HD30 Series
Vector Control Inverter

HD30 Series

Vector Control Inverter

User Manual

V1.1 2014.06

FOREWORD

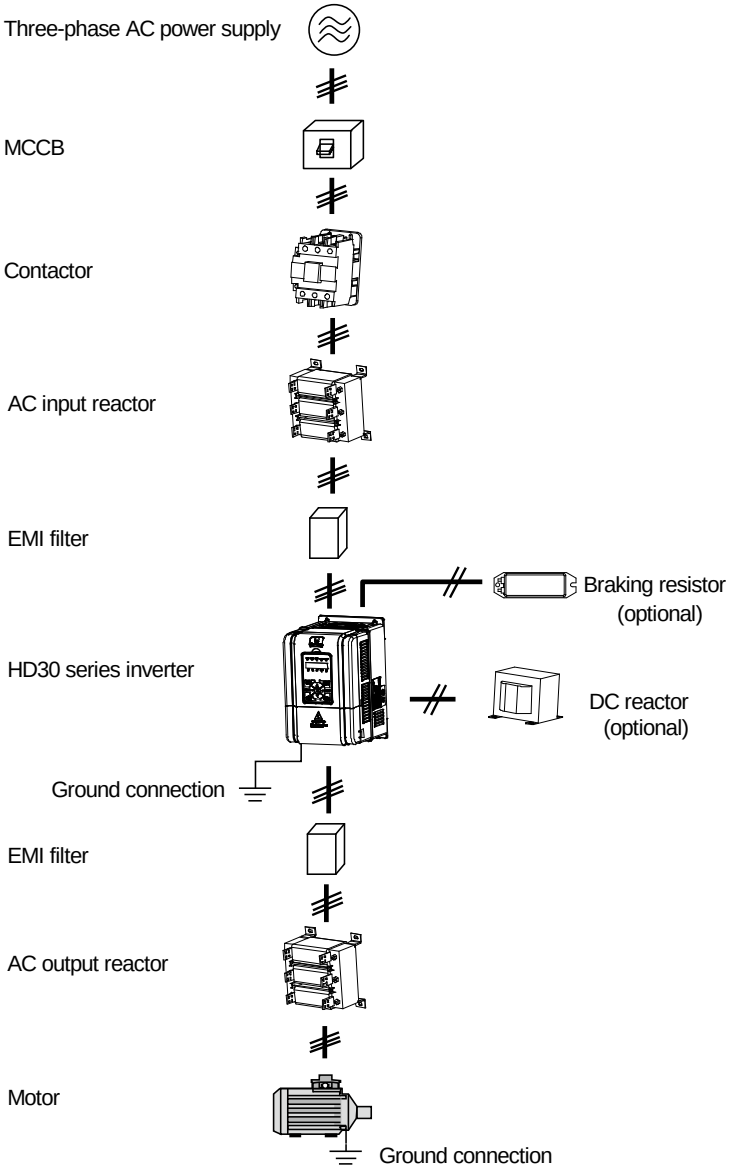
Thank you for purchasing HD30 series vector control inverter manufactured by Shenzhen Hpmont Technology Co., Ltd.

This User Manual describes how to use HD30 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.
- **Telephone: 4008-858-959 or 189 4871 3800**
- The product warranty is on the last page of this Manual, please preserve it for future.

Connection with peripheral devices



QUICK START for USER MENU of GROUP U

User menu of Group U

After map the parameters which will be used to the Group U, simply operating the Group U can directly achieve parameters of read and write.

When the user selects fewer functional parameters which are scattered in the function menu, the user can map the function menu to the user menu. Then the user can only operate in the user menu to read and write the required function parameters. It not only can avoid the frequently switch among the parameter groups but also can arrange the menu order according to our own habits. That will be much easier to memory and operate.

Note:

It need set the tens of value of parameter F01.01 as 0 (does not lock the parameter mapping relationship of Group U and Group F) so that you can modify Group U. The factory setting is 1 (lock the parameter mapping relationship of Group U and Group F).

Example for use

If you want to map F00.13 to the user menu map 1 (U00.00) and F03.01 to the user menu map 2 (U00.02), you only need to set U00.00 and U00.02 but do not set the mapping setting value (U00.01 and U00.03), as following table.

Which, two digits of setting value before the decimal point represent the functional group number of Group F, and the other two digits after the decimal point represent the intergroup number.

No.	Name	Value	Range
U00.00	User menu map of setting 1	00.13	00.00－23.03,99.99【Factory setting】 If set as 99.99, there is no parameter map function
U00.01	The setting value of map 1	Without setting	
U00.02	User menu map of setting 2	03.01	00.00－23.03,99.99【Factory setting】 If set as 99.99, there is no parameter map function
U00.03	The setting value of map 2	Without setting	

After finish setting, modifying the setting value of map (U00.01 and U00.03) can change value of F00.13 and F03.01 automatically.

Factory setting

The user menu Group U can set up to 16 parameters, of which there are 14 parameters have been set.

No.	Setting value	No.	Setting value
U00.00	00.01 (control mode selection)	U00.14	03.01 (acceleration time 1)
U00.02	00.06 (inverter maximum output frequency)	U00.16	03.02 (deceleration time 1)
U00.04	00.08 (upper limit of operation frequency)	U00.18	08.00 (motor rated power)
U00.06	00.13 (starting frequency digital setting)	U00.20	08.01 (motor rated voltage)
U00.08	00.10 (frequency setting sources selection)	U00.22	08.02 (motor rated current)
U00.10	00.11 (command setting source selection)	U00.24	08.03 (motor rated frequency)
U00.12	02.13 (stop mode selection)	U00.26	08.04 (motor rated RPM)

QUICK START for HD30 OPERATION

Note:

Some parameters have been set (factory setting) so that you could not set for the initial use.

Control the start/stop and set the running frequency via using the display panel

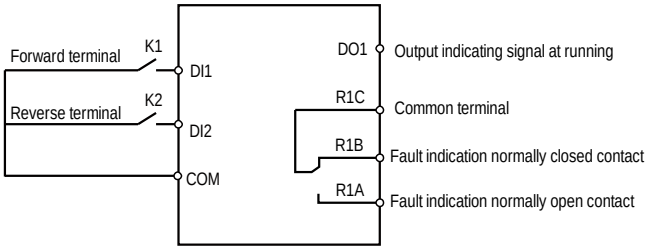
1. Power on. Using the display panel can set motor parameters (see the motor nameplate parameter), running frequency and acceleration/deceleration time. See the following table.

No.	Parameter name	No.	Parameter name
F08.00	Rated power of motor 1	F00.13	Starting frequency digital setting
F08.01	Rated voltage of motor 1		
F08.02	Rated current of motor 1	F03.01	Acceleration time 1
F08.03	Rated frequency of motor 1	F03.02	Deceleration time 1
F08.04	Rated RPM of motor 1		

2. Pressing panel's RUN key can start the inverter, and pressing STOP key can stop the inverter outputting.

Control the start/stop via terminals and set the running frequency via display panel

1. The terminal DI1 is forward running signal input, and DI2 is reverse running signal input, their wirings are as following figure.



2. After power on, set the functional parameters in accordance with wirings, as following table.

No.	Parameter name	Setting value	Meaning
F00.11	Command setting source selection	1	Terminal running command source
F15.00	DI1 terminal function selection	2 (factory setting)	Forward running function (terminal forward signal input)
F15.01	DI2 terminal function selection	3 (factory setting)	Rervese running function (terminal rervese signal input)

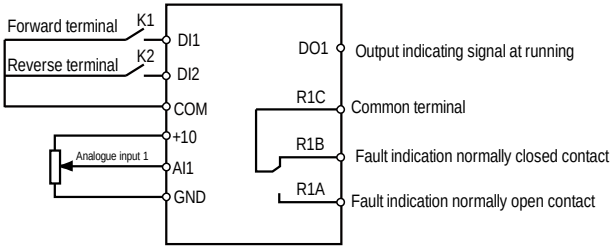
3. Set motor parameters (see motor nameplate parameters), running frequency and acceleration/deceleration time via the display panel, as following table.

No.	Parameter name	No.	Parameter name
F08.00	Rated power of motor 1	F00.13	Starting frequency digital setting
F08.01	Rated voltage of motor 1		
F08.02	Rated current of motor 1	F03.01	Acceleration time 1
F08.03	Rated frequency of motor 1	F03.02	Deceleration time 1
F08.04	Rated RPM of motor 1		

4. Close the K1 of the wiring diagram, the motor will run forward; close K2, run reverse; simultaneously close or disconnect, the motor will stop.

Control the start/stop via terminals and set the running frequency via analogue

1. The terminal DI1 is forward running signal input, and DI2 is reverse running signal input, their wirings are as following figure.



2. After power on, set the functional parameters in accordance with wirings, as following table.

No.	Parameter name	Setting value	Meaning
F00.10	Frequency setting source selection	3	Analogue setting
F00.11	Command setting source selection	1	Terminal running command source
F15.00	DI1 terminal function selection	2 (factory setting)	Forward running function (terminal forward signal input)
F15.01	DI2 terminal function selection	3 (factory setting)	Rervese running function (terminal rervese signal input)
F16.01	Analogue input AI1 function selection	2 (factory setting)	Frequency setting source (set by AI1)

3. Set motor parameters (see motor nameplate parameters), and acceleration/deceleration time via the display panel, as following table.

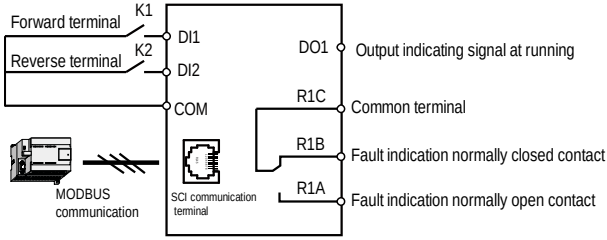
No.	Parameter name	No.	Parameter name
F08.00	Rated power of motor 1	F08.04	Rated RPM of motor 1
F08.01	Rated voltage of motor 1		
F08.02	Rated current of motor 1	F03.01	Acceleration time 1
F08.03	Rated frequency of motor 1	F03.02	Deceleration time 1

4. Set the running frequency by adjusting AI1 analogue input.

5. Close the K1 of the wiring diagram, the motor will run forward; close K2, run reverse; simultaneously close or disconnect, the motor will stop.

Control the start/stop via terminals and set the running frequency via communication

1. The terminal DI1 is forward running signal input, and DI2 is reverse running signal input, their wirings are as following figure.



2. After power on, set the functional parameters in accordance with wirings, as following table.

No.	Parameter name	Setting value	Meaning
F00.10	Frequency setting source selection	2	SCI communication setting
F00.11	Command setting source selection	1	Terminal running command source
F15.00	DI1 terminal function selection	2 (factory setting)	Forward running function (terminal forward signal input)
F15.01	DI2 terminal function selection	3 (factory setting)	Rervese running function (terminal rervese signal input)
F15.18	DO1 terminal function selection	2 (factory setting)	Inverter is running
F17.00	Data format	0 (factory setting)	1-8-2 format, no parity, RTU
F17.01	Baud rate	3 (factory setting)	9600bps
F17.02	Local address	2 (factory setting)	

3. Set motor parameters (see motor nameplate parameters) and acceleration/deceleration time via the display panel, as following table.

No.	Parameter name	No.	Parameter name
F08.00	Rated power of motor 1	F08.04	Rated RPM of motor 1
F08.01	Rated voltage of motor 1		
F08.02	Rated current of motor 1	F03.01	Acceleration time 1
F08.03	Rated frequency of motor 1	F03.02	Deceleration time 1

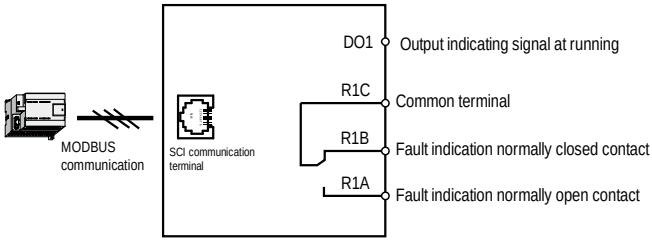
4. Close the K1 of the wiring diagram, the motor will run forward; close K2, run reverse; simultaneously close or disconnect, the motor will stop.

5. Modify the running frequency via SCI communication function code 0X06 writing register 0x3201. Such as: modify the local address two of slave with running frequency of 45.00Hz, as following table.

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

Control the start/stop and set the running frequency via using communication

1. The communication wirings are as following figure.



2. After power on, set the functional parameters in accordance with wirings, as following table.

No.	Parameter name	Setting value	Meaning
F00.10	Frequency setting source selection	2	SCI communication setting
F00.11	Command setting source selection	2	SCI communication running command source
F17.00	Data format	0 (factory setting)	1-8-2 format, no parity, RTU
F17.01	Baud rate	3 (factory setting)	9600bps
F17.02	Local address	2 (factory setting)	

3. Set the motor parameters (see motor nameplate parameters) and acceleration/deceleration time via the display panel, as following table.

No.	Parameter name	No.	Parameter name
F08.00	Rated power of motor 1	F08.04	Rated RPM of motor 1
F08.01	Rated voltage of motor 1		
F08.02	Rated current of motor 1	F03.01	Acceleration time 1
F08.03	Rated frequency of motor 1	F03.02	Deceleration time 1

4. Start and stop the local address 2 of inverter via SCI communication function code 0x06 writing register 0x3200, such as forward start command, as following table.

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

Deceleration stops command, as following table.

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

5. Modify the running frequency via SCI communication function code 0X06 writing register 0x3201. Such as: modify the local address two of slave with running frequency of 45.00Hz, as following table.

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

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 product or other equipments.

Note

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

1.2 About Motor and Load

Compared to the standard frequency operation

The HD30 series inverters are voltage-type frequency inverter 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 standard frequency operation.

Constant torque at low-speed operation

When the inverter 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.

Motor's overload protecting threshold

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

Operation above the motor rated frequency

If the motor exceeds its rated frequency operation, the noise will increase. It need play attention to the motor vibration as well as ensure the motor bearings and mechanical devices to meet the requirement of operation speed range.

Lubrication of mechanical devices

At long time low-speed operation, it should 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

By setting the skip frequency of the inverter (F05.17－F05.19) to avoid the load device or the motor mechanical resonance point.

Check the insulation of the motor

For the first time using of the motor or after long time storage, it need check the insulation of the motor to avoid damage the inverter because of the worse insulation motor.

Note:

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

Energy feedbacks to inverter

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

1.3 Installation Limitation

No capacitor or varistor on the output side

Since the inverter 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 the inverter fault tripping or component damage.

Contactors and circuit breakers connected to the output of the inverter

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

Rated voltage

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

Change three-phase input to single-phase input

For three-phase input inverter, the users should not change it to single-phase input.

If you have to use single-phase power supply, you should disable the input phase-loss protection function. And the bus-voltage and current ripple will increase, which not only influences the life of electrolytic capacitor but also deteriorates the performance of the inverter. In that case, the inverter must be derating and should be within the inverter 60% rated value.

Lightning surge protection

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

Altitude and derating

In the altitude exceeded 1000 meters area, since the heatsink efficiency will be reduced because of the tenuous air, the inverter should be derating. Figure 1-1 is the derating curve of the inverter rated current and the altitude.

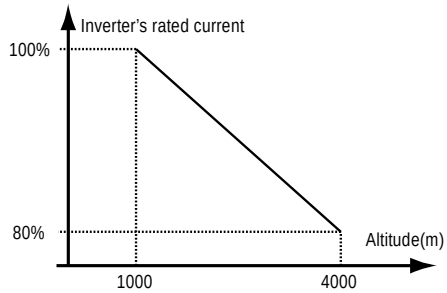
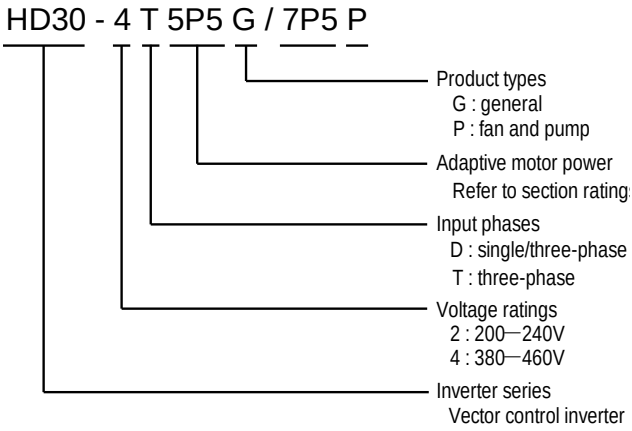


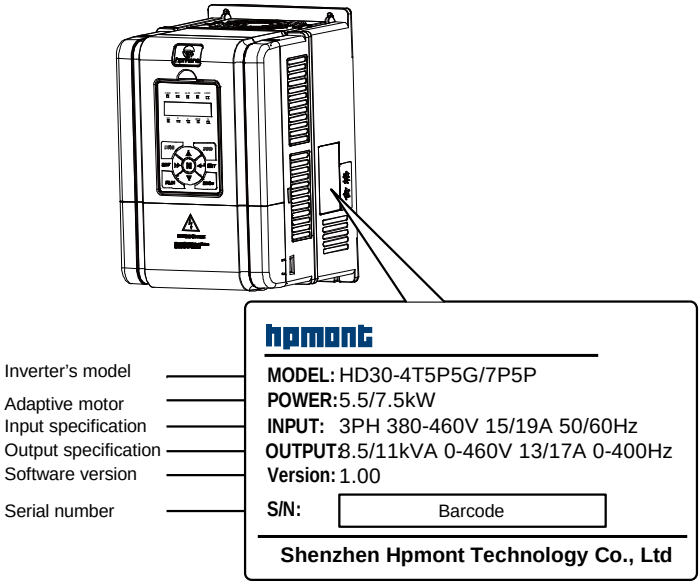
Figure 1-1 Derating curve of inverter rated current and altitude

Chapter 2 Product Information

2.1 Model Explanation



2.2 Nameplate



2.3 Specifications

Item		Specification
Electrical	Rated voltage and frequency	Single/three-phase: 200－240V, 50/60Hz Three-phase: 380－460V, 50/60Hz
	Accuracy	Voltage: fluctuating within ± 10%, imbalance rate < 3% Frequency: ± 5%
	Output voltage	0－input voltage
	Output frequency	0－400.00Hz
Performance	Maximum current	150% rated output current for 2 minutes 180% rated output current for 10 seconds
	Control mode	Sensorless vector control; V/f control
	Operation command channel	Panel; terminals; communication
	Speed setting mode	Digital setting, analogue setting, SCI communication setting
	Speed setting resulotion	Digital setting: 0.01Hz Analogue setting: 0.1% × max-frequency
	Speed control accuracy	Sensorless vector control: ± 0.5%
	Speed control range	Sensorless vector control: 1:100
	Torque control response	Sensorless vector control: < 200ms
	Start torque	Sensorless vector control: 180% rated-torque /0.5Hz
	Torque control accuracy	±5%
Characteristic	User-definable menu	Total 16 user-definable maps, user can edit
	Multi-group parameter upload and download function	To achive 2 group parameters uploading to display panel of backup function
	Programmable I/O interface	Input interface programmable is up to 53 functions Output interface pragrammable is up to 38 functions
	Process PID adjustment	Internal process PID module
	Simple PLC	To achive time and multi-frequency output with internal simple PLC module
	Wobble operation	Internal wobble operation module
	Length control	Internal length control module
	Compatible multi-communication protocol	Inverter built-in MODBUS communication protocol. Available options: PROFIBUS bus module, compatible with PROFIBUS protocol; DeviceNet bus module, compatible with DeviceNet protocol; CAN bus module, compatible with CAN communication protocol;

Item		Specification
Protection	Stall overvoltage	Bus voltage can auto-control against overvoltage fault
	Auto-limited 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
	I/O phase loss protection	I/O phase loss auto-detect and alarm function
	Braking fault protection	Braking detecion and alarming function
	Process PID commands and feedback loss detection	Process PID can auto-identify whether loss the reference 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
I/O feature	Analogue supply	+10V, maximum current 100mA
	Digital supply	+24V, maximum current 200mA
	Analogue input	AI1: voltage 0－10V AI2: -10V－+10V/0－20mA (selectable voltage/current) (it can be extended to 4 inputs with HD30-EIO)
	Analogue output	AO1, AO2: 0－10V/0－20mA (selectable voltage/current)
	Digital input	DI1－DI6 Remark: DI6 can be selectable for high-frequency input (it can be extended to 9 inputs with HD30-EIO)
	Digital output	DO1, DO2 Remark: DO2 can be selectable for high-frequency output
	Programmable relay output	R1A/R1B/R1C: contact rating 250VAC/3A or 30VDC/1A (it can be extended to 4 outputs with HD30-EIO)
Communication	SCI communication	RS-485 interface

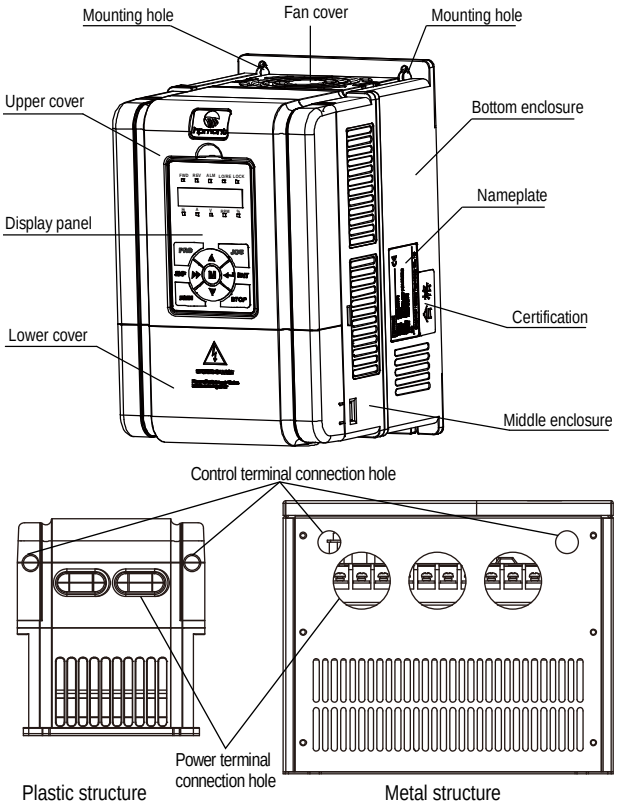
Item		Specification
Display panel	LED display	Five LEDs display Setting frequency, output frequency, output voltage, output current, motor speed, output torque, switching value terminal, status parameter, programm menu parameter and fault code etc.
	LCD display	Optional (HD-LCD), display operation contents in Chinese or English
	Parameter copy	Both LED and LCD display panel can achive quick parameter copy
	Indicator	5 unit indicators, 5 status indicators
Environment	Operation temperature	-10－+40℃, air temperature fluctuation is less than 0.5℃/min The derating value of the output current of the inverter 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
	Oscillation	Less than 5.9m/s^2(0.6g)
	Protection class	IP20
Options	Extended I/O	Additional I/O option (HD30-EIO) Plastic interface option (HD30-PIO)
	Bus communication	PROFIBUS option (HDFB-PROFIBUS-DP) DeviceNet option (HDFB-DeviceNet) CAN option (HDFB-CAN)
	About display panel	Status display panel (HD-LED-L) LED display pane with potentiometer (HD-LED-P) LCD display panel (HD-LCD) Mounting base to panel (HD-KMB) 1 meter extension cable to panel (HD-CAB-1M) 2 meter extension cable to panel (HD-CAB-2M) 3 meter extension cable to panel (HD-CAB-3M) 6 meter extension cable to panel (HD-CAB-6M)
	Enhanced protection	Protective cover (HD-CK-Frame4)
	Power units	Dynamic braking unit (HDBU) Power regenerative unit (HDRU)

2.4 Ratings

Model	Rated capacity (kVA)	Rated input current(A)	Rated output current(A)	Motor power (kW)
Single/three-phase power supply: 200—240V, 50/60Hz				
HD30-2D0P4G	1.0	5.8	2.5	0.4
HD30-2D0P7G	1.5	10.5	4.0	0.75
HD30-2D1P5G	2.8	18.5	7.5	1.5
HD30-2D2P2G	3.8	24.1	10	2.2
Three-phase power supply: 200—240V, 50/60Hz				
HD30-2T3P7G	5.9	19	17	3.7
HD30-2T5P5G	8.5	28	25	5.5
HD30-2T7P5G	11	35	32	7.5
HD30-2T011G	16	47	45	11
HD30-2T015G	21	62	55	15
HD30-2T018G	24	77	70	18.5
HD30-2T022G	30	92	80	22
HD30-2T030G	39	113	110	30
HD30-2T037G	49	156	130	37
HD30-2T045G	59	180	160	45
HD30-2T055G	72	214	200	55
HD30-2T075G	100	256	253	75
Three-phase power supply: 380—460V, 50/60Hz				
HD30-4T0P7G	1.5	3.4	2.3	0.75
HD30-4T1P5G	2.5	5.2	3.8	1.5
HD30-4T2P2G	3.4	7.3	5.1	2.2
HD30-4T3P7G/5P5P	5.9/8.5	11.9/15	9.0/13	3.7/5.5
HD30-4T5P5G/7P5P	8.5/11	15/19	13/17	5.5/7.5
HD30-4T7P5G/011P	11/16	19/28	17/25	7.5/11
HD30-4T011G/015P	16/21	28/35	25/32	11/15
HD30-4T015G/018P	21/24	35/39	32/37	15/18.5
HD30-4T018G/022P	24/30	39/47	37/45	18.5/22
HD30-4T022G/030P	30/39	47/62	45/60	22/30
HD30-4T030G/037P	39/49	62/77	60/75	30/37
HD30-4T037G/045P	49/59	77/92	75/90	37/45
HD30-4T045G/055P	59/72	92/113	90/110	45/55
HD30-4T055G/075P	72/100	113/156	110/152	55/75
HD30-4T075G/090P	100/116	156/180	152/176	75/90
HD30-4T090G/110P	116/138	180/214	176/210	90/110
HD30-4T110G/132P	138/167	214/256	210/253	110/132
HD30-4T132G/160P	167/200	256/307	253/304	132/160
HD30-4T160G/200P	200/250	307/385	304/380	160/200

Model	Rated capacity (kVA)	Rated input current(A)	Rated output current(A)	Motor power (kW)
HD30-4T200G/220P	250/280	385/430	380/426	200/220
HD30-4T220G/250P	280/309	430/475	426/470	220/250
HD30-4T250G/280P	309/349	475/535	470/530	250/280
HD30-4T280G/315P	349/398	535/609	530/600	280/315
HD30-4T315G/355P	398/434	609/664	600/660	315/355
HD30-4T355G/400P	434/494	664/754	660/750	355/400
HD30-4T400G/450P	494/560	754/852	750/830	400/450

2.5 Parts of Inverter



Chapter 3 Mechanical Installation

3.1 Installation Precautions

Danger

- Do not install if the inverter is imcomplete or impaired.
- Make sure that the inverter is far from the explosive and flammability things.
- Do not operate the inverter until the power is cut-off 10 minutes later.

Warning

- It is required not only carry the display panel and the cover but also the inverter bottom enclosure.
- Do not play metal into the inverter when installing.

3.2 Requirement for the Installation Site

Ensure the installation site meeting the following requirements:

- Do not install at the direct sunlight, moisture, water droplet location;
- Do not install at the flammability, explosive, corrosive gas and liquid location;
- Do not install at the oily dust, fiber and metal powder location;
- Be vertical installation on fire-retardant material with a strong support;
- Make sure adequate cooling space for the inverter so as to keep the ambient temperature between - 10—+ 40℃;
- Install at where the vibration is less than 5.9m/s^2 (0.6g).

Note:

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

2. Keep ambient temperature between -10－+40℃. It can improve the inverter operation performance if install at the 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 Figure 3-1and Table 3-1.

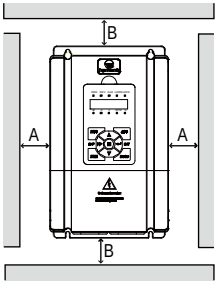


Figure 3-1 Installation of the inverter

Table 3-1 Installation dimension of the inverters

Inverter power	A(left and right)	B(up and down)
≤55kW	≥50mm	≥100mm
≥75kW	≥150mm	≥350mm

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

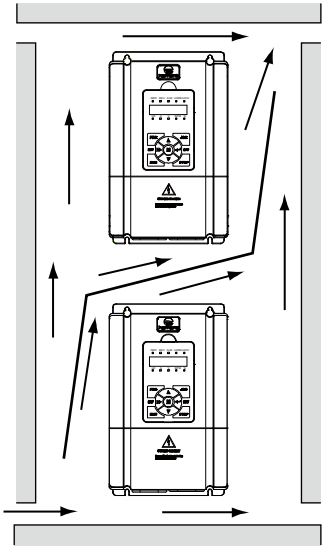


Figure 3-2 Installation of several inverters

3.4 Dimensions and Mounting Size

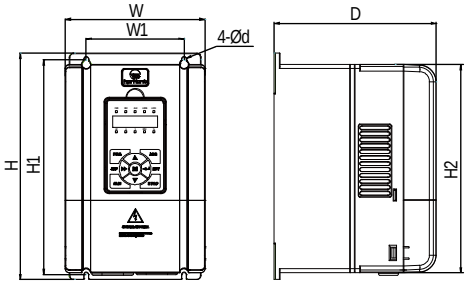


Figure1

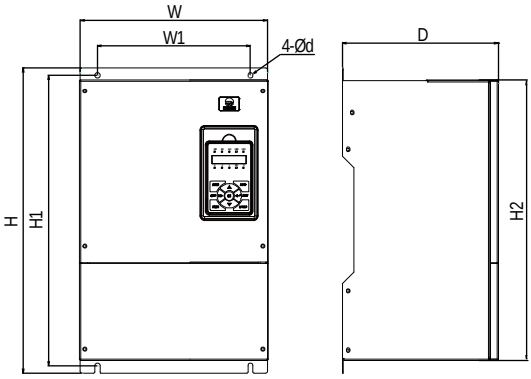


Figure2

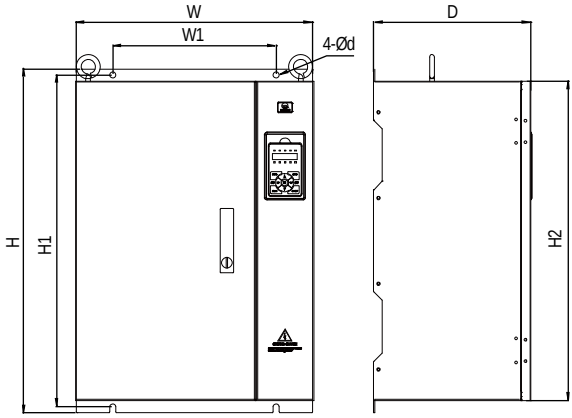


Figure3

Table 3-2 HD30 dimensions

Structure size	Model	Dimension (mm)			Mounting size (mm)				GW (kg)	Figure
		W	H	D	W1	H1	H2	d		
Frame 1	HD30-2D0P4G	135	241	162	91	226	220	5	2.4	Figure 1
	HD30-2D0P7G									
	HD30-2D1P5G									
	HD30-2D2P2G									
	HD30-4T0P7G									
	HD30-4T1P5G									
	HD30-4T2P2G									
Frame 2	HD30-2T3P7G	165	266	190	115	253	245	5	4.4	Figure 1
	HD30-4T3P7G/5P5P									
	HD30-4T5P5G/7P5P									
Frame 3	HD30-2T5P5G	200	299	210	146	286	280	5	5.8	Figure 1
	HD30-4T7P5G/011P									
	HD30-4T011G/015P									
Frame 4	HD30-2T7P5G	235	353	222	167	337	330	7	8.2	Figure 1
	HD30-4T015G/018P									
	HD30-4T018G/022P									
Frame 5	HD30-2T011G	290	469	240	235	445	430	8	20.4	Figure 2
	HD30-2T015G									
	HD30-2T018G									
	HD30-4T022G/030P									
	HD30-4T030G/037P									
Frame 6	HD30-2T022G	380	598	290	260	576	550	10	48	Figure 2
	HD30-2T030G									
	HD30-2T037G									
	HD30-4T037G/045P									
	HD30-4T045G/055P									
	HD30-4T055G/075P									
Frame 7	HD30-2T045G	500	721	330	343	696	670	12	80	Figure 3
	HD30-2T055G									
	HD30-2T075G									
	HD30-4T075G/090P									
	HD30-4T090G/110P									
	HD30-4T110G/132P									
Frame 8	HD30-4T132G/160P	620	917	360	450	890	850	12	115	Figure 3
	HD30-4T160G/200P									
	HD30-4T200G/220P									
Frame 9	HD30-4T220G/250P	740	1067	370	520	1040	1000	14	150	Figure 3
	HD30-4T250G/280P									
	HD30-4T280G/315P									

Structure size	Model	Dimension (mm)			Mounting size (mm)				GW (kg)	Figure
		W	H	D	W1	H1	H2	d		
Frame 10	HD30-4T315G/355P	970	1316	380	520	1286	1250	14	190	Figure 3
	HD30-4T355G/400P									
	HD30-4T400G/450P									

HD30 series cabinet appearance is shown as Figure 3-3 and the dimension is as Table 3-3.

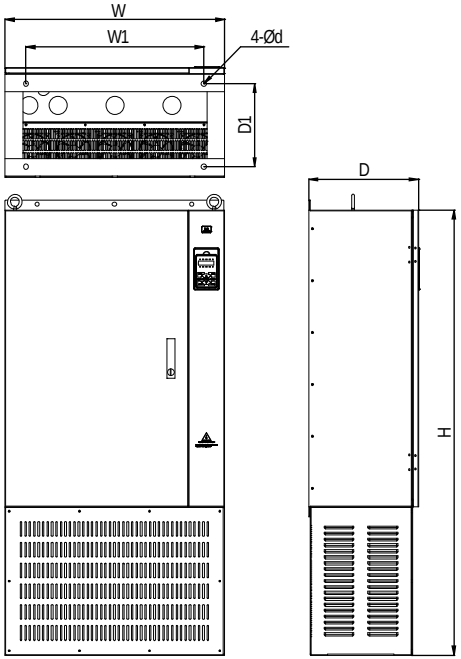


Figure 3-3 HD30 series cabinet dimension figure

Table 3-3 HD30 series cabinet dimension

Model	Dimension (mm)			Mounting size (mm)		
	W	H	D	W1	D1	d
HD30-4T132G/160P-C	620	1250	360	500	270	18
HD30-4T160G/200P-C						
HD30-4T200G/220P-C						
HD30-4T220G/250P-C	740	1500	370	600	280	18
HD30-4T250G/280P-C						
HD30-4T280G/315P-C						
HD30-4T315G/355P-C	970	1650	380	700	280	18
HD30-4T355G/400P-C						
HD30-4T400G/450P-C						

3.5 Display Panel Installation and Dismantle

According to the direction of the Figure 3-4, press the display panel until hear a “click” sound. Do not install the display panel from other directions or it will cause poor contact.

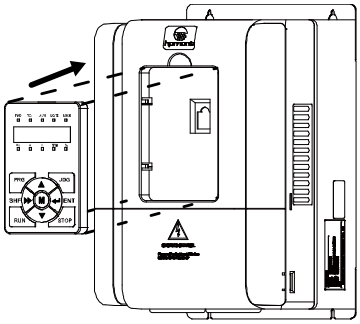


Figure 3-4 Installation of the display panel

There are two steps in Figure 3-5.

First, press the hook of the display panel according to the direction 1.

Second, take out of the display panel according to the direction 2.

