input corresponds to 100% of PID setting, refer to group F16. 2: Terminal pulse. • Set the terminal pulse input. Max. input pulse frequency corresponds to 100% of PID setting, refer to group F16. 3: AI1. 4: AI2.	
F04.02	Feedback channel selection	0 - 3 [0]
	0: Analogue. 1: Terminal pulse. 2: AI1. 3: AI2.	
F04.03	Setting digital reference	-100.0 - 100.0 [0.0%]
	Define the setting of PID regulator. Valid when F04.01 = 0 (digital setting).	
F04.04	Proportional gain (P1)	0.0 - 500.0 [50.0]
F04.05	Integral time (I)	0.01 - 10.00 [1.00s]
F04.06	Integral upper limit	0.0 - 100.0 [100.0%]
F04.07	Differential time (D1)	0.00 - 10.00 [0.00s]
F04.08	Differential limitation	0.0 - 100.0 [20.0%]

Ref. Code	Function Description	Setting Range [Default]
F04.09	**Sampling time (T)**	**0.01 - 50.00 [0.10s]**
	F04.04, F04.05 and F04.07 define the PID parameter. F04.06 defines the intergral upper limit. F04.08 defines differential upper limit. F04.09 defines sampling time of feedback value. The regulator calculates once during every sampling period. • F04.07 = 0, differential does not act.	
F04.10	**Bias limit**	**0.0 - 20.0 (setting) [0.0%]**
	The system output value of regulator is relevant to the max. tolerance of PID setting. • Within permitted range, the regulator stops regulating. • Proper setting of F04.10 helps keeping accuracy and stability of system output. • High setting of F04.10 may cause sharply regulation of PID, during which infinite oscillation occurs. 	
F04.11	**Upper limit channel of PID regulator**	**0 - 4 [0]**
	When PID serves as aux frequency setting channel, F04.11 is invalid, the upper limit is set by F19.35, F19.36. 0: Set by F04.13. 1: Analogue. Set by analogue input voltage, refer to F16. 2: Terminal pulse. 3: AI1. 4: AI2.	
F04.12	**Lower limit channel of PID regulator**	**0 - 4 [0]**
	When PID serves as aux frequency setting channel, F04.12 is invalid, the lower limit = REV frequency upper limit. • F04.12 is valid only when PID (F04.00 = 1) and prohibit reverse (F04.18 = 0). 0: Set by F04.14. 1: Analogue setting. Set by analogue input voltage, refer to F16. 2: Terminal pulse setting. 3: AI1. 4: AI2.	
F04.13	**PID regulator upper limit**	**0.0 - 100.0 [100.0%]**
F04.14	**PID regulator lower limit**	**0.0 - 100.0 [0.0%]**
	Define output upper / lower limit of PID regulator.	
F04.15	**Regulating characteristic of PID regulator**	**0,1 [0]**
	0: Positive characteristic. Option when the setting is added and motor rpm increase. 1: Negative characteristic. Optional when the setting is added and motor rpm decrease.	
F04.17	**PID output filtering time**	**0.01 - 10.00 [0.05s]**
	Defines filtering time of PID output.	
F04.18	**REV selection when PID outputs**	**0,1 [0]**
	0: Prohibit REV when PID regulates. PID output < 0, 0 is the limit. 1: Permit REV. F00.18 = 1 (prohibitted), 0 is the limit. • When PID serves as aux frequency setting channel, PID can reverse by default. Setting of F04.18 is invalid.	
F04.19	**REV frequency upper limit of PID output**	**0.0 - 100.0 [100.0%]**
	Defines the frequency upper limit when reverse at PID. It is valid when F04.18 = 1 (permit REV). • When PID serves as aux frequency setting channel, F04.19 is invalid, upper limit is set by F19.35 and F19.36.	

Ref. Code	Function Description	Setting Range [Default]
F04.20	**Proportional gain (P2)**	**0.0 - 100.0 [50.0]**
F04.21	**Integral time (I2)**	**0.01 - 10.00 [1.00s]**
F04.22	**Differential time (D2)**	**0.00 - 10.00 [0.00s]**
F04.23	**PID parameter adjustment bases**	**0 - 3 [0]**
	0: Do not adjust. Second PID is invalid. 1: DI. • Switch PID parameter according to DI terminal No.59 function. When the terminal is invalid, select group 1 (F04.04, F04.05, F04.07); When valid, select group 2 (F04.20 - F04.22). 2: Bias. • Select group 2 when bias between PID feedback and PID setting < PID parameter switching point 1 (F04.24). • Select group 1 when bias between PID feedback and PID setting > PID parameter switching point 1 (F04.25). • Select linear interpolation when bias between PID feedback and PID setting is within switching point 1 and 2. 3: Frequency. • Select group 1 when PID output frequency < switching point 1 (F04.24); • Select group 2 when PID output frequency > switching point 2 (F04.25); • Select linear interpolation when PID output frequency is within switching point 1 and 2.	
F04.24	**PID parameter switching point 1**	**0.0 - F04.25 [0.0%]**
F04.25	**PID parameter switching point 2**	**F04.24 - 100.0 [100.0%]**
F04.29	**PID calculating mode**	**0,1 [0]**
	0: Do not calculate when HD3Z stops. 1: Calculate when HD3Z stops.	
F04.30	**PID dormancy selection**	**0,1 [0]**
	0: Disable. 1: Enable.	
F04.31	**Wakeup tolerance**	**0.0 - 100.0 [10.0%]**
F04.32	**Wakeup delay**	**0.0 - 6000.0 [0.0s]**
	Positive: In dormant status, when feedback ≤ setting × (100% - F04.31), and counting time ≥ F04.32, wake up HD3Z. Negative: In dormant status, when feedback ≥ setting × (100% + F04.31), and counting time ≥ F04.32, wake up HD3Z.	
F04.33	**Dormancy tolerance**	**0.0 - 100.0 [10.0%]**
F04.34	**Dormancy delay**	**0.0 - 6000.0 [0.0s]**
F04.35	**Dormancy frequency**	**0.00 -Max. frequency [20.00Hz]**
	Positive: In wakeup status, when feedback ≥ setting × (100% + F04.33), target frequency ≤ F04.35 and counting time ≥ F04.34, HD3Z is dormant. Negative: In wakeup status, when feedback ≤ setting × (100% - F04.33), target frequency ≤ F04.35 and counting time ≥ F04.34, HD3Z is dormant.	

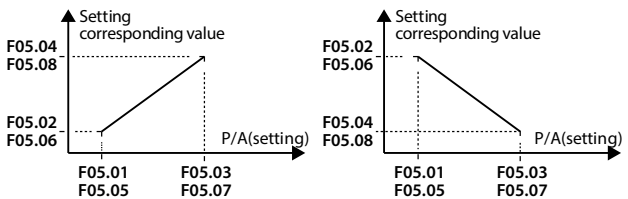
6.2.6 F05: External Setting Curve Parameter

Ref. Code	Function Description	Setting Range [Default]
F05.00	**External setting curve selection**	00000 - 30033 [33333]
	Unit: AI1 curve. Ten: AI2 curve. Ten thousand: Pulse curve. Each bit sets below: • 0: Line 1. • 1: Line 2. • 2: Polyline. • 3: Do not dispose.	
F05.01	**Line 1 min. setting**	0.0 - F05.03 [0.0%]
F05.02	**Corresponding value of line 1 min. setting**	0.0 - 100.0 [0.0%]
F05.03	**Line 1 max. setting**	F05.01 - 100.0 [100.0%]
F05.04	**Corresponding value of line 1 max. setting**	0.0 - 100.0 [100.0%]
F05.05	**Line 2 min. setting**	0.0 - F05.07 [0.0%]
F05.06	**Corresponding value of line 2 min. setting**	0.0 - 100.0 [0.0%]
F05.07	**Line 2 max. setting**	F05.05 - 100.0 [100.0%]
F05.08	**Corresponding value of line 2 max. setting**	0.0 - 100.0 [100.0%]
F05.09	**Max. setting of polyline**	F05.11 - 100.0 [100.0%]
F05.10	**Max. setting corresponding value of polyline**	0.0 - 100.0 [0.0%]
F05.11	**Inflection point 2 setting of polyline**	F05.13 - F05.09 [100.0%]
F05.12	**Inflection point 2 corresponding value**	0.0 - 100.0 [100.0%]
F05.13	**Inflection point 1 setting of polyline**	F05.15 - F05.11 [0.0%]
F05.14	**Inflection point 1 corresponding value**	0.0 - 100.0 [0.0%]
F05.15	**Min. setting of polyline**	0.0 - F05.13 [0.0%]
F05.16	**Min. setting corresponding value of polyline**	0.0 - 100.0 [0.0%]

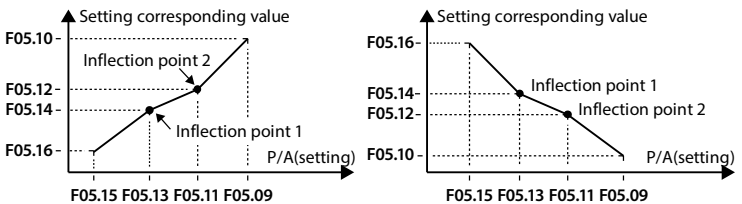
F05.01 - F05.04 define line 1. F05.05 - F05.08 define line 2. F05.09 - F05.16 define the polyline.

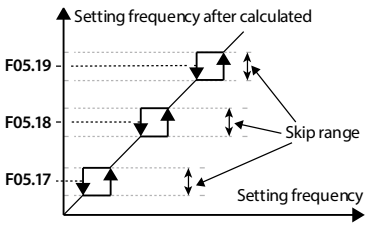
- Line 1, line 2 and the polyline can independently achieve positive and negative characteristics as shown in following figure.
- If the curve min. setting is the same as max. setting, it is a line. The default frequency is the corresponding frequency of the curve min. setting.

Positive and negative characteristic of line



Positive and negative characteristic of polyline



Ref. Code	Function Description	Setting Range [Default]
	In the figure: • P / A is terminal pulse / analogue setting. • Pulse frequency (P) is 100% corresponding to F16.17 max. input pulse frequency. Analogue input (A) is 100% corresponding to 10V or 20mA.	
F05.17	Skip frequency 1	F00.09 - Upper limit frequency [0.00Hz]
F05.18	Skip frequency 2	
F05.19	Skip frequency 3	
F05.20	Range of skip frequency	0.00 - 30.00 [0.00Hz]
	The setting of skip frequency is for output frequency of HD3Z to avoid resonance with the load. • HD3Z can not run at constant speed during skip range, the frequency will be updated automatically. • When setting the frequnecy skip, output frequency of HD3Z changes smoothly according to Acc. / Dec. curve setting. • Skip frequency setting is invalid when PID control or aux frequency setting selects process PID. 	
F05.21	Digital setting 2 of jog run frequency	0.00 - Upper limit frequency [5.00Hz]
	When terminal selects jog run 2, HD3Z runs according to F05.21.	

6.2.7 F06: Multi-speed

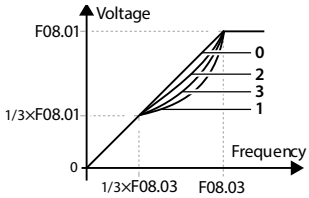
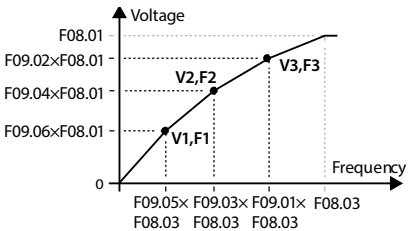
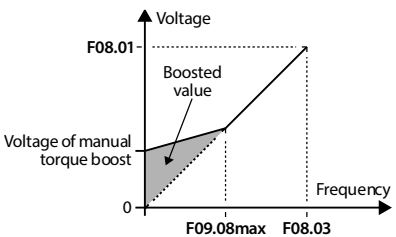
Ref. Code	Function Description	Setting Range [Default]
F06.00	Multi-frequency command 1	F00.09 - Upper limit frequency [5.00Hz]
F06.01	Multi-frequency command 2	F00.09 - Upper limit frequency [5.00Hz]
F06.02	Multi-frequency command 3	F00.09 - Upper limit frequency [5.00Hz]
F06.03	Multi-frequency command 4	F00.09 - Upper limit frequency [5.00Hz]
F06.04	Multi-frequency command 5	F00.09 - Upper limit frequency [5.00Hz]
F06.05	Multi-frequency command 6	F00.09 - Upper limit frequency [5.00Hz]
F06.06	Multi-frequency command 7	F00.09 - Upper limit frequency [5.00Hz]
F06.07	Multi-frequency command 8	F00.09 - Upper limit frequency [5.00Hz]
F06.08	Multi-frequency command 9	F00.09 - Upper limit frequency [5.00Hz]
F06.09	Multi-frequency command 10	F00.09 - Upper limit frequency [5.00Hz]
F06.10	Multi-frequency command 11	F00.09 - Upper limit frequency [5.00Hz]

Ref. Code	Function Description	Setting Range [Default]
F06.11	Multi-frequency command 12	F00.09 - Upper limit frequency [5.00Hz]
F06.12	Multi-frequency command 13	F00.09 - Upper limit frequency [5.00Hz]
F06.13	Multi-frequency command 14	F00.09 - Upper limit frequency [5.00Hz]
F06.14	Multi-frequency command 15	F00.09 - Upper limit frequency [5.00Hz]

6.2.8 F08: Asyn. Motor Parameters

Ref. Code	Function Description	Setting Range [Default]
F08.00	Rated power of motor	0.2 - 500.0kW [Depend on model]
F08.01	Rated voltage of motor	0 - 999V [Depend on model]
F08.02	Rated current of motor	0.1 - 999.9A [Depend on model]
F08.03	Rated frequency of motor	1.0 - 400.0 [50.0Hz]
F08.04	Rated Rpm of motor	1 - 24000rpm [Depend on model]
	F08.00 - F08.04: Set rated value of motor according to motor nameplate.	
F08.06	Parameter auto-tuning of motor	0 - 3 [0]
	Note: F08.06 is enabled only in keypad control (F00.11 = 0). 0: No action. 1: Stationary auto-tuning. 2: Rotary auto-tuning. 3: Motor stator resistance measurement. **Steps:** 1. Correctly set motor parameter (F08.00 - F08.04). 2. When F08.06 = 2, set proper Acc. time 1 (F03.01) and Dec. time (F03.02), free motor axis from load and make sure it is safe. 3. When F08.06 = 1 or 2 or 3, press ↵ , then press PRG to exit to parameter display state, and press RUN to start auto-tuning. LED keypad displays "Para auto-tuning". 4. When run command flahses on keypad, it means auto-tuning is finished and return to stop state display, and F08.06 resumes 0.	

6.2.9 F09: V/f Control Parameters

Ref. Code	Function Description	Setting Range [Default]
F09.00	**V/f curve of motor**	0 - 4 [0]
	Defines flexible V/f setting modes so as to meet requirements of different load characteristics. • Four curves and one user-defined curve can be selected according to the setting of F09.00. 0: Line. See line 0 in figure. 1: Square curve. See curve 1 in the figure. 2: 1.2 exponential curve. See curve 2 in the Figure. 3: 1.7 exponential curve. See curve 3 in the Figure. 4: User-defined curve. 	
F09.01	**V/f frequency of motor (F3)**	F09.03 - 100.0 [0.0%]
F09.02	**V/f voltage of motor (V3)**	F09.04 - 100.0 [0.0%]
F09.03	**V/f frequency of motor (F2)**	F09.05 - F09.01 [0.0%]
F09.04	**V/f voltage of motor (V2)**	F09.06 - F09.02 [0.0%]
F09.05	**V/f frequency of motor (F1)**	0.0 - F09.03 [0.0%]
F09.06	**V/f voltage of motor (V1)**	0.0 - F09.04 [0.0%]
	F09.01 - F09.06 is user-definable V/f curve. • If F09.00 = 4 (user-definable curve), F09.06 is enabled. • The V/f curve can be defined by connecting 3 points of (V1, F1), (V2, F2) and (V3, F3), to apply to special load. • According to actual condition, set proper curve to meet requirements of load characteristics. 	
F09.07	**Torque boost of motor**	0.0 - 30.0% [Depend on model]
F09.08	**Cut-off point used for manual torque boost of motor**	0.0 - 50.0 (F08.03) [25.0%]
	In order to compensate the torque drop at low frequency, HD3Z can boost the voltage so as to boost the torque. • No matter what kind of V/f curve is set by F09.00, the torque boost is enabled. • F09.07 ≠0, it is manually torque boost. • F09.07 = 0, it is auto torque boost. User needs to set motor rated frequency (F08.03); Set according to nameplate or auto-tune to get rated Rpm (F08.04); Get motor stator resistance (F08.07) by auto-tuning; Set slip compensation gain F09.09 = 100.0% to enable slip compensation to achieve fine load capability. • F09.08 is relative to percentage of rated frequency (F08.03). 	
F09.09	**Slip compensation gain of motor**	0.0 - 300.0 [0.0%]
F09.10	**Slip compensation filter time of motor**	0.01 - 10.00 [0.10s]
F09.11	**Slip compensation limit of motor**	0.0 - 250.0 [200.0%]

Ref. Code	Function Description	Setting Range [Default]
F09.14	**AVR (automatic voltage regulation) function of motor**	**0 - 2 [1]**
F09.15	**Low frequency oscillation-suppression of motor**	**0 - 200 [50]**
F09.16	**High frequency oscillation-suppression of motor**	**0 - 200 [20]**
	This function is used to suppress the existed oscillation when inverter works with motor. • If output current changes repeatedly when inverter runs with constant load, user can adjust F09.16 to depress oscillation to keep running smoothly.	
F09.17	**Energy saving control selection**	**0 - 3 [0]**
	0: Invalid. 3: Enabled according to output current. When F09.17 = 3 and V/f control mode (F00.01 = 0): • When output frequency ≥ F09.19 and output current ≤ F09.20 × rated current of HD3Z, enter energy saving mode. • If neither of above conditions is met, exit energy saving mode. *Note: Energy saving mode is valid in constant state only.*	
F09.18	**Motor energy saving coefficient**	**0.0 - 100.0 [5.0%]**
F09.19	**Starting frequency of motor energy saving**	**0.00 - 50.00 [25.00Hz]**
F09.20	**Switching point of motor energy saving**	**0.0 - 100.0 [100.0%]**
F09.21	**Detection times of motor energy saving**	**0 - 5000 [10 times]**
F09.22	**Voltage recovery time of motor energy saving**	**40 - 4000 [100ms]**
F09.23	**Voltage decrease time of motor energy saving**	**40 - 4000 [100ms]**

6.2.10 F10: Senior Parameter 1

6.2.11 F11: Senior Parameter 2

6.2.12 F15: Digital I/O Terminal Parameters

Ref. Code	Function Description	Setting Range [Default]
F15.00	DI1 function	0 - 91 [2]
F15.01	DI2 function	0 - 91 [3]
F15.02	DI3 function	0 - 91 [0]
F15.03	DI4 function	0 - 91 [0]
F15.04	DI5 function	0 - 91 [0]
F15.05	DI6 function	0 - 91 [0]

0: Unused. It disables the terminal function. HD3Z ignores any signal input via this terminal.

