FOREWORD

Thank you for purchasing HD31 series aqua inverter manufactured by Shenzhen Hpmont Technology Co., Ltd.

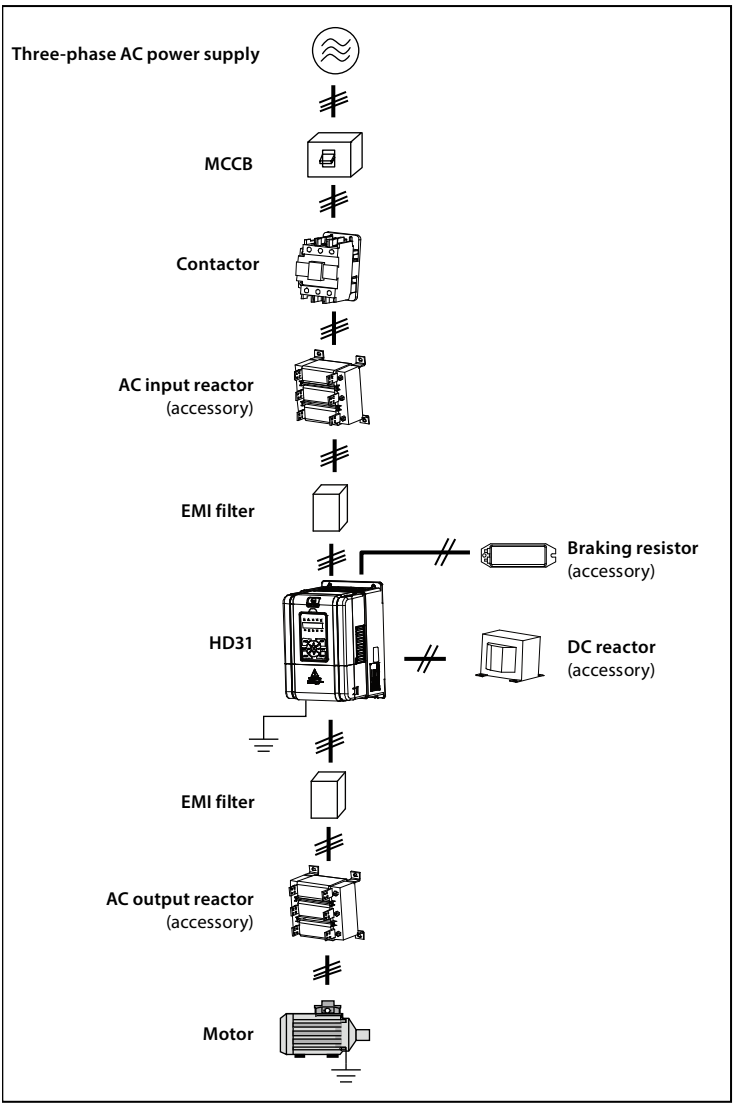
This User Manual describes how to use HD31 series inverters and their installation wiring, parameter setting, troubleshooting and daily maintenance etc.

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

Note:

- Preserve this Manual for future.
- 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.
- 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.
- For the first time using, the user should carefully read this manual.
- If you still have some problems during use, please contact our company Technical Service Center.
- Email address: **marketing@hpmont.com**

Connection with peripheral devices



Version and Revision Records

Time: 2019/07

Version: V1.5

Revised Chapter	Revised Contents
Chapter 6 Appendix A	• Add functional parameters d00.07, d00.11 - d00.13, d00.22, d00.40 - d00.41, d00.44 - d00.47, d00.52 - d00.54 • Add group d02, F02, F04, F13 • Add functional parameters F00.00, F00.03, F00.10-00.28, F03.00, F03.03 - F03.04, F05.21, F05.22, F08.12 - F08.16, F09.17-F09.21, F15.17, F15.25 - F15.27, F15.30 - F15.44, F16.27, F17.09 - F17.10, F18.14 - F18.16, F19.00 - F19.15, F20.38, F23.01, F23.03 - F23.05 • Modify the setting range of F00.12, F00.14, F01.01, F05.00, F08.00 – F08.02, F08.06, F15.00 - F15.08, F15.18 - F15.23, F16.00 – F16.04, F16.19 - F16.21, F17.00, F17.01, F17.04 - F17.05, F20.11 • Modify the setting range and the factory value of F09.01 - F09.06, F19.19, F19.20, F19.23 - F19.41, F20.19 • Modify the factory value of F09.08, F09.09, F17.03, F20.10, P00.40, P00.42, P00.44, P00.46, P00.48, P00.50, P02.28 • Modify the meaning of F09.15 - F09.16, F19.18 • Reserve d00.09, d00.19, F19.22

CONTENTS

Chapter 1 Safety Information and Precautions

1.1 Safety Definition

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.

1.2 About Motor and Load

Compared to the Industrial Frequency Running

The HD31 series inverters are voltage-type frequency inverters and their output is PWM wave with certain harmonic wave. Therefore, the temperature, noise and vibration of the motor will be a little higher than that at industrial frequency running.

Constant Torque at Low-speed Running

When HD31 drives a standard motor at low-speed running for a long time, the output torque ratings will become worse due to the motor cooling is less effective. In that case, we suggest that you should choose variable frequency motor.

Thermal Protection of Motor

When choose the adaptive motor, HD31 can effectively implement thermal protection of motor. Otherwise it must adjust the motor protection parameters or other protection measures to ensure that the motor is at a safe and reliable running.

Running above the Rated Frequency of Motor

If the motor runs exceeding its rated frequency, the noise will increase. Pay attention to the motor vibration as well as ensure the motor bearings and mechanical devices to meet the requirement of running speed range.

Lubrication of Mechanical Devices

At long time low-speed running, provide periodical lubrication maintenance for the mechanical devices such as gear box and geared motor etc. to make sure the drive results meet the site need.

Mechanical Resonance Point of Load

Set the skip frequency (F05.17 - F05.19) to avoid the load device or the motor mechanical resonance point.

Start and Stop HD31

User should use the control terminal to start and stop HD31.

It is strictly forbidden to use contactor or other switches on the input side of HD31 to start and stop directly, or it will damage the device.

Check the Insulation of the Motor

For the first time using of the motor or after long time storage, it needs checking the insulation of the motor. Worse insulation can cause damage to HD31.

Note:

Use a 500V Mega-Ohm-Meter to test and the insulation resistance must be higher than 5Mohm.

Load and Negative Torque

For the occasion to boost load and the like, negative torque often occurs. Consider setting proper parameters of the braking unit if HD31 is prone to overcurrent or overvoltage fault trip.

Requirement for Leakage Current Protector RCD

Since the device generates high leakage current which goes through the protective grounding conductor, please install B type leakage current protector RCD on one side of the power supply.

For the selection of RCD, users need to consider the possible problems of ground leakage current in both transient status and steady status at start and during running. It is recommended to choose either special RCD that can suppress the higher harmonics, or general RCD that has more aftercurrent.

Warning for Ground Mass Leakage Current

The device generates mass leakage current, so users need to confirm the reliable grounding before connect to the power supply. The grounding should comply with the local relative IEC standard.

1.3 About HD31

No Capacitor or Varistor on the Output Side

Since HD31 output is PWM wave, it is strictly forbidden to connect capacitor for improving the power factor or varistor for lightning protection to the output terminals so as to avoid HD31 fault trip or component damage.

Contactors and Circuit Breakers Connected to the Output of HD31

If circuit breaker or contactor needs to be connected between HD31 and the motor, be sure to operate these circuit breakers or contactor when HD31 has no output, so as to avoid any damage to HD31.

Running Voltage

HD31 is prohibited to be used beyond the specified range of running voltage. If needed, please use suitable voltage regulation device to change the voltage.

Capacitor Energy Storage

When the AC power supply is cut off, capacitor of HD31 sustains deadly power for a while. So to disassemble HD31 that is powered, please cut off the AC power supply for more than 10 minutes, confirm the internal charge indicator is off and the voltage between (+) and (-) of the main circuit terminals is below 36V.

Generally, the internal circuit enables the capacitor to discharge. However, the discharging may fail in some exceptions. In these cases, users need to consult Hpmont or our regional distributor.

Lightning Surge Protection

HD31 internal design has lightning surge overcurrent protection circuit, and has certain self-protection capacity against the lightning.

Altitude and Derating

In area where altitude exceeds 1000 meters, HD31 should be derating since the heatsink efficiency will be reduced because of the tenuous air.

The rated value of output current derates by 1% for each 100m increase of the altitude. I.e. for the altitude of 4000m, derated rate is 30% for rated current of HD31. Figure 1-1 is the derating curve of rated current and the altitude.

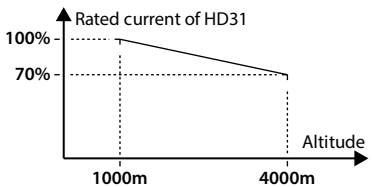
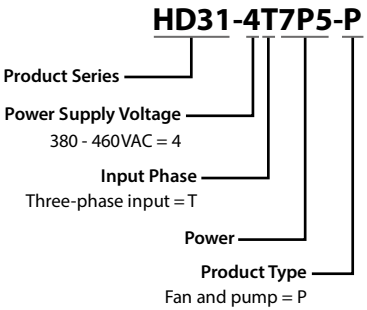


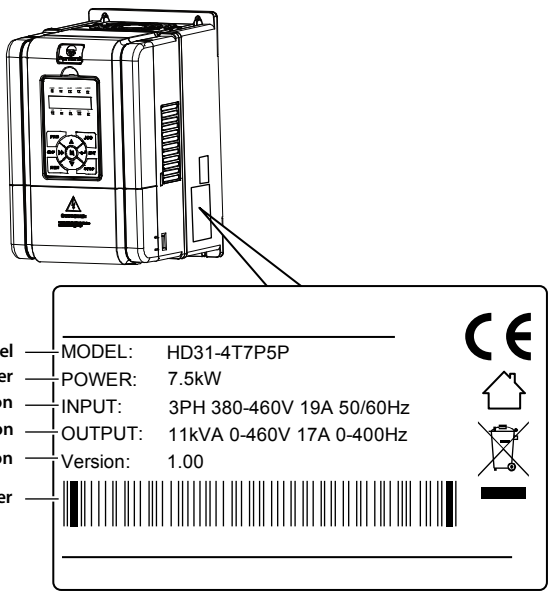
Figure 1-1 Derating curve of rated current and altitude

Chapter 2 Product Information

2.1 Model



2.2 Nameplate



2.3 Rated Value

Refer to section 3.4 Dimensions and Weight (on page 11) for size information.

Model	Motor (kW)	Rated Capacity (kVA)	Rated Input Current (A)	Rated Output Current (A)	Size
HD31-4T2P2P	2.2	3.4	7.3	5.1	F2
HD31-4T3P7P	3.7	5.9	11.9	9.0	F2
HD31-4T5P5P	5.5	8.5	15	13	F2
HD31-4T7P5P	7.5	11	19	17	F2
HD31-4T011P	11	16	28	25	F3
HD31-4T015P	15	21	35	32	F3
HD31-4T018P	18.5	24	39	37	F4
HD31-4T022P	22	30	47	45	F4
HD31-4T030P	30	39	62	60	F5
HD31-4T037P	37	49	77	75	F5
HD31-4T045P	45	59	92	90	F6
HD31-4T055P	55	72	113	110	F6
HD31-4T075P	75	100	156	152	F6
HD31-4T090P	90	116	180	176	F7
HD31-4T110P	110	138	214	210	F7
HD31-4T132P	132	167	256	253	F7

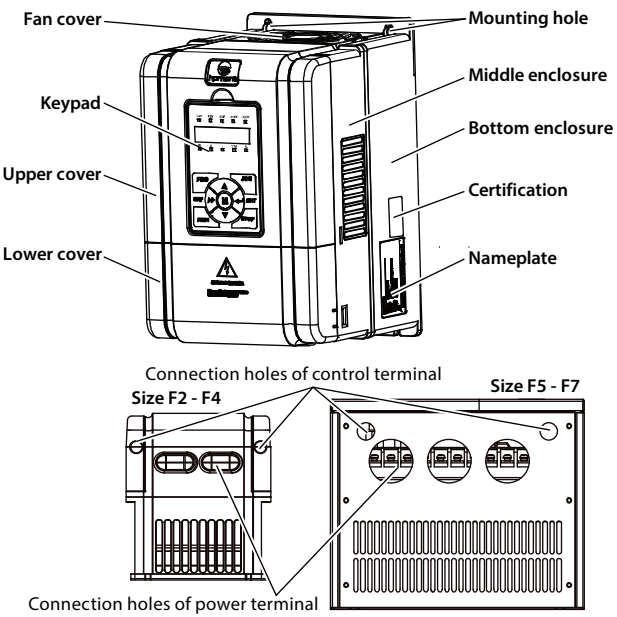
2.4 Technical Data

Electrical	
Input voltage	Three-phase: 380 - 460V, 50/60Hz Fluctuating within ± 10%, imbalance rate < 3%
Input frequency	50/60Hz ± 5%
Output voltage	0 - input voltage
Output frequency	0 - 400.00Hz
Performance	
Control mode	V/f, SVC
Max. current	120% rated output current for 5 minutes; 135% rated output current for 35 seconds
Running command	Keypad; Terminals; Communication
Speed setting	Digital; Analogue; Communication
Speed resulotion	Digital setting: 0.01Hz Analogue setting: 0.1% × max-frequency
SVC	Speed control accuracy: ± 0.5% Speed control range: 1:100 Torque control response: < 200ms Start torque: 180% rated torque / 0.5Hz
Torque control accuracy	±5%

Protection Functions	
Stall overvoltage	Bus voltage can auto-control against overvoltage fault
Auto-limit current protection	Output current can auto-limit against overcurrent fault
Overload pre-alarm and alarm	Overload early pre-alarm and protect
Load loss protection	Load loss alarm function
Input / Output voltage phase loss protection	Input / Output voltage phase loss auto-detect and alarm function
Braking fault protection	Braking detection and alarming 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 / Outpot	
Analogue power supply	+10V, max. current 100mA
Digital power supply	+24V, max. current 200mA
Analogue input	AI1 (control board): voltage 0 - 10V AI2 (control board): -10 - +10V/0 - 20mA (selectable voltage/current) AI3, AI4 (I/O board): -10 - +10V/0 - 20mA (selectable voltage/current)
Analogue output	AO1, AO2: 0 - 10V/0 - 20mA (selectable voltage/current)
Digital input	DI1 - DI6 (control board); DI7 - DI9 (I/O board) DI6 can be selectable for high-frequency input
Digital output	DO1, DO2 DO2 can be selectable for high-frequency output
Relay output	R1A/R1B/R1C (control board), R2A/R2C - R10A/R10C (I/O board) Contact rating: 250VAC/3A or 30VDC/1A
Keypad	
LED display	Five LEDs display, 5 unit indicators, 5 status indicators Setting frequency, output frequency, output voltage, output current, motor speed, output torque, switching value terminal, status parameter, programm menu parameter and fault code etc.
LCD display	Optional [HD-LCD], display contents in Chinese or English
Parameter copy	Both LED and LCD keypad can achieve quick parameter copy
Communication	
SCI communication	RS-485 interface; Terminal

Environment	
Running temperature	-10 - +40℃, max. 50℃, air temperature fluctuation is less than 0.5℃/min The derating value of the output current of HD31 shall be 2% for each degree centigrade above 40℃. Max. allowed temperature is 50℃
Storage temperature	-40 - +70℃
Location for use	Indoor, preventing from direct sunlight, no dust, corrosive, flammable gases, oil mist, water vaper, dripping or salt etc.
Altitude	Less than 1000 meters, otherwise should be derating use
Humidity	Less than 95%RH, non-condensing
Vibration Resistance	It is 3.5m/s^2 in 2 - 9Hz, it is 10m/s^2 (IEC60721-3-3) in 9 - 200Hz
Protection class	IP20
Pollution level	Level 2 (dry, non conducting dust pollution)
Accessories	
Bus communication	PROFIBUS option [HDFB-PROFIBUS-DP] DeviceNet option [HDFB-DeviceNet] CAN option [HDFB-CAN]
About keypad	LCD keypad (HD-LCD) Mounting base to keypad (HD-KMB) 1m/2m/3m/6m exTenion cable to keypad (HD-CAB-1M/2M/3M/6M)
Power Unit	Dynamic braking unit [HDBU]

2.5 Parts of Inverter



Chapter 3 Mechanical Installation

3.1 Precautions

Danger

- Do not install if HD31 is incomplete or impaired.
- When conveying HD31, please employ suitable tools according to its weight. Avoid scratch to the product. Be careful: rollover and drop may cause hurt.
- Make sure that HD31 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 HD31 is off and the voltage between (+) and (-) of the main circuit terminals is below 36V.

Warning

- It is required not only carry the keypad and the cover but also bottom enclosure of HD31.
- Do not let wires, screws or residues fall into HD31 when installing.

3.2 Installation Site Requirement

Ensure the Installation Site Meets the Following Requirements:

- Do not install at direct sunlight, moisture, water droplet location;
- 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 HD31 so as to keep ambient temperature between -10 - +40℃;
- Install at where the vibration is 3.5m/s^2 in 2 - 9Hz, 10m/s^2 in 9 - 200Hz (IEC60721-3-3);
- Install at where the humidity is less than 95%RH and non-condensing location;
- Protection level of HD31 is IP20 and pollution level is 2 (dry, non-conducting dust pollution).

Note:

1. It needs derating use if running temperature exceeds 40 ℃. The derating value of the output current of HD31 shall be 2% for each degree centigrade. Max. allowed temperature is 50 ℃.

2. Keep ambient temperature between -10 - +40 ℃. It can improve the running performance if install at location with good ventilation or cooling devices.

3.3 Installation Direction and Space Requirements

To achieve good cooling efficiency, install the inverter perpendicularly and always provide the following space to allow normal heat dissipation. The requirements on mounting space and clearance are shown in Table 3-1.

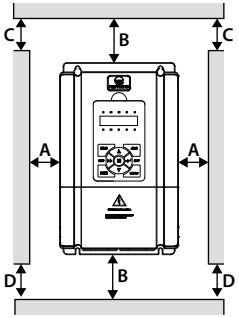


Table 3-1 Installation space

HD31 power	5.5 - 75kW	90 - 132kW
A (left and right)	≥50mm	≥150mm
B (up and down)	≥100mm	≥350mm
C (upper vent)	≥50mm	≥100mm
D (lower vent)	≥50mm	≥100mm

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When one inverter is mounted on top of another, an air flow diverting plate should be fixed between them. Just as shown in Table 3-2.

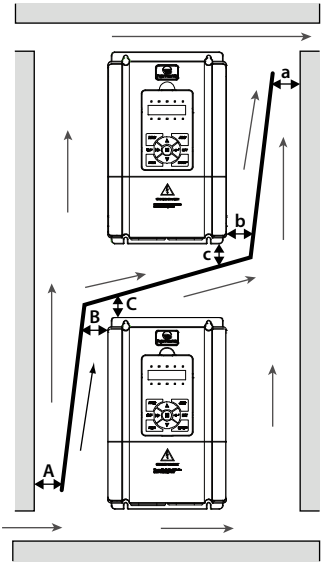

Table 3-2 Installation of several inverters

HD31 power	5.5 - 75kW	90 - 132kW
A	≥50mm	≥100mm
B	≥50mm	≥100mm
C	≥50mm	≥100mm
a	≥50mm	≥100mm
b	≥50mm	≥100mm
c	≥50mm	≥100mm

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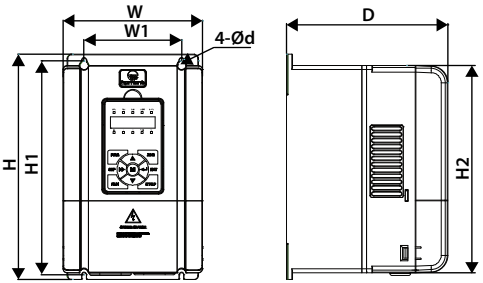
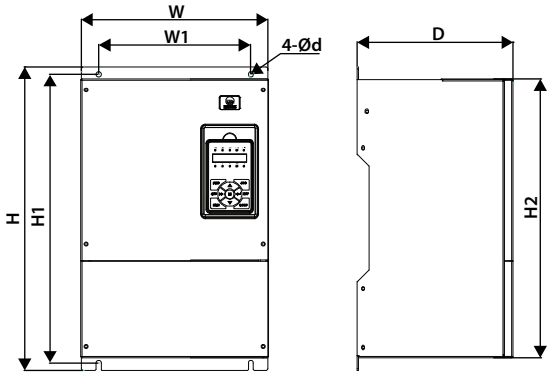
3.4 Dimensions and Weight

The dimensions and weight of HD31 are as shown in Table 3-3.

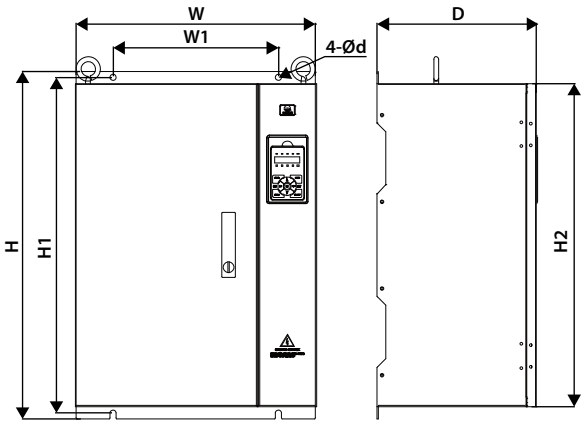
For the corresponding model of the mounting size, refer to section 2.3 Rated Value, on page 6.



Size F2 - F4



Size F5 - F6



Size F7

Table 3-3 HD31 dimensions and weight

Size	Dimension (mm)			Mounting size (mm)				GW
	W	H	D	W1	H1	H2	d	(kg)
F2	165	266	190	115	253	245	5	4.4
F3	200	299	210	146	286	280	5	5.8
F4	235	353	222	167	337	330	7	8.2
F5	290	469	240	235	445	430	8	20.4
F6	380	598	290	260	576	550	10	48
F7	500	721	330	343	696	670	12	80

3.5 Install and Dismantle Keypad

According to the direction of Figure 3–1, press the keypad until hear a "click" sound.

Do not install the keypad from other directions or it will cause poor contact.

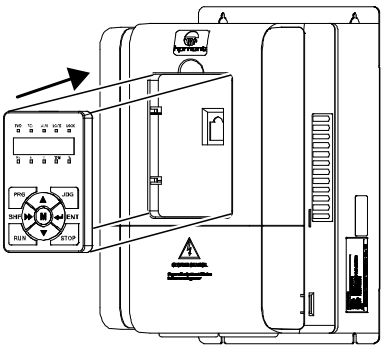


Figure 3–1 Install keypad

There are two steps in Figure 3–2.

First, press the hook of the keypad according to direction 1. Second, take out of the keypad according to direction 2.

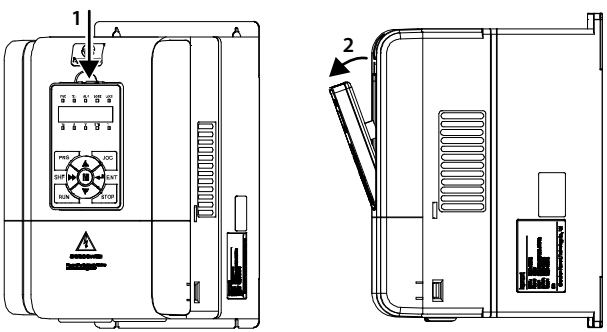
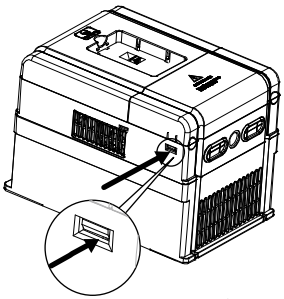


Figure 3–2 Dismantle keypad

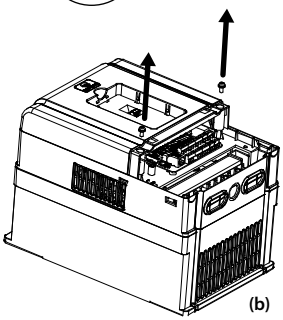
3.6 Dismantle Plastic Cover

The upper cover and lower cover of HD31 are removable. The dismantle steps are shown as Figure 3–3.

Before removing the upper cover, please take away the keypad.



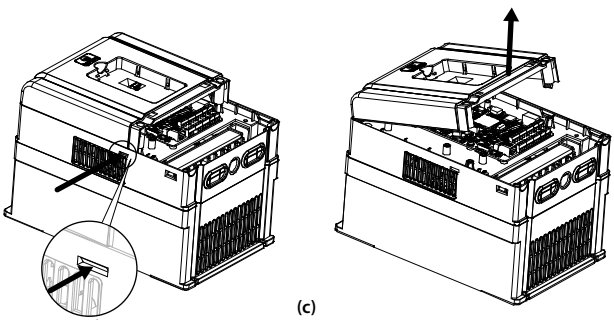
(a)



(b)

The removing processes of plastic cover board:

1. Extrude the hooks at both sides together, take off the lower cover, as (a).
2. Dismantle the screws of upper cover, as (b).
3. Extrude the hooks at both sides together, take off the upper cover, as (c).



(c)

Figure 3–3 Dismantle the plastic cover

Chapter 4 Electrical Installation

4.1 Precautions

Danger

- Only qualified electrical engineer can perform wiring job.
- Only when the power supply switch is completely off can you do the wiring job.
- You can't open the inverter cover to do wiring operation until the power is cut-off 10 minutes later. Do not wire or detach the inverter internal devices at power-on situation.
- Do not do wiring operation until the internal charge indicator of the inverter is off and the voltage between (+) and (-) of the main circuit terminals is below 36V.
- Check the wiring carefully before connecting emergency stop or safety circuit.
- The earth terminal PE of the inverters must be reliable earthing. It must use two separate earth wire due to the leakage current from the inverter to ground.
- It must use Type B mode when utilize earth leakage protection devices(ELCB/RCD).
- Do not touch the wire terminals of the inverter when it is live. The main circuit terminals is neither allowed connecting to the enclosure nor short-circuiting.

Warning

- Do not do dielectric strength test on the inverter.
- 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 the inverter.
- Do not connect the phase-shifting capacitors to the output circuit.
- Be sure the inverter has ceased output before switching motor or change-over switches.
- The inverter DC bus terminals must not be short-circuited.

4.2 Peripheral Accessories Selection

4.2.1 Wiring Specifications of Input and Output

The AC supply to HD31 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 Cable) While Installing (mm^2)	S ≤ 2.5	2.5 < S ≤ 16	16 < S ≤ 35	S > 35
Min. Sectional Area Sp of Relative Protective Conductor (Ground Cable) (mm^2)	2.5	S	16	S/2

Table 4-2 HD31 I/O wiring specification

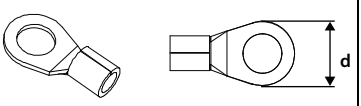
Model	MCCB (A)	Contactor (A)	Power Cable (mm^2)	Motor Cable (mm^2)	Ground Cable (mm^2)	Size
HD31-4T2P2P	16	10	1.5	0.75	2.5	F2
HD31-4T3P7P	16	10	2.5	1.5	2.5	F2
HD31-4T5P5P	25	16	2.5	2.5	2.5	F2
HD31-4T7P5P	32	25	4	4	4	F2
HD31-4T011P	40	32	6	6	6	F3
HD31-4T015P	63	40	10	10	10	F3
HD31-4T018P	63	40	10	10	10	F4
HD31-4T022P	100	63	16	16	16	F4
HD31-4T030P	100	63	25	25	16	F5
HD31-4T037P	125	100	35	35	16	F5
HD31-4T045P	160	100	35	35	16	F6
HD31-4T055P	200	125	35	35	16	F6
HD31-4T075P	200	125	50	50	25	F6
HD31-4T090P	250	160	95	70	50	F7
HD31-4T110P	250	160	120	120	50	F7
HD31-4T132P	350	350	120	120	50	F7

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 terminal as an example.

Table 4-3 Selection of power terminal lug

Size	Screw Size	Tightening torque (N. M)	Max. Outer Diameter of Lug d (mm)	
F2	M4	1.2 - 1.5	9.9	
F3	M5	2.5 - 3.0	12	
F4	M5	2.5 - 3.0	12	
F5	M6	4.0 - 5.0	15.5	
F6	M8	9.0 - 10.0	24	
F7	M10	17.6 - 22.5	30	

4.3 Main Circuit Terminals and Wiring

Danger

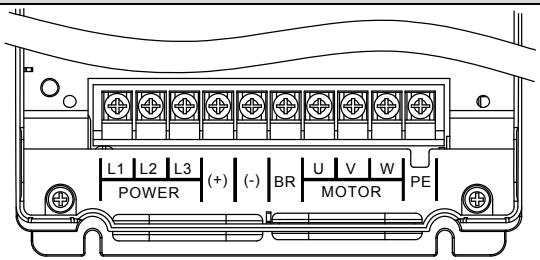
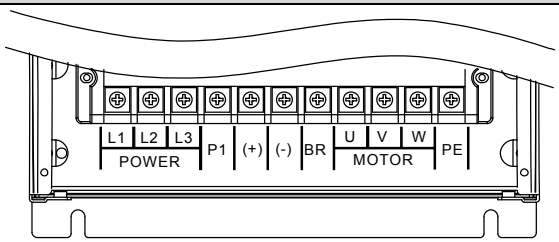
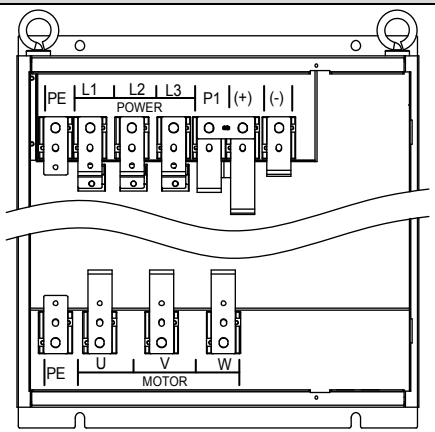
- The bare portions of the power cables must be bound with insulation tapes.

Warning

- Ensure that AC supply voltage is the same as rated input voltage of HD31.

4.3.1 Supply and Motor Terminal

Table 4-4 Supply and motor terminal description

Terminal description	
• L1, L2, L3: Three-phase AC power input terminals • U, V, W: Output terminals, connect to three-phase AC motor • P1, (+): DC reactor connection terminals • (+), (-): DC supply input terminals; DC input terminals of power regenerative unit • (+), BR: Braking resistor connection terminals • PE: Ground terminal, connect to the ground	**Frame 2**  **Frame 3 - Frame 6**  **Frame 7** 

4.3.2 Supply and Motor Connection

During trial running, make sure HD31 runs forward when the forward command is enabled.

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

The supply and motor connection are shown as Figure 4–1.

Refer to section 4.2 Peripheral Accessories Selection (on page 15) for product options.

Refer to section 9.3 Braking Resistor and Braking (on page 100) for braking resistors and braking Unit.

Refer to section 9.2 Reactor Selection (on page 99) for AC reactors and DC reactors.

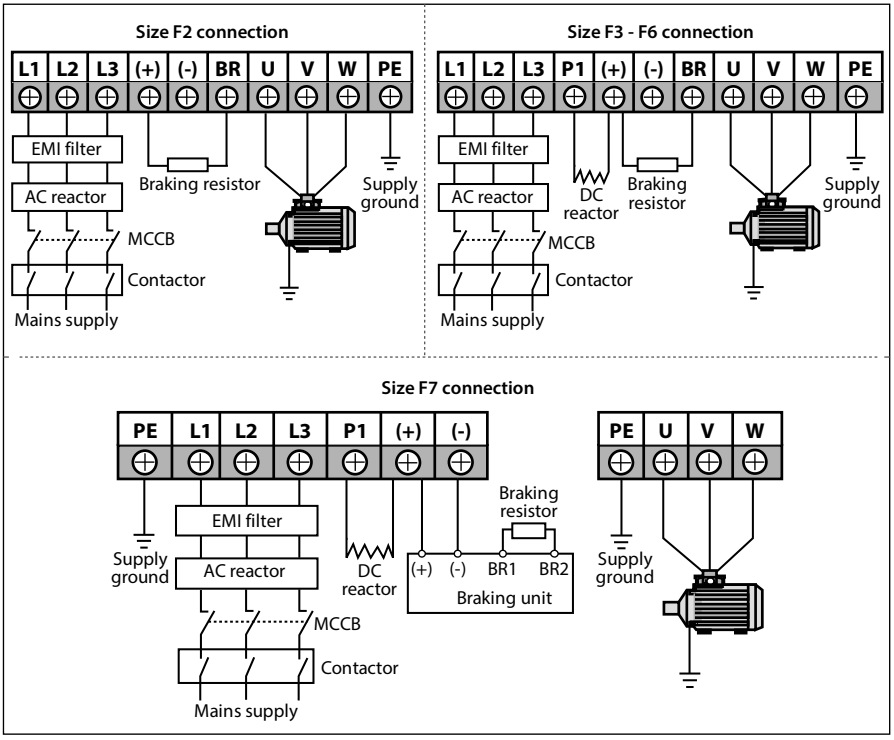


Figure 4–1 Supply and motor connection

4.4 Control Board and I/O Board

Danger

- The control circuit is basically isolated with the power circuit. Do not touch HD31 after it is powered.

Warning

- If the control circuit is connected to the external devices with live touchable port, it should increase an additional isolating barrier to ensure that classification of external devices not be changed
- If connect the communication terminal of the control circuit to the PC, choose RS485/232 isolating converter which meets the safety requirement.
- Only connect the relay terminal to AC 220V voltage signal. Other control terminal are strictly forbiden for this connection.

HD31 includes control board and I/O board, as shown in Figure 4–2.

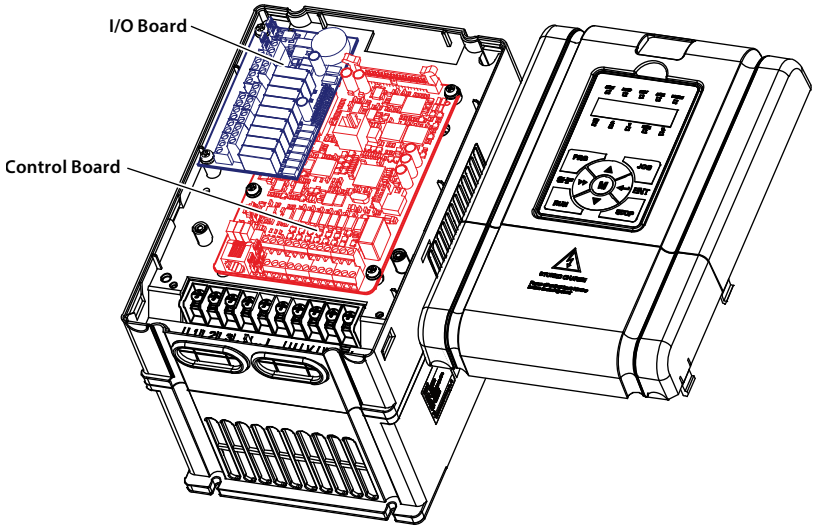


Figure 4–2 Control board and I/O board

4.4.1 Control Board Terminal

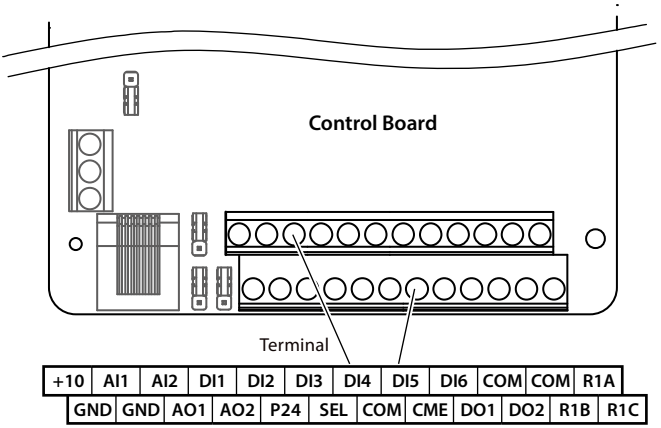


Figure 4–3 Control board terminal

Table 4-5 Control board terminal description

Terminal		Description
+10, GND	Analogue power supply	Analogue input use +10V power supply, max. output current is 100mA GND is isolated to COM
AI1, AI2	Analogue input	AI1 Input voltage: 0 - 10V (input impedance: 32kΩ) AI2 Input voltage: -10 - +10V (input impedance: 32kΩ) AI2 Input current: 0 - 20mA (input impedance: 500Ω) • AI2 can be voltage / current selectable
AO1, AO2	Analogue output	Output voltage / current signal: 0 - 10V/0 - 20mA Programmable output
GND	Analogue ground	
DI1 - DI6	Digital input	Programmable bipolar optional input signal Input voltage: 0 - 30VDC DI1 - DI5 input impedance 4.7kΩ, DI6 input impedance 1.6kΩ • DI6 can be selectable for high-frequency input, max-frequency 50kHz
P24, COM	Digital power supply	Analogue input use +24V power supply, max. output current is 200mA COM is isolated to CME
SEL	Digital input common terminal	SEL and P24 are connected by default • Disconnected SEL and P24 when use external power to drive DI
DO1, CME	Digital output	Programmable optical-couple isolation, open collector output • Output voltage: 0 - 30VDC, max-output current 50mA • DO2 can be selectable for pulse frequency output, max. frequency 50kHz CME is isolated to COM, connected to COM by default • Disconnect CME and COM when they are isolating output
DO2, COM	Digital output	
R1A/R1B/R1C	Relay output	Programmable output, contact rating: 250VAC/3A or 30VDC/1A • R1B, R1C: Normally closed. R1A, R1C: Normally open

Note:

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

4.4.2 I/O Board Terminal

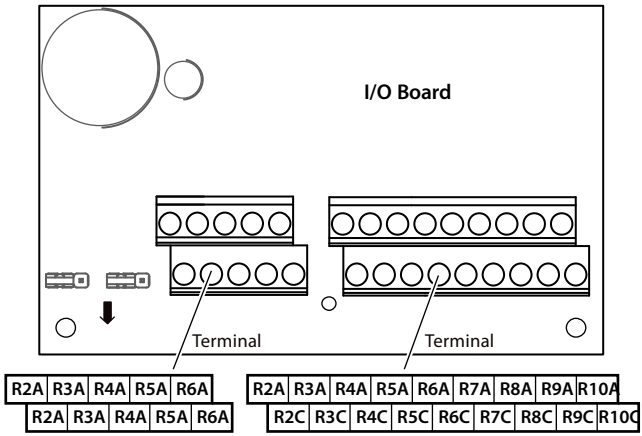


Figure 4–4 I/O board terminal

Table 4-6 I/O board terminal description

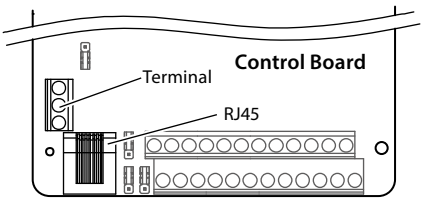
Terminal		Function Description
AI3 / AI4	Analogue input	Input voltage: -10 - +10V (input impedance: 32kΩ) Input current: 0 - 20mA (input impedance: 500Ω)
+10 / GND	Analogue power supply	Analogue input use +10V as supply, max. output current is 100mA
DI7 - DI9	Digital input	Programmable bipolar optional input, low level is effective by default. Input voltage: 0 - 30VDC (input impedance: 4.7kΩ)
P24, COM	Digital power supply	Digital input use +24V as supply, max. output current is 200mA
SEL	Digital input common terminal	SEL and P24 are connected by default • Disconnected SEL and P24 when use external power to drive DI7 - DI9
R2A/R2C - R10A/R10C	Relay output	Programmable normally open output Contact rating: 250VAC / 3A or 30VDC / 1A

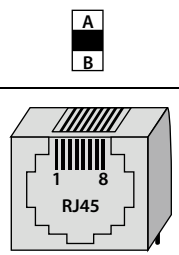
Note:

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

4.4.3 Modbus Communication Terminal

Do not use communication terminal and RJ45 simultaneously.