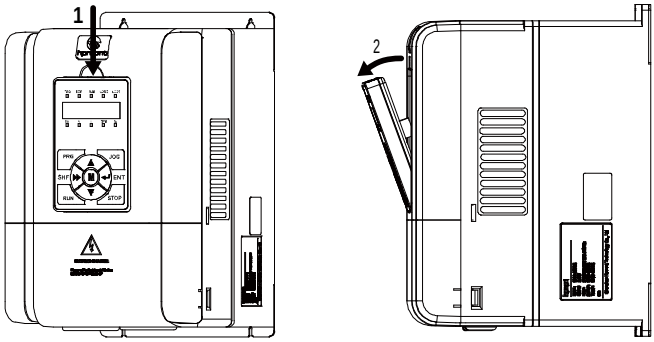
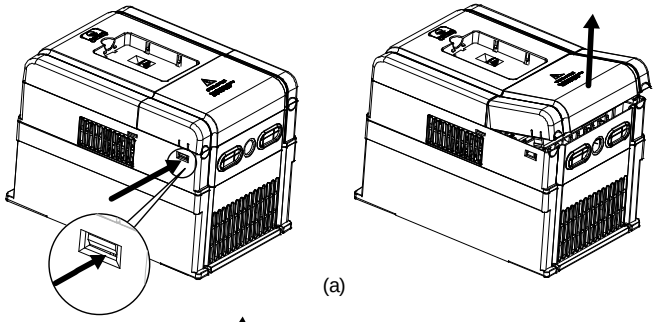


Figure 3-5 Dismantle of the display panel

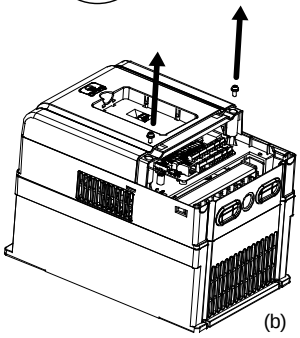
3.6 Plastic Cover Dismantle

The upper cover and the lower cover of the HD30 series inverter are removable. The dismantle step is shown as Figure 3-6.

Before removing the upper cover, please take away the display panel.



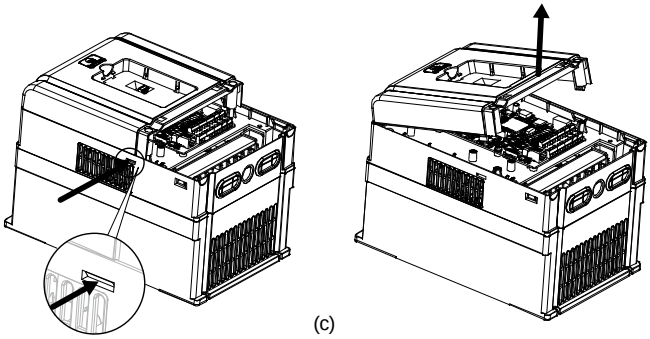
(a)



(b)

The removing proceeses of plastic cover board:

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



(c)

Figure 3-6 Dismantle of the plastic cover

Chapter 4 Electrical Installation

4.1 Wiring 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 Selection of Main Circuit Peripheral Devices

Please refer to the Table 4-1 for the recommended specifications.

Table 4-1 HD30 series inverters I/O wiring specification

Model	Input Protection		Main Circuit (mm^2)		Control Circuit (mm^2)
	MCCB (A)	Contactor (A)	Supply Cables	Motor Cables	
HD30-2D0P4G	16	10	1.0	1.0	⩾0.5
HD30-2D0P7G	16	10	1.5	1.5	⩾0.5
HD30-2D1P5G	20	16	2.5	1.5	⩾0.5
HD30-2D2P2G	32	20	4.0	2.5	⩾0.5
HD30-2T3P7G	40	32	4.0	4.0	⩾0.5
HD30-2T5P5G	63	40	6.0	6.0	⩾0.5
HD30-2T7P5G	63	40	6.0	6.0	⩾0.5
HD30-2T011G	100	63	16	16	⩾0.5

Model	Input Protection		Main Circuit (mm^2)		Control Circuit (mm^2)
	MCCB (A)	Contactor (A)	Supply Cables	Motor Cables	
HD30-2T015G	125	100	25	25	≥0.5
HD30-2T018G	160	100	25	25	≥0.5
HD30-2T022G	200	125	35	35	≥0.5
HD30-2T030G	200	125	50	50	≥0.5
HD30-2T037G	250	160	70	70	≥0.5
HD30-2T045G	250	160	95	95	≥0.5
HD30-2T055G	350	350	120	120	≥0.5
HD30-2T075G	400	400	150	150	≥0.5
HD30-4T0P7G	10	10	1.0	1.0	≥0.5
HD30-4T1P5G	16	10	1.0	1.0	≥0.5
HD30-4T2P2G	16	10	1.5	1.5	≥0.5
HD30-4T3P7G/5P5P	25	16	2.5	2.5	≥0.5
HD30-4T5P5G/7P5P	32	25	4.0	4.0	≥0.5
HD30-4T7P5G/011P	40	32	4.0	4.0	≥0.5
HD30-4T011G/015P	63	40	6.0	6.0	≥0.5
HD30-4T015G/018P	63	40	6.0	6.0	≥0.5
HD30-4T018G/022P	100	63	10	10	≥0.5
HD30-4T022G/030P	100	63	16	16	≥0.5
HD30-4T030G/037P	125	100	25	25	≥0.5
HD30-4T037G/045P	160	100	25	25	≥0.5
HD30-4T045G/055P	200	125	35	35	≥0.5
HD30-4T055G/075P	200	125	50	50	≥0.5
HD30-4T075G/090P	250	160	70	70	≥0.5
HD30-4T090G/110P	250	160	95	95	≥0.5
HD30-4T110G/132P	350	350	120	120	≥0.5
HD30-4T132G/160P	400	400	150	150	≥0.5
HD30-4T160G/200P	500	400	185	185	≥0.5
HD30-4T200G/220P	600	600	150*2	150*2	≥0.5
HD30-4T220G/250P	600	600	150*2	150*2	≥0.5
HD30-4T250G/280P	800	600	185*2	185*2	≥0.5
HD30-4T280G/315P	800	800	185*2	185*2	≥0.5
HD30-4T315G/355P	800	800	150*3	150*3	≥0.5
HD30-4T355G/400P	800	800	150*4	150*4	≥0.5
HD30-4T400G/450P	1000	1000	150*4	150*4	≥0.5
Remarks: *2, *3, *4 respectively represent “2, 3 or 4 main circuit cables are in parallel”.					

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 inverter's rated input voltage.

4.3.1 Power Terminal Description

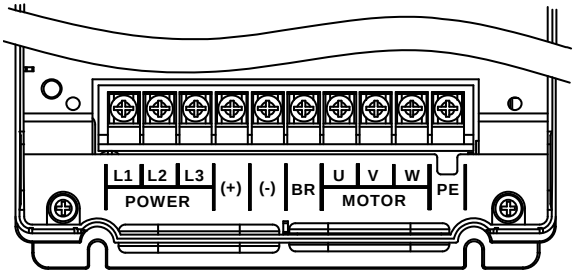


Figure 4-1 Main circuit terminal layout of 5.5kW or below model

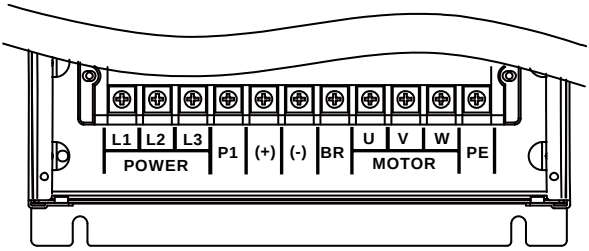


Figure 4-2 Main circuit terminal layout of 7.5—55kW model

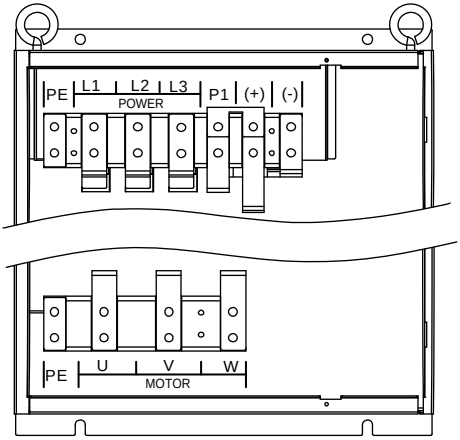


Figure 4-3 Main circuit terminal layout of 75—280kW model

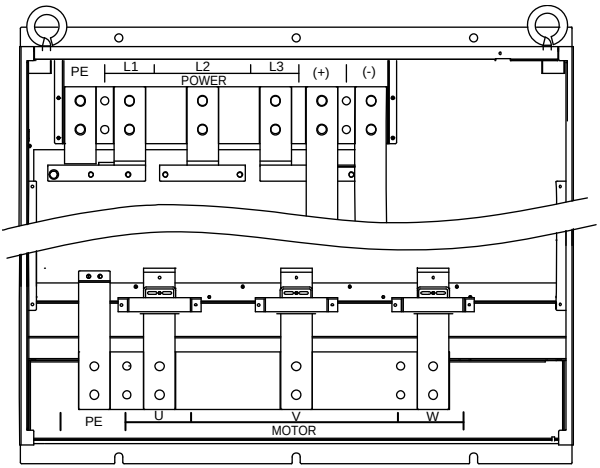


Figure 4-4 Main circuit terminal layout of 315—400kW model

Table 4-2 HD30 main circuit terminal function description

Terminal	Function 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; External braking unit connection terminals.
(+)、BR	Braking resistor connection terminals
PE	Earth terminal, connect to the ground

4.3.2 Power Terminal Wiring

During trial operation, make sure the inverter runs forward when the forward command is enabled. If not, switch any two of the output terminals (U, V, W) or modify the setting of parameter F00.17 to change the motor's direction.

The power terminal wirings are shown as Figure 4-5, Figure 4-6, Figure 4-7 and Figure 4-8.

The braking resistor and its selection are referred to section 9.5 Braking Unit and Braking Resistor Selection (page 135).

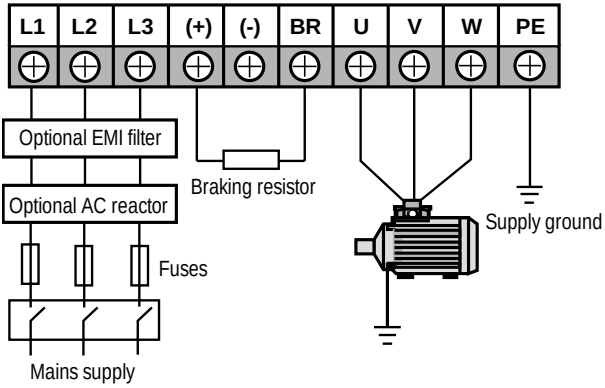


Figure 4-5 Main circuit connection of 5.5KW or below model

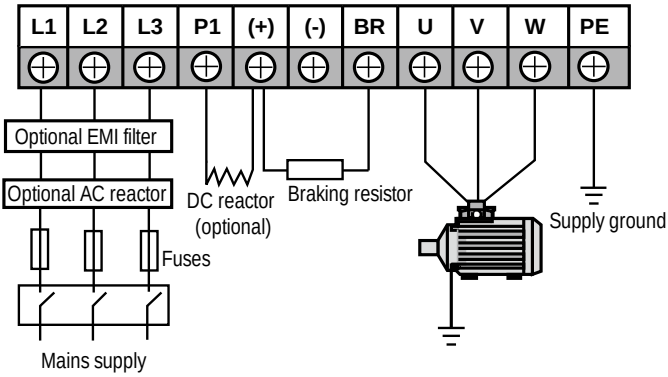


Figure 4-6 Main circuit connection of 7.5—55KW model

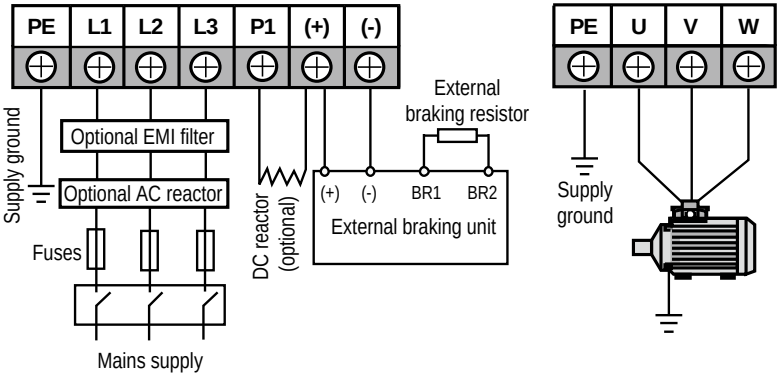


Figure 4-7 Main circuit connection of 75—280KW model

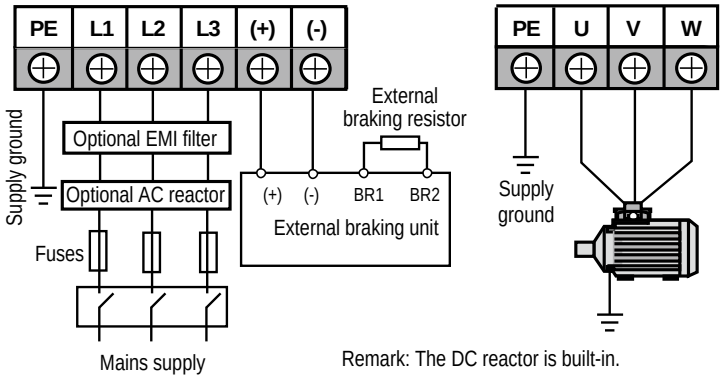


Figure 4-8 Main circuit connection of 315—400KW model

4.4 Control Terminals and Wire Connection

Danger

- The control circuit is designed as ELV (Extra Low Voltage) circuit and basically isolated with the power circuit. Do not touch the control circuit when the inverter is on power.

Warning

- If the control circuit is connected to the external devices with live touchable port (SELV circuit), it should increase an additional isolating barrier to ensure that SELV classification of external devices not be changed.
- If connect the communication terminal of the control circuit to the PC, you should choose the RS485/232 isolating converter which meets the safety requirement.

In order to efficiently suppress the interference to control signals, the length of signal cables should be less than 50m and keep a distance of at least 0.3m from the power lines. Please use twisted-pair shielded cables for analogue input and output signals.

The positions of control terminal, wire jumper and SCI communication port in the control PCB are shown in Figure 4-9.

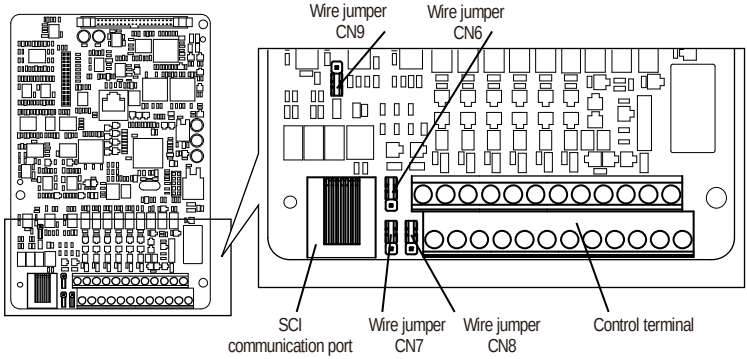


Figure 4-9 Positions of control terminal, wire jumper and SCI communication port in the control PCB

4.4.1 Control Terminal Description

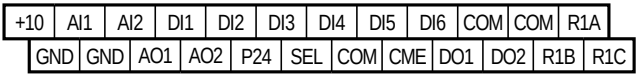


Figure 4-10 Control terminal layout

Table 4-3 Control terminal function description

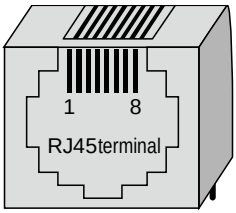
Item	Terminal	Name	Function Description
Analogue input	AI1	Anglogue input 1	Input voltage: 0－10V (input impedance: 32kΩ)
	AI2	Anglogue input 2	Input voltage/current is selectable; Input voltage: -10V－10V (input impedance: 32kΩ); Input current: 0－20mA (input impedance:500Ω)
Analogue output	AO1	Anglogue output 1	Output voltage/current signal: 0－10V/0－20mA; Programmable output
	AO2	Anglogue output 2	
Power source	+10	+10V power supply	Analogue input use +10V as reference supply, maximum output current is 100mA
	GND	+10V power reference ground	Analogue site, isolated to COM
	P24	+24V power supply	Digital input use +24V as supply, maximum output current is 200mA
	SEL	Digital input common terminal	Factory settings default SEL and P24 are connected. Disconnected SEL and P24 when use external power to drive DI1－DI6
	COM	Digital reference ground	Digital site, isolated to CME
Digital input	DI1－DI6	Digital input 1－6	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
Digital output	DO1	Digital output 1	Programmable optocoupler isolation, open collector output Output voltage: 0－30VDC, max-output current 50mA
	CME	DO1 reference ground	Isolated COM, default short connected COM; Disconnect CME and COM if need isolation output
	DO2	Digital output 2	Programmable optical-couple isolation, open collector output or pulse frequency output can be selectable; Output voltage: 0－30VDC, max-output current 50mA; It is equal to DO1 while selecting open collector output; Select pulse frequency output, max-frequency 50kHz
Relay output	R1A/ R1B/ R1C	Relay contact output	Programmable output, contact rating: 250VAC/3A or 30VDC/1A R1B,R1C: normally closed; R1A,R1C: normally open

4.4.2 Wire Jumper Description

Table 4-4 HD30 wire jumper function and setting description

Jumper switch	Function and setting description	Factory setting
CN6	AI2 analogue input channel can select voltage or current signal. When pin 1 and pin 2 of the CN6 are short-circuited, AI2 channel inputs voltage signal; When pin 2 and pin 3 of the CN6 are short-circuited, AI2 channel inputs current signal.	
CN7	AO1 analogue output channel can select voltage or current signal. When pin 1 and pin 2 of the CN7 are short-circuited, AO1 channel outputs voltage signal; When pin 2 and pin 3 of the CN7 are short-circuited, AO1 channel outputs current signal.	
CN8	AO2 analogue output channel can select voltage or current signal. When pin 1 and pin 2 of the CN8 are short-circuited, AO2 channel outputs voltage signal; When pin 2 and pin 3 of the CN8 are short-circuited, AO2 channel outputs current signal.	
CN9	SCI communication can select proper resistance. When pin 2 and pin 3 of the CN9 are short-circuited, no resistance; When pin 1 and pin 2 of the CN9 are short-circuited, select the proper resistance.	

4.4.3 SCI Communication Terminal Description



Pin	1	2	3	4	5	6	7	8
Signal	+5V	485+	+5V	GND	GND	GND	485-	Reserved

Figure 4-11 SCI communication terminal

4.4.4 Control Terminal Connection

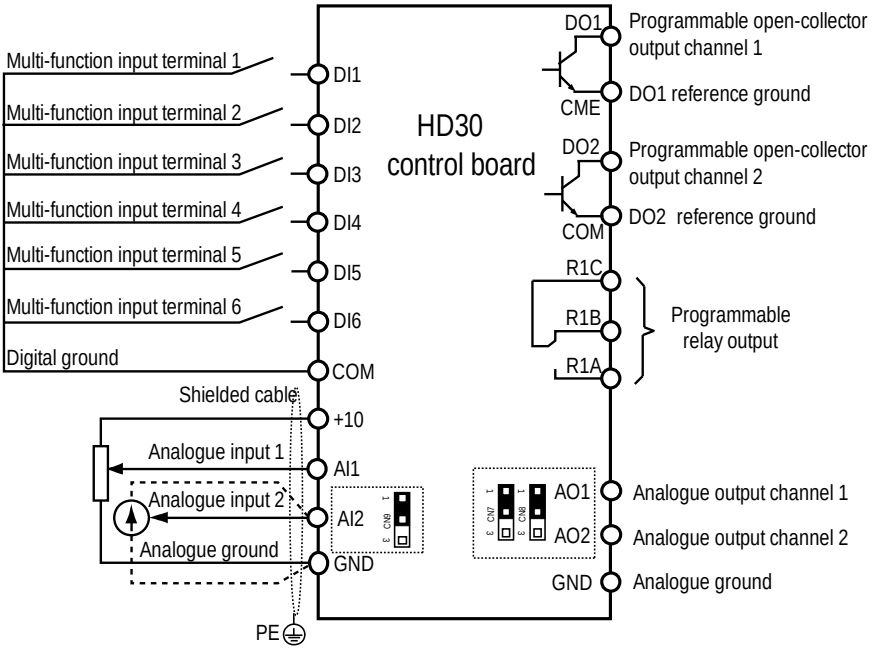


Figure 4-12 HD30 control circuit connection diagram

Wiring of digital input terminal

Dry contact connections

1. If the internal 24V power supply is used, the connection is as shown in Figure 4-13. (The SEL and the P24 are short-circuited at factory)

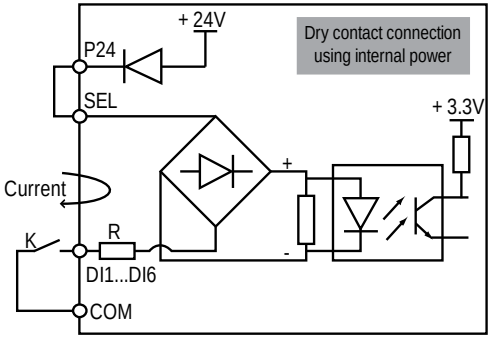


Figure 4-13 Dry contact connection when using internal 24V power

2. If the external power supply is used, the connection is as shown in Figure 4-14. (Note that the SEL and the P24 are not short-circuited)

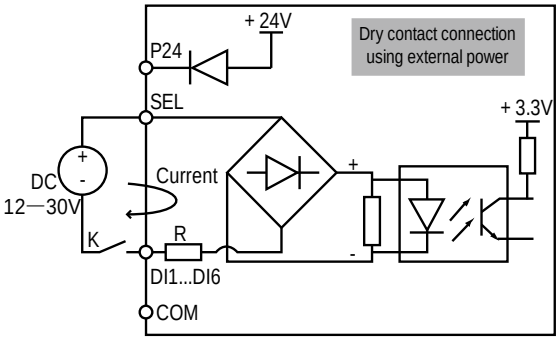


Figure 4-14 Dry contact connection when using external power

Source (Drain) connections

1. If the external power supply is used, the source connection is as shown in Figure 4-15. (Note that the SEL and the P24 are not short-circuited)

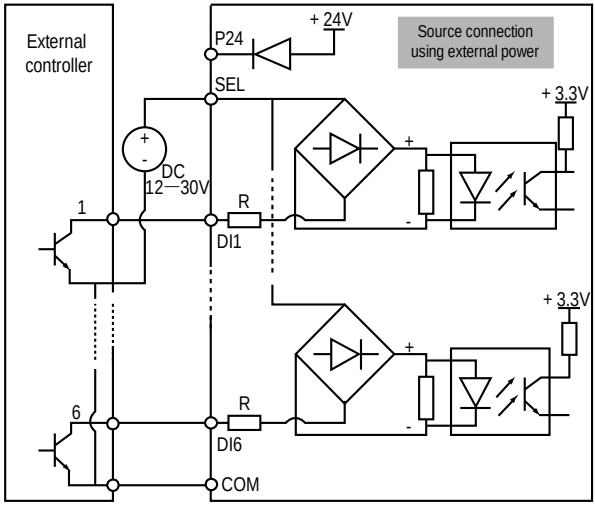


Figure 4-15 Source input signal connection when using external power

2. If the external power supply is used, the drain connection is as shown in Figure 4-16. (Note that the SEL and the P24 are not short-circuited)

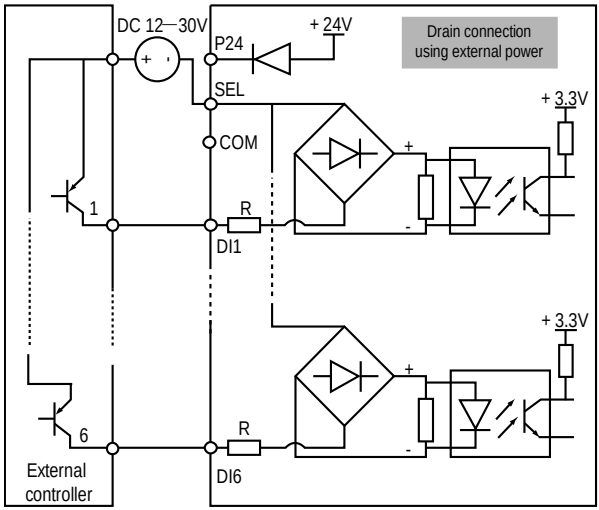


Figure 4-16 Drain input signal connection when using external power

3. If the inverter's internal 24V power supply is used, the common emitter output connection of NPN transistor in the external controller is as shown in Figure 4-17.

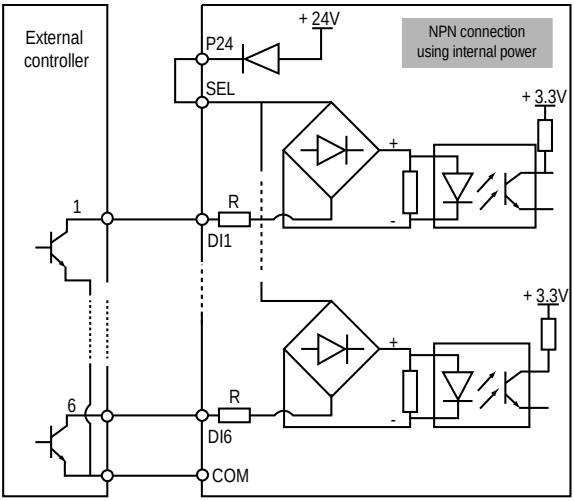


Figure 4-17 NPN signal input connection when using internal 24V power

4. If the inverter's internal +24V power supply is used, the common emitter output connection of the PNP transistor in the external controller is as shown in Figure 4-18. (Note that the SEL and the P24 are not short-circuited)

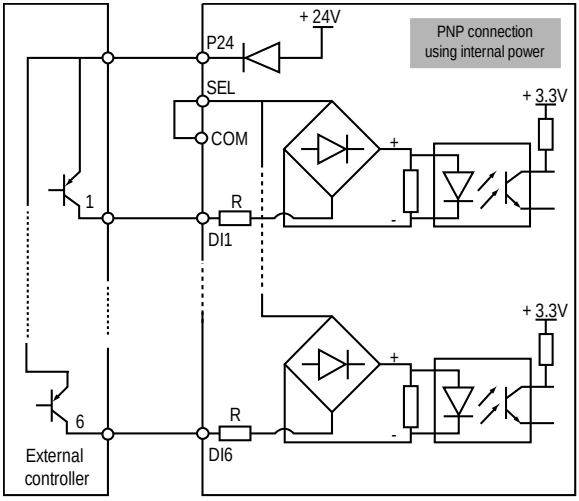


Figure 4-18 PNP signal input connection when using internal 24V power

Wiring of analogue input terminal

The AI1 is voltage input and the voltage input range is 0—10V. Its connection and disposal are shown in Figure 4-19.

The AI2 is selectable voltage/current input, the input range are -10—+10V/0—20mA. Its connection and disposal are shown in Figure 4-20.

The input voltage signal can use the control board of internal +/-10V, or be provided by the external.

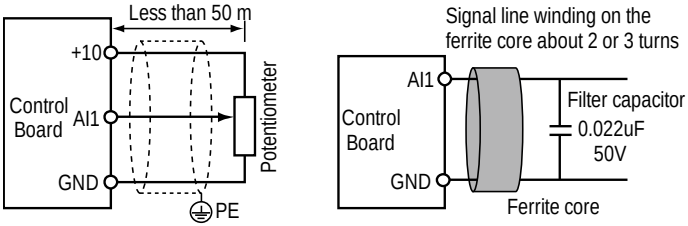


Figure 4-19 AI1 input terminal connection and disposal

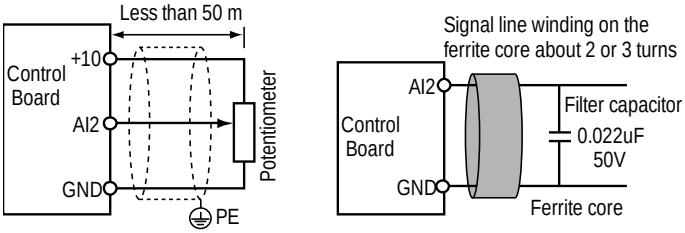


Figure 4-20 AI2 input terminal connection and disposal

The analogue input signal is a weak electrical signal, which is vulnerable to external interference. Therefore the shielded cable is required to use, which is no more than 50 meters and should be reliably grounded. In some more serious interference occasions, the analog input signal is needed to add the filter capacitor or ferrite ring.

Wiring of multi-function output terminal

1. The multi-function output terminal DO1 can use the inverter's internal 24V power supply or the external power supply. The connections are as shown in Figure 4-21.

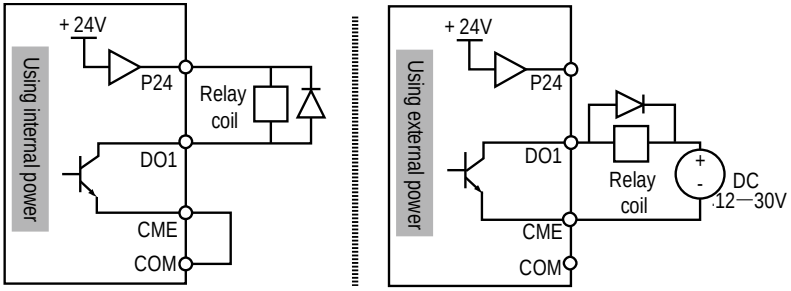


Figure 4-21 DO1 terminal connection

2. The frequency signal output terminal DO2 can use the inverter's internal 24V power supply or the external power supply. The connections are as shown in Figure 4-22.

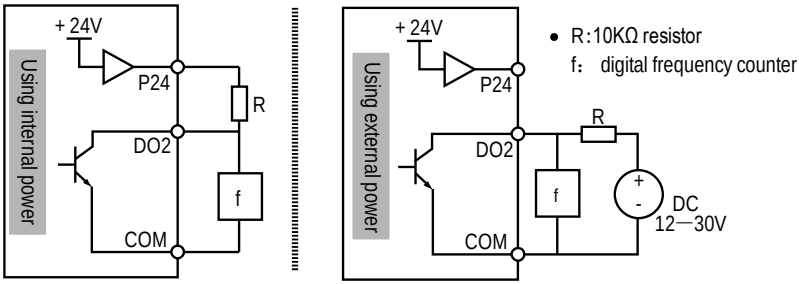


Figure 4-22 DO2 terminal connection

4.5 Meet EMC Requirement of Installation

4.5.1 Correct EMC Installation

According national standards GB/T12668.3, the inverter should meet the two requirements of electromagnetic interference (EMI) and anti-electromagnetic interference. The international standards IEC/61800-3 (VVVF drive system part 3: EMC specifications and test methods) are identical to the national standards GB/T12668.3.

HD30 Series Inverters are designed and produced according to the requirements of IEC/61800-3. Please install the inverter as per the description below so as to achieve good electromagnetic compatibility (EMC).

Divide the installation space into different areas:

In a drive system, the inverter, control equipment and sensors are installed in the same cabinet, the electromagnetic noise should be suppressed at the main connecting points with the EMI filter and input reactor installed in cabinet to satisfy the EMC requirements.

The most effective but expensive measure to reduce the interference is to isolate the noise source and the noise receiver, which should be considered in mechanical system design phase. In driving system, the noise source can be inverter, braking unit and contactor. Noise receiver can be automation equipment, encoder and sensor etc.

The mechanical/system is divided into different EMC areas according to its electrical characteristics. The recommended installation positions are shown in Figure 4-23.

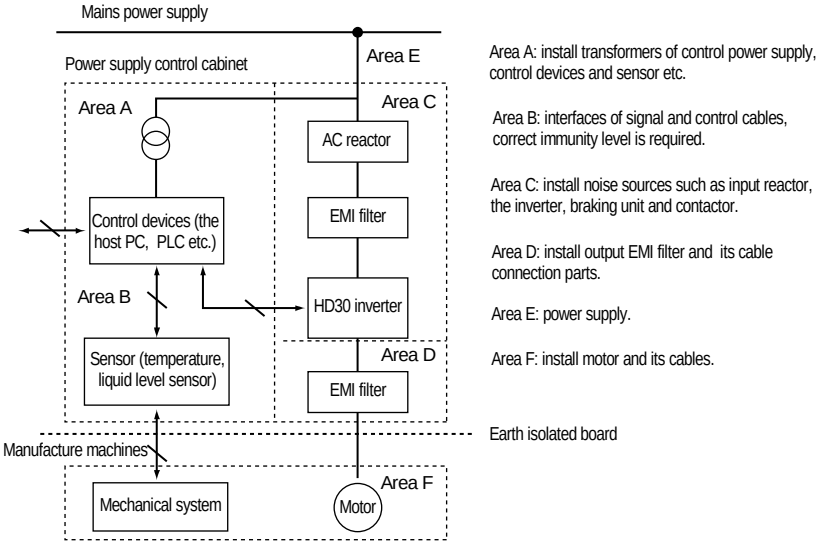


Figure 4-23 System wiring sketch

Remarks:

- All areas should be isolated in space to achieve electromagnetic decoupling effect.
- The minimum distance between areas should be 20cm, and use earthing bars for decoupling among areas, the cables from different area should be placed in different tubes.
- EMI filters should be installed at the interfaces between different areas if necessary.
- Bus cable (such as RS485) and signal cable must be shielded.

4.5.2 Wiring Requirement

In order to avoid interference intercoupling, it is recommended to separate the motor cables and the control cables from power supply cables, and keep enough distance among the cables. Especially when the cables are laid in parallel and the cable length is long, the signal cables should cross the power supply cables perpendicularly as shown in Figure 4-24.

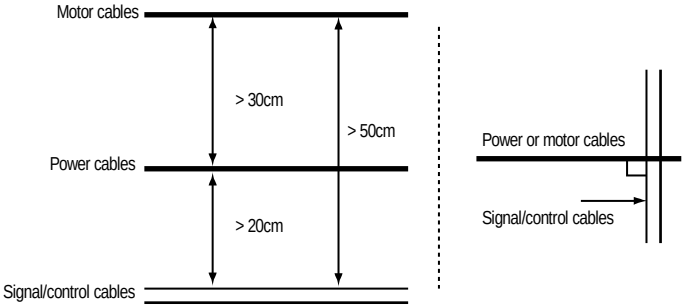


Figure 4-24 System wiring

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

Normally, the control cables must use the shielded cables and the shielding metal net must be connected to the metal enclosure of the inverter by cable clamps as shown in Figure 4-25.

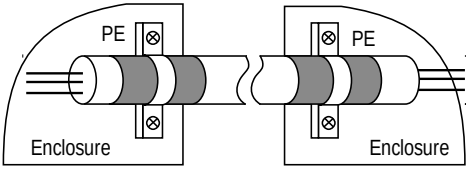


Figure 4-25 Correct connection of the shielded cable

4.5.3 Wiring Motor

Longer the cable between the inverter and the motor is, higher the high-frequency leakage current is, causing the inverter output current to increase as well. This may affect peripheral devices.

When the cable between the motor and the inverter is longer than 100 meters, it is recommended to install output reactor and adjust the carrier frequency as per the instruction in Table 4-5.

Table 4-5 Carrier frequency and the cable length between inverter and motor

Cable length	< 30m	30—50m	50—100m	≥ 100m
Carrier frequency	15kHz below	10kHz below	5kHz below	2kHz below

The inverter should be derated if the motor cables are too long or their cross sectional area (CSA) is too large. The inverter's cables should be the cables with specified CSA (see Table 4-1) because the capacitance of the cable to ground is in proportional to the cable's CSA. If the cable with big CSA is used, its current should be reduced. The current should be decreased by 5% when per level of CSA is increased.

4.5.4 Ground Connections

The earth terminals PE must be connected to earth properly. The earthing cable should be as short as possible (the earthing point should be as close to the inverter as possible) and the earthing area should be as large as possible.