- The unused terminal is recommended to be set as 0 to avoid wrong connection or action.

1: Inverter enabled.

- When enabled, HD3Z is enabled to run;
- When disabled, HD3Z is disabled to run and will be in auto stop status.
- If no terminal selects this function, it defaults that HD3Z is enabled.

2,3: FWD / REV.

- FWD / REV is valid only in terminal control mode.
- Refer to F15.16.

4: Three-wire running mode.

- Refer to F15.16.

5 - 7,87: Frequency setting channel selection 1 - 4.

- Achieve 2n frequency setting channel via terminals logic combination (n ≤ 4), as follow table.

Channel 4 (No.87)	Channel 3 (No.7)	Channel 2 (No.6)	Channel 1 (No.5)	Setting channel
0	0	0	0	Not change
0	0	0	1	Keypad digital
0	0	1	0	Terminal
0	0	1	1	Communication digital
0	1	0	0	Analogue
0	1	0	1	High speed pulse
0	1	1	X	Not change
1	0	0	0	Keypad digital
1	0	0	1	Terminal digital
1	0	1	0	Communication digital
1	0	1	1	AI1
1	1	0	0	AI2

8: Switch to analogue.

- When valid, frequency setting channel is switched to to analogue.
- Priority of frequency setting channel:
  Timing frequency switch > M button switching function (F00.12 = 1) > Switch from frequency to analogue (DI = 8) > Switch to normal running mode (DI = 30) > Multi-speed (DI = 13 - 16) > frequency setting channel terminal 1 - 3 (DI = 5 - 7) > channel set by F00.10.

Ref. Code	Function Description	Setting Range [Default]

9,10: Running command switching 1, 2.

- Achieve 4 commands:

Channel 2 (No.10)	Channel 1 (No.9)	Command
0	0	Not change
0	1	Keypad
1	0	Terminal
1	1	SCI

- The running commands can be switched during running, but not effective until stop state.

11: Command switch to terminal.

- When valid, running channel is switched to terminal.
- Priority of running command channel:
  M switching function (F00.12 = 1) > switching to terminal (DI = 11) > Running command switching 1, 2 (DI = 9,10) > running command set by F00.11.
- Valid only when HD3Z stops.

12: External command for stop.

- When valid, HD3Z stops according to F02.13. Effective for all of the running command channels.

13 - 16: Multi-speed frequency terminal 1 - 4.

- By logic combination, HD3Z can run at frequency setting channel and 15 frequency.
- Set 4 terminal function, HD3Z can switch between frequency setting channel and any one of multi frequency.
- Set 3 terminal function, HD3Z can switch between frequency setting channel and 7 frequency.
- Set 2 terminal function, HD3Z can switch between frequency setting channel and 3 frequency.
- Set 1terminal function, HD3Z can switch between frequency setting channel and multi-speed.
- K1-multi-speed frequency terminal 1, K2-multi-speed frequency terminal 2, K3-multi-speed frequency terminal 3, K4-multi-speed frequency terminal 4.

K4 (No.16)	K3 (No.15)	K2 (No.14)	K1 (No.13)	Frequency setting
0	0	0	0	Not change
0	0	0	1	Multi frequency 1 (F06.00)
0	0	1	0	Multi frequency 2 (F06.01)
0	0	1	1	Multi frequency 3 (F06.02)
0	1	0	0	Multi frequency 4 (F06.03)
0	1	0	1	Multi frequency 5 (F06.04)
0	1	1	0	Multi frequency 6 (F06.05)
0	1	1	1	Multi frequency 7 (F06.06)
1	0	0	0	Multi frequency 8 (F06.07)
1	0	0	1	Multi frequency 9 (F06.08)
1	0	1	0	Multi frequency 10 (F06.09)
1	0	1	1	Multi frequency 11 (F06.10)
1	1	0	0	Multi frequency 12 (F06.11)
1	1	0	1	Multi frequency 13 (F06.12)
1	1	1	0	Multi frequency 14 (F06.13)
1	1	1	1	Multi frequency 15 (F06.14)

Ref. Code	Function Description	Setting Range [Default]

17,18: Increase (UP) / decrease (DN) frequency.

- Increase or decrease frequency by terminal, equal to remote control by keypad.
- Range is set by F15.12. Refer to below table.
- Valid when normal running F00.10 = 1 (terminal digital setting) or aux frequency F19.00 = 2 (terminal digital setting).

UP (No.17)	DN (No.18)	Frequency change
0	0	Not change
0	1	Decrease
1	0	Increase
1	1	Not change

19: Clear aux setting frequency to 0.

- When valid, aux frequency is cleared to 0, and setting frequency is up to main setting.

20,21: FWD / REV jog 1 command input (JOGF1 / JOGR1).

22,23: FWD / REV jog 2 command input (JOGF2 / JOGR2).

24,25: Jog 1 command and direction input.

- Jog command in terminal control mode. JOGF is jog forward running and JOGR is jog reverse running.
- Need define F00.15 (Jog running frequency), F00.16 (Jog interval), F03.15 (Jog Acc. time) and F03.16 (Jog Dec. time):

Jog direction input (No.25)	Jog command input (No.24)	Running command
0	0	Invalid
1	0	Invalid
0	1	Jog 1 FWD
1	1	Jog 1 REV

Note: When No.20 and 21 are selected, No.24 and 25 are invalid.

26,27: Acc. / Dec. time terminal 1 and 2.

- Priority of Acc. / Dec. time:
  Acc. / Dec. time define by No.26 and 27 of terminal > Acc. / Dec. time defined by F03.09 and F03.10.
- By logic combination of Acc. / Dec. time terminal 1 and 2 can realize 4 sets of Acc. / Dec. time (as table below).
- 4 groups time can be selected by setting 2 Acc. / Dec. terminals.
- 2 groups time can be selected by setting 1 terminals.

Acc. / Dec. time terminal 2 (No.27)	Acc. / Dec. time terminal 1 (No.26)	Acc. / Dec. selection
0	0	Acc. / Dec. time1
0	1	Acc. / Dec. time 2
1	0	Acc. / Dec. time 3
1	1	Acc. / Dec. time 4

28: Acc. / Dec. mode selection.

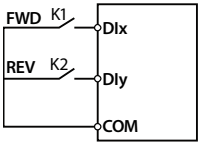
- When valid, select S curve mode; When invalid, select line mode.
- Priority: Acc. / Dec. mode defined by No.28 > Acc. / Dec. mode defined by F03.00.

29: Forbid Acc. / Dec. motor maintain current running speed despite external signal (but stop).

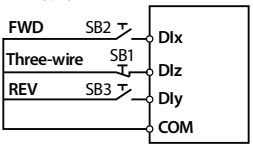
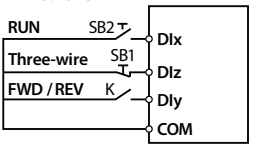
- Invalid when decelerates to stop.

6

Ref. Code	Function Description	Setting Range [Default]
	30: Switch to normal run. • When valid, frequency commands (multi-speed, simple PLC, process PID, wobble function, etc.) are switched to normal mode. 32: Pause process PID. • When valid, process PID function will pause, and HD3Z continues running at present frequency. 33: Forbid process PID. Switch PID to other modes. • When valid, HD3Z switches to other running modes. • Priority: Jog running > Process PID > Multi-speed > Normal run. 34: PID integral holding. • When valid, process PID stops integral accumulation, and the integrator keeps the current result. 35: Clear PID integral. • When valid, integrator clears PID ingetral. 38: Stop DC brake input. • Apply DC brake to motor which is in stop status via control terminal. It can make motor EMR stop and acquire accurate position. • Refer to F02.04 for braking current. • The terminal is valid in Dec. to stop process and DC brakes motor immediately. When invalid, DC brake stops. • No.38 function is valid except coast to stop mode. 39,40: External stop NO / NC contact input. • In running, when HD3Z receives external stop signal, it stops output. • When external stop signal is cancelled and HD3Z can run, it tracks and start running. 41,42: Coast to stop NO / NC input. • After HD3Z receives command, it stops output at once, the load will coast to stop according to mechanical inertia. 43: Emergency stop. • After HD3Z receives command, it decelerates to stop. The Dec. time is set by F03.17. 44,45: NO / NC input for external fault. • HD3Z can detect fault of external device and acts according to F15.17. • HD3Z shows external device's fault after receiving fault signal. • Two input modes for fault signal: NO or NC. 46: External reset (RST) input. Reset fault when HD3Z has fault. • It has the same function as STOP on keypad. 53: Pulse frequency input (DI6 only). • It receives pulse signal as frequency setting. • Refer to F05 for relationship of input signal pulse frequency and setting frequency. 54: Switch main / aux frequency channel. 59: Switch PID parameter. 86: Activate terminal DC brake input. • HD3Z starts DC brake if this terminal is valid during running. If no stop command, HD3Z restarts after this terminal is invalid. 87: Frequency setting channel = 4. • Refer to No.5 and 7. 88: Disable timing start / stop. • When No.88 is enabled, timing start / stop is invalid. 89: Disable timing frequency switch. • When No.89 is enabled, timing frequency switch is invalid.	

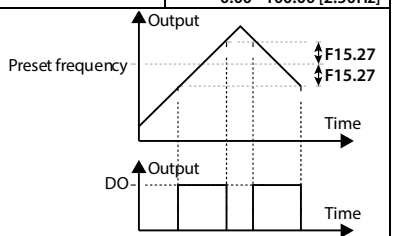
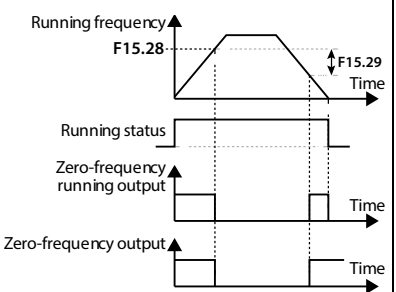
<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td></td><td colspan="2">90: Manually dehumidifying.
• Detect this function before running inverter. When No.90 is enabled, inverter dehumidifies according to F19.42 (dehumidifying current).
91: Auto dehumidifying.
• Inverter judges dehumidifying automatically before running. Refer to for details F19.44 - F19.47 for details.</td></tr>
<tr><td>F15.12</td><td>UP / DN Acc. / Dec. rate</td><td>0.00 - 99.99 [1.00Hz/s]</td></tr>
<tr><td></td><td colspan="2">Defines setting frequency changing rate by UP / DN.</td></tr>
<tr><td>F15.13</td><td>Interval between terminal detection</td><td>0 - 2 [0]</td></tr>
<tr><td></td><td colspan="2">0: 2ms.
1: 4ms.
2: 8ms.</td></tr>
<tr><td>F15.14</td><td>Terminal detection filter times</td><td>0 - 10000 [2]</td></tr>
<tr><td></td><td colspan="2">Delay or confirm digital input signal in case of mal-function.</td></tr>
<tr><td>F15.15</td><td>Terminal input logic setting</td><td>00 - 0xFF [00]</td></tr>
<tr><td></td><td colspan="2">Defines that each bit (binary) represents different physical channels.
• 0: Positive logic. Connected to corresponding common port: This logic is enabled. Otherwise disabled.
• 1: Negative logic. Connected to corresponding common port: This logic is disabled. Otherwise enabled.
<table>
<tr><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td>-</td><td>-</td><td>DI6</td><td>DI5</td><td>DI4</td><td>DI3</td><td>DI2</td><td>DI1</td></tr>
</table></td></tr>
<tr><td>F15.16</td><td>FWD / REV running mode</td><td>0 - 3 [0]</td></tr>
<tr><td></td><td colspan="2">• FWD: DI terminal is defined as No.2 function.
• REV: DI terminal is defined as No.3 function.
• Three-wire running mode: DI terminal is defined as No.4 function.
Define four modes under external terminal control.
0: Two-wire running mode 1.
1: Two-wire running mode 2.
• Terminal level is valid in terminal control mode, but HD3Z will not send run command even DI control terminal FWD / REV is valid when stop command input from other channels (terminal external stop command input is valid, terminal coast to stop command input is valid, inverter fault / external fault is valid).
• To run inverter again, enable FWD / REV.
 

<table>
<tr><th rowspan="2">K2</th><th rowspan="2">K1</th><th colspan="2">Run Command</th></tr>
<tr><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>Reverse</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>Reverse</td></tr>
</table>
2: Three-wire running mode 1.
• If the shift between SB2 and SB3 is disabled, HD3Z will keep the same mode.
3: Three-wire running mode 2.
• If SB2 changes from enabled into disabled, HD3Z will keep the same mode.</td></tr>
</table>

Ref. Code	Function Description	Setting Range [Default]
	F15.16=2  *SB1: Normally closed stop button* *SB2: Normally open forward button* *SB3: Normally open reverse button* F15.16=3  *K: Direction selection terminal (level on)* *K = 0(forward) K = 1(reverse)* *SB1: Normally closed stop button* *SB2: Normally open run button*	
F15.17	**Action selection when extrenal device has fault**	**0 - 3 [0]**
	Protection action when external device has fault. 0: Coast to stop. 2: Decelerate to stop. 1: Emergency stop. 3: Continue to run.	
F15.18	**DO1 function**	**0 - 41 [2]**
F15.20	**RLY1 relay function**	**0 - 41 [31]**
F15.21	**RLY2 relay function**	**0 - 41 [0]**
F15.22	**RLY3 relay function**	**0 - 41 [0]**
F15.23	**RLY4 relay function**	**0 - 41 [0]**
	0: Unused. 1: Inverter is ready. • Inverter can output normal running command after power up, it's enabled to run (DI = 1) and no fault occurs. 2: Inverter running. HD3Z is in run status. 3: Forward running. HD3Z is forward running. 4: Reverse running. HD3Z is reverse running. 5: DC brake. HD3Z is DC brake. 6: Zero-frequency status. • In zero-frequency range, the output frequency (including in stop status) outputs. • Refer to F15.28 and F15.29. 7: Zero-frequency running. • HD3Z output frequency is within zero-frequency range. Refer to F15.28 and F15.29. 9,10: Frequency level detection signal (FDT1, FDT2). • Refer to F15.31 - F15.35. 11: Frequency within FAR range (FAR). • The output frequency is within FAR range. Detection range is set by F15.27. 12: Frequency upper limit. • Indicating signal will output when setting frequency ≥ upper limit frequency. 13: Frequency lower limit. • Indicating signal will output when setting frequency ≤ lower limit frequency. 20: Signal output from SCI. • SCI control open collector output terminal or relay to output signal. 22: Timing function. • Output terminal of timing function. Refer to F15.25 and F15.26. 27: Analogue input exceeding limit. • When analogue exceeds upper or lower limit, output indicating signal. • Refer to F15.39 - F15.42.	

Ref. Code	Function Description	Setting Range [Default]
	29: Stop in under-voltage condition. • When DC busbar voltage is lower than under-voltage level, output indicating signal. 30: Overload detection signal. • When output current of HD3Z F20.01 (overload pre-alarm detection value), and time F20.02 (overload pre-alarm detection time, output indicating signal. 31: Inverter fault. HD3Z has fault. 32: External fault. HD3Z detects external devcice has fault via terminal. 33: Fault of inverter is reset automatically. 35: Dormancy function. 36: System is running. • When U/V/W terminals have output signal or waiting for starting status, output indicating signal. 39: Motor is dehumidifying. Inverter control motor to dehumidify. 40: In timing start and stop process. 41: In timing frequency switch process.	
F15.24	**Terminal output logic setting**	**000 - 0xFFF [00]**
	Defines that each bit (binary) represents different physical channels. • 0: Positive logic. Connected to corresponding common port, This logic is enabled. Otherwise disabled. • 1: Negative logic. Connected to corresponding common port, This logic is disabled. Otherwise enabled.	

Thousand				Ten				Unit			
Bit11	Bit10	Bit9	Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
-	-	-	RLY7	RLY6	RLY5	RLY4	RLY3	RLY2	RLY1	Unused	DO1

F15.27	**Speed within FAR range**	**0.00 - 100.00 [2.50Hz]**
	The pulse signal will output if elevator speed is within the FAR range. As shown in the right figure.	
F15.28	**Zero speed threshold**	**0.00 - Upper limit frequency [0.00Hz]**
F15.29	**Zero speed tolerance**	
	F15.28 and F15.29 defines the zero speed output control function.	