Terminal	Description
A	485+
B	485-
Pin	**Difinition**
1,3	+5V
2	485+
4,5,6	GND
7	485-
8	Unused

4.4.4 Jumper

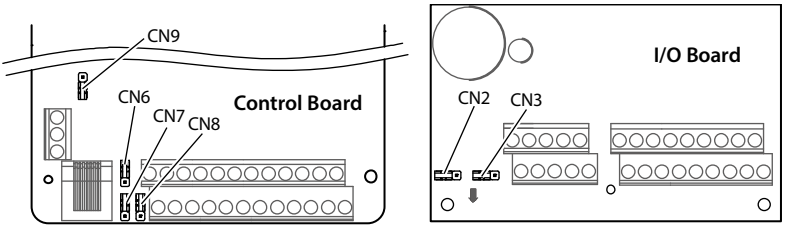
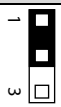
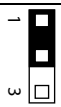
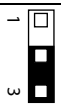


Figure 4–5 Jumper position

Table 4-7 Jumper description

Jumper	Description
Control board CN6 	AI2 can select voltage or current signal. • Pin 1 & 2 are short-connected, AI2 inputs voltage signal (factory setting). • Pin 2 & 3 are short-connected, AI2 inputs current signal.
Control board CN7 	AO1 can select voltage or current signal. • Pin 1 & 2 are short-connected, AO1 outputs voltage signal (factory setting). • Pin 2 & 3 are short-connected, AO1 outputs current signal.
Control board CN8 	AO2 can select voltage or current signal. • Pin 1 & 2 are short-connected, AO2 outputs voltage signal (factory setting). • Pin 2 & 3 are short-connected, AO2 outputs current signal.
Control board CN9 	SCI communication can select proper resistance. • Pin 1 & 2 are short-connected, select the proper resistance. • Pin 2 & 3 are short-connected, no resistance (factory setting).
I/O board CN2 	AI3 can select voltage or current signal. • Pin 1 & 2 are short-connected, AI3 inputs voltage signal (factory setting). • Pin 2 & 3 are short-connected, AI3 inputs current signal.
I/O board CN3 	AI4 can select voltage or current signal. • Pin1 & 2 are short-connected, AI4 inputs voltage signal (factory setting). • Pin2 & 3 are short-connected, AI4 inputs current signal.

Chapter 5 Keypad

Danger

- Only when the terminal cover of HD31 has been fitted can user 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 HD31 starts.
- Keep away from HD31 if the auto-restart function is enabled at power outage.
- To change the PCBA, correctly set the parameters before running.

Warning

- Do not check or detect the signal during HD31 running.
- Do not randomly change HD31 parameter setting.
- Please thoroughly complete all control commissioning and testing, make all adjustments and conduct a full safety assessment before switching the running command source of HD31.
- Do not touch the energy-depletion braking resistor due to the high temperature.

5

The standard HD31 are installed with LED keypad which is shown as Table 5-1.

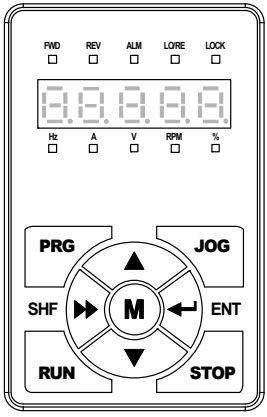


Table 5-1 Key description of keypad

Key	Description
PRG	Entry or exit programming key
JOG	In the keypad control, jog start HD31
RUN	In the keypad control, press this key to run HD31
STOP	a. In the keypad control, press this key to stop HD31 b. In the detection fault, press this key to reset at fault
M	Set certain function by F00.12
▲	Increase value or parameter
▼	Decrease value or parameter
▶▶	a. Select display parameter and shift bit b. Stop in loop/Display the parameter during running
↵	a. Enter lower menu b. Confirm saving the data

The kaypad consists of 5 status indicators and 5 unit indicators and shown as Table 5-2.

Table 5-2 Indicator description of the keypad

Mark	Name	■: Lighting	□: Flashing	□: Lightless
FWD	Forward status	HD31 is forward running at the moment	The start of HD31 is forward running next time	
REV	Reverse status	HD31 is reverse running at the moment	The start of HD31 is reverse running next time	
ALM	Alarm status	HD31 is faulty at the moment		HD31 is well at the moment
LO/RE	Remote/Local status	Indicate HD31 isn't in keypad control mode		HD31 is in keypad control mode
LOCK	Password locked status	The user password lock of HD31 is avail		There is no user password or unlocked
Hz	Frequency unit	The unit of the present parameter is Hz	The present parameter is output frequency	
A	Current unit	The unit of the present parameter is A		
V	Voltage unit	The unit of the current parameter is V		
RPM	Rotary speed unit	The unit of the present parameter is rpm	The present parameter is rotary speed unit	
%	% unit	The unit of the present function parameter is %		

The keypad of HD31 has five LED displays and their meanings are shown in Table 5-3.

Table 5-3 LED display description

LED display	Meaning	LED display	Meaning	LED display	Meaning	LED display	Meaning
	0		A		J		U
	1		b		L		u
	2		C		n		y
	3		c		o		-
	4		d		P		Point
	5		E		q		Full display
	6		F		r		No display
	7		H		S		Flash modifiable
	8		h		T		
	9		i		t		

Chapter 6 Function Introduction

This chapter will provide user with detail function introduction of each group.

Display Parameters:

General Parameters:

Specialized Parameter for Multi-pump Water Supply:

6.1 Group d: Display Parameters

Users can directly check the status parameters by checking the function code of Group d.

6.1.1 d00: Status Display Parameters

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>d00.00</td><td>Inverter series</td><td>[Actual value]</td></tr>
<tr><td>d00.01</td><td>Software version of the control board</td><td>[Actual value]</td></tr>
<tr><td>d00.03</td><td>Special software version of the control board</td><td>[Actual value]</td></tr>
<tr><td>d00.05</td><td>Software version of the keypad</td><td>[Actual value]</td></tr>
<tr><td>d00.06</td><td>Customized series No.</td><td>[Actual value]</td></tr>
<tr><td>d00.07</td><td>Motor and control mode</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display the current motor and the control mode.
Unit: Display the current driving motor
• 0: Motor 1.
• 1: Motor 2.
Ten: Control mode
• 0: V/f contorl without PG.
• 2: Vector control without PG.</td></tr>
<tr><td>d00.08</td><td>Rated current of the inverter</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">Display HD31 status, as shown in the following table:
<table>
<tr><td>Bit15: Unused</td><td>Bit14: Unused</td><td>Bit13: Current limit
0: Invalid
1: Valid</td><td>Bit12: Stall overvoltage
0: Invalid
1: Valid</td></tr>
<tr><td>Bit11: Unused</td><td>Bit10: Speed limit value
0: Invalid
1: Valid</td><td>Bit9: Unused</td><td>Bit8: Auto-tuning
0: Not in auto-tuning
1: In auto-tuning</td></tr>
<tr><td>Bit7: DC braking
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>Bit3: Zero speed running
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: No fault
1: Fault</td></tr>
</table>
123</td></tr>
<tr><td>d00.11</td><td>Master setting frequency source</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">0: Keypad set.
1: Terninal set.
2: Communicaiton set.
3: Analogue set.
4: Terminal pulse set.
6 - 9: AI1 - AI4 set.
10: Keypad potentiometer set.
11: PID.
12: Multi-speed.
13: PLC.</td></tr>
<tr><td>d00.12</td><td>Master setting frequency (Hz)</td><td>[Actual value]</td></tr>
<tr><td>d00.13</td><td>Auxiliary setting frequency (Hz)</td><td>[Actual value]</td></tr>
<tr><td>d00.14</td><td>Setting frequency</td><td>[Actual value]</td></tr>
<tr><td>d00.15</td><td>Setting frequency (after Acc / Dec)</td><td>[Actual value]</td></tr>
<tr><td>d00.16</td><td>Output frequency</td><td>[Actual value]</td></tr>
<tr><td>d00.17</td><td>Setting speed</td><td>[Actual value]</td></tr>
</table>

Ref. Code	Function Description	Setting Range [Default]
d00.18	**Running speed**	**[Actual value]**
	Display sequence phase of the three-phase input. • 0: Positive sequence: L1 (R) preceding L2 (S) preceding L3 (T). • 1: Negative sequence: L1 (R) preceding L3 (T) preceding L2 (S).	
d00.20	**Output voltage**	**[Actual value]**
d00.21	**Output current**	**[Actual value]**
d00.22	**Torque given (%)**	**[Actual value]**
	Display torque pro-given, the percentage of rated torque.	
d00.23	**Output torque**	**[Actual value]**
	Display output torque which is the relative percentage of the motor rated torque.	
d00.24	**Output power**	**[Actual value]**
	Display present actual output power whose unit is 0.1kW.	
d00.25	**DC bus voltage**	**[Actual value]**
d00.26	**Potentiometer input voltage of the keypad**	**[Actual value]**
	Display potentiometer input voltage of the keypad.	
d00.27	**AI1 input voltage**	**[Actual value]**
	Display AI1 input voltage.	
d00.28	**AI1 input voltage (after disposal)**	**[Actual value]**
	Display A1 input voltage which is calculated by the gain, bias and filter.	
d00.29	**AI2 input voltage**	**[Actual value]**
	Display AI2 input voltage. When selects current input, 0V corresponds to 0mA and 10.00V corresponds to 20mA.	
d00.30	**AI2 input voltage (after disposal)**	**[Actual value]**
	Display AI2 input voltage which is calculated by the gain, bias and filter.	
d00.31	**AI3 input voltage**	**[Actual value]**
	Display AI3 input voltage. When selects current input, 0V corresponds to 0mA and 10.00V corresponds to 20mA.	
d00.32	**AI3 input voltage (after disposal)**	**[Actual value]**
	Display AI3 input voltage which is calculated by the gain, bias and filter.	
d00.33	**AI4 input voltage**	**[Actual value]**
	Display AI4 input voltage. When selects current input, 0V corresponds to 0mA and 10.00V corresponds to 20mA.	
d00.34	**AI4 input voltage (after disposal)**	**[Actual value]**
	Display AI4 input voltage which is calculated by the gain, bias and filter.	
d00.35	**DI6 terminal pulse input frequency**	**[Actual value]**
	Display DI6 terminal pulse input frequency (Hz).	
d00.36	**AO1 output**	**[Actual value]**
	Display AO1 output. When selects current output, 0V corresponds to 0mA and 10.00V corresponds to 20mA.	
d00.37	**AO2 output**	**[Actual value]**
	Display AO2 output. When selects current output, 0V corresponds to 0mA and 10.00V corresponds to 20mA.	

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>d00.38</td><td>High-speed output pulse frequency</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display high-speed output pulse frequency (Hz).</td></tr>
<tr><td>d00.39</td><td>Heatsink temperature</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display heatsink temperature.</td></tr>
<tr><td>d00.40</td><td>Output current</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">When system is under constant pressure water supply condition,displays current actual output Power,unit:0.01kW.</td></tr>
<tr><td>d00.41</td><td>No flow power</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">When system is under constant pressure water supply condition,and dormancy mode P00.17=4,displays current no flow power,unit:0.01kW</td></tr>
<tr><td>d00.42</td><td>Set water supply pressure</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">When the system is supplying water at constant pressure, the current supply pressure will be displayed.</td></tr>
<tr><td>d00.43</td><td>Actual water supply pressure</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">When the system is supplying water at constant pressure, system pressure value detected by remote pressure gauge will be displayed.</td></tr>
<tr><td>d00.44</td><td>Process PID reference (%)</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display process PID reference relative to full scale (10.00V) percentage.</td></tr>
<tr><td>d00.45</td><td>Process PID feedback (%)</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display process PID feedback relative to full scale (10.00V) percentage.</td></tr>
<tr><td>d00.46</td><td>Process PID tolerance (%)</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display process PID tolerance relative to full scale (10.00V) percentage.</td></tr>
<tr><td>d00.47</td><td>Process PID integral item (%)</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display process PID integral item relative to full scale (10.00V) percentage.</td></tr>
<tr><td>d00.48</td><td>Process PID output</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display PID output to full scale (10.00V) percentage.</td></tr>
<tr><td>d00.49</td><td>External counting value</td><td>[Actual value]</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 sources which are in the below table.
• 0: Input terminals disconnect with common terminals.
• 1: Input 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>DI9</td><td>DI8</td><td>DI7</td><td>DI6</td><td>DI5</td><td>DI4</td><td>DI3</td><td>DI2</td><td>DI1</td></tr>
</table>
123</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 sources 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>RLY10</td><td>RLY9</td><td>RLY8</td><td>RLY7</td><td>RLY6</td><td>RLY5</td><td>RLY4</td><td>RLY3</td><td>RLY2</td><td>RLY1</td><td>DO2</td><td>DO1</td></tr>
</table>
123</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.</td></tr>
</table>

Ref. Code	Function Description	Setting Range [Default]
	1: Communication timeout. 4: Incorrect data frame content.	
d00.53	Actual length (m)	[Actual value]
d00.54	Total length (km)	[Actual value]
d00.55	Total time at power-on	[Actual value]
d00.56	Total time at operation	[Actual value]
	d00.55 displays total time at power-on; d00.56 displays total time at running. The unit is hour.	
d00.57	High bit of motor total energy consumption	[Actual value]
d00.58	Low bit of motor total energy consumption	[Actual value]
	Display high bit (d00.57) and low bit (d00.58) of the motor total energy consumption.	
d00.59	High bit of energy con. at this time running	[Actual value]
d00.60	Low bit of energy con. at this time running	[Actual value]
	Display high bit (d00.59) and low bit (d00.60) of energy consumption at this time running.	
d00.61	Present fault	[Actual value]
	Display present fault. • Displaying 100 means undervoltage.	

6.1.2 d02: Water Supply System Status

Ref. Code	Function Description	Setting Range [Default]
d02.00	Current Moment	[Actual value]
	Current system hour and minute format is displayed as 23.59, and 23 is the hour and 59 is the minute.	
d02.01	Pump 1 status	[Actual value]
d02.02	Pump 2 status	[Actual value]
d02.03	Pump 3 status	[Actual value]
d02.04	Pump 4 status	[Actual value]
d02.05	Pump 5 status	[Actual value]
	0: Waiting for running. 1: Running as main pump 2: Fault pump. 3:DI terminal disable	
d02.07	Current auxiliary pump amount	[Actual value]
	0: no main pump enabled currently 1-5:pump1-pump5	
d02.08	Main pump running time high bit (unit:min)	[Actual value]
d02.09	Main pump running time low bit (unit:min)	[Actual value]
d02.10	Pump 1 running time high bit as auxiliary pump (unit:min)	[Actual value]
d02.11	Pump 1 running time high bit as main pump (unit:min)	[Actual value]
d02.12	Pump 2 running time high bit as auxiliary pump (unit:min)	[Actual value]
d02.13	Pump 2 running time high bit as main pump (unit:min)	[Actual value]
d02.14	Pump 3 running time high bit as auxiliary pump (unit:min)	[Actual value]
d02.15	Pump 3 running time high bit as main pump (unit:min)	[Actual value]
d02.16	Pump 4 running time high bit as auxiliary pump (unit:min)	[Actual value]
d02.17	Pump 4 running time high bit as main pump (unit:min)	[Actual value]
d02.18	Pump 5 running time high bit as auxiliary pump (unit:min)	[Actual value]

Ref. Code	Function Description	Setting Range [Default]
d02.19	Pump 5 running time high bit as main pump (unit:min)	[Actual value]
	Time caculating formula:high bit value*65536+low bit value	
d02.20	Flow compensation	[Actual value]
	Flow compensation defined by P00.51-P00.54 and d02.07,range is 0-400.0%	

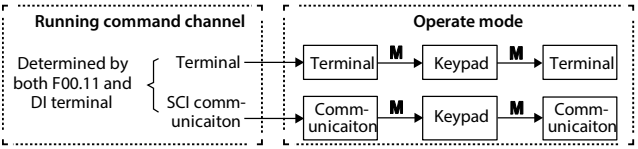
6.2 Group F: General Parameters

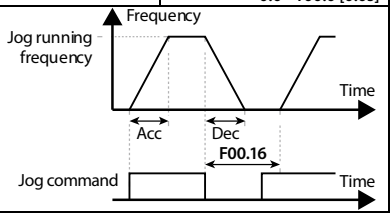
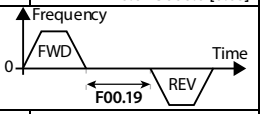
6.2.1 F00: Basic Parameters

Ref. Code	Function Description	Setting Range [Default]
F00.00	**Control mode selection**	0,1 [0]
	0: Speed control. 1: Torque control. • Torque control is valid only when the motor control mode is selected for PG vector control (F00.01 / F13.00 = 2). • Refer to Group F15 DI terminal (56, 57) function description and Group F21 torque control parameter description for details of torque control.	
F00.01	**Motor 1 control mode selection**	0 - 2 [0]
	0: V/f control without PG. Constant voltage/frequency ratio control. • It is specially applicable for occasions when one inverter drives more than one motors to achieve proper efficiency. • When select V/f control, please properly set the V/f control Group F09 to achieve proper efficiency. 2: Vector control without PG. Sensorless vector control. • It is applicable for application with high requirement on inverter performance and torque. • At first, it must perform motor parameter auto-tuning. And then adjust the settings of F08.00 - F08.04 according to the nameplate of the motor. Start the motor parameter auto-tuning function.	
F00.02	**Inverter type setting**	0,1 [1]
	0: G type, to drive heavy and general motor. 1: P type, to drive pump and fan.	
F00.03	**Motor selection**	0,1 [0]
	0: Motor 1. 1: Motor 2. *Note: It can preset two Group motor parameters. At stop they can shift even without input parameters when they are respectively driving two motors.*	
F00.04	**Extension card selection**	0,2 [2]
	0: Option is invalid. 2: HD31-WIO is valid.	
F00.05	**HD31 extended function**	0,1 [0]
	0: No extended. 1: Constant pressure water supply.	
F00.06	**Inverter max. output frequency**	50.00 - 400.00 [50.00Hz]
	Defines the max. frequency that HD31 is allowed to output. • Be careful to set reasonable parameters according to the nameplate of the motor and the actual running conditions.	

Ref. Code	Function Description	Setting Range [Default]
F00.07	**Upper limit of operation frequency setting source**	**0 - 2 [0]**
	Defines the highest frequency that user can set, and select setting sources to set the upper limit frequency via F00.07. 0: Digital setting. Set the upper limit frequency by F00.08. 1: Analogue input setting. Refer to Group F16. 2: DI6 pulse setting. Set by F16.17, and its max. pulse input frequency corresponds to F00.06 (max. output frequency of HD31).	

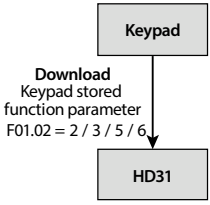
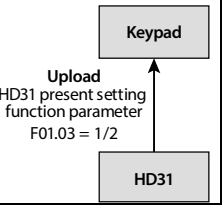
Ref. Code	Function Description	Setting Range [Default]
F00.08	**Upper limit of operation frequency**	**0.00 - F00.06 [50.00Hz]**
	F00.07 = 0, the upper limit frequency is set by F00.08.	
F00.09	**Lower limit of operation frequency**	**0.00 - F00.08 [0.00Hz]**
	Use F00.09 to limit the actual output frequency. When the setting frequency value < F00.09, it will operate at lower limit frequency. • Properly set the parameters according to the nameplate of the motor and actual running conditions. • No limitation on the motor parameter auto-tuning function. • Besides the lower /upper limit frequency, the running frequency of inverter is also limited by the parameter settings of skip frequency (F05.17 - F05.19).	
F00.10	**Frequency setting sources selection**	**0 - 10 [0]**
	0: Display panel digital setting. Change the value by pressing the ▲ or ▼ key of the keypad. Initial value is set by F00.13. 1: Terminal digital setting. Change the value by using the terminals UP/DN. F00.13 sets initial value. 2: SCI communication setting. Chang the setting frequency by SCI communication frequency command. • The initial value of the SCI communication frequency is 0. 3: AI analogue setting. It is set by the analogue input voltage. • See Group F16. • The corresponding relationship between the analogue value of AI1 and the inverter's running frequency setting is refered to Group F05. 4: Terminal pulse setting. It is set by the terminal pulse DI6. • Refered to Group F05 for the corresponding relationship between the pulse terminal frequency and the inverter's running frequency setting. 6 - 9: AI1 – AI4 set. 10: Keypad potentiometer setting.	
F00.11	**Command setting source selection**	**0 - 2 [0]**
	0: Display panel running source. Start and stop the inveter by pressing the key **RUN**, **STOP**, **JOG**. 1: Terminal running source. Start and stop by using the corresponding external terminals. • External terminal FWD (DI terminal is set to 2), REV (DI terminal is set to 3), JOGF1 (DI terminal is set to 20), JOGR1 (DI terminal is set to 21), JOGF2 DI terminal is set to 22), JOGR2 (DI terminal is set to 23). For more information please see Group F15. 2: SCI communication running source. Start and stop by SCI communication port according to communication protocol.	

Ref. Code	Function Description	Setting Range [Default]
F00.12	**M key function**	**0 - 2 [2]**
	0: Switch the keypad running direction. Switch the keypad running direction by **M** key. • When F00.11 = 0, it is valid. Do not save when power is off. • The operation direction can only be switched when the operation panel is in the status parameter display. 1: Switch local and remote control. Switch the local and remote control by **M** key. • LOCAL: when running the command channel is keypad command channel (F00.11 = 0). • REMOTE: When the command channel is a command channel other than keypad (F00.11 = 1, 2). • Run command channel priority: Local remote switch > DI terminal (9, 10, 11 function) determine command channel > F00.11 set command channel.  • LO/RE indicator: Lit: Indicates that the current drive is in the terminal running command channel. Blinking: Indicates that the current drive is in the communication run command channel. Off: Indicates that the current drive is in the operator panel running command channe. 2: Multi-function key is invalid.	
F00.13	**Starting frequency digital setting**	**0 - upper limit [50.00Hz]**
	F00.10 = 0 or 1, F00.13 sets the initial frequency value.	
F00.14	**Frequency setting control**	**0000 - 1111 [1001]**
	Only valid when F00.11 = 0 or 1. • The current setting frequency value will be replaced by a new one when the value of the F00.13 has been changed by setting the parameter. **Unit: Save selection of frequency setting at power outage** • 0: Do not save at power outage. • 1: Save to F00.13 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: Switch the frequency channel to the analogue selection** • 0: Not saved. • 1: Save.	

Ref. Code	Function Description	Setting Range [Default]
F00.15	**Jog running frequency digital setting 1**	**0 - upper limit frequency [5.00Hz]**
F00.16	**Interval of jog running**	**0.0 - 100.0 [0.0s]**
	After cancel the jog command, HD31 will not respond to the jog command at the interval of jog running set by 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. It can respond to the FWD / REV commands. When the analogue value is set to positive / negative voltage and the negative voltage corresponds to the reverse frequency, HD31 will run in accordance with the zero-frequency run.	
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 shown as the right figure. 	
F00.20	**Key enable of optional keypad**	**0,1 [0]**
	0: Enabled. When HD31 connects to two keypads, the keys of optional display using the communication port can be operated. 1: Invalid. When HD31 connects to two keypads, the keys of optional display using the communication port can not be operated.	
F00.21	**Dormant function**	**0,1 [0]**
	0: Disabled. This function is invalid. 1: Enabled. At running status, when the setting frequency ≤ lower limit of running frequency (F00.09), HD31 coasts to stop and enters dormant status.	
F00.22	**Dormancy wake up time**	**0.0 - 360.0 [0.0s]**
	When HD31 is at dormancy status, and the setting frequency > lower limit of running frequency (F00.09), and the duration achieves the setting time of F00.22, then HD31 wakes up from dormancy status, and starts at the mode of F02.00.	
F00.24	**Sleep delay time**	**0.0 - 6000.0 [1.0s]**
F00.25	**Sleep frequency**	**0.00 - upper limit [0.00Hz]**
	F00.21 - F00.25 can realize functions of sleep and wake up. • With running command and it is in sleep state, After setting the frequency ≥ F00.25, after the time F00.22 (sleep wake-up time), the inverter will exit the dormant state and start to start. • During operation, when set frequency < F00.25, the inverter enters the sleep state (the operation indicator is on and the LED flashes) and stops after the elapsed time F00.24 (sleep delay time). • The above sleep function is only valid at F00.11=1 (terminaloperation command channel).	

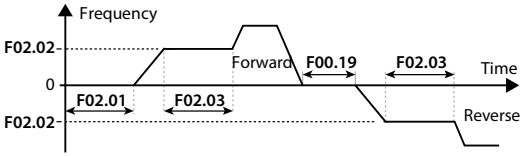
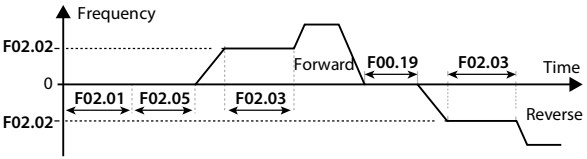
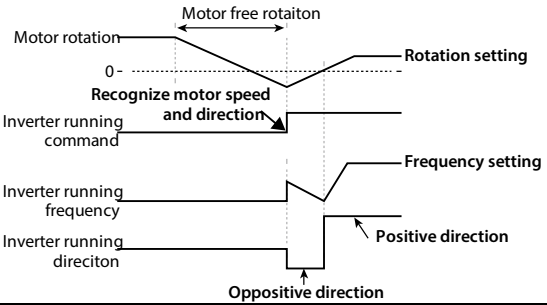
<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>F00.26</td><td>Action selection for inverter running at zero frequency</td><td>000 - 332 [111]</td></tr>
<tr><td></td><td colspan="2">Unit: When running is controlled by V/f, action selection of zero frequency
• 0: No treatment.
• 1: Inverter lock output.
• 2: Inverter run in DC brake.
Ten: Zero frequency action selection in open loop vector running
Hundred: Zero frequency action selection in torque control
• 0: No treatment.
• 1: Inverter lock output.
• 2: Inverter run in DC brake.
• 3: The frequency converter is operated by pre-excitation.</td></tr>
<tr><td>F00.27</td><td>Command source binding frequency source selection</td><td>000 - ddd [000]</td></tr>
<tr><td></td><td colspan="2">Only valid for the main frequency, when the command source has a binding frequency source, the command source is valid, F00.10 the frequency source is invalid.
Unit: Panel command binding frequency source selection
Ten: Terminal command Binding frequency source selection
Hundred: Communication command binding frequency source selection
• 0: No binding.
• 1: Keypa digital setting.
• 2: Terminal digital setting.
• 3: SCI communicaiton setting.
• 5: Terminal pulse setting.
• 7: AI1 setting.
• 8: AI2 setting.
• 9: AI3 setting.
• A: AI4 setting.
• b: Keypad potentiometer setting.
• C: PID setting.
• d: Multi-speed setting.</td></tr>
<tr><td>F00.28</td><td>Functions selection of button STOP</td><td>0,1 [0]</td></tr>
<tr><td></td><td colspan="2">0: Only valid in control of keypad.
1: Valid in all control mode.</td></tr>
</table>

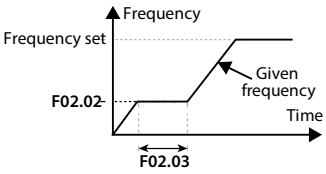
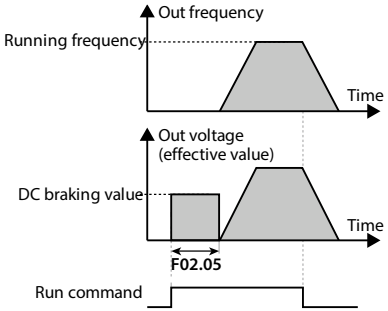
6.2.2 F01: Protection of Parameters

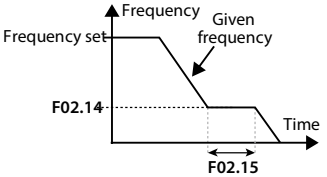
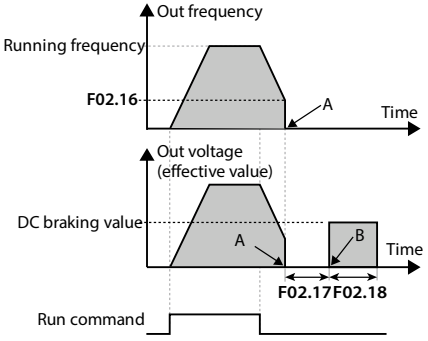
Ref. Code	Function Description	Setting Range [Default]
F01.00	**User's password**	**00000 - 65535 [00000]**
	XXXXX: To enable the password protection function, set any non-zero number as the password. • Once the password is set, to change any parameter, input correct password. Otherwise, all the parameters cannot be changed but only read. • When input correct password, by pressing **PRG** key 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.	
F01.01	**Menu mode**	**000 - 111 [010]**
	Unit: 0: Full menu mode. All function parameters can be displayed. 1: Checking menu mode. (only different from factory setting parameters can be displayed) **Ten:** 0: Does not lock the parameter mapping relationship of Group F. 1: Lock the parameter mapping relationship of Group F. **Hundred:** 0: After password protection, Group F parameters can be read. 1: After password protection, Group F parameters are prohibited from reading.	
F01.02	**Function code parameter initialization (download)**	**0 - 6 [0]**
	0: No operation. HD31 is in regular parameter read / write status. • Whether can change the parameter depends on user's password status and the actual running condition of HD31. 1: Restore to factory settings. • Except F01.00, F01.02, F01.03, F19.19, F19.24, F20.08, F20.09, F20.21 - F20.37, F23.00. • **Steps:** If set F01.02 = 1, press ↵ to ensure and the parameters are restored to factory settings. The keypad dispalys "rESEt". 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 clear. 5: Download the keypad EEPROM parameter 1 to the current function code settings (including the motor parameters). 6: Download the keypad EEPROM parameter 2 to the current function code settings (including the motor parameters).	
F01.03	**Display panel EEPROM parameter initialization (upload)**	**0 - 2 [0]**
	0: No operation. HD31 is in regular parameter read / write status. 1: Upload the current function code settings to the keypad EEPROM parameter 1. 2: Upload the current function code settings to the keypad EEPROM parameter 2. *Note: F01.00, F01.02, F01.03, F20.21 - F20.37 and Group y do not upload or download.*	

6

6.2.3 F02: Run / Stop Control Parameters

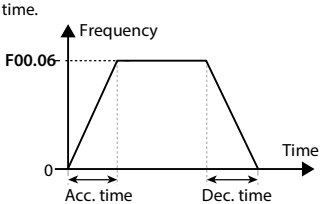
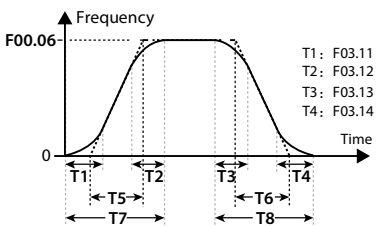
Ref. Code	Function Description	Setting Range [Default]
F02.00	**Start mode selection**	**0 - 2 [0]**
	0: From the DWELL frequency to start. • Refer to F02.02 and F02.03 parameters for the start DWELL frequency.  1: Brake first and then start from DWELL frequency. • Refer to F02.04 and F02.05 parameters for the DC braking. • Starting DC braking is enabled only in the process from the stop status to running status. But it is disabled in the process of direction switch, as shown in the figure. There is no F02.05 (DC braking time) when reverse.  2: Start after speed tracking. If the result of speed tracking is smaller than F02.02, it will start from the starting DWELL frequency. • The inverter automatically searches and catches the motor's running direction and speed, and starts the rotating motor smoothly without impact. As the right figure. • This mode is enabled only in the process from stop status to running status. But it is disabled in the process of direction switch.  	
F02.01	**Starting delay time**	**0.00 - 10.00 [0.00s]**
	When the inverter receives the run command, it will wait for the delay time set by F02.01 and then start running.	
F02.02	**Start DWELL frequency setting**	**0.00 - upper limit [0.00Hz]**
F02.03	**Retention time of starting DWELL frequency**	**0.00 - 10.00 [0.00s]**
	When starting, temporarily keep the output frequency to prevent the motor into a stall state. When it is loaded with a brake, when the brake is operating slowly, in order to prevent friction from the brake, use DWELL function to accelerate after the brake is fully opened.	

Ref. Code	Function Description	Setting Range [Default]
	• During Acc., when the given frequency matches the frequency set by F02.02, the output frequency is maintained at the time set in F02.03 and continues to accelerate. • Set F02.02 or F02.03 as 0, the starting DWELL frequency is disabled. *Note: Torque control, process PID / auxiliary set process PID, simple PLC and wobble , DWELL function is invalid.* 	
F02.04	**DC braking current setting**	**0 100 (inverter's rated current) [50%]**
F02.05	**DC braking time at start**	**0.00 - 60.00 [0.50s]**
	F02.04 is a percentage of the inverter's rated current. To set the current value of the DC braking at start and at stop. • If setting is higher than fivefold of motor's rated current, the injection current value is fivefold of the motor's rated current. • The DC braking current is valid to both start and stop DC braking. F02.05 = 0.0s, there is no DC braking process at start. • Only when F02.00 = 1 will F02.05 be enabled. 	
F02.06	**Faster tracking results compensation value**	**0.000 - 2.000 [0.000Hz]**
F02.08	**Voltage self-learning**	**0,1 [0]**
	0: Invalid. 1: Enabled. Steps : • 1. Please confirm that the inverter is connected to the motor line. (If F00.05=1, set P01.00 - P01.06 and P03.15 - P03.24 reasonably.) • 2. Please confirm that motor is in a static state. • 3. After F02.08 is set to 1, the keypad displays "tunE" during self-learning, self-learning is completed after 2 - 3s, and F02.08 automatically turns to 0. *Note:* *1. If E0023 fault is reported in the process of voltage self-learning, please confirm again whether the motor is in a completely static state, and then re-enable the energy voltage self-learning.* *2. If F00.05 = 1, set the frequency conversion pump (P01.00 - P01.06) and its corresponding relay (P03.15 - P03.24).*	
F02.09	**Search frequency direction reverse**	**0,1 [0]**
	0: Not inverted. 1: Inverted.	
F02.10	**Speed search start threshold**	**0.0 - 60.0 [15.0%]**
F02.11	**Voltage difference**	**0 - 200 [30%]**
F02.12	**Speed search post-processing time**	**0.0 - 5.0s [Depend on HD31]**

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>F02.13</td><td>Stop mode selection</td><td>0 - 2 [0]</td></tr>
<tr><td></td><td colspan="2">0: Dec. to stop.
• After the stop command is received, the inverter reduces its output frequency according to the Dec. time. When the frequency decreases to F02.14 and holds on a time F02.15 set, it will stop.
• Refer to the parameter F02.14 and F02.15 in the figure.
1: Coast to stop.
• After the stop command is received, the inverter stops output immediately and the motor stops under the effects of mechanical inertia.
2: Dec. to stop with DC braking.
• After the stop command is received, the inverter reduces its output frequency according to the Dec. time and starts DC braking when its output frequency reaches F02.16 setting frequency.
• Refers to parameter F02.16 - F02.18 in the figure for the DC braking at stop.
• Refers to parameter F03.00 - F03.08 for the Dec. time.</td></tr>
<tr><td>F02.14</td><td>DWELL frequency setting at stop</td><td>0.00 - upper limit [0.00Hz]</td></tr>
<tr><td>F02.15</td><td>Retention time of DWELL frequency at stop</td><td>0.00 - 10.00 [0.00s]</td></tr>
<tr><td></td><td colspan="2">F02.14 defines inverter's DWELL frequency at stop.
F02.15 is a holding time DWELL frequency at stop (F02.14) in inverter stop process.
• Only when F02.13 = 0 will it be enabled.
• Set F02.14 or F02.15 as 0, DWELL frequency at stop is disabled.
 