The grounding resistance should be less than 10Ω for 380V Class inverters.

Do not share the earth wire with other devices such as welding machines or power tools. It could share the earthing pole, but the motor and the inverter each have their own earthing pole, then the earthing effect is better. The recommended and avoided earthing methods are respectively shown in Figure 4-26 and Figure 4-27.

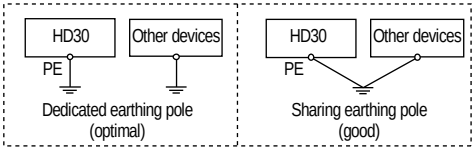


Figure 4-26 Recommended earthing method

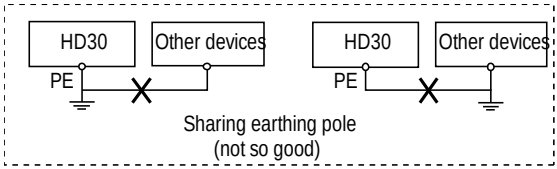


Figure 4-27 Avoided earthing method

When using more than one inverter, be careful not to loop the earth wire as shown in Figure 4-28.

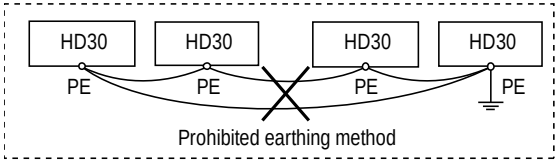


Figure 4-28 Prohibited earthing method

4.5.5 EMI Filter

The EMI filter should be used in the equipment that may generate strong EMI or the equipment that is sensitive to the external EMI. The EMI filter should be a dual-way low pass filter through which lower frequency current can flow while higher frequency current can hardly flow.

Function of EMI filter

1. The EMI filter ensures the equipment not only can satisfy the conducting emission and conducting sensitivity in EMC standard but also can suppress the radiation of the equipment.

2. It can prevent the EMI generated by equipment from entering the power cable and the EMI generated by power cable from entering equipment.

Common mistakes in using EMI filter

1. Too long the power cable is between the EMI filter and the inverter

The filter inside the cabinet should be located near to the input power source. The length of the power cables should be as short as possible.

2. Too close the input and output cables of the EMI filter

The distance between input and output cables of the filter should be as far apart as possible. Otherwise the high-frequency noise may be coupled between the cables and bypass the filter. Thus, the filter will become ineffective.

3. Bad earthing of the EMI filter

The EMI filter's enclosure must be earthed properly to the metal case of the inverter. In order to achieve better earthing effect, make use of a special earthing terminal on the filter's enclosure. If you use one cable to connect the filter to the case, the earthing is useless for high frequency interference. When the frequency is high, so is the impedance of cable, hence there is little bypass effect.

The correct installation: The filter should be mounted on the enclosure of equipment. Ensure to clear away the insulation paint between the filter case and the enclosure for good earthing contact.

4.5.6 Conduction, Radiation and Radio Frequency Interference Countermeasures

EMI of the inverter

The inverter's operating theory means that some EMI is unavoidable. The inverter is usually installed in a metal cabinet which normally little affects the instruments outside the metal cabinet. The cables are the main EMI source. If connect the cables according to this manual, the EMI can be suppressed effectively.

If the inverter and other control equipment are installed in one cabinet, the area rule must be observed. Pay attention to the isolation between different areas, cable layout and shielding.

Reducing conducted interference

Please add a noise filter to suppress conducted interference on the output side. Additionally, conducted interference can be efficiently reduced by threading all the output cables through a grounded metal tube. And conducted interference can be dramatically decreased when the distance between the output cables and the signal cables is above 0.3m.

RF interference clearing

The I/O cables and the inverter produce radio frequency interference. A noise filter can be installed both on the input side and output side, and shield them with iron utensil to reduce RF interference. The wiring distance between the inverter and the motor should be as short as possible shown in Figure 4-29.

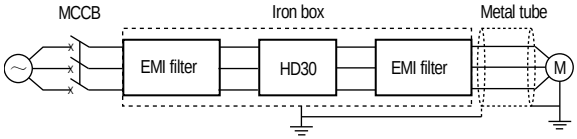


Figure 4-29 RF interference clearing

4.5.7 Input and Output Reactor

AC input reactor

The purpose of installing an AC input reactor is: to increase the input power factor; to dramatically reduce the harmonics on the input side at the high voltage point of common coupling and prevent input current unbalance which can be caused by the phase-to-phase unbalance of the power supply. An AC line reactor which will help to protect the input rectifiers also reduces external line voltage spikes (for example the lightning!).

DC reactor

The installation of a DC reactor can increase the input power factor, improve the inverter's overall efficiency and thermal stability, substantially eliminate the upper harmonics influence on the inverter's performance, and considerably decrease the conducted and radiated electromagnetic emissions from the inverter.

AC output reactor

Generally speaking, when the length of the cable between inverter and motor is more than 100m, it will cause leakage current and inverter tripping. It suggests that the user should consider installing an AC output reactor.

Chapter 5 Operation Instructions

Danger

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

Warning

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

5.1 Function Description

Note:

In the following sections, you may encounter control, running and status of the inverter description many times.

Please read this section carefully. It will help you to correctly understand and use the functions to be discussed.

5.1.1 Inverter Run Command Source

It defines the source from which the inverter receives run commands (START, RUN, STOP, JOG). There are three run command sources which can be selected through function parameter F00.11 and multi-function terminals:

Display panel: Via RUN, STOP and JOG keys to achieve run, stop and jog operation control.

Control terminal: Via control terminal to achieve start and stop operation control.

SCI communication port: Via SCI communication to achieve start and stop operation control.

5.1.2 Inverter Frequency Setting Source

The final setting frequency of the HD30 inverter results from many calculating (defined by F19.01) the value of 5 master setting sources (set by F00.10) and 6 auxiliary setting sources (set by F19.00).

Note:

The frequency will be set by master setting source if the auxiliary is the same as the master setting source.

Master setting frequency sources

0: Display panel digital setting, change the value by ▲and▼ keys. (Initial value is set by F00.13)

1: Terminal digital setting, change the value by terminals UP/DN. (Initial value is set by F00.13)

2: SCI communication digital setting. (Initial value is 0)

3: Analogue setting

4: Terminal pulse setting (F15.05 = 53)

Auxiliary setting frequency sources

0: No auxiliary frequency

1: Digital setting 1, change the value by ▲and▼ keys. (Initial value is set by F19.03)

2: Digital setting 2, change the values by terminals UP/DN. (Initial value is set by F19.03)

3: Digital setting 3, SCI communication direct setting. (Initial value is 0)

4: Analogue setting

5: Terminal pulse setting (F15.05 = 53)

6: Process PID output setting

5.1.3 Inverter Status

HD30 inverter has three running status: Stop, Run and Motor parameters auto-tuning.

Stop: After the inverter is switched on and initialized, if no run command inputs or the stop command is given, there is no output from U, V, W of the inverter. Therefore the RUN indicator will flash.

Run: The inverter starts output after it receives the run command. The RUN indicator is lighting.

Motor parameters auto-tuning: If the inverter receives the run command by the function parameter F08.06/F13.07 set as 1 or 2, the inverter will enter motor parameters auto-tuning status. Then enters stop status if the auto-tuning process is completed.

5.1.4 Inverter Operation Mode

HD30 inverter has six types of operating mode: Jog, Process PID adjustment, MS SPEED, Simple PLC, Wobble operation and Common operation.

Jog:

In the display panel control mode, after press JOG key, the inverter will be on the jog frequency operation. (It need set the parameters of F00.15, F03.15 and F03.16)

In the terminal control mode, after receive the Jog command from the multi-function terminal (No.20－No.25 functions), the inverter will be on the corresponding jog frequency operation. (It need set the parameters of F00.15, F03.15, F03.16 and F05.21)

Process PID adjustment:

If the process PID adjustment function is enabled (F04.00=1), the inverter will select the process PID adjustment operation mode, i.e. it will perform PID control according to the setting and feedback values (it need set function parameters of Group F04). This function can be disabled by a multi-function terminal (No.33 function) and switch to other operation modes.

MS SPEED:

To achieve MS SPEED operation, it should use the logic combination of the multi-function terminals (No.13－No. 16 function) and select multi-step frequency 1－15 (F06.00－F06.14).

Simple PLC:

If the simple PLC function is enabled (F06.15=1), the inverter will select PLC operating mode and will operate in the preset operating parameter mode (see explanation of Group F06). The simple PLC function can be disabled by a digital input multi-functional terminal (No. 30 function).

Wobble operation:

If the wobble operation is enabled (F07.00 = 1), the inverter will operate in the preset operating parameter mode (see explanation of Group F07) to implement wobble operation.

5.2 Operating Instructions

5.2.1 Display Panel Description

The standard HD30 inverter is installed with LED display panel, as shown in Figure 5-1.

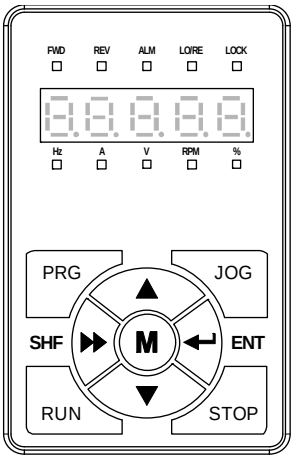


Figure 5-1 Display panel of standard HD30 inverter

There are keys on the display panel and their functions, as shown in Table 5-1.

Table 5-1 Key function description

Key	Name	Function
PRG	Program/exit key	Entry or exit programming key
JOG	Jog key	In the mode of display panel control, jog start the inverter
RUN	Run key	In the mode of display panel control, press this key to run the inverter
STOP	Stop/reset key	In the mode of display panel control, to stop the inverter and reset the fault
M	Multi-function key	Set certain function by F00.12
▲	Increment key	Increase value or parameter
▼	Decrement key	Decrease value or parameter
▶▶	SHF shift key	Selecting display parameter and shift bit
↵	ENT enter/confirm key	Enter lower menu or confirm saving the data

The display panel of the HD30 inverter consists of 5 status indicators and 5 unit indicators. The indicators and their display status meanings are as shown in Table 5-2.

Table 5-2 Indicator description of the display panel

Mark	Name	Description
FWD	Forward status indicator	Lighting: Indicate the inverter is forward running at the moment Flashing: Indicate the start of the inverter is forward running next time
REV	Reverse status indicator	Lighting: Indicate the inverter is reverse running at the moment Flashing: Indicate the start of the inverter is reverse running next time
ALM	Alarm status indicator	Lighting: Indicate the inverter is faulty at the moment Lightless: Indicate the inverter is well at the moment
LO/RE	Remote/local status indicator	Lighting: Indicate the inverter isn't in display panel control mode Lightless: Indicate the inverter is in display panel control mode
LOCK	Password locked status indicator	Lighting: Indicate the user password lock of the inverter is avail Lightless: Indicate there is no user password or unlocked
Hz	Frequency unit indicator	Lighting: The unit of the present function parameter or status display parameter is Hz Flashing: Output frequency status display at the stop or run situation Lightless: The unit of the present function parameter or status display parameter is not Hz
A	Current unit indicator	Lighting: The unit of the present function parameter or status display parameter is A Lightless: The unit of the present function parameter or status display parameter is not A
V	Voltage unit indicator	Lighting: The unit of the current function parameter or status display parameter is V Lightless: The unit of the current function parameter or status display parameter is not V
RPM	Rotary speed unit indicator	Lighting: The unit of the present function parameter or status is rpm Flashing: Running rotatry speed status display at the stop or run situation Lightless: The unit of the present function parameter or status display parameter is not rpm
%	% unit indicator	Lighting: The unit of the present function parameter or status display parameter is % Lightless: The unit of the present function parameter or status display parameter is not %

The indicator has three statuses: Lightless, lighting, flashing statuses are shown as following:

☐ It means lightless indicator; ■ It means lighting indicator; ▩ It means flashing indicator.

The display panel of the HD30 inverter has five LED displays and their meanings are shown as 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		

5.2.2 Display Status

The display panel of the HD30 inverter can display the parameters at stopping, running, editing, alarming and special state.

Parameter displayed status at stopping

When the inverter stops operating, the display panel will display stopping status parameter and the unit indicator will display the parameter's unit, as shown in Figure 5-2. Other parameters can be displayed by pressing ▶▶(defined by parameter F18.08—F18.13).

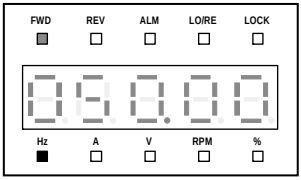


Figure 5-2 Display status of the display panel

Parameter displayed status at running

When the inverter is running, the display panel will display running status parameter and the unit indicator will display the parameter's unit, as well as the status indicator will display the inverter status, as shown in Figure 5-3.

Other parameters can be displayed by pressing ▶▶(defined by parameter F18.02－F18.07).

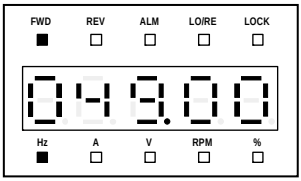


Figure 5-3 Display status of the display panel

Four-level menu switching operation

The display panel of the HD30 inverter uses four-level menu configuration for parameter setting or other operations.

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

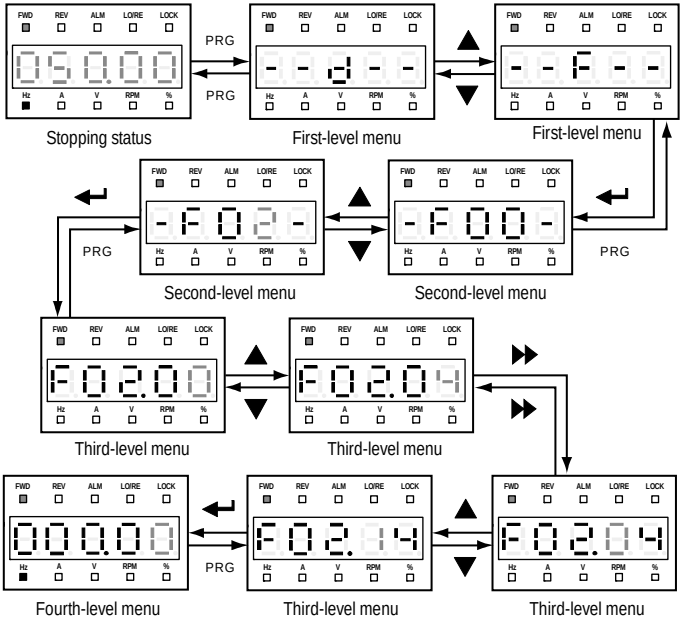


Figure 5-4 Four-level operation process

Table 5-4 Switching four-level description of the key

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

Function parameter editing status

At stop, run or fault alarm status, press PRG to enter function parameter editing status (see the description of parameter F01.00 and the user password unlock and modify of section 5.2.3), as shown in Figure 5-5.

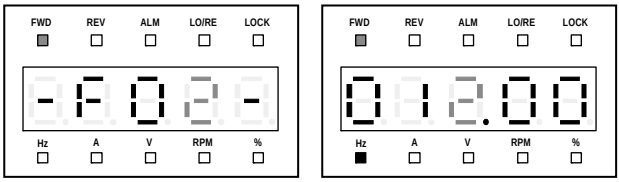


Figure 5-5 Parameter editing status

Fault alarm status

If the inverter detects a fault signal, the display panel will enter the fault alarm status and flashing display the fault code, as shown in Figure 5-6.

You can enter Group F20 (F20.21—F20.37) to check the fault history.

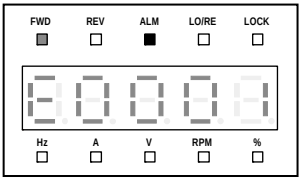


Figure 5-6 Fault alarm status

The inverter can be reset by pressing STOP key, or by sending the reset commands via the control terminal or communication reset port.

Special display status

The special display status includes the setting and unlocked password status, upload and download parameter, power on initialization, parameter auto-tuning, display panel self-check and restored factory settings, as shown in Figure 5-7.

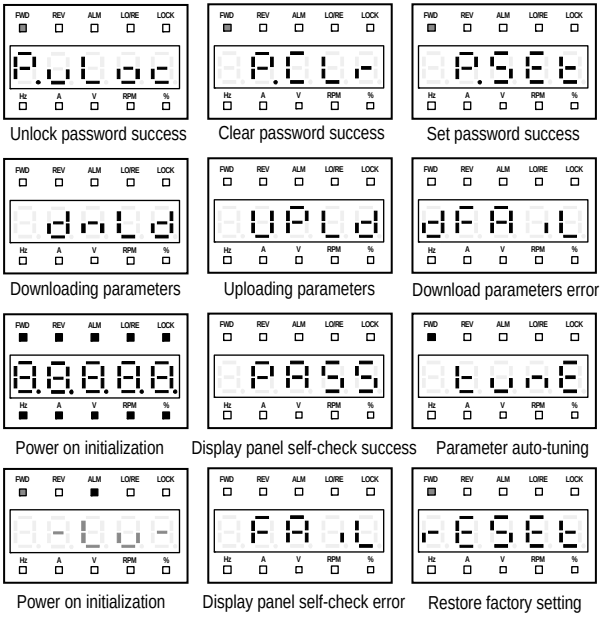


Figure 5-7 Special display status

5.2.3 Display Panel Operation Examples

Function parameter setting

For example: To modify the setting value of the function parameter F02.14 from 000.00Hz to 012.00Hz, as shown in Figure 5-8.

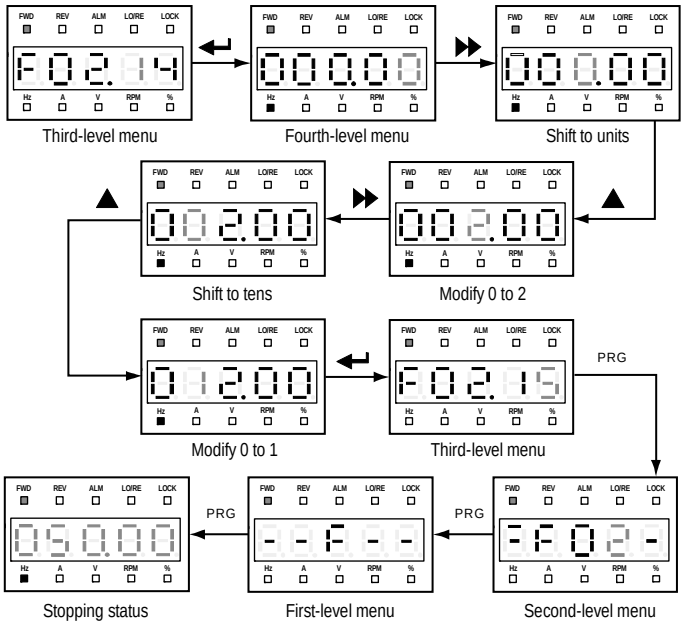


Figure 5-8 Function parameter setting

In the setting fourth-level menu situation, if the parameter is not flashing, it indicates that this parameter can't be modified. The possible reasons are as follows:

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

Switching display parameters at stop status

There are six stop parameters(F18.08－F18.13) of the HD30 inverter. For example, set the parameter to be default value and the Figure 5-9 describes the operation of displaying parameters.

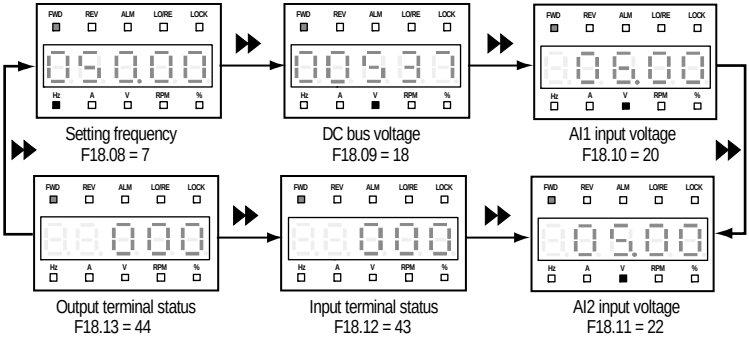


Figure 5-9 Switching display parameters at stop status

Unlock user's password

When user set F01.00 to non-zero value, by pressing the PRG key to exit to stop/run display status or by detecting that there is no press on the display panel within 5 minutes, the user's password will be valid. The LOCK status indicator of the display panel is lighting at the moment.

The operation of the unlock user's password is as shown in Figure 5-10 which takes 4 as the user's password.

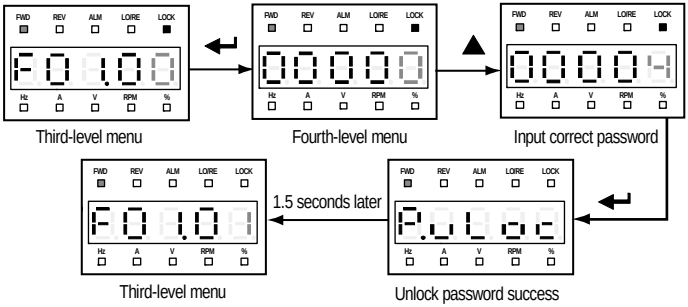


Figure 5-10 Operation of unlocking user's password

5

Modify user's password

If no password, directly modify the value of F01.00 according to Figure 5-11. Otherwise, you should unlock the password according to Figure 5-10. When it successfully displays "F01.01", you can set a new password according to Figure 5-11 which takes"02004" as the new password.

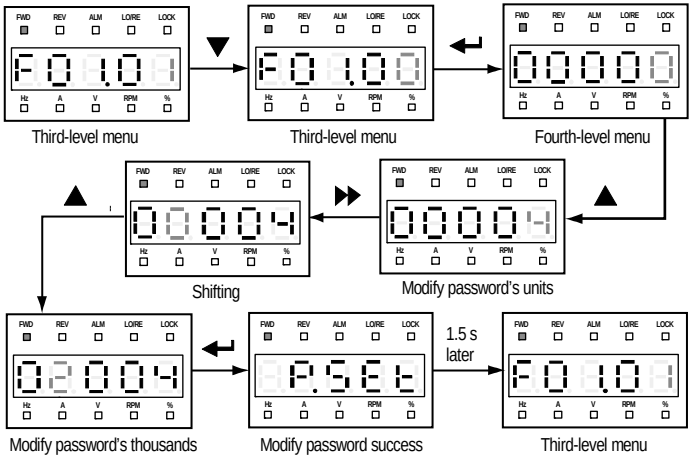


Figure 5-11 Operation of modifying user's password

Clear user's password

If there is password, you should unlock according to Figure 5-10. When it successfully displays "F01.01", you can clear the user's password according to Figure 5-12.

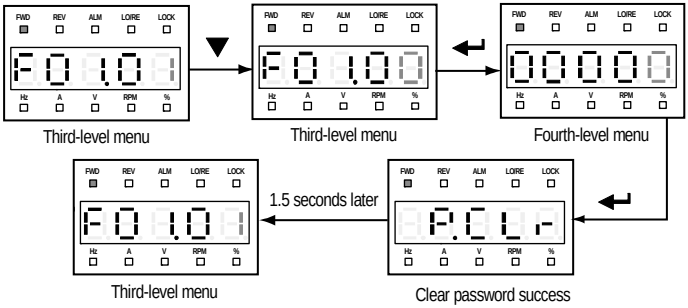


Figure 5-12 Operation of clearing user's password

Display panel self-test

The display panel of the HD30 series Inverters has self-test function which facilitates periodic inspection for itself and keys.

I the self-checking function can be enabled by pressing ▶▶ and ↵ simultaneously.

The process of the display panel self-test:

1. In stop status, press ▶▶ and ↵ simultaneously for 2—3 seconds, the 5-bit LED will cyclically display "8." from left to right in turn for three times which is as shown in Figure 5-13.

Later, the indicator will be cyclically bit by bit clockwise lighting from the first upper left for three times.

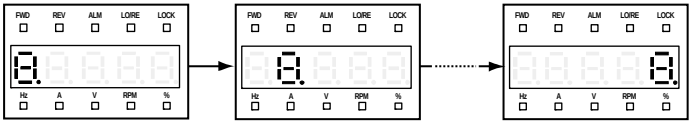


Figure 5-13 Starting display of the display panel self-checking

2. Press any key of the display panel and watch the LED and the status indicators to detect the corresponding key is valid. And the correct correspondence is as shown in Figure 5-14.

In this process, if there is no press within 4—5 seconds, it will directly jump to step 4. If the self-test makes it, it will jump to step 3.

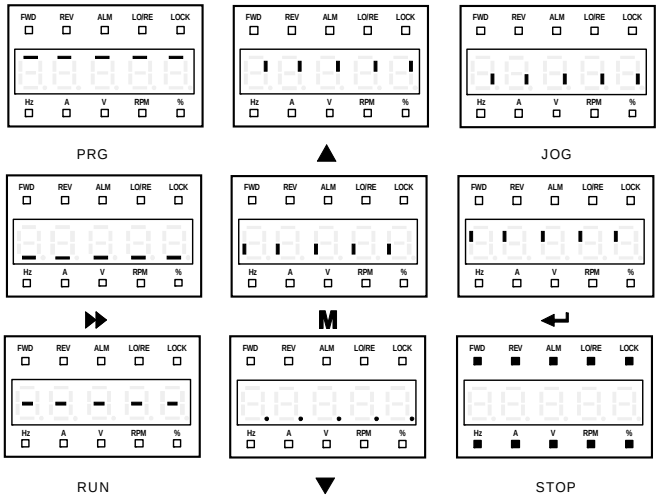


Figure 5-14 Correct correspondence of the keys and the displays

3. If the self-test is success, the display panel will display "PASS" and all keys are valid. The "PASS" will auto-disappear 3—5 seconds later and back to display status before self-test.

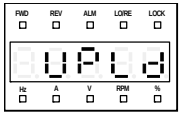
4. If the self-test is failure, the panel will display "FAiL". The "FAiL" will auto-disappear 3—5 seconds later and back to display status before self-test.

The reason may be: Exceed 5 seconds without a pressing key or invalid pressing keys.

Upload and download parameters

Upload:

When set the function parameter F01.03 = 1/2 (upload the setting value of current function code to the display panel EEPROM storage parameter 1/2), the display panel will display "UPLd". When the upload is finished, the display panel will jump to display next function code F01.00.

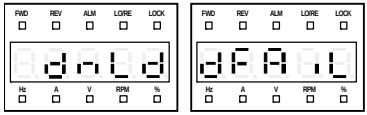


Uploading parameters

Figure 5-15 Display uploading parameter

Download:

When set the function parameter F01.02 = 2/3(download the display panel EEPROM storage parameter 1/2 to the setting value of current function code) or F01.02=5/6 (downloaded functional parameter includes the motor parameter), the display panel will display "dnLd". When the download is finished, the display panel will jump to display next function code F01.03.



Downloading parameters Download parameters error

Figure 5-16 Display downloading parameter

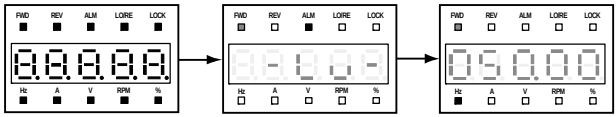
Note:

1. When downloading parameters, it displays "dFAiL" which represents that the EEPROM storage parameters of display panel and the function parameters of current inverter do not match. First, you need upload the setting value of the correct function code to the EEPROM of display panel, and then you can download.
2. When upload or download parameters, the display panel is flashing to display "E0022" which represents that the EEPROM of display panel is fault. It will jump to next function code for 10 seconds later. The troubleshooting is in Chapter 7 (Page 123).

5.3 Initial Power On

It need carefully check before power is on. Please wire the inverter according to specifications supplied by this manual.

After checking the wiring and mains supply voltage, switch on the circuit breaker and the inverter will be initialization. The display panel will display as shown in Figure 5-17.



Firstly displaying initialization Then displaying Finish inverter initialization

Figure 5-17 Display initialing display panel

Chapter 6 Function Introduction

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

Display Parameters:

General Function Parameters:

User Setting Parameters:

Manufacturer Function Parameters (on page122)

6.1 Group d: Display Parameters

Group d is status display parameters. The users can directly check the status parameters by checking the function code of Group d.

6.1.1 Group d00 Status Display Parameters

No.	Name Description	Range【factory setting】
d00.00	**Series of the inverter**	**【Actual value】**
	Display the series of the inverter.	
d00.01	**Software version of the control board**	**【Actual value】**
	Display the software version of the control board.	
d00.02	**Reserved**	
d00.03	**Special software version of the control board**	**【Actual value】**
	Display the special software version of the control board.	
d00.04	**Reserved**	
d00.05	**Software version of the display panel**	**【Actual value】**
	Display the software version of the display panel.	
d00.06	**Customized series No.**	**【Actual value】**
	Display the customized series No.	
d00.07	**Motor and control mode**	**【Actual value】**
	Display the current motor and the control mode. **Units: Display the current driving motor** • 0: Motor 1. • 1: Motor 2. **Tens: Control mode** • 0: V/f contorl without PG. • 1: Reserved. • 2: Vector control without PG.	
d00.08	**Rated current of the inverter**	**【Actual value】**
	Display the rated current of the inverter.	
d00.09	**Extension function of the inverter**	**【Actual value】**
	Display the extension function of the inverter. 0: Standard inverter.	

<table>
<tr><th>No.</th><th>Name Description</th><th>Range【factory setting】</th></tr>
<tr><td>d00.10</td><td>Inverter status</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display the inverter status, as shown in the following table:
<table>
<tr><th></th><th>Bit3</th><th>Bit2</th><th>Bit1</th><th>Bit0</th></tr>
<tr><td>Units</td><td>Zero speed running
0: In non-zero speed runing
1: In zero speed running</td><td>Forward/reverse
0: Forward
1: Reverse</td><td>Run/stop
0: Stop
1: Run</td><td>Inverter fault
0: No fault
1: Fault</td></tr>
<tr><td>Tens</td><td>DC braking
0: Non-DC braking status
1: In DC braking</td><td>Reserved</td><td colspan="2">Bit1&Bit0: Acceleration/deceleration/constant
00: Constant 01: Acceleration
11: Constant 10: Deceleration</td></tr>
<tr><td>Hundreds</td><td>Reserved</td><td>Speed limiting value
0: Not in the limiting
1: In the limiting</td><td>Reserved</td><td>Parameter auto-tuning
0: No auto-tuning
1: Auto-tuning</td></tr>
<tr><td>Thousands</td><td>Reserved</td><td>Reserved</td><td>Current limiting
0: In
1: Not in</td><td>Stall overvoltage
0: In
1: Not in</td></tr>
</table></td></tr>
<tr><td>d00.11</td><td>Master setting frequency source</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display the master setting frequency source, see parameter F00.10.</td></tr>
<tr><td>d00.12</td><td>Master setting frequency</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display the master setting frequency.</td></tr>
<tr><td>d00.13</td><td>Auxiliary setting frequency</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display the auxiliary setting frequency.</td></tr>
<tr><td>d00.14</td><td>Setting frequency</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display the target setting frequency.</td></tr>
<tr><td>d00.15</td><td>Reference frequency (after acceleration/deceleration)</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display the reference frequency for the change of the acceleration/deceleration.</td></tr>
<tr><td>d00.16</td><td>Output frequency</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display the output frequency.</td></tr>
<tr><td>d00.17</td><td>Setting RPM</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display the setting RPM.</td></tr>
<tr><td>d00.18</td><td>Running RPM</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display the running RPM.</td></tr>
<tr><td>d00.19</td><td>Three-phase power supply input sequence phase</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display the 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).</td></tr>
</table>

No.	Name Description	Range【factory setting】
d00.20	**Output voltage**	【Actual value】
	Display output voltage.	
d00.21	**Output current**	【Actual value】
	Display output current.	
d00.22	**Reserved**	
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 the present actual output power whose unit is 0.1kW.	
d00.25	**DC bus voltage**	【Actual value】
	Display DC bus voltage.	
d00.26	**Potentiometer input voltage of the display panel**	【Actual value】
	Display potentiometer input voltage of the display panel.	
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 disposed by the gain, bias, analogue curve and filter.	
d00.29	**AI2 input voltage**	【Actual value】
	Display AI2 input voltage. When AI2 selects current input, the corresponding relations are: 0V corresponds to 0mA and 10.00V corresponds to 20mA.	
d00.30	**AI2 input voltage (after disposal)**	【Actual value】
	Display A2 input voltage which is disposed by the gain, bias, analogue curve and filter.	
d00.31	**AI3 input voltage**	【Actual value】
	Display AI3 input voltage. • Selecting HD30-EIO, the AI3 corresponds to the AI3 of HD30-EIO. When AI3 selects current input, the corresponding relations are: 0V corresponds to 0mA and 10.00V corresponds to 20mA. • Selecting HD30-PIO, the AI3 corresponds to the channel one of HD30-PIO. When the channel one selects current input, the corresponding relations are: 0V corresponds to 0A and 24.00V corresponds to 1A.	
d00.32	**AI3 input voltage (after disposal)**	【Actual value】
	Display A3 input voltage which is disposed by the gain, bias, analogue curve and filter.	
d00.33	**AI4 input voltage**	【Actual value】
	Display AI4 input voltage. • Selecting HD30-EIO, the AI4 corresponds to the AI4 of HD30-EIO.When AI4 selects current input, the corresponding relations are: 0V corresponds to 0mA and 10.00V corresponds to 20mA. • Selecting HD30-PIO, the AI4 corresponds to the channel two of HD30-PIO. When the channel two selects current input, the corresponding relations are: 0V corresponds to 0A and 24.00V corresponds to 1A.	
d00.34	**AI4 input voltage (after disposal)**	【Actual value】
	Display A4 input voltage which is disposed by the gain, bias, analogue curve and filter.	
d00.35	**DI6 terminal pulse input frequency**	【Actual value】
	Display DI6 terminal pulse input frequency(Hz).	