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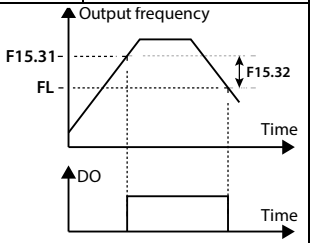
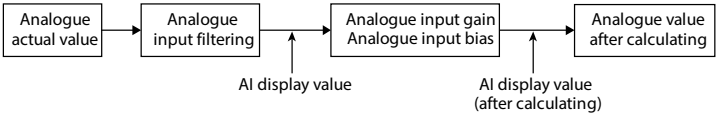
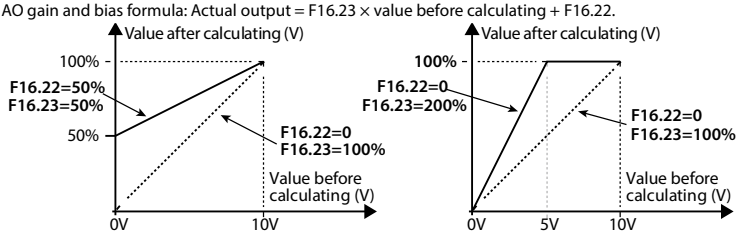
Ref. Code	Function Description	Setting Range [Default]
F15.30	**FDT1 detection mode**	**0,1 [0]**
	0: Detect according to setting frequency. 1: Detect according to output frequency.	
F15.31	**FDT1 level**	**0.00 - Upper limit frequency [50.00Hz]**
F15.32	**FDT1 delay**	**0.00 - Upper limit frequency [1.00Hz]**
	When F15.30 > F15.31, HD3Z outputs command signal until output frequency is lower than FDT1 level and delay (FL) (F15.31 - F15.32). 	
F15.33	**FDT2 detection mode**	**0,1 [0]**
	0: Detect according to setting frequency. 1: Detect according to output frequency.	
F15.34	**FDT2 level**	**0.00 - Upper limit frequency [50.00Hz]**
F15.35	**FDT2 delay**	**0.00 - Upper limit frequency [1.00Hz]**
	Refer to F15.31 and F15.32.	
F15.39	**Action selection when motor is overheated**	**00 - 30 [00]**
	If corresponding analogue temperature of motor > F15.40 or analogue < F15.41 and go through F15.42, HD3Z report motor overheat fault, motor coast to stop. **Ten: Select analogue input terminal** • 0: No analogue terminal. • 2: AI1. • 3: AI2.	
F15.40	**Upper limit of motor overheat input**	**0.0 - 100.0 [100.0%]**
F15.42	**Detection time of motor overheat**	**0.00 - 50.00 [5.00s]**
F15.43	**Terminal output delay**	**0.0 - 100.0 [0.0s]**
F15.45	**RLY5 relay function**	**0 - 41 [0]**
F15.46	**RLY6 relay function**	**0 - 41 [0]**
F15.47	**RLY7 relay function**	**0 - 41 [0]**
	Function of F15.45 - F15.47 are the same as F15.20 - F15.23 (Relay RLY1 - RLY4).	

6.2.13 F16: Analogue I/O Terminal Parameters

Ref. Code	Function Description	Setting Range [Default]
F16.01	**AI1 function**	**0 - 23 [2]**
F16.02	**AI2 function**	**0 - 23 [0]**
	0: Unused. 2: Frequency setting. • F00.10 = 3 (analogue input sets frequency setting channel), setting frequency is set by corresponding input voltage. 3: Aux frequency setting. • F19.00 = 4 (analogue sets aux frequency setting), aux frequency is set by corresponding input voltage. 4: Process PID setting. • F04.01 = 1 (analogue sets process PID setting), process PID setting is set by corresponding input voltage. 5: Process PID feedback. • F04.02 = 0 (analogue inputs process PID feedback), process PID feedback is set by corresponding input voltage. 6: Process PID regulating upper limit. • F04.11 = 1 (analogue sets upper limit of PID regulator), process PID regulating upper limit is set by corresponding input voltage. 7: Process PID regulating lower limit. • F04.12 = 1 (analogue sets lower limit of PID regulator), process PID regulating lower limit is set by corresponding input voltage. 20: Detect ambient humidity. 21: Detect ambient temperature. 22: Detect motor humidity. 23: Detect motor temperature.	
F16.05	**AI1 bias**	**-100.0 - 100.0 [0.0%]**
F16.08	**AI2 bias**	
F16.06	**AI1 gain**	**0.00 - 10.00 [1.00]**
F16.09	**AI2 gain**	
F16.07	**AI1 filtering time**	**0.01 - 10.00 [0.05s]**
F16.10	**AI2 filtering time**	
	When AI1 - AI2 is open loop frequency setting channel, the relationship between the analogue input and the analogue value after calculating is shown as figure:  The formula is: Y=kX+b. • Y is analogue after calculating, X is value before adjusting, k is analogue input gain (F16.06, F16.09), b is analogue input bias (F16.05, F16.08).	
F16.17	**Max. input pulse frequency**	**0 - 50000 [10000Hz]**
	When set the DI6 as pulse input, F16.17 defines the max. input pulse frequency.	
F16.18	**Input pulse filter time**	**0.01 - 10.00 [0.20s]**

Ref. Code	Function Description	Setting Range [Default]
F16.19	AO1 function	0 - 20 [2]
F16.20	AO2 function	0 - 20 [0]
	0: Unused. 1,2: Output frequency / setting frequency (0 - max. output frequency). 3: Motor RPM (0 - max. output frequency corresponding to RPM). 4: Output current (0 - twice rated current of HD3Z). 5: Output current (0 - twice rated current of motor). 10: Output torque (0 - 3 times rated torque of motor). 11: Output torque (0 - 1.2 times rated voltage of HD3Z). 12: Bus voltage (0 - 2.2 times rated voltage of HD3Z). 13: Output power (0 - twice rated power of motor). 14: AI1 input (0 - max. AI1 after calculating). 15: AI2 input (0 - max. AI2 after calculating). 18,19: Output frequency, setting frequency (-1 - 1 times max. output frequency). 20: Setting frequency (0 - max. output frequency).	
F16.22	AO1 bias	-100.0 - 100.0 [0.0%]
F16.23	AO1 gain	0.0 - 200.0 [100.0%]
	User can use output gain to adjust AO1 output. Below is a figure shows curve relationship between AO and F16.22, F16.23. • AO gain and bias formula: Actual output = F16.23 × value before calculating + F16.22. 	
F16.24	AO2 bias	-100.0 - 100.0 [0.0%]
F16.25	AO2 gain	0.0 - 200.0 [100.0%]

6.2.14 F17: SCI Communication Parameter

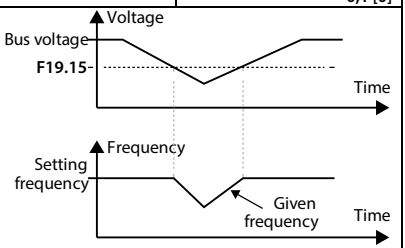
Ref. Code	Function Description	Setting Range [Default]
F17.00	**Data format**	**0 - 6 [0]**
	0: 1-8-2 format, no parity, RTU. 1: 1-8-1 format, even parity, RTU. 2: 1-8-1 format, even parity, RTU. 6: 1-8-1 format, no parity, RTU.	
F17.01	**Baud rate**	**0 - 8 [3]**
	0: 1200bps. 5: 38400bps. 1: 2400bps. 6: 57600bps. 2: 4800bps. 7: 76800bps. 3: 9600bps. 8: 115200bps. 4: 19200bps.	
F17.02	**Local address**	**0 - 247 [2]**
	F17.02 = 0, it means broadcast address.	
F17.03	**Host PC response time**	**0 - 1000 [1ms]**
F17.04	**Detection time at communication timeout**	**0.0 - 600.0 [0.0s]**
	Time at no communication data > setting time of F17.04, it will be considered as communication timeout, HD3Z continue running and report E0028 fault (SCI communication timeout). F17.04 = 0, it will not detect communication timeout.	
F17.05	**Detection time at communication error**	**0.0 - 600.0 [0.0s]**
	Time at communication error > setting time of F17.05, it will be considered as SCI error. F17.05 = 0, it will not detect the communication error.	
F17.06	**Action selection at communication timeout**	**0 - 3 [3]**
F17.07	**Action selection at communication error**	**0 - 3 [3]**
F17.08	**Action selection at communication peripheral device fault**	**0 - 3 [1]**
	F17.06 defines the action selection at communication timeout. F17.07 defines the action selection at communication error. In the communication command setting mode, F17.08 will define the action selection when communication peripheral device fault is alarmed. 0: Coast to stop. 2: Decelerate to stop. 1: Emergency stop. 3: Continue to run.	
F17.09	**EEPROM storage selection under communication read / write function parameter**	**00 - 11 [01]**
	F17.09 is used to select parameter storage during modifying. **Unit: Parameters storage selection except F00.13 and F19.03** **Ten: F00.13 and F19.03 storage selection** 0: Do not store to EEPROM. 1: Store to EEPROM. *Note: Caution! When tens = 1, it may cause damage to HD3Z.*	
F17.10	**Detection time of networking communication timeout**	**0.0 - 600.0 [0.0s]**
	Communication timeout means when the interval of two sets of data (including local and non-local data) > F17.10, HD3Z will continue running and report E0028 fault (SCI communication timeout). F17.10 = 0, do not detect communication timeout.	

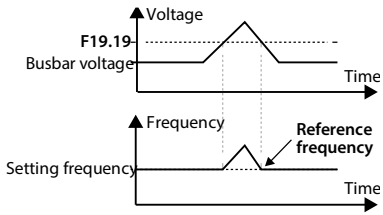
6.2.15 F18: Display Control Parameter

Ref. Code	Function Description	Setting Range [Default]
F18.01	**Display contrast of LCD keypad**	**1 - 10 [5]**
	To select LCD display contrast.	
F18.02	**Set parameter 1 of run status**	**0 - 49 [9]**
F18.03	**Set parameter 2 of run status**	**0 - 49 [7]**
F18.04	**Set parameter 3 of run status**	**0 - 49 [13]**
F18.05	**Set parameter 4 of run status**	**0 - 49 [14]**
F18.06	**Set parameter 5 of run status**	**0 - 49 [35]**
F18.07	**Set parameter 6 of run status**	**0 - 49 [36]**
F18.08	**Set parameter 1 of stop status**	**0 - 49 [7]**
F18.09	**Set parameter 2 of stop status**	**0 - 49 [18]**
F18.10	**Set parameter 3 of stop status**	**0 - 49 [35]**
F18.11	**Set parameter 4 of stop status**	**0 - 49 [36]**
F18.12	**Set parameter 5 of stop status**	**0 - 49 [43]**
F18.13	**Set parameter 6 of stop status**	**0 - 49 [44]**
	The keypad display parameters which is the run status (F18.02 - F18.07) or stop status (F18.08 - F18.13). It can be cycling displayed by ▶▶ on keypad. 0: Unused. 1: Rated current of HD3Z. 3: Invertre status. • Refer to d00.10. 4: Main setting frequency channel. 5: Main setting frequency. 6: Aux setting frequency. 7: Setting frequency. 8: Setting frequency (after Acc. / Dec.). 9: Output frequency. 10: Setting Rpm. 11: Running Rpm. 13: Output voltage. 14: Output current. 16: Output torque. 17: Output power. 18: DC busbar voltage. 20: AI1 input voltage. 21: AI1 input voltage (after calculating). 22: AI2 input voltage. 23: AI2 input voltage (after calculating). 28: DI6 terminal pulse input frequency. 29: AO1 output. 30: AO2 output. 32: Heatsink temperature. 35: Ambient humidity. 36: Ambient temperature. 37: Process PID setting. 38: Process PID feedback. 39: Process PID deviation. 40: Process PID integral value. 41: Process PID output. 43: Input terminal status. • Bit0 - Bit5 corresponds to DI1 - DI6. 44: Output terminal status. • Bit0 corresponds to DO1. • Bit2 - Bit8 correspond to RLY1 - RLY7. 45: MODBUS status. 46: Motor humidity. 47: Motor temperature. 48: Total time at power on (hour). 49: Total running time (hour).	
F18.14	**Frequency display gain**	**0.1 - 160.0 [1.0]**

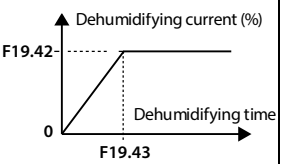
6.2.16 F19: Function-boost Parameters

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>F19.00</td><td>Aux frequency setting channel selection</td><td>0 - 8 [0]</td></tr>
<tr><td></td><td colspan="2">Define setting channel.
0: No aux channel.
1: Keypad. Adjust by ▲, ▼ on keypad. Initial value is set by F19.03.
2: Terminal. Adjust by UP / DN terminal. Initial value is set by F19.03.
3: SCI. Initial value is 0.
4: Analogue.
5: Terminal puse.
6: PID output. Set according to PID and feedback relationship.
7: AI1.
8: AI2.
• F19.00 = 4,5,7 - 8, value is set by actual analogue input. Refer to F05.00 for frequency curve selection.</td></tr>
<tr><td>F19.01</td><td>Main / Aux setting calculating</td><td>00 - 41 [10]</td></tr>
<tr><td></td><td colspan="2">Define the relationship between final setting frequency and main / aux frequency. Switch frequency by No.54 function of DI terminal (switching main / aux frequnecy channel).
Unit: Main / Aux calculating
0: Main + Aux setting.
1: Main - Aux setting
Ten: Frequency channel selection
0: Main.
1: Main / Aux calculating.
2: Main / Aux switching.
3: Main and Main / Aux calculating switching.
4: Aux and Main / Aux calculating switching.
<table>
<tr><th rowspan="2">DI = 54</th><th colspan="10">F19.01 setting value</th></tr>
<tr><th>00</th><th>10</th><th>20</th><th>30</th><th>40</th><th>01</th><th>11</th><th>21</th><th>31</th><th>41</th></tr>
<tr><td>0</td><td>Main</td><td>Main+Aux</td><td>Aux</td><td>Main+Aux</td><td>Main+Aux</td><td>Main</td><td>Main-Aux</td><td>Aux</td><td>Main-Aux</td><td>Main-Aux</td></tr>
<tr><td>1</td><td>Main</td><td>Main+Aux</td><td>Main</td><td>Main</td><td>Aux</td><td>Main</td><td>Main-Aux</td><td>Main</td><td>Main</td><td>Aux</td></tr>
</table></td></tr>
<tr><td>F19.02</td><td>Aux setting coefficient</td><td>0.00 - 9.99 [1.00]</td></tr>
<tr><td></td><td colspan="2">Use F19.02 to calculate gain, then calculate aux frequency by F05.
• Valid when F19.00 = 4,5,7 - 10.</td></tr>
<tr><td>F19.03</td><td>Initial value of digital aux frequency</td><td>0.00 - F00.06 [0.00Hz]</td></tr>
<tr><td></td><td colspan="2">Valid when 19.00 = 1,2. F19.03 is initial value for the two aux frequency setting.</td></tr>
<tr><td>F19.04</td><td>Digital aux frequency control</td><td>00 - 11 [00]</td></tr>
<tr><td></td><td colspan="2">Valid when F19.00 = 1,2.
Unit: Storage selection at power failure
• 0: Do not save aux frequency.
• 1: Save aux frequency.
Ten: Frequency at stop
• 0: Maintain aux frequency at stop.
• 1: Aux frequency resumes to F19.03 at stop.</td></tr>
<tr><td>F19.05</td><td>Setting frequency adjustment selection</td><td>0 - 2 [1]</td></tr>
<tr><td>F19.06</td><td>Setting frequency adjustment coefficient</td><td>0.0 - 200.0 [100.0%]</td></tr>
<tr><td></td><td colspan="2">F19.05, F19.06 define the adjustment ways of setting frequency (the frequency that calculated by main and aux setting frequency is shorted as resultant frequency).
0: Do not adjust.
• Setting frequency = resultant frequency.
1: Adjust according to max. output frequency (F00.06).
• Setting frequency = resultant frequency + F00.06 × (F19.06 - 100%).
2: Adjust according to current frequency.
• Setting frequency = resultant frequency × F19.06.</td></tr>
</table>

Ref. Code	Function Description	Setting Range [Default]
F19.07	**Fan control**	**0 - 2 [0]**
F19.08	**Fan control delay time**	**0.0 - 600.0 [120.0s]**
	Defines the control mode of cooling fan. With overheat protection, the fan runs all the time. 0: Auto stop. • The fan runs all the time when HD3Z is running. After HD3Z stops for the time set by F19.08, the fan continues running if overheat protection is activated. 1: Immediate stop. The fan runs all the time when HD3Z is running and stops when HD3Z stops. 2: Runs all the time when power on. The fan runs all the time when HD3Z is powered on.	
F19.10	**Zero frequency threshold**	**0.00 - Upper limit frequency [1.00Hz]**
F19.11	**Action selection when setting frequency < zero frequency threshold**	**0 - 3 [0]**
	0: Runs according to frequency command. 1: Remains stop and does not output. 2: Runs according to zero frequency. 3: Runs at 0Hz.	
F19.12	**Non-stop at instantaneous power loss**	**0,1 [0]**
	If instantaneous power loss occurs when HD3Z is running (DC busbar voltage of main circuit V_{DC} < F19.15), HD3Z runs non-stop by decreasing output frequency and maintain DC busbar voltage. 0: Forbid non-stop at instantaneous power loss. 1: Enable non-stop at instantaneous power loss. Compensate to under-voltage. 	
F19.13	**Voltage compensation gain for non-stop running**	**10 - 1000 [500]**
	When F19.12 = 1, HD3Z judges the difference between current DC busbar and F19.15 as well as voltage compensation gain. By real time adjusts output frequency, HD3Z maintains DC busbar voltage to avoid stop due to under-voltage. • Under-voltage can not fully compensate if compensation gain and and load feedback energy is too small; • Output frequency will fluctuate even system oscillates if compensation gain and and load feedback energy is too big.	
F19.15	**Voltage for action judgement at instantaneous power loss**	**340 - 670 [430V]**
F19.16	**Restart after power failure**	**0,1 [0]**
	0: Disabled. 1: Enabled. In the occation that power failure occurs to HD3Z that is running, when HD3Z is powered on again and the run command is still valid, it will wait until time of F19.17 is finished and then restart the motor.	