</td></tr>
<tr><td>F02.16</td><td>DC braking initial frequency at stop</td><td>0.00 - 50.00 [0.50Hz]</td></tr>
<tr><td>F02.17</td><td>DC braking waiting time at stop</td><td>0.00 - 10.00 [0.00s]</td></tr>
<tr><td>F02.18</td><td>DC braking time at stop</td><td>0.00 - 10.00 [0.50s]</td></tr>
<tr><td></td><td colspan="2">F02.17 is the interval from A to B in the right figure during Dec. stop process.
• The inverter has no output during the waiting time. By F02.17 setting the waiting time, the current overshoot in the initial stage (point B in the figure) of braking can be reduced when the inverter drives a high power motor.
• By F02.04 setting the DC braking current at stop.
F02.18 = 0.00s, there is no DC braking process at stop.
• Only when F02.13 = 2 will F02.16 - F02.18 be enabled.
 
</td></tr>
</table>

Ref. Code	Function Description	Setting Range [Default]
F02.19	**Jog control mode**	**00 - 11 [10]**
	Unit: 0: The jog functions of start and stop mode etc are invalid. • In jog running, start mode set by F02.00 and stop mode set by F02.13 are invalid. When the jog command is valid, the inverter starts up and running. When the jog command is invalid, the inverter will decelerate and stop. 1: The jog functions of start and stop mode etc are enabled. • In jog running, inverter will run in start mode set by F02.00 and stop mode set by F02.13. **Ten:** 0: Terminal jog is not preferred. • Terminal control operation does not respond to terminal jog command. 1: Terminal jog priority.	
F02.20	**Pre-excitation time**	**0.00 - 0.50 [0.50s]**
	Pre-excitation effect: Before the motor rotation, establish the motor flux, in order to obtain faster Acc. performance. • This function only takes effect in open loop vector control mode. It is recommended that F02.20 value be not less than 0.10s. • F02.20 = 0.00s, the pre-excitation function is disabled.	
F02.21	**Frequency threshold judged by voltage**	**0.00 - 20.00 [0.00Hz]**

6.2.4 F03: Acc / Dec Parameters

Ref. Code	Function Description	Setting Range [Default]
F03.00	**Acc. / Dec. mode selection**	**00 -11 [00]**
	Unit: Mode selection of Ace. and Dec. 0: Linear Acc. or Dec.. • Output frequency increases or decreases according to the constant slope. 1: S-curve Acc. or Dec.. • Output frequency increases or decelerases according to the S-curve. • T5 is the setting Acc. time, T7 is the actual Acc. time. T6 is the setting Dec. time, T8 is the actual Dec. time.   **Ten: Acc. / Dec. time reference frequency adjustment** 0: Max. frequency (F00.06). 1: Set frequency.	

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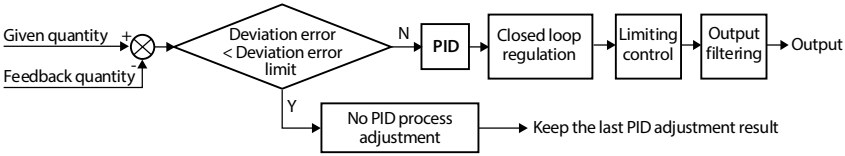
Ref. Code	Function Description	Setting Range [Default]
F03.01	**Acc. time 1**	**0.1 - 6000.0**
F03.02	**Dec. time 1**	**[18.5kW and below: 10.0s]**
F03.03	**Acc. time 2**	**[22 - 75kW: 30.0s]**
F03.04	**Dec. time 2**	**[90kW and above: 60.0s]**
F03.05	**Acc. time 3**	
F03.06	**Dec. time 3**	
F03.07	**Acc. time 4**	
F03.08	**Dec. time 4**	
	Acc. time is the time required for inverter to accelerate from zero frequency to the reference frequency in a straight line. Dec. time is the time required for inverter to decrease from the reference frequency to the zero frequency in a straight line. • The reference frequency can be set by the F03.00 tens digit. The Acc. / Dec. time can only be selected. See the illustration in F03.00. Acc. time, Dec. time switch: • The Acc. / Dec. time can be selected by 26,27 of DI terminal or F03.09, F03.10 during inverter operation. Acc. / Dec. mode switching: • The inverter can select the Acc. / Dec. mode (straight line or S curve) by setting F03.00 or DI terminal No. 28 function. *Note: The inverter may fail overvoltage when the brake assembly is not properly selected, rapid Dec. or load inertia is large. F19.18, F19.19 can be adjusted by selecting the appropriate brake assembly or increasing the Dec. time to avoid possible overvoltage faults.*	
F03.09	**Switching frequency of Acc. time 2 and time 1**	**0.00 - upper limit [0.00Hz]**
F03.10	**Switching frequency of Dec. time 2 and time 1**	**0.00 - upper limit [0.00Hz]**
	When the running frequency is smaller than the F03.09 setting, it will accelerate according to Acc. time 2; Otherwise it will accelerate according to Acc. time 1. When the running frequency is smaller than the F03.10 setting, it will decelerate according to Dec. time 2; Otherwise it will decelerate according to Dec. time 1. • When use terminals to select Acc. / Dec. time (set multi-function terminal as number 26 and 27 function), F03.10 is disabled.	
F03.11	**S-curve characteristic time at starting Acc.**	**0.00 - 2.50 [0.20s]**
F03.12	**S-curve characteristic time at ending Acc.**	**0.00 - 2.50 [0.20s]**
F03.13	**S-curve characteristic time at starting Dec.**	**0.00 - 2.50 [0.20s]**
F03.14	**S-curve characteristic time at ending Dec.**	**0.00 - 2.50 [0.20s]**
	Refer to the figure of parameter F03.00.	
F03.15	**Acc. time of jog operation**	**0.1 - 6000.0 [6.0s]**
F03.16	**Dec. time of jog operation**	**0.1 - 6000.0 [6.0s]**
	F03.15 and F03.16 define the Acc / Dec time of jog running.	
F03.17	**Dec time of emergency stop**	**0.1 - 6000.0 [10.0s]**
	Defines the Dec time of emergency stop.	

6.2.5 F04: Process PID Control

Closed-loop can be constituted not only by analogue reference and feedback but also by pulse reference and feedback. Generally, the process PID control mode is used to regulate on-site pressure, liquid level and temperature etc.

The process PID control is shown in the following figure:



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: When using the auxiliary PID, set F04.00 to 0.*	
F04.01	**Reference source selection**	**0 - 7 [0]**
	0: Digital reference. It is the value of F04.03 reference. 1: AI analogue reference. It is the value of the analogue input voltage AI reference, and refer to Group F16. 2: Terminal pulse reference. It is the value of the terminal pulse input reference, and max. input pulse frequency corresponding to 10V of the PID reference. 3 - 6: AI1 - AI4 given. 7: Operation panel potentiometer given.	
F04.02	**Feedback source selection**	**0 - 7 [0]**
	0: AI analogue feedback. 4: AI3 given. 1: Terminal pulse feedback. 5: AI4 given. 2: AI1 given. 6: Operation panel potentiometer given. 3: AI2 given. 7: Speedn closed loop feedback.	
F04.03	**Setting digital reference**	**-100.0 - 100.0 [0.0%]**
	It defines the process PID regulator reference. • When F04.01 = 0 (digital reference), it is enabled.	
F04.04	**Proportional gain (P1)**	**0.0 - 500.0 [50.0]**
F04.05	**Integral time (I1)**	**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 amplitude limit value**	**0.0 - 100.0 [20.0%]**
F04.09	**Sampling cycle (T)**	**0.01 - 50.00 [0.10s]**
	F04.04, F04.05 and F04.07 define the process PID parameters. F04.06 defines the process PID integral upper limit. F04.08 defines the process PID differential amplitude limit value. F04.09 defines the sampling cycle of feedback value and the PID regulator calculates once in each sampling cycle. • When F04.07 = 0, the differential is disabled.	

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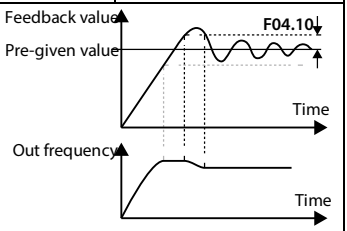
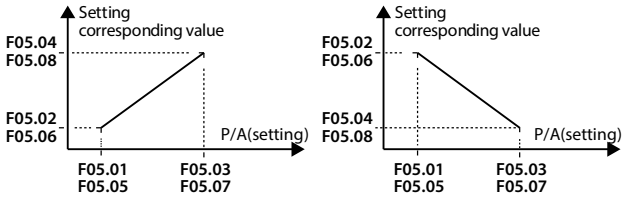
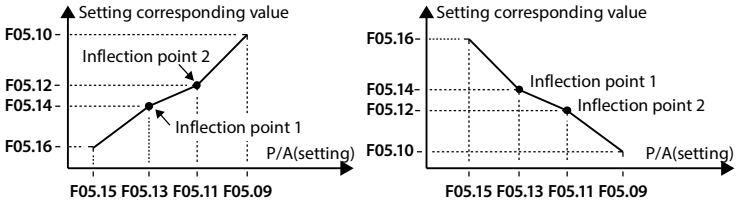
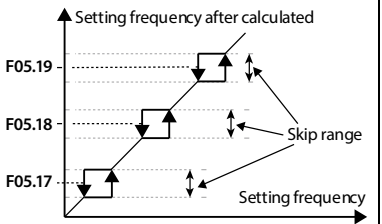
Ref. Code	Function Description	Setting Range [Default]
F04.10	**Bias limit**	**0.0 - 20.0 (reference) [0.0%]**
	F04.10 defines the max. deviation of the output from the reference closed-loop. • PID regulator stops operation when the feedback value is within this range. • Setting this parameter correctly is instructive to improve the system output accuracy and stability. • Large setting value of F04.10 may cause the process PID gap to adjust greatly, the whole process system does not converge the shock. 	
F04.11	**PID regulator upper limit source selection**	**0 - 7 [0]**
	0: Set by F04.13. 1: Set by AI analogue value. Set by analogue input voltage AI and refer to Group F16. 2: Set by terminal pulse input. 3 - 6: AI1 - AI4 set. 7: Keypad potentiometer setting.	
F04.12	**PID regulator lower limit source selection**	**0 - 7 [0]**
	It defines the setting source of PID regulator lower limit value. 0: Set by F04.14. 1: Set by AI analogue value. Set by analogue input voltage AI and refer to Group F16. 2: Set by terminal pulse. 3 - 6: AI1 - AI4 set. 7: Keypad potentiometer setting.	
F04.13	**PID regulator upper limit value**	**0.00 - upper limit [50.00Hz]**
F04.14	**PID regulator lower limit value**	**0.00 - upper limit [0.00Hz]**
	It defines that the process PID regulator output digital setting value of upper limit or lower limit.	
F04.15	**PID regulator characteristic**	**0,1 [0]**
	0: Positive. The motor RPM is required to increase with the increase of the reference. 1: Negative. The motor RPM is required to decrease with the increase of the reference.	
F04.17	**PID output filter time**	**0.01 - 10.00 [0.05s]**
	It defines the filtering time of process PID output.	
F04.18	**PID output reverse selection**	**0,1 [0]**
	0: PID regulation disable reverse. When PID output is negative, 0 is the limit. 1: PID regulation enable reverse. When F00.18 = 1 (disable reverse), 0 is the limit.	
F04.19	**PID output reverse frequency's upper limit**	**0.00 - upper limit [50.00Hz]**
	It defines the PID upper limit frequency when reverse. • When F04.18 = 1 (PID regulation enable reverse), it is enabled.	
F04.20	**Proportional gain (P2)**	**0.0 - 500.0 [50.0]**
F04.21	**Integral time (I2)**	**0.01 - 10.00 [1.00s]**
F04.22	**Derivative time (D2)**	**0.00 - 10.00 [0.00s]**
F04.23	**PID parameter adjustment basis**	**0 - 3 [0]**
	0: Do not adjust. The second segment PID is invalid. 1: DI. • PID parameter switching according to DI terminal function No. 59. When the terminal is invalid, select parameter Group 1 (F04.04, F04.05, F04.07) and select parameter Group 2 (F04.20 - F04.22) when valid.	

Ref. Code	Function Description	Setting Range [Default]
	2: Deviation. • PID parameter selects parameter Group 1 when the deviation between PID feedback and PID reference is less than PID parameter switching point 1 (F04.24). • PID parameter selects parameter Group 2 when the deviation between PID feedback and PID reference is greater than PID parameter switching point 2 (F04.25). • When the deviation between the PID feedback and the PID reference is between the PID parameter switching points 1 and 2, the PID parameter is a linear interpolation of the two sets of parameters. 3: Frequency. • PID parameter selects parameter Group 1 when PID output frequency is less than PID parameter switching point 1 (F04.24). • PID parameter selects parameter Group 2 when PID output frequency is greater than PID parameter switching point 2 (F04.25). • When the PID output frequency is between PID parameter switching points 1 and 2, the PID parameter is a linear interpolation of two sets of parameters.	
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%]**
F04.27	**Pulse of each turn**	**1 - 9999 [1024]**
F04.28	**Max. closed loop speed**	**1 - 24000 [1500rpm]**
F04.29	**PID arithmetic mode**	**0,1 [0]**
	0: No operation at stop. 1: Operation at shutdown.	
F04.30	**PID sleep**	**0,1 [0]**
	0: No sleeping. 1: Sleep enable.	
F04.31	**Tolerance of waking up**	**0.0 - 100.0 [10.0%]**
F04.32	**Delay of waking up**	**0.0 - 6000.0 [0.0s]**
	Positive characteristics: sleep state, when the feedback value ≤ set value × (100% - F04.31), and the timing ≥ F04.32, wake up the inverter. Negative characteristics: In the sleep state, when the feedback value ≥ set value × (100% + F04.31), and the time ≥ F04.32, wake up the inverter.	
F04.33	**Sleep tolerance**	**0.0 - 100.0 [10.0%]**
F04.34	**Sleep delay**	**0.0 - 6000.0 [0.0s]**
F04.35	**Sleep frequency**	**0.00 - max. frequency [20.00Hz]**
	Positive characteristics: wake-up state, when the feedback value ≥ given value × (100% + F04.33), the target frequency ≤ F04.35 and the timing time ≥ F04.34, the inverter sleep. Negative characteristics: In the wake-up state, when the feedback value is less than or equal to × (100% - F04.33), the target frequency is ≤ F04.35 and the counting time is ≥ F04.34. the inverter sleep.	

6.2.6 F05: External Setting Curve Parameters

Ref. Code	Function Description	Setting Range [Default]
F05.00	**External reference curve selection**	**00000 - 33333 [00000]**
	Unit: AI1 characteristic curve selection Ten: AI2 characteristic curve selection Hundred: AI3 characteristic curve selection Thousand: AI4 characteristic curve selection Ten thousand: Pulse input curve selection Each bit setting: • 0: Line 1. • 1: Line 2. • 2: Polyline. • 3: No treatment.	
F05.01	**Min. reference of line 1**	**0.0 - F05.03 [0.0%]**
F05.02	**Min. reference corresponding value of line 1**	**0.0 - 100.0 [0.0%]**
F05.03	**Max. reference of line 1**	**F05.01 - 100.0 [100.0%]**
F05.04	**Max. reference corresponding value of line 1**	**0.0 - 100.0 [100.0%]**
F05.05	**Min. reference of line 2**	**0.0 - F05.07 [0.0%]**
F05.06	**Min. reference corresponding value of line 2**	**0.0 - 100.0 [0.0%]**
F05.07	**Max. reference of line 2**	**F05.05 - 100.0 [100.0%]**
F05.08	**Max. reference corresponding value of line 2**	**0.0 - 100.0 [100.0%]**
F05.09	**Max. reference of polyline**	**F05.11 - 100.0 [100.0%]**
F05.10	**Max. reference corresponding value of polyline**	**0.0 - 100.0 [100.0%]**
F05.11	**Inflection point 2 reference 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 reference of polyline**	**F05.15 - F05.11 [0.0%]**
F05.14	**Inflection point 1 corresponding value**	**0.0—100.0 [0.0%]**
F05.15	**Min. reference of polyline**	**0.0 - F05.13 [0.0%]**
F05.16	**Min. reference 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**  	

Ref. Code	Function Description	Setting Range [Default]
	Positive and negative characteristic of polyline  **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 [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 HD31 to avoid resonance with the load. • HD31 will skip the above frequencies as shown in figure. Up to 3 skip frequency ranges can be set. • During the process of Acc / Dec, HD31 will run with countinous frequency output, ignoring the skip frequency ranges. But HD31 will not run at constant speed in the skip frequency ranges. • Frequency setting is uncontinuous, while frequency output is continuous.  	
F05.21	**Jog operation frequency digital setting 2**	**0.00 - upper limit [5.00Hz]**
	When select jog operation 2 through terminal, set the jog frequency operation according to F05.21.	
F05.22	**Operation panel potentiometer curve selection**	**0 - 3 [3]**
	0: Straight line 1. 1: Straight line 2. 2: Polyline. 3: No treatment.	

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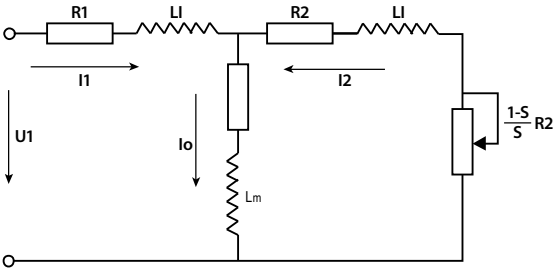
6.2.7 F08: Asynchronous Motor Parameters



R1=F08.07 (Stator resistance) LI=F08.09 (Leakage inductance)
R2=F08.08 (Rotor resistance) Lm=F08.10 (Mutual inductance)
Io=F08.11 (Excitation current) S=Slip ratio

The idling excitation current (F08.11) can be calculated by the rated current (F08.02) and power factor (F08.05) or detected by parameter auto-tuning (F08.06 = 2).

The relationship between rated torque current, F08.11 and F08.02 is below:

Rated torque current = F08.05 × F08.02

Idling excitation current $F08.11 = \sqrt{1 - F08.05^2} \times F08.02$

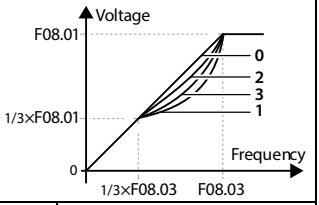
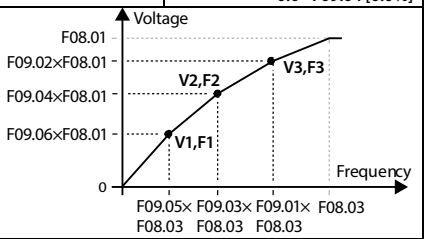
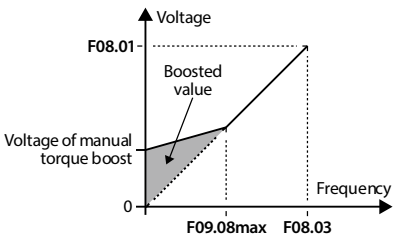
Mutual inductance $F08.10 = \frac{F08.01}{2\sqrt{3}\pi \times F08.03 \times F08.11} - F08.09$

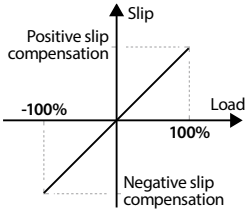
Note: Except F08.03, F08.04 and F08.06, the other factory settings are depended on HD31.

Ref. Code	Function Description		Setting Range [Default]
F08.00	Rated power of motor 1		0.2 – 999.9kW
F08.01	Rated voltage of motor 1		0 - inverter's rated voltage
F08.02	Rated current of motor 1	7.5kW above motor	0.1 – 2500.0A
		7.5kW or below motor	0.01 – 250.00A
F08.03	Rated frequency of motor 1		1.0 - 400.0 [50.0Hz]
F08.04	Rated speed of motor 1		1 - 24000 [1500rpm]
	F08.03 and F08.04 should be set in accordance with the parameters of motor nameplate.		
F08.05	Power factor of motor 1		0.001 - 1.000
F08.06	Parameter auto-tuning of motor 1		0 - 3 [0]
	0: Auto-tuning is disabled. 1: Stationary auto-tuning. • In the process of stationary auto-tuning, the motor is at rest. The stator resistance, rotor resistance and leakage inductance will be measured and written into F08.07, F08.08 and F08.09 automatically. 2: Rotary auto-tuning. • In process of rotary auto-tuning, the motor is at rest at the beginning, and the stator resistance, rotor resistance and leakage inductance will be measured. Hinterher the motor will start rotating, accordingly mutual inductance and idling excitation inductance will be measured automatically. All the measured values above will be saved respectively in F08.07, F08.08, F08.09, F08.10 and F08.11 • When the motor is in rotating status, oscillation, even overcurrent, might occur. In this case, press the **STOP** key to stop auto-tuning and then adjust the F09.15 (oscillation-suppression mode) and F09.16 (oscillation-suppression coefficient) suitably to mitigate the possible oscillation. 3: Motor stator resistance measurement. • The motor is at rest, and the stator resistance of the motor is automatically measured and the measured parameters are automatically written to F08.07.		

Ref. Code	Function Description		Setting Range [Default]
	Auto-tuning steps: • 1. Input correct motor parameters as per its nameplate (F08.00 - F08.04). • 2. When F08.06 is set as 2, set proper Acc time (F03.01) and Dec time (F03.02) and make sure the motor is disconnected with the load for security. • 3. Set F08.06 as 1 or 2 firstly, then press the ↵ key, and therewith press **RUN** key to start auto-tuning. The LED will display "tunE". • 4. When the RUN indicator is flashing, it indicates that auto-tuning has been completed.Now the keypad displays the parameters of stop status and F08.06 resets to 0.		
F08.07	Stator resistance of motor 1	11 - 90kW above motor	0.000 – 9.999Ω
		7.5kW or below motor	0.00 - 99.99Ω
F08.08	Rotor resistance of motor 1	7.5kW or below motor	0.00 - 99.99Ω
		11 - 90kW above motor	0.000 – 9.999Ω
		90kW above motor	0.0000 - 0.9999Ω
F08.09	Leakage inductance of motor 1	7.5kW or below motor	0.0 - 5000.0mH
		11 - 90kW above motor	0.00 - 500.00mH
		90kW above motor	0.000 – 50.000mH
F08.10	Mutual inductance of motor 1	7.5kW or below motor	0.0 - 5000.0mH
		11 - 90kW above motor	0.00 – 500.00mH
		90kW above motor	0.000 – 50.000mH
F08.11	Idling excitation current of motor 1	7.5kW above	0.0 - 999.9A
		7.5kW or below	0.00 - 99.99A
F08.12	Motor 1 core saturation coefficient 1		0.00 - 1.00 [1.00]
F08.13	Motor 1 core saturation coefficient 2		0.00 - 1.00 [1.00]
F08.14	Motor 1 core saturation coefficient 3		0.00 - 1.00 [1.00]
F08.15	Motor 1 core saturation coefficient 4		0.00 - 1.00 [1.00]
F08.16	Motor 1 core saturation coefficient 5		0.00 - 1.00 [1.00]

6.2.8 F09: V/f Control Parameters

Ref. Code	Name Description	Setting Range [Default]
F09.00	**V/f curve selection of motor 1**	**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. Shown as curve 0 in figure. 1: Square curve. Shown as curve 1 in the figure. 2: 1.2 exponential curve. Shown as curve 2 in the Figure. 3: 1.7 exponential curve. Shown as curve 3 in the Figure. 4: User-defined curve. 	
F09.01	**V/f frequency value F3 of motor 1**	**F09.03 - 100.0 [80.0%]**
F09.02	**V/f voltage value V3 of motor 1**	**F09.04 - 100.0 [80.0%]**
F09.03	**V/f frequency value F2 of motor 1**	**F09.05 - 100.0 [80.0%]**
F09.04	**V/f voltage value V2 of motor 1**	**F09.06 - 100.0 [80.0%]**
F09.05	**V/f frequency value F1 of motor 1**	**0.0 - F09.03 [0.0%]**
F09.06	**V/f voltage value V1 of motor 1**	**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 adapt to special load. • According to the actual condition, set proper curve to meet the requirements of load characteristics. 	
F09.07	**Torque boost of motor 1**	**0.0 - 30.0** **[55kW and below: 2.0%]** **[75 - 132kW: 1.0%]**
F09.08	**Cut-off point used for manual torque boost of motor 1**	**0.0 - 50.0 (F08.03) [25.0%]**
	In order to compensate the torque drop at low frequency, HD31 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 is manually torque boost. • If F09.07=0, it is manually torque boost. User needs to set rated frequency (F08.03) and rated rotary speed (F08.04) of the motor correctly according to its nameplate. F09.08 is relative to percentage of rated frequency (F08.03). 	

Ref. Code	Function Description	Setting Range [Default]
F09.09	**Slip compensation gain of motor 1**	**0.0 - 300.0 [0.0%]**
F09.10	**Slip compensation filter time of motor 1**	**0.01 - 10.00 [0.10s]**
F09.11	**Slip compensation limit of motor 1**	**0.0 - 250.0 [200.0%]**
F09.12	**Compensation time constant of motor 1**	**0.1 - 25.0 [2.0s]**
	The motor slip changes with the load torque, which results in the variance of motor speed. Reduce the influence through slip compensation (HD31 will automatically adjust its output frequency according to the load torque). • In driving status (the actual speed < the setting speed) and in generating status (the actual speed > the setting speed), the slip compensation gain (F09.09) should be increased gradually. • The auto slip compensation depends on the rated slip of motor, consequently make sure the rated frequency (F08.03) and rated speed (F08.04) are set correctly. • Range of slip compensation = F09.11 × Rated slip. • Rated slip = F08.03 - F08.04 × Np / 60. • Np is the number of the motor pole pairs. 	
F09.14	**AVR (automatic voltage regulation) function of motor**	**0 - 2 [1]**
	0: Disabled. 1: Enabled all the time. 2: Disabled in Dec process. • The output voltage can be regulated to maintain constant via AVR. Thus, normally the AVR function should be enabled, especially when the input voltage is higher than the rated voltage. • In Dec process, if F09.14 = 0 or 2, the running current will be a little higher; while if F09.14 = 1, the motor will decelerate steadily and the current will be smaller.	
F09.15	**Motor 1 low frequency suppression shock coefficient**	**0 - 200 [50]**
	0: Depend on excitation current component. 1: Depend on torque current component.	
F09.16	**Motor 1 high frequency suppression shock coefficien**	**0 - 200 [20]**
	This function is used to damp oscillation when output current is continually unstable. • This function helps to keep the motor running smoothly through correctly adjusting the setting of F09.16.	
F09.17	**Motor 1 energy saving control select**	**0 - 3 [0]**
	0: Energy saving control invalid. 3: Energy saving according to output current. When F09.17 = 3 and V/f control mode (F00.01 = 0). • When the output frequency ≥ F09.19 and the output current ≤ F09.20 × inverter rated current, enter the energy saving mode. • If any of the above conditions are not currently met, the drive will exit the power saving mode. *Note: The power saving mode is only valid at constant speed.*	
F09.18	**Motor 1 energy saving factor**	**0.0 - 100.0 [5.0%]**
F09.19	**Motor 1 energy start frequency**	**0.00 - 50.00 [25.00Hz]**
F09.20	**Motor 1 energy switching point**	**0.0 - 100.0 [100.0%]**
F09.21	**Motor 1 energy saving detecting times**	**0 - 5000 [10 times]**

6.2.9 F13: Asyn. Motor 2 Parameters

This Group can be set as the second Group of motor parameters and control parameters corresponding to the first Group parameters (motor 1). The concrete meaning refers the corresponding parameters of motor 1 and achieves flexible switching between the 2 motors (refer to DI terminal No. 47 function).

Note:

Check group F08 for F13.01 - F13.15, F13.53, F13.54.

Check group F09 for F13.16 - F13.34, F13.58 - F13.62.

Ref. Code	Function Description		Setting Range [Default]
F13.00	Control mode selection of motor 2		0 - 2 [0]
	0: V/f control without PG. 2: Vector control without PG.		
F13.01	Rated power of motor 2		0.2 – 999.9kW [Depend on HD31]
F13.02	Rated voltage of motor 2		0 - 999V [Depend on HD31]
F13.03	Rated current of motor 2	7.5kW above motor	0.0 -2500.0A [Depend on HD31]
		7.5kW or below motor	0.00-250.00A [Depend on HD31]
F13.04	Rated frequency of motor 2		1.0 - 400.0[50.0Hz]
F13.05	Rated speed of motor 2		1 - 24000 [Depend on HD31]
F13.07	Parameter auto-tuning of motor 2		0 - 3 [0]
	0: Auto-tuning is disabled. 1: Stationary auto-tuning.	2: Rotary auto-tuning. 3: Motor stator resistance measurement.	
F13.08	Stator resistance of motor 2	7.5kW below motor	0.00 - 99.99Ω [Depend on HD31]
		11 - 90kW motor	0.000 - 9.999Ω [Depend on HD31]
		90kW and above motor	0.0000-0.9999Ω [Depend on HD31]
F13.09	Rotor resistance of motor 2	7.5kW below motor	0.00 - 99.99Ω [Depend on HD31]
		11 - 75kW motor	0.000 - 9.999Ω [Depend on HD31]
		90kW and above motor	0.0000-0.9999Ω [Depend on HD31]
F13.10	Leakage inductance of motor 2	7.5kW below motor	0.0 - 5000.0mH [Depend on HD31]
		11 - 75kW motor	0.00 - 500.00mH [Depend on HD31]
		90kW and above motor	0.000 - 50.000 mH [Depend on HD31]
F13.11	Mutual inductance of motor 2	75kW below motor	0.0 - 5000.0mH [Depend on HD31]
		11 - 75kW motor	0.00 - 500.00mH [Depend on HD31]
		90kW and above motor	0.000 - 50.000 mH [Depend on HD31]
F13.12	Idling exciting current of motor 2	7.5kW or below motor	0.00 – 99.99A [Depend on HD31]
		7.5kW above motor	0.0 - 999.9A [Depend on HD31
F13.13	Motor 2 core saturation coefficient 1		0.00 - 1.00 [1.00]
F13.14	Motor 2 core saturation coefficient 2		0.00 - 1.00 [1.00]
F13.15	Motor 2 core saturation coefficient 3		0.00 - 1.00 [1.00]

Ref. Code	Function Description	Setting Range [Default]
F13.16	V/f curve selection of motor 2	0 - 4 [0]
	0: Line. 1: Square curve. 2: 1.2 exponential curve. 3: 1.7 exponential curve. 4: User-defined curve.	
F13.17	V/f frequency value F3 of motor 2	F13.19 - 100.0 [0.0%]
F13.18	V/f voltage value V3 of motor 2	F13.20 - 100.0 [0.0%]
F13.19	V/f frequency value F2 of motor 2	F13.21 - F13.17 [0.0%]
F13.20	V/f voltage value V2 of motor 2	F13.22 - F13.18 [0.0%]
F13.21	V/f frequency value F1 of motor 2	0.0 - F13.19 [0.0%]
F13.22	V/f voltage value V1 of motor 2	0.0 - F13.20 [0.0%]
F13.23	Torque boost of motor 2	0.0 - 30.0 55kW and below inverter: 2.0%] [75 - 132kW inverter: 1.0%]
F13.24	Cut-off point used for manual torque boost of motor 2	0.0 - 50.0 (F13.04) [30.0%]
F13.25	Slip compensation gain of motor 2	0.0 - 300.0 [0.0%]
F13.26	Slip compensation filter time of motor 2	0.01 - 10.00 [0.10s]
F13.27	Slip compensation limitation of motor 2	0.0 - 250.0 [200.0%]
F13.28	Compensation constant of motor 2	0.000 - 9.999kW [Depend on HD31]
F13.30	AVR (automatic voltage regulation) function of motor 2	0 - 2 [1]
	0: Disabled. 1: Enabled all the time. 2: Disabled in Dec. process.	
F13.31	Motor 2 low frequency suppression shock coefficient	0 - 200 [50]
F13.32	Motor 2 high frequency suppression shock coefficient	0 - 200 [20]
F13.33	Motor 2 energy saving control select	0 - 3 [0]
	0: Energy saving control invalid. 3: Energy saving according to output current.	
F13.34	Motor 2 energy saving factor	0.0 - 100.0 [5.0%]
F13.53	Motor 2 core saturation coefficient 4	0.00 - 1.00 [1.00]
F13.54	Motor 2 core saturation coefficient 5	0.00 - 1.00 [1.00]
F13.55	Motor 2 current loop feedforward enabled	0,1 [1]
F13.58	Motor 2 energy start frequency	0.00 - 50.00 [25.00Hz]
F13.59	Motor 2 energy switching point	0.0 - 100.0 [100.0%]
F13.60	Motor 2 energy saving detecting times	0 - 5000 [10 times]
F13.61	Motor 2 energy voltage recovery time	40 - 4000 [100ms]
F13.62	Motor 2 energy voltage decreasing time	40 - 4000 [100ms]

6.2.10 F15: Digital I/O Terminal Parameters

Ref. Code	Function Description	Setting Range [Default]
F15.00	DI1 function	0 – 54 [2]
F15.01	DI2 function	0 - 54 [3]
F15.02	DI3 function	0 - 54 [0]
F15.03	DI4 function	0 - 54 [0]
F15.04	DI5 function	0 - 54 [0]
F15.05	DI6 function	0 - 54 [0]
F15.06	DI7 function	0 - 54 [0]
F15.07	DI8 function	0 - 54 [0]
F15.08	DI9 function	0 - 54 [0]

0: Unused. It disables the terminal function. HD31 ignores the 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, HD31 is enabled to run.
- When disabled, HD31 is disabled to run and will be in auto stop status.
- If no terminal selects this function, it defaults that HD31 is enabled.

2,3: FWD / REV function.

- Set any DI terminal for the FWD / REV to control run / stop of HD31.
- FWD / REV is valid only in terminal control mode (F00.11 = 1).
- Refer to parameter F15.16.

4: Three-wire operation mode.

- Refer to parameter 15.16.

5,6,7: Frequency source selection 1, 2, 3.

8: The frequency source switch to analogue setting.

9,10: Run command source selection 1,2.

11: Switch to terminal control mode.

12: External stop command input.

- F00.05=1, the pump stops in sequence, otherwise stops according to stop mode. It is valid for all running command sources.

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

17: Frequency ramp (UP).

18: Frequency ramp (DN).

19: Clearing auxiliary frequency setting.

20,21: Command control input for forward / reverse jog 1 (JOGF1/ JOGR1).

22,23: Command control input for forward / reverse jog 2 (JOGF2/ JOGR2).

24: Jog 1 command control input.

25: Jog 1 direction control input.

Remark: When select 20 and 21, the functions 24 and 25 are invalid.

26: Acc. / Dec. time selection terminals 1.

27: Acc. / Dec. time selection terminals 2.

28: Acc. / Dec. mode selection.

29: Acc. / Dec. prohibition.

30: Switch to ordinary running mode.

31: Reset the stop status of PLC operation.

32: Pausing the process PID.

33: Disabling the process PID.

34: Holding PID integral.