<table>
<tr><th>No.</th><th>Name Description</th><th>Range【factory setting】</th></tr>
<tr><td>d00.36</td><td>AO1 output</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display AO1 output. When AO1 selects current output, the corresponding relations are: 0V corresponds to 0mA and 10.00V corresponds to 20mA.</td></tr>
<tr><td>d00.37</td><td>AO2 output</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display AO2 output. When AO2 selects current output, the corresponding relations are: 0V corresponds to 0mA and 10.00V corresponds to 20mA.</td></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>Setting line speed</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display the setting line speed.</td></tr>
<tr><td>d00.41</td><td>Reference line speed</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display the reference line speed.</td></tr>
<tr><td>d00.42</td><td>Reserved</td><td></td></tr>
<tr><td>d00.43</td><td>Reserved</td><td></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 process 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></td><td colspan="2">Display external counting 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 function parameter stands for different physical sources which are in the below table.
• 0: The multi-function input terminals are disconnected with corresponding common terminals.
• 1: The multi-function input terminals are connected with corresponding common terminals.
<table>
<tr><th colspan="4">Hundreds</th><th colspan="4">Tens</th><th colspan="4">Units</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>-</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>
Note: Only when using HD30-EIO will the DI7 – DI9 be enabled.</td></tr>
</table>

6

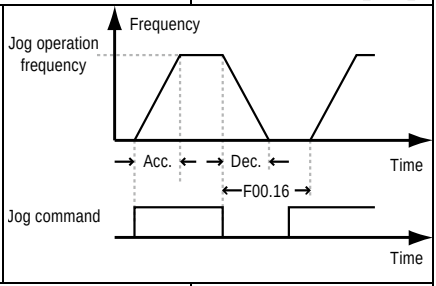
<table>
<tr><th>No.</th><th>Name Description</th><th>Range【factory setting】</th></tr>
<tr><td>d00.51</td><td>Output terminal status</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display output terminal status. Each bit(binary) of this function parameter stands for different physical sources which are in the below table.
• 0: The multi-function output terminals are disconnected with corresponding common terminals.
• 1: The multi-function output terminals are connected with corresponding common terminals.
<table>
<tr><th colspan="4">Tens</th><th colspan="4">Units</th></tr>
<tr><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td>-</td><td>-</td><td>RLY4</td><td>RLY3</td><td>RLY2</td><td>RLY1</td><td>DO2</td><td>DO1</td></tr>
</table>
Note: Only when using HD30-EIO will the RLY2 − RLY4 be enabled.</td></tr>
<tr><td>d00.52</td><td>MODBUS communication status</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display MODBUS communication status.
0: Normal.
1: Communication timeout.
2: Incorrect data frame head.
3: Incorrect data frame checking.
4: Incorrect data frame content.</td></tr>
<tr><td>d00.53</td><td>Actual length</td><td>【Actual value】</td></tr>
<tr><td>d00.54</td><td>Total length</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">d00.53 displays actual length; d00.54 displays total length.</td></tr>
<tr><td>d00.55</td><td>Total time at power-on</td><td>【Actual value】</td></tr>
<tr><td>d00.56</td><td>Total time at operation</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">d00.55 display total time at power-on; d00.56 displays total time at operation. The unit is hour.</td></tr>
<tr><td>d00.57</td><td>High bit of motor total energy consumption</td><td>【Actual value】</td></tr>
<tr><td>d00.58</td><td>Low bit of motor total energy consumption</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display the high bit (d00.57) and the low bit (d00.58) of the motor total energy consumption.</td></tr>
<tr><td>d00.59</td><td>High bit of energy consumption at this time running</td><td>【Actual value】</td></tr>
<tr><td>d00.60</td><td>Low bit of energy consumption at this time running</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display the high bit (d00.59) and the low bit (d00.60) of energy consumption at this time running.</td></tr>
<tr><td>d00.61</td><td>Present fault</td><td>【Actual value】</td></tr>
<tr><td></td><td colspan="2">Display the present fault.
• Displaying 100 means the undervoltage.</td></tr>
</table>

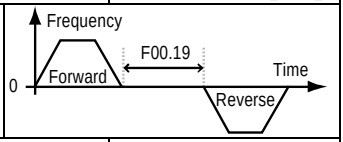
6.2 Group F: General Function Parameters

6.2.1 Group F00 Basic Parameters

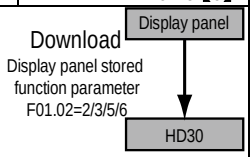
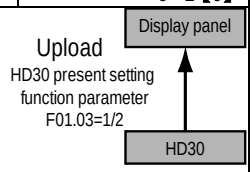
No.	Name Description	Range【factory setting】
F00.00	**Reserved**	
F00.01	**Motor 1 control mode selection**	**0—2【0】**
	0: V/f control without PG. Constant voltage/frequency ratio control. • It is specially applicable for occasions when one inverter drives more than one motors to achieve proper efficiency. • When select V/f control, please properly set the V/f control parameter of Group F09 or Group F13 to achieve proper efficiency. 1: Reserved. 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 and properly set Group F10 parameters, so as to achieve excellent vector control efficiency.	
F00.02	**Inverter type setting**	**0,1【0】**
	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	**HD30 general extension option selection**	**0—3【0】**
	0: Option is invalid. 1: HD30-EIO is valid. 2: Reserved. 3: HD30-PIO is valid. **Note: The extension function can be used with the corresponding option.**	
F00.05	**HD30 extension application function**	**0,1【0】**
	0: No extension application.	
F00.06	**Inverter maximum output frequency**	**50.00—400.00【50.00Hz】**
	It defines the highest frequency that the inverter is allowed to output. • It should be careful to set reasonable parameters according to the nameplate of the motor and the actual operating conditions.	
F00.07	**Upper limit of operation frequency setting source**	**0—2【0】**
	It defines the highest frequency that the user is set to operate, and select different setting sources to set the upper limit frequency by F00.07. 0: Digital setting. Set the upper limit frequency by F00.08. 1: Analogue input AI setting. See Group F16. 2: Terminal pulse setting. F16.17 sets the max. pulse input frequency according to F00.06 (inverter max. output frequency).	

No.	Name Description	Range【factory setting】
F00.08	**Upper limit of operation frequency**	**0.00—F00.06【50.00Hz】**
	When 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 is bigger than the zero frequency threshold (F19.10) but smaller than F00.09, it will operate at lower limit frequency. • Please properly set the parameters according to the nameplate of the motor and actual operating conditions. • No limitation on the motor parameter auto-tuning function. • Besides the lower and upper limit of frequency, the inverter's running frequency is also limited by the parameter settings of start/stop DWELL frequency (F02.02, F02.14), zero frequency threshold (F19.10), stop DC braking starting frequency (F02.16) and skip frequency (F05.17, F05.18, F05.19) etc.	
F00.10	**Frequency setting sources selection**	**0—4【0】**
	0: Display panel digital setting. Change the value by pressing the ▲ or ▼ key of the display panel. 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. • The specification of input pulse signal: voltage range: 15—30V; frequency range: 0—50.0kHz. • Refered to Group F05 for the corresponding relationship between the pulse terminal frequency and the inverter's running frequency 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 (multi-function terminal is set to 2), REV (multi-function terminal is set to 3), JOGF1 (multi-function terminal is set to 20), JOGR1 (multi-function terminal is set to 21), JOGF2 (multi-function terminal is set to 22), JOGR2 (multi-function 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.	
F00.12	**Function selection of the multi-function key**	**0—2【2】**
	0: Switch the display panel running direction. Switch the display panel running direction by M key. • When F00.11 = 0, it is valid. Do not save when power is off. 1: Switch local and remote control. Switch the local and remote control by M key. • When F00.11 = 0 or 1, it is valid. 2: The multi-function key is invalid.	
F00.13	**Starting frequency digital setting**	**0.00—upper limit【50.00Hz】**
	When F00.10 = 0 or 1, F00.13 start to set the initial frequency value.	

No.	Name Description	Range【factory setting】
F00.14	**UP/DOWN digital setting control**	**000—111【1001】**
	Only when F00.11 = 0 or 1 will it be valid. • The current setting frequency value will be replaced by a new one when the value of the F00.13 has be changed by the parameter setting. **Units: Frequency setting save selection at power outage** • 0: Frequency setting will not be saved at power outage. • 1: Frequency setting will be saved to F00.13 at power outage. **Tens: Frequency setting control selection at stop** • 0: Frequency setting will not be restored to F00.13 at stop. • 1: Frequency setting will be restored to F00.13 at stop. **Hundreds: Communication setting frequency storage selection** • 0: Do not save when power is off. • 1: Save to F00.13 when power is off. **Thousands: Switch the frequency channel to the analogue selection** • 0: Do not save. • 1: Save the frequency set by display pane.	
F00.15	**Jog operation frequency digital setting 1**	**0.00—upper limit【5.00Hz】**
F00.16	**Interval of jog operation**	**0.0—100.0【0.0s】**
	After cancel the jog command, the inverter will not respond to the jog command at the interval of jog operation set by F00.16. • After the interval of jog is completed, it immediately execute the arrived jog command. As show in figure.	
F00.17	**Operation direction selection**	**0,1【0】**
	0: The same as run command. 1: Opposite to run command.	
F00.18	**Anti-reverse operation**	**0,1【0】**
	This function will be valid when F00.11 = 0,1,2. 0: Reverse operation is permitted. 1: Reverse operation is prohibitted. It can respond the forward/ reverse operation commands. When the analogue value is set to positive/negative voltage and the negative voltage corresponding to the reverse frequency, the inverter will run in accordance with the zero-frequency run.	

No.	Name Description	Range【factory setting】
F00.19	**Dead time of direction switch**	**0.0—3600.0【0.0s】**
	F00.19 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 display panel**	**0,1【0】**
	0: Enabled. When the inverter connects to two display panels, the keys of optional display using the communication port can be operated. 1: Invalid. When the inverter connects to two display panels, the keys of optional display using the communication port can not be operated.	
F00.21	**Dormant function selection**	**0,1【0】**
	0: Disabled. This function is invalid. 1: Enabled. At the running state, when the preset frequency ≤lower limit of operation frequency (F00.09), the inverter coasts to stop and go into dormant state.	
F00.22	**Dormancy wake up time**	**0.0—360.0【0.0s】**
	When the inverter is at the dormancy state, and the preset frequency ＞lower limit of operation frequency (F00.09), and the duration achieves the time of F00.22 setting, then the inverter wakes up from dormancy state, and start at the mode of F02.00 setting.	

6.2.2 Group F01 Protection of Parameters

No.	Name Description	Range【factory setting】
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, if you want to change any parameter you must input correct password. Otherwise, all the parameters cannot be changed but only read. • When input correct password, by pressing the PRG key to exit to stop/run display status or by detecting that there is no press on the display panel within 5 minutes, the user's password will be valid. It is necessary to input correct password if you want to change parameters. It will restart when there is no press on the display panel within 5 minutes. 00000: The factory setting of F01.00 is 00000, namely the password protection function is disabled. • If the user unlocks the password, it means clearing the user's password. • To unlock, change and clear the user's password, see section 5.2.3.	
F01.01	**Menu mode selection**	**00－11【10】**
	Units: 0: Full menu mode. All function parameters can be displayed in this menu. 1: Checking menu mode. Only different from factory setting parameters can be displayed. **Tens:** 0: Does not lock the parameter mapping relationship of Group U and Group F. 1: Lock the parameter mapping relationship of Group U and Group F.	
F01.02	**Function code parameter initialization (download)**	**0－6【0】**
	0: No operation. The inverter is in regular parameter read/write status. • Whether can change the parameter it depends on the user's password status and the actual operating conditions. 1: Restore to factory settings. • Except F01.00, F01.02, F01.03, Group F08, F13.01－F13.15, F19.15, F19.19, F19.24, F20.08, F20.09, F20.21－F20.37, F23.00 and Group y. • **Operation steps:** If set F01.02 = 1, press ↵ to ensure and the parameters are restored to factory settings. The display panel dispalys "rESEt". Then the display panel will display parameters in stop status after finish restoring to factory setting. 2: Download the display panel EEPROM parameter 1 to the current function code settings. 3: Download the display panel 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 display panel EEPROM parameter 1 to the current function code settings (including the motor parameters). 6: Download the display panel 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. The inverter is in regular parameter read/write status. 1: Upload the current function code settings to the display panel EEPROM parameter 1. 2: Upload the current function code settings to the display panel EEPROM parameter 2. **Note: F01.00, F01.02, F01.03, F20.21－F20.37 and Group y do not upload or download.**	

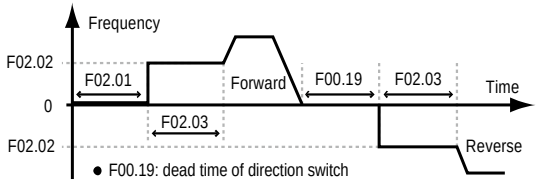
6

6.2.3 Group F02 Run/Stop Control Parameters

No.	Name Description	Range【factory setting】
F02.00	**Start mode selection**	0—2【0】

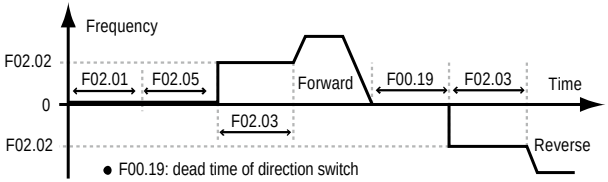
0: From the DWELL frequency to start.

- Refer to F02.02 and F02.03 parameters for the start DWELL frequency.
- The starting DWELL frequency (F02.02) still works during the process of direction switch, as following. F02.03 (starting DWELL frequency retention time) is enabled when reverse.



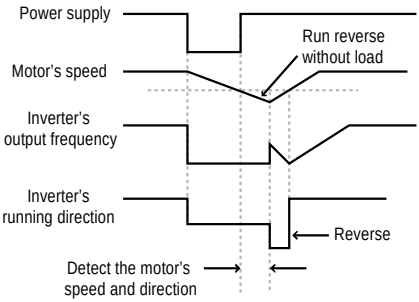
1: Brake first and then start from DWELL frequency.

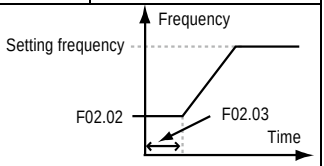
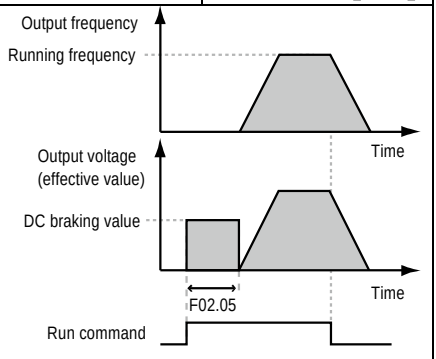
- Refer to F02.04 and F02.05 parameters for the DC braking.
- Starting DC braking is enabled only in the process from the stop status to running status. But it is disabled in the process of direction switch, as shown in the figure. There is no F02.05 (DC braking time) when reverse.

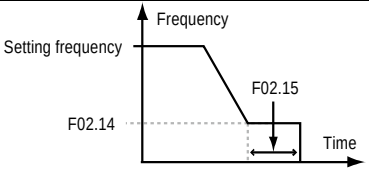


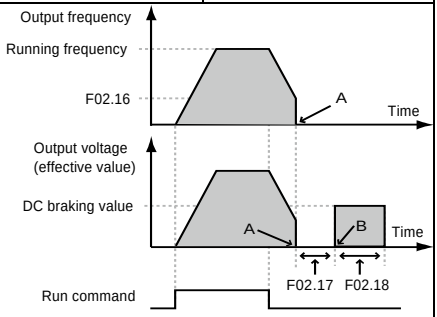
2: Start after speed tracking. If the result of speed tracking is smaller than F02.02, it will start from the starting DWELL frequency.

- 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.



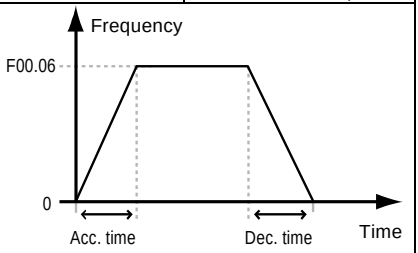
No.	Name Description	Range【factory setting】
F02.01	**Starting delay time**	**0.00—10.00【0.00s】**
	When the inverter receives the run command, it will wait for the delay time set by F02.01 and then start running.	
F02.02	**Start DWELL frequency setting**	**0.00—upper limit【0.00Hz】**
F02.03	**Retention time of starting DWELL frequency**	**0.00—10.00【0.00s】**
	F02.02 defines the DWELL frequency of the inverter at start. F02.03 is the retention time of starting DWELL frequeny (F02.02) refers to the hold time when the inverter in the starting process. • The start should be delayed according to F02.01 setting when the starting command is enabled. Then start according to F02.00 setting mode. • Only when F02.00 = 0 or 1 will F02.02 and F02.03 be enabled. • Set F02.02 or F02.03 as 0, the starting DWELL frequency is disabled.	
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	**Speed tracking mode selection**	**0,1【0】**
	0: Searching based on residual voltage. • The inverter injects certain frequency's voltage to the motor and starts speed searching according to F02.08 setting. 1: Searching based on current. • The inverter injects current to the motor according to F02.08 setting and starts speed searching according to F02.07 setting.	

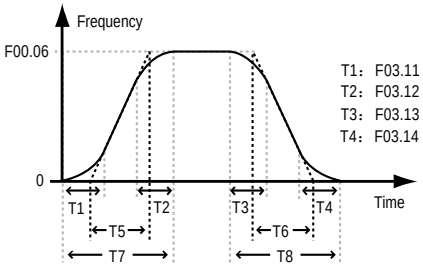
No.	Name Description	Range【factory setting】
F02.07	**Speed search mode based on current**	**0,1【1】**
	0: From the max. output frequency to start speed searching. 1: From the stopping frequency to start speed searching.	
F02.08	**Setting reference current for speed search**	**0—100(motor's rated current)【50%】**
	Set the motor injection current.	
F02.09	**Acc./Dec. time of the speed search**	**1.0—50.0【5.0s】**
	Frequency rate of decline follows the deceleration time at speed searching. F02.06 = 1 (speed searching based on current) is enabled.	
F02.10	**Waiting time of speed search**	**0.1—5.0【1.0s】**
	The start should wait for a time according to F02.10 setting when the starting command is enabled. Then start speed searching.	
F02.11	**V/f ratio of speed search**	**0.0—100.0【100.0%】**
	V/f ratio of speed search = F02.11 × motor's rated voltage / motor's rated frequency.	
F02.12	**Disposal time after speed search**	**0.01—5.00【1.00s】**
	Complete the establishment of the time from searching the frequency to output the voltage in speed search process.	
F02.13	**Stop mode selection**	**0—2【0】**
	0: Decelerate to stop. After the stop command is received, the inverter reduces its output frequency according to the deceleration 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: Decelerate to stop with DC braking. After the stop command is received, the inverter reduces its output frequency according to the deceleration 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 deceleration time.	
F02.14	**DWELL frequency setting at stop**	**0.00—upper limit【0.00Hz】**
F02.15	**Retention time of DWELL frequency at stop**	**0.00—10.00【0.00s】**
	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.	

<table>
<tr><th>No.</th><th>Name Description</th><th>Range【factory setting】</th></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—60.00【0.50s】</td></tr>
<tr><td></td><td colspan="2">F02.17 is the interval from A to B in the right figure during deceleration 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.
 

• A: running frequency reaches F02.16
B: start to apply DC braking value</td></tr>
<tr><td>F02.19</td><td>Jog control mode</td><td>0,1【0】</td></tr>
<tr><td></td><td colspan="2">0: The jog functions of start and stop mode etc are invalid.
1: The jog functions of start and stop mode etc are enabled.</td></tr>
</table>

6.2.4 Group F03 Acceleration/Deceleration Parameters

<table>
<tr><th>No.</th><th>Name Description</th><th>Range【factory setting】</th></tr>
<tr><td>F03.00</td><td colspan="2">Acceleration/Deceleration mode selection</td><td>0,1【0】</td></tr>
<tr><td></td><td colspan="2">0: Linear acceleration or deceleration. Output frequency increases or decreases according to the constant slope, as shown in figure.
 

1: S-curve acceleration or deceleration. Output frequency increases or decelerases according to the S-curve.
• Refer to F03.11－F03.14 about the corresponding parameters of S-curve.
 

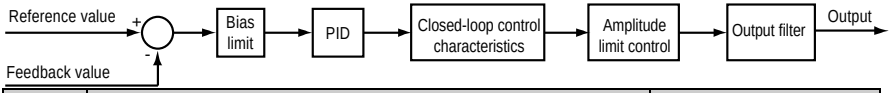
In the figure:
• T5 is the setting acceleration time.
• T6 is the setting deceleration time.
• T7 is the actual acceleration time.
• T8 is the actual deceleration time.</td></tr>
<tr><td>F03.01</td><td>Acceleration time 1</td><td rowspan="8">0.1－6000.0
【15kW and below inverter: 10.0s】
【18.5－55kW interter :30.0s】
【75kW and above inverter: 60.0s】</td></tr>
<tr><td>F03.02</td><td>Deceleration time 1</td></tr>
<tr><td>F03.03</td><td>Acceleration time 2</td></tr>
<tr><td>F03.04</td><td>Deceleration time 2</td></tr>
<tr><td>F03.05</td><td>Acceleration time 3</td></tr>
<tr><td>F03.06</td><td>Deceleration time 3</td></tr>
<tr><td>F03.07</td><td>Acceleration time 4</td></tr>
<tr><td>F03.08</td><td>Deceleration time 4</td></tr>
<tr><td></td><td colspan="2">Acceleration time is the time that the inverter's output frequency accelerates from 0 Hz to F00.06 (the max-output frequency) in the linear form.
Deceleration time is the time that the inverter's output frequency decelerates from F00.06 (the max-output frequency) to 0 Hz in the linear form.
• It can only choose one of the acceleration time or the deceleration time.
• Refer to the figure of parameter F03.00.</td></tr>
</table>

No.	Name Description	Range【factory setting】
F03.09	**Switching frequency of acceleration 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 acceleration time 2; Otherwise it will accelerate according to acceleration time 1. • When use terminals to select acceleration/deceleration time (set multi-function terminal as number 26 and 27 function), F03.09 is disabled.	
F03.10	**Switching frequency of deceleration time 2 and time 1**	**0.00—upper limit【0.00Hz】**
	When the running frequency is smaller than the F03.10 setting, it will decelerate according to deceleration time 2; Otherwise it will decelerate according to deceleration time 1. • When use terminals to select acceleration/deceleration time (set multi-function terminal as number 26 and 27 function), F03.10 is disabled.	
F03.11	**S-curve characteristic time at starting acceleration**	**0.00—2.50【0.20s】**
F03.12	**S-curve characteristic time at ending acceleration**	**0.00—2.50【0.20s】**
F03.13	**S-curve characteristic time at starting deceleration**	**0.00—2.50【0.20s】**
F03.14	**S-curve characteristic time at ending deceleration**	**0.00—2.50【0.20s】**
	Refer to the figure of parameter F03.00.	
F03.15	**Acceleration time of jog operation**	**0.1—6000.0【6.0s】**
F03.16	**Deceleration time of jog operation**	**0.1—6000.0【6.0s】**
	F03.15 and F03.16 define the acceleration/deceleration time of jog operation.	
F03.17	**Deceleration time of emergency stop**	**0.1—6000.0【10.0s】**
	It defines the deceleration time of emergency stop.	

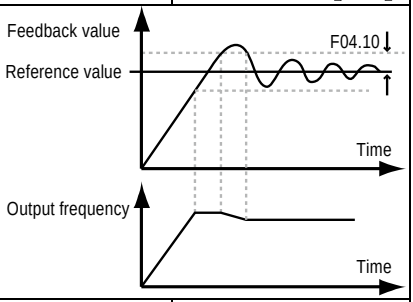
6.2.5 Group F04 Process PID Control

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.

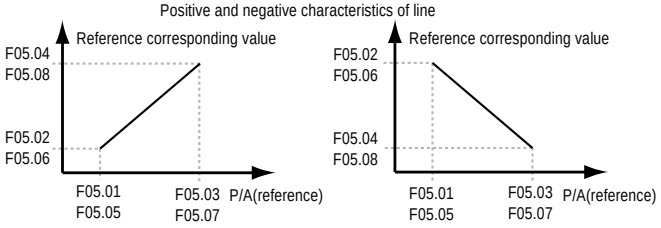
The maximum analogue input or maximum pulse input frequency (F16.17) corresponds to the maximum output frequency (F00.06). The process PID control is shown in the following figure:

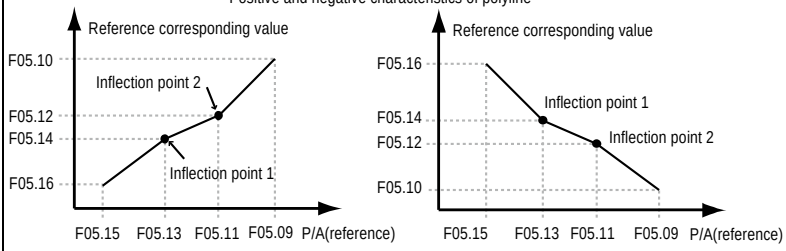
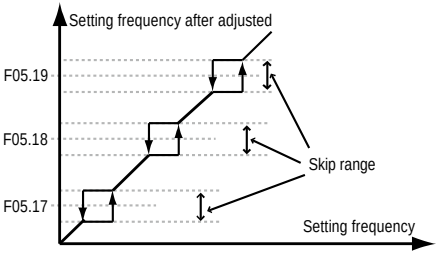


No.	Name Description	Range【factory setting】
F04.00	**Process PID control selection**	**0,1【0】**
	0: PID control is disabled. 1: PID control is enabled.	
F04.01	**Reference source selection**	**0—2【0】**
	0: Digital reference. It is the value of F04.03 reference. 1: AI analogue reference. It is the value 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 maximum input pulse frequency corresponding to 10V of the PID reference.	
F04.02	**Feedback source selection**	**0,1【0】**
	0: AI analogue feedback. 1: Terminal pulse feedback.	
F04.03	**Setting digital reference**	**-10.00—10.00/0.00—24.00【0.00V】**
	It defines the process PID regulator reference. When F04.01 = 0 (digital reference), it is enabled. • When F00.04 = 3 (HD30-PIO function enable), the setting range is 0.00—24.00V. • When F00.04 is set to other values (HD30-PIO function is disabled), the setting range is -10.00—10.00V.	
F04.04	**Proportional gain (P)**	**0.00—10.00【2.00】**
F04.05	**Integral time (I)**	**0.01—10.00【1.00s】**
F04.06	**Integral upper limit**	**0.00—upper limit【50.00】**
F04.07	**Differential time (D)**	**0.00—10.00【0.00s】**
F04.08	**Differential amplitude limit value**	**0.00—upper limit【20.00】**
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.	

No.	Name Description	Range【factory setting】
F04.10	**Bias limit**	**0.0—20.0 (reference) 【2.0%】**
	F04.10 defines the maximum 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. 	
F04.11	**PID regulator upper limit source selection**	**0—2【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.	
F04.12	**PID regulator lower limit source selection**	**0—2【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.	
F04.13	**PID regulator upper limit value**	**0.00—upper limit【50.00Hz】**
	It defines that the process PID regulator output digital setting value of upper limit.	
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 lower limit.	
F04.15	**PID regulator characteristic**	**0,1【0】**
	0: Positive. The motor RPM is required to increase with the increase of the reference. 1: Negative. The motor RPM is required to decrease with the increase of the reference.	
F04.16	**Integral regulation selection**	**0,1【0】**
	0: Stop integral regulation when the frequency reaches the upper or lower limit. 1: Continue the integral regulation when the frequency reaches the upper or lower limit. • It is recommended to disable the integral regulation when the frequency reaches the upper or lower limit on condition that fast response is needed.	
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.	

6.2.6 Group F05 External Reference Curve Parameters

No.	Name Description	Range【factory setting】
F05.00	**External reference curve selection**	**00000－22222【00000】**
	Units: AI1 characteristic curve selection. Tens: AI2 characteristic curve selection. Hundreds: AI3 characteristic curve selection. Thousands: AI4 characteristic curve selection. Ten thousands: Pulse input characteristic curve selection. Each bit setting: • 0: Line 1. • 1: Line 2. • 2: Polyline. **Note: Only when using HD30-EIO can hundreds and thousands be enabled.**	
F05.01	**Minimum reference of line 1**	**0.0－F05.03【0.0%】**
F05.02	**Minimum reference corresponding value of line 1**	**0.0－100.0【0.0%】**
F05.03	**Maximum reference of line 1**	**F05.01－100.0【100.0%】**
F05.04	**Maximum reference corresponding value of line 1**	**0.0－100.0【100.0%】**
F05.05	**Minimum reference of line 2**	**0.0－F05.07【0.0%】**
F05.06	**Minimum reference corresponding value of line 2**	**0.0－100.0【0.0%】**
F05.07	**Maximum reference of line 2**	**F05.05－100.0【100.0%】**
F05.08	**Maximum reference corresponding value of line 2**	**0.0－100.0【100.0%】**
F05.09	**Maximum reference of polyline**	**F05.11－100.0【100.0%】**
F05.10	**Maximum 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	**Minimum reference of polyline**	**0.0－F05.13【0.0%】**
F05.16	**Minimum reference corresponding value of polyline**	**0.0－100.0【0.0%】**
	F05.01－F05.04 define the line 1. F05.05－F05.08 define the line 2. F05.09－F05.16 define the polyline. • Line 1, line 2 and polyline can independently achieve positive and negative characteristics as shown in following figure. • If set the curve's minimum reference the same as maximum reference, it must be a line. The default frequency is the corresponding frequency of the curve minimum reference. Positive and negative characteristics of line  	

No.	Name Description	Range【factory setting】
	Positive and negative characteristics of polyline  **In the figure:** • P/A is terminal pulse/ analogue reference. • Pulse frequency P is 100% corresponding to F16.17 maximum input pulse frequency. • Analogue input value (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 the inverter's output frequency to avoid resonance with the load. • The inverter will skip the above frequencies as shown in figure. Up to 3 skip frequency ranges can be set.  • During the process of acceleration/ deceleration, the inverter will run with countinous frequency output, ignoring the skip frequency ranges. But the inverter 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.	

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6.2.7 Group F06 MS SPEED and Simple PLC

Simple PLC function enables the inverter to change its running frequency and direction automatically according to PLC parameter settings.

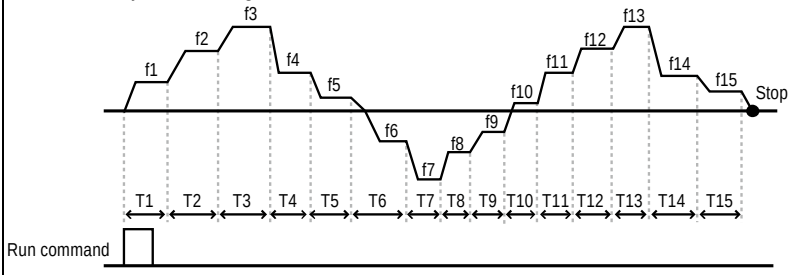
No.	Name Description	Range【factory setting】
F06.00	Multi-step frequency command 1	F00.09－upper limit【3.00Hz】
F06.01	Multi-step frequency command 2	F00.09－upper limit【6.00Hz】
F06.02	Multi-step frequency command 3	F00.09－upper limit【9.00Hz】
F06.03	Multi-step frequency command 4	F00.09－upper limit【12.00Hz】
F06.04	Multi-step frequency command 5	F00.09－upper limit【15.00Hz】
F06.05	Multi-step frequency command 6	F00.09－upper limit【18.00Hz】
F06.06	Multi-step frequency command 7	F00.09－upper limit【21.00Hz】
F06.07	Multi-step frequency command 8	F00.09－upper limit【24.00Hz】
F06.08	Multi-step frequency command 9	F00.09－upper limit【27.00Hz】
F06.09	Multi-step frequency command 10	F00.09－upper limit【30.00Hz】
F06.10	Multi-step frequency command 11	F00.09－upper limit【33.00Hz】
F06.11	Multi-step frequency command 12	F00.09－upper limit【36.00Hz】
F06.12	Multi-step frequency command 13	F00.09－upper limit【39.00Hz】
F06.13	Multi-step frequency command 14	F00.09－upper limit【42.00Hz】
F06.14	Multi-step frequency command 15	F00.09－upper limit【45.00Hz】
	They define the initial value of each step speed in multi-step speed mode and PLC operation mode.	
F06.15	Simple PLC control selection	0,1【0】
	0: No PLC operation. 1: Enabling PLC operation. It need reset the value of F06.16－F06.46 according to actual operation.	

No.	Name Description	Range【factory setting】
F06.16	**Simple PLC operation mode selection**	**0000—1122【0000】**

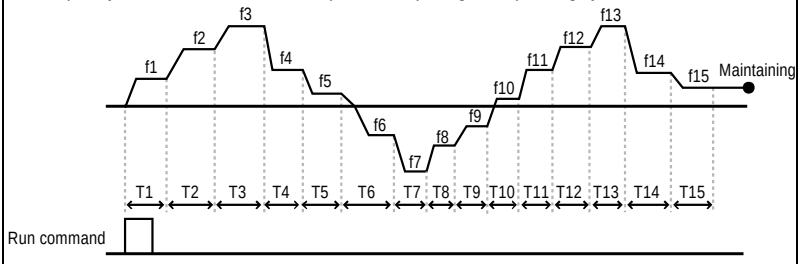
There are 4 parameter settings: units (0—2), tens (0—2), hundreds (0,1), thousands (0,1).

Units: PLC operation mode selection (taking 15-step PLC for example)

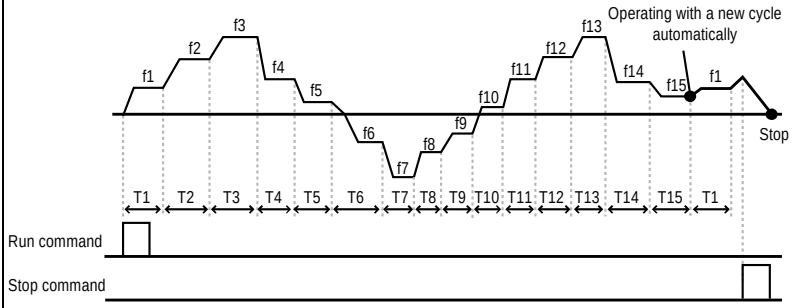
- 0: Stop after single cycle operation. The inverter stops automatically after one operating cycle. It will start only after receiving the run command next time.



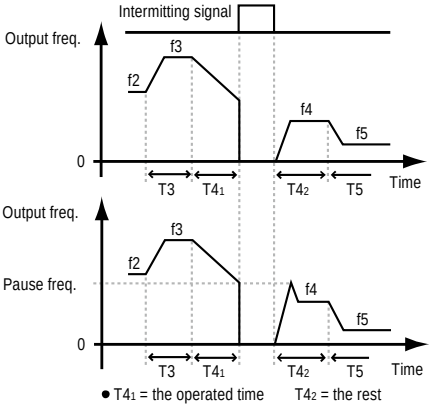
- 1: Maintain the final value after single cycle of PLC operation. The inverter will maintain the run frequency and direction of the last step after completing one operating cycle.



- 2: Cycle operation. The inverter will operate with a new cycle from Step 1 automatically after completing one operating cycle until receiving the stop command.



6

No.	Name Description	Range【factory setting】
	Tens: PLC operation restart mode selection after pause • 0: Start from step 1. • If the inverter stops during PLC operation due to the stop command, fault or power failure, the PLC operation will start from the Step 1 next time. • 1: Continue to operate from the step where the inverter pauses. • If the inverter stops during PLC operation due to the stop command or fault, it will record the uptime. • When it restarts, the inverter will continue operation from the step where it pauses as shown in figure. • 2: Continue to operate at the frequency when the inverter pauses.  • When the inverter stops during PLC operation due to the stop command or fault, it will record not only the operated time but also the current frequency. • It will continue to operate at the recorded frequency upon restart, as shown in figure. **Note: The difference between Mode 1 and Mode 2 is that Mode 2 also memorizes the running frequency when the inverter pauses, and the inverter will continue to operate at the frequency upon restart.** **Hundreds: Save the PLC status after power failure** • 0: Not save. The PLC running status will not be saved after power failure and start running from Step 1 next time. • 1: Save. The operating parameters of PLC operation, including the operating step, operating frequency and operating time of this step,etc, can be saved. The inverter will continue to operate in accordance with the PLC operation restart mode selection after pause (defined by tens of F06.16). **Thousands: time unit selection of the PLC step** • 0: Second (s). • 1: Minute (m).	
F06.17	**Setting of PLC step 1**	**000—321【000】**
F06.19	**Setting of PLC step 2**	**000—321【000】**
F06.21	**Setting of PLC step 3**	**000—321【000】**
F06.23	**Setting of PLC step 4**	**000—321【000】**
F06.25	**Setting of PLC step 5**	**000—321【000】**
F06.27	**Setting of PLC step 6**	**000—321【000】**
F06.29	**Setting of PLC step 7**	**000—321【000】**
F06.31	**Setting of PLC step 8**	**000—321【000】**
F06.33	**Setting of PLC step 9**	**000—321【000】**
F06.35	**Setting of PLC step 10**	**000—321【000】**
F06.37	**Setting of PLC step 11**	**000—321【000】**
F06.39	**Setting of PLC step 12**	**000—321【000】**
F06.41	**Setting of PLC step 13**	**000—321【000】**
F06.43	**Setting of PLC step 14**	**000—321【000】**

No.	Name Description	Range【factory setting】
F06.45	**Setting of PLC step 15**	**000—321【000】**

	F06.17, F06.19, F06.21, F06.23, F06.25, F06.27, F06.29, F06.31, F06.33, F06.35, F06.37, F06.39, F06.41, F06.43, F06.45 are used to configure the running frequency, the direction, acceleration and deceleration time of every PLC step.
	