Ref. Code	Function Description	Setting Range [Default]
F19.17	**Waiting time for restart after power failure**	**0.00 - 10.00 [2.00s]**
F19.18	**Overvoltage suppression gain**	**0.000 - 1.000 [0.000]**
	0: Forbid stall overvoltage. 0.001 - 1.000: Enable stall overvoltage. • When HD3Z is running, it detects busbar voltage and compares it with F19.19, if busbar voltage > F19.19, HD3Z will increase output frequency to avoid large load feedback. • If F19.18 is too small, it can not effectively supress increase of busbar voltage. • If F19.18 is too large, output frequency will fluctuate even system oscillates; To avoide this problem, increase duration of Dec. process. *Note: If stall overvoltage states for more than 1 minute, HD3Z reports stall overvlotage fault (E0007), and stops output.*	
F19.19	**Stall overvoltage point**	**650 - 790 [690V]**
	If overvoltage occurs suring running, properly increase stall overvoltage gain and decrease F19.19. Stall overvoltage and braking unit: • Usually when appling braking units to inverter, please forbid stall overvoltage (F19.18 = 0). • But if feedback energy is too large at loading moment and delayed energy release of braking unit, HD3Z will adopt overvoltage protection. To avoid protection, enable stall overvoltage and (F19.19) should > action voltage of braking unit.  $\triangle F = F19.18 \times (V_{DC} - F19.19)$	
F19.20	**Auto current limit gain**	**0.000 - 1.000 [0.500]**
	Output frequency of HD3Z > F19.21, HD3Z will limit current to avoid over-current protection. • Adjust F19.20 according to actual load: • If F19.20 is too small, it can not fully limit increase of output current; • If F19.20 is too large, output frequency will fluctuate even system oscillates. • Auto current limt is invalid when F19.20 = 0.	
F19.21	**Auto current limit threshold**	**20.0 - 200.0 [120.0%]**
	Defines the current threshold of auto current limit. The current = F19.21 × rated current of HD3Z. • When auto current limit is valid, if F19.21 is too small, it may affect the load capacity of HD3Z.	
F19.23	**Enabled terminal at power on**	**0,1 [0]**
	Valid only in two-wire control. 0: Rise edge. • For many applications, HD3Z is not allowed to auto run to avoid device damage and ensure safety due to no person interference at power on. In these applications, when the inverter has power initialized and ready to run, it can not start to run until the terminal run command is given. 1: Level. • For certain applications, when ensured personal safety and device safety, HD3Z needs immediately run at power on in order to provide automation and efficiency. In these applications, HD3Z will immediately run as soon as the terminal running command is given whether before or after power on.	
F19.25	**Flux braking**	**0,1 [0]**
	0: Disabled. 1: Enable, and disable stall overvoltage automatically. *Note: Please set F19.25 = 0 when brake a lot, otherwise will damage the motor.*	

Ref. Code	Function Description	Setting Range [Default]
F19.35	**Aux PID output limit**	**0.0 - 100.0 [100.0%]**
	When aux frequency selects PID, adjustment upper limit of PID output = F19.35 × main setting frequency.	
F19.36	**Aux PID output setting**	**0.0 - 100.0 [0.0%]**
	Aux PID output setting = output llimit of F19.35 + F19.36 × F00.06.	
F19.37	**Frequency adjustment range**	**000 - 111 [100]**
	Unit: Main frequency calculating range • 0: 0 - max. frequency. • 1: Negative max. frequency - max. frequency. **Ten: Aux frequency calculating range** • 0: 0 - max. frequency. • 1: Negative max. frequency - max. frequency. **Hundred: Resultant frequency calculating range** • 0: 0 - upper limit frequency. • 1: Negative upper limit frequency - upper limit frequency.	
F19.38	**Inter-phase short-circuit detection**	**0,1 [1]**
	Used to detect inter-phase short-circuit before running HD3Z. 0: Do not detect. 1: Detect.	
F19.39	**Input voltage selection**	**0 - 2 [1]**
	0: 380 - 460V. 1: 260 - 460V. 2: 200 - 460V. *Note : When F19.39 = 1 or 2, HD3Z needs derating to use, and the actual output current should not surpass rated output current of HD3Z.*	
F19.40	**Flux braking PI regulator Kp**	**0 - 4000 [1000]**
F19.41	**Flux braking PI regulator Ki**	**0 - 500 [20]**
F19.42	**Motor dehumidifying current**	**1 - 80 [10%]**
F19.43	**Dehumidifying time when current of motor rises**	**0.1 - 240.0 [30.0min]**
F19.44	**Motor auto dehumidification selection**	**0x00 - 0x11 [0x11]**
	Ten: The basis of judgement for starting the auto dehumidification of the motor • 0: According to humidity. • Before each operation, the inverter detects the motor humidity value (d00.53). When the motor humidity value (d00.53) > F19.45 and the terminal automatic dehumidification is effective, the motor starts with the dehumidification current value curve according to the right figure before it runs. • 1: According to the stop interval. • Before each operation, the inverter detects the interval time of this operation and last opereation (d01.07), when the stop interval (d01.07) ≥ F19.48 (F19.48 is not zero) and the terminal automatic dehumidification is effective, the motor starts dehumidification according to the dehumidification current value curve on the right before it runs. **Unit: The judgement basis for stopping automatic dehumidification of the motor** • 0: According to humidity. • After the motor starts to dehumidify automatically, when the motor humidity value (d00.53) < (F16.45 - F19.46), the motor dehumidification process ends and the motor starts normally. • 1: According to time. • After the motor starts to dehumidify automatically, after the F19.47 time, the dehumidification process ends and the motor starts normally.	



Ref. Code	Function Description	Setting Range [Default]
F19.45	**Motor auto dehumidifying humidity**	**F19.46 - 100.0 [80.0%rm]**
F19.46	**Motor auto dehumidifying humidity delay**	**0.0 - 30.0 [5.0%rm]**
F19.47	**Motor auto dehumidifying time**	**0.1 - 1200.0 [120.0min]**
F19.48	**Motor auto dehumidification stop interval**	**0.0 - 6000.0 [0.0h]**
	When F19.48 = 0, the dehumidification according to the stop interval is invalid.	

6.2.17 F20: Fault Protection Parameters

Ref. Code	Function Description	Setting Range [Default]
F20.00	**Overload pre-alarm detection**	**00000 - 31111 [00000]**
	Unit: Overload pre-alarm detection • 0: It is active all the time in running status. • 1: It is active only at constant speed. **Ten: Overload pre-alarm action** • 0: HD3Z doesn't alarm and continues running when detecting an active overload signal. • 1: HD3Z alarms and stops running when detecting an active overload signal. **Hundred: Overload detection threshold** • 0: Relates to rated current of motor (alarm E0019: Motor overload). • 1: Relates to rated current of HD3Z (alarm E0017: Inverter overload). **Thousand: Motor type** • 0: Standard motor. As the cooling effect of the standard motor deteriorates at low speed, HD3Z will automatically make regulation to the time of motor overload protection. • 1: Variable frequency motor. The cooling effect of the variable frequency motor is not affected by the motor speed due to its forced cooling potential, HD3Z will not automatically make regulation to the time of motor overload protection. **Ten Thousand: Overload protection** • 0: Enable inverter overload protection and motor overload protection. • 1: Enable inverter overload protection; Shield motor overload protection. • 2: Shield inverter overload protection; Enable motor overload protection. • 3: Shield inverter overload protection and motor overload protection.	
F20.01	**Overload pre-alarm detection value**	**20.0 - 200.0 [150.0%]**
	Defines the current value for overload pre-alarm. It relates to rated current of motor or inverter.	
F20.02	**Overload pre-alarm detection time**	**0.0 - 60.0 [5.0s]**
	When output current of HD3Z > F20.01, and duration F20.02, HD3Z will report E0017 fault (Inverter overload) or E0019 fault (Motor overload).	
F20.08	**The detection base of lack of input**	**0 - 80 [30%]**
F20.09	**The detection time of lack of input**	**1.00 - 5.00 [1.00s]**
	F20.08 is percentage related to rated voltage of HD3Z. When HD3Z detects certain input voltage does not hit the detection base F20.08, and exceeds the preset detection time (F20.09), HD3Z alarms E0015 fault (Lack of input). • F20.08 = 0, HD3Z will not detect input phase loss fault.	
F20.10	**The detection base of lack of output**	**0 - 100 [20%]**
F20.11	**The detection time of lack of output**	**1.00 - 20.00 [3.00s]**
	F20.10 is percentage related to rated current of HD3Z. When HD3Z detects certain output current does not hit the detection base (F20.10), and exceeds the detection time (F20.11), HD3Z alarms E0016 fault (Lack of output). • F20.10 = 0, HD3Z will not detect output phase loss fault.	

Ref. Code	Function Description	Setting Range [Default]
F20.12	**PID setting lose detection value**	**0 - 100 [0%]**
F20.13	**PID setting loss detection time**	**0.00 - 10.00 [0.20s]**
	F20.12 is percentage related to max. setting channel. If the PID setting < F20.12 within detection time (F20.13), HD3Z will alarm E0025 fault (PID feedback loss). • F20.12 = 0 or F20.13 = 0, HD3Z willl not detect PID setting loss fault.	
F20.14	**PID feedback loss detection value**	**0 - 100 [0%]**
F20.15	**PID feedback loss detection time**	**0.00 - 10.00 [0.20s]**
	F20.14 percentage related to max. feedback channel. If the PID feedback value < F20.14 in the detection time (F20.15), HD3Z will alarm E0026 fault (PID feedback loss). • F20.14 or F20.15 = 0, HD3Z will not detect PID feedback loss fault.	
F20.16	**Detection value at PID feedback out of the limit**	**0 - 100 [100%]**
F20.17	**Detection time at PID feedback out of the limit**	**0.00 - 10.00 [0.20s]**
	F20.16 percentage related to max. feedback channel. If the PID feedback value > F20.16 in the detection time (F20.17), HD3Z will alarm E0027 fault (PID feedback out of limit). • F20.16 = 100 or F20.17 = 0, HD3Z will not detect PID feedback out of limit fault.	
F20.18	**Fault auto reset times**	**0 - 100 [0]**
F20.19	**Fault auto reset interval**	**0.01 - 200.00 [5.00s/time]]**
	When F20.18 = 0, it means "auto reset" is unused and the protective device will be activated. • If no other fault is detected within 5 minutes, the auto reset count will be automatically cleared. • On condition of external fault reset, auto reset count will be cleared.	
	Below faults can not auto reset: • E0008 (Power module fault), E0010 (Braking unit fault), E0013 (Soft start contactor failed), E0014 (Current detection circuit fault), E0021 (Read / Write fault of control board EEPROM), E0023 (Faulty setting of parameters), E0024 (Fault of external equipment).	
F20.20	**Faulty relay action**	**00 - 11 [00]**
	Unit: In auto reset process • 0: Faulty relay doesn't act. • 1: Faulty relay acts. **Ten: In undervoltage process** • 0: Faulty relay doesn't act. • 1: Faulty relay acts. *Note: Relay must be set as No.31 function.*	
F20.21	**NO.5 fault type**	**[Actual value]**
F20.22	**Setting frequency at NO.5 fault**	
F20.23	**Running frequency at NO.5 fault**	
F20.24	**DC bus vlotage at NO.5 fault**	
F20.25	**Output voltage at NO.5 fault**	
F20.26	**Output current at NO.5 fault**	
F20.27	**Input terminal status at NO.5 fault**	
F20.28	**Output terminal status at NO.5 fault**	
F20.29	**NO.5 fault interval**	
F20.30	**NO.4 fault type**	
F20.31	**NO.4 fault interval**	
F20.32	**NO.3 fault type**	
F20.33	**NO.3 fault interval**	

Ref. Code	Function Description	Setting Range [Default]
F20.34	NO.2 fault type	[Actual value]
F20.35	NO.2 fault interval	
F20.36	NO.1 fault type	
F20.37	NO.1 fault interval	
F20.38	Last time fault interval	
	F20.22 - F20.29 record status parameters of HD3Z at the last fault. F20.30 - F20.37 record the type and interval per time of four faults before the latest. The unit of interval is 0.1 hour.	

6.2.18 F23: PWM Control Parameter

Ref. Code	Function Description	Setting Range [Default]
F23.00	Carrier frequency	1 - 6kHz [Depend on model]
	F23.00 defines the carrier frequency of PWM output wave. • The carrier frequency will affect the running noise of the motor. The higher the carrier frequency, the lower the noise made by the motor. So properly set the carrier frequency. • When the value > factory setting, HD3Z should be derated by 5% when per 1kHz is increased compared to the factory setting.	
F23.01	Auto adjust carrier frequency	0 - 2 [1]
	0: Prohibited. 1: Adjust 1. 2: Adjust 2. • HD3Z auto adjust the carrier frequency according to output frequency and heatsink temperature.	
F23.02	PWM overshoot enable	0,1 [1]
	0: Disabled. 1: Enabled.	
F23.03	PWM modulation mode	0,1 [0]
	0: Switch between two phase / three phase. 1: Three phase	
F23.04	Switch point 1 of PWM modulation mode	0.00 - 50.00Hz [Depend on model]
F23.05	Switch point 2 of PWM modulation mode	0.00 - 50.00Hz [Depend on model]
F23.09	Random carrier factor K1	0 - 2000 [2]
F23.10	Random carrier factor K2	0 - 2000 [3]

6.2.19 P00: Timing Time Parameter

Ref. Code	Function Description	Setting Range [Default]
P00.00	Year	00 - 99 [Actual value]
P00.01	MM/DD	01.01 - 12.31 [Actual value]
P00.02	Min/Sec	00.00 - 23.59 [Actual value]

6.2.20 P01: Timing Control Parameter

Ref. Code	Function Description	Setting Range [Default]
P01.00	**Timing start and stop selection**	**0,1 [0]**
	0: Invalid. 1: Valid.	
P01.01	**Timing start 1**	**00.00 - 23.59 [00.00]**
P01.02	**Timing stop 1**	**00.00 - 23.59 [00.00]**
P01.03	**Timing start 2**	**00.00 - 23.59 [00.00]**
P01.04	**Timing stop 2**	**00.00 - 23.59 [00.00]**
P01.05	**Timing start 3**	**00.00 - 23.59 [00.00]**
P01.06	**Timing stop 3**	**00.00 - 23.59 [00.00]**
P01.07	**Timing start 4**	**00.00 - 23.59 [00.00]**
P01.08	**Timing stop 4**	**00.00 - 23.59 [00.00]**
	When P01.00 = 1 and D01.02 (present Min/Sec) = any value within P01.01 - P01.08, HD3Z responds to timing start or stop. • Any one of P01.01 - P01.08 = 0, do not respond to this timing start or stop command. • All of P01.01 - P01.08 = 0, timing function is invalid. *Note: Timing function is invalid when motor manual dehumidifying terminal is valid or in motor auto dehumidifying process.*	
P01.09	**Timing frequency switch selection**	**0,1 [0]**
	0: Invalid. 1: Valid.	
P01.10	**Time 1 of timing frequency switch**	**00.00 - 23.59 [00.00]**
P01.11	**Value 1 of timing frequency switch**	**0.00 - Upper limit frequency [0.00Hz]**
P01.12	**Time 2 of timing frequency switch**	**00.00 - 23.59 [00.00]**
P01.13	**Value 2 of timing frequency switch**	**0.00 - Upper limit frequency [0.00Hz]**
P01.14	**Time 3 of timing frequency switch**	**00.00 - 23.59 [00.00]**
P01.15	**Value 3 of timing frequency switch**	**0.00 - Upper limit frequency [0.00Hz]**
P01.16	**Time 4 of timing frequency switch**	**00.00 - 23.59 [00.00]**
P01.17	**Value 4 of timing frequency switch**	**0.00 - Upper limit frequency [0.00Hz]**
P01.18	**Time 5 of timing frequency switch**	**00.00 - 23.59 [00.00]**
P01.19	**Value 5 of timing frequency switch**	**0.00 - Upper limit frequency [0.00Hz]**
P01.20	**Time 6 of timing frequency switch**	**00.00 - 23.59 [00.00]**
P01.21	**Value 6 of timing frequency switch**	**0.00 - Upper limit frequency [0.00Hz]**
P01.22	**Time 7 of timing frequency switch**	**00.00 - 23.59 [00.00]**
P01.23	**Value 7 of timing frequency switch**	**0.00 - Upper limit frequency [0.00Hz]**
P01.24	**Time 8 of timing frequency switch**	**00.00 - 23.59 [00.00]**
P01.25	**Value 8 of timing frequency switch**	**0.00 - Upper limit frequency [0.00Hz]**
	When P01.00 = 1 and D01.02 (present Min/Sec) is within anyone of P01.10 - P01.25, inverter responds to corresponding time. • If any one of P01.10 - P01.25 = 0, inverter does not respond to this switch value. • If all of P01.10 - P01.25 = 0, inverter does not respond to frequency switch.	

Chapter 7 Troubleshooting and Maintenance

7.1 Troubleshooting

If a fault occurs, the keypad will display the fault alarm status. Meanwhile, faulty relay acts, accordingly HD3Z stops output and the motor coasts to stop.

When fault alarm occurs, user should record the fault in detail and take proper action according to Table 7-1. If technical help is needed, contact the suppliers or directly call Shenzhen Hpmont Technology Co., Ltd.