Ref. Code	Function Description	Setting Range [Default]
	35: Clearing PID integral. 36: Switch to wobble operation. 37: Reset the wobble operating status. 38: DC braking start while stopping. 39: External pause signal (normally-open input). 40: External pause signal (normally-closed input). 41,42: Coast to stop normally open / normally closed input. • HD31 will stop outputting immediately and the load will coast to stop in accordance with the mechanical inertia when a DI terminal is set as 41 or 42. 43: Emergency stop. 44,45: External fault normally open / normally closed input. • When HD31 receives the EXT signal, E0024 fault (fault of external equipment) will be displayed. • The fault signal has two input modes: normally open and normally closed input. 46: External reset (RST) input. When HD31 alarms fault, reset it by this terminal. • The function of RST terminal is the same as the **STOP** key. 47: Switch between motor 1 and motor 2. 48: Timing function input. 49: Clearing the length. 50: Clearing the counter to zero. 51: Counter's triggering signal input. 52: Length counting input (only DI6). 53: Pulse frequency input (DI6). • This terminal is used to input pulse signal as frequency setting. • Refer to Group F05 for the relationship between input pulse frequency and frequency setting. 54: Clear fault records. In valid, clear P04.04 at stop. 56: Speed control / torque control switching. 57: Torque control torque polarity switching. 59: PID parameter switch. 85: Pausing PLC operation. 86: Terminal stop DC braking. 87: Frequency setting channel selection 4.	
F15.12	**Acc. / Dec. rate of UP/DN terminal**	**0.00 - 99.99 [1.00Hz/s]**
	It defines the change rate of setting frequency via the UP/DN terminal.	
F15.13	**Terminal detecting interval**	**0 - 2[0]**
	0: 2ms. 1: 4ms. 2: 8ms.	
F15.14	**Terminal detecting filter number**	**0 - 10000 [2]**
	The digital input terminal signal should be delayed and confirmed so as to avoid digital input error.	

F15.15 Terminal input positive and negative logic setting — **000 - 0x1FF [000]**

Defines that each bit (binary) represents different input terminal.

- 0: Positive logic. When input terminals are connected to corresponding common port, this logic is enabled. Otherwise the logic is disabled.
- 1: Negative logic. When input terminals are connected to corresponding common port, this logic is disabled. Otherwise the logic is enabled.

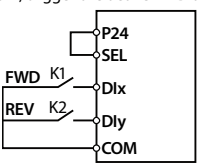
Hundreds				Ten				Unit			
Bit11	Bit10	Bit9	Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
-	-	-	DI9	DI8	DI7	DI6	DI5	DI4	DI3	DI2	DI1

F15.16 FWD/REV operation mode — **0 - 3 [0]**

- FWD:DI terminal is defined as No. 2 function.
- REV: DI terminal is defined as No. 3 function.
- Three-wire running: DI terminal is defined as No. 4 function.

0, 1: Two-wire running mode 1, 2.

- When stop command coming from other sources makes HD31stop though the terminal logic enabled in the terminal control mode, there is no running command even the control terminals FWD / REV are still valid.
- To run HD31 again, trigger the active FWD and REV.



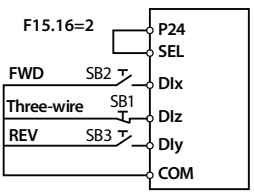
K2	K1	Run Command	
		F15.16=0	F15.16=1
0	0	Stop	Stop
1	0	Reverse	Stop
0	1	Forward	Forward
1	1	Stop	Reverse

2: Three-wire running mode 1.

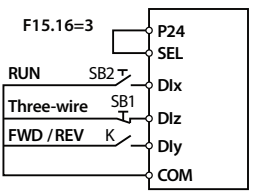
- If the shift between SB2 and SB3 is disabled, HD31 will keep the control mode.

3: Three-wire running mode 2.

- If SB2 changes from enabled into disabled, HD31 will keep the same mode.



SB1: Normally closed stop button
SB2: Normally open forward button
SB3: Normally open reverse button



K: Direction selection terminal (level on)
K = 0(forward) K = 1(reverse)
SB1: Normally closed stop button
SB2: Normally open run button

F15.17 Terminal operating selection due to fault of external equipment — **0 - 3 [0]**

When there is fault of external equipment, it can select protection.

0: Coast to stop.

1: Emergency stop.

2: Dec. to stop.

3: Continue to run.

F15.18 DO1 function — **0 - 35 [2]**

F15.19 DO2 function — **0 - 38 [0]**

Ref. Code	Function Description	Setting Range [Default]
F15.20	RLY1 function	0 - 35 [31]
F15.21	RLY2 function	0 - 35 [0]
F15.22	RLY3 function	0 - 35 [0]
F15.23	RLY4 function	0 - 35 [0]

0: Unused.

1: Inverter ready.

- HD31 completes power on and no fault occurs, then it can normally run the indicating signal.

2: Inverter is running (RUN).

- HD31 is in run status and outputs indicating signal.

3: Inverter is forward running.

- HD31 is forward running the indicating signal.

4: Inverter is reverse running.

- HD31 is reverse running the indicating signal.

5: Inverter is DC braking.

6: Inverter is in zero-frequency statu.

- In the zero-frequency range, the output frequency (including in stop status) outputs the indication signal.

7: Inverter is in zero-frequency running.

- In the zero-frequency range HD31 output frequency outputs the indicating signal.

9,10: Frequency detection threshold (FDT1,FDT2).

11: Frequency arriving signal (FAR).

12: Limitation of upper limit of frequency.

13: Limitation of lower limit of frequency.

14: Limitation of upper/lower limits of wobble frequency.

15: Simple PLC operating status indication.

16: Simple PLC pausing indication.

17: Simple PLC cycle completion indication.

18: Completion of simple PLC operation stages.

19: Completion of simple PLC operation.

20: Output data from SCI communication.

21: Preset operating time out.

22: Timing function output.

23: Preset counting value reach.

24: Indicating counting value reach.

25: Setting length arrive.

26: Indication of motor 1 and motor 2.

27: Analog input overrun output.

29: Undervoltage lock-up signal (LU).

30: Overload signal (OL).

31: Inverter fault.

- HD31 will output fault signal when it has a fault.

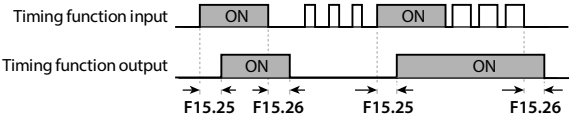
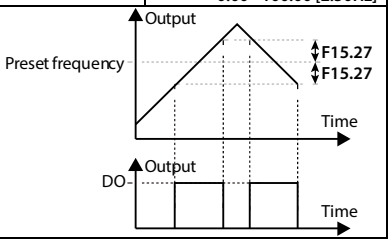
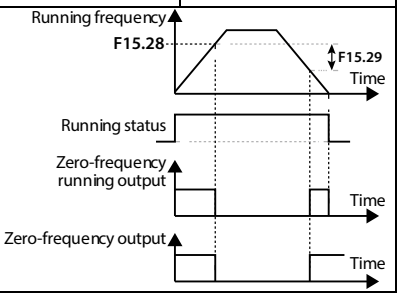
32: External fault.

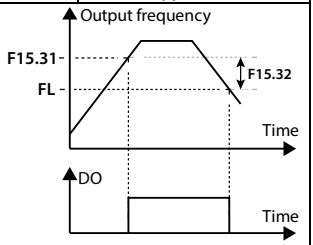
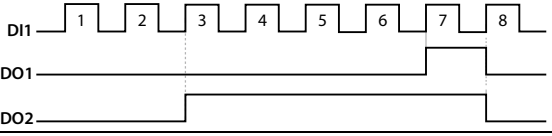
- The indicating signal can output when HD31 detects the external fault signal via terminal.

33: Inverter auto-reset fault.

35: Dormancy indicating function.

38: High-frequency output (DO2). DO2 can be selected as high-frequency output.

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>F15.24</td><td>Output terminal positive and negative logic selection</td><td>000 - 0xFFF [000]</td></tr>
<tr><td></td><td colspan="2">Defines that each bit (binary) represents different output terminal.
• 0: Positive logic. When output terminals are connected to corresponding common port, this logic is enabled. Otherwise the logic is disabled.
• 1: Negative logic. When output terminals are connected to corresponding common port, this logic is disabled. Otherwise the logic is enabled.
<table>
<tr><th colspan="4">Thousand</th><th colspan="4">Ten</th><th colspan="4">Unit</th></tr>
<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>RLY10</td><td>RLY9</td><td>RLY8</td><td>RLY7</td><td>RLY6</td><td>RLY5</td><td>RLY4</td><td>RLY3</td><td>RLY2</td><td>RLY1</td><td>DO2</td><td>DO1</td></tr>
</table>
123</td></tr>
<tr><td>F15.25</td><td>ON side delay time of timing function</td><td rowspan="2">0.00 - 300.00 [0.00s]</td></tr>
<tr><td>F15.26</td><td>OFF side delay time of timing function</td></tr>
<tr><td></td><td colspan="2">F15.25 and F15.26 can be used to set the ON/OFF side delay time (dead area) of the timing function output relative to the input.
• The timing function output will be ON when the ON time of timing function is longer than that defined by F15.25.
• The timing function output will be OFF when the OFF time of timing function delays behind that defined by F15.26.
The timing function operation figure is shown as follows:
 
</td></tr>
<tr><td>F15.27</td><td>FAR range</td><td>0.00 - 100.00 [2.50Hz]</td></tr>
<tr><td></td><td colspan="2">The pulse signal will be output if the inverter's output frequency is within the FAR range. As shown in the right figure.
 
</td></tr>
<tr><td>F15.28</td><td>Zero-frequency operation threshold</td><td>0.00 - upper limit [0.00Hz]</td></tr>
<tr><td>F15.29</td><td>Zero-frequency hysteresis</td><td></td></tr>
<tr><td></td><td colspan="2">F15.28 and F15.29 are used to set the zero-frequency output control function, refer to the right figure.
 
</td></tr>
</table>

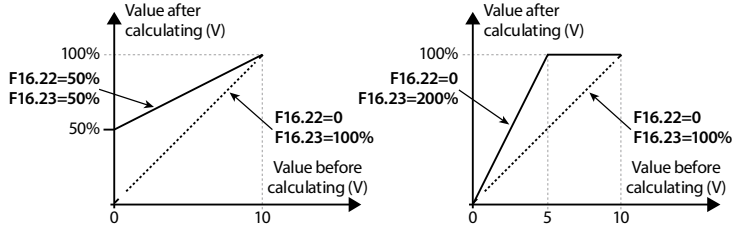
Ref. Code	Function Description	Setting Range [Default]
F15.30	**FDT1 detection mode**	**0,1 [0]**
	0: Detect according to the reference frequency. 1: Detect according to the output frequency.	
F15.31	**FDT1 level**	**0.00 - upper limit [50.00Hz]**
F15.32	**FDT1 lag**	**0.00 - upper limit [1.00Hz]**
	The indicating signal can be output if the setting frequency F15.30 is higher than certain frequency (F15.31), and becomes disabled when the setting frequency is lower than certain frequency of FDT1 level (F15.31 - F15.32). Please refer to FL of the right figure. 	
F15.33	**FDT2 detection mode**	**0,1 [0]**
	0: Detect according to the reference frequency. 1: Detect according to the output frequency.	
F15.34	**FDT2 level**	**0.00 - F00.06 [50.00Hz]**
F15.35	**FDT2 lag**	**0.00 - F00.06 [1.00Hz]**
	Refer to parameters F15.31 and F15.32.	
F15.36	**Preset operating time**	**0 – 65535 [0h]**
	When the total operating time reaches the preset operating time (F15.36), the inverter will output an indicating signal (500ms). • 0: Preset operating time is disabled.	
F15.37	**Preset counting value arriving**	**F15.38 - 9999 [0]**
F15.38	**Specified counting value arriving**	**0 - F15.37 [0]**
	F15.37 presents that when the number of pulse input by the DI terminals (set as No. 51 function) reaches a certain quantity, the DO terminals or relay will send an indicating signal. F15.38 presents that when the number of pulse input by the DI terminals (set as No. 51 function) reaches a specified quantity, the DO terminals or relay will send an indicating signal until the pulse number hits the preset counting value. **For instance:** If F15.37 is set to 7 and F15.38 is set to 3, DO1 selects preset count arriving function (F15.18 = 23), DO2 selects specified count arriving (F15.19 = 24), and DI1 selects counter trigger signal input function (F15.00 = 51). Sequence of counting value arriving is shown in figure: • DO2 will output an indicating signal when DI1 inputs the third pulse until the preset count value reachs seven. • DO1 will output an indicating signal when DI1 inputs the seventh pulse; output signal of DO1 returns to low level when DI1 inputs the eighth pulse. 	

Ref. Code	Function Description	Setting Range [Default]
F15.39	**Ananlogue input over-limitation selection**	**0000 - 1133 [0000]**
	If the corresponding analog > F15.40 or analog < F15.41, and continued F15.42 time, the overrun check. After the limit detection, when F15.41 ≤ analog ≤ F15.40, according to thousands to determine whether the automatic operation of the inverter. **Unit: Action drive when the input exceeds the limit** • 0: Free stop. • 1: Emergency shutdown. • 2: Dec. stop. • 3: No action. **Ten: Select the analog input port** • 0: No analog port. • 1: Operation panel potentiometer. • 2: AI1 port. • 3: AI2 port. **Hundred: Analog overrun detection conditions** • 0: Always detected. • 1: Run command is detected. **Thousand: Automatical selection when analog overrun is detected** • 0: Do not allow automatic operation. • 1: Allows automatic operation. *Note: Thousand are valid only in terminal two-wire mode.*	
F15.40	**Analog input overrun upper limit**	**F15.41 - 100.0 [100.0%]**
F15.41	**Analog input overrun down limit**	**0.0 - F15.40 [0.0%]**
F15.42	**Analog overrun detection time**	**0.00 - 50.00 [5.00s]**
F15.43	**Terminal output delay**	**0.0 - 100.0[0.0s]**
F15.44	**Start analog overrun detection time**	**0.00 - 50.00 [15.00s]**

6.2.11 F16: Analogue I/O Terminal Parameters

Ref. Code	Function Description	Setting Range [Default]
F16.00	**Display panel with potentiometer function selection**	**0 - 18 [0]**
	Only when using keypad with potentiometer is F16.00 enabled.	
F16.01	**AI1 function**	**0 - 8 [2]**
F16.02	**AI2 function**	**0 - 18 [5]**
F16.03	**AI3 function**	**0 -18 [0]**
F16.04	**AI4 function**	**0 - 18 [0]**
	0: Unused. 1: Upper limit frequency setting source. • F00.07 = 1 (analogue input sets upper limit frequency), the upper limit frequency is set by the input voltage corresponding to the AI terminal. 2: Frequency setting. • F00.10 = 3 (analogue input sets frequency), the setting frequency is set by the input voltage corresponding to the AI terminal. 3: Auxiliary frequency reference. 4: Process PID reference. 5: Process PID feedback. 6: Process PID regulating upper limit. 7: Process PID regulating lower limit. 8: Motor overheating signal input. 9: Motor 1 forward rotation torque limit. 10: Motor 1 reverse electric torque limit. 11: Motor 1 forward regeneration rotation torque limit. 12: Motor 1 reverse regeneration rotation torque limit. 13: Torque command given. 15: Torque control up limit frequency. 16: Motor 2 Forward rotation electrical torque limit. 17: Motor 2 reverse rotation electrical torque limit. 18: Motor 2 Forward regeneration torque limit. 19: Motor 2 reverse regeneration torque limit.	

Ref. Code	Function Description	Setting Range [Default]
F16.05	AI1 bias	-100.0 - 100.0 [0.0%]
F16.08	AI2 bias	
F16.11	AI3 bias	
F16.14	AI4 bias	
F16.06	AI1 gain	-10.00 - 10.00 [1.00]
F16.09	AI2 gain	
F16.12	AI3 gain	
F16.15	AI4 gain	
F16.07	AI1 filter time	0.01 - 10.00 [0.05s]
F16.10	AI2 filter time	
F16.13	AI3 filter time	
F16.16	AI4 filter time	
	When AI1 - AI4 sets frequency, the relationship between the analogue input and the analogue value after calculating is shown as figure: Analogue actual value → Analogue input filtering → Analogue input gain Analogue input bias → Analogue value after calculating • The formula is: AI actual value = Gain × Value before calculating +Bias • F16.07, F16.10, F16.13, F16.16 define the filter time. • The longer filter time is, the higher immunity level is, the response time is prolonged. The shorter filter time is, the quicker response time is, the lower the immunity level is.	
F16.17	Max. input pulse frequency	0.0 - 50.0 [10.0kHz]
	When set the DI6 terminal as pulse input, F16.17 defines the max. input pulse frequency.	
F16.18	Input pulse filter time	0 - 500 [10ms]
	It is used to filter the input pulse frequency and filter out the small fluctuations in the pulse frequency.	
F16.19	AO1 function	0 - 19 [1]
F16.20	AO2 function	0 - 19 [0]
F16.21	High-speed pulse output function	0 - 19 [0]
	0: Unused. 1,2: Output frequency / setting frquency (0 - max. output frequency). 3: Motor speed (0 - max. output frequency corresponding to speed). 4: Output current (0 - twice rated current of motor). 5: Output current (0 - twice rated current of motor). 6: Torque command (0 - 3 times motor rated torque). 10: Output torque (0 - 3 times rated torque of motor). 11: 11: Output voltage (0 - 1.2 times inverter's rated voltage). 12: 12: Bus voltage (0 - 2.2 times inverter's rated voltage). 13: Output power (0 - twice rated power of motor). 14: AI1 input (0 - 10V). 15: AI2 input (-10 - 10V / 0 - 20mA). 16: AI3 input (-10 - 10V / 0 - 20mA). 17: AI4 input (-10 - 10V / 0 - 20mA). 18: Output frequency (-1 times - 1 times max. output frequency). 19: Reference frequency (-1 times - 1 times max. output frequency). 20: Set frequency (0 - max. output frequency).	

Ref. Code	Function Description	Setting Range [Default]
F16.22	**Analogue output AO1 bias**	**-100.0 - 100.0 [0.0%]**
F16.23	**Analogue output AO1 gain**	**0.0 - 200.0 [100.0%]**
	The proportional relation of output can be adjusted by output gain, as shown in the figure below. • The formula is: AO1 actual output = F16.23 × Value before calculating + F16.22 	
F16.24	**Analogue output AO2 bias**	**-100.0 - 100.0 [0.0%]**
F16.25	**Analogue output AO2 gain**	**0.0 - 200.0 [100.0%]**
	Refer to F16.22 and F16.23.	
F16.26	**DO2 max. output pulse frequency**	**0.1 - 50.0 [10.0kHz]**
	Defines the DO2 terminal allowable max. output frequency.	
F16.27	**Keypad potentiometer offset**	**-100.0 - 100.0 [0.0%]**

6.2.12 F17: SCI Communication Parameters

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, odd parity, RTU. 6: 1-8-11 format, no parity, RTU	
F17.01	**Baud rate selection**	**0 - 5 [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	**Time threshold for detecting communication status**	**0.0 - 600.0 [0.0s]**
	Time at no communication data > setting time of F17.04, it will be considered as E0028 fault (SCI timeout fault). • 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 E0029 fault (SCI error). • When F17.05 = 0, it will not detect the communication error.	

Ref. Code	Function Description	Setting Range [Default]
F17.06	**Action selection at communication time out**	**0 - 3 [3]**
F17.07	**Action selection at communication fault**	**0 - 3 [3]**
F17.08	**Action selection at communication peripheral device fault**	**0 - 3 [1]**
	F17.06 defines the action selection at commmunication 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. 1: Emergency stop. 2: Decelerate to stop. 3: Continue to run.	
F17.09	**Communication write function parameter of storage EEPROM method selection**	**00 - 11 [01]**
	When used to change parameter in selecting communicaition, whether stored in EEPROM or not. **Unit: Except of F00.13, F19.03, EEPROM storeage selection in communication** 0: Not stored in EEPROM. 1: Stored in EEPROM. **Ten: For F00.13, F19.03, EEPROM storeage selection in communication** 0: Not stored in EEPROM. 1: Stored in EEPROM. *Note:* *1. When ten is set to 1, it may damage the inverter. Please be careful.* *2. Only when using the communication write function parameter, and function code is 0x06 or 0x10, will F17.09 be valid. Refer to of Appendix B for details.*	
F17.10	**Detecting time of network communicaiton overtime**	**0.0 - 600.0 [0.0s]**
	The time interval between two received correct data (including local or non-native data) continues to exceed F17.10 and is detected for communication timeout. The timeout is checked and the timeout protection is selected according to F17.06. • F17.10 = 0, the communication timeout is not detected.	

6.2.13 F18: Display Control Parameters

Ref. Code	Function Description	Setting Range [Default]
F18.00	**Language selection**	**0,1 [0]**
	Defines the displaying language on the LCD keypad. 0: Chinese. 1: English.	
F18.01	**Display contrast of the LCD keypad**	**1 - 10 [5]**
	To select LCD display contrast.	
F18.02	**Set the display parameter 1 during operation**	**0 - 49 [8]**
F18.03	**Set the display parameter 2 during operation**	**0 - 49 [7]**
F18.04	**Set the display parameter 3 during operation**	**0 - 49 [36]**
F18.05	**Set the display parameter 4 during operation**	**0 - 49 [13]**
F18.06	**Set the display parameter 5 during operation**	**0 - 49 [14]**
F18.07	**Set the display parameter 6 during operation**	**0 - 49 [18]**
F18.08	**Set the display parameter 1 at stop**	**0 - 49 [7]**
F18.09	**Set the display parameter 2 at stop**	**0 - 49 [18]**
F18.10	**Set the display parameter 3 at stop**	**0 - 49 [20]**

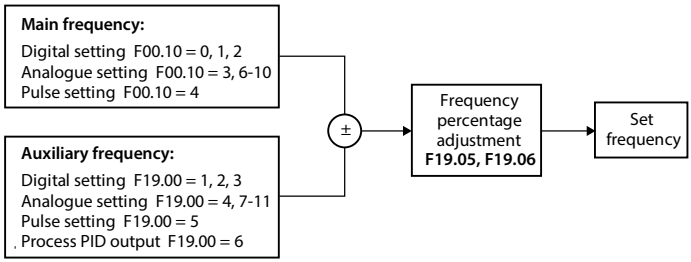
Ref. Code	Function Description	Setting Range [Default]
F18.11	**Set the display parameter 4 at stop**	**0 - 49 [22]**
F18.12	**Set the display parameter 5 at stop**	**0 - 49 [35]**
F18.13	**Set the display parameter 6 at stop**	**0 - 49 [36]**
	The keypad displays parameters which is the run status (F18.02 - F18.07) and stop status (F18.08 - F18.13). • It can be cycling displayed by ▶▶ key on the keypad. • Each content of display parameter can be set corresponding to 49 statuses. • For instance: when set F18.08 as 7, the stop parameter is setting frequency at initial power on. 0: Unused. 1: Inverter's rated current. 3: Inverter status. 4: Master setting frequency source. 5: Master setting frequency. 6: Auxiliary setting frequency. 7: Setting frequency. 8: Reference frequency (after Acc. / Dec.). 9: Output frequency. 10: Setting speed. 11: Running speed. 13: Output voltage. 14: Output current. 15: Torque given. 16: Output torque. 17: Output power. 18: DC bus voltage. 19: Potentiometer input voltage. 20: AI1 input voltage. 21: AI1 input voltage (after disposal). 22: AI2 voltage. 23: AI2 input voltage (after disposal). 24: AI3 input voltage . 25: AI3 input voltage (after disposal). 26: AI4 input voltage. 27: AI4 input voltage (after disposal). 28: DI6 terminal pulse input frequency. 29: AO1 output. 30: AO2 output. 31: High-speed output pulse frequency. 32: Heatsink temperature. 33: Set the line speed. 34: Reference line speed. 35: Content water supply pressure setting. 36: Actula feedback pressure. 37: Process PID reference. 38: Process PID feedback. 39: Process PID error. 40: Process PID integral value. 41: Process PID output. 42: External couting value. 43: Input terminal status. • Bit0 - Bit8 are corresponding to DI1 - DI9. 44: Output terminal status. • Bit0 - Bit11 are corresponding to DO1, DO2, RLY1 - RLY10. 45: MODBUS communication status. 46: Actual length. 47: Total length. 48: Total time at power on (hour). 49: Total time at running (hour).	
F18.14	**Frequency display gain**	**0.1 - 160.0 [1.0]**
F18.15	**Max. line speed**	**0 - 65535 [1000]**
F18.16	**Line speed display accuracy**	**0 - 3 [0]**
	0: Integer. 1: One decimal. 2: Two decimal. 3: Three decimal. *Note: The max. linear velocity must be newly set when the display accuracy is changed.*	

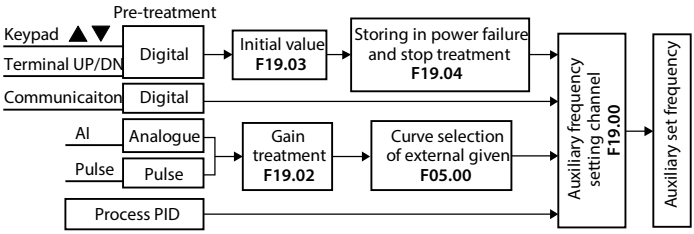
6.2.14 F19: Function-boost Parameters

Frequency auxiliary setting sources (F19.00 - F19.06)

The multi-step frequency of HD30 is the result of both master setting frequency and auxiliary setting frequency.

F19.00 defines the auxiliary frequency setting sources. When the auxiliary frequency setting source is the same as the master frequency setting source (except analogue setting), the auxiliary frequency setting source will be disabled.





Ref. Code	Function Description	Setting Range [Default]
F19.00	**Auxiliary frequency setting source selection**	**0 - 11 [0]**
	It defines the setting source of the auxiliary frequency. • When set F19.00 as 1, 2, the initial value is set by F19.03. • When set F19.00 as 4, 5, 7 - 10, the initial value is set by the actual analogue input. Refer to F05.00 about the frequency relation characteristic curve selections. • When set F19.00 as 6, set the auxiliary setting frequency according to the relationship of PID setting and feedback. • Please refer to the above figure. 0: No auxiliary source. 1: Digital setting 1 (the initial value is set by F19.03 and adjusted by ▲ and ▼ keys on the keypad) 2: Digital setting 2 (the initial value is set by F19.03 and adjusted by terminals UP/DN) 3: Digital setting 3 (the initial value = 0, set by SCI direct communication4: AI analogue setting. 5: Terminal pulse setting. 6: Process PID output. 7 - 10: AI1 - AI4. 11: Keypad potentiometer.	

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>F19.01</td><td>Master/Auxiliary setting calculation</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 source).
Unit: Main and auxiliary operations
0: Master setting + auxiliary setting.
1: Master setting - auxiliary setting.
Ten: Frequency source switch selection
0: Main.
1: Main and auxiliary operations.
2: Main and auxiliary switching.
3: Master and main auxiliary operation switch.
4: Auxiliary and main auxiliary operation switch.</td></tr>
<tr><td></td><td colspan="2">
<table>
<tr><th rowspan="2">DI=54</th><th colspan="10">F19.01setting 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>Analogue auxiliary setting coefficient</td><td>0.00 - 9.99 [1.00]</td></tr>
<tr><td></td><td colspan="2">First, calculate the gain by using F19.02, then calculate auxiliary frequency according to the frequency characteristic curve of Group F05. When F19.00 = 4, 5, 7-10, F19.02 is enabled.</td></tr>
<tr><td>F19.03</td><td>Initial value of digital auxiliary frequency</td><td>0.00 - F00.06 [0.00]</td></tr>
<tr><td></td><td colspan="2">Only when F19.00 = 1 or 2 will F19.03 be enabled and provide the initial value for the two methods.</td></tr>
<tr><td>F19.04</td><td>Control selection of digital auxiliary frequency</td><td>00 - 11 [00]</td></tr>
<tr><td></td><td colspan="2">Only when F19.00 = 1 or 2 will F19.04 be enabled.
Unit: Save selection at power outage
• 0: Not save auxiliary frequency at power outage.
• 1: The auxiliary frequency will be saved to F19.03 at power outage.
Ten: Frequency disposal when the inverter stops
• 0: Maintain the auxiliary frequency when the inverter stops.
• 1: The auxiliary frequency clears to zero when the inverter stops.</td></tr>
<tr><td>F19.05</td><td>Adjustment selection of setting frequency</td><td>0 - 2 [1]</td></tr>
<tr><td>F19.06</td><td>Adjustment coefficient of setting frequency</td><td>0.0 - 200.0 [100.0%]</td></tr>
<tr><td></td><td colspan="2">F19.05 and F19.06 is to set the adjustment mode of setting frequency (the compounded frequency is computed by master setting frequency plus auxiliary setting frequency).
0: No adjustment.
• Setting frequency = synthetic frequency.
1: To adjust as per the max. output frequency.
• Setting frequency = synthetic frequency + F00.06 × (F19.06 – 100%).
2: To adjust as per the current frequency.
• Setting frequency = synthetic frequency × F19.06.</td></tr>
</table>

Cooling Fan (F19.07 - F19.08)

Ref. Code	Name Description	Setting Range [Default]
F19.07	**Control selection of cooling fan**	**0 - 2 [0]**
F19.08	**Cooling fan controls delaying time**	**0.0 - 600.0 [60.0s]**
	Defines the control mode of cooling fan. With overheat protection, the fan runs all the time. 0: Auto stop mode. • The fan runs all the time when HD31 is in running status. After HD31stops for the time set by F19.08, the fan continues running if overheat protection is activated. 1: Immediate stop mode. • The fan runs all the time when HD31 is in running status and stops when HD31stops. 2: The fan runs continuously when power on. • The fan runs all the time when HD31 is powered on.	

Zero-frequency operation (F19.10 - F19.11)

Refer to below figure for the details.

Fcmd = Setting frequency

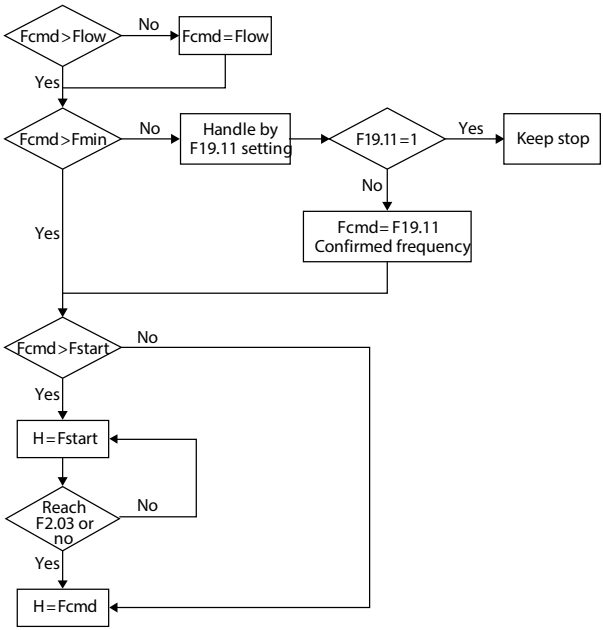
Fmin = Zero-frequency threshold (F19.10)

Flow = Lower limit frequency (F00.09)

H = Target frequency

Fstart = Start DWELL frequency (F02.02)

F02.03 (Keeping time of start frequency)



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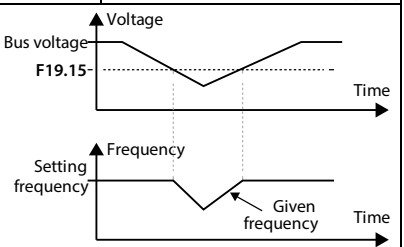
Ref. Code	Function Description	Setting Range [Default]
F19.10	**Zero-frequency threshold**	**0.00 - upper limit [1.00Hz]**
F19.11	**Action selection at setting frequency is lower than zero-frequency threshold**	**0 - 3 [0]**
	0: Run according to frequency command. 1: Holding stop, no output. 2: Run according to zero-frequency threshold. 3: Run according to zero-frequency.	

Trip-free operation during momentary power loss (F19.12 - F19.15)

The inverter can automatically perform low-voltage compensation when the voltage decreases or instantaneous under-voltage occurs. The inverter can continue to operate without tripping by reducing its output frequency and feedback energy via motor.

Ref. Code	Function Description		Setting Range [Default]
F19.12	**Trip-free selection at momentary power loss**		**0,1 [0]**
	If the inverter is momentarily lost during running (main circuit DC bus voltage VDC < F19.15), the inverter maintains the DC bus voltage by reducing the output frequency to avoid undervoltage shutdown. 0: This function is disabled. 1: This function is enabled. And low-voltage compensation is activated.		
F19.13	**Dec. time at voltage compensation**		**0.1 - 6000.0 [5.0s]**
	When the instantaneous stop is enabled, the inverter will judge the voltage difference, the voltage compensation gain according to the current DC bus voltage and the F19.15 instantaneous stop operation, adjust the output frequency in real time, and maintain the DC bus voltage to avoid the undervoltage shutdown. • If F19.13 is set too small, the feedback energy of motor will be too large and overvoltage protection might be activated. • If F19.13 is set too big, the feedback energy of motor will be too small to achieve voltage compensation effect.		
F19.15	**Reference voltage of trip-free operation at momentary power loss**	**220V inverter:**	**210 - 370 [248V]**
		380V inverter:	**400 - 670 [430V]**
		660V inverter:	**620 - 1130 [747V]**

Restart after power failure (F19.16 - F19.17)

This function decides in different control modes whether the inverter starts automatically or not and the delay time for restart when the inverter is switched off and then switched on.

Ref. Code	Name Description	Setting Range [Default]
F19.16	**Restart after power failure**	**0,1 [0]**
	0: Disabled. 1: Enabled. In the terminal two-wire control mode and suddenly power failure during running process, when HD31 is powered on again and the terminal is still enabled, it will wait certain time defined by F19.17 and then restart with speed tracking mode.	
F19.17	**Delay time for restart after power failure**	**0.00 - 10.00 [2.00s]**

Protection of Stall Overvoltage (F19.18 - F19.19)

During Dec, the actual decrease rate of motor may < output frequency due to the load inertia. At this time, the motor will feed the energy back to HD31, resulting in voltage rise on the DC bus. If no measure is taken, HD31 will trip due to overvoltage.

Ref. Code	Name Description		Setting Range [Default]
F19.18	**Overvoltage suppression gain**		**0.000 - 1.000 [0.500]**
	0: Overvoltage stall is prohibited. 0.001 - 1.000: Turn on overvoltage stall. • It in running, he bus voltage is greater than F19.19 overvoltage stall when the bus voltage is compared with F19.19, the inverter automatically increases the output frequency to avoid more energy being fed back to converter by the load. • Overvoltage suppression gain setting is too small to effectively suppress DC bus voltage rise. • The overvoltage suppression gain setting is too large, which may cause the output frequency to fluctuate and cause the whole system to oscillate. The deceleration time may be appropriate to increase during deceleration to avoid the system shock caused by overvoltage stall. *Note: When the overvoltage stall condition is held for more than 1 minute, the inverter reports overvoltage stall failure (E0007) and stops the output.*		
F19.19	**Stall overvoltage point**	**220V inverter:**	**210 - 370 [390V]**
		380V inverter:	**650 - 790 [690V]**
		660V inverter:	**900 - 1180 [1150V]**
	If the stall overvoltage point is set a little lower, Dec time should be comparatively longer.		

6

Auto Current Limit (F19.20 - F19.22)

Auto current limit is used to limit the load current in real time < F19.21. Therefore HD31 will not trip due to surge current. It is especially suitable for applications with big load inertia or big change of load.

In auto current limit process, output frequency of HD31 may change; therefore, it is recommended not to enable when stable output frequency is required.

Ref. Code	Name Description	Setting Range [Default]
F19.20	**Auto current limiting selection**	**0.000 – 1.000 [0.500]**
	0.000: The automatic current limit is invalid. 1: Enabled in Acc / Dec running process, but disabled in constant speed running process. 2: Enabled both in Acc / Dec and constant speed running process. • When the auto current limit is enabled, the output overload capacity will be impaired if auto current limit threshold is set too low.	
F19.21	**Auto current limiting threshold**	**20.0 - 200.0 [110%]**
	Defines the current threshold of auto current limit. The current = F19.21 × rated current of HD31.	
F19.23	**Terminal running commands valid method**	**0x00 - 0x11 [0x00]**
	Unit: Power-on moment terminal detection **Ten: Running commands valid method** 0: Rise edge enabled mode. 1: Level enabled mode.	

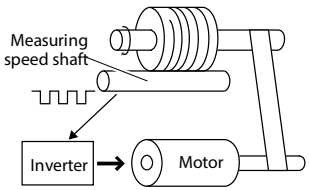
Braking unit (F19.24 - F19.25, F19.40 – F19.41)

Ref. Code	Function Description	Setting Range [Default]
F19.24	**Action voltage of braking unit**	**630 - 750 [720V]**
	Note: Only the frequency converter with built-in brake unit releases energy through the braking resistor, and the energy release only occurs when the inverter is running.	
F19.25	**Flux brake enabled**	**0,1 [0]**
	0: Prohibited. 1: Enable, automatically disable overvoltage stall function. • By increasing the loss of the motor, you can decelerate faster without braking resistors. • The flux brake effect can be adjusted by F19.40, F19.41. • Valid only when V/f control is active. *Note: Do not use this function during frequent braking, which may damage the motor.*	

Fixed length arrive and stop function (F19.26 - F19.34)

This Group is used to realize fixed length stop function. As the right figure:

The inverter inputs the count pulse from the terminal (multi-function terminal is set as No. 52 function) and gets the count length according to the measuring number of pulses per revolution (F19.31) and shaft diameter (F19.30). Then modify the count length and obtain the actual length (F19.27) via length ratio (F19.28) and length checking coefficient (F19.29) too.



The formula is as follows:

F19.27 = Counted length × F19.28 ÷ F19.29

Counted length = Counted pulse number ÷ F19.31 × F19.30 × π

If F19.27 ≥ F19.26, the inverter will automatically send the stop command. Before running again, it need clear F19.27 or changed to F19.27 < F19.26. Otherwise the inverter can't be started.