	Units: PLC running frequency selection
	• 0: Multi- step frequency command. The absolute value of each step frequency is the same as the setting of multi-step frequency.
	  • Example: the absolute value of running frequency in PLC Step 15 is the setting value of F06.14.
	• 1: Depend on F00.10. The running frequency source selectes the reference by F00.10 selection.
	
	Tens: Operation direction selection of PLC at different steps
	• 0: Forward.
	• 1: Reverse.
	• 2: Depend on run command. The motor's operation direction can be alternated via external direction command.
	  • If the direction is not set, the inverter will run in the direction according to last step.
	
	Hundreds: Acceleration/deceleration time selection of PLC at different steps
	• 0: Acceleration/deceleration time 1.
	• 1: Acceleration/deceleration time 2.
	• 2: Acceleration/deceleration time 3.
	• 3: Acceleration/deceleration time 4.	

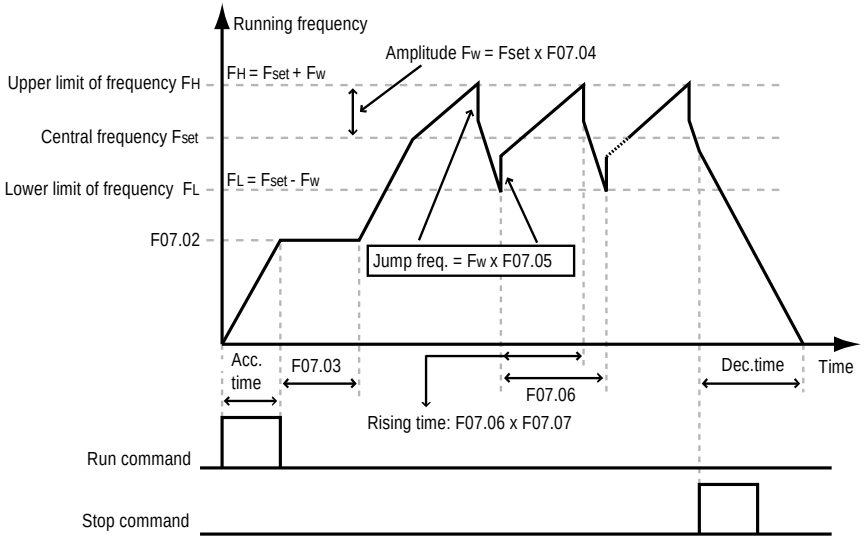
F06.18	**Running time of step 1**	**0.0—3276.7【5.0】**
F06.20	**Running time of step 2**	**0.0—3276.7【0.0】**
F06.22	**Running time of step 3**	**0.0—3276.7【0.0】**
F06.24	**Running time of step 4**	**0.0—3276.7【0.0】**
F06.26	**Running time of step 5**	**0.0—3276.7【0.0】**
F06.28	**Running time of step 6**	**0.0—3276.7【0.0】**
F06.30	**Running time of step 7**	**0.0—3276.7【0.0】**
F06.32	**Running time of step 8**	**0.0—3276.7【0.0】**
F06.34	**Running time of step 9**	**0.0—3276.7【0.0】**
F06.36	**Running time of step 10**	**0.0—3276.7【0.0】**
F06.38	**Running time of step 11**	**0.0—3276.7【0.0】**
F06.40	**Running time of step 12**	**0.0—3276.7【0.0】**
F06.42	**Running time of step 13**	**0.0—3276.7【0.0】**
F06.44	**Running time of step 14**	**0.0—3276.7【0.0】**
F06.46	**Running time of step 15**	**0.0—3276.7【0.0】**
	F06.18, F06.20, F06.22, F06.24, F06.26, F06.28, F06.30, F06.32, F06.34, F06.36, F06.38, F06.40, F06.42, F06.44, F06.46 define the running time of PLC at different steps. • When set the running time to 0 at some step, it means that the PLC function of this step is disabled.	

6.2.8 Group F07 Wobble Operation Parameters

The wobble operation process is shown as below:

First, the inverter accelerates to the preset frequency of wobble operation (F07.02) within the acceleration time and then waits for certain time (F07.03). Hinterher the inverter transits to the central frequency of the wobble operation as per the acceleration time, and ultimately start wobble operation according to the preset wobble amplitude (F07.04), jump frequency (F07.05), wobble cycle (F07.06) and the rise time of wobble operation (F07.07) until it receives a stop command and stops as per the deceleration time.

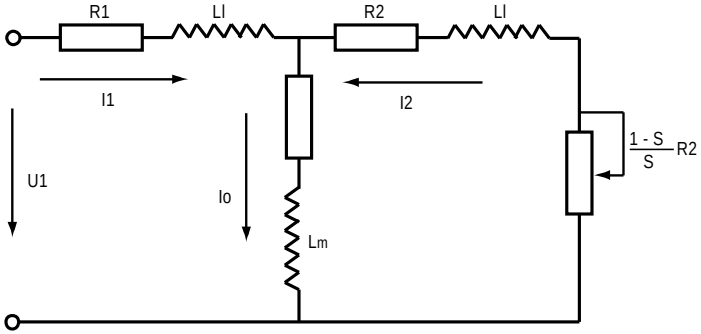
The process is shown in figure:



No.	Name Description	Range【factory setting】
F07.00	**Wobble operation selection**	**0,1【0】**
	0: Disabled. 1: Enabled.	

No.	Name Description	Range【factory setting】
F07.01	**Wobble operation mode**	**0000—1111【0000】**
	Units: Start mode of wobble operation. • 0: Auto start. The inverter will first operate at the preset frequency of wobble operation (F07.02) for certain time (F07.03), and then enter wobble mode automatically. • 1: Manual start. If the multi-function terminal is set as No.36 function (set as wobble start function) and the signal is enabled, the inverter will enter wobble mode. If the terminal is disabled, the inverter will end wobble operation and operate at the preset frequency of wobble operation (F07.02). **Tens: Wobble operation amplitude.** Refer to parameter F07.04. • 0: Relative to the wobble central frequency. • 1: Relative to the maximum output frequency. **Hundreds: Restart mode of wobble operation.** • 0: The inverter restarts the wobble operation as per the recorded frequency and direction when it stops last time. • 1: The inverter restarts the wobble operation from 0 Hz. **Thousands: Save the wobble operation parameters at power outage** • 0: Saved. When the hundreds of F07.01 is set as 0, the wobble operation parameters will be saved when power outage occurs. • 1: Not be saved.	
F07.02	**Preset wobble frequency**	**0.00—upper limit【0.00Hz】**
F07.03	**Holding time of preset wobble frequency**	**0.0—999.9【0.0s】**
	F07.02 defines the inverter's running frequency before entering wobble mode. F07.03 defines the time that the inverter operates at the preset wobble frequency. • Only when select auto start (set units of F07.01 as 0) will F07.03 be enabled.	
F07.04	**Wobble amplitude**	**0.0—50.0【0.0%】**
	Relative to central frequency: F_W = central frequency × F07.04. • Wobble central frequency is the frequency value set by F00.10 (frequency reference source). Relative to maximum output frequency: F_W = maximum output frequency F00.06 × F07.04.	
F07.05	**Jump frequency**	**0.0—F07.04【0.0%】**
	The setting is the percentage of wobble amplitude. There is not jump frquency if set as 0.	
F07.06	**Wobble operation cycle**	**0.1—999.9【10.0s】**
	F07.06 defines a complete cycle of wobble operation including rising and falling processes.	
F07.07	**Rising time of triangle wave**	**0.0—100.0【50.0%】**
	Relative to wobble operation cycle of the F07.06, F07.07 defines the rising and the falling time of wobble operation and their unit is s. • Rising time of wobble operation = F07.06 × F07.07. • Falling time of wobble operation = F07.06 × (1 - F07.07).	

6.2.9 Group F08 Asynchronous Motor 1 Parameters



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

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

The relationship between rated torque current, idling exciting current and motor's rated current is below:

$$\text{Rated torque current} = \text{F08.05} \times \text{F08.02}$$

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

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

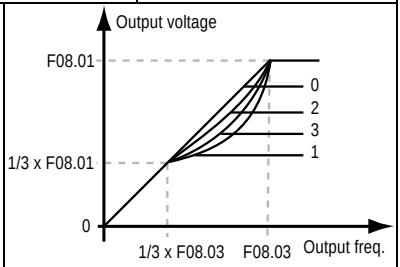
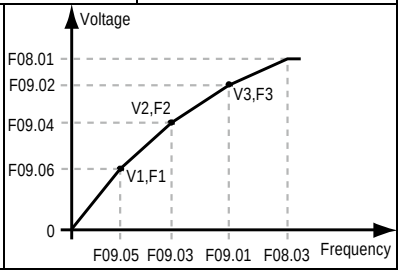
Note: Except F08.03, F08.04 and F08.06, the other factory settings are depended on the inverter's model.

No.	Name Description		Range【factory setting】
F08.00	Rated power of motor 1		0.2—500.0kW
F08.01	Rated voltage of motor 1		0—999V
F08.02	Rated current of motor 1	5.5kW above motor	0.1—999.9A
		5.5kW and below motor	0.01—99.99A
F08.03	Rated frequency of motor 1		1.0—400.0【50.0Hz】
F08.04	Rated RPM 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

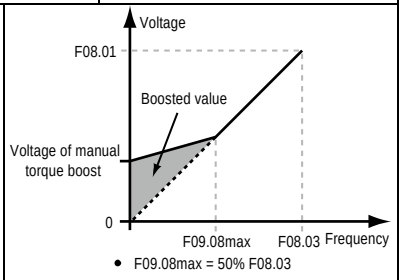
No.	Name Description		Range【factory setting】
F08.06	**Parameter auto-tuning of motor 1**		**0—2【0】**
	0: Auto-tuning is disabled. 1: Stationary auto-tuning. • In the process of stationary auto-tuning, the motor is at rest. The stator resistance, rotor resistance and leakage inductance will be measured 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 exciting 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, please press the STOP key to stop auto-tuning and then adjust the F09.15 (oscollation-suppression mode) and F09.16 (oscollation-suppression factor) suitably to mitigate the possible oscillation. **Note: The auto-tuning is enabled only in** display panel control mode (F00.11 = 0)**.** **Auto-tuning procedures:** 1. Input correctly the motor parameters as per its nameplate (F08.00－F08.04). 2. When F08.06 is set as 2, please set the proper acceleration time 1 (F03.01) and deceleration time 1 (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. At this time, the inverter displays the parameters of stop status and F08.06 resets to 0.		
F08.07	**Stator resistance of motor 1**	**5.5KW above motor**	**0.000—9.999Ω**
		5.5KW and below motor	**0.00—99.99Ω**
F08.08	**Rotor resistance of motor 1**	**5.5KW above motor**	**0.000—9.999Ω**
		5.5KW and below motor	**0.00—99.99Ω**
F08.09	**Leakage inductance of motor 1**	**5.5KW above motor**	**0.00—500.00mH**
		5.5KW and below motor	**0.0—5000.0mH**
F08.10	**Mutual inductance of motor 1**	**5.5KW above motor**	**0.00—500.00mH**
		5.5KW and below motor	**0.0—5000.0mH**
F08.11	**Idling exciting current of motor 1**	**5.5KW above motor**	**0.0—999.9A**
		5.5KW and below motor	**0.00—99.99A**
F08.12	**Reserved**		
F08.13	**Reserved**		
F08.14	**Reserved**		

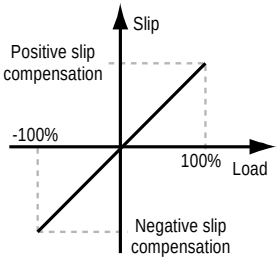
6

6.2.10 Group F09 V/f Control Parameters

No.	Name Description	Range【factory setting】
F09.00	**V/f curve selection of motor 1**	**0—4【0】**
	It defines flexible V/f setting modes so as to meet requirements of different load characteristics. • Four preset 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—F08.03【0.00Hz】**
F09.02	**V/f voltage value V3 of motor 1**	**F09.04—F08.01【0V】**
F09.03	**V/f frequency value F2 of motor 1**	**F09.05—F09.01【0.00Hz】**
F09.04	**V/f voltage value V2 of motor 1**	**F09.06—F09.02【0V】**
F09.05	**V/f frequency value F1 of motor 1**	**0.00—F09.03【0.00Hz】**
F09.06	**V/f voltage value V1 of motor 1**	**0—F09.04【0V】**
	F09.01—F09.06 is the 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 operation, set proper curve to meet the requirements of load characteristics.	

<table>
<tr><th>No.</th><th>Name Description</th><th>Range【factory setting】</th></tr>
<tr><td>F09.07</td><td>Torque boost of motor 1</td><td>0.0—30.0
【45kW and below inverter: 2.0%】
【55—132kW inverter: 1.0%】
【160kW and above inverter: 0.5%】</td></tr>
<tr><td>F09.08</td><td colspan="2">Cut-off point used for manual torque boost of motor 1
0.0—50.0（F08.03）【30.0%】</td></tr>
<tr><td></td><td colspan="2">In order to compensate the torque drop at low frequency, the inverter 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.
If F09.07 = 0, auto torque boost is enabled.
• If F09.07 is set as non-zero, manual torque boost is enabled.

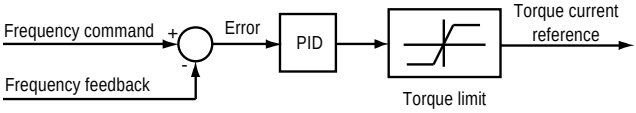
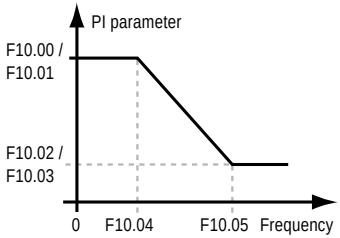
F09.08 is relative to percentage of motor's rated frequency (F08.03).
 

• F09.08max = 50% F08.03</td></tr>
<tr><td>F09.09</td><td>Slip compensation gain of motor 1</td><td>0.0—300.0【100.0%】</td></tr>
<tr><td>F09.10</td><td>Slip compensation filter time of motor 1</td><td>0.01—10.00【0.10s】</td></tr>
<tr><td>F09.11</td><td>Slip compensation limitation of motor 1</td><td>0.0—250.0【200.0%】</td></tr>
<tr><td>F09.12</td><td>Compensation constant of motor 1</td><td>0.1—25.0s【2.0s】</td></tr>
<tr><td></td><td colspan="2">The motor's slip changes with the load torque, which results in the variance of motor speed. Through slip compensation (the inverter will automatically adjust its output frequency according to the load torque) to reduce the influence.
• In driving status (the actual speed is lower than the setting speed) and in generating status (the actual speed is higher than the setting speed), the slip compensation gain (F09.09) should be increased gradually.
• The value of auto slip compensation depends on the motor's rated slip, consequently make sure the motor's rated frequency (F08.03) and rated speed (F08.04) are set correctly.
 

Range of slip compensation = Slip compensation limit (F09.11) × Rated slip.
Rated slip = F08.03 - F08.04 × Np / 60.
• Np is the number of the motor pole pairs.</td></tr>
<tr><td>F09.13</td><td>Reserved</td><td></td></tr>
</table>

No.	Name Description	Range【factory setting】
F09.14	**AVR (automatic voltage regulation) function of motor 1**	**0—2【1】**
	0: Disabled. 1: Enabled all the time. 2: Disabled in deceleration 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 deceleration process, if the F09.14 = 0 or F09.14 = 2, the running current will be a little higher; while if the F09.14 =1, the motor will decelerate steadily and the current will be smaller.	
F09.15	**Oscillation-suppression mode of motor 1**	**0,1【0】**
	0: Oscillation suppression is dependent on the motor's exciting current component. 1: Oscillation suppression is dependent on the motor's torque current component.	
F09.16	**Oscillation-suppression coefficient of motor 1**	**0—200【50】**
	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	**Reserved**	
F09.18	**Reserved**	

6.2.11 Group F10 Motor 1 Vector Control Speed-loop Parameters

No.	Name Description	Range【factory setting】
F10.00	Speed control proportional gain 1 of motor 1	0.1—200.0【20.0】
F10.01	Speed control integral time 1 of motor 1	0.00—10.00【0.20s】
F10.02	Speed control proportional gain 2 of motor 1	0.1—200.0【20.0】
F10.03	Speed control integral time 2 of motor 1	0.00—10.00【0.200s】
F10.04	Speed-loop PI switching frequency 1 of motor 1	0.00—50.00【10.00Hz】
F10.05	Speed-loop PI switching frequency 2 of motor 1	0.00—50.00【15.00Hz】
	The parameters of F10.00—F10.05 and F10.07 comfirm the PID parameters of automatic speed regulator (ASR). The structure of ASR is shown in figure.  As the right figure: • When the inverter operates with frequency in a range of 0—F10.04, the PI parameters of vector control are F10.00 and F10.01; • When the inverter operates with frequency above the value of F10.05, the PI parameters of vector control are F10.02 and F10.03; • When the inverter operates with frequency in a range of F10.04—F10.05, P is the linear interpolation between F10.00 and F10.02, while I is the linear interpolation between F10.01 and F10.03.  • The system's response can be expedited through increasing the ASR proportional gain P, but oscillation may occur if the value of P is too high. • The system's response can be expedited through increasing the ASR integral constant Ti, but oscillation and high overshoot happen easily if the value of Ti is too high. • If Ti =0, the integral function is disabled and the speed-loop works only as a proportional controller. • Generally, the proportional gain P should be adjusted firstly to the maximum on condition that the system does not vibrate, and then the integral constant Ti should be adjusted to shorten the response time without overshoot. • It need increase proportional gain (P) and decrease integral constant (Ti), on condition that shorter dynamic response time is required during low frequency operation.	
F10.06	Speed-loop integral limitation of motor 1	0.0—200.0 (F08.02)【180.0%】
	It is used to limit the maximum value of the vector control speed-loop integral.	
F10.07	Speed-loop differential time of motor 1	0.00—1.00【0.00s】
	It defines the vector control speed-loop differential time. • Generally, it doesn't need to set F10.07 except for expediting the dynamic response. • There is not the speed-loop differential when F10.07 = 0.	
F10.08	Speed-loop output filter time of motor 1	0.000—1.000【0.020s】
	It is used to filter the output of ASR regulator. • When F10.08 = 0, the speed-loop filter is disabled.	

No.	Name Description	Range【factory setting】
F10.09	Reserved	
F10.10	Reserved	
F10.11	Motor torque limitation when motor 1 is forward	0.0—200.0 (F08.02)【180.0%】
F10.12	Motor torque limitation when motor 1 is reverse	
F10.13	Recreated torque limitation when motor 1 is forward	
F10.14	Recreated torque limitation when motor 1 is reverse	

6.2.12 Group F11 Reserved

6.2.13 Group F12 Reserved

6.2.14 Group F13 Asynchronous 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 multi-function input terminal No. 47 function).

Note:

Refer to Group F08 Asynchronous Motor 1 parameters for F13.01—F13.15.

Refer to Group F09 V/f Control parameters for F13.16—F13.34.

Refer to Group F10 Motor 1 Vector Control Speed-loop Parameters for F13.35—F13.49.

No.	Name Description		Range【factory setting】
F13.00	Control mode selection of motor 2		0—2【0】
	0: V/f control without PG. 1: Reserved. 2: Vector control without PG.		
F13.01	Rated power of motor 2		0.2—500.0kW【dependent on inverter model】
F13.02	Rated voltage of motor 2		0—999V【dependent on inverter model】
F13.03	Rated current of motor 2	above 5.5KW motor	0.1—999.9A【dependent on inverter model】
		5.5KW or below motor	0.01—99.99A【dependent on inverter model】
F13.04	Rated frequency of motor 2		1.0—400.0【50.0Hz】
F13.05	Rated speed of motor 2		1—24000【1500rpm】
	F13.04 and F13.05 should be set in accordance with the parameters of motor nameplate.		
F13.06	Power factor of motor 2		0.001—1.000【dependent on inverter model】
F13.07	Parameter auto-tuning of motor 2		0—2【0】

No.	Name Description		Range【factory setting】
F13.08	Stator resistance of motor 2	above 5.5KW motor	0.000－9.999Ω【dependent on inverter model】
		5.5KW or below motor	0.00－99.99Ω【dependent on inverter model】
F13.09	Rotor resistance of motor 2	above 5.5KW motor	0.000－9.999Ω【dependent on inverter model】
		5.5KW or below motor	0.00－99.99Ω【dependent on inverter model】
F13.10	Leakage inductance of motor 2	above 5.5KW motor	0.00－500.00mH【dependent on inverter model】
		5.5KW or below motor	0.0－5000.0mH【dependent on inverter model】
F13.11	Mutual inductance of motor 2	above 5.5KW motor	0.00－500.00mH【dependent on inverter model】
		5.5KW or below motor	0.0－5000.0mH【dependent on inverter model】
F13.12	Idling exciting current of motor 2	above 5.5KW motor	0.0－999.9A【dependent on inverter model】
		5.5KW or below motor	0.00－99.99A【dependent on inverter model】
F13.13	Reserved		
F13.14	Reserved		
F13.15	Reserved		
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－F13.04【0.00Hz】
F13.18	V/f voltage value V3 of motor 2		F13.20－F13.02【0V】
F13.19	V/f frequency value F2 of motor 2		F13.21－F13.17【0.00Hz】
F13.20	V/f voltage value V2 of motor 2		F13.22－F13.18【0V】
F13.21	V/f frequency value F1 of motor 2		0.00－F13.19【0.00Hz】
F13.22	V/f voltage value V1 of motor 2		0－F13.20【0V】

No.	Name Description	Range【factory setting】
F13.23	Torque boost of motor 2	0.0—30.0 【45kW and below inverter: 2.0%】 【55—132kW inverter: 1.0%】 【160kW and above inverter: 0.5%】
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【100.0%】
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	0.1—25.0【2.0s】
F13.29	Reserved	
F13.30	AVR (automatic voltage regulation) function of motor 2	0—2【1】
F13.31	Oscillation-suppression mode of motor 2	0,1【0】
F13.32	Oscillation-suppression coefficient of motor 2	0—200【50】
F13.33	Reserved	
F13.34	Reserved	
F13.35	Speed control proportional gain 1 of motor 2	0.1—200.0【20.0】
F13.36	Speed control integral time 1 of motor 2	0.00—10.00【0.20s】
F13.37	Speed control proportional gain 2 of motor 2	0.1—200.0【20.0】
F13.38	Speed control integral time 2 of motor 2	0.00—10.00【0.20s】
F13.39	Speed-loop PI switching frequency 1 of motor 2	0.00—50.00【10.00Hz】
F13.40	Speed-loop PI switching frequency 2 of motor 2	0.00—50.00【15.00Hz】
F13.41	Speed-loop integral limitation of motor 2	0.0—200.0 (F13.03)【180.0%】
F13.42	Speed-loop differential time of motor 2	0.00—1.00【0.00s】
F13.43	Speed-loop output filter time of motor 2	0.000—1.000【0.020s】
F13.44	Reserved	
F13.45	Reserved	
F13.46	Motor torque limitation when motor 2 is forward	0.0—200.0 (F13.03)【180.0%】
F13.47	Motor torque limitation when motor 2 is reverse	
F13.48	Recreated torque limitation when motor 2 is forward	
F13.49	Recreated torque limitation when motor 2 is reverse	
F13.50	Reserved	
F13.51	Reserved	
F13.52	Reserved	

6.2.15 Group F14 Reserved

6.2.16 Group F15 Digital I/O Terminal Parameters

No.	Name Description	Range【factory setting】
F15.00	DI1 terminal function selection	0－86【2】
F15.01	DI2 terminal function selection	0－86【3】
F15.02	DI3 terminal function selection	0－86【0】
F15.03	DI4 terminal function selection	0－86【0】
F15.04	DI5 terminal function selection	0－86【0】
F15.05	DI6 terminal function selection	0－86【0】
F15.06	DI7 terminal (option terminal) function selection	0－86【0】
F15.07	DI8 terminal (option terminal) function selection	0－86【0】
F15.08	DI9 terminal (option terminal) function selection	0－86【0】

0: Reserved. It disables the terminal's function. The inverter ignores the signal input via this terminal.

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

1: Inverter enabled.

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

2,3: FWD/REV function. You can set any multi-function terminal for the FWD/REV terminal to control the inverter's run and stop.

- When F00.11 = 1 (external terminal reference run command source) or terminal No. 11 function is enabled, FWD/REV function is valid.
- Refer to parameter F15.16.

4: Three-wire operation mode.

- Refer to parameter 15.16.

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

- Up to 2^n frequency reference sources can be switched through terminal logic combination setting n (the maximum n is 3). Refer to the below table.
- Up to 8 frequency reference sources can be switched through selecting 3 terminals.
- Up to 4 frequency reference sources can be switched through selecting 2 terminals.

Terminal 3	Terminal 2	Terminal 1	Selection
0	0	0	Holding
0	0	1	Display panel digital setting
0	1	0	Terminal digital setting
0	1	1	SCI communication digital setting
1	0	0	Analogue value setting
1	0	1	Terminal pulse setting
1	1	X	Hold

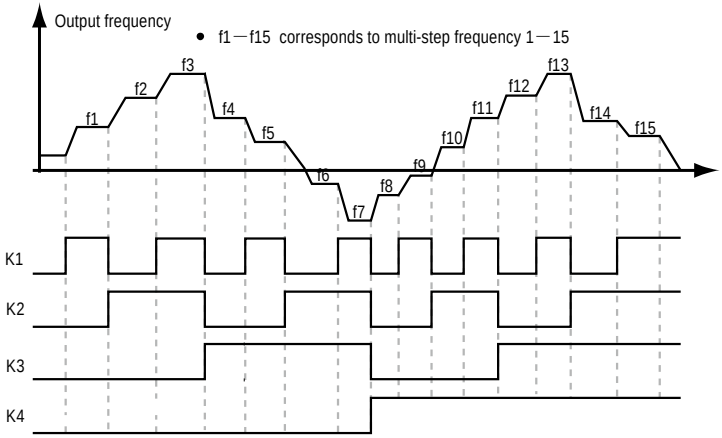
<table>
<tr><th>No.</th><th>Name Description</th><th>Range【factory setting】</th></tr>
<tr><td></td><td colspan="2">
8: The frequency source switch to analogue setting.
• If the setting is 8, the frequency reference source can be forcibly switched to analogue setting.
• The priority of frequency sources is shown below:
AI frequency source > multi-step frequency terminal 1, 2, 3 and 4(multi-function terminal is No. 13, 14, 15, 16 function)> frequency setting terminal 1,2 and 3(multi-function terminal is No. 5,6,7 function) > frequency source defined by F00.10.
9,10: Run command source selection 1, 2.
• In the below table there are 4 kind control modes selected by the different logic combinations of terminals 1 and 2.
<table>
<tr><th>Terminal 2</th><th>Terminal 1</th><th>Selection</th></tr>
<tr><td>0</td><td>0</td><td>Hold the control mode</td></tr>
<tr><td>0</td><td>1</td><td>Display panel control mode</td></tr>
<tr><td>1</td><td>0</td><td>Terminal control mode</td></tr>
<tr><td>1</td><td>1</td><td>SCI communication control mode</td></tr>
</table>
• The inverter can accept that run command source switch changes while running, but only at stop status all switches can be enabled.
11: Switch to terminal control mode.
• When this terminal function is enabled, the run command source will be forcibly switched to the terminal control mode.
• The priority of frequency selection is below:
Terminal control mode to be the run command source > Display panel's M key achieves local and remote switching function (F00.12 = 1) > Run command source selection terminal 1and 2 (multi-function terminal is No. 9,10 function) > Run command source defined by F00.11.
• The modification of run command source is enabled only at stop.
12: External stop command input.
• When enabled, the inverter stops according to F02.13 (stop mode selection). It is valid for all command source.
</td></tr>
</table>

No.	Name Description	Range【factory setting】

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

- Up to 15 speed references can be set through different logic combinations of terminals.
- The inverter can realise 15-step speed operation through the logical combinations of 4 terminals.
- The inverter can realise 7-step speed operation through the logical combinations of 3 terminals.
- The inverter can realise 3-step speed operation through the logical combinations of 2 terminals.
- The inverter can realise the switch between setting frequency and multi-step frequency through one terminal function.
- Refer to the below table and figure. K1 is corresponding to terminal 1, K2 is corresponding to terminal 2, K3 is corresponding to terminal 3 and K4 is corresponding to terminal 4.

K4	K3	K2	K1	Frequency setting
0	0	0	0	Setting frequency
0	0	0	1	Multi-step frequency 1 (F06.00)
0	0	1	0	Multi-step frequency 2 (F06.01)
0	0	1	1	Multi-step frequency 3 (F06.02)
0	1	0	0	Multi-step frequency 4 (F06.03)
0	1	0	1	Multi-step frequency 5 (F06.04)
0	1	1	0	Multi-step frequency 6 (F06.05)
0	1	1	1	Multi-step frequency 7 (F06.06)
1	0	0	0	Multi-step frequency 8 (F06.07)
1	0	0	1	Multi-step frequency 9 (F06.08)
1	0	1	0	Multi-step frequency 10 (F06.09)
1	0	1	1	Multi-step frequency 11 (F06.10)
1	1	0	0	Multi-step frequency 12 (F06.11)
1	1	0	1	Multi-step frequency 13 (F06.12)
1	1	1	0	Multi-step frequency 14 (F06.13)
1	1	1	1	Multi-step frequency 15 (F06.14)



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No.	Name Description	Range【factory setting】

17,18: Frequency ramp (UP) / (DN).

- If the setting is 17 or 18, the terminal can be used to increase or decrease frequency, and accordingly enables remote control.
- Increase or decrease rate is determined by F15.12. The function refers to below table.
- This terminal is enabled when F00.10=1 (terminal digital setting) or F19.00=2 (terminal digital setting).

Up (UP) command	Down (DN) command	Frequency change trend
0	0	To keep the setting frequency
0	1	To decrease the setting frequency
1	0	To increase the setting frequency
1	1	To keep the setting frequency

19: Clearing auxiliary frequency setting.

- When the setting is 19, this terminal is used to clear the counter to zero, but it is only valid for digital auxiliary setting.

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

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

24,25: Jog 1 command and direction control input.

- In terminal control mode, if 24 or 25 are enabled, then forward jog or reverse jog operation are enabled. JOGF is forward jog command and JOGR is reverse jog command.
- It need define parameters F00.15 (jog frequency), F00.16 (jog interval), F03.15 (acceleration time of jog operation) and F03.16 (deceleration time of jog operation), refering to below table.

Jog direction input (No. 25 function)	Jog command input (No. 24 function)	Run command
0	0	Jog command is invalid
1	0	Jog command is invalid
0	1	Jog 1 forward
1	1	Jog 1 reverse

- **Note: When select 20 and 21, the functions 24 and 25 are invalid.**

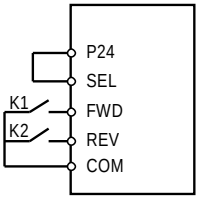
26,27: Acceleration/deceleration time selection terminals 1 and 2.

- Acceleration/deceleration time 1－4 can be selected through logic combination of the terminals 1 and 2, as shown in table.
- The inverter can realise 4 groups Acc./Dec. time selection through the function of 2 Acc./Dec. terminals.
- The inverter can realise 2 groups Acc./Dec. time selection through the function of 1 Acc./Dec. terminals.

Acc./Dec. terminal 2	Acc./Dec. terminal 1	Acc./Dec. selection
0	0	Acc./Dec. time 1
0	1	Acc./Dec. time 2
1	0	Acc./Dec. time 3
1	1	Acc./Dec. time 4

No.	Name Description	Range【factory setting】
	28: Accelereation/deceleration mode selection. • If the setting is enabled, the S-curve accelereation/deceleration mode will be selected. While the setting is disabled, linear acceleration/deceleration mode will be selected. • The acceleration/deceleration mode set by terminal No. 28 function is priority to by F03.00. 29: Acceleration/deceleration prohibition. If the setting is 29, this terminal can make the motor immune to external signals (except stop command) and maintain operation at the current speed. • The function is disabled in the process of deceleration to stop. 30: Switch to ordinary running mode. • When this function is enabled, the frequency command (including MS function, simple PLC function, process PID function, wobble function etc.) forced to switch to the ordinary mode operation. 31: Reset the stop status of PLC operation. • In the stop status of PLC operation, the memorized PLC operating information (operating step, operating time, operating frequency, etc.) will be cleared when this terminal is enabled, refering to Group F06. 32: Pausing the process PID. • If the setting is 32, the process PID function is temporary disabled and the inverter keeps the present frequency output and continue running. 33: Disabling the process PID. To achieve the flexible switch between the process PID and the lower class operation mode. • When enabled, the operation mode switchs to the lower class. • The priority of operation mode is as: Jog operation > Process PID operation > PLC operation > wobble operation > MS Speed operation > Operation. 34: Holding PID integral. • When enabled, the process PID stops increasing and the integrator keeps the present result. 35: Clearing PID integral. • When enabled, the process PID is cleared. 36: Switch to wobble operation. The wobble operation mode selects manual start (set the units of F07.01 to 1). • If the setting is 36, the wobble function is enabled. 37: Reset the wobble operating status. • If wobble operation (set F07.00 to 1) is enabled, connecting this terminal can clear all the memorised information about the wobble operation no matter the inverter is in auto start or manual start mode (depend on F07.01 setting). 38: DC braking start while stopping. • To implement DC braking for the motor in stop status through control terminal and then realise motor's emergency stop and accuracy location. • F02.04 defines the DC braking current. • Implement DC braking for the motor as soon as this terminal is enabled. • Only in deceleration stop this function is enabled. 39,40: External pause signal (normally-open/normally-closed input). • After receiving an external pause command during the running process, the inverter will immediately stop. • Once the external signal is removed and the situation meets the running condition, the inverter will start tracking at high speed. 41,42: Coast to stop (normally-open/normally-closed input). • The inverter will stop outputting immediately and the load will coast to stop in accordance with the mechanical inertia when a multi-function terminal is set as 41 or 42.	