After the fault is eliminated, reset HD3Z by any of the following methods:

1. Keypad reset.

2. External reset terminal (DI terminal = No.16 function).

3. Communication fault reset.

4. Switching on HD3Z after completely power off.

Table 7-1 Fault and counter-measures

Fault		Fault reasons	Counter-measures
-Lu-	DC bus undervoltage	• At the begining of power on and at the end of power off • Input voltage is too low • Improper wiring leads to undervoltage of hardware	• It is normal status of power on and power off • Check input power voltage • Check wiring and wire HD3Z properly
E0001	Inverter output overcurrent (in Acc. process)	• Improper connection between inverter and motor. Poor insulation of motor • Improper motor parameters • The rating of the used inverter is too small • Acc. / Dec. time is too short • Restart motor that is rotating after sudden instantaneous voltage loss	• Connect HD3Z and motor properly Check insulation. • Set correct motor parameter (F08.00 - F08.04) • Select inverter with higher rating • Set proper Acc. / Dec. time (F03.01 - F03.08) • Set F02.00 = 2 • Do parameter auto-tuning (F08.06)
E0002	Inverter output overcurrent (in Dec. process)		
E0003	Inverter output overcurrent (in constant speed process)		
E0004	DC bus over voltage (in Acc. process)	• Input voltage is too high • Deceleration time is too short • Improper wiring leads to overvoltage of hardware • Restart motor that is rotating after sudden instantaneous voltage loss	• Check power input • Set proper value of Dec. time (F03.02, F03.04, F03.06, F03.08) • Check wiring and wire HD3Z properly • Set F02.00 = 2
E0005	DC bus over voltage (in Dec. process)		
E0006	DC bus over voltage (in constant speed process)		

Fault		Fault reasons	Counter-measures
E0008	Power module fault	• Short circuit between phases output • Short circuit to the ground • Output current is too high • Power module is damaged	• Check the connection and connect the wire properly • Check the connection and connect the wire properly • Check the connection and mechanism • Contact the supplier for repairing
E0009	Heatsink overheat	• Ambient temperature is too high • Poor external ventilation of HD3Z • Fan fault • Fault occurs to temperature detection circuit	• Use inverter with higher power capacity • Improve the ventilation around HD3Z • Replace the cooling fan • Seek technical support
E0012	Parameters auto-tuning fault	• Parameter auto-tuning is timeout	• Check the motor connection • Input correct motor parameters (F08.00 - F08.04) • Seek technical support
E0013	Soft start contactor failed	• Contactor fault • Control circuit fault	• Replace the contactor • Seek technical support
E0014	Current detection circuit fault	• Current detection circuit is damaged	• Contact the supplier for repairing
E0015	Input voltage phase loss	• For three-phase input HD3Z, input phase loss fault occurs to power input	• Check the three-phase power input • Seek technical support
E0016	Output voltage phase loss	• Output voltage phase disconnection or loss • Three-phase load of HD3Z is severely unbalanced	• Check the connection between HD3Z and motor • Check the quality of motor
E0017	Inverter overload	• Acc. time is too short • Improper setting of motor parameter • Improper setting of V/f curve or torque boost leads to over current • Restart motor that is rotating after sudden instantaneous voltage loss • Mains supply voltage is too low • Motor load is too high	• Adjust Acc. time (F03.01, F03.03, F03.05, F03.07) • Set proper motor parameter (F08.00 - F08.04) • Adjust V/f curve (F09.00 - F09.06) or torque boost (F09.07, F09.08) • Select F02.00 = 2 • Check mains supply voltage • Use HD3Z with proper power rating
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 locked-rotor or overload	• Adjust V/f curve (F09.00 - F09.06) • Check the power input • Use special motor if the motor needs to operate for a long time with heavy load • Check the load and mechanical transmission devices
E0020	Motor overheat	• Motor overheat • The setting of motor parameter is incorrect	• Reduce the load; Repair or replace the motor • Increase Acc. / Dec. time (F03.01 - F03.08) • Set correct motor parameter (F08.00 - F08.04)

Fault		Fault reasons	Counter-measures
E0021	Read / Write fault of control board EEPROM	• Memory circuit fault of control board EEPROM	• Contact the supplier for repairing
E0022	Read / Write fault of keypad EEPROM	• Memory circuit fault of keypad EEPROM	• Replace the keypad • Contact the supplier for repairing
E0023	Faulty setting of parameters	• The power rating between motor and inverter is too different • Improper setting of motor parameters	• Select an inverter with suitable power rating • Set correct value of motor parameter (F08.00 - F08.04)
E0024	Fault of external equipment	• Fault terminal of external equipment operates	• Check external equipment
E0025	PID setting loss	• Analogue reference signal < F20.12 • Analogue input circuit fault	• Check the connection • Seek technical support
E0026	PID feedback loss	• Analogue setting < F20.14 • Analogue input circuit fault	• Check the connection • Seek technical support
E0027	PID feedback out of limit	• Analogue setting signal > F20.16 • Analogue input circuit fault	• Check the connection • Seek technical support
E0028	SCI communication timeout	• Connection fault of communication cable • Disconnected or not well connected	• Check the connection
E0029	SCI communication error	• Connection fault of communication cable • Disconnected or not well connected • Communication setting error • Communication data error	• Check the connection • Check the connection • Corerectly set communication format (F17.00) baud rate (F17.01) • Send the data according to MODBUS protocol
E0034	Clock fault	• Connection is loose • Running out of battery • Wrong time setting • Damaged	• Check connection • Reconnect power or replace battery • Correctly set P01.00 - P00.02 • Seek technical support
Note: E0022 does not affect normal run of controller.			

7.2 Maintenance

Factors such as ambient temperature, humidity, PH, dust, oscillation, internal component aging, wear and tear will give rise to the occurrence of potential faults. Therefore, it is necessary to conduct daily maintenance to the controller.

- If HD3Z has been transported for a long distance, check whether the components of HD3Z are complete and the screws are well tightened.
- Periodically clean the dust inside HD3Z and check whether the screws are loose.

Danger

- Only a trained and qualified professional person can maintain HD3Z.
- Maintenance personnel should take off all metal jewelry before carrying out maintenance or internal measurements in HD3Z. Suitable clothes and tools must be used.
- High voltage exists when HD3Z is powered up or running.
- Checking and maintaining can only be done after AC power of HD3Z is cut off and wait for at least 10 minutes.

Warning

- For HD3Z with more than 2 years storage, please use voltage regulator to increase the input voltage gradually.
- Do not leave metal parts like screws or pads inside HD3Z.
- Do not make modification on the inside HD3Z without instruction from the supplier.
- There are IC components inside HD3Z, which are sensitive to stationary electricity. Directly touch the components on the PCB board is forbidden.

Daily Maintenance

HD3Z must be operated in the specified environment, refer to section 3.2, page 7. Therefore maintain it according to Table 7-2. To prolong the lifetime of HD3Z, keep good running environment, record the daily run data and detect any abnormal behavior.

Table 7-2 Daily maintenance

Items	Content	Criteria
Running environment	Temperature and humidity	-10 - +55℃ Less than 95%RH, non-condensing
	Dust and water dripping	No conductive dust accumulating, no water dripping
	Gas	No strange smell
HD3Z	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

Customer should check HD3Z in every 3 to 6 months according to the actual environment so as to avoid hidden problems and make sure HD3Z runs well for a long time.

General Inspection:

- Check whether the screws of control terminals are loose. If so, tighten them with a screw driver;
- Check whether the main circuit terminals are properly connected; Whether the copper bar and mains cables are overheated;
- Check whether the power cables and control cables are damaged, check especially for any wear on the cable tube;
- Check whether the insulating tapes around the cable lugs are stripped, and for signs of overheating near terminations;
- Clean the dust on PCBs and air ducts with a vacuum cleaner.

Note:

1. Dielectric strength test of HD3Z has already been conducted in the factory. Do not do the test again. Otherwise, HD3Z might be damaged.

2. If insulation test to the motor is necessary, it should be done after the input terminals U/V/W of motor have been detached from HD3Z. Otherwise, HD3Z will be damaged.

3. For HD3Z that have been stored for a long time, they must be powered up every 2 years. When supplying AC power to HD3Z, use a voltage regulator to gradually raise the input voltage to rated input voltage at least 5 hours.

Replacing Damaged Parts

The components that are easily damaged are: Cooling fan and electrolytic capacitors of filters. Their lifetime depends largely on their application environment and preservation. Users can decide the time when the components should be replaced according to their service time.

Easily damaged	Cooling fan	Electrolytic capacitors
Life	60, 000 hours	50, 000 hours
Possible cause of damages	Wear of the bearing, aging of the fan vanes	High ambient temperature, aging of electrolyte and large pulse current induced by rapid changing loads
Criteria	After the drive is switched off, check if the abnormal conditions such as crack existing on fan vanes and other parts. When the drive is switched on, check if drive running is normal, and check if there is any abnormal oscillation	Check if frequent overcurrent or overvoltage failures occur during drive start-up with load. Check if there is any leakage of liquids. Check if the safety valve protrudes. Measure the static capacitance and insulation resistance

Unwanted Controller Recycling

When disposing HD3Z, pay attention to the following factors:

- The capacitors may explode if they are burnt.
- Poisonous gas may be generated when the plastic parts like front covers are burnt.
- Disposing method: Dispose unwanted controllers as industrial waste.

Appendix A MODBUS Communication Protocol

1. Introduction

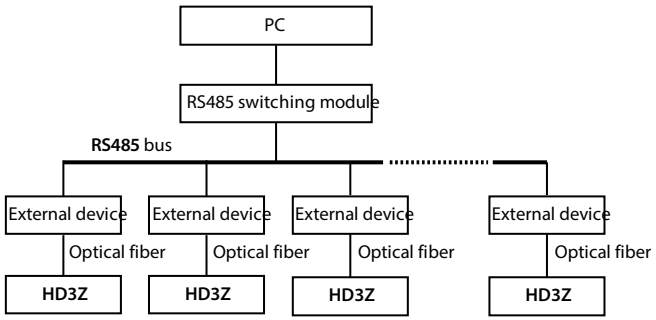
By using the host computer (including communication devices such as computer and PLC), user can operate to read-write the controller's function code, read the status parameters and write the control command etc. The inverter is in slave mode when it is communicating.

Optical Fiber Communication Interface

HD3Z has in-built optical transceiver single fiber mode. User optical flange interface is ST type:

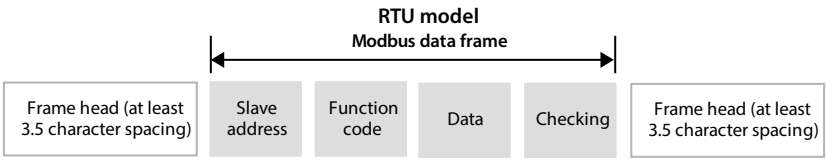
Port	Asyn, half-duplex
Format	1-8-2 (1 start bit, 8 data bits, 2 stop bits), no parity, RTU
Baut rate	9600bps
Relative setting	Refer to F17, page 53

Network Mode



Protocol Format

MODBUS supports RTU mode, with corresponding frame format as shown below:



MODBUS adopts "Big Endian" encoding mode, higher byte prior to lower byte at sending.

- The idle time of frame head and frame tail passing bus should be not less than 3.5 bytes.
- Slave address = 0, it means broadcast address.
- Data checking relies on CRC-16. The whole information need be checked. The concrete CRC checking is referred to the page 76.

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For example: To read the slave internal register F00.08 = 50.00Hz of No.1 address:

	Address	Parameter	Register address		Read char no.		Checksum	
Command frame	0x01	0x03	0x00	0x08	0x00	0x01	0x05	0xC8
	Address	**Parameter**	**Response byte**		**Content of register**		**Checksum**	
Response frame	0x01	0x03	0x02	0x13	0x88		0xB5	0x12

2. Scaling of Drive Transmitting Values

Except the parameters of the remarks, all other function codes can define the scaling relationship of the specified function code via referring the manual's minimum unit.

Remarks:

1. 0-2000 of F04.03, F16.05, F16.08, F16.22, F16.24 corresponds to -1000 - +1000.

2. Communication data 0-16000 of status parameter 0x3318 corresponds to -8000 - +8000.

3. Communication dats 0-2000 of status parameter (AI2 input voltage, AI2 input voltage (after calculating), process PID setting, process PID feedback, process PID tolerance, process PID integral and process PID output correspond to -1000 - +1000.

3. Protocol Function

Supported Function

MODBUS protocol supports the below parameter operation:

Supported function	Code	Instructions
To read function parameters and status parameter	0x03	
To rewrite single function parameter or control parameter	0x06	Set by F17.09
	0x41	Not saved at power off
To rewrite numbers of function parameters or control parameters	0x10	Set by F17.09
	0x43	Saved at power off

To Read function Parameters and Status Parameter

Function code 0x03, command frame and response frame are in below table (take RTU as an example).

Command frame	Address	Code	Starting register address	No. of register	CRC / LRC checking
Data frame bytes	1	1	2	2	2/1
Value or range	0 - 247	0x03	0x0000 - 0xFFFF	0x0001 - 0x000C	

Response frame	Address	Code	Read byte no.	Register content	CRC / LRC checking
Data frame bytes	1	1	1	2*no. of registers	2/1
Value or range	1 - 247	0x03	2*no. of registers		

To Rewrite Single Function Parameter or Control Parameter

Function code 0x06 (set by F17.09), 0x41 (not saved at power off); Command frame and response frame are in below table (take RTU as an example).

Command frame	Address	Code	Register address	Register content	CRC / LRC checking
Data frame bytes	1	1	2	2	2/1
Value or range	0 - 247	0x06, 0x41	0x0000 - 0xFFFF	0x0000 - 0xFFFF	

Response frame	Address	Code	Register address	Register content	CRC / LRC checking
Data frame bytes	1	1	2	2	2/1
Value or range	1 - 247	0x06, 0x41	0x0000 - 0xFFFF	0x0000 - 0xFFFF	

To Rewrite Numbers of Function Parameters or Control Parameters

Function code 0x10 (set by F17.09), 0x43 (saved at power off); Command frame and response frame are in below table (take RTU as an example).

Command frame	Address	Code	Starting register address	No. of register	Byte no. of register content	Register content	CRC / LRC checking
Data frame bytes	1	1	2	2	1	2*no. of registers	2/1
Value or range	0 - 247	0x10, 0x43	0x0000 - 0xFFFF	0x0000 - 0x0004	2*no. of registers		

Response frame	Address	Code	Starting register address	No. of operation registers	CRC checking
Data frame bytes	1	1	2	2	2/1
Value or range	1 - 247	0x10, 0x43	0x0000 - 0xFFFF	0x0000 - 0x0004	

This command rewrites the contents of continuous data unit from starting register address where is mapped as function parameter and control parameter of controller, etc. The controller will start to save from low address to high address of the register when it continuously saves many register parameters. The saving will return from the firstly failed address if the saving process isn't completely successful.

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Fault and Exception Code

If the operation command fails, the response is fault code. The fault code is + 0x80. Below is the instruction for the exception codes.

Exception code	Instructions	Exception code	Instructions
0x01	Illegal function parameters.	0x17	The register number of command frame is fault.
0x02	Illegal register address.	0x18	Incorrect information frame, including incorrect information length and incorrect checking.
0x03	Data fault. Data is exceeded the upper / lower limit.	0x20	Parameters cannot be modified.
0x04	Slave operation fails (including fault caused by data invalid).	0x21	Parameters are unchangeable when the controller is in running status.
0x16	Unsupported operation (unsupported to read the attributes, factory default and upper / lower limit for the control parameter and status parameter).	0x22	Parameters are protected by password.

E.g.: Write STOP function selection of address 2 (range: 0x00 - 0x01, 0x02 exceeds limit of register content, and fault code is 0x86 (0x06 + 0x80), abnormal code 0x03.

	Address	Code	Register address		Register content		Checksum	
Command frame	0x02	0x06	0x00	0x1C	0x00	0x02	0xc9	0xfe

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

4. Address Mapping

The function parameters and status parameters are all mapped as MODBUS's read-write register.

Function Code Address Mapping

Their group numbers are mapped as higher bytes of register address while the relationships are shown as below table. The intergroup indexes are mapped as lower bytes. Please refer to user manual for F00 - F23, P00 and P01.

High bytes of register address	Group number	High bytes of register address	Group number	High bytes of register address	Group number
0x00	F00	0x08	F08	0x12	F18
0x01	F01	0x09	F09	0x13	F19
0x02	F02	0x0a	F10	0x14	F20
0x03	F03	0x0b	F11	0x17	F23
0x04	F04	0x0f	F15		
0x05	F05	0x10	F16	0x28	P00
0x06	F06	0x11	F17	0x29	P01

For instance: The register address of function parameter F03.02 is 0x0302, and that of function parameter F16.01 is 0x1001.

Control Parameter (0x33) Address Mapping

Control parameters are used to start / stop inveter, set running frequency, check running frequency and output current of inverter and others by searching them.