Ref. Code	Function Description	Setting Range [Default]
F19.26	**Preset length**	**0 - 65535 [0m]**
F19.27	**Actual length**	**0 - 65535 [0m]**
F19.28	**Length ratio**	**0.001 - 30.000 [1.000]**
F19.29	**Length checking coefficient**	**0.001 - 1.000 [1.000]**
F19.30	**Measuring shaft diameter**	**1.00 - 100.00 [10.00cm]**
F19.31	**Number of pulses per revolution**	**1 - 9999 [1]**
F19.32	**Length arrive and output function selection**	**0,1 [0]**
	0: Output level signal. 1: Output 500ms pulse.	
F19.33	**Record of length disposal after length arrive**	**0,1 [0]**
F19.34	**Record of length disposal at stop**	**0,1 [0]**
	0: Auto-clear. 1: No change.	

Auxiliary PID limit (F19.35 - F19.36)

Ref. Code	Function Description	Setting Range [Default]
F19.35	**Auxiliary PID output limit**	**0.0 - 100.0 [100.0%]**
	Auxiliary frequency selected as PID, PID takes as PID adjustment up limit F19.35 × main given frequency.	
F19.36	**Auxiliary PID output limit increase**	**0.0 - 100.0 [0.0%]**
	Auxiliray PIDoutput limit = output limit comfirmed by F19.35 + F19.36 × F00.06.	

Frequency adjust range (F19.37)

Ref. Code	Function Description	Setting Range [Default]
F19.37	**Frequency adjust range selection**	**000 - 111 [100]**
	Unit: The main frequency calculation range • 0: 0 to max. frequency. • 1: Negative max. frequency to max. frequency. **Ten: Auxiliary frequency calculation range** • 0: 0 to max. frequency. • 1: Negative max. frequency to max. frequency. **Hundred: Synthetic frequency calculation range** • 0: 0 to the upper limit frequency. • 1: Negative upper limit frequency to upper limit frequency.	

Short detection (F19.38)

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

Input voltage selection (F19.39)

Ref. Code	Function Description	Setting Range [Default]
F19.39	**Input voltage selection**	**000 - 002 [0]**
	Unit: 380V model input voltage selection 0: 380 - 460V. 1: 260 - 460V. 2: 200 - 460V. ***Ten, Hundred: Unused***	

Brake function (F19.24 - F19.25, F19.40 - F19.41)

Ref. Code	Function Description	Setting Range [Default]
F19.40	**Flux brake PI regulator Kp**	**0 - 4000 [1000]**
F19.41	**Flux brake PI regulator Ki**	**0 - 500 [20]**

6.2.15 F20: Fault Protection Parameters

Overload Fault (F20.00 - F20.02)

Ref. Code	Name Description	Setting Range [Default]
F20.00	**Overload pre-alarm detection**	**00000 - 11111 [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: Action selection for overload pre-alarm
	• 0: The inverter doesn't alarm and continues operation when detecting an active overload signal.
	• 1: The inverter alarms and stops operation when detecting an active overload signal.
	Hundred: Overload threshold selection
	• 0: Ratio of load current to the motor's rated current (alarm: motor overload).
	• 1: Ratio of load current to the inverter's rated current (alarm: inverter overload).
	Thousand: Motor type selection
	• 0: Standard motor.
	  • As the cooling effect of the standard motor deteriorates at low speed, HD31 will automatically make regulation to the time of motor overload protection.
	• 1: Variable frequency.
	  • The cooling effect of the variable frequency motor is not affected by the motor speed due to its forced cooling potential, HD31 will not automatically make regulation to the time of motor overload protection.
	Ten thousand: Overload protection
	• 0: Enabled.
	• 1: Disabled.	

F20.01	**Overload pre-alarm detection threshold**	**20.0 - 200.0 [150.0%]**
	Defines the current threshold for overload pre-alarm protection. The current = F20.01 × rated current of motor / rated current of HD31.	
F20.02	**Overload pre-alarm detection time**	**0.0 - 60.0 [5.0s]**
	Defines the time during which the output current of HD31 > F20.01. If the status remains after overload pre-alarm detection time (F20.02), HD31 will alarm E0017 fault (inverter overload) or E0019 fault (motor overload).	

Output Load-loss Detection Fault of HD31(F20.03 - F20.05)

Ref. Code	Name Description	Setting Range [Default]
F20.03	**Inverter output load-loss detection**	**0 - 4 [0]**
	0: Disabled. It does not detect output load-loss. 1: It is detecting all the time in running process, and then continues operation after detecting (alarm). 2: It detectes only at the same speed, and then continues operation after detecting (alarm). 3: It is detecting all the time in running process, and then cut off the output after detecting (fault). 4: It is detectes only at the same speed, and then cut off the output after detecting (fault).	
F20.04	**Inverter output load-loss detection threshold**	**0 - 100 [30%]**
	Defines the current threshold of load-loss. The current = F20.01 × rated current of HD31.	
F20.05	**Inverter output load-loss detection time**	**0.00 - 20.00 [1.00s]**
	If the output current of HD31 < F20.04 and exceeds the time defined by load-loss detection time (F20.05), HD31 will alarm E0018 fault (inverter output load-loss). • F20.04 or F20.05 = 0, HD31 will not detect load-loss fault.	

Motor Overheat Fault (F20.06 - F20.07)

It can connect the electronic thermistor embedded motor stator coils to the AI terminal of HD31 in order to protect motor overheat.

Ref. Code	Name Description	Setting Range [Default]
F20.06	**Motor overheat signal input type**	**0 - 2 [0]**
	0: Does not detect the motor overheating. 1: Positive charateristic (PTC). 2: Negative charateristic (NTC).	
F20.07	**Thermistor value at motor overheat**	**0 - 10.0 [5.0kΩ]**

Input and Output Voltage Phase Loss Fault (F20.08 - F20.11)

Ref. Code	Name Description	Setting Range [Default]
F20.08	**Input phase loss detection reference**	**0 - 50 [30%]**
F20.09	**Input phase loss detection time**	**1.00 - 5.00 [1.00s]**
	The detection voltage = F20.08 × rated voltage of HD31. When HD31 detects certain input voltage < the detection setting (F20.08) and exceeds the detection time (F20.09), HD31 will alarm E0015 fault (input voltage phase loss). • F20.08 = 0, HD31 will not detect input voltage phase loss fault.	
F20.10	**Output phase loss detection reference**	**0 - 100 [20%]**
F20.11	**Output phase loss detection time**	**1.00 - 20.00 [3.00s]**
	The detection current = F20.10 × rated current of HD31. When HD31 detects certain output current < the detection setting (F20.10) and exceeds the detection time (F20.11), HD31will alarm E0016 fault (output voltage phase loss). • F20.10 or F20.11 = 0, HD31 will not detect output voltage phase loss fault.	

PID Setting and Feedback Loss Fault (F20.12 - F20.17)

Ref. Code	Name Description	Setting Range [Default]
F20.12	**PID reference lose detected value**	**0 - 100 [0%]**
F20.13	**PID reference loss detection time**	**0.0 – 1000.0 [0.20s]**
	F20.12 value is a percentage of the max. setting source. If the PID setting < F20.12 in the detection time (F20.13), HD31 will alarm E0025 fault (PID setting loss). • F20.12 or F20.13 =0, HD31 will not detect PID setting loss fault.	
F20.14	**PID feedback loss detected value**	**0 - 100 [0%]**
F20.15	**PID feedback loss detection time**	**0.0 - 1000.0 [0.20s]**
	F20.14 value is a percentage of the max. feedback source. If the PID feedback value < F20.14 in the detection time (F20.15), HD31 will alarm E0026 fault (PID feedback loss). • F20.14 or F20.15 = 0, HD31 will not detect PID feedback loss fault.	

Fault at PID Feedback Value out of the Limit (F20.16 - F20.17)

Ref. Code	Name Description	Setting Range [Default]
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 - 1000.00 [0.20s]
	F20.16 value is a percentage of the max. feedback source. If the PID feedback value > F20.16 in the detection time (F20.17), HD31 will alarm E0027 fault (PID feedback out of limit). • F20.16=100 or F20.17=0, HD31 will not detect PID feedback out of limit fault.	

Fault Auto Reset Function and Faulted Relay Action (F20.18 - F20.20)

Auto reset function enables HD31 to reset the fault as per the reset times and interval.

During the reset interval, HD31 stops output and it will automatically restarts with speed tracking mode.

The following faults do not have the auto reset function:

E0008: Power module fault
E0010: Braking unit fault
E0013: Soft start contactor failed
E0014: Current detection fault
E0021: Read / Write fault of control board EEPROM
E0023: Parameter setting fault
E0024: Peripheral device fault

Ref. Code	Name Description	Setting Range [Default]
F20.18	Auto reset times	0 - 100 [0]
F20.19	Auto reset interval	0.01 - 200.00 [5.00s/times]
	F20.18 = 0, it means "auto reset" is disabled and the fault protection will be activated. • If no other fault is detected within 5 minutes, the auto reset times will be automatically cleared. • On condition of external fault reset, auto reset time will be cleared.	
F20.20	Faulted relay action selection	00 - 11 [00]
	Unit: In auto reset process 0: Faulted relay doesn't act. 1: Faulted relay acts. **Ten: In the undervoltage process** 0: Faulted relay doesn't act. 1: Faulted relay acts. *Note: Relay needs to be set as No. 31 function (inverter fault).*	

Fault History (F20.21 - F20.37)

Ref. Code	Name Description	Setting Range [Default]
F20.21	Type of fifth latest (the last) fault	[Actual value]
F20.22	Setting frequency at the last fault	
F20.23	Running frequency at the last fault	
F20.24	Bus voltage at the last fault	
F20.25	Output voltage at the last fault	
F20.26	Output current at the last fault	
F20.27	Input terminal status at the last fault	
F20.28	Output terminal status at the last fault	
F20.29	Interval of fifth latest fault	
F20.30	Type of fourth latest fault	
F20.31	Interval of fourth latest fault	
F20.32	Type of third latest fault	
F20.33	Interval of third latest fault	
F20.34	Type of second latest fault	
F20.35	Interval of second latest fault	
F20.36	Type of first latest fault	
F20.37	Interval of first latest fault	
	F20.22 - F20.29 record status parameters of HD31 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.	
F20.38	Last fault interval	[Actual value]
	F20.22 - F20.29 record the inverter status parameters at the last fault. F20.30 - F20.37 record the type and interval per time of four faults before the latest. The interval's unit is 0.1 hour.	

6.2.16 F23: PWM Control Parameters

<table>
<tr><th>Ref. Code</th><th>Name Description</th><th>Setting Range [Default]</th></tr>
<tr><td>F23.00</td><td>Set the carrier frequency</td><td>1 - 16kHz [Depend on HD31]</td></tr>
<tr><td></td><td colspan="2">F23.00 defines the carrier frequency of PWM output wave.
<table>
<tr><th>Inverter power</th><th>Setting range</th><th>Factory setting</th></tr>
<tr><td>7.5 - 30kW</td><td>1 - 16kHz</td><td>8kHz</td></tr>
<tr><td>37 - 45kW</td><td>1 - 12kHz</td><td>6kHz</td></tr>
<tr><td>55kW</td><td>1 - 6kHz</td><td>4kHz</td></tr>
<tr><td>≥ 75kW</td><td>1 - 4kHz</td><td>2kHz</td></tr>
</table>
• 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 > the factory setting, HD31 should be derated by 5% when per 1kHz is increased compared to the factory setting.</td></tr>
<tr><td>F23.01</td><td>Carrier frequency is automatically adjusted</td><td>0 - 2 [1]</td></tr>
<tr><td></td><td colspan="2">0: The carrier frequency is disabled automatically.
1: Carrier frequency auto adjustment 1.
2: Carrier frequency automatic adjustment 2.
• When the carrier frequency is automatically adjusted, the inverter automatically adjusts the carrier frequency according to the output frequency and the radiator temperature.
• Invalid carrier frequency auto adjustment during torque control.</td></tr>
<tr><td>F23.02</td><td>PWM overshoot enable</td><td>0,1 [1]</td></tr>
<tr><td></td><td colspan="2">0: Disabled.
1: Enabled.</td></tr>
<tr><td>F23.03</td><td>PWM modulation mode</td><td>0 - 2 [0]</td></tr>
<tr><td></td><td colspan="2">0: Two-phase modulation or three-phase modulation.
1: Three-phase modulation.
2: Two-phase modulation.</td></tr>
<tr><td>F23.04</td><td>PWM Modulation mode switching point1</td><td rowspan="2">0.00 - 50.00Hz
[Dependent on HD31]</td></tr>
<tr><td>F23.05</td><td>PWM Modulation mode switching point2</td></tr>
<tr><td></td><td colspan="2">PWM modulation mode switching only applies to working conditions of V/f control and carrier frequency > 3kHz. Open loop vector or carrier frequency ≤ 3kHz, the inverter automatically selects the three-phase modulation.
• F23.04 sets the switching frequency of two-phase modulation → three-phase modulation.
• 2.2kW and below models (380V and 220V) factory value 10.00Hz, the lower limit of 10.00Hz.
• Other models, factory default 5.00Hz, lower limit 5.00Hz.
• F23.05 sets the switching frequency of three-phase modulation → two-phase modulation.
• 2.2kW and below models (380V and 220V) factory value 15.00Hz.
• Other models, factory value 10.00Hz.
Note: F23.04 setting value is F23.05 - 2.00Hz, F23.05 lower limit is F23.04 + 2.00Hz.</td></tr>
</table>

6.3 Group P: Special Parameter for Multi-pump Water Supply

6.3.1 P00: Water Supply Logic Parameter

Ref. Code	Name Description	Setting Range [Default]
P00.00	**Water supply mode**	**0,1 [1]**
	0: Water supply running mode.. • Applicable to common water supply system, e.g., water supply for daily use, industrial use, municipal use. • Also applicable to similar systems, such as oil supply system, vent system and other systems. 1: Water supply commissioning. mode • Used for on-site commissioning, and to confirm the switching logic and wiring of HD31. *Note: The above modes are valid when F00.05 = 1. The I/O terminals of I/O board are valid when F00.04 = 2.*	
P00.01	**Water level (WL) signal input**	**0 - 2 [0]**
	0: No input. No control for WL signal of the intake pool. 1: DI terminal input. • No. 15 - 17 function of P03.04 - P03.12 respectively set the current upper limit WL, lower limit WL and water shortage WL. 2: AI terminal input. • The P03.00 - P03.03 set the signal source of the analogue WL. • The P00.02 - P00.04 respectively set the upper limit WL, lower limit WL and water shortage WL.	
P00.02	**Upper limit WL of intake pool**	**0.0 - 100.0 [50.0%]**
P00.03	**Lower limit WL of intake pool**	**0.0 - P00.02 [30.0%]**
P00.04	**Water shortage WL of intake pool**	**0.0 - P00.03 [10.0%]**
P00.05	**Backup pressure**	**0.0 - P05.03 × 10 [0.0kg/cm²]**
	100.0% of the WL signal corresponds to 10V or 20mA. **Water level control:** • When WL of the intake pool decreases: • The system runs in accordance with P00.05 when water shortage WL of intake pool < current WL < lower limit WL of intake pool; • The system stops all of the bumps when current WL < water shortage WL of intake pool. • When WL of the intake pool increases: • The system runs in accordance with P00.05 when lower limit WL of intake pool < current WL < upper limit WL of intake pool; • The system resumes normal pressure running when upper limit WL of intake pool < current WL.	
P00.06	Reserved	
P00.07	**Adding pump detection time**	**0.0 – 3600.0【 5.0s 】**
P00.08	Reserved	
P00.09	**Main pump Dec.time when adding pump**	**0.0 – 100.0【 10.0s 】**
	• Adding pump conditions: • ①The main pump is currently running, and n auxiliary pumps have been activated (n=0,1,2,3) • ②The current operating frequency reaches the n+1 auxiliary pump plus pump frequency (corresponding to P00.55-P00.58) • ③The duration of condition ①② ≥ P00.07 • Add auxiliary pump: When the system meets the pumping conditions, if there is currently an auxiliary pump, it can be added. • The system will directly use the power frequency operation mode and add a pump with the least accumulated running time as an auxiliary pump.	

Ref. Code	Name Description	Setting Range [Default]
	• At the same time, in order to avoid a sudden increase in pipe pressure, the current variable frequency pump will reduce the current output frequency according to P00.09 (the deceleration time of the main pump when the pump is added), and the reduced value is the difference between the n+1th auxiliary pump pumping frequency and the pumping frequency reduction For example, when the first auxiliary pump is started, the difference is △=P00.55-P00.59 (the first auxiliary pump plus the pump frequency-the first auxiliary pump minus the pump frequency), and then perform PI adjustment. • • note: • 1. When adding a pump, add the pump with the least accumulated running time as the auxiliary pump, and the accumulated time refers to the running time as the auxiliary pump. • 2. The maximum number of auxiliary pumps added in the system is 4, and the added pumps are valid pumps (P03.00-P03.04 pump type is correspondingly set to 1, and the DI terminal does not transmit a pump invalid signal).	
P00.10	Reserved	
P00.11	Removng pump detection time	0.0 – 3600.0【 5.0s 】
P00.12	Main pump acc. Time when removing pump	0.0 – 100.0【 10.0s 】
	• Remove pump conditions: • ①The main pump is currently running, and n auxiliary pumps have been activated (n=1,2,3,4) • ②The current operating frequency reaches the subtraction frequency of the nth auxiliary pump (corresponding to P00.59-P00.62) • ③The duration of condition ①②≥ P00.11. • Reduce auxiliary pump: When the system meets the pumping conditions, if there is currently an auxiliary pump that can be added. • The system removes an auxiliary pump with the longest accumulated running time. • At the same time, in order to avoid a sudden drop in pipe pressure, the current variable frequency pump increases the current output frequency according to P00.12 (the acceleration time of the main pump when the pump is reduced), and the increased value is the difference between the increase and decrease frequency of the nth auxiliary pump. For example, when the first auxiliary pump is reduced, the difference is △=P00.55-P00.59 (the first auxiliary pump plus pump frequency-the first auxiliary pump minus pump frequency), and then PI adjustment is performed. • • Note: 1、 When reducing the pump, remove the auxiliary pump with the longest accumulated running time. The accumulated time refers to the running time of the auxiliary pump. 2、when system gets the stop command，as the set time of P00.11，stop the auxiliary pump one by one and then stop the main pump	

6

Ref. Code	Name Description	Setting Range [Default]
P00.13	Breaking delay of pump 1 contacotr	0.000 - 5.000 [0.020s]
P00.14	Touching delay of pump 1 contactor	0.000 - 5.000 [0.200s]
	Used during the pump switch process. It is used for the mechanical delay close and open of the contactor. And more importantly, it's used to avoid the remanence effect. This effect occurs during the process of variable frequency switching to power frequency. Remanence effect may cause the switch fail. • P00.13 is the duration of HD31 from sending a command of free stop (send an instruction to disconnect HD31 drive contactor simultaneously) to close the normal drive contactor. • For pumps over 45kW which require to switch from variable frequency to power frequency, P00.13 can effectively reduce the switching current and improve successful switching. • P00.14 is the duration from sending a close command of inverter drive contactor to the output moment of HD31. It allows for the mechenical delay of the contactor before starting the next variable frequency pump.	
P00.15	Main pump default pump number	1 - 5 [1]
P00.16	Main pump rotation period	0 - 9999 [0h]
	Main pump rotation When P00.16 is not 0,and there is Main pump drived by inverter,after cumulative running time reaches to P00.16.then when next time system start or start from dormancy mode,starts the pump which has the shortest cumulative running time as the Main pump from the other pumps When P00.16 is 0,rotation function is invalid,default starts the pump of P00.15 as Main pump.if pump of P00.15 is invalid,start the pump with the shortest cumulative running time as the Main pump. If there is only present Main pump valid,other pump due to fault or disabled,rotation function is invalid	
P00.17	Dormancy enable	0 - 4 [0]
	0: No dormancy. 1: Constant pressure dormancy. 2: Specified pressure dormancy. 3: No flow dormancy1. 4: No flow dormancy 2. *Note: F00.21 and F00.22 support specified pressure dormancy (it's dormant when the setting frequency meets lower limit frequency).*	
P00.18	Pressure tolerance of dormancy awakening	0.0 - 100.0 [10.0%]
P00.19	Delay time of dormancy awakening	0.0 - 3600.0 [5.0s]
	When P00.17 = 0, the sleep function is invalid. • When P00.17 = 1, when there is only one main pump in the system, if the feedback pressure> set pressure - set pressure × P00.20, the system enters the dormant state. • When P00.17 = 2, when there is only one main pump in the system, the feedback pressure> set pressure + set pressure × P00.20 condition, after the time set by P00.22, the system stops running and enters sleep status. • When P00.17 = 3, when there is only one main pump in the system, the feedback pressure> set pressure - set pressure × P00.20 and the output frequency is less than P00.23 for a certain period of time (if it is a startup process, the time is P00 .24, the rest of the time is P00.22. If there is no special requirement, you can set P00.22 = P00.24), the system sleeps. • When P00.17 = 4, when there is only one main pump in the system, the feedback pressure> set pressure - set pressure × P00.20, and the detected output power is less than the no-flow power or the output frequency is less than P00.23 for a certain time (P00.22), the system sleeps. • In the dormant state, when the feedback pressure <set pressure-set pressure × P00.18 condition, and exceed the time set by P00.19, it will wake up from sleep. • When waking up from sleep, if the system starts the main pump first, if the flow demand is large, the auxiliary pump will be added.	

Ref. Code	Name Description	Setting Range [Default]
P00.20-	Shutdown detection coefficient	0.0 - 100.0 [0.0%]
P00.21	Reserved	
P00.22	Detection time of shutdown detection	0.0 - 3600.0 [6.0s]
P00.23	No-flow detecting frequency	0.0 - 50.00[25.00Hz]
P00.24	Detecting time for no-flow detecting start delay	0.0 - 3600.0[60.0s]
P00.25	No flow correction factor	1 - 400[100%]
	Before correcting no-flow frequency, pls refer to d00.41.	
P00.26	No-flow low speed	0.00 - 99.99 [0.00Hz]
P00.27	No-flow low speed power	0.00 - 10.00 [0.00kW]
P00.28	No-flow high speed	0.00 - 99.99 [0.00Hz]
P00.29	No-flow high speed power	0.00 - 10.00 [0.00kW]
	No-flow power measuring steps: • Set F00.05 = 0, F00.10 = 0 and ensure the system reach normal temporature before no-flow power testing. • Close main valve and stop flow • When the setted frequency is about 50% of motor rated frequency, recording setted frequency in P00.26 and recording current value of D00.40 in P00.27 • When the setted frequency is about 85% of motor rated frequency, recording setted frequency in P00.28 and recording current value of D00.40 in P00.29.	
P00.30	No-flow detection curve	0 - 3 [0]
	0: Square curve. 1: Straight line. 2: Cubic curve 1. 3: Cubic curve 2. *Note: By P00.26 - P00.29, corresponding no-flow power will be work out by setted curve and will be recorded in d00.41, pleasure select reasonbale curve.*	
P00.31	0 : Forbidden •Before the auxiliary pump ,no phase sequency detecting 1 : Enable •Before the auxiliary pump , detect phase sequency ,prevent the aux pump from reversing due to phase sequency fault when starting as power frequency *Note: Detailed steps refer to 7.2 Debugging for Switching between VF and PF,.*	
P00.32-P00.38	Reserved	

P00.39	Dealy of pump 2 contactor breaking	0.000 - 5.000 [0.020s]
P00.40	Dealy of pump 2 contactor touching	0.000 - 5.000 [0.020s]
P00.41	Dealy of pump 3 contactor breaking	0.000 - 5.000 [0.020s]
P00.42	Dealy of pump 3 contactor touching	0.000 - 5.000 [0.020s]
P00.43	Dealy of pump 4 contactor breaking	0.000 - 5.000 [0.020s]
P00.44	Dealy of pump 4 contactor touching	0.000 - 5.000 [0.020s]
P00.45	Dealy of pump 5 contactor breaking	0.000 - 5.000 [0.020s]
P00.46	Dealy of pump 5 contactor touching	0.000 - 5.000 [0.020s]
P00.47-P00.50	Reserved	
P00.51	Auxiliary pump 1 flow compensation	0.0 – 100.0【 0.0% 】
P00.52	Auxiliary pump 2 flow compensation	0.0 – 100.0【 0.0% 】
P00.53	Auxiliary pump 3 flow compensation	0.0 – 100.0【 0.0% 】
P00.54	Auxiliary pump 4 flow compensation	0.0 – 100.0【 0.0% 】
	With the flow increasing，Main pump can not hold the pressure，this time starts first auxiliary pump to satisfy the pressure，if the flow keeps increasing，starts the second auxiliary pump。Starts one by one ，up to four pumps can be added。 In this process，pressure of pipe head(detection point) and end is also increasing。Starts in turn after auxiliary pump，Given increment need to be set as below methods ，to make up for the increased pressure difference，and make up the pressure decrease of pipe end。 When first auxiliaty pump runs，given increment is P00.51， When second auxiliaty pump runs，given increment is P00.51+P00.52， When third auxiliaty pump runs，given increment is P00.51+P00.52+P00.53， When forth auxiliaty pump runs，given increment is P00.51+P00.52+P00.53+P00.54。	
P00.55	Auxiliary pump 1 start frequency	0.00 – 400.00【 50.00Hz 】
P00.56	Auxiliary pump 2 start frequency	0.00 – 400.00【 50.00Hz 】
P00.57	Auxiliary pump 3 start frequency	0.00 – 400.00【 50.00Hz 】
P00.58	Auxiliary pump 4 start frequency	0.00 – 400.00【 50.00Hz 】
P00.59	Auxiliary pump 1 stop frequency	0.00 – 400.00【 25.00Hz 】
P00.60	Auxiliary pump 2 stop frequency	0.00 – 400.00【 25.00Hz 】
P00.61	Auxiliary pump 3 stop frequency	0.00 – 400.00【 25.00Hz 】
P00.62	Auxiliary pump 4 stop frequency	0.00 – 400.00【 25.00Hz 】
	The function here is to control the addition and subtraction logic of the auxiliary pump, When the pressure demand is relatively small, there is only the main pump at this time, and the pressure demand can be met by adjusting the frequency of the main pump (range: 0 ~ P00.55). When the pressure demand increases, the frequency of the main pump exceeds the starting frequency of the current pump (the first auxiliary pump is P00.55, and so on), and the maintain time reaches P00.63, at	

	this time an auxiliary pump will be added And the output frequency of the inverter will decrease according to the following formula = (start frequency-stop frequency). When the pressure demand decreases, the frequency of the main pump is lower than the stop frequency of the current pump (the first auxiliary pump is P00.59, and so on), and the maintain time reaches P00.64, then one auxiliary pump will be reduced And the output frequency of the inverter will increase according to the following formula = (start frequency-stop frequency). With the change of the number of auxiliary pumps, the main pump frequency change (start frequency-stop frequency) is given by the following parameters. The current auxiliary pump is one, and the frequency change of the main pump (P00.55-P00.59), There are currently 2 auxiliary pumps, and the frequency change of the main pump (P00.56-P00.60), There are currently 3 auxiliary pumps, and the frequency change of the main pump (P00.57-P00.61), There are currently 4 auxiliary pumps, and the frequency change of the main pump (P00.58-P00.62). When adding or subtracting an auxiliary pump, it is controlled according to the cumulative running time of the pump as an auxiliary pump. When adding the pump, the first priority is to start and the one with shortest running time, and when system wants to reduce pumps, the first to shut down is the one with longest running time.。	
P00.63	Forbbiden adding pump time after the main pump is invalid	0.5 – 3600.0【 20.0s 】
	When the DI terminal enables the main pump to be invalid,. Within the time of P00.63, it will not enter the pump reduction logic to prevent the pump frequency reduction P00.59-P00.62 A logical conflict occurred.	
P00.64	Delay switching time after the main pump is invalid	0.0 – 3600.0【 5.0s 】
	When the DI terminal makes the main pump invalid, if the available pump is used as the new main pump, it is necessary to wait for P00.64 time before starting the new main pump, to prevent the fault of the Inverter caused by the auxiliary pump not being stopped when theauxiliary pump is used as the new main pump. Note: the set value of P00.63 should be greater than P00.64, otherwise, the new main pump is not started within P00.64, but the adding pump logic after P00.63 is entered, and the auxiliary pump that is still in operation is removed	

6.3.2 P01: Water Supply Pump Parameter

Ref. Code	Name Description		Setting Range [Default]
P01.00	Pump 1 type		0 - 1 [0]
P01.01	Pump 2 type		0 - 1 [0]
P01.02	Pump 3 type		0 - 1 [0]
P01.03	Pump 4 type		0 - 1 [0]
P01.04	Pump 5 type		0 - 1 [0]
	0: The water pump is invalid. The corresponding pump is not installed or does not participate in system work. 1: Automatic pump. The corresponding pump adopts variable frequency/power frequency start according to the following conditions. • When the system is running, a pump will be activated first as the main pump. At this time, the main pump is used as the variable frequency regulating pump of the entire water supply system. It is controlled by the inverter and automatically adjusts the speed of the pump according to the actual pressure of the system to maintain the system. Constant pressure. • Add pump: When a main pump is not enough to maintain a constant system pressure, the pump with the shortest accumulated running time will be selected as the auxiliary pump from the unrunning pumps. The pump is started by industrial frequency, and the main pump will respond accordingly Decrease (see P00.09 for pumping conditions). The system can add up to four auxiliary pumps. • Pump reduction: When there are too many auxiliary pumps enough to maintain a constant system pressure, the auxiliary pump with the longest cumulative running time will be disconnected from the auxiliary pumps that have been running, and the main pump will be accelerated accordingly (details regarding pump reduction See P00.12). When there is no auxiliary pump to reduce, the last stop is the main pump. • When the main pump switching condition is reached, and the system enters the dormant state or the system is manually stopped, the pump with the least accumulated running time will be searched for as the new main pump. note: 1. When the pump is set as an automatic pump, its corresponding variable frequency control relay and power frequency control relay must be set (see P03.15-P03.24 1-10 function), otherwise the system will not consider this pump as a valid pump. As a result, the pump cannot be operated. If there is only one automatic pump in the system and no inverter control relay or power frequency control relay is set, the inverter will not output after the system is started. *2. The accumulated running time refers to the time spent as an auxiliary pump.*		
P01.05-P01.06	Reserved		
P01.07	Rated current of pump 1	5.5kW above motor	0.1 - 999.9A [Depend on HD31]
		5.5kW and below motor	0.01 - 99.99A [Depend on HD31]
P01.08	Rated current of pump2	5.5kW above motor	0.1 - 999.9A [Depend on HD31]
		5.5kW and below motor	0.01 - 99.99A [Depend on HD31]
P01.09	Rated current of pump3	5.5kW above motor	0.1 - 999.9A [Depend on HD31]
		5.5kW and below motor	0.01 - 99.99A [Depend on HD31]
P01.10	Rated current of pump4	5.5kW above motor	0.1 - 999.9A [Depend on HD31]
		5.5kW and below motor	0.01 - 99.99A [Depend on HD31]
P01.11	Rated current of pump5	5.5kW above motor	0.1 - 999.9A [Depend on HD31]
		5.5kW and below motor	0.01 - 99.99A [Depend on HD31]
		Please set motor rated current(P01.07-P01.11) accroding to Motor label,these parameters will influence the overload	

Ref. Code	Name Description		Setting Range [Default]
			protection of Inverter to motor

Ref. Code	Name Description		Setting Range [Default]
P01.13	Rated current of pump7	5.5kW above motor	0.1 - 999.9A [Depend on HD31]
		5.5kW and below motor	0.01 - 99.99A [Depend on HD31]
	Please set the above rated current according to the nameplate on the motor. These parameters will affect the overload protection of HD31 for the motor.		

6.3.3 P02: Water Supply PID Parameter

Ref. Code	Name Description	Setting Range [Default]
P02.00	Pressure setting source	0 - 2 [0]
	0: Digital setting. P02.01 sets the setting pressure. 1: Pressure setting of timing water supply. P02.02 - P02.26 set the setting pressure. 2: Pressure setting of analogue water supply. The selected analogue of P03.00 - P03.03 set the setting pressure.	
P02.01	Pressure digital setting	0.0 - P05.03×10 [0.0kg/cm²]
	Used for digital pressure setting. 100.0% of digital setting is corresponding to 10V or 20mA. *Note:* *1. 100.0% of the feedback signal is corresponding to 10V or 20mA.* *2. 100% of P00.05、P02.01, P02.04, P02.06, P02.08, P02.10, P02.12, P02.14, P02.16, P02.18, P02.20, P02.22, P02.24, P02.26, P04.00 and P04.02 is corresponding to 10V or 20mA.* *3. 100% of P00.06, P00.10, P00.18 and P00.20 is corresponding to the setting pressure of P02.00.*	
P02.02	Pressure time	1 - 12 [1]
	P02.00 = 1, multi-time pressure is valid.	
P02.03	T1 start time	00.00 - 23.59 [00.00]
P02.05	T2 start time	00.00 - 23.59 [00.00]
P02.07	T3 start time	00.00 - 23.59 [00.00]
P02.09	T4 start time	00.00 - 23.59 [00.00]
P02.11	T5 start time	00.00 - 23.59 [00.00]
P02.13	T6 start time	00.00 - 23.59 [00.00]
P02.15	T7 start time	00.00 - 23.59 [00.00]
P02.17	T8 start time	00.00 - 23.59 [00.00]
P02.19	T9 start time	00.00 - 23.59 [00.00]
P02.21	T10 start time	00.00 - 23.59 [00.00]
P02.23	T11 start time	00.00 - 23.59 [00.00]
P02.25	T12 start time	00.00 - 23.59 [00.00]
P02.04	T1 time pressure	0.0 - P05.03×10 [0.0kg/cm²]
P02.06	T2 time pressure	0.0 - P05.03×10 [0.0kg/cm²]
P02.08	T3 time pressure	0.0 - P05.03×10 [0.0kg/cm²]
P02.10	T4 time pressure	0.0 - P05.03×10 [0.0kg/cm²]
P02.12	T5 time pressure	0.0 - P05.03×10 [0.0kg/cm²]
P02.14	T6 time pressure	0.0 - P05.03×10 [0.0kg/cm²]
P02.16	T7 time pressure	0.0 - P05.03×10 [0.0kg/cm²]
P02.18	T8 time pressure	0.0 - P05.03×10 [0.0kg/cm²]
P02.20	T9 time pressure	0.0 - P05.03×10 [0.0kg/cm²]

Ref. Code	Name Description	Setting Range [Default]
P02.22	T10 time pressure	0.0 - P05.03×10 [0.0kg/cm²]
P02.24	T11 time pressure	0.0 - P05.03×10 [0.0kg/cm²]

Ref. Code	Name Description	Setting Range [Default]
P02.26	T12 time pressure	0.0 - P05.03×10 [0.0kg/cm²]
	Used for time setting of multi-time pressure water supply and the pressure setting of the corresponding time. • Principle of time setting: T1 ≤ T2 ≤ T3 ≤ T4 ≤ T5 ≤ T6 ≤ T7 ≤ T8 ≤ T9 ≤ T10 ≤ T11 ≤ T12. • T1 refers to the beginning of T1 till beginning of T2; T2 refers to the beginning of T2 till the beginning of T3, and so forth. T12 refer to the beginning of T12 till the beginning of T1. • The beginning time of a certain period may be the same as its' previous one. In this case, the previous one joins to this period. • There is only one period per day if T1 = T2 = T3 = T4 = T5 = T6 = T7 = T8 = T9 = T10 = T11 = T12.	
P02.27	Upper limit of pressure closed-loop	0 - upper limit [50.00Hz]
	Max. frequency of closed-loop regulator output.	
P02.28	Proportional gain of pressure closed-loop (Kp)	0.00 - 10.00 [0.10]
	Defines the proportional gain, decides the adjustment inTenity of the regulator: the bigger KP is, the higher inTenity will be.	
P02.29	Integration time of pressure closed-loop (Ti)	0.01 - 10.00 [0.10s]
	Defines the integration time (Ti), and decides the speed of integration adjustment. The regulator makes adjustment for the tolerance of feedback / setting pressure. • When the tolerance of feedback / setting pressure is 100%, the integral regulator, with the continuous adjustment of P02.29, reaches the max. pressure (overlook the effect of P02.28 and P02.30). • The shorter integration time is, the faster adjustment speed will be.	
P02.30	Differential time of pressure closed-loop (Td)	0.00 - 1.00 [0.00s]
	Differential time decides the inTenity of integration adjustment. The regulator makes adjustment for the tolerance change of the feedback / setting pressure. • The adjustment of the derivative adjustment is max. pressure if the feedback pressure changes 100% within P02.30 (overlook the effect of P02.28 and P02.29). • The longer integration time is, the higher adjustment inTenity will be.	
P02.31	Sampling time (T)	0.01 - 30.00 [0.50s]
	Defines sampling time of feedback value. The regulator calculates once during every sampling period. • The longer sampling time is, the slower response will be.	
P02.32	Bias limit	0.0 - 20.0 [2.0%]
	The output value of the regulator is relevant to the max. tolerance of pressure setting. Within permitted range, the regulator stops regulating.	
P02.33	Output wave filter of pressure closed-loop	0.01 - 30.00 [0.50s]
	Make wave filter to the output frequency signal of the regulator, and avoid the jumping interfering signal to influence on the system. • Adjustment sensitivity is affected by overlong time of wave filtering.	
P02.34	Regulating characteristic of pressure closed-loop	0,1 [0]
	0: Positive characteristic. When the setting is added, pressure increases. 1: Negative characteristic. When the setting is added, pressure decreases.	
P02.35	Digital setting for saving selection when power failure	0,1 [1]
	0: Not saving.	