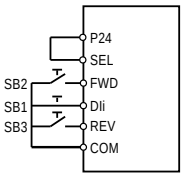
No.	Name Description	Range【factory setting】
	43: Emergency stop. • After receiving terminal command, the inverter will decelerate to stop during the deceleration time according to the F03.17 (deceleration time of emergency stop). 44,45: External fault signal (normally-open and normally-closed input). • If the setting is 44 or 45, the fault signal of external equipment can be input via the terminal, which is convenient for the inverter to monitor the external equipment and carry out protection according to the value of F15.17. • Once the inverter receives the fault signal, it will display external fault. • The fault signal has two input modes: normally-open and normally-closed input. 46: External reset (RST) input. If the setting is 46, the inverter can be reset via this terminal when it has a fault. • Accordingly the terminal has the same function as the STOP key on the display panel. 47: Switch between motor 1 and motor 2. • When enabled, it can realise parameters of the two motors to switch. 48: Timing function input. If the setting is 48, the inverter can use the timing function input terminal. • Refer to parameters F15.25 and F15.26. 49: Clearing the length. If the setting is 49, the inverter can use clearing the length input terminal in the fixed length control. • Refer to parameters F19.26－F19.34. 50: Clearing the counter to zero. When the setting is 50, this terminal is used to clear the counter to zero. • It is normally used with Function 51 (counter's triggering signal input). 51: Counter's triggering signal input. It is built-in counter's couting pulse input port and can save the current couting value at power loss. • Pulse's maximum frequency: 200Hz. • Refer to parameters F15.37 and F15.38. 52: Length counting input. If the setting is 52, it can be used as length input terminal in the fixed length control. • Refer to parameters F19.26－F19.34. 53: Pulse frequency input (only DI6 terminal is enabled). This terminal is used to input pulse signal as frequency setting. • See Group F05 parameters for the relationship between input pulse frequency and frequency setting. 54－84: Reserved. 85: Pausing PLC operation. If the setting is 85, this terminal is used to pause the PLC operation. • The inverter will operate at the frequency of the current step when the terminal is enabled, and there is no timing at PLC operation. When disabled, the timing will continue. 86: Terminal stop DC braking. • After the inverter receives the stop command, if the stop mode is decelerate to stop + DC braking (F02.13 = 2), and the running frequency is lower than the DC braking initial frequency at stop (F02.16), the inverter will begin to DC braking. • The braking current is set by F02.04, and the braking time is the longer time of the terminal function holding time and the DC braking time at stop (F02.18). **Note: Only when using HD30-EIO will F15.06 − F15.08 be enabled.**	
F15.09	**Reserved**	
F15.10	**Reserved**	
F15.11	**Reserved**	

<table>
<tr><th>No.</th><th>Name Description</th><th>Range【factory setting】</th></tr>
<tr><td>F15.12</td><td>Acceleration/deceleration rate of UP/DN terminal</td><td>0.00—99.99【1.00 Hz/s】</td></tr>
<tr><td></td><td colspan="2">It defines the change rate of setting frequency via the UP/DN terminal.</td></tr>
<tr><td>F15.13</td><td>Terminal detecting interval</td><td>0—2【0】</td></tr>
<tr><td></td><td colspan="2">0: 2ms
1: 4ms
2: 8ms</td></tr>
<tr><td>F15.14</td><td>Terminal detecting filter number</td><td>0—10000【2】</td></tr>
<tr><td></td><td colspan="2">The digital input terminal signal should be delayed and confirmed so as to avoid digital input error.</td></tr>
<tr><td>F15.15</td><td>Terminal input positive and negative logic setting</td><td>000—0x1FF【000】</td></tr>
<tr><td></td><td colspan="2">It defines that each bit (binary) of this function represents different physical sources.
• Positive logic: When multi-function input terminals are connected to corresponding common port, this logic is enabled. Otherwise the logic is disabled.
• Negative logic: When multi-function input terminals are connected to corresponding common port, this logic is disabled. Otherwise the logic is enabled.
<table>
<tr><th colspan="4">Hundreds</th><th colspan="4">Tens</th><th colspan="4">Units</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>-</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>
• 0 means positive logic while 1 means negative logic.
Note: Only when using HD30-EIO will DI7 − DI9 be enabled.</td></tr>
<tr><td>F15.16</td><td>FWD/REV operation mode</td><td>0—3【0】</td></tr>
<tr><td></td><td colspan="2">• FWD can be selected by multi-function input terminal DIx and represented as “FWD”. At this time, the function of this terminal should be defined as No. 2 function.
• REV can be selected by multi-function input terminal DIy and represented as “REV”. At this time, the function of this terminal should be defined as No. 3 function.
This function defines the four control modes via the external terminals.
0: Two-wire operation mode 1.
1: Two-wire operation mode 2.
• When stop command coming from other sources makes the inverter stopping though the terminal logic enabled in the terminal control mode, there is no run command even the control terminal FWD/REV are still valid.
• If you want the inverter to run again, you should trigger the active FWD and REV. For example: The terminal function set as 12, 41—45 or PLC stop after single cycle.


<table>
<tr><th rowspan="2">K2</th><th rowspan="2">K1</th><th colspan="2">Run command</th></tr>
<tr><th>Mode 1</th><th>Mode 2</th></tr>
<tr><td>0</td><td>0</td><td>Stop</td><td>Stop</td></tr>
<tr><td>1</td><td>0</td><td>Reverse</td><td>Stop</td></tr>
<tr><td>0</td><td>1</td><td>Forward</td><td>Forward</td></tr>
<tr><td>1</td><td>1</td><td>Stop</td><td>Reverse</td></tr>
</table></td></tr>
</table>

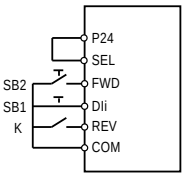
No.	Name Description	Range【factory setting】
	2: Three-wire operation mode 1. • If the shift between SB2 and SB3 is disabled, the inverter will hold the control mode. 3: Three-wire operation mode 2. • If SB2 changes from enabled into disabled, the inverter will keep the same mode. • DIi can be selected by the multi-function input terminal DIi. At this time, the function of this terminal should be defined as No. 4 function of "three-wire operation".	
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: Decelerate to stop. 3: Continue to run.	
F15.18	**DO1 terminal function selection**	**0—35【2】**
F15.19	**DO2 terminal function selection**	**0—38【0】**
F15.20	**RLY1 relay function selection**	**0—35【31】**
F15.21	**RLY2 relay (extension relay) function selection**	**0—35【0】**
F15.22	**RLY3 relay (extension relay) function selection**	**0—35【0】**
F15.23	**RLY4 relay (extension relay) function selection**	**0—35【0】**
	0: Reserved. There is no output function and action of the output terminal. 1: Inverter ready. The inverter completes power on and no fault occurs, then it can normally run the indicating signal. 2: Inverter is running. The inverter is in run status and output indicatiing signal. 3: Inverter is forward running. The inverter is forward running the indicating signal. 4: Inverter is reverse running. The inverter is reverse running the indicating signal. 5: Inverter is DC braking. The inverter is DC braking the indicating signal. 6: Inverter is in zero-frequency status. In the zero-frequency range the inverter's output frequency (including in stop status) outputs the indication signal. • Refer to parameters F15.28 and F15.29. 7: Inverter is in zero-frequency running. In the zero-frequency range the inverter's output frequency outputs the indicating signal. • Refer to parameters F15.28 and F15.29. 8: Reserved. 9,10: Frequency detection threshold (FDT1,FDT2). • Refer to parameters F15.31—F15.35.	

Three-wire operation mode 1



• SB1：Normally-closed stop button (effective at the falling edge)
SB2：Normally-open forward button (effective at the risling edge)
SB3：Normally-open reverse button (effective at the rising edge)

Three-wire operation mode 2



• K：Direction selection button (level on)
K = 0 (forward) K = 1 (reverse)
SB1：Normally-closed stop button (effective at the falling edge)
SB2：Normally-open run button (effective at the risling edge)

No.	Name Description	Range【factory setting】

11: Frequency arriving signal (FAR). Indication signal will be output when the inverter's output frequency is within the FAR range.

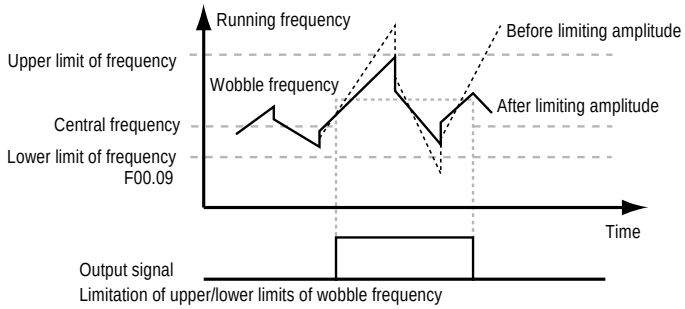
- The FAR is set by F15.27 (FAR range).

12: Limitation of upper limit of frequency. The indicating signal will be output if the setting frequency is beyond the upper limit of frequency.

13: Limitation of lower limit of frequency. The indicating signal will be output if the setting frequency is lower than the lower limit of frequency.

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

- If the wobble frequency calculated by the central frequency is higher than upper limit of frequency or lower than the lower limit of frequency (F00.09), signal will be output, as shown in figure.
- When F07.00 = 1 (using the wobble function), this terminal function is enabled.



15: Simple PLC operating status indication. The indicating signal will be output when the inverter is at simple PLC operating.

16: Simple PLC pausing indication. The indicating signal will be output if the simple PLC operation is suspended by external terminals.

17: Simple PLC cycle completion indication. The indicating signal will be output if one cycle of PLC operation is finished.

18: Completion of simple PLC operation stages. The indicating signal will be output if the current step of PLC operation is finished.

19: Completion of simple PLC operation. The indicating signal will be output if the PLC operation is finished.

20: Output data from SCI communication. Output indicating signal of open collector or relay is controlled by the SCI communication directly.

21: Preset operating time out.

- The indicating signal will be output if the inverter's operating time reaches the preset operating time (F15.36)

Note: The No. 17, 18, 19 and 21 functions output indicating signal which is single pulse signal, 500ms.

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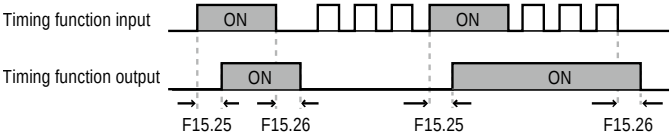
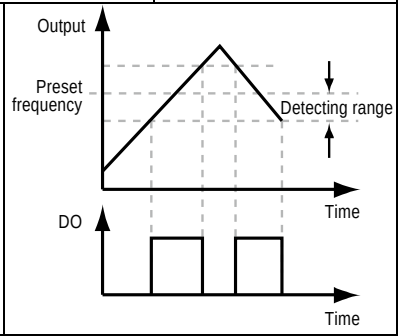
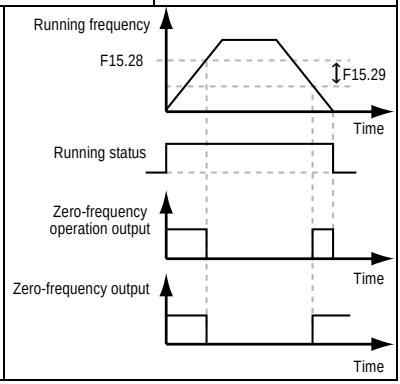
<table>
<tr><th>No.</th><th>Name Description</th><th>Range【factory setting】</th></tr>
<tr><td></td><td colspan="2">22: Timing function output. If the setting is 22, the inverter can use the timing function output terminal.
• Refer to parameters F15.25 and F15.26.
23: Preset counting value reach.
24: Indicating counting value reach.
• Refer to parameters F15.37 and F15.38.
25: Setting length arrive. The indicating signal will be output if the inverter's actual length reaches the preset length.
26: Indication of motor 1 and motor 2. According to the current motor selection, output corresponding indicating signal.
• When the inverter controls the motor 1, this signal will be disabled; while controls the motor 2, it will output the indicating signal.
27,28: Reserved.
29: Undervoltage lock-up signal (LU). When the DC bus voltage is lower than the undervoltage threshold, the inverter will output undervoltage signal.
• The LED on the display panel will display "-Lu-".
30: Overload signal (OL). The indicating signal can be output when the inverter's output current value is higher than that defined by F20.01(overload pre-alarm detection threshold) and the overload time is longer than that defined by F20.02 (overload pre-alarm detection time).
31: Inverter fault. The inverter will output fault signal when it has a fault.
32: External fault. The indicating signal can be output when the inverter detects the external fault signal via terminal.
33: Inverter auto-reset fault. The indicating signal can be output when the inverter is during fault auto-reset.
34: Three-phase power supply forward input. The indicating signal can be output when the inverter's three-phase input power supply is forward.
• Power supply forward: L1 (R) preceding L2 (S) preceding L3 (T).
35: Dormancy instruction function.
36－37: Reserved.
38: High-frequency output (only DO2). DO2 can be selected as high-frequency output.
• Refer to parameter F16.21.
Note: Only when using HD30-EIO will F15.21 − F15.23 be enabled.</td></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">It defines that each bit (binary) of this function represents different physical sources.
• Positive logic: When multi-function output terminals are connected to corresponding common port, this logic is enabled. Otherwise the logic is disabled.
• Negative logic: When multi-function output terminals are connected to corresponding common port, this logic is disabled. Otherwise the logic is enabled.
<table>
<tr><th colspan="4">Tens</th><th colspan="4">Units</th></tr>
<tr><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td>-</td><td>-</td><td>RLY4</td><td>RLY3</td><td>RLY2</td><td>RLY1</td><td>DO2</td><td>DO1</td></tr>
</table>
Note: Only when using HD30-EIO will RLY2 − RLY4 be enabled.</td></tr>
</table>

No.	Name Description	Range【factory setting】
F15.25	**ON side delay time of timing function**	**0.00—300.00【0.00s】**
F15.26	**OFF side delay time of timing function**	
	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: 	
F15.27	**FAR range**	**0.00—100.00【2.50Hz】**
	The pulse signal will be output if the inverter's output frequency is within the FAR range. As shown in the right figure. 	
F15.28	**Zero-frequency operation threshold**	**0.00—upper limit【0.00Hz】**
F15.29	**Zero-frequency hysteresis**	
	F15.28 and F15.29 are used to set the zero-frequency operation output control function, please see the right figure. 	

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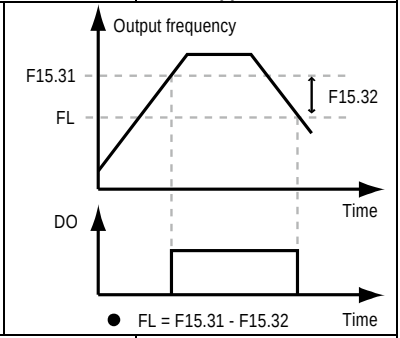
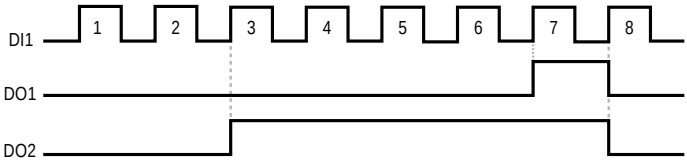
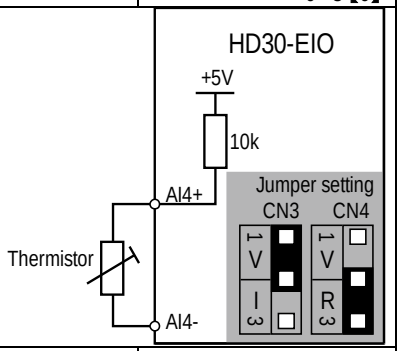
No.	Name Description	Range【factory setting】
F15.30	**FDT1 detection mode**	**0,1【0】**
	0: Detect according to the reference frequency. 1: Detect according to the output frequency.	
F15.31	**FDT1 level**	**0.00—upper limit【50.00Hz】**
F15.32	**FDT1 lag**	**0.00—upper limit【1.00Hz】**
	The indicating signal 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—upper limit【50.00Hz】**
F15.35	**FDT2 lag**	**0.00—upper limit【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).	

No.	Name Description	Range【factory setting】
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 multi-function input terminals (set as No. 51 function) reaches a certain quantity, the multi-function output terminals or relay will send an indicating signal. F15.38 presents that when the number of pulse input by the multi-function input terminals (set as No. 51 function) reaches a specified quantity, the multi-function output 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. 	
F15.39	**Reserved**	
F15.40	**Reserved**	
F15.41	**Reserved**	
F15.42	**Reserved**	
F15.43	**Terminal output delay**	**0.0—100.0【0.0s】**

6.2.17 Group F16 Analogue I/O Terminal Parameters

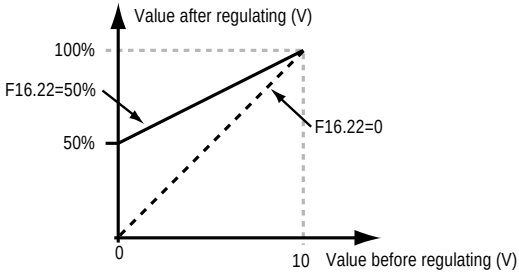
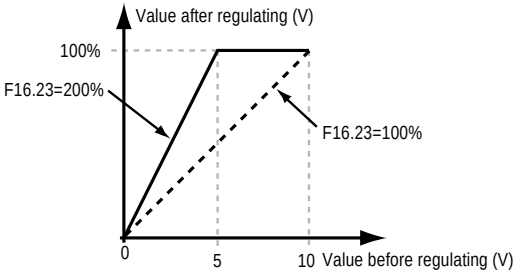
No.	Name Description	Range【factory setting】
F16.00	**Display panel with potentiometer function selection**	0—7【0】
	Only when using display panel with potentiometer can F16.00 is enabled.	
F16.01	**Analogue input AI1 function selection**	0—7【2】
F16.02	**Analogue input AI2 function selection**	0—7【5】
F16.03	**Analogue input AI3 function selection**	0—7【0】
	0: Reserved. 1: Upper limit frequency setting source. • When F00.07 = 1 (upper limit frequency setting source is set by analogue input), the upper limit frequency will be set by the input voltage value corresponding to the analogue source which selects this function. 2: Frequency setting source. • When F00.10 = 3 (frequency setting source is set by analogue input), the setting frequency will be set by the input voltage value corresponding to the analogue source which selects this function. 3: Auxiliary frequency reference. • When F19.00 = 4 (auxiliary frequency reference is set by AI analogue), the auxiliary frequency will be set by the input voltage value corresponding to the analogue source which selects this function. 4: Process PID reference. • When F04.01 = 1 (process PID reference is set by AI analogue), the process PID reference will be set by the input voltage value corresponding to the analogue source which selects this function. 5: Process PID feedback. • When F04.02 = 0 (AI analogue inputs process PID feedback), the process PID feedback will be set by the input voltage value corresponding to the analogue source which selects this function. 6: Process PID regulating upper limit. • When F04.11 = 1 (upper limit value of the PID regulator is set by AI analogue), the process PID regulating upper limit will be set by the input voltage value corresponding to the analogue source which selects this function. 7: Process PID regulating lower limit. • When F04.12 = 1 (lower limit value of the PID regulator is set by AI analogue), the process PID regulating lower limit will be set by the input voltage value corresponding to the analogue source which selects this function.	

<table>
<tr><th>No.</th><th>Name Description</th><th>Range【factory setting】</th></tr>
<tr><td>F16.04</td><td colspan="2">Analogue input AI4 function selection</td><td>0—8【0】</td></tr>
<tr><td></td><td colspan="2">8: Motor overheating signal input.
• Connect electronic thermistor embedded motor stator coils to the inverter's analogue input, as the right figure.
• Refer to parameters F20.06 and F20.07 about the thermistor.
• Refer to parameters F16.00－F16.03 about the range of 1－7.

Note: Only when using HD30-EIO will F16.03 and F16.04 (analogue inputs AI3 and AI4) be enabled.
 
</td><td></td></tr>
<tr><td>F16.05</td><td>Analogue input AI1 bias</td><td rowspan="4">-100.0—100.0【0.0%】</td></tr>
<tr><td>F16.08</td><td>Analogue input AI2 bias</td></tr>
<tr><td>F16.11</td><td>Analogue input AI3 bias</td></tr>
<tr><td>F16.14</td><td>Analogue input AI4 bias</td></tr>
<tr><td>F16.06</td><td>Analogue input AI1 gain</td><td rowspan="4">-10.00—10.00【1.00】</td></tr>
<tr><td>F16.09</td><td>Analogue input AI2 gain</td></tr>
<tr><td>F16.12</td><td>Analogue input AI3 gain</td></tr>
<tr><td>F16.15</td><td>Analogue input AI4 gain</td></tr>
<tr><td>F16.07</td><td>Analogue input AI1 filtering time</td><td rowspan="4">0.01—10.00【0.05s】</td></tr>
<tr><td>F16.10</td><td>Analogue input AI2 filtering time</td></tr>
<tr><td>F16.13</td><td>Analogue input AI3 filtering time</td></tr>
<tr><td>F16.16</td><td>Analogue input AI4 filtering time</td></tr>
<tr><td></td><td colspan="2">When select AI1－AI4 inputs as open-loop frequency setting source, the relationship between the analogue input and the setting frequency is shown as figure:
 

The analogue voltage reasults from setting frequency signal disposed by analogue input filtering, bias and gain. The relationship between the analogue voltage and the setting frequency is set by parameters of Group F05.
• Analogue input gain and bias are involved in analogue calculation is as following formula: Y=kX+b
• Here: Y is the calculated analogue, X is the value before adjusting, k is the analogue input gain (F16.06, F16.09, F16.12, F16.15), and b is the analogue input bias (F16.05, F16.08, F16.11, F16.14).
• F16.07, F16.10, F16.13, F16.16 define the filtering time. It is used to filter the analogue signal.The longer the filter time is, the higher the immunity level is, but the response time is prolonged. That is, the shorter the filter time is, the quicker the response time is, but the lower the immunity level.
Note: Only when using HD30-EIO will F16.11 – F16.16 (analogue inputs AI3 and AI4) be enabled.</td><td></td></tr>
<tr><td>F16.17</td><td>Maximum input pulse frequency</td><td>0.0—50.0【10.0kHz】</td></tr>
<tr><td></td><td colspan="2">When set the DI6 terminal as pulse input, F16.17 defines the maximum input pulse frequency.</td></tr>
<tr><td>F16.18</td><td>Input pulse filtering time</td><td>0—500【10ms】</td></tr>
<tr><td></td><td colspan="2">It is used to filter the input pulse frequency and filter out the small fluctuations in the pulse frequency.</td></tr>
</table>

No.	Name Description	Range【factory setting】
F16.19	AO1 terminal output function selection	0—19【1】
F16.20	AO2 terminal output function selection	0—19【0】
F16.21	High-speed pulse output function selection	0—19【0】
	0: Reversed. 1,2: Output frequency, reference frquency (0—maximum output frequency) 3: Motor RPM (0—maximum output frequency corresponding to RPM). 4: Output current (0—twice motor's rated current). 5: Output current (0—twice motor's rated current). 6—9: Reversed. 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). 18,19: Output frequency, reference frequency (- 1 times—1 times maximum output frequency).	

No.	Name Description	Range【factory setting】
F16.22	**Analogue output AO1 bias**	**-100.0—100.0【0.0%】**
F16.23	**Analogue output AO1 gain**	**0.0—200.0【100.0%】**
	• This parameter is used to realise the proportional relation adjustment of AO1 analogue output. • The formula is: Y=kX+b • Y is actual output value, X is output value with ratio and gain not being adjusted, k is analogue output gain (F16.23), b is analogue output bias (F16.22). The relationship between analogue output and bias is shown as following figure.  The relationship between analogue output and gain is shown as following figure.  	
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 parameters F16.22 and F16.23.	
F16.26	**DO2 maximum output pulse frequency**	**0.1—50.0【10.0kHz】**
	It defines the DO2 terminal allowable maximum output frequency.	

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6.2.18 Group F17 SCI Communication Parameters

Refer to Appendix C (Page 181) for the communication function.

No.	Name Description	Range【factory setting】
F17.00	**Data format**	**0—5【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. 3: 1-7-2 format, no parity, ASCII. 4: 1-7-1 format, even parity, ASCII. 5: 1-7-1 format, odd parity, ASCII.	
F17.01	**Baud rate selection**	**0—8【3】**
	0: 1200bps. 5: 38400bps. 1: 2400bps. 6：57600bps. 2: 4800bps. 7：76800bps. 3: 9600bps. 8：115200bps. 4: 19200bps.	
F17.02	**Local address**	**0—247【2】**
	When F17.02 = 0, it means broadcast address.	
F17.03	**Host PC response time**	**0—1000【0ms】**
F17.04	**Time threshold for detecting communication status**	**0.0—1000.0【0.0 s】**
	When the time at no communication data exceeds the setting time of F17.04, it will be considered as communication time out. • When F17.04 = 0, it will not detect communication time out.	
F17.05	**Detecting time at communication error**	**0.0—1000.0s【0.0】**
	When the time at communication error exceeds the setting time of F17.05, it will be considered as communication error detection. • When F17.05 = 0, it will not detect the communication error.	
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 time out. F17.07 defines the action selection at communication fault. 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**	**0,1【1】**
	0: Communication write function parameter without storage EEPROM. 1: Communication write function parameter with storage EEPROM. **Note: Only when using the communication write function parameter, and function code is 0x06 or 0x10, will F17.09 be valid. Refer to Protocol Function of Appendix C for details.**	

6.2.19 Group F18 Display Control Parameters

Note: Refer to the《User Manual of HD31 Series Special Inverter for Water and Wastewater application》 for the water and wastewater display parameters.

No.	Name Description	Range【factory setting】
F18.00	**Language selection**	**0,1【0】**
	It defines the displaying language on the LCD display panel. • Only when using LCD display panel will F18.00 be enabled. 0: Chinese. 1: English.	
F18.01	**Displaying contrast of the LCD display panel**	**1—10【5】**
	To select LCD displaying contrast. • Only when using LCD display panel will F18.01 be enabled.	
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【9】**
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】**
F18.11	**Set the display parameter 4 at stop**	**0—49【22】**
F18.12	**Set the display parameter 5 at stop**	**0—49【43】**
F18.13	**Set the display parameter 6 at stop**	**0—49【44】**
	The display panel displays parameters which difine the operation status (F18.02—F18.07) and stop status (F18.08—F18.13). • It can be cycling displayed by ▶▶ key on the display panel. • Each display parameter of content can be set as the corresponding 49 statuses. • For instance: when set F18.08 as 7, it displays stop parameters which is setting frequency at initial power on. 0: Reserved. 1: Inverter's rated current. 2: Inverter's extension function. • 0: No extension function. • 1: Water and wastwater applications. 3: The inverter status. • Refer to parameter d00.10. 4: Master setting frequency source. 5: Master setting frequency. 6: Auxiliary setting frequency. 7: Setting frequency. 8: Reference frequency (after acceleration/ deceleration). 9: Output frequency. • At running state, Hz indicator is flashing. 10: Setting RPM. 11: Running RPM. • At running state, RPM indicator is flashing.	

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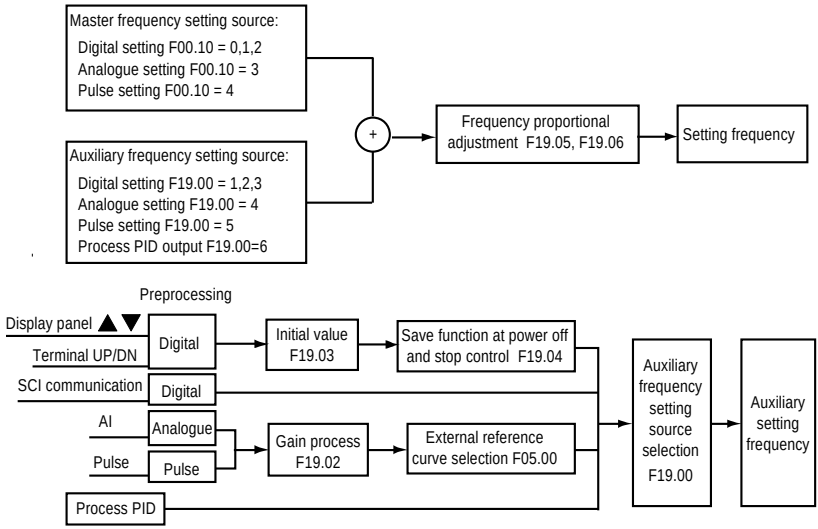
No.	Name Description	Range【factory setting】
	12: Three-phase power supply input phase sequence. • 0: Positive sequence, L1(R) preceding L2(S) preceding L3(T). • 1: Negative sequence, L1(R) preceding L3(T) preceding L2(S). 13: Output voltage. 14: Output current. 15: Reserved. 16: Output torque. 17: Output 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. 31: High-speed output pulse frequency. 32: Heatsink temperature. 33: Set the line speed. 34: Reference line speed. 35－36: Reserved. 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	**Reserved**	
F18.15	**Maximum line speed**	**0－65535【1000】**
F18.16	**Line speed display accuracy**	**1－3【0】**
	0: Integer. 1: One decimal. 2: Two decimal. 3: Three decimal.	

6.2.20 Group F19 Function-boost Parameters

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

The multi-step frequency of HD30 series inverters 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.



No.	Name Description	Range【factory setting】
F19.00	**Auxiliary frequency setting source selection**	0—6【0】
	It defines the setting source of the auxiliary frequency. • When set F19.00 as 1 and 2, the initial value is set by F19.03. Setting F19.04 can save the modified frequency to F19.03 at power loss. • When set F19.00 as 4 and 5, 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, adjusted by ▲ and ▼ keys on the display panel. The initial value is set by F19.03. 2: Digital setting 2, adjusted by terminal UP/DN. The initial value is set by F19.03. 3: Digital setting 3, set by SCI communication. The initial value is 0. 4: AI analogue setting. 5: Terminal pulse setting. 6: Process PID output.	

No.	Name Description	Range【factory setting】
F19.01	**Master/Auxiliary setting calculation**	**0—5【0】**
	It defines the calculating relationship between the final setting frequency and the master/auxiliary freqeuency. 0: Master setting + auxiliary setting. 1: Master setting − auxiliary setting. 2: MAX (master setting, auxiliary setting). 3: MIN (master setting, auxiliary setting). 4: Master setting + auxiliary setting × master setting /maximum value of master setting. 5: Master setting – auxiliary setting × master setting /maximum value of master setting.	
F19.02	**Analogue auxiliary setting coefficient**	**0.00—9.99【1.00】**
	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, F19.02 is enabled.	
F19.03	**Initial value of digital auxiliary frequency**	**0.00—F00.06【0.00】**
	Only when F19.00 = 1 or 2 will F19.03 be enabled and provide the initial value for the two methods.	
F19.04	**Control selection of digital auxiliary frequency**	**00—11【00】**
	Only when F19.00 = 1 or 2 will F19.04 be enabled. **Units: 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. **Tens: 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.	
F19.05	**Adjustment selection of setting frequency**	**0—2【1】**
F19.06	**Adjustment coefficient of setting frequency**	**0.0—200.0【100.0%】**
	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 = master setting frequency + auxiliary setting frequency. 1: To adjust as per the max. output frequency of F00.06. • Setting frequency = (master setting frequency + auxiliary setting frequency) + F00.06 × (F19.06 - 100%). 2: To adjust as per the current frequency. • Setting frequency = (master setting frequency + auxiliary setting frequency) × F19.06.	
F19.07	**Control selection of cooling fan**	**0—2【0】**
F19.08	**Cooling fan controls delaying time**	**0.0—600.0【30.0s】**
	0: Auto stop mode. • The fan runs all the time when the inverter is in running status. After the inverter stops for the time set by F19.08, the fan stops if the inverter is not overheated. The fan will continue running if the overheat protection is activated. 1: Immediate stop mode. The fan runs all the time when the inverter is in running status and stops when the inverter stops. 2: The fan runs continuously when power on. The fan runs continuously after the inverter is switched on.	
F19.09	**Droop control**	**0.00—10.00【0.00Hz】**
	This function is used in the application that several inverters drive one motor. The function can make the inverters share the load equally. When the load of one inverter is heavier, this inverter will reduce its output frequency to shed part of the load according to the setting of F19.09.	

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

Refer to below figure for the details.

Fcmd1 = Final setting frequency 1

Fcmd2 = Final setting frequency 2

Fstart = Start DWELL frequency (parameter F02.02)

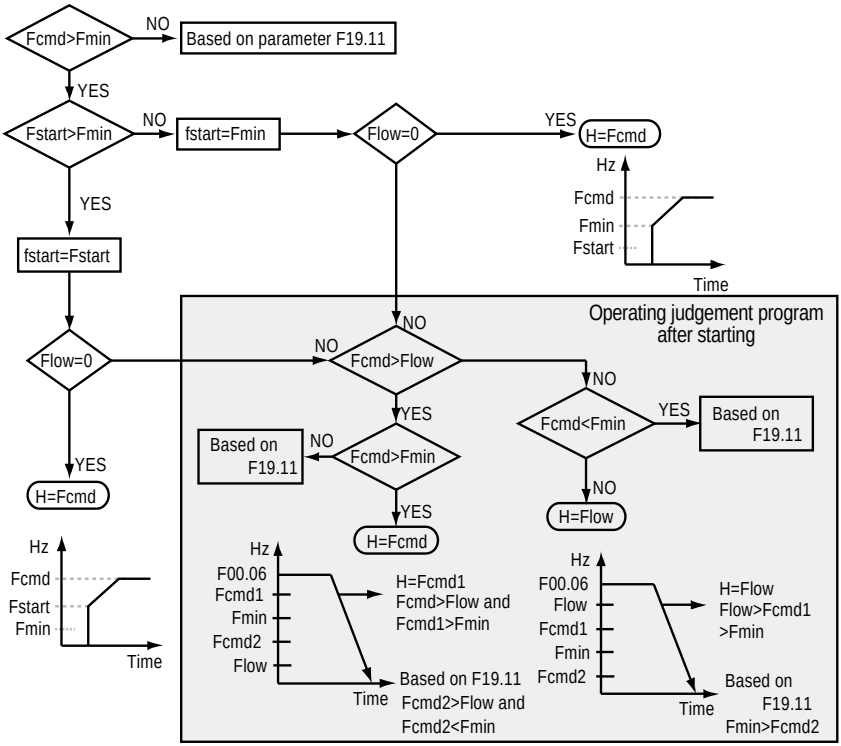
fstart = Actual start DWELL frequency

Flow = Lower limit frequency (parameter F00.09)

H = Target frequency

Fmin = Zero-frequency threshold (parameter F19.10)

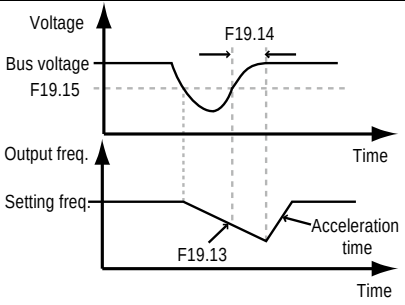
Judgement program at instantaneous start



No.	Name Description	Range【factory setting】
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.

<table>
<tr><th>No.</th><th>Name Description</th><th>Range【factory setting】</th></tr>
<tr><td>F19.12</td><td colspan="2">Trip-free selection at momentary power loss</td><td>0,1【0】</td></tr>
<tr><td></td><td colspan="2">0: This function is disabled.
1: This function is enabled. And low-voltage compensation is activated.
• If the bus voltage is lower than F19.15, the inverter will decrease the operating frequency according to F19.13.
• If the bus voltage is higher than F19.15 and maintains the voltage rise diagnosis time (F19.14), the inverter will reset the setting frequency to run. Otherwise, the inverter will continue to decrease the running frequency.</td><td> 
</td></tr>
<tr><td>F19.13</td><td colspan="2">Deceleration time at voltage compensation</td><td>0.1—6000.0【5.0s】</td></tr>
<tr><td></td><td colspan="3">If F19.13 is set too big, the feedback energy of motor will be too small to achieve voltage compensation effect. If F19.13 is set too small, the feedback energy of motor will be too large and overvoltage protection might be activated.</td></tr>
<tr><td>F19.14</td><td colspan="2">Voltage rise diagnosis time of trip-free operation at momentary power loss</td><td>0.00—10.00【0.10s】</td></tr>
<tr><td>F19.15</td><td colspan="2">Reference voltage of trip-free operation at momentary power loss</td><td>0—1200V
【220V inverter: 248V】
【380V inverter: 430V】
【660V inverter: 747V】</td></tr>
</table>

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.

<table>
<tr><th>No.</th><th>Name Description</th><th>Range【factory setting】</th></tr>
<tr><td>F19.16</td><td>Restart after power failure</td><td>0,1【0】</td></tr>
<tr><td></td><td colspan="2">0: This function is disabled.
1: This function is enabled. In the terminal two-wire control mode and suddenly power failure during running process, when the inverter is powered on again and the terminal is still enabled, it will wait certain time defined by F19.17 and then start operation automatically.</td></tr>
<tr><td>F19.17</td><td>Delay time for restart after power failure</td><td>0.00—10.00【2.00s】</td></tr>
</table>

Protection of stall overvoltage (F19.18—F19.19)

During deceleration, the motor's decelerate rate may be lower than that of the inverter's output frequency due to the load inertia. At this time, the motor will feed the energy back to the inverter, resulting in voltage rise on the inverter's DC bus. If no measures taken, the inverter will trip due to overvoltage.