The status parameters (0x33) are mapped as higher bytes of the register address, and the intergroup indexes are as following:

Address	Function	Save at power failure or not
0x3200	Control command	No
0x3201	Running frequency setting	Set by F00.14 hundreds
0x3202	Aux running frequency setting	No
0x3204	Virtual terminal control setting	No

Control command (0x3200) and its setting:

Control (Bit)	Meaning		Description
Bit0	0: Running command is invalid	1: Running command is valid	Control start and stop (edge trigger)
Bit1	0: FWD	1: REV	Control running direction
Bit2	0: Unused	1: Coast to stop	Control stop mode (edge trigger)
Bit3	0: Unused	1: Emergency to stop	Control stop mode (edge trigger)
Bit4	0: Unused	1: Coast to stop	Control stop mode (edge trigger)
Bit5	0: Unused	1: External fault signal	Display external fault and stop or run according to F17.08
Bit6	0: Stop jog FWD	1: Jog FWD	Control jog FWD
Bit7	0: Stop jog REV	1: Jog REV	Control jog REV
Bit8	0: Fault reset is invalid	1: Fault reset is valid	Control fault reset

Control (Bit)	Meaning		Description
Bit9 - Bit11	0: Unused		
Bit12	0: Current control is invalid	1: Current control is valid	Control is valid / invalid
Bit13 - Bit15	0: Unused		

Register content can control command:

Register content	Command	Register content	Command	Register content	Command
0x1001	RFWD	0x1004	Dec. to stop	0x1040	Dec. to stop
0x1003	REV	0x1008	Emergency to stop	0x1080	Emergency to stop
		0x1010	Coast to stop	0x1100	Coast to stop
		0x1020	Stop at external fault		Stop at external fault

Virtual terminal control setting (0x3204) and its setting:

Control (Bit)	Meaning	
Bit0	0: DO1 output is invalid	1: DO1 output is valid
Bit2	0: RLY1 output is invalid	1: RLY1 output is valid
Bit3	0: RLY2 output is invalid	1: RLY2 output is valid
Bit4	0: RLY3 output is invalid	1: RLY3 output is valid
Bit5	0: RLY4 output is invalid	1: RLY4 output is valid
Bit6	0: RLY5 output is invalid	1: RLY5 output is valid
Bit7	0: RLY6 output is invalid	1: RLY6 output is valid
Bit8	0: RLY7 output is invalid	1: RLY7 output is valid
Bit9 - Bit15	Unused	Unused

Status Parameter (0x33) Address Mapping

The status parameters (0x33) are mapped as higher bytes of the register address, and the intergroup indexes are as following:

Address	Function	Address	Function
0x3300	Controller series	0x3325	AO2 output
0x3301	Software version of MCB	0x3327	Heatsink temperature
0x3303	Special sofwtware version of MCB	0x332A	Ambient humidity
0x3305	Software of keypad	0x332B	Ambient temperature
0x3306	Customized serial No.	0x332C	Process PID setting
0x3308	Rated current of inverter	0x332D	Process PID feedback
0x330A	Inverter status	0x332E	Process PID tolerance
0x330B	Main setting frequency channel	0x332F	Process PID integral
0x330C	Main setting frequency	0x3330	Process PID output
0x330D	Aux setting frequency	0x3332	Input terminal status
0x330E	Setting frequency	0x3333	Output terminal status
0x330F	Setting frequency (after calculated)	0x3334	MODBUS status
0x3310	Output frequency	0x3335	Motor humidity
0x3311	Setting rpm	0x3336	Motor temperature
0x3312	Running rpm	0x3337	Total power up time
0x3314	Output voltage	0x3338	Total running time
0x3315	Output current	0x3339	Total energy consumption high bit of motor
0x3317	Output torque	0x333A	Total energy consumption low bit of motor
0x3318	Output power	0x333B	Present energy consumption high bit
0x3319	DC busbar voltage	0x333C	Present energy consumption low bit
0x331B	AI1 input voltage	0x333D	Present fault
0x331C	AI1 input voltage (after calculated)	0x333E	Present year
0x331D	AI2 input voltage	0x333F	Present MM/DD
0x331E	AI2 input voltage (after calculated)	0x3340	Present Min/Sec
0x3323	DI6 terminal pulse input frequency	0x3345	System correct year
0x3324	AO1 output	0x3346	System corrects MM/DD

5. Special Instruction

No.	Special Instructions
1	For the data frame in ASCII mode, if the frame length is an even number, the frame is abandoned.
2	Host computer cannot restore to factory setting. It can read but not write these parameters: F08 (Asyn motor parameter) and F17 (SCI parameter).
3	Host computer cannot modify F01.00 (User password). But it can write F01.00 to verify user password. When verified, host computer access modifying function parameter of inverter. After modifying, write invalid password into F01.00 to disable this access.
4	If many multi-function input terminals setting are the same, it may cause dysfunction. Therefore, the user should avoid this case when modify the multi-function terminal function via the MODBUS.

6. CRC Checking

Code of online calculating CRC is shown below:

```
unsigned int crc_check(unsigned char *data,unsigned char length)
{
    int i;
    unsigned crc_result=0xffff;
    while(length--)
    {
        crc_result^=*data++;
        for(i=0;i<8;i++)
        {
            if(crc_result&0x01)
                crc_result=(crc_result>>1)^0xa001;
            else
                crc_result=crc_result>>1;
        }
    }
    return (crc_result=((crc_result&0xff)<<8)|(crc_result>>8));
}
```

7. Application Case

Please verify all the hardware equipments are connected well before controlling the controller via communication. In addition, please preset the communication data format, baud rate and communication address.

1. To read max. output frequency of address 2 (to read command frame F00.06), response frame = 50.00Hz.

	Address	Code	Register address		Word no. of read		Checksum	
Command frame	0x02	0x03	0x00	0x06	0x00	0x01	0x64	0x38
	Address	**Code**	**Answer byte**		**Register content**		**Checksum**	
Response frame	0x02	0x03	0x02		0x13	0x88	0xF1	0x12

2. To read the DC bus voltage of address 2 (group d00), corresponding answer frame = 537V.

	Address	Code	Register address		Word no. of read		Checksum	
Command frame	0x02	0x03	0x33	0x19	0x00	0x01	0x5A	0xBA
	Address	**Code**	**Answer byte**		**Register content**		**Checksum**	
Response frame	0x02	0x03	0x02		0x02	0x19	0x3C	0xEE

3. To write setting frequency of address 2 (F00.13 = 45.00Hz).

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

4. F00.10 = 2, write setting running frequency of address 2 = 45.00Hz, register content 0x11, 0x94.

	Add.	Code	Register address		Register content		Checksum	
Command / Response frame	0x02	0x06	0x32	0x01	0x11	0x94	0xDB	0x7E

5. F00.11 = 2, address 2 is reverse.

	Add.	Code	Register address		Register content		Checksum	
Command / Response frame	0x02	0x06	0x32	0x00	0x10	0x03	0xCA	0x80

6. F00.11 = 2, address 2 decelerates to stop.

	Add.	Code	Register address		Register content		Checksum	
Command / Response frame	0x02	0x06	0x32	0x00	0x10	0x04	0x8B	0x42

7. F00.11 = 2, address 2 emergency stops.

	Add.	Code	Register address		Register content		Checksum	
Command / Response frame	0x02	0x06	0x32	0x00	0x10	0x08	0x8B	0x47

8. F00.11 = 2, address 2 coasts to stop.

	Add.	Code	Register address		Register content		Checksum	
Command / Response frame	0x02	0x06	0x32	0x00	0x10	0x10	0x8B	0x4D

9. Address 2 has external fault.

	Add.	Code	Register address		Register content		Checksum	
Command / Response frame	0x02	0x06	0x32	0x00	0x10	0x20	0x8B	0x59

10. Address 2 fault reset.

	Add.	Code	Register address		Register content		Checksum	
Command / Response frame	0x02	0x06	0x32	0x00	0x11	0x00	0x8B	0x11

Appendix B Parameters

Attributes are changed:

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

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

"○": It denotes that the setting parameter can be modified when the controller is in run status.

"–": It denotes that the parameters have same mapping.

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
d00: Status Display Parameter (on pages 25 - 27)						
d00.00	HD3Z series	0x10 - 0x50			*	
d00.01	Software version of HD3Z	00.00 - 99.99			*	
d00.03	Non-standard software version of HD3Z	00.00 - 99.99			*	
d00.05	Software version of keypad	00.00 - 99.99			*	
d00.06	Customized serial number	0 - 9999			*	
d00.08	Rated current of HD3Z	0.1A			*	
d00.10	Inverter status	Bit0: Inverter fault Bit1: Run / Stop Bit2: Forward / Reverse Bit3: Zero speed Bit5&Bit4: Acc. / Dec. / Constant Bit7: DC brake Bit10: Speed limitation Bit11: Dehumidifing Bit12: Stall overvoltage Bit13: Auto current restriction Bit14: Timing start / stop mode Bit15: Frequency switch mode			*	
d00.11	Main setting frequency channel	0 - 14			*	
d00.12	Main setting frequency	0.01 - 400.00Hz			*	
d00.13	Aux setting frequency	0.01 - 400.00Hz			*	
d00.14	Setting frequency	0.01 - 400.00Hz			*	
d00.15	Setting frequency (after Acc. / Dec.)	0.01 - 400.00Hz			*	
d00.16	Output frequency	0.01 - 400.00Hz			*	
d00.17	Setting rpm	0 - 60000rpm			*	
d00.18	Running rpm	0 - 60000rpm			*	
d00.20	Output voltage	0 - 999V			*	
d00.21	Output current	Actual value, unit: 0.1A			*	
d00.23	Output torque	0.0 - 300.0% (rated torque of motor)			*	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
d00.24	Output power	Actual value, unit: 0.1kW			*	
d00.25	DC busbar voltage	0 - 999V			*	
d00.27	AI1 input	0.0 - 100.0%			*	
d00.28	AI1 input (after calculating)	0.0 - 100.0%			*	
d00.29	AI2 input	-100.0 - 100.0%			*	
d00.30	AI2 input (after calculating)	-100.0 - 100.0%			*	
d00.35	DI6 terminal pulse input frequency	0 - 50000Hz			*	
d00.36	AO1 output	0.0 - 100.0%			*	
d00.37	AO2 output	0.0 - 100.0%			*	
d00.39	Heatsink temperature	0.0 - 999.9°C			*	
d00.42	Ambient humidity	0.0 - 100.0%rm			*	
d00.43	Ambient temperature	-40 - 120°C			*	
d00.44	PID setting	-100.0 - 100.0%			*	
d00.45	PID feedback	-100.0 - 100.0%			*	
d00.46	PID tolerance	-100.0 - 100.0%			*	
d00.47	PID integral item	-100.0 - 100.0%			*	
d00.48	PID output	-100.0 - 100.0%			*	
d00.50	Input terminal status	Bit0 - Bit5 correspond to DI1 - DI6 0: Input terminals disconnect with common terminals 1: Input terminals connect with common terminals			*	
d00.51	Output terminal status	Bit0 corresponds to DO1 Bit2 - Bit8 correspond to RLY1 - RLY7 0: Output terminals disconnect with common terminals 1: Output terminals connect with common terminals			*	
d00.52	MODBUS communication status	0: Normal 1: Communication timeout 2: Wrong data frame head 4: Wrong data frame content			*	
d00.53	Motor humidity	0.0 - 100.0%rm			*	
d00.54	Motor temperature	-40 - 120°C			*	
d00.55	Total power up time	0 - 65535h			*	
d00.56	Total running time	0 - 65535h			*	
d00.57	Total energy consumption high bit of motor	0 - 65535k kW.h			*	
d00.58	Total energy consumption low bit of motor	0.0 - 999.9kW.h			*	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
d00.59	Present energy consumption high bit	0 - 65535k kW.h			*	
d00.60	Present energy consumption low bit	0.0 - 999.9kW.h			*	
d00.61	Present fault	0 - 100 *100: Means under-voltage*			*	
d01: Timing Display Parameter (on pages 27 - 28)						
d01.00	Present year	0 - 99			*	
d01.01	Present MM/DD	1.01 - 12.31			*	
d01.02	Present Min/Sec	0.00 - 23.59			*	
d01.04	Last time stop year	0 - 99				
d01.05	Last time stop MM/DD	1.01 - 12.31				
d01.06	Last time stop Min/Sec	0.00 - 23.59				
d01.07	Last time stop interval	0 - 65535h			*	
d01.08	System calibration time year	0 - 99			*	
d01.09	System calibration time MM/DD	1.01 - 12.31				
F00: Basic Parameters (on pages 28 - 31)						
F00.06	Max. output frequency of HD3Z	50.00 - 400.00Hz	50.00Hz	0.01Hz	×	
F00.08	Upper limit of running frequency	0.00Hz - F00.06	50.00Hz	0.01Hz	×	
F00.09	Lower limit of running frequency	0.00Hz - F00.08	0.00Hz	0.01Hz	×	
F00.10	Frequency setting channels	0: Keypad 1: Terminal 2: SCI communication 3: Analogue 4: DI pulse 6: AI1 7: AI2	0	1	○	
F00.11	Command setting channel	0: Keypad 1: Terminal 2: SCI	0	1	×	
F00.12	M key function	0: Switch running direction 1: Switch local and remote control 2: M key invalid	2	1	○	
F00.13	Starting frequency digital setting	0.00Hz - Upper limit frequency	50.00Hz	0.01Hz	○	
F00.14	Frequency setting control	Unit: Save selection of frequency setting at power outage 0: Do not save at power outage 1: Save at power outage	1001	1	○	