Ref. Code	Name Description	Setting Range [Default]
	1: Saving. When P02.00 = 0 and inverter is in stop/running, setted pressure is displaying. We can adjust the setted pressure through button ▲ or ▼ . After power failure, adjusted pressure value can be saved by P02.35.	

6.3.4 P03: Water Supply AIO Function Parameter

Ref. Code	Name Description	Range setting [Default]
P03.00	AI1 function	0 - 3 [0]
P03.01	AI2 function	0 - 3 [0]
P03.02	AI3 function	0 - 3 [0]
P03.03	AI4 function	0 - 3 [0]
	0: Unused. 1: Analoguepressure setting. • When P02.00 = 2 (pressure setting of analogue water supply), this function is selected by analogue source, which corresponds to input voltage. The input voltage sets the setting pressure. 2: Analoguefeedback setting. • This function is selected by analogue source, which corresponds to input voltage. The input voltage sets the feedback pressure. 3: Anologue WL feedback. • When P00.01 = 2 (WL signal is set by analogue source), this function is selected by analogue source, which corresponds to input voltage. The input voltage decides the WL signal. *Note:* *1. Once set P03.00 - P03.01, the corresponding F16.01 - F16.02 are invalid.* *2. 0 - 10V of AI1 - AI4 are corresponding to feedback signal 0 - 100.0%.*	
P03.04	DI1 function	0 - 19 [0]
P03.05	DI2 function	0 - 19 [0]
P03.06	DI3 function	0 - 19 [0]
P03.07	DI4 function	0 - 19 [0]
P03.08	DI5 function	0 - 19 [0]
P03.09	DI6 function	0 - 19 [0]
P03.10	DI7 function	0 - 19 [0]
P03.11	DI8 function	0 - 19 [0]
P03.12	DI9 function	0 - 19 [0]
	0: Unused. 1 - 5: pump 1 – 5 commissioning running. • Respectively specify inverter drive motor that needs commissioning start. When the commission terminal of the specified variable frequency pump is valid, the pump will start with variable frequency, and switch to power frequency after meeting P00.08. If there are multiple valid commission terminals, HD31 starts and switches them according to their consequence of switch off. 6-7：Reserved 8 - 12: pump 1 - 5 invalid. • Specify the pumps that need to be withdrawn from the system. After this command is valid, the corresponding pump will no longer participate in the operating logic of the system. • If the invalid pump indicated by the DI terminal is an auxiliary pump, the corresponding relay will be disconnected and exit operation. • If it is the main pump, the pump with the least accumulated running time will be selected as the main pump from other normal pumps. (If the selected pump is running as an auxiliary pump, you need to exit the auxiliary pump mode first and then change to the main pump mode)	

13 – 14: Reserved

15: Upper limit water level(WL) of intake pool.

16: Lower limit WL of intake pool.

17: Water shortage WL.

- When P00.01 =1 , No. 15- 17 decide the upper limit WL, lower limit WL and water shortage WL.

18 - 19: Reserved

- The sewage pump is triggered into use when WL of sewage pool exceeds upper limit WL; otherwise it deactivates and stops output.

Note: After setting the P03.04 - P03.09 functions, the corresponding F15.00 - F15.05 function are invalid.

Ref. Code	Name Description	Setting Range [Default]
P03.13	DO1 function	0 - 23 [0]
P03.14	DO2 function	0 - 23 [0]
P03.15	RLY1 function	0 - 23 [0]
P03.16	RLY2 function	0 - 23 [0]
P03.17	RLY3 function	0 - 23 [0]
P03.18	RLY4 function	0 - 23 [0]
P03.19	RLY5 function	0 - 23 [0]
P03.20	RLY6 function	0 - 23 [0]
P03.21	RLY7 function	0 - 23 [0]
P03.22	RLY8 function	0 - 23 [0]
P03.23	RLY9 function	0 - 23 [0]
P03.24	RLY10 function	0 - 23 [0]

0: Unused. No output function.

1,3,5,7,9,: pump 1 - 5 variable frequency control.

2,4,6,8,10: pump 1 – 5 power frequency control.

- Define the control signal of every pump. HD31 drive pump needs both control signals of variable frequency and power frequency.
- Please do wiring correctly during commissioning.

11 – 14：Reserved

15: Dormant running.

- This signal is valid when the system is in dormant running mode.

16: Over-pressure.

- This signal is valid when the pressure of pipe network is pressure of P04.00 or above, and sustains the setting time of P04.01.

17: Under-pressure.

- This signal is valid when pipe network pressure is pressure of P04.02 or below, and sustains the setting time of P04.03.

18: Backup pressure running.

- This signal is valid when the system meets the running condition of backup pressure and runs according to it.
- Refer to P00.01 - P00.05.

19: Pool water shortage.

- This signal is valid when WL of the intake pool < shortage WL.

20: Reserved

21: Faulty pump occurs.

- This signal is valid when P04.04 is not 0.

22: Reserved

23: The supply system is in running status.

- This signal is valid when the water supply system is in running status.

Note: After setting the P03.13 - P03.15 functions, the corresponding functions of F15.18 - F15.20 are invalid.

6.3.5 P04: Water Supply Fault Protection Parameter

Ref. Code	Name Description	Setting Range [Default]
P04.00	**Setting value of over-pressure protection**	**0.0 - P05.03×10 [0.0kg/cm²]**
P04.01	**Detection time of over-pressure protection**	**0.0 - 3600.0 [300.0s]**
	The system alarms for over-pressure when the pipe network pressure reaches the max. setting of P04.00 and sustains the setting time of P04.01. The alarm will stop only after value of the pipe network pressure is no more than the over-pressure protection value and sustains the setting time of P04.01.	
P04.02	**Setting value of under-pressure protection**	**0.0 - P05.03×10 [0.0kg/cm²]**
P04.03	**Detection time of under-pressure protection**	**0.0 - 3600.0 [300.0s]**
	Alarm on and off for under-pressure protection is similar with over-pressure protection (refer to P04.00 and P04.01).	
P04.04	**Record of faulty pump**	**0 - 0x1F [0]**

- When an variable frequency pump occurs fault which can be reset, the system automatically reset the pump according to F20.18 and F20.19. If the fault can not be reset, the system automatically stops the pump.
- Reset times for fault > setting value of F20.18 and fault still exits, HD31 records this pump (its bit set as 1) and marks it as invalid. Meanwhile, the faulty pump quits the system and does not participate in the switch logic.
- The following figure shows corresponding relationship between the pump and the position.

Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1
-	-	-	Pump 5	Pump 4	Pump 3	Pump 2	Pump 1

- The faulty pump which had troubleshot can participate the switch logic only after clear fault information (F01.02 = 4).

Example: P04.04 = 0x18= 00011000B indicates that the pump 4 and pump 5 occurs fault.

P04.05	**Troubleshooting for the inverter**	**0 [0]**

- 0: All stop.
- Record the current faulty pump and shut down the entire water supply system.
- • If the automatic reset function is set, perform the above operations after resetting the corresponding fault times, otherwise directly.

6.3.6 P05: Water Supply Time Parameter

Ref. Code	Name Description	Setting Range [Default]
P05.00	**Set current time (Year)**	**11 – 99 [Actual value]**
	Set time of the system: Year.	
P05.01	**Set current time (Month & Date)**	**0101 – 1231 [Actual value]**
	Set time of the system: Month & Date.	
P05.02	**Set current time (Hour & Minute)**	**0000 – 2359 [Actual value]**
	Set time of the system: Hour & Minute.	

Ref. Code	Name Description	Setting Range [Default]
P05.03	**Pressure sensor range setting**	**0.0 - 10.0 [1.6MPa]**
	1MPa=10kg/cm^2.	
P05.04	**Pressure sensor signal type selection**	**0 - 2 [0]**
	0: 0 - 10V. 1: 0 - 20mA. 2: 4 - 20mA. *Note:* *1. Only the AI2, AI3, AI4 terminals can be input the current signal and need to change the CN6 of the control board or the CN2 or CN3 jumper on water supply card. Please refer to the jumper description in the user manual for details.* *2. When P05.04 = 2, set the F05.00 teb bit to 1 and set F05.05 = 20.0%. When P05.04 = 0 or 1, set F05.00 ten bit to 0 and set to F05. 05 = 0.0%.*	
P05.05	**Water supply method selection**	**0x00 - 0x75 [0x00]**

Modify P05.05 and system will automatically set P01.00 - P01.04, P03.15 - P03.24.

Set the principle:

Follow P01.00 - P01.04 to set the auto-pump, set P03.16 - P03.24, P03.15 power and variable frequency control in turns.

For example: Set P05.05 = 5, the parameters automatically set, as follows:

Ref. Code	Function	Value	Defination
P01.00	Pump 1 type	1	Pump 1 is variable frequency pump
P01.01	Pump 2 type	1	Pump 2 is variable frequency pump
P01.02	Pump 3 type	1	Pump 3 is variable frequency pump
P01.03	Pump 4 type	1	Pump 4 is variable frequency pump
P01.04	Pump 5 type	1	Pump 5 is power frequency pump
P03.15	RLY1 function	10	Pump 6 power frequency running
P03.16	RLY2 function	1	Pump 1 variable frequency running
P03.17	RLY3 function	2	Pump 1 power frequency running
P03.18	RLY4 function	3	Pump 2 variable frequency running
P03.19	RLY5 function	4	Pump 2 power frequency running
P03.20	RLY6 function	5	Pump 3 variable frequency running
P03.21	RLY7 function	6	Pump 3 power frequency running
P03.22	RLY8 function	7	Pump 4 variable frequency running
P03.23	RLY9 function	8	Pump 4 power frequency running
P03.24	RLY10 function	9	Pump 5 power frequency running

Note:

1. A bit indicates the number of variable frequency pumps in the system; ten indicates the number of frequency pumps in the system.

2. The number of frequency pump plus frequency pump can not exceed 7, the total number of relays can not be more than 10.

参数号	参数描述参数描述	设定范围【出厂值】

P05.06	供水故障状态显示与清除	0x00－0x11【0x00】
	个位：供水故障状态显示 显示 EP0＋ 故障泵记录（P04.04）。 十位：STOP 键清除故障泵状态 0：禁止。 1：使能。 *注意：* *1．故障显示（个位）：显示 EP0＋ 故障泵记录(P04.04)，如 1 号泵有故障，显示 EP001（EP0＋01）。* *2．故障泵清除（十位）：需要系统停机且操作面板显示状态界面后，按 **STOP** 键才能清除。*	

Chapter 7 Application Reference

7.1 Take One-to-Four Inverter as an Example.

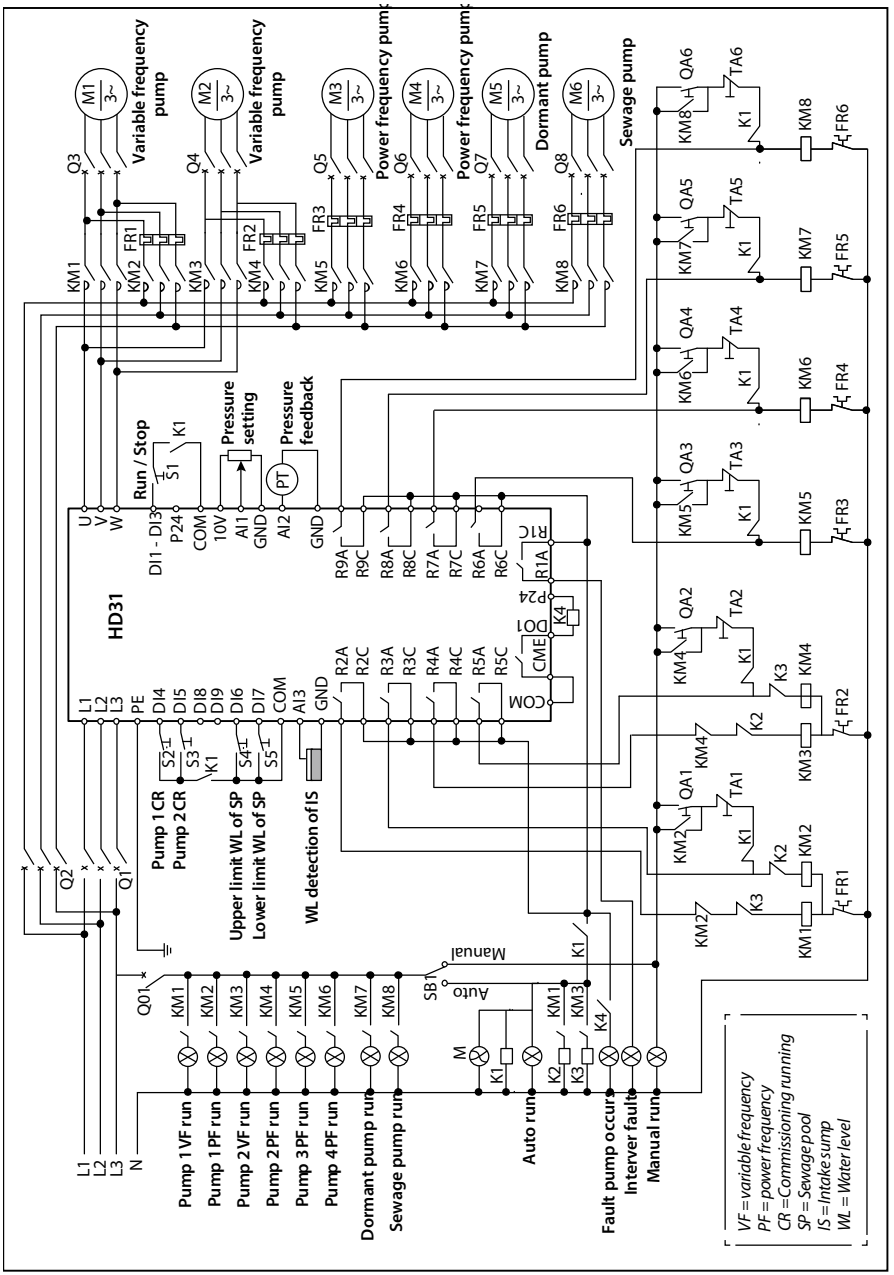
1. Compatible with: variable pump x 5

2. Technical requirements:

- The analogue value sets the water pressure.
- The analogue value feeds back the intake pool WL (water level) signal. The liquid level signal feeds back the sewage pool WL signal.
- Backup pressure function: 0.2Mpa backup pressure.

3. Pressure gauge selection: remote control, DC 0 - 10V output, 1Mpa range.

HD31 system wiring is shown in figure below.



One-to-six wiring

Set parameter

Ref. Code	Setting	Description
F00.04	2	I/O terminal signal on HD31-WIO board is enabled
F00.05	1	Water supply function is enabled
F00.11	1	Terminal sets setting source
F15.00	2	Input terminal DI1: set as FWD command
P00.00	0 or 1	Select 1 for commissioning to confirm correct wiring, then select 0 for water supply
P01.00	1	All set as auto pumps
P01.01	1	
P01.02	1	
P01.03	1	
P01.04	1	
P01.07 - P01.13	Depend on HD31	Depend on rated current of motor
P03.05	1	DI2. function: pump 1 commissioning running
P03.06	2	DI3 function: pump 2 commissioning running
P03.07	3	DI4 function: pump 3 commissioning running
P03.08	4	DI5 function: pump 4 commissioning running
P03.09	5	DI6 function: pump 5 commissioning running
P03.13	21	DO1 function: faulty pump occurs
P03.15	10	RLY1 function: inverter fault
P03.16	1	RLY2 function: pump 1variable frequency running
P03.17	2	RLY3 function: pump 1 power frequency running
P03.18	3	RLY4 function: pump 2 variable frequency running
P03.19	4	RLY5 function: pump 2 power frequency running
P03.20	5	RLY6 function: pump 3 variable frequency running
P03.21	6	RLY7 function: pump 3 power frequency running
P03.22	7	RLY8 function: pump 4 variable frequency running
P03.23	8	RLY9 function: pump 4 power frequency running
P03.24	9	RLY10 function: pump 5 variable frequency running
P00.01	2	Analogue value sets WL
P03.02	3	AI3 function: anologue WL feedback
P00.02	50.0%	Upper limit WL of intake pool: 50% (Depend on actual condition)
P00.03	30.0%	Lower limit WL of intake pool: 30% (Depend on actual condition)
P00.04	10.0%	Water shortage WL of intake pool: 10.0% (Depend on actual condition)
P00.05	20.0%	Backup pressure: 0.2Mpa
P02.00	2	Pressure setting of analogue water supply
P03.00	1	AI1 function: analogue pressure setting
P03.01	2	AI2 function: analogue feedback setting
P02.34	0	Regulating characteristic of close-loop: positive
P02.28 - P02.33		Parameters relative to PID, depend on actual condition

7.2 Debugging for Switching between VF and PF

VF = variable frequency, PF = power frequency.

In order to prevent motor reversal due to improper wiring phase sequence during power frequency operation of the auxiliary pump, debugging precautions are as follows:

- According to the actual pump configuration, professional wiring.
- When P00.31 = 1 (variable frequency cutting working frequency phase sequence detection is enabled), if the frequency converter is reported to E0037 (input misphase fault) or check

D00.19 = 1 indicates that the current inverter input phase sequence is out of phase. At this time, you need to replace the control cabinet power input of any two phases, and again

Verify that the phase sequence of the power frequency contactor is consistent with the output phase sequence of the frequency converter, namely, L1-U, L2-V and L3-W.

- Use debug mode to confirm motor rotation direction, if the opposite, please change any two phase sequence input by motor side (please ensure that F00.17 = 0,

Do not change the direction of rotation by changing F00.17 = 1).

Chapter 8 Troubleshooting

HD31 series inverter has inbuilt protective and warning self-diagnostic functions. If a fault occurs, the fault code will be displayed on the keypad. At the same time, faulty relay acts, accordingly HD31 stops output and the motor coasts to stop.

When fault or alarm occurs, user should record the fault details and take proper actions according to the Table below. If some technical help is needed, contact the suppliers or directly call Shenzhen Hpmont Technology Co., Ltd.

After the fault is eliminated, reset HD31 by any of the following methods:

1. Keypad.
2. External reset terminal (DI terminal set as No. 46 function).
3. Communication.
4. Switch on HD31 after switch off.

Table 8-1 Fault alarm description and counter-measures

Fault		Fault reasons	Counter-measures
-Lu-	DC bus undervoltage	• At the begining of powering on and at the end of powering off • Input voltage is too low • Improper wiring leads to undervoltage of hardware	• It is normal status of powering on and powering off • Check input power voltage • Check wiring and wire HD31 properly
E0001	Inverter output overcurrent (in Acc process)	• Improper connection between inverter and motor • Improper motor parameters • The rating of the used inverter is too small • Acc / Dec time is too short	• Connect HD31 and motor properly • Set correct motor parameter (F08.00 - F08.04) • Select inverter with higher rating • Set proper Acc / Dec time (F03.01, F03.02)
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 • Deceleartion time is too short • Improper wiring leads to overvoltage of hardware • Improper selection of the braking devices	• Check power input • Set a proper value for Dec time (F03.02) • Check wiring and wire HD31 properly • Select recommended braking devices according to section 9.3.
E0005	DC bus over voltage (in Dec process)		
E0006	DC bus over voltage (in constant speed process)		
E0007	Stall overvoltage	• Bus voltage is too high • The setting of stall overvoltage is too low	• Check power input or the function of brake • Properly set the value of stall overvoltage (F19.19)

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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 HD31 • Fan fault • Fault occurs to temperature detection circuit	• Use inverter with higher power capacity • Improve the ventilation around HD31 • Replace the cooling fan • Seek technical support
E0010	Braking unit fault	• Circuit fault of braking unit	• Seek technical support
E0011	CPU fault	• CPU abnormal	• Detect at power on after completely power outage • 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 fault	• Current detection circuit is damaged	• Contact the supplier for repairing
E0015	Input voltage phase loss	• For three-phase input inverter, input voltage 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 HD31 is severely unbalanced	• Check the connection between HD31 and motor • Check the quality of motor
E0017	Inverter overload	• Acc time is too short • Improper setting of V/f curve or torque boost leads to over current • Mains supply voltage is too low • Motor load is too high	• Adjust Acc time (F03.01) • Adjust V/f curve (F09.00 - F09.06) or torque boost (F09.07,F09.08) • Check mains supply voltage • Use inverter with proper power rating
E0018	Inverter output load-loss	• Load disappears or falls suddenly • Parameters are not set properly	• Check load and mechanical transmission devices • Set the parmeters properly (F20.03 - F20.05)
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

Fault		Fault reasons	Counter-measures
E0020	Motor overheat	• Motor overheat • The setting of motor paramteter is incorrect	• Reduce the load; Repaire or replace the motor • Increase the Acc / Dec time (F03.01, F03.02) • Set the motor parameter (F08.00 - F08.04)
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 parameters (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 time-out	• 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 • Correctly set communication format (F17.00) and the baud rate (F17.01) • Send the data according to MODBUS protocol
E0037	Input wrong phase	• F00.05 = 1 and P00 .3 = 1, input phase of inverter is negative phase (d00.19 = 1)	• Replace the inverter power input phase sequence

Note:

E0022 does not affect normal running of HD31.

Chapter 9 Accessories

9.1 Keypad Installation Assembly

The keypad installation assembly includes mounting base and exTenion cable.

Mounting Base

The keypad mounting base is an accessory. If needed, please order goods.

Model: HD-KMB. The mounting base and its size are shown as Figure 9–1 and the unit is mm.

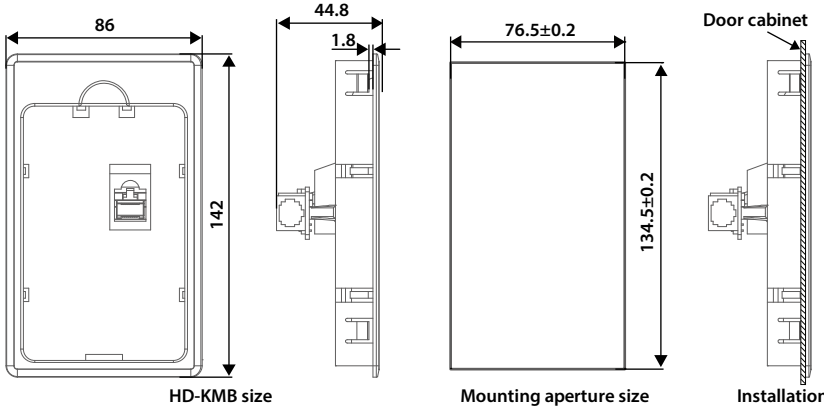

Figure 9–1 Mounting base and its size

ExTenion Cable

The keypad exTenion cable is an accessory. If needed, please order goods. The models are as follows:

- 1m exTenion cable to keypad: HD-CAB-1M
- 2m exTenion cable to keypad: HD-CAB-2M
- 3m exTenion cable to keypad: HD-CAB-3M
- 6m exTenion cable to keypad: HD-CAB-6M

9.2 Reactor Selection

Table 9-1 Reactor selection

Model	AC Input Reactor		AC Output Reactor		DC Reactor	
	Model	Parameter (mH-A)	Model	Parameter (mH-A)	Model	Parameter (mH-A)
HD31-4T045P	HD-AIL-4T037	0.19-75	HD-AOL-4T037	0.08-80	HD-DCL-4T037	0.35-100
HD31-4T055P	HD-AIL-4T045	0.16-90	HD-AOL-4T045	0.06-100	HD-DCL-4T045	0.29-120
HD31-4T075P	HD-AIL-4T055	0.13-115	HD-AOL-4T055	0.04-125	HD-DCL-4T055	0.23-150

Model	AC Input Reactor		AC Output Reactor		DC Reactor	
	Model	Parameter (mH-A)	Model	Parameter (mH-A)	Model	Parameter (mH-A)
HD31-4T090P	HD-AIL-4T075	0.093-150	HD-AOL-4T075	0.035-160	HD-DCL-4T075	0.17-200
HD31-4T110P	HD-AIL-4T090	0.08-180	HD-AOL-4T090	0.03-200	HD-DCL-4T090	0.14-240
HD31-4T132P	HD-AIL-4T110	0.067-210	HD-AOL-4T110	0.02-225	HD-DCL-4T110	0.12-290

9.3 Braking Resistor and Braking Unit

For the braking unit HDBU-4T150, the max. braking current is 150A. Refer to the "HDBU Series Dynamic Braking Unit User Manual" for more details.

The braking resistor selection is shown as Table 9-2. If needed, please order goods.

The connection of braking resistor and the braking unit is shown as section 4.3.2 Supply and Motor Connection (on page 18).

Table 9-2 Recommendation for the braking unit and braking resistor

Model	Motor	Braking Unit	Braking Resistor Value	Braking Resistor Power
HD31-4T2P2P	2.2 kW	Built-in	200 - 300 Ω	0.2 kw
HD31-4T3P7P	3.7 kW	Built-in	150 - 250 Ω	0.25 kw
HD31-4T5P5P	5.5 kW	Built-in	100 - 150 Ω	0.3 kW
HD31-4T7P5P	7.5 kW	Built-in	80 - 100 Ω	0.5 kW
HD31-4T011P	11 kW	Built-in	60 - 80 Ω	0.7 kW
HD31-4T015P	15 kW	Built-in	40 - 50 Ω	1 kW
HD31-4T018P	18.5 kW	Built-in	30 - 40 Ω	1.5 kW
HD31-4T022P	22 kW	Built-in	25 - 30 Ω	2 kW
HD31-4T030P	30 kW	Built-in	20 - 25 Ω	2.5 kW
HD31-4T037P	37 kW	Built-in	15 - 20 Ω	3 kW
HD31-4T045P	45 kW	Built-in	15 - 20 Ω	3.5 kW
HD31-4T055P	55 kW	Built-in	10 - 15 Ω	4.5 kW
HD31-4T075P	75 kW	Built-in	10 - 15 Ω	5.5 kW
HD31-4T090P	90 kW	HDBU-4T150	8 - 10 Ω	7.5 kW
HD31-4T110P	110 kW	HDBU-4T150	8 - 10 Ω	9 kW
HD31-4T132P	132 kW	HDBU-4T150	6 - 8 Ω	11 kW

Note:

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

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

Appendix A 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 inverter is in run status.

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

"-": The same as the mapping functional parameter.