No.	Name Description	Range【factory setting】
F19.18	**Protection of stall overvoltage**	**0,1【0】**
	0: Disabled. The dynamic braking unit and braking resistor are recommended to be installed if F19.18 is set to 0. 1: Enabled. During the deceleration, the inverter detects the bus voltage and compares it with the stall overvoltage point defined by F19.18. • If the detecting bus voltage exceeds F19.19 (stall overvoltage point), the inverter will stop reducing its output frequency. When detect again, if the bus voltage becomes lower than F19.19, the deceleration continues. **Note: If stall overvoltage lasts more than 1 minute, the inverter will alarm fault (E0007). And at this time, the inverter stops output.**	
F19.19	**Stall overvoltage point**	**0—1200V** **【220V inverter: 390V】** **【380V inverter: 740V】** **【660V inverter: 1150V】**
	If the stall overvoltage point is set a little lower, deceleration time should be comparatively longer.	

Auto current limiting function (F19.20—F19.22)

Auto current limiting function is used to limit the load current in real time smaller than the auto current limiting threshold (F19.21). Therefore the inverter will not trip due to surge current. This function is especially suitable for applications with big load inertia or big change of load.

In auto current limiting process, the inverter's output frequency may change; therefore, it is recommended not to enable this function when stable output frequency is required.

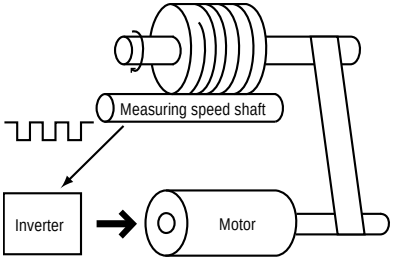
No.	Name Description	Range【factory setting】
F19.20	**Auto current limiting selection**	**0—2【1】**
	0: Disabled. 1: Enabled in acceleration/deceleration operating process, but disabled in constant speed operating process. 2: Enabled both in acceleration/deceleration operating process and in constant speed operating process. • When the auto current limiting function is enabled, the output overload capacity will impaired if auto current limiting threshold is set too low.	
F19.21	**Auto current limiting threshold**	**20.0—200.0** **【G：150%】 【P：110%】**
	F19.21 defines the threshold of auto current limiting. It is a percentage of the inverter's rated current.	
F19.22	**Deceleration time at auto current limiting**	**0.0—6000.0** **【15kW and below: 10.00s】** **【18.5—55kW inverter: 30.00s】** **【75kW and above: 60.00s】**
	F19.22 defines the speed rate for the output frequency adjustment at auto current limiting action. • If the setting is too small, it will not be easy to over the auto current limiting status and finally result in overload fault. • If the setting is too big, the frequency will change too sharply and therefore, the inverter may be in generating status for a long time, which may result in overvoltage protection. • If F19.22 is set to 0, it will not decelerate at current limiting.	
F19.23	**Enabled mode of terminal run command**	**0,1【0】**
	0: Rise edge enabled mode. • For many applications, the inverter is not allowed to auto-run to avoid device damage and ensure safety due to no person interference at power on. In these applications, when the inverter's power is initialized and ready to run, it can not start to run until the terminal run command is given. 1: Level enabled mode. • For certain applications, when ensured personal safety and device safety it need the inverter immediately run at power on in order to provide automation and efficiency. In these application, the inverter will immediately run as soon as the terminal run command is given whether before or after power on.	

Braking unit (F19.24—F19.25)

No.	Name Description		Range【factory setting】
F19.24	Action voltage of braking unit	220V inverter	330—400【380V】
		380V inverter	630—750【720V】
		660V inverter	850—1200【1130V】
	Note: Only in inverter running status the braking is enabled.		
F19.25	Reserved		

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.

No.	Name Description	Range【factory setting】
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】
	0: Auto-clear. 1: No change.	
F19.34	Record of length disposal at stop	0,1【0】
	0: Auto-clear. 1: No change.	
F19.35	Reserved	
F19.36	Reserved	
F19.37	Reserved	
F19.38	Reserved	

6.2.21 Group F20 Protection of Fault Parameters

Overload fault (F20.00－F20.02)

No.	Name Description	Range【factory setting】
F20.00	**Overload pre-alarm detection**	**00000－11111【00000】**
	Units: Overload pre-alarm detection • 0: It is active all the time in running status. • 1: It is active only at constant speed. **Tens: 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. **Hundreds: Overload threshold selection** • 0: Ratio of load current to the motor's rated current (alarm: motor overload "E0019"). • 1: Ratio of load current to the inverter's rated current (alarm: inverter overload "E0017"). **Thousands: Motor type selection** • 0: Standard motor. As the cooling effect of the standard motor deteriorates at low speed, the inverter will automatically make regulation to the motor overload protection time. • 1: Variable frequency. The cooling effect of the variable frequency motor is not affected by the motor's speed due to its forced cooling potential, the inverter will not automatically make regulation to the motor overload protection time, as efficient motor cooling by an external motor fan is assumed. **Ten thousands: Overload protection** • 0: Overload protection is enabled. • 1: Overload protection is disabled.	
F20.01	**Overload pre-alarm detection threshold**	**20.0－200.0【150.0%】**
	F20.01 defines the current threshold for overload pre-alarm protection. The setting range is a percentage value of the motor's or the inverter's rated current	
F20.02	**Overload pre-alarm detection time**	**0.0－60.0【5.0s】**
	F20.02 defines the time during which the inverter output current exceeds overload pre-alarm detection threshold (F20.01). If the status remains after overload pre-alarm detection time (F20.02), the inverter will output pre-alarm signal.	

Inverter output load-loss detection fault (F20.03－F20.05)

No.	Name Description	Range【factory setting】
F20.03	**Inverter output load-loss detection**	**0－4【0】**
	0: Disabled. It does not detect inverter 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%】**
	F20.04 defines the current threshold of load-loss. It is a percentage of the inverter's rated current.	
F20.05	**Inverter output load-loss detection time**	**0.00－20.00【1.00s】**
	If the inverter's output current is smaller than the load-loss detection threshold (F20.04) beyond the time defined by load-loss detection time (F20.05), the inverter will alarm inverter load-loss fault (E0018). • When F20.04 or F20.05 is set to 0, the inverter will not detect load loss fault.	

Motor overheating fault (F20.06—F20.07)

It can connect the electronic thermistor embedded motor stator coils to the inverter's analogue input in order to protect motor overheating. The connection is shown as the figure of parameter F16.04.

No.	Name Description	Range【factory setting】
F20.06	**Motor overheating signal input type**	**0—2【0】**
	0: Does not detect the motor overheating. 1: Positive charateristic (PTC). 2: Negative charateristic (NTC). **Note: Only when using HD30-EIO will F20.06 be enabled. It need correctly set the jumpers of CN3 and CN4 to detect the motor overheating.**	
F20.07	**Thermistor value at motor overheating**	**0—10.0【5.0kΩ】**

Input and output phase loss fault (F20.08—F20.11)

No.	Name Description	Range【factory setting】
F20.08	**Input phase loss detection reference**	**0—50【30%】**
F20.09	**Input phase loss detection time**	**1.00—5.00【1.00s】**
	F20.08 value is a percentage of the inverter's rated voltage. When the inverter detects certain input voltage not hit the preset detection reference (F20.08) and exceed the preset detection time (F20.09), the inverter will perform input phase loss alarm (E0015). • When F20.08 or F20.09 is set to 0, the inverter will not detect input phase loss fault.	
F20.10	**Output phase loss detection reference**	**0—50【20%】**
F20.11	**Output phase loss detection time**	**0.00—20.00【3.00s】**
	F20.10 value is a percentage of the inverter's rated current. When the inverter detects certain output current not hit the preset detection reference (F20.10) and exceed the preset detection time (F20.11), the inverter will perform output phase loss alarm (E0016). • When F20.10 or F20.11 is set to 0, the inverter will not detect output phase loss fault.	

PID reference and feedback loss fault (F20.12—F20.17)

No.	Name Description	Range【factory setting】
F20.12	**PID reference lose detected value**	**0—100【0%】**
F20.13	**PID reference loss detection time**	**0.0—10.0【0.20s】**
	F20.12 value is a percentage of the maximum reference source. If the PID reference value is lower than the detected value (F20.12) in the detection time〈F20.13〉, the inverter will alarm E0025 fault (PID reference loss). • When F20.12 or F20.13 is set to 0, the inverter will not detect PID reference loss fault.	
F20.14	**PID feedback loss detected value**	**0—100【0%】**
F20.15	**PID feedback loss detection time**	**0.0—10.0【0.20s】**
	F20.14 value is a percentage of the maximum feedback source. If the PID feedback value is lower than the detected value (F20.14) in the detection time (F20.15), the inverter will implement PID feedback loss alarm (E0026). • When F20.14 or F20.15 is set to 0, the inverter will not detect PID feedback loss fault.	

Fault at PID feedback value out of the limit (F20.16—F20.17)

No.	Name Description	Range【factory setting】
F20.16	**Detection value at PID feedback out of the limit**	**0—100【100%】**
F20.17	**Detection time at PID feedback out of the limit**	**0.00—10.00【0.20s】**
	F20.16 value is a percentage of the maximum feedback source. If the PID feedback value exceed the detection value (F20.16) in the detection time (F20.17), the inverter will alarm PID feedback out of limiting (E0027). • When F20.16 or F20.17 is set to 0, the inverter will not detect PID feedback out of limiting fault.	

Faulted auto reset function and faulted relay action (F20.18—F20.20)

Auto reset function enables the inverter to reset the fault as per the preset times (F20.18) and interval (F20.19).

During the reset interval, the inverter stops output and it will automatically restarts with flying start mode.

The following faults do not have the auto reset function:

E0008: Power modular fault
E0010: Braking unit fault
E0013: Contactor isn't closed at power on
E0014: Current detection circuit fault
E0021: Control board EEPROM read/write fault
E0023: Parameter setting fault
E0024: Peripheral device fault

No.	Name Description	Range【factory setting】
F20.18	**Auto reset times**	**0—100【0】**
F20.19	**Auto reset interval**	**2.0—20.0【5.0s/times】**
	When F20.19 = 0, it means "auto reset" is disabled and the protective device will be activated in case of fault. • 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】**
	Units: In auto reset process • 0: Faulted relay doesn't act. • 1: Faulted relay acts. **Tens: In the undervoltage process** • 0: Faulted relay doesn't act. • 1: Faulted relay acts. **Note: It need preset the relay function as No. 31 function.**	

Fault history (F20.21—F20.37)

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.

No.	Name Description	Range【factory setting】
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	

6.2.22 Group F21 Reserved

6.2.23 Group F22 Reserved

6.2.24 Group F23 PWM Control Parameters

<table>
<tr><th>No.</th><th>Name Description</th><th>Range【factory setting】</th></tr>
<tr><td>F23.00</td><td>Set the carrier frequency</td><td>1—16kHz【dependent on inverter model】</td></tr>
<tr><td></td><td colspan="2">F23.00 defines the carrier frequency of PWM output wave.
<table>
<tr><td>Inverter power</td><td>Setting range</td><td>Factory setting</td></tr>
<tr><td>0.2—22kW</td><td>1k—16kHz</td><td>8kHz</td></tr>
<tr><td>30kW—45kW</td><td>1k—12kHz</td><td>6kHz</td></tr>
<tr><td>45kW</td><td>1k—6kHz</td><td>4kHz</td></tr>
<tr><td>55kW and above</td><td>1k—4kHz</td><td>2kHz</td></tr>
</table>
• The carrier frequency will affect the operating noise of the motor. The higher the carrier frequency, the lower the noise made by the motor. Please properly set the carrier frequency.
• When the value is higher than the factory setting, the inverter should be derated by 5% when per 1kHz is increased compared to the factory setting.</td></tr>
<tr><td>F23.01</td><td>Reserved</td><td></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>
</table>

6.3 Group U User Menu Mode Display Parameters

When the user select fewer function parameters which is scattered in the function menu, the user can map the function menu to the user menu. Then the user can only operate in the user menu to read and write the required function parameters. It not only can avoid the frequently switch among the parameter groups but also can arrange the menu order according to our own habits. That will be much easier to memory and operate. Refer to Appendix B about the record.

The concrete use is illustrated as the following example:

If you want to map F00.13 (starting frequency digital setting) to the user menu map 1 (U00.00), you only need to set U00.00 as 00.13 (corresponding to F00.13) and then you can directly control F00.13 via read-write U00.01 (setting value of map 1), which is the same effect as the direct operation of F00.13.

No.	Name Description	Range【factory setting】
U00.00	User menu map of setting 1	00.00－23.02，99.99【00.01】
U00.02	User menu map of setting 2	00.00－23.02，99.99【00.06】
U00.04	User menu map of setting 3	00.00－23.02，99.99【00.08】
U00.06	User menu map of setting 4	00.00－23.02，99.99【00.13】
U00.08	User menu map of setting 5	00.00－23.02，99.99【00.10】
U00.10	User menu map of setting 6	00.00－23.02，99.99【00.11】
U00.12	User menu map of setting 7	00.00－23.02，99.99【02.13】
U00.14	User menu map of setting 8	00.00－23.02，99.99【03.01】
U00.16	User menu map of setting 9	00.00－23.02，99.99【03.02】
U00.18	User menu map of setting 10	00.00－23.02，99.99【08.00】
U00.20	User menu map of setting 11	00.00－23.02，99.99【08.01】
U00.22	User menu map of setting 12	00.00－23.02，99.99【08.02】
U00.24	User menu map of setting 13	00.00－23.02，99.99【08.03】
U00.26	User menu map of setting 14	00.00－23.02，99.99【08.04】
U00.28	User menu map of setting 15	－
U00.30	User menu map of setting 16	－
	If set as 99.99, there is no parameter map function.	
U00.01	The setting value of map 1	The same as the selected parameter【0】
U00.03	The setting value of map 2	
U00.05	The setting value of map 3	
U00.07	The setting value of map 4	
U00.09	The setting value of map 5	
U00.11	The setting value of map 6	
U00.13	The setting value of map 7	
U00.15	The setting value of map 8	
U00.17	The setting value of map 9	
U00.19	The setting value of map 10	
U00.21	The setting value of map 11	
U00.23	The setting value of map 12	
U00.25	The setting value of map 13	
U00.27	The setting value of map 14	
U00.29	The setting value of map 15	

No.	Name Description	Range【factory setting】
U00.31	The setting value of map 16	

6.4 Group y Manufacturer Function Parameters

The Group y is the manufacturer parameters group for debugging at the factory before delivery.

Chapter 7 Troubleshooting

HD30 series inverter has inbuilt protective and warning self-diagnostic functions. If a fault occurs, the fault code will be displayed on the display panel. At the same time, fault relay acts, accordingly the inverter stops output and the motor coasts to stop.

When fault or alarm occurs, please record the fault details and take proper actions according to the below Table 7-1. If you need some technical help, please contact to the suppliers or directly call Shenzhen Hpmont Technology Co., Ltd.

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

1. Display panel.
2. External reset terminal (multi-function terminal set as No. 46 function).
3. Communication.
4. Switching on the inverter after switching off.

Table 7-1 Fault alarm description and counter-measures

Fault code	Fault name	Possible reasons of fault	Counter-measures
-Lu-	DC bus undervoltage	• At the begining of powering on and at the end of powering off • Input voltage is too low • Improper wiring leads to undervoltage of hardware	• It is normal status of powering on and powering off • Please check input power voltage • Please check wiring and wire the inverter properly
E0001	Inverter output overcurrent (in acceleration process)	• Improper connection between inverter and motor • Improper motor parameters • The rating of the used inverter is too small • Acceleration/deceleration time is too short • Instant stop occurs, the running motor is restarted	• Connect the inverter and motor properly • Please set correct motor parameters (F08.00－F08.04、F13.01－F13.05) • Select inverter with higher rating • Please set proper acceleration time and deceleration time (F03.01－F03.08) • Please set start mode to be speed tracking (F02.00=2)
E0002	Inverter output overcurrent (in deceleration process)		
E0003	Inverter output overcurrent (in constant speed process)		
E0004	DC bus over voltage (in acceleration process)	• Input voltage is too high • Deceleartion time is too short • Improper wiring leads to overvoltage of hardware • Instant stop occurs, the running motor is restarted • Improper selection of the braking devices	• Please check power input • Please set a proper value for deceleration time (F03.02、F03.04、F03.06、F03.08) • Please check wiring and wire the inverter properly • Please set start mode to be speed tracking (F02.00=2) • Select according to the recommended braking devices of user manual
E0005	DC bus over voltage (in deceleration process)		
E0006	DC bus over voltage (in constant speed process)		

Fault code	Fault name	Possible reasons of fault	Counter-measures
E0007	Stall overvoltage	• Bus voltage is too high • The setting of stall overvoltage is too low.	• Please check power input or the function of brake • Set the value of stall overvoltage properly
E0008	Fault of power module	• Short circuit between phases output • Short circuit to the ground • Output current is too high • Power module is damaged	• Please check the connection and connect the wire properly • Please check the connection and connect the wire properly • Please check the connection and mechanism • Please contact the supplier for repairing
E0009	Heatsink overheat	• Ambient temperature is too high • Inverter external ventilation is not good • Fan fault • Fault occurs to temperature detection circuit	• Please use inverter with higher power capacity • Improve the ventilation around the inverter • Replace the cooling fan • Please seek technical support
E0010	Fault of braking unit	• Circuit fault of braking unit	• Please seek technical support
E0011	CPU fault	• CPU abnormal	• Please detect at power on after completely power outage • Please seek technical support
E0012	Parameters auto-tuning fault	• Parameter auto-tuning is time out	• Please check the motor's connection • Input the correct motor parameters (F08.00－F08.04、F13.01－F13.05) • Please seek technical support
E0013	Contactor is not actuated	• Contactor fault • Fault of control circuit	• Replace the contactor • Please seek technical support
E0014	Fault of current detection circuit	• Current detection circuit is damaged	• Please contact the supplier for repairing
E0015	Fault of input phase	• For three-phase input inverter, input phase loss fault occurs to power input	• Please check the three-phase power input • Please seek technical support
E0016	Fault of output phase	• Output phase disconnection or loss • Heavy imbalance of inverter's three-phase load	• Please check the connection between inverter and motor • Please check the quality of motor

Fault code	Fault name	Possible reasons of fault	Counter-measures
E0017	Inverter overload	• Acceleration time is too short • Improper setting of V/f curve or torque boost leads to over current • Instant power-off occurs, the running motor is restarted • Mains supply voltage is too low • Motor load is too high	• Adjust acceleration time (F03.01、F03.03、F03.05、F03.07) • Adjust V/f curve (F09.00—F09.06) or torque boost (F09.07, F09.08) • Please set start mode to be speed tracking (F02.00=2) • Please check mains supply voltage • Please use inverter with proper power rating
E0018	Inverter output is unloaded	• Load disappeared or comes down suddenly • Parameters are not set properly	• Please check load and mechanical transmission devices • Please 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's overload protection factor is not set properly • Motor runs with blocked torque or load is too heavy	• Adjust the setting of V/f curve (F09.00—F09.06) • Check the power input • Please use special motor if the motor needs to operate for a long time with heavy load • Please properly set the overload protection factor of the motor • Please check the load and mechanical transmission devices
E0020	Motor overheat	• Motor overheat • The setting of motor paramteters is incorrect	• Reduce the load; Repaire or replace the motor; Increase the acceleration/deceleration time (F03.01—F03.08) • Set the motor parameter (F08.00—F08.04、F13.01—F13.05)
E0021	Access fault of Control board EEPROM	• Memory circuit fault of control board EEPROM	• Please contact the supplier for repairing
E0022	Access fault of display panel EEPROM	• Memory circuit fault of display panel EEPROM	• Replace the display panel • Please contact the supplier for repairing
E0023	Fault 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 • Please set correct value of motor parameters (F08.00—F08.04、F13.01—F13.05)
E0024	Fault of external equipment	• Fault terminal of external equipment operates	• Please check external equipment

Mark: E0022 doesn't affect the inverter normal operation.

Fault code	Fault name	Possible reasons of fault	Counter-measures
E0025	PID reference loss	• Analogue reference signal is smaller than F20.12 • Analogue input circuit fault	• Please check the connection • Please seek technical support
E0026	PID feedback loss	• Analogue setting signal is smaller than F20.14 • Analogue input circuit fault	• Please check the connection • Please seek technical support
E0027	PID feedback out of limiting	• Analogue setting signal is bigger than F20.16 • Analogue input circuit fault	• Please check the connection • Please seek technical support
E0028	SCI communication time-out	• Connection fault of Communication cable • Disconnected or not well connected	• Please check the connection
E0029	SCI communication error	• Connection fault of Communication cable • Disconnected or not well connected • Communication setting error • Communication data error	• Please check the connection • Please check the connection • Please correctly set the communication format (F17.00) and the baud rate (F17.01) • Send the data according to MODBUS protocol

Chapter 8 Maintenance

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

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

Danger

- Only a trained and qualified professional person can maintain the inverter.
- Maintenance personnel should take off all metal jewellery before carrying out maintenance or internal measurements in the inverter. Suitable clothes and tools must be used.
- High voltage exists when the inverter is powered up or running.
- Checking and maintaining can only be done after the inverter's AC power is cut off and wait for at least 10 minutes. The cover maintenance can only be done after ensured that the charge indicator inside the inverter and the indicators on the display panel are off and the voltage between main circuit power terminals (+) and (-) is below 36V.

Warning

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

8.1 Daily Maintenance

The inverter must be operated in the specified environment (refer to section 3.2, page 11). Besides, some unexpected accidents may occur during operation.

Therefore you should maintain the inverter conditions according to the Table 8-1, record the operation data, and investigate problems immediately.

Table 8-1 Daily checking items

Items	Content	Criteria
Operating environment	Temperature and humidity	-10－+40℃, derating at 40－50℃
	Dust and water dripping	No water dripping
	Gas	No strange smell
Inverter	Oscillation and heating	Stable oscillation and proper temperature
	Noise	No abnormal sound
Motor	Heating	No overheating
	Noise	Low and regular noise
Operating status parameters	Output current	Within rated range
	Output voltage	Within rated range

8.2 Periodical Maintenance

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

General Inspection:

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

Note:

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

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

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

8.3 Replacing Damaged Parts

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

Cooling fan

Life: 60,000 hours.

Possible cause of damages: Wear of the bearing, aging of the fan vanes.

Criteria: After the inverter is switched off, check if the abnormal conditions such as crack existing on fan vanes and other parts. When the inverter is switched on, check if inverter running is normal, and check if there is any abnormal oscillation.

Electrolytic capacitors

Life: 50,000 hours

Possible cause of damages: High ambient temperature, aging of electrolyte and large pulse current induced by rapid changing loads.

Criteria: Check if frequent overcurrent or overvoltage failures occur during inverter start-up with load. Check if there is any leakage of liquids. Check if the safety valve protrudes. Measure the static capacitance and insulation resistance.

8.4 Unwanted Inverter Recycling

When disposing the inverter, please pay attention to the following factors:

The capacitors may explode if they are burnt.

Poisonous gas may be generated when the plastic parts like front covers are burnt.

Disposing method: Please dispose unwanted inverters as industrial waste.

Chapter 9 Options

9.1 Extension I/O Card (HD30-EIO)

HD30 series inverters using with extension I/O card (HD30-EIO) can achieve the extension of analogue input, digital input and relay contact output, shown as Figure 9-1.

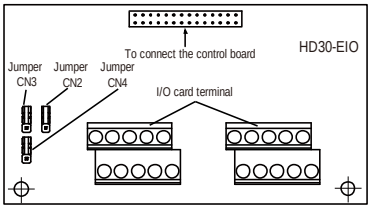


Figure 9-1 Extension I/O card

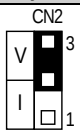
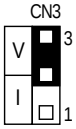
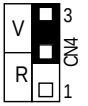
9.1.1 Terminal Description of Extension I/O Card

Figure 9-2 Extension I/O card terminal layout

Table 9-1 Extension I/O card terminal function description

Item	Terminal	Name	Function description
Analogue input	AI3	Analogue input	Input voltage/current are selectable Input voltage range: -10V－10V (input impedance 32kΩ); Input current range: 0－20mA (input impedance 500Ω)
	AI4+	Analogue differential input	Input voltage/current are selectable Input voltage range: -10V－10V (input impedance 34kΩ); Input current range: 0－20mA (input impedance 500Ω)
	AI4-		
Digital input	DI7－DI9	Digital input 7－9	Programmable bipolar optional input signal Input voltage range: 0－30VDC Input impedance: 4.7kΩ
Relay output	R2A/R2B/R2C	Relay contact output	Programmable output, contact rating: 250VAC/3A or 30VDC/1A RB、RC: Normally closed; RA、RC: Normally open
	R3A/R3B/R3C		
	R4A/R4B/R4C		
Power supply	GND	Analogue ground	Analogue ground, isolated to COM
	P24	+24V power	Digital input use the +24V, maximum allowable output current is 200mA
	SEL	Digital input common terminal	Defaulted the SEL and the P24 are short connected. When using the external power to drive the DI7－DI9, it need disconnect the SEL and the P24
	COM	Digital reference ground	Digital ground

9.1.2 Wire Jumper Description of Extension I/O Card

Jumper	Function and setting description	Factory setting
CN2	AI3 analogue input channel can select voltage or current signal: When pin 1 and pin 2 of the CN2 are short-circuited, AI3 channel inputs voltage singal; When pin 2 and pin 3 of the CN2 are short-circuited, AI3 channel inputs current singal.	
CN3	AI4 analogue input channel can select voltage or current signal: When pin 1 and pin 2 of the CN3 are short-circuited, AI4 channel inputs voltage singal; When pin 2 and pin 3 of the CN3 are short-circuited, AI4 channel inputs current singal. **Note: Need to short-circuits pin 2 and pin 3 of the CN4.**	
CN4	AI4 analogue input channel can select thermistor: When pin 1 and pin 2 of the CN4 are short-circuited, AI4 by external thermistor as motor overheat detection signal input; When pin 2 and pin 3 of CN4 are short-circuited, AI4 channel inputs reference analogue.	

9.1.3 Terminal Connection of Extension I/O card

Wiring of analogue input terminal

AI3 with the AI2 of control terminal has same wiring, see analog input terminal of the section 4.4.4 Control Terminal Connection, shown as Figure 4-20.

When AI4 is used as reference analogue input terminal, the wiring is shown as Figure 9-3 and AI4+ as analogue signal input.

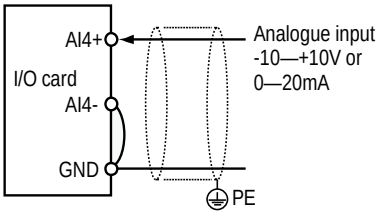


Figure 9-3 Wiring of AI4 selected analogue input terminal

When AI4 is used as motor overheat detection signal input terminal, the wiring is shown as Figure 9-4. Motor stator coil embedded of the thermistor connected to the analog input, and need to set jumper correctly.

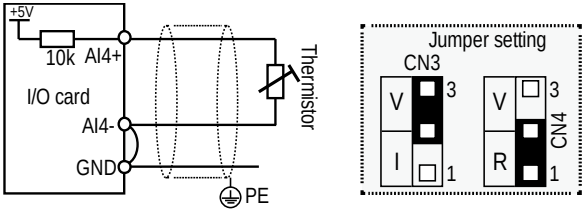


Figure 9-4 Wiring of AI4 as over-heated signal detection input terminal

Wiring of digital input terminal

Extension I/O card digital input terminals (DI7—DI9) have the same connection with control board digital input terminals (DI1—DI6), please refer to section 4.4.4 digital input terminal wiring of Control Terminal Connection.

9.2 Plastic Interface Card (HD30-PIO)

HD30 series inverters can use plastic interface card (HD30-PIO), HD30-PIO is specific development for injection molding machine industry, mainly provide two way isolated selectable sampling 0－24V voltage, 0－1A current signal analogue input channels

Terminal arrangement is shown as Figure 9-5 and the terminal functions are as Table 9-2.

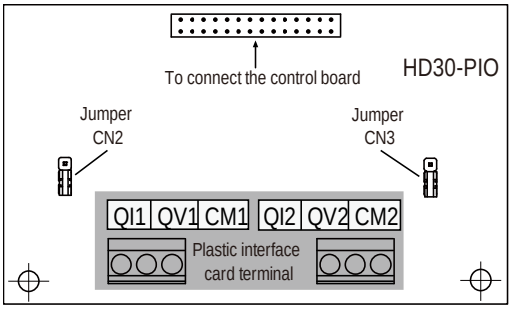


Figure 9-5 HD30-PIO

Table 9-2 HD30-PIO function description

Item	Terminal	Name	Description	Reference function
Channel 1	QI1－CM1	Current input	Input: 0－1A	Reference function AI3
	QV1－CM1	Voltage input	Input: 0－24V	
Channel 2	QI2－CM2	Current input	Input: 0－1A	Reference function AI4
	QV2－CM2	Voltage input	Input: 0－24V	

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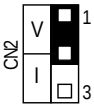
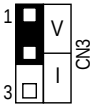
HD30-PIO jumper description is shown as Table 9-3.

Table 9-3 HD30-PIO jumper description

Jumper	Function and setting description	Factory setting
CN2	Analogue input channel 1: When pin 1 and pin 2 of the CN2 are short-circuited, channel 1 inputs voltage; When pin 2 and pin 3 of the CN2 are short-circuited, channel 1 inputs current.	
CN3	Analogue input channel 2: When pin 1 and pin 2 of the CN3 are short-circuited, channel 2 inputs voltage; When pin2 and pin 3 of the CN3 are short-circuited, channel 2 inputs current.	

9.3 Panel Installation Assembly

The panel installation assembly includes mounting base and extension cable.

9.3.1 Mounting Base

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

Model: HD-KMB. The mounting base and its size are shown as Figure 9-6 and the unit is mm.

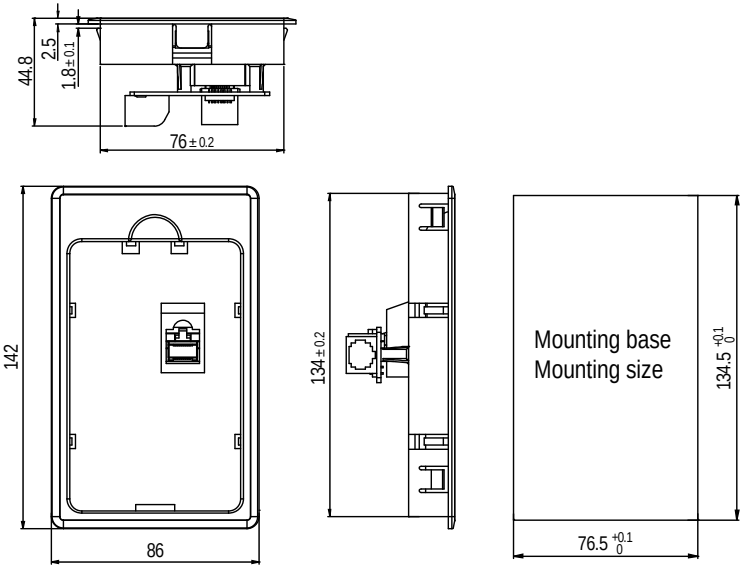


Figure 9-6 Mounting base and its size

9.3.2 Extension Cable

The panel extension cable is an accessory. If needed, please order goods.

The models are as follows:

- 1m extension cable to panel: HD-CAB-1M
- 2m extension cable to panel: HD-CAB-2M
- 3m extension cable to panel: HD-CAB-3M
- 6m extension cable to panel: HD-CAB-6M

9.4 Power Regenerative Unit

Please refer to HDRU Series Power Regenerative Unit User Manual for more details.

9.5 Braking Unit and Braking Resistor Selection

The braking unit has 2 models: HDBU-4T150 (the maximum braking current is 150A) and HDBU-4T250 (the maximum braking current is 250A). If needed, please order goods. Refer to the HDBU Series Dynamic Braking Unit User Manual for more details.

The braking resistor selection is shown as Table 9-4.

The connection of braking unit and the braking resistor is shown as section 4.3.2 of Power Terminal Wiring (page 23).

Table 9-4 Recommendation for the braking unit and braking resistor

Model	Adaptive motor	Braking unit model	Braking resistor resistance	Braking resistor power
HD30-2D0P4G	0.4 kW	Built-in	200－300 Ω	50 W
HD30-2D0P7G	0.75 kW	Built-in	150－250 Ω	80 W
HD30-2D1P5G	1.5 kW	Built-in	100－150 Ω	100 W
HD30-2D2P2G	2.2 kW	Built-in	80－100 Ω	200 W
HD30-2T3P7G	3.7 kW	Built-in	60－80 Ω	300 W
HD30-2T5P5G	5.5 kW	Built-in	40－50 Ω	500 W
HD30-2T7P5G	7.5 kW	Built-in	30－40 Ω	700 W
HD30-2T011G	11 kW	Optional	20－25 Ω	1 kW
HD30-2T015G	15 kW	Optional	15－20 Ω	1.5 kW
HD30-2T018G	18.5 kW	Optional	10－15 Ω	2 kW
HD30-2T022G	22 kW	Optional	10－15 Ω	2.5 kW
HD30-2T030G	30 kW	Optional	8－10 Ω	3 kW
HD30-2T037G	37 kW	Optional	6－8 Ω	3.5 kW
HD30-2T045G	45 kW	HDBU-4T150	4－6 Ω	4.5 kW
HD30-2T055G	55 kW	HDBU-4T150	4－6 Ω	4.5 kW
HD30-2T075G	75 kW	HDBU-4T250	4－6 Ω *2	4.5 kW *2

Model	Adaptive motor	Braking unit model	Braking resistor resistance	Braking resistor power
HD30-4T0P7G	0.75 kW	Built-in	250－350 Ω	100 W
HD30-4T1P5G	1.5 kW	Built-in	200－300 Ω	200 W
HD30-4T2P2G	2.2 kW	Built-in	150－250 Ω	250 W
HD30-4T3P7G/5P5P	3.7/5.5 kW	Built-in	100－150 Ω	300 W
HD30-4T5P5G/7P5P	5.5/7.5 kW	Built-in	80－100 Ω	500 W
HD30-4T7P5G/011P	7.5/11 kW	Built-in	60－80 Ω	700 W
HD30-4T011G/015P	11/15 kW	Built-in	40－50 Ω	1 kW
HD30-4T015G/018P	15/18.5 kW	Built-in	30－40 Ω	1.5 kW
HD30-4T018G/022P	18.5/22 kW	Built-in	25－30 Ω	2 kW
HD30-4T022G/030P	22/30 kW	Optional	20－25 Ω	2.5 kW
HD30-4T030G/037P	30/37 kW	Optional	15－20 Ω	3 kW
HD30-4T037G/045P	37/45 kW	Optional	15－20 Ω	3.5 kW
HD30-4T045G/055P	45/55 kW	Optional	10－15 Ω	4.5 kW
HD30-4T055G/075P	55/75 kW	Optional	10－15 Ω	5.5 kW
HD30-4T075G/090P	75/90 kW	HDBU-4T150	8－10 Ω	7.5 kW
HD30-4T090G/110P	90/110 kW	HDBU-4T150	8－10 Ω	9 kW
HD30-4T110G/132P	110/132 kW	HDBU-4T150	6－8 Ω	11 kW
HD30-4T132G/160P	132/160 kW	HDBU-4T250	6－8 Ω	13.2 kW
HD30-4T160G/200P	160/200 kW	HDBU-4T250	4－6 Ω	16 kW
HD30-4T200G/220P	200/220 kW	HDBU-4T250	4－6 Ω	20 kW
HD30-4T220G/250P	220/250 kW	HDBU-4T250 *2	6－8 Ω *2	11 kW *2
HD30-4T250G/280P	250/280 kW	HDBU-4T250 *2	6－8 Ω *2	12.5 kW *2
HD30-4T280G/315P	280/315 kW	HDBU-4T250 *2	4－6 Ω *2	14 kW *2
HD30-4T315G/355P	315/355 kW	HDBU-4T250 *2	4－6 Ω *2	16 kW *2
HD30-4T355G/400P	355/400 kW	HDBU-4T250 *3	4－6 Ω *3	11 kW *3
HD30-4T400G/450P	400/450 kW	HDBU-4T250 *3	4－6 Ω *3	14 kW *3
Remark: *2 or *3 is meaning 2 or 3 parallel way.				