B

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F00.14	Frequency setting control	Ten: Control selection of frequency setting at stop 0: Do not restore to F00.13 at stop 1: Restore to F00.13 at stop Hundred: Save selection of communication setting frequency 0: Do not save when power is off 1: Save to F00.13 when power is off Thousand: Save selection of frequency setting when switching frequency channel 0: Do no save 1: Save	1001	1	○	
F00.15	Jog running frequency digital setting 1	0.00Hz - Upper limit frequency	5.00Hz	0.01Hz	○	
F00.16	Interval of jog running	0.0 - 100.0s	0.0s	0.1s	×	
F00.17	Running direction	0: The same as running command 1: Opposite to running command	0	1	×	
F00.18	Reverse	0: Permitted 1: Prohibitted	0	1	×	
F00.19	Dead time of direction switch	0.0 - 3600.0s	0.0s	0.1s	×	
F00.21	Dormant function	0: Disabled 1: Enable	0	1	×	
F00.22	Dormancy wake up time	0.0 - 6000.0s	1.0s	0.1s	○	
F00.24	Dormancy delay time	0.0 - 6000.0s	1.0s	0.1s	○	
F00.25	Dormancy frequency	0.00Hz - Upper limit frequency	0.00Hz	0.01Hz	○	
F00.26	Action selection of HD3Z at zero-speed	Unit: Action selection of zero-speed under V/f control 0: Do not process 1: HD3Z does not output 2: HD3Z runs at DC brake Ten: Unused	11	1	×	
F00.27	Command channel binding frequency channel	Unit: Keypad binds to frequency channel Ten: Terminal binds to frequency channel Hundred: SCI binds to frequency channel 0: No binding 1: Keypad digital setting 2: Terminal digital setting 3: SCI setting 5: Terminal pulse setting	000	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		7: AI1 8: AI2 C: PID d: Multi-speed				
F00.28	Function of STOP button	0: Valid in keypad control mode only 1: Valid in all control modes	0	1	○	
F01: Protection of Parameters (on pages 31 - 32)						
F01.00	User password	00000 - 65535	0	1	○	
F01.01	Menu mode	Unit: 0: Full menu mode 1: Checking menu mode Hundred: 0: group F can check after setting password 1: group F can not check after setting password	010	1	○	
F01.02	Function code parameter initialization (download)	0: No operation 1: Restore to factory settings 2/3: Download the keypad EEPROM parameter 1/2 to the current function code settings 4: Clear fault information 5/6: Copy the keypad EEPROM parameter 1/2 to the current function code settings (including the motor parameters)	0	1	×	
F01.03	Copy parameter to keypad (upload)	0: No operation 1/2: Copy the current function code settings to keypad EEPROM parameter 1/2	0	1	○	
F02: Parameters for Start and Stop (on pages32 - 34)						
F02.00	Start mode	0: Start from starting DWELL frequency 1: Brake and then start from starting DWELLfrequency 2: Rotate speed tracking restart	0	1	×	
F02.01	Start delay time	0.00 - 10.00s	0.00s	0.01s	×	
F02.02	Starting DWELL frequency setting	0.00Hz - Upper limit frequency	0.00Hz	0.01Hz	×	
F02.03	Starting DWELL retention time	0.00 - 10.00s	0.00s	0.01s	×	
F02.04	Current at DC brake	0 - 100% (rated current of inverter)	50%	1%	×	
F02.05	DC brake starting time 1	0 - 6000s	5s	1s	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F02.06	Compensation for full speed tracking	0.000 - 2.000Hz	0.000Hz	0.001Hz	○	
F02.13	Stop modes at speed control	0: Decelerate to stop 1: Coast to stop 2: Decelerate to stop + DC brake	0	1	×	
F02.14	Stop DWELL frequency setting	0.00Hz - Upper limit frequency	0.00Hz	0.01Hz	×	
F02.15	Stop DWELL frequency retention time	0.00 - 10.00s	0.00s	0.01s	×	
F02.16	Starting frequency of stop DC brake	0.00 - 50.00Hz	0.50Hz	0.01Hz	×	
F02.17	Waiting time of stop DC brake	0.00 - 60.00s	0.00s	0.01s	×	
F02.18	Stop DC brake time	0.00 - 60.00s	0.50s	0.01s	×	
F02.19	Jog control mode	Unit: 0: Can not jog the start and stop function 1: Can jog the start and stop function Ten: 0: Terminal jog is not preferred 1: Terminal jog is preferred	10	1	×	
F02.21	DC brake starting time 2	0 - 6000s	0s	1s	×	
F03: Acc. / Dec. Parameter (on pages 34 - 35)						
F03.00	Acc. / Dec. modes selection	Unit: Acc. / Dec. modes selection 0: Linear Acc. / Dec. 1: S curve Acc. / Dec. Ten: Reference frequency for Acc. / Dec. time 0: Max frequency (F00.06) 1: Setting frequency	00	1	○	
F03.01	Acc. time 1	0.1 - 6000.0s	Depend on model	0.1s	○	
F03.02	Dec. time 1	0.1 - 6000.0s		0.1s	○	
F03.03	Acc. time 2	0.1 - 6000.0s		0.1s	○	
F03.04	Dec. time 1	0.1 - 6000.0s		0.1s	○	
F03.05	Acc. time 3	0.1 - 6000.0s		0.1s	○	
F03.06	Dec. time 1	0.1 - 6000.0s		0.1s	○	
F03.07	Acc. time 4	0.1 - 6000.0s		0.1s	○	
F03.08	Dec. time 1	0.1 - 6000.0s		0.1s	○	
F03.09	Switching frequency of Acc. time 1 and 2	0.00Hz - Upper limit frequency	0.00Hz	0.01Hz	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F03.10	Switching frequency of Dec. time 2 and 1	0.00Hz - Upper limit frequency	0.00Hz	0.01Hz	○	
F03.11	Characteristic time of S curve at beginning of Acc.	0.00 - 2.50s	0.20s	0.01s	○	
F03.12	Characteristic time of S curve at end of Acc.	0.00 - 2.50s	0.20s	0.01s	○	
F03.13	Characteristic time of S curve at beginning of Dec.	0.00 - 2.50s	0.20s	0.01s	○	
F03.14	Characteristic time of S curve at end of Dec.	0.00 - 2.50s	0.20s	0.01s	○	
F03.15	Jog Acc. time	0.1 - 6000.0s	6.0s	0.1s	○	
F03.16	Jog Dec. time	0.1 - 6000.0s	6.0s	0.1s	○	
F03.17	Dec. time for EMR stop	0.1 - 6000.0s	10.0s	0.1s	○	
F04: Process PID Control (on pages 35 - 38)						
F04.00	Process PID control selection	0: PID control is disabled 1: PID control is enabled	0	1	×	
F04.01	Setting channel selection	0: Digital 1: Analogue 2: Terminal pulse 3: AI1 4: AI2	0	1	×	
F04.02	Feedback channel selection	0: Analogue 1: Terminal pulse 2: AI1 3: AI2	0	1	×	
F04.03	Setting digital reference	-100.0 - 100.0%	0.0%	0.1%	○	
F04.04	Proportional gain (P1)	0.0 - 500.0	50.0	0.1	○	
F04.05	Integral time (I)	0.01 - 10.00s	1.00s	0.01s	○	
F04.06	Integral upper limit	0.0 - 100.0%	100.0%	0.1%	○	
F04.07	Differential time (D1)	0.00 - 10.00s *0.00: Differential does not act*	0.00s	0.01s	○	
F04.08	Differential limitation	0.0 - 100.0%	20.0%	0.1%	○	
F04.09	Sampling time (T)	0.01 - 50.00s	0.10s	0.01s	○	
F04.10	Bias limit	0.0 - 20.0% (setting)	0.0%	0.1%	○	
F04.11	Upper limit channel of PID regulator	0: Set by F04.13 1: Analogue 2: Terminal pulse 3: AI1 4: AI2	0	1	×	
F04.12	Lower limit channel of PID regulator	0: Set by F04.14 1: Analogue setting 2: Terminal pulse setting 3: AI1 4: AI2	0	1	×	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F04.13	PID regulator upper limit	0.0 - 100.0%	100.0%	0.1%	×	
F04.14	PID regulator lower limit	0.0 - 100.0%	0.0%	0.1%	×	
F04.15	Regulating characteristic of PID regulator	0: Positive characteristic 1: Negative characteristic	0	1	×	
F04.17	PID output filtering time	0.01 - 10.00s	0.05s	0.01s	○	
F04.18	REV selection when PID outputs	0: Prohibit REV when PID regulates 1: Permit REV	0	1	×	
F04.19	REV frequency upper limit of PID output	0.0 - 100.0%	100.0%	0.1%	×	
F04.20	Proportional gain (P2)	0.0 - 100.0	50.0	0.1	○	
F04.21	Integral time (I2)	0.01 - 10.00s	1.00s	0.01s	○	
F04.22	Differential time (D2)	0.00 - 10.00s	0.00s	0.01s	○	
F04.23	PID parameter adjustment bases	0: Do not adjust 1: DI 2: Bias 3: Frequency	0	1	○	
F04.24	PID parameter switching point 1	0.0% - F04.25	0.0%	0.1%	○	
F04.25	PID parameter switching point 2	F04.24 - 100.0%	100.0%	0.1%	○	
F04.29	PID calculating mode	0: Do not calculate when HD3Z stops 1: Calculate when HD3Z stops	0	1	○	
F04.30	PID dormancy selection	0: Disable 1: Enable	0	1	○	
F04.31	Wakeup tolerance	0.0 - 100.0%	10.0%	0.1%	○	
F04.32	Wakeup delay	0.0 - 6000.0s	0.0s	0.1s	○	
F04.33	Dormancy tolerance	0.0 - 100.0%	10.0%	0.1%	○	
F04.34	Dormancy delay	0.0 - 6000.0s	0.0s	0.1s	○	
F04.35	Dormancy frequency	0.00Hz - Max. frequency	20.00Hz	0.01Hz	○	
F05: External Setting Curve Parameter **(on pages 38 - 39)**						
F05.00	External setting curve selection	Unit: AI1 curve Ten: AI2 curve Ten thousand: Pulse curve 0: Line 1 1: Line 2 2: Polyline 3: Do not dispose	33333	1	○	
F05.01	Line 1 min. setting	0.0% - F05.03	0.0%	0.1%	○	
F05.02	Corresponding value of line 1 min. setting	0.0 - 100.0%	0.0%	0.1%	○	
F05.03	Line 1 max. setting	F05.01 - 100.0%	100.0%	0.1%	○	
F05.04	Corresponding value of	0.0 - 100.0%	100.0%	0.1%	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
	line 1 max. setting					
F05.05	Line 2 min. setting	0.0% - F05.07	0.0%	0.1%	○	
F05.06	Corresponding value of line 2 min. setting	0.0 - 100.0%	0.0%	0.1%	○	
F05.07	Line 2 max. setting	F05.05 - 100.0%	100.0%	0.1%	○	
F05.08	Corresponding value of line 2 max. setting	0.0 - 100.0%	100.0%	0.1%	○	
F05.09	Max. setting of polyline	F05.11 - 100.0%	100.0%	0.1%	○	
F05.10	Max. setting corresponding value of polyline	0.0 - 100.0%	100.0%	0.1%	○	
F05.11	Inflection point 2 setting of polyline	F05.13 - F05.09	100.0%	0.1%	○	
F05.12	Inflection point 2 corresponding value	0.0 - 100.0%	100.0%	0.1%	○	
F05.13	Inflection point 1 setting of polyline	F05.15 - F05.11	0.0%	0.1%	○	
F05.14	Inflection point 1 corresponding value	0.0 - 100.0%	0.0%	0.1%	○	
F05.15	Min. setting of polyline	0.0% - F05.13	0.0%	0.1%	○	
F05.16	Min. setting corresponding value of polyline	0.0 - 100.0%	0.0%	0.1%	○	
F05.17	Skip frequency 1	F00.09 - Upper limit frequency	0.00Hz	0.01Hz	×	
F05.18	Skip frequency 2	F00.09 - Upper limit frequency	0.00Hz	0.01Hz	×	
F05.19	Skip frequency 3	F00.09 - Upper limit frequency	0.00Hz	0.01Hz	×	
F05.20	Range of skip frequency	0.00 - 30.00Hz	0.00Hz	0.01Hz	×	
F05.21	Digital setting 2 of jog run frequency	0.00Hz - Upper limit frequency	5.00Hz	0.01Hz	○	
F06: Multi-speed (on pages 39 - 40)						
F06.00	Multi-frequency command 1	F00.09 - Upper limit frequency	5.00Hz	0.01Hz	○	
F06.01	Multi-frequency command 2	F00.09 - Upper limit frequency	5.00Hz	0.01Hz	○	
F06.02	Multi-frequency command 3	F00.09 - Upper limit frequency	5.00Hz	0.01Hz	○	
F06.03	Multi-frequency command 4	F00.09 - Upper limit frequency	5.00Hz	0.01Hz	○	
F06.04	Multi-frequency command 5	F00.09 - Upper limit frequency	5.00Hz	0.01Hz	○	
F06.05	Multi-frequency command 6	F00.09 - Upper limit frequency	5.00Hz	0.01Hz	○	
F06.06	Multi-frequency command 7	F00.09 - Upper limit frequency	5.00Hz	0.01Hz	○	
F06.07	Multi-frequency	F00.09 - Upper limit frequency	5.00Hz	0.01Hz	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
	command 8					
F06.08	Multi-frequency command 9	F00.09 - Upper limit frequency	5.00Hz	0.01Hz	○	
F06.09	Multi-frequency command 10	F00.09 - Upper limit frequency	5.00Hz	0.01Hz	○	
F06.10	Multi-frequency command 11	F00.09 - Upper limit frequency	5.00Hz	0.01Hz	○	
F06.11	Multi-frequency command 12	F00.09 - Upper limit frequency	5.00Hz	0.01Hz	○	
F06.12	Multi-frequency command 13	F00.09 - Upper limit frequency	5.00Hz	0.01Hz	○	
F06.13	Multi-frequency command 14	F00.09 - Upper limit frequency	5.00Hz	0.01Hz	○	
F06.14	Multi-frequency command 15	F00.09 - Upper limit frequency	5.00Hz	0.01Hz	○	
F08: Asyn. Motor Parameters (on pages 40 - 41)						
F08.00	Rated power of motor	0.2 - 500.0kW	Depend on model	0.1kW	×	
F08.01	Rated voltage of motor	0 - 999V		1V	×	
F08.02	Rated current of motor	0.1 - 999.9A		0.1A	×	
F08.03	Rated frequency of motor	1.0 - 400.0Hz	50.0Hz	0.1Hz	×	
F08.04	Rated Rpm of motor	1 - 24000rpm	Depend on model	1rpm	×	
F08.06	Parameter auto-tuning of motor	0: No action 1: Stationary auto-tuning 2: Rotary auto-tuning 3: Motor stator resistance measurement	0	1	×	
F09: V/f Control Parameters **(on pages 41 - 43)**						
F09.00	V/f curve of motor	0: Line 1: Square curve 2: 1.2 exponential curve 3: 1.7 exponential curve 4: User-defined curve	0	1	×	
F09.01	V/f frequency of motor (F3)	F09.03 - 100.0%	0.0%	0.1%	×	
F09.02	V/f voltage of motor (V3)	F09.04 - 100.0%	0.0%	0.1%	×	
F09.03	V/f frequency of motor (F2)	F09.05 - F09.01	0.0%	0.1%	×	
F09.04	V/f voltage of motor (V2)	F09.06 - F09.02	0.0%	0.1%	×	
F09.05	V/f frequency of motor (F1)	0.0% - F09.03	0.0%	0.1%	×	
F09.06	V/f voltage of motor (V1)	0.0% - F09.04	0.0%	0.1%	×	
F09.07	Torque boost of motor	0.0 - 30.0% *0.0: Auto torque boost*	Depend on model	0.1%	○	
F09.08	Cut-off point used for	0.0 - 50.0% (F08.03)	25.0%	0.1%	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
	manual torque boost of motor					
F09.09	Slip compensation gain of motor	0.0 - 300.0%	0.0%	0.1%	○	
F09.10	Slip compensation filter time of motor	0.01 - 10.00s	0.10s	0.01s	○	
F09.11	Slip compensation limit of motor	0.0 - 250.0%	200.0%	0.1%	×	
F09.14	AVR (automatic voltage regulation) function of motor	0: Do not act 1: Act all the time 2: Act only when decelerates	1	1	○	
F09.15	Low frequency oscillation-suppression of motor	0 - 200	50	1	○	
F09.16	High frequency oscillation-suppression of motor	0 - 200	20	1	○	
F09.17	Energy saving control selection	0: Invalid 3: Enabled according to output current	0	1	×	
F09.18	Motor energy saving coefficient	0.0 - 100.0%	5.0%	0.1%	○	
F09.19	Starting frequency of motor energy saving	0.00 - 50.00Hz	25.00Hz	0.01Hz	○	
F09.20	Switching point of motor energy saving	0.0 - 100.0%	100.0%	0.1%	○	
F09.21	Detection times of motor energy saving	0 - 5000 time	10 time	1 time	○	
F09.22	Voltage recovery time of motor energy saving	40 - 4000ms	100ms	1ms	○	
F09.23	Voltage decrease time of motor energy saving	40 - 4000ms	100ms	1ms	○	
F15: Digital I/O Terminal Parameters **(on pages 43 - 51)**						
F15.00	DI1 function	0: Unused 1: Inverter enabled 2,3: FWD / REV 4: Three-wire running mode 5 - 7, 87: Frequency setting channel selection 1 - 4 8: Switch to analogue 9,10: Running command switching 1, 2 11: Command switch to terminal 12: External command for stop 13 - 16: Multi-speed frequency terminal 1 - 4	2	1	×	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F15.01	DI2 function	17: Increase (UP) frequency 18: Decrease (DN) frequency 19: Clear aux setting frequency to 0 20,21: FWD / REV jog 1 command input (JOGF1 / JOGR1) 22,23: FWD / REV jog 2 command input (JOGF2 / JOGR2) 24: Jog 1 command input 25: Jog 1 direction input *Note: When No.20 and 21 are selected, No.24 and 25 are invalid.* 26,27: Acc. / Dec. time terminal 1 and 2 28: Acc. / Dec. mode selection 29: Forbid Acc. / Dec. 30: Switch to normal run 32: Pause process PID 33: Forbid process PID 34: PID integral holding 35: Clear PID integral 38: Stop DC brake input 39: External stop NO contact input 40: External stop NC contact input 41,42: Coast to stop NO / NC input 43: Emergency stop 44,45: NO / NC input for external fault 46: External reset (RST) input 53: Pulse frequency input (DI6 only) 54: Switch main / aux frequency channel 59: Switch PID parameter 86: Activate terminal DC brake input 87: Frequency setting channel = 4 88: Disable timing start / stop 89: Disable timing frequency switch 90: Manually dehumidifying 91: Auto dehumidifying	3	1	×	
F15.02	DI3 function		0	1	×	
F15.03	DI4 function		0	1	×	
F15.04	DI5 function		0	1	×	
F15.05	DI6 function		0	1	×	
F15.12	UP / DN Acc. / Dec. rate	0.00 - 99.99Hz/s	1.00 Hz/s	0.01 Hz/s	×	
F15.13	Interval between terminal detection	0: 2ms 1: 4ms 2: 8ms	0	1	○	
F15.14	Terminal detection filter times	0 - 10000	2	1	○	
F15.15	Terminal input logic setting	Bit0 - Bit5 correspond to DI1 - DI6 Bitx: Dly iput logic	000	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		0: Positive logic 1: Negative logi				
F15.16	FWD / REV running mode	0: Two-wire running mode 1 1: Two-wire running mode 2 2: Three-wire running mode 1 3: Three-wire running mode 2	0	1	×	
F15.17	Action selection when extrenal device has fault	0: Coast to stop 1: Emergency stop 2: Decelerate to stop 3: Continue to run	0	1	×	
F15.18	DO1 function	0: Unused 1: Inverter is ready 2: Inverter running 3: Forward running 4: Reverse running 5: DC brake 6: Zero-frequency status 7: Zero-frequency running 9,10: Frequency level detection signal (FDT1, FDT2) 11: Frequency within FAR range (FAR) 12: Frequency upper limit 13: Frequency lower limit 20: Signal output from SCI 22: Timing function 27: Analogue input exceeding limit 29: Stop in under-voltage condition 30: Overload detection signa 31: Inverter fault 32: External fault 33: Fault of inverter is reset automatically 35: Dormancy function 36: System is running 39: Motor is dehumidifying 40: In timing start and stop process 41: In timing frequency switch process	2	1	×	
F15.20	RLY1 relay function		31	1	×	
F15.21	RLY2 relay function		0	1	×	
F15.22	RLY3 relay function		0	1	×	
F15.23	RLY4 relay function		0	1	×	
F15.24	Terminal output logic setting	Bit0 corresponds to DO1 Bit2 - Bit8 correspond to RLY1 - RLY7 Bitx: DOy, RLYy output logic 0: Positive logic 1: Negative logic	00	1	○	
F15.27	Speed within FAR range	0.00 - 100.00Hz	2.50Hz	0.01Hz	○	
F15.28	Zero speed threshold	0.00Hz - Upper limit frequency	0.00Hz	0.01Hz	○	
F15.29	Zero speed tolerance	0.00Hz - Upper limit frequency	0.00Hz	0.01Hz	○	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F15.30	FDT1 detection mode	0: Detect according to setting frequency 1: Detect according to output frequency	0	1	○	
F15.31	FDT1 level	0.00Hz - Upper limit frequency	50.00Hz	0.01Hz	○	
F15.32	FDT1 delay	0.00Hz - Upper limit frequency	1.00Hz	0.01Hz	○	
F15.33	FDT2 detection mode	0: Detect according to setting frequency 1: Detect according to output frequency	0	1	○	
F15.34	FDT2 level	0.00Hz - Upper limit frequency	50.00Hz	0.01Hz	○	
F15.35	FDT2 delay	0.00Hz - Upper limit frequency	1.00Hz	0.01Hz	○	
F15.39	Action selection when motor is overheated	Ten: Select analogue input terminal 0: No analogue terminal 2: AI1 3: AI2	00	1	×	
F15.40	Upper limit of motor overheat input	0.0 - 100.0%	100.0%	0.1%	○	
F15.42	Detection time of motor overheat	0.00 - 50.00s	5.00s	0.01s	○	
F15.43	Terminal output delay	0.0 - 100.0s	0.0s	0.1s	○	
F15.45	RLY5 relay function	0 - 41 *Function of F15.45 - F15.47 are the same as F15.20 - F15.23 (relay RLY1 - RLY4)*	0	1	×	
F15.46	RLY6 relay function		0	1	×	
F15.47	RLY7 relay function		0	1	×	
F16: Analogue I/O Terminal Parameters (on pages 51 - 53)						
F16.01	AI1 function	0: Unused 2: Frequency setting 3: Aux frequency setting 4: Process PID setting 5: Process PID feedback 6: Process PID regulating upper limit 7: Process PID regulating lower limit 20: Detect ambient humidity 21: Detect ambient temperature 22: Detect motor humidity 23: Detect motor temperature	2	1	×	
F16.02	AI2 function		0	1	×	
F16.05	AI1 bias	-100.0 - 100.0%	0.0%	0.1%	○	
F16.08	AI2 bias		0.0%	0.1%	○	
F16.06	AI1 gain	0.00 - 10.00	1.00	0.01	○	
F16.09	AI2 gain		1.00	0.01	○	
F16.07	AI1 filtering time	0.01 - 10.00s	0.05s	0.01s	○	
F16.10	AI2 filtering time		0.05s	0.01s	○	
F16.17	Max. input pulse frequency	0 - 50000Hz	10000Hz	1Hz	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F16.18	Input pulse filter time	0.01 - 10.00s	0.20s	0.01s	○	
F16.19	AO1 function	0: Unused 1: Output frequency (0 - max. output frequency) 2: Setting frequency (0 - max. output frequency) 3: Motor RPM (0 - max. output frequency corresponding to RPM) 4: Output current (0 - twice rated current of HD3Z) 5: Output current (0 - twice rated current of motor) 10: Output torque (0 - 3 times rated torque of motor) 11: Output torque (0 - 1.2 times rated voltage of HD3Z) 12: Bus voltage (0 - 2.2 times rated voltage of HD3Z) 13: Output power (0 - twice rated power of motor) 14: AI1 input (0 - max. AI1 after calculating) 15: AI2 input (0 - max. AI2 after calculating) 18: Output frequency (-1 - 1 times max. output frequency) 19: Setting frequency (-1 - 1 times max. output frequency) 20: Setting frequency (0 - max. Output frequency)	2	1	○	
F16.20	AO2 function		0	1	○	
F16.22	AO1 bias	-100.0 - 100.0%	0.0%	0.1%	○	
F16.23	AO1 gain	0.0 - 200.0%	100.0%	0.1%	○	
F16.24	AO2 bias	-100.0 - 100.0%	0.0%	0.1%	○	
F16.25	AO2 gain	0.0 - 200.0%	100.0%	0.1%	○	
F17: SCI Communication Parameter (on pages 53 - 54)						
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, even parity, RTU 6: 1-8-1 format, no parity, RTU	0	1	×	
F17.01	Baud rate	0: 1200bps 5: 38400bps 1: 2400bps 6: 57600bps 2: 4800bps 7: 76800bps 3: 9600bps 8: 115200bps 4: 19200bps	3	1	×	
F17.02	Local address	0 - 247	2	1	×	
F17.03	Host PC response time	0 - 1000ms	1ms	1ms	×	