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
d00: Status Display Parameters						
d00.00	Series of the inverter	0x10 - 0x50			*	
d00.01	Software version of the control board	00.00 - 99.99			*	
d00.03	Special software version of the control board	00.00 - 99.99			*	
d00.05	Software version of the keypad	00.00 - 99.99			*	
d00.06	Custom series No.	0 - 9999			*	
d00.07	Motor and control mode	Unit: Display the current driving motor 0: Motor 1 1: Motor 2 Ten: Control mode 0: V/f control without PG 2: Vector control without PG			*	
d00.08	Rated current of the inverter	7.5kW or below type: 0.01A 11kW or above type: 0.1A			*	
d00.10	Inverter status	Unit: Bit0: Inverter fault Bit1: Run / stop Bit2: Forward / reverse Bit3: Zero speed running Ten: Bit1&Bit0: Acc. / Dec. / constant Bit3: DC braking (including start and stop DC braking) Hundred: Bit0: Parameter auto-tuning Bit2: Speed limiting value Bit3: Control mode Thousand: Bit0: Stall overvoltage Bit1: Current limiting			*	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
d00.11	Master setting frequency source	0 - 13			*	
d00.12	Master setting frequency	0.01 - 400.00Hz			*	
d00.13	Auxiliary setting frequency	0.01 - 400.00Hz			*	
d00.14	Setting frequency	0.01 - 400.00Hz			*	
d00.15	Reference frequency (after Acc. / Dec.)	0.01 - 400.00Hz			*	
d00.16	Output frequency	0.01 - 400.00Hz			*	
d00.17	Setting speed	0 - 60000rpm			*	
d00.18	Running speed	0 - 60000rpm			*	
d00.20	Output voltage	0 - 999V			*	
d00.21	Output current	Actual value, unit is 0.1A			*	
d00.22	Torque given	-250.0 - 250.0% (motor rated torque)			*	
d00.23	Output torque	0 - 300.0% (motor rated torque)			*	
d00.24	Output power	Actual value, unit is 0.1kW			*	
d00.25	DC bus voltage	0 - 999V			*	
d00.26	Potentiometer input voltage of the keypad	0.00 - 5.00V			*	
d00.27	AI1 input voltage	0.00 - 10.00V			*	
d00.28	AI1 input voltage (after disposal)	0.00 - 10.00V			*	
d00.29	AI2 input voltage	-10.00 - 10.00V			*	
d00.30	AI2 input voltage (after disposal)	-10.00 - 10.00V			*	
d00.31	AI3 input voltage	-10.00 - 10.00V			*	
d00.32	AI3 input voltage (after disposal)	-10.00 - 10.00V			*	
d00.33	AI4 input voltage	-10.00 - 10.00V			*	
d00.34	AI4 input voltage (after disposal)	-10.00 - 10.00V			*	
d00.35	DI6 terminal pulse input frequency	0 - 50000Hz			*	
d00.36	AO1 output	0.00 - 10.00V			*	
d00.37	AO2 output	0.00 - 10.00V			*	
d00.38	High-speed output pulse frequency	0 - 50000Hz			*	
d00.39	Heatsink temperature	0.0 - 999.9℃			*	
d00.40	Output power	Actual value,unit:0.01kW			*	
d00.41	No flow power	Actual value,unit:0.01kW			*	
d00.42	Set water supply pressure	0 - P05.03 × 10kg/cm^2			*	
d00.43	Actual water supply pressure	0 - P05.03 × 10kg/cm^2			*	
d00.44	Process PID reference	-100.0 - 100.0%			*	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
d00.45	Process PID feedback	-100.0 - 100.0%			*	
d00.46	Process PID tolerance	-100.0 - 100.0%			*	
d00.47	Process PID integral item	-100.0 - 100.0%			*	
d00.48	Process PID output	-100.0 - 100.0%			*	
d00.49	External counting value	0 - 9999			*	
d00.50	Input terminal status	Bit0 - Bit8 corresponding to DI1 - DI9 0: Input terminal disconnect with common terminal 1: Input terminal connect with common terminal			*	
d00.51	Output terminal status	Bit0 - Bit1 corresponding to DO1 - DO2 Bit2 - Bit5 corresponding to RLY1 – RLY10 0: Output terminal disconnect with common terminal 1: Output terminal connect with common terminal			*	
d00.52	MODBUS communication status	0: Normal 1: Communication timeout 2: Incorrect data frame head 3: Incorrect data frame checking 4: Incorrect data frame content			*	
d00.53	Actual length	0 - 65535m			*	
d00.54	Total length	0 - 65535km			*	
d00.55	Total time at power-on	0 - 65535h			*	
d00.56	Total time at operation	0 - 65535h			*	
d00.57	High bit of motor total energy consumption	0 - 65535k kW.h			*	
d00.58	Low bit of motor total energy consumption	0.0 - 999.9kW.h			*	
d00.59	High bit of energy con. at this time running	0 - 65535k kW.h			*	
d00.60	Low bit of energy con. at this time running	0.0 - 999.9kW.h			*	
d00.61	Present fault	1 - 100 *100: Means undervoltage*			*	
d02: Water Supply System Status						
d02.00	Current time	Current system time			*	
d02.01	Pump 1 status	0: Waiting for running 1: Running as main pump 2: Running as auxiliary pump 3: Fault pump 4: DI terminal invalid			*	
d02.02	Pump 2 status				*	
d02.03	Pump 3 status				*	
d02.04	Pump 4 status				*	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
d02.05	Pump 5 status				*	
d02.06	Main pump number	0、 The main pump is not enabled currently 1、 1-5:pump1 to pump5			*	
d02.07	Current auxiliary pump number	0-4			*	
d02.08	Main pump running time high bit(unit:min)	0-65535			*	
d02.09	Main pump running time low bit(unit:min)	0-65535			*	
d02.10	Pump 1 running time high bit as auxiliary pump (unit:min)	0-65535			*	
d02.11	Pump 1 running time high bit as main pump (unit:min)	0-65535			*	
d02.12	Pump 2 running time high bit as auxiliary pump (unit:min)	0-65535			*	
d02.13	Pump 2 running time high bit as main pump (unit:min)	0-65535			*	
d02.14	Pump 3 running time high bit as auxiliary pump (unit:min)	0-65535			*	
d02.15	Pump 3 running time high bit as main pump (unit:min)	0-65535			*	
d02.16	Pump 4 running time high bit as auxiliary pump (unit:min)	0-65535			*	
d02.17	Pump 4 running time high bit as main pump (unit:min)	0-65535			*	
d02.18	Pump 5 running time high bit as auxiliary pump (unit:min)	0-65535			*	
d02.19	Pump 5 running time high bit as main pump (unit:min)	0-65535			*	
d02.20	Flow compensation	0.0-400.0%			*	
F00: Basic Parameter						
F00.00	Control mode selection	0: Speed control 1: Torque control	0	1	×	
F00.01	Motor 1 control mode selection	0: V/f control without PG 2: Vector control without PG	0	1	×	
F00.02	Inverter type setting	0: G type 1: P type	0	1	×	
F00.03	Motor selection	0: Motor 1 1: Motor 2	0	1	×	
F00.04	ExTenion card selection	0: Option is invalid 2: HD31-WIO is valid	0	1	×	
F00.05	HD31 extended function	0: No extended	0	1	×	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		1: Constant pressure water supply				
F00.06	Inverter max. output frequency	50.00 - 400.00Hz	50.00Hz	0.01Hz	×	
F00.07	Upper limit of operation frequency setting source	0: Digital setting (F00.08) 1: Analogue input AI setting 2: Terminal pulse setting 3 - 6: AI1 - AI4 set 7: Keypad potentiometer setting	0	1	×	
F00.08	Upper limit of operation frequency	0.00 - F00.06	50.00Hz	0.01Hz	×	
F00.09	Lower limit of operation frequency	0.00 - upper limit	0.00Hz	0.01Hz	×	
F00.10	Frequency setting sources selection	0: Display panel digital setting 1: Terminal digital setting 2: SCI communication setting 3: AI analogue setting 4: Terminal pulse setting 6 - 9: AI1 - AI4 set 10: Keypad potentiometer setting	0	1	○	
F00.11	Command setting source selection	0: Display panel running source 1: Terminal running source 2: SCI communication running source	0	1	×	
F00.12	Function selection of the multi-function key	0: Switch the keypad running direction 1: Switch local and remote control 2: Multi-function key is invalid	2	1	○	
F00.13	Starting frequency digital setting	0.00 - upper limit	50.00Hz	0.01Hz	○	
F00.14	Frequency setting control	Unit: Frequency setting save selection at power outage 0: Not stored when power down 1: Storage when power down Ten: Frequency setting control selection at stop 0: Set frequency at stop 1: Set the frequency to F00.13 when stopping Hundred: Communication setting frequency storage	1001	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		0: Not stored when power down 1: Storage when power down Thousand: Switch the frequency channel to the analogue 0: Not saved 1: Save				
F00.15	Jog operation frequency digital setting 1	0.00 - upper limit	5.00Hz	0.01Hz	○	
F00.16	Interval of jog operation	0.0 - 100.0s	0.0s	0.1s	×	
F00.17	Operation direction selection	0: The same as run command 1: Opposite to run command	0	1	×	
F00.18	Anti-reverse operation	0: Reverse operation is permitted 1: Reverse operation is prohibitted	0	1	×	
F00.19	Dead time of direction switch	0.0 - 3600.0s	0.0s	0.1s	×	
F00.20	Key enable of optional keypad	0: Enabled 1: Disabled	0	1	○	
F00.21	Dormant function selection	0: Disabled 1: Enabled	0	1	×	
F00.22	Dormancy wake up time	0.0 - 6000.0s	1.0s	0.1s	○	
F00.24	Sleep delay time	0.0 - 6000.0s	1.0s	0.1s	○	
F00.25	Sleep frequency	0.00Hz - upper limit	0.00Hz	0.01Hz	○	
F00.26	Action selection for inverter running at zero frequency	Unit: When running is controlled by V/f, action selection of zero frequency 0: No treatment 1: Inverter lock output 2: Inverter run in DC brake	111	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F00.26	Action selection for inverter running at zero frequency	Ten: Zero frequency action selection in open loop vector running Hundred: Zero frequency action selection in torque control 0: No treatment 1: Inverter lock output 2: Inverter run in DC brake 3: The frequency converter is operated by pre-excitation	111	1	×	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F00.27	Command source binding frequency source selection	Unit: Panel command binding frequency source selection Ten: Terminal command Binding frequency source selection Hundred: Communication command binding frequency source selection 0: No binding 1: Keypa digital setting 2: Terminal digital setting 3: SCI communicaiton setting 5: Terminal pulse setting 7 - 9: AI1 - AI3 setting A: AI4 setting b: Keypad potentiometer setting C: PIDsetting d: Multi-speed setting			×	
F00.28	Functions selection of button STOP	0: Only valid in control of keypad 1: Valid in all control mode	0	1	○	
F01: Protection of Parameters						
F01.00	User's password	00000 - 65535	0	1	○	
F01.01	Menu mode selection	Unit: 0: Full menu mode 1: Checking menu mode (Only different from factory setting parameters can be displayed) Ten: 0: Does not lock the parameter mapping relationship of Group F 1: Lock the parameter mapping relationship of Group F Hundred: 0: After password protection, Group F parameters can be read 1: After password protection, Group F parameters are prohibited from reading	010	1	○	
F01.02	Function code parameter initialization	0: No operation 1: Restore to factory settings 2,3: Download the keypad EEPROM parameter 1/2 to the current function code settings	0	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		4: Clear fault information 5,6: Download the keypad EEPROM parameter 1/2 to the current function code settings (including the motor parameters)				
F01.03	Display panel EEPROM parameter initialization	0: No operation 1,2: Upload the current function code settings to the keypad EEPROM parameter 1/2	0	1	○	
F02: Run / Stop Control Parameters						
F02.00	Start mode selection	0: From the DWELL frequency to start 1: Brake first and then start from DWELL frequency 2: Start after speed tracking	0	1	×	
F02.01	Starting delay time	0.00 - 10.00s	0.00s	0.01s	×	
F02.02	Start DWELL frequency setting	0.00 - upper limit	0.00Hz	0.01Hz	×	
F02.03	Retention time of starting DWELL frequency	0.00 - 10.00s	0.00s	0.01s	×	
F02.04	DC braking current setting	0 - 100% (inverter's rated current)	50%	1%	×	
F02.05	DC braking time at start	0.00 - 60.00s	0.50s	0.01s	×	
F02.06	Faster tracking results compensation value	0.000 - 2.000Hz	0.000Hz	0.001Hz	○	
F02.08	Voltage self-learning	0: Invalid 1: Enabled	0	1	×	
F02.09	Search srequency direction reverse	0: Positive 1: Negative	0	1	×	
F02.10	Speed search start threshold	0.0 - 60.0%	15.0%	0.1%	○	
F02.11	Voltage difference	0 - 200%	30%	1%	○	
F02.12	Speed search for post processing time	0.0 - 5.0s	Depend on HD31	0.1s	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F02.13	Stop mode selection	0: Dec. to stop 1: Coast to stop 2: Dec. to stop with DC braking	0	1	×	
F02.14	DWELL frequency setting at stop	0.00 - upper limit	0.00Hz	0.01Hz	×	
F02.15	Retention time of DWELL frequency at stop	0.00 - 10.00s	0.00s	0.01s	×	
F02.16	DC braking initial frequency at stop	0.00 - 50.00Hz	0.50Hz	0.01Hz	×	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F02.17	DC braking waiting time at stop	0.00 - 10.00s	0.00s	0.01s	×	
F02.18	DC braking time at stop	0.00 - 10.00s	0.50s	0.01s	×	
F02.19	Jog control mode	Unit: 0: The jog functions of start and stop mode etc are invalid 1: The jog functions of start and stop mode etc are enabled Ten: 0: Terminal jog is not preferred 1: Terminal jog priority	10	1	×	
F02.20	Pre-excitatio n time	0.00 - 0.50s	0.50s	0.01s	×	
F02.21	Frequency threshold judged by voltage	0.00 - 20.00Hz	0.00Hz	0.01Hz	○	
F03: Acc. / Dec. Parameters						
F03.00	Acc. / Dec. mode selection	Unit: Mode selection of Acc. and Dec. 0: Linear Acc. or Dec. 1: S-curve Acc. or Dec. Ten: Acc. / Dec. time reference frequency adjustment 0: Max. frequency (F00.06) 1: Set frequency	00	1	○	
F03.01	Acc. time 1	0.1 - 6000.0s	18.5kW or below: 10.0s 22 - 75kW: 30.0s 90kW and above: 60.0s	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 2	0.1 - 6000.0s		0.1s	○	
F03.05	Acc. time 3	0.1 - 6000.0s		0.1s	○	
F03.06	Dec. time 3	0.1 - 6000.0s		0.1s	○	
F03.07	Acc. time 4	0.1 - 6000.0s		0.1s	○	
F03.08	Dec. time 4	0.1 - 6000.0s		0.1s	○	
F03.09	Switching frequency of Acc. time 2 and time 1	0.00 - upper limit	0.00Hz	0.01Hz	×	
F03.10	Switching frequency of Dec. time 2 and time 1	0.00 - upper limit	0.00Hz	0.01Hz	×	
F03.11	S-curve characteristic time at starting Acc.	0.00 - 2.50s	0.20s	0.01s	○	
F03.12	S-curve characteristic time at ending Acc.	0.00 - 2.50s	0.20s	0.01s	○	
F03.13	S-curve characteristic time at starting Dec.	0.00 - 2.50s	0.20s	0.01s	○	
F03.14	S-curve characteristic time at ending Dec.	0.00 - 2.50s	0.20s	0.01s	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F03.15	Acc. time of jog operation	0.1 - 6000.0s	6.0s	0.1s	○	
F03.16	Dec. time of jog operation	0.1 - 6000.0s	6.0s	0.1s	○	
F03.17	Dec. time of emergency stop	0.1 - 6000.0s	10.0s	0.1s	○	
F04: Process PID Control						
F04.00	Process PID control selection	0: PID control is disabled 1: PID control is enabled	0	1	×	
F04.01	Reference source selection	0: Digital reference 1: AI analogue reference 2: Terminal pulse reference 3 - 6: AI1 - AI4 given 7: Operation panel potentiometer given	0	1	×	
F04.02	Feedback source selection	0: AI analogue feedback 1: Terminal pulse feedback 2 - 5: AI1 - AI4 given 6: Operation panel potentiometer given 7: Speedn closed loop feedback	0	1	×	
F04.03	Setting digital reference	-100.0 - 100.0%	0.00%	0.01%	○	
F04.04	Proportional gain (P1)	0.0 - 500.0	50.0	0.1	○	
F04.05	Integral time (I1)	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: The differential is disabled*	0.00s	0.01s	○	
F04.08	Differential amplitude limit value	0.00 - 100.0%	20.0%	0.1%	○	
F04.09	Sampling cycle (T)	0.01 - 50.00s	0.10s	0.01s	○	
F04.10	Bias limit	0.0 - 20.0% (reference)	0.0%	0.1%	○	
F04.11	PID regulator upper limit source selection	0: Set by F04.13 1: Set by AI analogue value 2: Set by terminal pulse input 3 - 6: AI1 - AI4 given 7: Keypad potentiometer setting	0	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F04.12	PID regulator lower limit source selection	0: Set by F04.14 1: Set by AI analogue value 2: Set by terminal pulse input 3 - 6: AI1 - AI4 given 7: Keypad potentiometer setting	0	1	×	
F04.13	PID regulator upper limit value	0.00 - upper limit	50.00Hz	0.01Hz	×	
F04.14	PID regulator lower limit value	0.00 - upper limit	0.00Hz	0.01Hz	×	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F04.15	PID regulator characteristic	0: Positive 1: Negative	0	1	×	
F04.17	PID output filter time	0.01 - 10.00s	0.05s	0.01s	○	
F04.18	PID output reverse selection	0: PID regulation disable reverse (When PID output is negative, 0 is the limit) 1: PID regulation enable reverse (When F00.18 = 1 disable reverse, 0 is the limit)	0		×	
F04.19	PID output reverse frequency's upper limit	0.00Hz - upper limit	50.00Hz	0.01Hz	×	
F04.20	Proportional gain (P2)	0.0 - 500.0	50.0	0.1	○	
F04.21	Integral time (I2)	0.01 - 10.00s	1.00s	0.01s	○	
F04.22	Derivative time (D2)	0.00 - 10.00s	0.00s	0.01s	○	
F04.23	PID parameter adjustment basis	0: Do not adjust 1: DI 2: Deviation 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%	○	
F04.27	Pulse of each turn	1 - 9999	1024	1	×	
F04.28	Max. closed loop speed	1 - 24000rpm	1500rpm	1rpm	×	
F04.29	PID arithmetic mode	0: No operation at stop 1: Operation at shutdown	0	1	×	
F04.30	PID sleep	0: No sleeping 1: Sleep enable	0	1	×	
F04.31	Tolerance of waking up	0.0 - 100. 0%	0.0%	0.1%	○	
F04.32	Delay of waking up	0.0 - 6000.0s	10.0s	0.1s	○	
F04.33	Sleep tolerance	0.0 - 100.0%	0.0%	0.1%	○	
F04.34	Sleep delay	0.0 - 6000.0s	10.0s	0.1s	○	
F04.35	Sleep frequency	0.00Hz - max. frequency	20.00Hz	0.01Hz	○	
F05: External Reference Curve Parameters						
F05.00	External reference curve selection	Unit: AI1 characteristic curve selection Ten: AI2 characteristic curve selection Hundred: AI3 characteristic curve selection Thousand: AI4 characteristic curve selection Ten thousand: Pulse input characteristic curve selection 0: Line 1	33333	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		1: Line 2 2: Polyline 3: No treatment				
F05.01	Min. reference of line 1	0.0 - F05.03	0.0%	0.1%	○	
F05.02	Min. reference corresponding value of line 1	0.0 - 100.0%	0.0%	0.1%	○	
F05.03	Max. reference of line 1	F05.01 - 100.0%	100.0%	0.1%	○	
F05.04	Max. reference corresponding value of line 1	0.0 - 100.0%	100.0%	0.1%	○	
F05.05	Min. reference of line 2	0.0 - F05.07	0.0%	0.1%	○	
F05.06	Min. reference corresponding value of line 2	0.0 - 100.0%	0.0%	0.1%	○	
F05.07	Max. reference of line 2	F05.05 - 100.0%	100.0%	0.1%	○	
F05.08	Max. reference corresponding value of line 2	0.0 - 100.0%	100.0%	0.1%	○	
F05.09	Max. reference of polyline	F05.11 - 100.0%	100.0%	0.1%	○	
F05.10	Max. reference corresponding value of polyline	0.0 - 100.0%	100.0%	0.1%	○	
F05.11	Inflection point 2 reference 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 reference 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. reference of polyline	0.0 - F05.13	0.0%	0.1%	○	
F05.16	Min. reference corresponding value of polyline	0.0 - 100.0%	0.0%	0.1%	○	
F05.17	Skip frequency 1	F00.09 - upper limit	0.00Hz	0.01Hz	○	
F05.18	Skip frequency 2	F00.09 - upper limit	0.00Hz	0.01Hz	○	
F05.19	Skip frequency 3	F00.09 - upper limit	0.00Hz	0.01Hz	○	
F05.20	Range of skip frequency	0.00 - 30.00Hz	0.00Hz	0.01Hz	○	
F05.21	Jog operation frequency digital setting 2	0.00 - upper limit	5.00Hz	0.01Hz	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F05.22	Operation panel potentiometer curve selection	0: Straight line 1 1: Straight line 2 2: Polyline 3: No treatment	3	1	×	
F08: Asyn. Motor 1 Parameters						
F08.00	Rated power of motor 1	0.2 - 999.9kW	Depend on HD31	0.1kW	×	
F08.01	Rated voltage of motor 1	0 - inverter's rated voltage		1V	×	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F08.02	Rated current of motor 1	7.5kW above: 0.1 - 2500.0A		0.1A	×	
		7.5kW or below: 0.01 - 250.00A		0.01A		
F08.03	Rated frequency of motor 1	1.0 - 400.0Hz	50.0Hz	0.1Hz	×	
F08.04	Rated speed of motor 1	1 - 24000rpm	1500rpm	1rpm	×	
F08.05	Power factor of motor 1	0.001 - 1.000	Depend on HD31	0.001	×	
F08.06	Parameter auto-tuning of motor 1	0: Auto-tuning is disabled 1: Stationary auto-tuning 2: Rotary auto-tuning 3: Motor stator resistance measurement	0	1	×	
F08.07	Stator resistance of motor 1	7.5kW or below: 0.00 - 99.99Ω	Depend on HD31	0.01Ω	×	
		11 - 90kW: 0.000 - 9.999Ω		0.001Ω		
		90kW above: 0.0000 - 0.9999Ω		0.0001Ω		
F08.08	Rotor resistance of motor 1	7.5kW or below: 0.00 - 99.99Ω		0.01Ω	×	
		11 - 90kW: 0.000 - 9.999Ω		0.001Ω		
		90kW above: 0.0000 - 0.9999Ω		0.0001Ω		
F08.09	Leakage inductance of motor 1	7.5kW or below: 0.0 - 5000.0mH		0.1mH	×	
		11 - 90kW: 0.00 - 500.00mH		0.01mH		
		90kW above: 0.000 - 50.000 mH		0.001 mH		
F08.10	Mutual inductance of motor 1	7.5kW or below: 0.0 - 5000.0mH		0.1mH	×	
		11 - 90kW: 0.00 - 500.00mH		0.01mH		
		90kW above: 0.000 - 50.000 mH		0.001 mH		
F08.11	Idling exciting current of motor 1	7.5kW or below: 0.00 – 99.99A		0.01A	×	
		7.5kW above: 0.0 – 999.9A		0.1A		
F08.12	Motor 1 core saturation coefficient 1	0.00 - 1.00	1.00	0.01	×	
F08.13	Motor 1 core saturation coefficient 2	0.00 - 1.00	1.00	0.01	×	
F08.14	Motor 1 core saturation coefficient 3	0.00 - 1.00	1.00	0.01	×	
F08.15	Motor 1 core saturation coefficient 4	0.00 - 1.00	1.00	0.01	×	
F08.16	Motor 1 core saturation coefficient 5	0.00 - 1.00	1.00	0.01	×	
F09: V/f Control Parameters						
F09.00	V/f curve selection of motor 1	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 value F3 of motor 1	F09.03 - 100.0%	80.0%	0.1%	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F09.02	V/f voltage value V3 of motor 1	F09.04 - 100.0%	80.0%	0.1%	×	
F09.03	V/f frequency value F2 of motor 1	F09.05 - 100.0%	50.0%	0.1%	×	
F09.04	V/f voltage value V2 of motor 1	F09.06 - 100.0%	50.0%	0.1%	×	
F09.05	V/f frequency value F1 of motor 1	0.0% - F09.03	0.0%	0.1%	×	
F09.06	V/f voltage value V1 of motor 1	0.0% - F09.04	0.0%	0.1%	×	
F09.07	Torque boost of motor 1	0.0 - 30.0% 0.0: Auto torque boost	55kW and below: 2.0% 75 - 132kW: 1.0%	0.1%	×	
F09.08	Cut-off point used for manual torque boost of motor 1	0.0 - 50.0% (F08.03)	25.0%	0.1%	○	
F09.09	Slip compensation gain of motor 1	0.0 - 300.0%	00.0%	0.1%	○	
F09.10	Slip compensation filter time of motor 1	0.01 - 10.00s	0.10s	0.01s	○	
F09.11	Slip compensation limitation of motor 1	0.0 - 250.0%	200.0%	0.1%	×	
F09.12	Compensation constant of motor 1	0.1 - 25.0s	2.0s	0.1s	×	
F09.14	AVR function of motor 1	0: Disabled 1: Enabled all the time 2: Disabled in Dec. process	1	1	○	
F09.15	Motor 1 low frequency suppression shock coefficient	0 - 200	50	1	○	
F09.16	Motor 1 high frequency suppression shock coefficient	0 - 200	20	1	○	
F09.17	Motor 1 energy saving control select	0: Energy saving control invalid 3: Energy saving according to output current	0	1	×	
F09.18	Motor 1 energy saving factor	0.0 - 100.0%	5.0%	0.1%	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F09.19	Motor 1 energy start frequency	0.00 - 50.00Hz	25.00Hz	0.01Hz	○	
F09.20	Motor 1 energy switching point	0.0 - 100.0%	100.0%	0.1%	○	
F09.21	Motor 1 energy saving detecting times	0 - 5000times	10times	1times	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F13: Asyn. Motor 2 Parameters						
F13.00	Control mode selection of motor 2	0: V/f control without PG 2: Vector control without PG	0	1	×	
F13.01	Rated power of motor 2	0.2 - 999.9kW	Depend on HD31	0.1kW	×	
F13.02	Rated voltage of motor 2	0 - 999V		1V	×	
F13.03	Rated current of motor 2	7.5kW above: 0.0 - 2500.0A		0.1A	×	
		7.5kW or below: 0.00 – 250.00A		0.01A		
F13.04	Rated frequency of motor 2	1.0 - 400.0Hz	50.0Hz	0.1Hz	×	
F13.05	Rated speed of motor 2	1 - 24000rpm	Depend on HD31	1rpm	×	
F13.07	Parameter auto-tuning of motor 2	0: Auto-tuning is disabled 1: Stationary auto-tuning 2: Rotary auto-tuning 3: Motor stator resistance measurement	0	1	×	
F13.08	Stator resistance of motor 2	7.5kW or below: 0.00 - 99.99Ω	Depend on HD31	0.01Ω	×	
		11 -90kW: 0.000 - 9.999Ω		0.001Ω		
		90kW above: 0.0000 - 0.9999Ω		0.0001Ω		
F13.09	Rotor resistance of motor 2	7.5kW or below: 0.00 - 99.99Ω	Depend on HD31	0.01Ω	×	
		11 - 75kW: 0.000 - 9.999Ω		0.001Ω		
		90kW above: 0.0000 - 0.9999Ω		0.0001Ω		
F13.10	Leakage inductance of motor 2	7.5kW below: 0.0 - 5000.0mH		0.1mH	×	
		11 - 75kW: 0.00 - 500.00mH		0.01mH		
		90kW above: 0.000 - 50.000 mH		0.001 mH		
F13.11	Mutual inductance of motor 2	7.5kW below: 0.0 - 5000.0mH		0.1mH	×	
		11 - 75kW: 0.00 - 500.00mH		0.01mH		
		90kW above: 0.000 - 50.000 mH		0.001 mH		
F13.12	Idling exciting current of motor 2	7.5kW or below: 0.00 – 99.99A		0.01A	×	
		7.5kW above: 0.0 – 999.9A		0.1A		
F13.13	Motor 2 core saturation coefficient 1	0.00 - 1.00	1.00	0.01	×	
F13.14	Motor 2 core saturation coefficient 2	0.00 - 1.00	1.00	0.01	×	
F13.15	Motor 2 core saturation coefficient 3	0.00 - 1.00	1.00	0.01	×	
F13.16	V/f curve selection of motor 2	0: Line 1: Square curve 2: 1.2 exponential curve 3: 1.7 exponential curve 4: User-defined curve	0	1	×	
F13.17	V/f frequency value F3 of motor 2	F13.19 - 100.0%	0.0%	0.1%	×	
F13.18	V/f voltage value V3 of motor 2	F13.20 - 100.0%	0.0%	0.1%	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F13.19	V/f frequency value F2 of motor 2	F13.21 - F13.17	0.0%	0.1%	×	
F13.20	V/f voltage value V2 of motor 2	F13.22 - F13.18	0.0%	0.1%	×	
F13.21	V/f frequency value F1 of motor 2	0.0% - F13.19	0.0%	0.1%	×	
F13.22	V/f voltage value V1 of motor 2	0.0% - F13.20	0.0%	0.1%	×	
F13.23	Torque boost of motor 2	0.0 - 30.0% 0.0: Auto torque boost	55kW and below: 2.0% 75 - 132 kW: 1.0%	0.1%	×	
F13.24	Cut-off point used for manual torque boost of motor 2	0.0 - 50.0% (F13.04)	30.0%	0.1%	○	
F13.25	Slip compensation gain of motor 2	0.0 - 300.0%	0.0%	0.1%	○	
F13.26	Slip compensation filter time of motor 2	0.01 - 10.00s	0.10s	0.01s	○	
F13.27	Slip compensation limitation of motor 2	0.0 - 250.0%	200.0%	0.1%	×	
F13.28	Compensation constant of motor 2	0.000 - 9.999kW	Depend on HD31	0.001kW	×	
F13.30	AVR function of motor 2	0: Disabled 1: Enabled all the time 2: Disabled in Dec. process	1	1	○	
F13.31	Motor 2 low frequency suppression shock coefficient	0 - 200	50	1	○	
F13.32	Motor 2 high frequency suppression shock coefficient	0 - 200	20	1	○	
F13.33	Motor 2 energy saving control select	0: Energy saving control invalid 3: Energy saving according to output curren	0	1	×	
F13.34	Motor 2 energy saving factor	0.0 - 100.0%	5.0%	0.1%	○	
F13.53	Motor 2 core saturation coefficient 4	0.00 - 1.00	1.00	0.01	×	
F13.54	Motor 2 core saturation coefficient 5	0.00 - 1.00	1.00	0.01	×	
F13.58	Motor 2 energy start frequency	0.00 - 50.00Hz	25.00Hz	0.01Hz	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F13.59	Motor 2 energy switching point	0.0 - 100.0%	100.0%	0.1%	○	
F13.60	Motor 2 energy saving detecting times	0 - 5000 times	10 times	1 times	○	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F13.61	Motor 2 energy voltage recovery time	40 - 4000ms	100ms	1ms	○	
F13.62	Motor 2 energy voltage decreasing time	40 - 4000ms	100ms	1ms	○	
F15: Digital I/O Terminal Parameters						
F15.00	DI1I function	0: Unused 1: Inverter enabled 2: FWD function 3: REV function 4: Three-wire operation mode 5,6,7: Frequency source selection 1, 2, 3 8: The frequency source switch to analogue setting 9,10: Run command source selection 1,2 11: Switch to terminal control mode 12: External stop command input 13 - 16: Multi-step frequency terminal 1 - 4 17: Frequency ramp (UP) 18: Frequency ramp (DN) 19: Clearing auxiliary frequency setting 20,21: Command control input for forward / reverse jog 1 (JOGF1/ JOGR1) 22,23: Command control input for forward / reverse jog 2 (JOGF2/ JOGR2) 24: Jog 1 command control input 25: Jog 1 direction control input *Remark: When select 20 and 21, the functions 24 and 25 are invalid* 26: Acc. / Dec. time selection terminals 1 27: Acc. / Dec. time selection terminals 2 28: Acc. / Dec. mode selection 29: Acc. / Dec. prohibition	2	1	×	
F15.01	DI2 function		3	1	×	
F15.02	DI3 function		0	1	×	
F15.03	DI4 function		0	1	×	
F15.04	DI5 function		0	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F15.05	DI6 function	30: Switch to ordinary running mode 31: Reset the stop status of PLC operation 32: Pausing the process PID 33: Disabling the process PID 34: Holding PID integral 35: Clearing PID integral 36: Switch to wobble operation 37: Reset the wobble operating status 38: DC braking start while stopping 39: External pause signal (normally-open input) 40: External pause signal (normally-closed input) 41: Coast to stop (normally-open input) 42: Coast to stop (normally-closed input) 43: Emergency stop 44: External fault signal (normally-open input) 45: External fault signal (normally-closed input) 46: External reset (RST) input 47: Switch between motor 1 and motor 2 48: Timing function input 49: Clearing the length 50: Clearing the counter to zero 51: Counter's triggering signal input 52: Length counting input (only DI6) 53: Pulse frequency input (only DI6) 54: Clear fault records 56: Speed control / torque control switching 57: Torque control torque polarity switching 59: PID parameter switch 85: Pausing PLC operation 86: Terminal stop DC braking 87: Frequency setting channel selection 4	0	1	×	
F15.06	DI7 (option terminal) function		0	1	×	
F15.07	DI8 (option terminal) function		0	1	×	
F15.08	DI9 (option terminal) function		0	1	×	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F15.12	Acc. / Dec. rate of UP/DN terminal	0.00 - 99.99Hz/s	1.00Hz/s	0.01Hz/s	×	
F15.13	Terminal detecting interval	0: 2ms 1: 4ms 2: 8ms	0	1	○	
F15.14	Terminal detecting filter number	0 - 10000	2	1	○	
F15.15	Terminal input positive and negative logic setting	Bit0 - Bit8 is corresponding to DI1 - DI9 Bitx: Dly terminal input positive and negative logic 0: Positive logic 1: Negative logic	000	1	○	
F15.16	FWD/REV operation mode	0: Two-wire operation mode 1 1: Two-wire operation mode 2 2: Three-wire operation mode 1 3: Three-wire operation mode 2	0	1	×	
F15.17	Terminal operating selection due to fault of external equipment	0: Coast to stop 1: Emergency stop 2: Dec. to stop 3: Continue to run	0	1	×	
F15.18	DO1 function	0: Unused 1: Inverter ready 2: Inverter is running (RUN) 3: Inverter is forward running 4: Inverter is reverse running 5: Inverter is DC braking 6: Inverter is in zero-frequency status 7: Inverter is in zero-frequency running 9,10: Frequency detection threshold (FDT1,FDT2) 11: Frequency arriving signal (FAR) 12: Limitation of upper limit of frequency 13: Limitation of lower limit of frequency 14: Limitation of upper/lower limits of wobble frequency 15: Simple PLC operating status indication 16: Simple PLC pausing indication	2	1	○	
F15.19	DO2 function		0	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F15.20	RLY1 function	17: Simple PLC cycle completion indication 18: Completion of simple PLC operation stages 19: Completion of simple PLC operation 20: Output data from SCI communication 21: Preset operating time out 22: Timing function output 23: Preset counting value reach 24: Indicating counting value reach 25: Setting length arrive 26: Indication of motor 1 and motor 2 27: Analog input overrun output 29: Undervoltage lock-up signal (LU) 30: Overload signal (OL) 31: Inverter fault 32: External fault 33: Inverter auto-reset fault 35: Dormancy instruction function 36: The system is running 38: High-frequency output (only DO2)	31	1	○	
F15.21	RLY2 function		0	1	○	
F15.22	RLY3 function		0	1	○	
F15.23	RLY4 function		0	1	○	
F15.24	Output terminal positive and negative logic selection	Bit0 – Bit1 is corresponding to DO1 - DO2 Bit2 - Bit5 is corresponding to RLY1 - RLY4 Bitx: DOy and RLYy terminals output positive and negative logic 0: Positive logic 1: Negative logic	000	1	○	
F15.25	ON side delay time of timing function	0.00 - 300.00s	0.00s	0.01s	○	
F15.26	OFF side delay time of timing function	0.00 - 300.00s	0.00s	0.01s	○	
F15.27	FAR range	0.00 - 100.00Hz	2.50Hz	0.01Hz	○	
F15.28	Zero-frequency operation threshold	0.00 - upper limit	0.00Hz	0.01Hz	○	
F15.29	Zero-frequency hysteresis	0.00 - upper limit	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 the reference frequency 1: Detect according to the output frequency	0	1	○	
F15.31	FDT1 level	0.00 - upper limit	50.00Hz	0.01Hz	○	
F15.32	FDT1 lag	0.00 - upper limit	1.00Hz	0.01Hz	○	
F15.33	FDT2 detection mode	0: Detect according to the reference frequency 1: Detect according to the output frequency	0	1	○	
F15.34	FDT2 level	0.00 - F00.06	50.00Hz	0.01Hz	○	
F15.35	FDT2 lag	0.00 - F00.06	1.00Hz	0.01Hz	○	
F15.36	Preset operating time	0 - 65535h *0: Preset operating time is disabled*	0h	1h	○	
F15.37	Preset counting value arriving	F15.38 - 9999	0	1	○	
F15.38	Specified counting value arriving	0 - F15.37	0	1	○	
F15.39	Ananlogue input over-limitation selection	Unit: Action drive when the input exceeds the limit 0: Free stop 1: Emergency shutdown 2: Dec. stop 3: No action Ten: Select the analog input port 0: No analog port 1: Operation panel potentiometer 2: AI1 port 3: AI2 port Hundred: Analog overrun detection conditions 0: Always detected 1: Run command is detected Thousand: Automatical selection when analog overrun is detected 0: Do not allow automatic operation 1: Allows automatic operation	0000	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F15.40	Analog input overrun upper limit	F15.41 - 100.0%	100.0%	0.1%	○	
F15.41	Analog input overrun down limit	0.0% - F15.40	0.0%	0.1%	○	
F15.42	Analog overrun detection time	0.00 - 50.00s	5.00s	0.01s	○	
F15.43	Terminal output delay	0.0 - 100.0s	0.0s	0.1s	○	
F15.44	Start analog overrun detection time	0.00 - 50.00s	15.00s	0.01s	○	
F16: Analogue I/O Terminal Parameters						
F16.00	Display panel with potentiometer function selection	0: Unused 1: Upper limit frequency setting source 2: Frequency setting source 3: Auxiliary frequency reference 4: Process PID reference 5: Process PID feedback 6: Process PID regulating upper limit 7: Process PID regulating lower limit 8: Motor overheating signal input 9: Motor 1 forward rotation torque limit 10: Motor 1 reverse electric torque limit 11: Motor 1 forward regeneration rotation torque limit 12: Motor 1 reverse regeneration rotation torque limit 13: Torque command given 15: Torque control up limit frequency 16: Motor 2 Forward rotation electrical torque limit 17: Motor 2 reverse rotation electrical torque limit 18: Motor 2 Forward regeneration torque limit 19: Motor 2 reverse regeneration torque limit	0	1	×	
F16.01	AI1 function		2	1	×	
F16.02	AI2 function		5	1	×	
F16.03	AI3 function		0	1	×	
F16.04	AI4 function		0	1	×	
F16.05	AI1 bias	-100.0 - 100.0%	0.0%	0.1%	○	
F16.08	AI2 bias	-100.0 - 100.0%	0.0%	0.1%	○	
F16.11	AI3 bias	-100.0 - 100.0%	0.0%	0.1%	○	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F16.14	AI4 bias	-100.0 - 100.0%	0.0%	0.1%	○	
F16.06	AI1 gain	-10.00 - 10.00	1.00	0.01	○	
F16.09	AI2 gain	-10.00 - 10.00	1.00	0.01	○	
F16.12	AI3 gain	-10.00 - 10.00	1.00	0.01	○	
F16.15	AI4 gain	-10.00 - 10.00	1.00	0.01	○	
F16.07	AI1 filtering time	0.01 - 10.00s	0.05s	0.01s	○	
F16.10	AI2 filtering time	0.01 - 10.00s	0.05s	0.01s	○	
F16.13	AI3 filtering time	0.01 - 10.00s	0.05s	0.01s	○	
F16.16	AI4 filtering time	0.01 - 10.00s	0.05s	0.01s	○	
F16.17	Max. input pulse frequency	0.0 - 50.0kHz	10.0kHz	0.1kHz	○	
F16.18	Input pulse filtering time	0 - 500ms	10ms	1ms	○	
F16.19	AO1 function	0: Unused 1: Output frequency (0 - max. output frequency) 2: Reference frquency (0 - max. output frequency) 3: Motor speed (0 - max. output frequency corresponding to speed) 4: Output current (0 - twice motor's rated current) 5: Output current (0 - twice motor's rated current) 6: Torque command(0 - 3 times motor rated torque) 10: Output torque (0 - 3 times motor's rated torque) 11: Output voltage (0 - 1.2 times inverter's rated voltage) 12: Bus voltage (0 - 2.2 times inverter's rated voltage) 13: Output power (0 - twice motor's rated power) 14: AI1 input (0 - 10V) 15: AI2 input (-10 - 10V / 0 - 20mA) 16: AI3 input (-10 - 10V / 0 - 20mA) 17: AI4 input (-10 - 10V / 0 - 20mA) 18: Output frequency (-1 times - 1 times max. output frequency) 19: Reference frequency (-1 times - 1 times max. output frequency) 20: Set frequency (0 - max. output frequency)	2	1	○	
F16.20	AO2 function		0	1	○	
F16.21	High-speed pulse output function		0	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F16.22	Analogue output AO1 bias	-100.0 - 100.0%	0.0%	0.1%	○	
F16.23	Analogue output AO1 gain	0.0 - 200.0%	100.0%	0.1%	○	
F16.24	Analogue output AO2 bias	-100.0 - 100.0%	0.0%	0.1%	○	
F16.25	Analogue output AO2 gain	0.0 - 200.0%	100.0%	0.1%	○	
F16.26	DO2 max. output pulse frequency	0.1 - 50.0kHz	10.0kHz	0.1kHz	○	
F16.27	Keypad potentiometer offset	-100.0 - 100.0%	0.0%	0.1%	○	
F17: SCI Communication Parameters						
F17.00	Data format	0: 1-8-2 format, no parity, RTU 1: 1-8-1 format, even parity, RTU 2: 1-8-1 format, odd parity, RTU 6: 1-8-11 format, no parity, RTU	0	1	×	
F17.01	Baud rate selection	0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps 6: 57600bps 7: 76800bps 8: 115200bps	3	1	×	
F17.02	Local address	0 - 247	2	1	×	
F17.03	Host PC response time	0 - 1000ms	1s	1ms	×	
F17.04	Time threshold for detecting communication status	0.0 - 600.0s *0.0: Not detect communication time out*	0.0s	0.1s	×	
F17.05	Detecting time at communication error	0.0 - 600.0s *0.0: Not detect communication error*	0.0s	0.1s	×	
F17.06	Action selection at communication time out	0: Coast to stop 1: Emergency stop 2: Dec. to stop 3: Continue to run	3	1	×	
F17.07	Action selection at communication fault		3	1	×	
F17.08	Action selection at communication peripheral device fault		1	1	×	
F17.09	Communication write function parameter of storage EEPROM method selection	Unit: Except of F00.13, F19.03, EEPROM storeage selection in communication 0: Not stored in EEPROM 1: Stored in EEPROM Ten: For F00.13, F19.03, EEPROM storeage selection in communication	01	1	×	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		0: Not stored in EEPROM 1: Stored in EEPROM				
F17.10	Detecting time of network communicaiton overtime	0.0 - 600.0s *0.0: Not detected communication timeout*	0.0s	0.1s	×	
F18: Display Control Parameters						
F18.00	Language selection	0: Chinese 1: English	0	1	○	
F18.01	Displaying contrast of the LCD keypad	1 - 10	5	1	○	
F18.02	Set the display parameter 1 during operation	0: Unused 1: Inverter's rated current 3: Inverter status 4: Master setting frequency source 5: Master setting frequency 6: Auxiliary setting frequency 7: Setting frequency 8: Reference frequency (after Acc. / Dec.) 9: Output frequency 10: Setting speed 11: Running speed 13: Output voltage 14: Output current 15: Torque given 16: Output torque 17: Output power 18: DC bus voltage 19: Potentiometer input voltage 20: AI1 input voltage 21: AI1 input voltage (after disposal) 22: AI2 input voltage 23: AI2 input voltage (after disposal) 24: AI3 input voltage 25: AI3 input voltage (after disposal) 26: AI4 input voltage 27: AI4 input voltage (after disposal) 28: DI6 terminal pulse input frequency 29: AO1 output 30: AO2 output	8	1	○	
F18.03	Set the display parameter 2 during operation		7	1	○	
F18.04	Set the display parameter 3 during operation		36	1	○	
F18.05	Set the display parameter 4 during operation		13	1	○	
F18.06	Set the display parameter 5 during operation		14	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F18.07	Set the display parameter 6 during operation	31: High-speed output pulse frequency 32: Heatsink temperature 33: Set the line speed 34: Reference line speed 35: Content water supply pressure setting 36: Actula feedback pressure 37: Process PID reference 38: Process PID feedback 39: Process PID error 40: Process PID integral value 41: Process PID output 42: External couting value 43: Input terminal status 44: Output terminal status 45: MODBUS communication status 46: Actual length 47: Total length 48: Total time at power on (hour) 49: Total time at running (hour)	18	1	○	
F18.08	Set the display parameter 1 at stop		7	1	○	
F18.09	Set the display parameter 2 at stop		18	1	○	
F18.10	Set the display parameter 3 at stop		20	1	○	
F18.11	Set the display parameter 4 at stop		22	1	○	
F18.12	Set the display parameter 5 at stop		35	1	○	
F18.13	Set the display parameter 6 at stop		36	1	○	
F18.14	Frequency display gain	0.1 - 160.0	1.0	0.1	○	
F18.15	Max. line speed	0 - 65535	1000	1	○	
F18.16	Line speed display accuracy	0: Integer 1: One decimal 2: Two decimal 3: Three decimal	0	1	○	
F19: Function-boost Parameters						
F19.00	Auxiliary frequency setting source selection	0: No auxiliary source 1: Digital setting 1 (the initial value is set by F19.03 and adjusted by ▲ and ▼ keys on the keypad) 2: Digital setting 2 (the initial value is set by F19.03 and adjusted by terminals UP/DN) 3: Digital setting 3 (the initial value = 0, set by SCI direct communication 4: AI analogue setting 5: Terminal pulse setting 6: Process PID output 7 - 10: AI1 - AI4 11: Keypad potentiometer	0	1	○	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F19.01	Master/Auxiliary setting calculation	Unit: Main and auxiliary operations 0: Master setting + auxiliary setting 1: Master setting - auxiliary setting Ten: Frequency source switch selection 0: Main 1: Main and auxiliary operations 2: Main and auxiliary switching 3: Master and main auxiliary operation switch 4: Auxiliary and main auxiliary operation switch	10	1	○	
F19.02	Analogue auxiliary setting coefficient	0.00 - 9.99	1.00	0.01	○	
F19.03	Initial value of digital auxiliary frequency	0.00 - F00.06	0.00Hz	0.01Hz	○	
F19.04	Control selection of digital auxiliary frequency	Unit: Save selection at power outage (only when F19.00 = 1 or 2 will F19.04 be enabled) 0: Not save auxiliary frequency at power outage 1: The auxiliary frequency will be saved to F19.03 at power outage Ten: Frequency disposal when the inverter stops 0: Maintain the auxiliary frequency when the inverter stops 1: The auxiliary frequency clears to zero when the inverter stops	00	1	○	
F19.05	Adjustment selection of setting frequency	0: No adjustment 1: To adjust as per the max. output frequency 2: To adjust as per the current frequency	1	1	○	
F19.06	Adjustment coefficient of setting frequency	0.0 - 200.0%	100.0%	0.1%	○	
F19.07	Control selection of cooling fan	0: Auto stop mode 1: Immediate stop mode 2: The fan runs continuously when power on	0	1	○	
F19.08	Cooling fan controls delaying time	0.0 - 600.0s	60.0s	0.1s	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F19.10	Zero-frequency threshold	0.00 - upper limit	1.00 Hz	0.01Hz	○	
F19.11	Action selection at setting frequency is lower than zero-frequency threshold	0: Run according to frequency command 1: Holding stop, no output 2: Run according to zero-frequency threshold 3: Run according to zero-frequency	0	1	×	
F19.12	Trip-free selection at momentary power loss	0: This function is disabled 1: This function is enabled	0	1	×	
F19.13	Dec. time at voltage compensation	0.1 - 6000.0s	5.0s	0.1s	○	
F19.15	Reference voltage of trip-free operation at momentary power loss	220V inverter: 210 - 370V	248V	1V	×	
		380V inverter: 400 - 670V	430V			
		660V inverter: 620 - 1130V	747V			
F19.16	Restart after power failure	0: This function is disabled 1: This function is enabled	0	1	×	
F19.17	Delay 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: Overvoltage stall is prohibited*	0.500	0.001	○	
F19.19	Stall overvoltage point	220V inverter: 350 - 400V	390V	1V	○	
		380V inverter: 650 - 790V	690V			
		660V inverter: 900 - 1180V	1150V			
F19.20	Auto current limiting selection	0.000 - 1.000 *0.000: The automatic current limit is invalid*	0.500	0.001	○	
F19.21	Auto current limiting threshold	20.0 - 200.0%	110.0%	0.1%	○	
F19.23	Enabled mode of terminal run command	Unit: Power-on moment terminal detection Ten: Running commands valid method 0: Rise edge enabled mode 1: Level enabled mode	0	1	○	
F19.24	Action voltage of braking unit	630 - 750V	720V	1V	○	
F19.25	Flux brake enabled	0: Prohibited 1: Enable	0	1	○	
F19.26	Preset length	0 - 65535m	0m	1m	○	
F19.27	Actual length	0 - 65535m	0m	1m	*	
F19.28	Length ratio	0.001 - 30.000	1.000	0.001	○	
F19.29	Length checking coefficient	0.001 - 1.000	1.000	0.001	○	
F19.30	Measuring shaft diameter	1.00 - 100.00cm	10.00cm	0.01cm	○	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F19.31	Number of pulses per revolution	1 - 9999	1	1	○	
F19.32	Length arrive and output function selection	0: Output level signal 1: Output 500ms pulse	0	1	○	
F19.33	Record of length disposal after length arrive	0: Auto-clear 1: No change	0	1	○	
F19.34	Record of length disposal at stop	0: Auto-clear 1: No change	0	1	○	
F19.35	Auxiliary PID output limit	0.0 - 100.0%	100.0%	0.1%	×	
F19.36	Auxiliary PID output limit increase	0.0 - 100.0%	0.0%	0.1%	×	
F19.37	Frequency adjust range selection	Unit: The main frequency calculation range 0: 0 to max. frequency 1: Negative max. frequency to max. frequency Ten: Auxiliary frequency calculation range 0: 0 to max. frequency 1: Negative max. frequency to max. frequency Hundred: Synthetic frequency calculation range 0: 0 to the upper limit frequency 1: Negative upper limit frequency to upper limit frequency	100	1	○	
F19.38	Phase short circuit detection action selection	0: No detection 1: Detection	1	1	○	
F19.39	Input voltage selection	Unit: 380V model input voltage selection 0: 380 - 460V 1: 260 - 460V 2: 200 - 460V Ten, Hundred: Unused	0	1	×	
F19.40	Flux brake PI regulator Kp	0 - 4000	1000	1	○	
F19.41	Flux brake PI regulator Ki	0 - 500	20	1	○	
F20: Protection of Fault Parameters						
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	00000	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F20.00	Overload pre-alarm detection	Ten: Action selection for overload pre-alarm 0: The inverter doesn't alarm and continues operation when detecting an active overload signal 1: The inverter alarms and stops operation when detecting an active overload signal Hundred: Overload threshold selection 0: Ratio of load current to the motor's rated current (alarm: motor overload) 1: Ratio of load current to the inverter's rated current (alarm: inverter overload) Thousand: Motor type selection 0: Standard motor 1: Variable frequency Ten thousand: Overload protection 0: Overload protection is enabled 1: Overload protection is disabled 2: Shielded inverter overload protection, enable motor overload protection 3: Shielded inverter overload protection, motor overload protection	00000	1	○	
F20.01	Overload pre-alarm detection threshold	20.0 - 200.0%	150.0%	0.1%	○	
F20.02	Overload pre-alarm detection time	0.0 - 60.0s	5.0s	0.1s	○	
F20.03	Inverter output load-loss detection	0: Disabled 1: It is detecting all the time in running process, and then continues operation after detecting (alarm) 2: It detectes only at the same speed, and then continues operation after detecting (alarm)	0	1	○	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F20.03	Inverter output load-loss detection	3: It is detecting all the time in running process, and then cut off the output after detecting (fault) 4: It is detectes only at the same speed, and then cut off the output after detecting (fault)	0	1	○	
F20.04	Inverter output load-loss detection threshold	0 - 100%	30%	1%	○	
F20.05	Inverter output load-loss detection time	0.00 - 20.00s	1.00s	0.01s	○	
F20.06	Motor overheating signal input type	0: Does not detect the motor overheating 1: Positive charateristic (PTC) 2: Negative charateristic (NTC)	0	1	○	
F20.07	Thermistor value at motor overheating	0.0 - 10.0kΩ	5.0kΩ	0.1kΩ	○	
F20.08	Input phase loss detection reference	0 - 80% *0%: Not detect input phase loss fault*	30%	1%	○	
F20.09	Input phase loss detection time	1.00 - 5.00s	1.00s	0.01s	○	
F20.10	Output phase loss detection reference	0 - 100% *0%: Not detect output phase loss fault*	20%	1%	○	
F20.11	Output phase loss detection time	1.00 - 20.00s	3.00s	0.01s	○	
F20.12	PID reference lose detected value	0 - 100% *0%: Not detect PID reference lose*	0%	1%	○	
F20.13	PID reference loss detection time	0.00 – 1000.0s *0.00s: Not detect PID reference loss*	0.20s	0.01s	○	
F20.14	PID feedback loss detected value	0 - 100% *0%: Not detect PID feedback loss*	0%	1%	○	
F20.15	PID feedback loss detection time	0.00 – 1000.0s *0.00s: Not detect PID feedback loss*	0.20s	0.01s	○	
F20.16	Detection value at PID feedback out of the limit	0 - 100% *100%: Not detect PID feedback out of the limit*	100%	1%	○	
F20.17	Detection time at PID feedback out of the limit	0.00 – 1000.0s *0.00s: Not detect PID feedback out of the limit*	0.20s	0.01s	○	
F20.18	Auto reset times	0 - 100 *0: No auto reset function*	0	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F20.19	Auto reset interval	0.01 - 200.00s/time	5.00s/time	0.01 s/time	○	
F20.20	Faulted relay action selection	Unit: In auto reset process Ten: In the undervoltage process 0: Faulted relay doesn't act 1: Faulted relay acts	00	1	○	
F20.21	Type of fifth latest (the last) fault	E0001: Acc. overcurrent E0002: Dec. overcurrent E0003: Costant overcurrent E0004: Acc. overvoltage E0005: Dec. overvoltage E0006: Constant overvoltage E0007: Stall overvoltage E0008: Fault of power module E0009: Heatsink overheat E0010: Fault of braking unit E0011: CPU fault E0012: Parameters auto-tuning fault E0013: Contactor is not actuated E0014: Fault of current detection circuit E0015: Fault of input phase E0016: Fault of output phase E0017: Inverter overload E0018: Inverter output is unloaded E0019: Motor overload E0020: Motor overheat E0021: Access fault of control board EEPROM E0022: Access fault of keypad EEPROM (only displaying without any protection) E0023: Fault setting of parameters E0024: Fault of external equipment E0025: PID reference loss E0026: PID feedback loss E0027: PID feedback out of limiting E0028: SCI communication time-out E0029: SCI communication error E0037: Input wrong phase	0	1	*	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F20.22	Setting frequency at the last fault	0.00 - 400.00Hz	0Hz	0.01Hz	*	
F20.23	Running frequency at the last fault	0.00 - 400.00Hz	0Hz	0.1Hz	*	
F20.24	Bus voltage at the last fault	0 - 1999V	0V	1V	*	
F20.25	Output voltage at the last fault	0 - 999V	0V	1V	*	
F20.26	Output current at the last fault	7.5kW above: Actual value	0.0A	0.1A	*	
		7.5kW or below: Actual value	0.00A	0.01A		
F20.27	Input terminal status at the last fault	0 - 0x1FF	0	1	*	
F20.28	Output terminal status at the last fault	0 - 0x7FF	0	1	*	
F20.29	Interval of fifth latest fault	0 - 6553.5 hours	0.0	0.1h	*	
F20.30	Type of fourth latest fault	0 - 99	0	1	*	
F20.31	Interval of fourth latest fault	0.0 - 6553.5 hours	0.0	0.1h	*	
F20.32	Type of third latest fault	0 - 99	0	1	*	
F20.33	Interval of third latest fault	0.0 - 6553.5 hours	0.0	0.1h	*	
F20.34	Type of second latest fault	0 - 99	0	1	*	
F20.35	Interval of second latest fault	0.0 - 6553.5 hours	0.0	0.1h	*	
F20.36	Type of first latest fault	0 - 99	0	1	*	
F20.37	Interval of first latest fault	0.0 - 6553.5 hours	0.0	0.1h	*	
F20.38	Last fault interval	0.0 - 6553.5 hours	0.0	0.1h	*	
F23: PWM Control Parameters						
F23.00	Set the carrier frequency	1 - 16kHz	Depend on HD31	1kHz	×	
F23.01	Carrier frequency is automatically adjusted	0: The carrier frequency is disabled automatically 1: Carrier frequency auto adjustment 1 2: Carrier frequency automatic adjustment 2	1	1	×	
F23.02	PWM overshoot enable	0: Disabled 1: Enabled	1	1	×	
F23.03	PWM modulation mode	0: Two-phase modulation or three-phase modulation 1: Three-phase modulation 2: Two-phase modulation	0	1	×	
F23.04	PWM Modulation mode switching point1	0.00 - 50.00Hz	Depend on HD31	0.01Hz	×	
F23.05	PWM Modulation mode switching point2	0.00 - 50.00Hz	Depend on HD31	0.01Hz	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
P00: Water Supply Logic Parameter						
P00.00	Water supply mode	0: Running 1: Commissioning	1	1	×	
P00.01	Water level(WL) signal input	0: No input 1: DI terminal input 2: AI terminal input	0	1	×	
P00.02	Upper limit WL of intake pool	0.0 - 100.0%	50.0%	0.1%	○	
P00.03	Lower limit WL of intake pool	0.0 - P00.02	30.0%	0.1%	○	
P00.04	Water shortage WL of intake pool	0.0 - P00.03	10.0%	0.1%	○	
P00.05	Backup pressure	0.0 - P05.03×10kg/cm^2	0.0kg/cm^2	0.1kg/cm^2	○	
P00.06	Reserved					
P00.07	Detection time for adding pump	0.0 - 3600.0s	5.0s	0.1s	○	
P00.08	Reserved					
P00.09	Dec time of variable frequency pump when adding power frequency pump	0.0 - 100.0s	10.0s	0.1s	○	
P00.10	Reserved					
P00.11	Detection time for removing pump	0.0 - 3600.0s	5.0s	0.1s	○	
P00.12	Acc time of variable frequency pump when removing power frequency pump	0.0 - 100.0s	10.0s	0.1s	○	
P00.13	Breaking delay of pump 1 contacotr	0.000 - 5.000s	0.020s	0.001s	○	
P00.14	Touching delay of pump 1 contactor	0.000 - 5.000s	0.020s	0.001s	○	
P00.15	Switch circle of power frequency pump	0 - 9999h	0h	1h	○	
P00.16	Switch circle of variable frequency pump	0 - 9999h	0h	1h	○	
P00.17	Dormancy enable	0: No dormancy 1: Constant pressure dormancy 2: Specified pressure dormancy 3: No flow dormancy1 4: No flow dormancy 2	0	1	○	
P00.18	Pressure tolerance of dormancy awakening	0.0 - 100.0%	10.0%	0.1%	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
P00.19	Delay time of dormancy awakening	0.0 - 3600.0s	5.0s	1.0s	○	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
P00.20	Shutdown detection coefficient	0.0 - 100.0%	0.0%	0.1%	○	
P00.21	Interval of shutdown the pump and water supply	0.0 - 60.0s	10.0s	0.1s	○	
P00.22	Detection time of shutdown detection	0.0 - 3600.0s	6.0s	0.1s	○	
P00.23	No-flow detecting frequency	0.00 - 50.00Hz	25.00Hz	0.01Hz	○	
P00.24	Detecting time for no-flow detecting start delay	0.0 - 3600.0s	60.00s	0.01s	○	
P00.25	No flow correction factor	1 - 400%	100%	1%	○	
P00.26	No-flow low speed	0.00 – 99.99Hz	0.00Hz	0.01Hz	○	
P00.27	No-flow low speed power	0.00 – 10.00kW	0.00kW	0.01kW	×	
P00.28	No-flow high speed	0.00 – 99.99Hz	0.00Hz	0.01Hz	○	
P00.29	No-flow high speed power	0.00 – 10.00kW	0.00kW	0.01kW	×	
P00.30	No-flow detection curve	0: Square curve 1: Straight line 2: Cubic curve 1 3: Cubic curve 2	0	1	×	
P00.31	Auxiliary pump phase sequency detection enable	0:Forbiddden 1:enable				
P00.32-P00.38	Reserved				×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
P00.39	Dealy of pump 2 contactor breaking	0.000 – 5.000s	0.020s	0.001s	○	
P00.40	Dealy of pump 2 contactor touching	0.000 – 5.000s	0.020s	0.001s	○	
P00.41	Dealy of pump 3 contactor breaking	0.000 – 5.000s	0.020s	0.001s	○	
P00.42	Dealy of pump 3 contactor touching	0.000 – 5.000s	0.020s	0.001s	○	
P00.43	Dealy of pump 4 contactor breaking	0.000 – 5.000s	0.020s	0.001s	○	
P00.44	Dealy of pump 4 contactor touching	0.000 – 5.000s	0.020s	0.001s	○	
P00.45	Dealy of pump 5 contactor breaking	0.000 – 5.000s	0.020s	0.001s	○	
P00.46	Dealy of pump 5 contactor touching	0.000 – 5.000s	0.020s	0.001s	○	
P00.47-P00.50	Reserved				×	
P00.51	Auxiliary pump 1 flow compensation	0.0 – 100.0%	0.0%	0.1%	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
P00.52	Auxiliary pump 2 flow compensation	0.0 – 100.0%	0.0%	0.1%	○	
P00.53	Auxiliary pump 3 flow compensation	0.0 – 100.0%	0.0%	0.1%	○	
P00.54	Auxiliary pump 4 flow compensation	0.0 – 100.0%	0.0%	0.1%	○	
P00.55	Auxiliary pump 1 adding pump frequency	0.00 – 400.00Hz	50.00Hz	0.01Hz	○	
P00.56	Auxiliary pump 2 adding pump frequency	0.00 – 400.00Hz	50.00Hz	0.01Hz	○	
P00.57	Auxiliary pump 3 adding pump frequency	0.00 – 400.00Hz	50.00Hz	0.01Hz	○	
P00.58	Auxiliary pump 4 adding pump frequency	0.00 – 400.00Hz	50.00Hz	0.01Hz	○	
P00.59	Auxiliary pump 1 removing pump frequency	0.00 – 400.00Hz	25.00Hz	0.01Hz	○	
P00.60	Auxiliary pump 2 removing pump frequency	0.00 – 400.00Hz	25.00Hz	0.01Hz	○	
P00.61	Auxiliary pump 3 removing pump frequency	0.00 – 400.00Hz	25.00Hz	0.01Hz	○	
P00.62	Auxiliary pump 4 removing pump frequency	0.00 – 400.00Hz	25.00Hz	0.01Hz	○	
P00.63	Forbidden adding/removing pump time after main pump is invalid	0.5 – 3600.0s	20.0s	0.1s	○	
P00.64	Delay switching time after the main pump is invalid	0.0 – 3600.0	5.0s	0.1s	○	
P01: Water Supply Pump Parameter						
P01.00	Pump 1 type	0: Invalid 1: Variable frequency pump 2: Power frequency pump 3: Dormant pump 4: Sewage pump	0	1	×	
P01.01	Pump 2 type		0	1	×	
P01.02	Pump 3 type		0	1	×	
P01.03	Pump 4 type		0	1	×	
P01.04	Pump 5 type		0	1	×	
P01.05	Pump 6 type		0	1	×	
P01.06	Pump 7 type		0	1	×	
P01.07	Rated current of pump 1	5.5kW above motor: 0.1 - 999.9A	Depend on motor	0.1A	×	
		5.5kW and below motor: 0.01 - 99.99A		0.01A		
P01.08	Rated current of pump 2	5.5kW and above motor: 0.1 - 999.9A		0.1A	×	
		5.5kW and below motor: 0.01 - 99.99A		0.01A		
P01.09	Rated current of pump 3	5.5kW above motor: 0.1 - 999.9A		0.1A	×	
		5.5kW and below motor: 0.01 - 99.99A		0.01A		