B

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F17.04	Detection time at communication timeout	0.0 - 600.0s *0.0: Not detect communication timeout*	0.0s	0.1s	×	
F17.05	Detection time at communication error	0.0 - 600.0s *0.0: Not detect the communication error*	0.0s	0.1s	×	
F17.06	Action selection at communication timeout	0: Coast to stop 1: Emergency stop 2: Decelerate to stop 3: Continue to run	3	1	×	
F17.07	Action selection at communication error		3	1	×	
F17.08	Action selection at communication peripheral device fault		1	1	×	
F17.09	EEPROM storage selection under communication read / write function parameter	Unit: Parameters storage selection except F00.13 and F19.03 Ten: F00.13 and F19.03 storage selection 0: Do not store to EEPROM 1: Store to EEPROM *F17.09 is used to select parameter storage during modifying*	01	1	×	
F17.10	Detection time of networking communication timeout	0.0 - 600.0s	0.0s	0.1s	×	
F18: Display Control Parameter (on pages 54 - 55)						
F18.01	Display contrast of LCD keypad	1 - 10	5	1	○	
F18.02	Set parameter 1 of run status	0: Unused 1: Rated current of HD3Z 3: Invertre status 4: Main setting frequency channel 5: Main setting frequency 6: Aux setting frequency 7: Setting frequency 8: Setting frequency (after Acc. / Dec.) 9: Output frequency 10: Setting Rpm 11: Running Rpm 13: Output voltage 14: Output current 16: Output torque 17: Output power 18: DC busbar voltage 20: AI1 input voltage	9	1	○	
F18.03	Set parameter 2 of run status		7	1	○	
F18.04	Set parameter 3 of run status		13	1	○	
F18.05	Set parameter 4 of run status		14	1	○	
F18.06	Set parameter 5 of run status		35	1	○	
F18.07	Set parameter 6 of run status		36	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F18.08	Set parameter 1 of stop status	21: AI1 input voltage (after calculating) 22: AI2 input voltage 23: AI2 input voltage (after calculating) 28: DI6 terminal pulse input frequency 29: AO1 output 30: AO2 output 32: Heatsink temperature 35: Ambient humidity 36: Ambient temperature 37: Process PID setting 38: Process PID feedback 39: Process PID deviation 40: Process PID integral value 41: Process PID output 43: Input terminal status 44: Output terminal status 45: MODBUS status 46: Motor humidity 47: Motor temperature 48: Total time at power on (hour) 49: Total running time (hour)	7	1	○	
F18.09	Set parameter 2 of stop status		18	1	○	
F18.10	Set parameter 3 of stop status		35	1	○	
F18.11	Set parameter 4 of stop status		36	1	○	
F18.12	Set parameter 5 of stop status		43	1	○	
F18.13	Set parameter 6 of stop status		44	1	○	
F18.14	Frequency display gain	0.1 - 160.0	1.0	0.1	○	
F19: Function-boost Parameters (on pages 55 - 59)						
F19.00	Aux frequency setting channel selection	0: No aux channel 1: Keypad 2: Terminal 3: SCI 4: Analogue 5: Terminal puse 6: PID output 7: AI1 8: AI2	0	1	○	
F19.01	Main / Aux setting calculating	Unit: Main / Aux calculating 0: Main+Aux setting 1: Main-Aux setting Ten: Frequency channel selection 0: Main 1: Main / Aux calculating 2: Main / Aux switching 3: Main and Main / Aux calculating switching 4: Aux and Main / Aux calculating switching	10	1	○	

B

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F19.02	Aux setting coefficient	0.00 - 9.99	1.00	0.01	○	
F19.03	Initial value of digital aux frequency	0.00 - F00.06	0.00Hz	0.01Hz	○	
F19.04	Digital aux frequency control	Unit: Storage selection at power failure 0: Do not save aux frequency 1: Save aux frequency Ten: Frequency at stop 0: Maintain aux frequency at stop 1: Aux frequency resumes to F19.03 at stop	00	1	○	
F19.05	Setting frequency adjustment selection	0: Do not adjust 1: Adjust according to max. output frequency (F00.06) 2: Adjust according to current frequency	1	1	○	
F19.06	Setting frequency adjustment coefficient	0.0 - 200.0%	100.0%	0.1%	○	
F19.07	Fan control	0: Auto stop 1: Immediate stop 2: Runs all the time when power on	0	1	○	
F19.08	Fan control delay time	0.0 - 600.0s	120.0s	0.1s	○	
F19.10	Zero frequency threshold	0.00Hz - Upper limit frequency	1.00Hz	0.01Hz	○	
F19.11	Action selection when setting frequency < zero frequency threshold	0: Runs according to frequency command 1: Remains stop and does not output 2: Runs according to zero frequency 3: Runs at 0Hz	0	1	×	
F19.12	Non-stop at instantaneous power loss	0: Forbid non-stop at instantaneous power loss 1: Enable non-stop at instantaneous power loss	0	1	×	
F19.13	Voltage compensation gain for non-stop running	10 - 1000	500	1	○	
F19.15	Voltage for action judgement at instantaneous power loss	340 - 670V	430V	1V	×	
F19.16	Restart after power failure	0: Disabled 1: Enabled	0	1	×	
F19.17	Waiting time for restart after power failure	0.00 - 10.00s	2.00s	0.01s	○	
F19.18	Overvoltage suppression gain	0.000 - 1.000 *0.000: Forbid stall overvoltage*	0.000	0.001	○	
F19.19	Stall overvoltage point	650 - 790V	690V	1V	×	
F19.20	Auto current limit gain	0.000 - 1.000	0.500	0.001	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F19.21	Auto current limit threshold	20.0 - 200.0%	120.0%	0.1%	×	
F19.23	Enabled terminal at power on	0: Rise edge 1: Level	0	1	○	
F19.25	Flux braking	0: Disabled 1: Enable	0	1	×	
F19.35	Aux PID output limit	0.0 - 100.0%	100.0%	0.1%	○	
F19.36	Aux PID output setting	0.0 - 100.0%	0.0%	0.1%	○	
F19.37	Frequency adjustment range	Unit: Main frequency calculating range 0: 0 - max. frequency 1: Negative max. frequency- max. frequency Ten: Aux frequency calculating range 0: 0 - max. frequency 1: Negative max. frequency- max. frequency Hundred: Resultant frequency calculating range 0: 0 - upper limit frequency 1: Negative upper limit frequency - upper limit frequency	100	1	○	
F19.38	Inter-phase short-circuit detection	0: Do not detect 1: Detect	1	1	○	
F19.39	Input voltage selection	0: 380 - 460V 1: 260 - 460V 2: 200 - 460V	1	1	×	
F19.40	Flux braking PI regulator Kp	0 - 4000	1000	1	○	
F19.41	Flux braking PI regulator Ki	0 - 500	20	1	○	
F19.42	Motor dehumidifying current	1 - 80%	10%	1%	×	
F19.43	Dehumidifying time when current of motor rises	0.1 - 240.0min	30.0min	0.1min	○	
F19.44	Auto dehumidifying selection	Ten: The basis of judgement for starting the auto dehumidification of the motor 0: According to humidity 1: According to the stop interval	0	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		Unit: The judgement basis for stopping automatic dehumidification of the motor 0: According to humidity 1: According to time				
F19.45	Motor auto dehumidifying humidity	F19.46 - 100.0%rm	80.0% rm	0.1% rm	○	
F19.46	Motor auto dehumidifying humidity delay	0.0 - 30.0%rm	5.0% rm	0.1% rm	○	
F19.47	Motor auto dehumidifying humidity time	0.1 - 1200.0min	120.0min	0.1min	○	
F19.48	Motor auto dehumidification stop interval	0.0 - 6000.0h	0.0h	0.1h	×	
F20: Fault Protection Parameters (on pages 59 - 61)						
F20.00	Overload pre-alarm detection	Unit: Overload pre-alarm detection 0: It is active all the time in running status 1: It is active only at constant speed Ten: Overload pre-alarm action 0: HD3Z doesn't alarm and continues running when detecting an active overload signal 1: HD3Z alarms and stops running when detecting an active overload signal Hundred: Overload detection threshold 0: Relates to rated current of motor (alarm E0019: Motor overload) 1: Relates to rated current of HD3Z (alarm E0017: Inverter overload) Thousand: Motor type 0: Standard motor 1: Variable frequency motor Ten thousand: Overload protection 0: Enable inverter overload protection and motor overload protection 1: Enable inverter overload protection; Shield motor overload protection 2: Shield inverter overload protection; Enable motor overload	00000	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		protection 3: Shield inverter overload protection and motor overload protection				
F20.01	Overload pre-alarm detection value	20.0 - 200.0%	150.0%	0.1%	×	
F20.02	Overload pre-alarm detection time	0.0 - 60.0s	5.0s	0.1s	×	
F20.08	The detection base of lack of input	0 - 80% *0: Not detect input phase loss fault*	30%	1%	×	
F20.09	The detection time of lack of input	1.00 - 5.00s	1.00s	0.01s	×	
F20.10	The detection base of lack of output	0 - 100% *0: Not detect output phase loss fault*	20%	1%	×	
F20.11	The detection time of lack of output	1.00 - 20.00s	3.00s	0.01s	×	
F20.12	PID setting lose detection value	0 - 100% *0: Not detect PID setting loss fault*	0%	1%	×	
F20.13	PID setting loss detection time	0.00 - 10.00s *0.00: Not detect PID setting loss fault*	0.20s	0.01s	×	
F20.14	PID feedback loss detection value	0 - 100% *0: Not detect PID feedback loss fault*	0%	1%	×	
F20.15	PID feedback loss detection time	0.00 - 10.00s *0.00: Not detect PID feedback loss fault*	0.20s	0.01s	×	
F20.16	Detection value at PID feedback out of the limit	0 - 100% *100: Not detect PID feedback out of limit fault*	100%	1%	×	
F20.17	Detection time at PID feedback out of the limit	0.00 - 10.00s *0.00: Not detect PID feedback out of limit fault*	0.20s	0.01s	×	
F20.18	Fault auto reset times	0 - 100 *0: Auto reset is unused*	0	1	×	
F20.19	Fault auto reset interval	0.01 - 200.00s/time	5.00s/ time	0.01s/ time	×	
F20.20	Faulty relay action	Unit: In auto reset process 0: Faulty relay doesn't act 1: Faulty relay acts Ten: In undervoltage process 0: Faulty relay doesn't act 1: Faulty relay acts	00	1	○	
F20.21	NO.5 fault type	-Lu-: DC bus undervoltage E0001: Inverter output overcurrent E0002: Inverter output overcurrent E0003 Inverter output overcurrent	0	1	*	
F20.21	NO.5 fault type	E0004: DC bus over voltage (in Acc.	0	1	*	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		process) E0005: DC bus over voltage (in Dec. process) E0006 DC bus over voltage (in constant speed process) E0008: Power module fault E0009: Heatsink overheat E0012: Parameters auto-tuning fault E0013: Soft start contactor failed E0014: Current detection circuit fault E0015: Input voltage phase loss E0016: Output voltage phase loss E0017: Inverter overload E0019: Motor overload E0020: Motor overheat E0021: Read / Write fault of control board EEPROM E0022: Read / Write fault of keypad EEPROM (E0022 does not affect normal run of controller.) E0023: Faulty setting of parameters E0024: Fault of external equipment E0025: PID setting loss E0026: PID feedback loss E0027: PID feedback out of limit E0028: SCI communication timeout E0029: SCI communication error E0034: Clock fault				
F20.22	Setting frequency at NO.5 fault	0.00 - 400.00Hz	0.00Hz	0.01Hz	*	
F20.23	Running frequency at NO.5 fault	0.00 - 400.00Hz	0.00Hz	0.01Hz	*	
F20.24	DC bus vlotage at NO.5 fault	0 - 999V	0V	1V	*	
F20.25	Output voltage at NO.5 fault	0 - 999V	0V	1V	*	
F20.26	Output current at NO.5 fault	Actual value	0.0A	0.1A	*	
F20.27	Input terminal status at NO.5 fault	0 - 0x1FF	0	1	*	
F20.28	Output terminal status at NO.5 fault	0 - 0x7FF	0	1	*	
F20.29	NO.5 fault interval	0 - 6553.5h	0.0h	0.1h	*	
F20.30	NO.4 fault type	0 - 99	0	1	*	
F20.31	NO.4 fault interval	0 - 6553.5h	0.0h	0.1h	*	
F20.32	NO.3 fault type	0 - 99	0	1	*	
F20.33	NO.3 fault interval	0 - 6553.5h	0.0h	0.1h	*	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F20.34	NO.2 fault type	0 - 99	0	1	*	
F20.35	NO.2 fault interval	0 - 6553.5h	0.0h	0.1h	*	
F20.36	NO.1 fault type	0 - 99	0	1	*	
F20.37	NO.1 fault interval	0 - 6553.5h	0.0h	0.1h	*	
F20.38	Last time fault interval	0 - 6553.5h	0.0h	0.1h	*	
F23: PWM Control Parameter (on page 61)						
F23.00	Carrier frequency	1 - 6kHz	Depend on model	1kHz	×	
F23.01	Auto adjust carrier frequency	0: Prohibited 1: Adjust 1 2: Adjust 2	1	1	×	
F23.02	PWM overshoot enable	0: Disabled 1: Enabled	1	1	×	
F23.03	PWM modulation mode	0: Switch between two phase/three phase 1: Three phase	0	1	×	
F23.04	Switch point 1 of PWM modulation mode	0.00 - 50.00Hz	Depend on model	0.01Hz	×	
F23.05	Switch point 2 of PWM modulation mode	0.00 - 50.00Hz	Depend on model	0.01Hz	×	
F23.09	Random carrier factor K1	0 - 2000	2	1	×	
F23.10	Random carrier factor K2	0 - 2000	3	1	×	
P00: Timing Time Parameter **(on page 61)**						
P00.00	Year	0 - 99	Actual value	1	○	
P00.01	MM/DD	01.01 - 12.31	Actual value	0.01	○	
P00.02	Min/Sec	00.00 - 23.59	Actual value	0.01	○	
P01: Timing Control Parameter **(on page 62)**						
P01.00	Timing start and stop selection	0: Invalid 1: Valid	0	1	○	
P01.01	Timing start 1	00.00 - 23.59	00.00	0.01	○	
P01.02	Timing stop 1	00.00 - 23.59	00.00	0.01	○	
P01.03	Timing start 2	00.00 - 23.59	00.00	0.01	○	
P01.04	Timing stop 2	00.00 - 23.59	00.00	0.01	○	
P01.05	Timing start 3	00.00 - 23.59	00.00	0.01	○	
P01.06	Timing stop 3	00.00 - 23.59	00.00	0.01	○	
P01.07	Timing start 4	00.00 - 23.59	00.00	0.01	○	
P01.08	Timing stop 4	00.00 - 23.59	00.00	0.01	○	
P01.09	Timing frequency switch selection	0: Invalid 1: Valid	0	1	○	
P01.10	Time 1 of timing frequency switch	00.00 - 23.59	00.00	0.01	○	

B

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
P01.11	Value 1 of timing frequency switch	0.00Hz - Upper limit frequency	0.00Hz	0.0	○	
P01.12	Time 2 of timing frequency switch	00.00 - 23.59	00.00	0.01	○	
P01.13	Value 2 of timing frequency switch	0.00Hz - Upper limit frequency	0.00Hz	0.0	○	
P01.14	Time 3 of timing frequency switch	00.00 - 23.59	00.00	0.01	○	
P01.15	Value 3 of timing frequency switch	0.00Hz - Upper limit frequency	0.00Hz	0.0	○	
P01.16	Time 4 of timing frequency switch	00.00 - 23.59	00.00	0.01	○	
P01.17	Value 4 of timing frequency switch	0.00Hz - Upper limit frequency	0.00Hz	0.0	○	
P01.18	Time 5 of timing frequency switch	00.00 - 23.59	00.00	0.01	○	
P01.19	Value 5 of timing frequency switch	0.00Hz - Upper limit frequency	0.00Hz	0.0	○	
P01.20	Time 6 of timing frequency switch	00.00 - 23.59	00.00	0.01	○	
P01.21	Value 6 of timing frequency switch	0.00Hz - Upper limit frequency	0.00Hz	0.0	○	
P01.22	Time 7 of timing frequency switch	00.00 - 23.59	00.00	0.01	○	
P01.23	Value 7 of timing frequency switch	0.00Hz - Upper limit frequency	0.00Hz	0.0	○	
P01.24	Time 8 of timing frequency switch	00.00 - 23.59	00.00	0.01	○	
P01.25	Value 8 of timing frequency switch	0.00Hz - Upper limit frequency	0.00Hz	0.0	○	