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
P01.10	Rated current of pump 4	5.5kW above motor: 0.1 - 999.9A	Depend on motor	0.1A	×	
		5.5kW and below motor: 0.01 - 99.99A		0.01A		
P01.11	Ratedcurrent of pump 5	5.5kW above motor: 0.1 - 999.9A		0.1A	×	
		5.5kW and below motor: 0.01 - 99.99A		0.01A		
P01.12-P01.13	Reserved				×	
P02: Water Supply PID Parameter						
P02.00	Pressure setting source	0: Digital setting 1: Pressure setting of timing water supply 2: Pressure setting of analogue water supply	0	1	×	
P02.01	Pressure digital setting	0.0 - P05.03×10kg/cm²	0.0kg/cm²	0.10kg/cm²	×	
P02.02	Pressure time	1 - 12	1	1	×	
P02.03	T1 start time	00.00 - 23.59	00.00	0.01	×	
P02.04	T1 time pressure	0.0 - P05.03×10kg/cm²	0.0kg/cm²	0.10kg/cm²	×	
P02.05	T2 start time	00.00 - 23.59	00.00	0.01	×	
P02.06	T2 time pressure	0.0 - P05.03×10kg/cm²	0.0kg/cm²	0.10kg/cm²	×	
P02.07	T3 start time	00.00 - 23.59	00.00	0.01	×	
P02.08	T3 time pressure	0.0 - P05.03×10kg/cm²	0.0kg/cm²	0.10kg/cm²	×	
P02.09	T4 start time	00.00 - 23.59	00.00	0.01	×	
P02.10	T4 time pressure	0.0 - P05.03×10kg/cm²	0.0kg/cm²	0.10kg/cm²	×	
P02.11	T5 start time	00.00 - 23.59	00.00	0.01	×	
P02.12	T5 time pressure	0.0 - P05.03×10kg/cm²	0.0kg/cm²	0.10kg/cm²	×	
P02.13	T6 start time	00.00 - 23.59	00.00	0.01	×	
P02.14	T6 time pressure	0.0 - P05.03×10kg/cm²	0.0kg/cm²	0.10kg/cm²	×	
P02.15	T7 start time	00.00 - 23.59	00.00	0.01	×	
P02.16	T7 time pressure	0.0 - P05.03×10kg/cm²	0.0kg/cm²	0.10kg/cm²	×	
P02.17	T8 start time	00.00 - 23.59	00.00	0.01	×	
P02.18	T8 time pressure	0.0 - P05.03×10kg/cm²	0.0kg/cm²	0.10kg/cm²	×	
P02.19	T9 start time	00.00 - 23.59	00.00	0.01	×	
P02.20	T9 time pressure	0.0 - P05.03×10kg/cm²	0.0kg/cm²	0.10kg/cm²	×	
P02.21	T10 start time	00.00 - 23.59	00.00	0.01	×	
P02.22	T10 time pressure	0.0 - P05.03×10kg/cm²	0.0kg/cm²	0.10kg/cm²	×	
P02.23	T11 start time	00.00 - 23.59	00.00	0.01	×	
P02.24	T11 time pressure	0.0 - P05.03×10kg/cm²	0.0kg/cm²	0.10kg/cm²	×	
P02.25	T12 start time	00.00 - 23.59	00.00	0.01	×	
P02.26	T12 time pressure	0.0 - P05.03×10kg/cm²	0.0kg/cm²	0.10kg/cm²	×	

A

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
P02.27	Upper limit of pressure closed-loop	0 - upper limit	50.00Hz	0.01Hz	○	
P02.28	Proportional gain of pressure closed-loop (Kp)	0.00 – 10.00	0.10	0.01	○	
P02.29	Integration time of pressure closed-loop (Ti)	0.01 - 10.00s	0.10	0.01	○	
P02.30	Differential time of pressure closed-loop (Td)	0.00 - 1.00s	0.00	0.01	○	
P02.31	Sampling time (T)	0.01 - 30.00s	0.50s	0.01s	○	
P02.32	Bias limit	0.0 - 20.0%	2.0%	0.1%	○	
P02.33	Output wave filter of pressure closed-loop	0.01 - 30.00s	0.50	0.01	○	
P02.34	Regulating characteristic of pressure closed-loop	0: Positive characteristi 1: Positive characteristic	0	1	○	
P02.35	Digital setting for saving selection when power failure	0: Not saving 1:Saving	1	1	○	
P03: Water Supply AIO Function Parameter						
P03.00	AI1 function	0: Unused 1: Analoguepressure setting 2: Analoguefeedback setting 3: Anolog WL feedback	0	1	×	
P03.01	AI2 function		0	1	×	
P03.02	AI3 function		0	1	×	
P03.03	AI4 function		0	1	×	
P03.04	DI1 function	0: Reserved 1 - 5: Pump 1 – 5 commissioning running 6-7: Reserved 8 - 12: Pump 1 - 5 invalid 15, 16: Upper / Lower limit WL of intake pool 17: Water shortage WL 18, 19: Upper / Lower limit WL of sewage pool	0	1	×	
P03.05	DI2 function		0	1	×	
P03.06	DI3 function		0	1	×	
P03.07	DI4 function		0	1	×	
P03.08	DI5 function		0	1	×	
P03.09	DI6 function		0	1	×	
P03.10	DI7 function		0	1	×	
P03.11	DI8 function		0	1	×	
P03.12	DI9 function		0	1	×	
P03.13	DO1 function	0: Unused 1,3,5,7,9: Pump 1 - 5 variable frequency running 2,4,6,8,10: Pump 1 - 5 power frequency running 11-14:Reserved 15: Dormant running 16: Over-pressure 17: Under-pressure 18: Backup pressure running 19: Pool water shortage 20: WL of the sewage pool reaches the upper limit 21: Faulty pump occurs	0	1	×	
P03.14	DO2 function		0	1	×	
P03.15	RLY1 function		0	1	×	
P03.16	RLY2 function		0	1	×	
P03.17	RLY3 function		0	1	×	
P03.18	RLY4 function		0	1	×	
P03.19	RLY5 function		0	1	×	
P03.20	RLY6 function		0	1	×	
P03.21	RLY7 function		0	1	×	
P03.22	RLY8 function		0	1	×	

A

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
P03.23	RLY9 function	22: Unused 23: The supply system is in running status	0	1	×	
P03.24	RLY10 function		0	1	×	
P04: Water Supply Fault Protection Parameter						
P04.00	Setting value of over-pressure protection	0.0 - P05.03×10kg/cm^2	0.0kg/cm^2	0.10kg/cm^2	○	
P04.01	Detection time of over-pressure protection	0.0 - 3600.0s	300.0s	0.1s	○	
P04.02	Setting value of under-pressure protection	0.0 - P05.03×10kg/cm^2	0.0kg/cm^2	0.10kg/cm^2	○	
P04.03	Detection time of under-pressure protection	0.0 - 3600.0s	300.0s	0.1s	○	
P04.04	Record of faulty pump	0 - 0x1F	0	1	*	
P04.05	Troubleshooting for the inverter	0: The whole system stops 1: HD31 automatically switches to the next variable frequency pump; while if there is no such pump, HD31 controls in power frequency mode	0	1	○	
P05: Water Supply Time Parameter						
P05.00	Set current time (Year)	11 - 99	Actual value	1	○	
P05.01	Set current time (Month & Date)	0101 - 1231	Actual value	1	○	
P05.02	Set current time (Hour & Minute)	0000 - 2359	Actual value	1	○	
P05.03	Pressure sensor range setting	0.0 – 10.0MPa	1.6MPa	0.1MPa	×	
P05.04	Pressure sensor signal type selection	0: 0 - 10V 1: 0 - 20mA 2: 4 - 20mA	0	1	×	
P05.05	Water supply method selection	0-5	0	1	×	

Appendix B MODBUS Communication Protocol

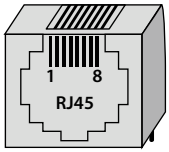
1. Introduction

HD31 series inverters provide one RS485 communication interface which uses the standard MODBUS communication protocol.

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

Communication Terminal

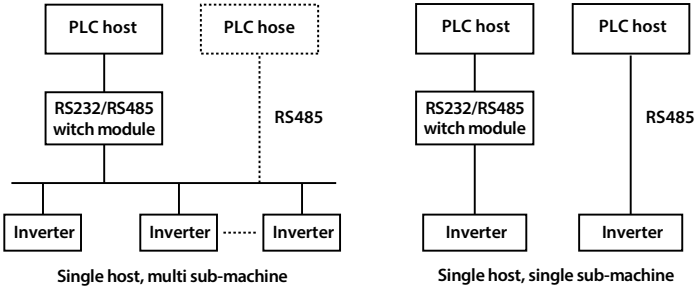
The communication terminal is shown in following table.

Type	Name	Terminal Description	
123  	SCI terminal	**Pin**	**Difinition**
		1,3	+5V
		2	485+
		4,5,6	GND
		7	485-
		8	Unused
 	Terminal	**Terminal**	**Description**
		A	485+
		B	485-

The transmitting mode is shown in following table.

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	Refe to F17: SCI Communication Parameters

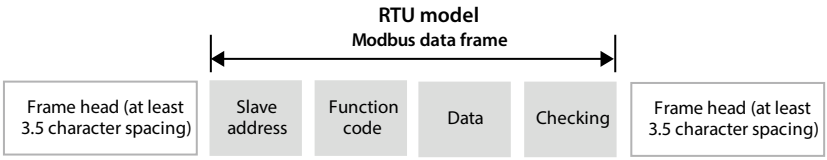
Network Mode



B

Protocol Format

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



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

In the RTU mode

- 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 148.

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

Command	**Address**	**Parameter**	**Register Address**		**Read Char No.**		**Checksum**	
Frame	0x01	0x03	0x00	0x08	0x00	0x01	0x05	0xC8
Response	**Address**	**Parameter**	**Response Byte**		**Content of Register**		**Checksum**	
Frame	0x01	0x03	0x02		0x13	0x88	0xB5	0x12

2. Scaling of Drive Transmitting Value

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 min. unit.

Remarks:

1. Communication data for F04.03, F21.01, F16.05, F16.08, F16.11, F16.14, F16.22, F16.24 0 - 2000 corresponding data -1000 - +1000.

2. Status parameter 0x3318 communication data 0 - 16000 corresponds to data -8000 - +8000.

3. Status parameters: AI2 - AI4 input voltage, AI2 - AI4 input voltage (after processing), process PID reference, process PID feedback, process PID error, process PID integral item and process PID output communication data 0-2000 Corresponding data -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	Saving or not is set by F17.09 in power failure
	0x41	Not saved at power off
To rewrite numbers of function parameters or control parameters	0x10	Saving or not is set by F17.09 in power failure
	0x43	Saved at power off

To read function parameters and status parameter

Function code 0x03, command frame and response frame are in below table.

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 (saving or not is set by F17.09 in power failure) or 0x41 (not save at power off). Command frame and response frame are in below table.

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 0x06 (saving or not is set by F17.09 in power failure) or 0x43 (save at power off). Command frame and response frame are in below table.

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 operation registers	2/1
Value or range	0 - 247	0x10, 0x43	0x0000 - 0xFFFF	0x0000 - 0x0004	2* no. of operation 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 inverter 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.

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

4. 4. Address Mapping

The function parameters, control 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 inter Group indexes are mapped as lower bytes. Please refer to user manual for index of F00 - F23.

High Bytes of Register Address	Group Number	High Bytes of Register Address	Group Number	High Bytes of Register Address	Group Number
0x00	F00	0x0d	F13	0x28	P00
0x01	F01	0x0f	F15	0x29	P01
0x02	F02	0x10	F16	0x2a	P02
0x03	F03	0x11	F17	0x2b	P03
0x04	F04	0x12	F18	0x2c	P04
0x05	F05	0x13	F19	0x2d	P05
0x08	F08	0x14	F20		
0x09	F09	0x17	F23		

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

Control Parameter (0x32) Address Mapping

The users can realize the inverter's starting, stopping and running speed setting through the control parameter, and obtain the inverter's running frequency, output current, etc. through indexing the inverter's status parameters.

The status parameters (0x32) are mapped as higher bytes of the register address, and the inter group indexes are as following:

Register Address	Parameter Name	Retained or Not at Power Loss
0x3200	Control command character	No
0x3201	Running frequency setting	Saving or not is set by hundreds bit of F00.14 in power failure
0x3202	Auxiliary running frequency setting	No
0x3204	Virtual terminal control setting	No

B

Definition of inverter control command words (0x3200):

Bit	Value and Definition		Function Description
Bit0	0: Run command disabled	1: Run command enabled	To control the inverter's starting and stop (in edge triggering mode)
Bit1	0: Forward	1: Reverse	Running direction: have the same function as terminal FWD / REV
Bit2	0: Unused	1: Stop mode: Dec. to stop	Dec. to stop the inverter (in edge triggering mode)
Bit3	0: Unused	1: Stop mode: emergency to stop	Emergency to stop the inverter (in edge triggering mode)
Bit4	0: Unused	1: Stop mode: coast to stop	Coast to stop the inverter (in edge triggering mode)
Bit5	0: Unused	1: Stop mode: external fault	The inverter is displaying external fault, and will stop in accordance with F17.08 setting mode or continue to run
Bit6	0: Jog forward stop	1: Jog forward run	Jog forward control
Bit7	0: Jog reverse stop	1: Jog reverse run	Jog reverse control
Bit8	0: Fault reset disabled	1: Fault reset enabled	Fault reset control
Bit9 - Bit11	0: Unused		
Bit12	0: Present control disa	1: Present control enabled	The present sending control word is valid
Bit13 - Bit15	0: Unused		

The contents of the register can be defined as control commands as shown in the table below, ie the control command word bit logic combination.

Register Content	Control Command	Register Address	Parameter Name
0x1001	Forward running	0x1020	Stop due to external fault
0x1003	Reverse running	0x1040	Forward jog
0x1004	Dec. to stop	0x1080	Reverse jog
0x1008	Emergency to stop	0x1100	Fault reset
0x1010	Coast to stop		

Definition of virtual terminal control setting word (0x3204):

Bit	Value and Definition	
Bit0	0: DO1 output is disabled	1: DO1 output is enabled
Bit1	0: DO2 output is disabled	1: DO2 output is enabled
Bit2	0: RLY1 output is disabled	1: RLY1 output is enabled
Bit3	0: RLY2 output is disabled	1: RLY2 output is enabled
Bit4	0: RLY3 output is disabled	1: RLY3 output is enabled
Bit5	0: RLY4 output is disabled	1: RLY4 output is enabled
Bit6 - Bit15	Unused	Unused

Status Parameter (0x33) Address Mapping

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

Address	Function	Address	Function
0x3300	Inverter series	0x3323	DI6 terminal pulse input frequency
0x3301	Software version of DSP	0x3324	AO1 output
0x3303	Special software version of DSP	0x3325	AO2 output
0x3305	Software version of keypad	0x3326	High-speed output pulse frequency
0x3306	Custom series No.	0x3327	Heatsink temperature
0x3307	Motor and control mode	0x332C	Process PID reference
0x3308	Rated current of HD31	0x332D	Process PID feedback
0x330A	Inverter status	0x332E	Process PID error
0x330B	Master setting frequency source	0x332F	Process PID integral
0x330C	Master setting frequency	0x3330	Process PID output
0x330D	Auxiliary setting frequency	0x3331	External counting value
0x330E	Setting frequency	0x3332	Input terminal status
0x330F	Reference frquency (after Acc. / Dec.)	0x3333	Output terminal status
0x3310	Output frequency	0x3334	MODBUS communication status
0x3311	Setting Rpm	0x3335	Actual length
0x3312	Running Rpm	0x3336	Total length
0x3314	Output voltage	0x3337	Total time at power on (hour)
0x3315	Output current	0x3338	Total time at running (hour)
0x3316	Setting torque	0x3339	High byte of motor total energy
0x3317	Output torque	0x333A	Low byte of motor total energy
0x3318	Output power	0x333B	High byte of this running energy
0x3319	DC bus voltage	0x333C	Low byte of this running energy
0x331A	Input voltage of keypad of potentiometer	0x333D	The present fault code
0x331B	AI1 voltage	0x3347	Current moment
0x331C	AI1 voltage (after calculating)	0x3348	Pump 1 status
0x331D	AI2 voltage	0x3349	Pump 2 status
0x331E	AI2 voltage (after calculating)	0x334A	Pump 3 status
0x331F	AI3 voltage	0x334B	Pump 4 status
0x3320	AI3 voltage (after calculating)	0x334C	Pump 5 status
0x3321	AI4 voltage	0x334D	Pump 6 status
0x3322	AI4 voltage (after calculating)	0x334E	Pump 7 status

5. Special Instruction

1. Group F08 (Asyn. motor 1 parameter setting), Group F12 (Unused), F13.00 - F13.15 (Asyn. motor 2 parameter setting) and Group F17 (SCI communication parameters) are the inverter parameter which can be read but cannot be modified by the host computer.

2. F01.00 (user password) cannot be set and adjusted through communication as well, but the user can verify the user password by writing F01.00 and get access to adjust inverter function parameters on the host. After adjustment, the user can close the permission by writing invalid password to F01.00.

3. If many multi-function input terminals are set the same function, 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

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

1. To read the command frame of the max. output frequency of slave 2 (to read F00.06), answer 50.00Hz.

Command	Address	Code	Register Address		Word No. of Read		Checksum	
Frame	0x02	0x03	0x00	0x06	0x00	0x01	0x64	0x38
Response	Address	Code	Answer Byte		Register Content		Checksum	
Frame	0x02	0x03	0x02		0x13	0x88	0XF1	0x12

2. To read the DC bus voltage of slave 2 (to read status parameter), answer 537V.

Command	Address	Code	Register Address		Word No. of Read		Checksum	
Frame	0x02	0x03	0x33	0x19	0x00	0x01	0x5A	0xBA
Response	Address	Code	Answer Byte		Register Content		Checksum	
Frame	0x02	0x03	0x02		0x02	0x19	0x3C	0xEE

3. To read the setting frequency of slave 2 (set F00.13 to 45.00Hz).

Command	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x00	0x0D	0x11	0x94	0x15	0xC5
Response	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x00	0x0D	0x11	0x94	0x15	0xC5

4. When the frequency setting source F00.10 = 2, set the frequency value to 45.00Hz by writing the register content 0x11, 0x94.

Command	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x01	0x11	0x94	0xDB	0x7E
Response	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x01	0x11	0x94	0xDB	0x7E

5. F00.11 = 2, give the reverse operation command to the address 2 of slave.

Command	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x10	0x03	0xCA	0x80
Response	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x10	0x03	0xCA	0x80

6. F00.11 = 2, give the Dec. stop command to the address 2 of slave.

Command	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x10	0x04	0x8B	0x42
Response	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x10	0x04	0x8B	0x42

7. F00.11 = 2, give the emergency stop command to the address 2 of slave.

Command	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x10	0x08	0x8B	0x47
Response	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x10	0x08	0x8B	0x47

8. F00.11 = 2, give the coast to stop command to the address 2 of slave.

Command	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x10	0x10	0x8B	0x4D
Response	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x10	0x10	0x8B	0x4D

9. External fault stop control of slave 2 via communication (E0024 fault).

Command	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x10	0x20	0x8B	0x59
Response	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x10	0x20	0x8B	0x59

10. Give the fault reset signal to the address 2 of slave.

Command	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x11	0x00	0x8B	0x11
Response	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x11	0x00	0x8B	0x11