9.6 Reactor Selection

The reactor selections are shown as Table 9-5 and Table 9-6.

Table 9-5 AC reactor selection

Model	AC input reactor		AC output reactor	
	Model	Parameter (mH-A)	Model	Parameter (mH-A)
HD30-4T037G/045P	HD-AIL-4T037	0.19-75	HD-AOL-4T037	0.08-80
HD30-4T045G/055P	HD-AIL-4T045	0.16-90	HD-AOL-4T045	0.06-100
HD30-4T055G/075P	HD-AIL-4T055	0.13-115	HD-AOL-4T055	0.04-125
HD30-4T075G/090P	HD-AIL-4T075	0.093-150	HD-AOL-4T075	0.035-160
HD30-4T090G/110P	HD-AIL-4T090	0.08-180	HD-AOL-4T090	0.03-200
HD30-4T110G/132P	HD-AIL-4T110	0.067-210	HD-AOL-4T110	0.02-225
HD30-4T132G/160P	HD-AIL-4T132	0.055-255	HD-AOL-4T132	0.016-280
HD30-4T160G/200P	HD-AIL-4T160	0.046-305	HD-AOL-4T160	0.013-320
HD30-4T200G/220P	HD-AIL-4T200	0.037-380	HD-AOL-4T200	0.011-400
HD30-4T220G/250P	HD-AIL-4T220	0.034-415	HD-AOL-4T220	0.01-450
HD30-4T250G/280P	HD-AIL-4T25	0.026-530	HD-AOL-4T250	0.009-560
HD30-4T280G/315P	HD-AIL-4T280		HD-AOL-4T280	
HD30-4T315G/355P	HD-AIL-4T315	0.023-600	HD-AOL-4T315	0.007-630
HD30-4T355G/400P	HD-AIL-4T355	0.019-760	HD-AOL-4T355	0.006-800
HD30-4T400G/450P	HD-AIL-4T400		HD-AOL-4T400	

Table 9-6 DC reactor selection

Model	DC reactor	
	Model	Parameter (mH-A)
HD30-4T037G/045P	HD-DCL-4T037	0.35-100
HD30-4T045G/055P	HD-DCL-4T045	0.29-120
HD30-4T055G/075P	HD-DCL-4T055	0.23-150
HD30-4T075G/090P	HD-DCL-4T075	0.17-200
HD30-4T090G/110P	HD-DCL-4T090	0.14-240
HD30-4T110G/132P	HD-DCL-4T110	0.12-290
HD30-4T132G/160P	HD-DCL-4T132	0.11-330
HD30-4T160G/200P	HD-DCL-4T160	0.09-400
HD30-4T200G/220P	HD-DCL-4T200	0.07-500
HD30-4T220G/250P	HD-DCL-4T220	0.06-550
HD30-4T250G/280P	HD-DCL-4T250	0.05-700
HD30-4T280G/315P	HD-DCL-4T280	
HD30-4T315G/355P	Built-in	—
HD30-4T355G/400P	Built-in	—
HD30-4T400G/450P	Built-in	—

9.7 Protective Cover

The protective cover is an accessory. If needed, please order goods.

Model: HD-CK-Frame4. The protective cover is applied for Frame1—Frame4 of product models, and each needs 2 protective covers.

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.

❖: It denotes that this parameter is enabled when using corresponding extension option.

A

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
Group d00 Status Display Parameters (refer to pages 54—59)						
d00.00	Series of the inverter	0x10－0x50			*	
d00.01	Software version of the control board	00.00－99.99			*	
d00.02	Reserved					
d00.03	Special software version of the control board	00.00－99.99			*	
d00.04	Reserved					
d00.05	Software version of the display panel	00.00－99.99			*	
d00.06	Custom series No.	0－9999			*	
d00.07	Motor and control mode	Units: Display the current driving motor 0: Motor 1 1: Motor 2 Tens: Control mode 0: V/f control without PG 1: Reserved 2: Vector control without PG			*	
d00.08	Rated current of the inverter	5.5kW or below type: 0.01A 7.5kW or above type: 0.1A			*	
d00.09	Extension function of the inverter	0: Standard inverter			*	
d00.10	Inverter status	Units: Bit0: Inverter fault Bit1: Run/stop Bit2: Forward/reverse Bit3: Zero speed running Tens: Bit1&Bit0: Acceleration/ deceleration/ constant Bit2: Reserved Bit3: DC braking (including start and stop DC braking) Hundreds: Bit0: Parameter auto-tuning Bit1: Reserved Bit2: Speed limiting value Bit3: Reserved Thousands: Bit0: Stall overvoltage			*	

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
		Bit1: Current limiting Bit2: Reserved Bit3: Reserved				
d00.11	Master setting frequency source	0－4			*	
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 acceleration/ deceleration)	0.01－400.00Hz			*	
d00.16	Output frequency	0.01－400.00Hz			*	
d00.17	Setting speed	0－60000rpm			*	
d00.18	Running speed	0－60000rpm			*	
d00.19	Three-phase power supply input sequence phase	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	0－999V			*	
d00.21	Output current	Actual value, unit is 0.1A			*	
d00.22	Reserved					
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 display panel	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			*	

A

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
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	Setting line speed	0－max output line speed			*	
d00.41	Reference line speed	0－max output line speed			*	
d00.42	Reserved					
d00.43	Reserved					
d00.44	Process PID reference	-100.0－100.0%			*	
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 Only using HD30-EIO can the DI7－DI9 be enabled.			*	
d00.51	Output terminal status	Bit0－Bit1 corresponding to DO1－DO2 Bit2－Bit5 corresponding to RLY1－RLY4 0: Output terminal disconnect with common terminal 1: Output terminal connect with common terminal Only using HD30-EIO can the RLY2－RLY4 be enabled.			*	
d00.52	MODBUS communication status	0: Normal 1: Communication timeout 2: Incorrect data frame head 3: Incorrect data frame checking 4: Incorrect data frame			*	

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
		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			*	
Group F00 Basic Parameter (refer to pages 59－62)						
F00.00	Reserved					
F00.01	Control mode selection	0: V/f control without PG 1: Reserved 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	HD30 general extension option selection	0: Option is invalid 1: HD30-EIO is valid 2: Reserved 3: HD30-PIO is valid	0	1	×	
F00.05	HD30 extension application function	0: No extension application	0	1	×	
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	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	0	1	×	

A

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
		3: AI analogue setting 4: Terminal pulse setting				
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 display panel 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	UP/DOWN digital setting control	Units: Frequency setting save selection at power outage 0: Frequency setting will not be saved at power outage 1: Frequency setting will be saved to F00.13 at power outage Tens: Frequency setting control selection at stop 0: Frequency setting will not be restored to F00.13 at stop 1: Frequency setting will be restored to F00.13 at stop Hundreds: Communication setting frequency storage selection 0: Do not save when power is off. 1: Save to F00.13 when power is off. Thousands: Switch the frequency channel to the analogue selection 0: Do not save 1: Save the frequency set by display pane	1001	1	×	
F00.15	Jog operation frequency digital setting 1	0.00－upper limit	5.00Hz	0.01Hz	○	

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
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 display panel	0: Enabled 1: Disabled	0	1	○	
F00.21	Dormant function selection	0: Disabled 1: Enabled	0	1	×	
F00.22	Dormancy wake up time	0.0－360.0s	0.0s	0.1s	○	
Group F01 Protection of Parameters (refer to pages 62－64)						
F01.00	User's password	00000－65535	0	1	○	
F01.01	Menu mode selection	Units: 0: Full menu mode 1: Checking menu mode (Only different from factory setting parameters can be displayed) Tens: 0: Does not lock the parameter mapping relationship of Group U and Group F 1: Lock the parameter mapping relationship of Group U and Group F	10	1	○	
F01.02	Function code parameter initialization	0: No operation 1: Restore to factory settings 2: Download the display panel EEPROM parameter 1 to the current function code settings 3: Download the display panel EEPROM parameter 2 to the current function code settings 4: Clear fault information 5: Download the display panel EEPROM parameter 1 to the current function code	0	1	×	

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
		settings (including the motor parameters). 6: Download the display panel EEPROM parameter 2 to the current function code settings (including the motor parameters).				
F01.03	Display panel EEPROM parameter initialization	0: No operation 1: Upload the current function code settings to the display panel EEPROM parameter 1 2: Upload the current function code settings to the display panel EEPROM parameter 2	0	1	○	
Group F02 Run/Stop Control Parameters (refer to pages 64—68)						
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. If the result of speed tracking is smaller than F02.02, it will start from the starting DWELL frequency	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	Speed tracking mode selection	0: Searching based on residual voltage 1: Searching based on current	0	1	×	
F02.07	Speed search mode based on current	0: From the max. output frequency to start speed searching 1: From the stopping frequency to start speed searching	1	1	×	
F02.08	Setting reference	0－100% (motor's rated	50%	1%	×	

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
	current for speed search	current)				
F02.09	Acc./Dec. time of the speed search	1.0－50.0s	5.0s	0.1s	×	
F02.10	Waiting time of speed search	0.1－5.0s	1.0s	0.1s	×	
F02.11	V/f ratio of speed search	0.0－100.0%	100.0%	0.1%	×	
F02.12	Disposal time after speed search	0.01－5.00s	1.00s	0.01s	×	
F02.13	Stop mode selection	0: Decelerate to stop (decreases to DWELL frequency setting and holds on retention time of DWELL frequency, then it will stop) 1: Coast to stop 2: Decelerate 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	×	
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	0: The jog functions of start and stop mode etc are invalid. 1: The jog functions of start and stop mode etc are enabled.	0	1	×	
Group F03 Acceleration/Deceleration Parameters **(refer to pages 68－70)**						
F03.00	Acc./Dec. mode selection	0: Linear Acc. or Dec. 1: S-curve Acc. or Dec.	0	1	○	
F03.01	Acceleration time 1	0.1－6000.0s	15kW or below models: 10.0s 18.5－55 kW: 30.0s other	0.1s	○	
F03.02	Deceleration time 1	0.1－6000.0s		0.1s	○	
F03.03	Acceleration time 2	0.1－6000.0s		0.1s	○	
F03.04	Deceleration time 2	0.1－6000.0s		0.1s	○	
F03.05	Acceleration time 3	0.1－6000.0s		0.1s	○	
F03.06	Deceleration time 3	0.1－6000.0s		0.1s	○	
F03.07	Acceleration time 4	0.1－6000.0s		0.1s	○	
F03.08	Deceleration time 4	0.1－6000.0s		0.1s	○	

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
			models: 60.0s			
F03.09	Switching frequency of acceleration time 2 and time 1	0.00－upper limit	0.00Hz	0.01Hz	×	
F03.10	Switching frequency of deceleration time 2 and time 1	0.00－upper limit	0.00Hz	0.01Hz	×	
F03.11	S-curve characteristic time at starting acceleration	0.00－2.50s	0.20s	0.01s	○	
F03.12	S-curve characteristic time at ending acceleration	0.00－2.50s	0.20s	0.01s	○	
F03.13	S-curve characteristic time at starting deceleration	0.00－2.50s	0.20s	0.01s	○	
F03.14	S-curve characteristic time at ending deceleration	0.00－2.50s	0.20s	0.01s	○	
F03.15	Acceleration time of jog operation	0.1－6000.0s	6.0s	0.1s	○	
F03.16	Deceleration time of jog operation	0.1－6000.0s	6.0s	0.1s	○	
F03.17	Deceleration time of emergency stop	0.1－6000.0s	10.0s	0.1s	○	
Group F04 Process PID Control (refer to pages 70－72)						
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	0	1	×	
F04.02	Feedback source selection	0: AI analogue feedback 1: Terminal pulse feedback	0	1	×	
F04.03	Setting digital reference	-10.00－10.00V	0.00V	0.01V	○	
F04.04	Proportional gain (P)	0.00－10.00	2.00	0.01	○	
F04.05	Integral time (I)	0.00－10.00s	1.00s	0.01s	○	
F04.06	Integral upper limit	0.00－upper limit	50.00Hz	0.01Hz	○	
F04.07	Differential time (D)	0.00－10.00s The differential is disabled when F04.07 is set to 0	0.00s	0.01s	○	
F04.08	Differential amplitude limit value	0.00－upper limit	20.00Hz	0.01Hz	○	
F04.09	Sampling cycle (T)	0.01－50.00s	0.10s	0.01s	○	

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
F04.10	Bias limit	0.0－20.0% (reference)	2.0%	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	0	1	×	
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	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	×	
F04.15	PID regulator characteristic	0: Positive 1: Negative	0	1	×	
F04.16	Integral regulation selection	0: Stop integral regulation when the frequency reaches the upper or lower limit 1: Continue the integral regulation when the frequency reaches the upper or lower limit	1	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	×	
Group F05 External Reference Curve Parameters (refer to pages 72－74)						
F05.00	External reference curve selection	Units: AI1 characteristic curve selection Tens: AI2 characteristic curve selection Hundreds: AI3 characteristic curve selection Thousands: AI4 characteristic curve selection Ten thousands: Pulse input characteristic curve selection 0: Line 1 1: Line 2 2: Polyline Only when using HD30-EIO can hundreds and thousands be enabled.	00000	1	×	

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
F05.01	Minimum reference of line 1	0.0－F05.03	0.0%	0.1%	○	
F05.02	Minimum reference corresponding value of line 1	0.0－100.0%	0.0%	0.1%	○	
F05.03	Maximum reference of line 1	F05.01－100.0%	100.0%	0.1%	○	
F05.04	Maximum reference corresponding value of line 1	0.0－100.0%	100.0%	0.1%	○	
F05.05	Minimum reference of line 2	0.0－F05.07	0.0%	0.1%	○	
F05.06	Minimum reference corresponding value of line 2	0.0－100.0%	0.0%	0.1%	○	
F05.07	Maximum reference of line 2	F05.05－100.0%	100.0%	0.1%	○	
F05.08	Maximum reference corresponding value of line 2	0.0－100.0%	100.0%	0.1%	○	
F05.09	Maximum reference of polyline	F05.11－100.0%	100.0%	0.1%	○	
F05.10	Maximum 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	Minimum reference of polyline	0.0－F05.13	0.0%	0.1%	○	
F05.16	Minimum 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	0.00－upper limit	5.00Hz	0.01Hz	○	

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
	setting 2					
Group F06 MS SPEED and Simple PLC (refer to pages 74—78)						
F06.00	Multi-step frequency command 1	F00.09—upper limit	3.00Hz	0.01Hz	○	
F06.01	Multi-step frequency command 2	F00.09—upper limit	6.00Hz	0.01Hz	○	
F06.02	Multi-step frequency command 3	F00.09—upper limit	9.00Hz	0.01Hz	○	
F06.03	Multi-step frequency command 4	F00.09—upper limit	12.00Hz	0.01Hz	○	
F06.04	Multi-step frequency command 5	F00.09—upper limit	15.00Hz	0.01Hz	○	
F06.05	Multi-step frequency command 6	F00.09—upper limit	18.00Hz	0.01Hz	○	
F06.06	Multi-step frequency command 7	F00.09—upper limit	21.00Hz	0.01Hz	○	
F06.07	Multi-step frequency command 8	F00.09—upper limit	24.00Hz	0.01Hz	○	
F06.08	Multi-step frequency command 9	F00.09—upper limit	27.00Hz	0.01Hz	○	
F06.09	Multi-step frequency command 10	F00.09—upper limit	30.00Hz	0.01Hz	○	
F06.10	Multi-step frequency command 11	F00.09—upper limit	33.00Hz	0.01Hz	○	
F06.11	Multi-step frequency command 12	F00.09—upper limit	36.00Hz	0.01Hz	○	
F06.12	Multi-step frequency command 13	F00.09—upper limit	39.00Hz	0.01Hz	○	
F06.13	Multi-step frequency command 14	F00.09—upper limit	42.00Hz	0.01Hz	○	
F06.14	Multi-step frequency command 15	F00.09—upper limit	45.00Hz	0.01Hz	○	
F06.15	Simple PLC control selection	0: No PLC operation 1: Enabling PLC operation	0	1	×	
F06.16	Simple PLC operation mode selection	Units: PLC operation mode selection 0: Stop after single cycle operation 1: Maintain the final value after single cycle of PLC operation 2: Cycle operation Tens: PLC operation restart mode selection after pause	0000	1	×	

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
		0: Start from step 1 1: Continue to operate from the step where the inverter pauses 2: Continue to operate at the frequency when the inverter pauses Hundreds: Save the PLC status after power failure 0: Not be saved 1: Saved Thousands: time unit selection of the PLC step 0: Second (s) 1: Minute (m)				
F06.17	Setting of PLC step 1	Units: PLC running frequency selection 0: Multi- step frequency command 1: Depend on F00.10 Tens: Operation direction selection of PLC at different step 0: Forward 1: Reverse 2: Depend on run command Hundreds: Acc./Dec. time selection of PLC at different steps 0: Acc./Dec. time 1 1: Acc./Dec. time 2 2: Acc./Dec. time 3 3: Acc./Dec. time 4	000	1	○	
F06.19	Setting of PLC step 2		000	1	○	
F06.21	Setting of PLC step 3		000	1	○	
F06.23	Setting of PLC step 4		000	1	○	
F06.25	Setting of PLC step 5		000	1	○	
F06.27	Setting of PLC step 6		000	1	○	
F06.29	Setting of PLC step 7		000	1	○	
F06.31	Setting of PLC step 8		000	1	○	
F06.33	Setting of PLC step 9		000	1	○	
F06.35	Setting of PLC step 10		000	1	○	
F06.37	Setting of PLC step 11		000	1	○	
F06.39	Setting of PLC step 12		000	1	○	
F06.41	Setting of PLC step 13		000	1	○	
F06.43	Setting of PLC step 14		000	1	○	
F06.45	Setting of PLC step 15		000	1	○	
F06.18	Running time of step 1	0.0－3276.7	5.0	0.1	○	
F06.20	Running time of step 2	0.0－3276.7	0.0	0.1	○	
F06.22	Running time of step 3	0.0－3276.7	0.0	0.1	○	
F06.24	Running time of step 4	0.0－3276.7	0.0	0.1	○	
F06.26	Running time of step 5	0.0－3276.7	0.0	0.1	○	
F06.28	Running time of step 6	0.0－3276.7	0.0	0.1	○	
F06.30	Running time of step 7	0.0－3276.7	0.0	0.1	○	
F06.32	Running time of step 8	0.0－3276.7	0.0	0.1	○	
F06.34	Running time of step 9	0.0－3276.7	0.0	0.1	○	
F06.36	Running time of step	0.0－3276.7	0.0	0.1	○	

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
	10					
F06.38	Running time of step 11	0.0－3276.7	0.0	0.1	○	
F06.40	Running time of step 12	0.0－3276.7	0.0	0.1	○	
F06.42	Running time of step 13	0.0－3276.7	0.0	0.1	○	
F06.44	Running time of step 14	0.0－3276.7	0.0	0.1	○	
F06.46	Running time of step 15	0.0－3276.7	0.0	0.1	○	
Group F07 Wobble Operation Parameters (refer to pages 78－80)						
F07.00	Wobble operation selection	0: Disabled 1: Enabled	0	1	×	
F07.01	Wobble operation mode	Units: Start mode of wobble operation 0: Auto start (according to F07.03) 1: Manual start Tens: Wobble operation amplitude 0: Relative to the wobble central frequency 1: Relative to the maximum output frequency Hundreds: Restart mode of wobble operation 0: The inverter restarts the wobble operation as per the recorded frequency and direction when it stops last time 1: The inverter restarts the wobble operation from 0 Hz Thousands: Save the wobble operation parameters at power outage 0: Saved 1: Not be saved	0000	1	×	
F07.02	Preset wobble frequency	0.00－upper limit	0.00Hz	0.01Hz	×	
F07.03	Holding time of preset wobble frequency	0.0－999.9s	0.0s	0.1s	×	
F07.04	Wobble amplitude	0.0－50.0%	0.0%	0.1%	×	

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
F07.05	Jump frequency	0.0－F07.04	0.0%	0.1%	×	
F07.06	Wobble operation cycle	0.0－999.9s	10.0s	0.1s	×	
F07.07	Rising time of triangle wave	0.0－100.0% (F07.06)	50.0%	0.1%	×	
Group F08 Asynchronous Motor 1 Parameters (refer to pages 80－82)						
F08.00	Rated power of motor 1	0.2－500.0kW	Dependent on inverter model	0.1kW	×	
F08.01	Rated voltage of motor 1	0－inverter's rated voltage		1V	×	
F08.02	Rated current of motor 1	5.5kW above: 0.0－999.9A		0.1A	×	
		5.5kW or below: 0.00－99.99A		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	Dependent on inverter model	0.001	×	
F08.06	Parameter auto-tuning of motor 1	0: Auto-tuning is disabled 1: Stationary auto-tuning 2: Rotary auto-tuning	0	1	×	
F08.07	Stator resistance of motor 1	5.5kW above: 0.000－9.999Ω	Dependent on inverter model	0.001Ω	×	
		5.5kW or below: 0.00－99.99Ω		0.01Ω		
F08.08	Rotor resistance of motor 1	5.5kW above: 0.000－9.999Ω		0.001Ω	×	
		5.5kW or below: 0.00－99.99Ω		0.01Ω		
F08.09	Leakage inductance of motor 1	5.5kW above: 0.00－500.00mH		0.01mH	×	
		5.5kW or below: 0.0－5000.0mH		0.1mH		
F08.10	Mutual inductance of motor 1	5.5kW above: 0.00－500.00mH		0.01mH	×	
		5.5kW or below: 0.0－5000.0mH		0.1mH		
F08.11	Idling exciting current of motor 1	5.5kW above: 0.0－999.9A		0.1A	×	
		5.5kW or below: 0.00－99.99A		0.01A		
F08.12	Reserved					
F08.13	Reserved					
F08.14	Reserved					
Group F09 V/f Control Parameters (refer to pages 82－85)						

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
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－F08.03	0.00Hz	0.01Hz	×	
F09.02	V/f voltage value V3 of motor 1	F09.04－F08.01	0V	1V	×	
F09.03	V/f frequency value F2 of motor 1	F09.05－F09.01	0.00Hz	0.01Hz	×	
F09.04	V/f voltage value V2 of motor 1	F09.06－F09.02	0V	1V	×	
F09.05	V/f frequency value F1 of motor 1	0.00－F09.03	0.00Hz	0.01Hz	×	
F09.06	V/f voltage value V1 of motor 1	0－F09.04	0V	1V	×	
F09.07	Torque boost of motor 1	0.0－30.0% 0.0: Auto torque boost	45kW and below: 2.0% 55－132kW inverter: 1.0% 160kW and above: 0.5%	0.1%	×	
F09.08	Cut-off point used for manual torque boost of motor 1	0.0－50.0% (F08.03)	30.0%	0.1%	○	
F09.09	Slip compensation gain of motor 1	0.0－300.0%	100.0%	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	○	
F09.13	Reserved					
F09.14	AVR function of motor 1	0: Disabled 1: Enabled all the time 2: Disabled in deceleration process	1	1	○	
F09.15	Oscillation-suppression mode of motor 1	0: Oscillation suppression is dependent on the motor's exciting current component	1	1	○	

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
		1: Oscillation suppression is dependent on the motor's torque current component				
F09.16	Oscillation-suppression coefficient of motor 1	0－200	50	1	○	
F09.17	Reserved					
F09.18	Reserved					
Group F10 Motor 1 Vector Control Speed-loop Parameters (refer to pages 85－86)						
F10.00	Speed control proportional gain 1 of motor 1	0.1－200.0	20.0	0.1	○	
F10.01	Speed control integral time 1 of motor 1	0.00－10.00s	0.20s	0.01s	○	
F10.02	Speed control proportional gain 2 of motor 1	0.1－200.0	20.0	0.1	○	
F10.03	Speed control integral time 2 of motor 1	0.00－10.00s	0.20s	0.01s	○	
F10.04	Speed-loop PI switching frequency 1 of motor 1	0.00－50.00Hz	10.00Hz	0.01Hz	○	
F10.05	Speed-loop PI switching frequency 2 of motor 1	0.00－50.00Hz	15.00Hz	0.01Hz	○	
F10.06	Speed-loop integral limitation of motor 1	0.0－200.0% (motor rated current)	180.0%	0.1%	○	
F10.07	Speed-loop differential time of motor 1	0.00－1.00s There is not the speed-loop differential when F10.07 = 0	0.00s	0.01s	○	
F10.08	Speed-loop output filter time of motor 1	0.000－1.000s When F10.08 = 0, the speed-loop filter is disabled	0.020s	0.001s	○	
F10.09	Reserved					
F10.10	Reserved					
F10.11	Motor torque limitation when motor 1 is forward	0.0－200.0% (motor rated current)	180.0%	0.1%	×	
F10.12	Motor torque limitation when motor 1 is reverse	0.0－200.0% (motor rated current)	180.0%	0.1%	×	
F10.13	Recreated torque limitation when motor 1 is forward	0.0－200.0% (motor rated current)	180.0%	0.1%	×	
F10.14	Recreated torque limitation when motor 1 is reverse	0.0－200.0% (motor rated current)	180.0%	0.1%	×	

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
Group F11 Reserved						
Group F12 Reserved						
Group F13 Asynchronous Motor 2 Parameters **(refer to pages 86－88)**						
F13.00	Control mode selection of motor 2	0: V/f control without PG 1: Reserved 2: Vector control without PG	0	1	×	
F13.01	Rated power of motor 2	0.2－500.0kW	Dependent on inverter model	0.1kW	×	
F13.02	Rated voltage of motor 2	0－inverter rated voltage		1V	×	
F13.03	Rated current of motor 2	5.5kW above: 0.0－999.9A		0.1A	×	
		5.5kW or below: 0.00－99.99A		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	1500rpm	1rpm	×	
F13.06	Power factor of motor 2	0.001－1.000	Dependent on inverter model	0.001	×	
F13.07	Parameter auto-tuning of motor 2	0: Auto-tuning is disabled 1: Stationary auto-tuning 2: Rotary auto-tuning	0	1	×	
F13.08	Stator resistance of motor 2	5.5kW above: 0.000－9.999Ω	Dependent on inverter model	0.001Ω	×	
		5.5kW or below: 0.00－99.99Ω		0.01Ω		
F13.09	Rotor resistance of motor 2	5.5kW above: 0.000－9.999Ω		0.001Ω	×	
		5.5kW or below: 0.00－99.99Ω		0.01Ω		
F13.10	Leakage inductance of motor 2	5.5kW or below: 0.00－500.00mH		0.01mH	×	
		5.5kW or below: 0.0－5000.0mH		0.1mH		
F13.11	Mutual inductance of motor 2	5.5kW above: 0.00－500.00mH		0.01mH	×	
		5.5kW or below: 0.0－5000.0mH		0.1mH		
F13.12	Idling exciting current of motor 2	5.5kW above: 0.0－999.9A		0.1A	×	
		5.5kW or below: 0.00－99.99A		0.01A		
F13.13	Reserved					
F13.14	Reserved					
F13.15	Reserved					
F13.16	V/f curve selection of	0: Line	0	1	×	

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
	motor 2	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－F13.04	0.00Hz	0.01Hz	×	
F13.18	V/f voltage value V3 of motor 2	F13.20－F13.02	0V	1V	×	
F13.19	V/f frequency value F2 of motor 2	F13.21－F13.17	0.00Hz	0.01Hz	×	
F13.20	V/f voltage value V2 of motor 2	F13.22－F13.18	0V	1V	×	
F13.21	V/f frequency value F1 of motor 2	0.00－F13.19	0.00Hz	0.01Hz	×	
F13.22	V/f voltage value V1 of motor 2	0－F13.20	0V	1V	×	
F13.23	Torque boost of motor 2	0.0－30.0% 0.0: Auto torque boost	45kW and below: 2.0% 55－132 kW inverter: 1.0% 160kW and above: 0.5%	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%	100.0%	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	0.1－25.0s	2.0s	0.1s	○	
F13.29	Reserved					
F13.30	AVR function of motor 2	0: Disabled 1: Enabled all the time 2: Disabled in deceleration process	1	1	○	
F13.31	Oscillation-suppression mode of motor 2	0: Oscillation suppression is dependent on the motor's exciting current component 1: Oscillation suppression is	1	1	○	

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
		dependent on the motor's torque current component				
F13.32	Oscillation-suppression coefficient of motor 2	0－200	50	1	○	
F13.33	Reserved					
F13.34	Reserved					
F13.35	Speed control proportional gain 1 of motor 2	0.1－200.0	20.0	0.1	○	
F13.36	Speed control integral time 1 of motor 2	0.00－10.00s	0.20s	0.01s	○	
F13.37	Speed control proportional gain 2 of motor 2	0.1－200.0	20.0	0.1	○	
F13.38	Speed control integral time 2 of motor 2	0.00－10.00s	0.20s	0.01s	○	
F13.39	Speed-loop PI switching frequency 1 of motor 2	0.00－50.00Hz	10.00Hz	0.01Hz	○	
F13.40	Speed-loop PI switching frequency 2 of motor 2	0.00－50.00Hz	15.00Hz	0.01Hz	○	
F13.41	Speed-loop integral limitation of motor 2	0.0－200.0% (motor rated current)	180.0%	0.1%	○	
F13.42	Speed-loop differential time of motor 2	0.00－1.00s There is not the speed-loop differential when F13.42 = 0	0.00s	0.01s	○	
F13.43	Speed-loop output filter time of motor 2	0.000－1.000s When F13.43 = 0, the speed-loop filter is disabled	0.020s	0.001s	○	
F13.44	Reserved					
F13.45	Reserved					
F13.46	Motor torque limitation when motor 2 is forward	0.0－200.0% (motor rated current)	180.0%	0.1%	×	
F13.47	Motor torque limitation when motor 2 is reverse	0.0－200.0% (motor rated current)	180.0%	0.1%	×	
F13.48	Recreated torque limitation when motor 2 is forward	0.0－200.0% (motor rated current)	180.0%	0.1%	×	
F13.49	Recreated torque limitation when motor 2 is reverse	0.0－200.0% (motor rated current)	180.0%	0.1%	×	
F13.50	Reserved					

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
F13.51	Reserved					
F13.52	Reserved					
Group F14 Reserved **(refer to pages 88－89)**						
Group F15 Digital I/O Terminal Parameters (refer to pages 89－102)						
F15.00	DI1 terminal function selection	0: Reserved 1: Inverter enabled 2: FWD function 3: REV function 4: Three-wire operation mode 5,6,7: Frequency source selection 1, 2, 3 8: AI to be the frequency source 9,10: Run command source selection 1,2 11: Terminal control mode to be the run command source 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: Forward and reverse jog 1 command control input (JOGF1/ JOGR1) 22,23: Forward and reverse jog 2 command control input (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	2	1	×	
F15.01	DI2 terminal function selection		3	1	×	
F15.02	DI3 terminal function selection		0	1	×	
F15.03	DI4 terminal function selection		0	1	×	

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
F15.04	DI5 terminal function 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 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 terminal is enabled) 53: Pulse frequency input (only DI6 terminal is enabled) 54－84: Reserved 85: Pausing PLC operation 86: Terminal stop DC braking	0	1	×	
F15.05	DI6 terminal function selection		0	1	×	
F15.06❖	DI7 terminal (option terminal) function selection		0	1	×	
F15.07❖	DI8 terminal (option terminal) function selection		0	1	×	
F15.08❖	DI9 terminal (option terminal) function selection		0	1	×	

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
F15.09	Reserved					
F15.10	Reserved					
F15.11	Reserved					
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: DIy terminal input positive and negative logic 0: Positive logic 1: Negative logic Only when using HD30-EIO and HD30-WIO will DI7－DI9 be enabled.	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: Decelerate to stop 3: Continue to run	0	1	×	
F15.18	DO1 terminal function selection	0: Reserved 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	2	1	×	

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
F15.19	DO2 terminal function selection	7: Inverter is in zero-frequency running 8: Reserved 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 27,28: Reserved 29: Undervoltage lock-up signal (LU) 30: Overload signal (OL) 31: Inverter fault 32: External fault 33: Inverter auto-reset fault 34: Three-phase power supply forward input 35－37：Reserved 38: High-frequency output (only DO2)	0	1	×	
F15.20	RLY1 relay function selection		31	1	×	
F15.21❖	RLY2 relay (extension relay) function selection		0	1	×	
F15.22❖	RLY3 relay (extension relay) function selection		0	1	×	
F15.23❖	RLY4 relay (extension relay) function selection		0	1	×	
F15.24	Output terminal positive and negative	Bit0－Bit2 is corresponding to DO1－DO2	000	1	○	

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
	logic selection	Bit2－Bit5 is corresponding to RLY1－RLY4 Bitx: DOy and RLYy terminals output positive and negative logic 0 means positive logic 1 means negative logic Only when using HD30-EIO will RLY2－RLY4 be enabled.				
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	○	
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	Reserved					
F15.40	Reserved					
F15.41	Reserved					
F15.42	Reserved					
F15.43	Terminal output delay	0.0－100.0s	0.0s	0.1s	×	
Group F16 Analogue I/O Terminal Parameters (refer to pages 102－106)						

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
F16.00	Display panel with potentiometer function selection	0: Reserved 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	0	1	×	
F16.01	Analogue input AI1 function selection		2	1	×	
F16.02	Analogue input AI2 function selection		5	1	×	
F16.03❖	Analogue input AI3 function selection		0	1	×	
F16.04❖	Analogue input AI4 function selection		0	1	×	
F16.05	Analogue input AI1 bias	-100.0－100.0%	0.0%	0.1%	○	
F16.08	Analogue input AI2 bias	-100.0－100.0%	0.0%	0.1%	○	
F16.11❖	Analogue input AI3 bias	-100.0－100.0%	0.0%	0.1%	○	
F16.14❖	Analogue input AI4 bias	-100.0－100.0%	0.0%	0.1%	○	
F16.06	Analogue input AI1 gain	-10.00－10.00	1.00	0.01	○	
F16.09	Analogue input AI2 gain	-10.00－10.00	1.00	0.01	○	
F16.12❖	Analogue input AI3 gain	-10.00－10.00	1.00	0.01	○	
F16.15❖	Analogue input AI4 gain	-10.00－10.00	1.00	0.01	○	
F16.07	Analogue input AI1 filtering time	0.01－10.00s	0.05s	0.01s	○	
F16.10	Analogue input AI2 filtering time	0.01－10.00s	0.05s	0.01s	○	
F16.13❖	Analogue input AI3 filtering time	0.01－10.00s	0.05s	0.01s	○	
F16.16❖	Analogue input AI4 filtering time	0.01－10.00s	0.05s	0.01s	○	
F16.17	Maximum input pulse frequency	0.0－50.0kHz	10.0kHz	0.1kHz	○	
F16.18	Input pulse filtering time	0－500ms	10ms	1ms	○	

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
F16.19	AO1 terminal output function selection	0: Reserved 1: Output frequency (0－max. output frequency) 2: Reference frquency (0－max. output frequency) 3: Motor speed (0－maximum output frequency corresponding to speed) 4: Output current (0－twice motor's rated current) 5: Output current (0－twice motor's rated current) 6－9: Reserved 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 maximum output frequency) 19: Reference frequency (- 1 times－1 times maximum output frequency)	1	1	○	
F16.20	AO2 terminal output function selection		0	1	○	
F16.21	High-speed pulse output function selection		0	1	○	
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 maximum output pulse frequency	0.1－50.0kHz	10.0kHz	0.1kHz	○	
Group F17 SCI Communication Parameters (refer to pages 106－107)						

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
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 3: 1-7-2 format, no parity, ASCII 4: 1-7-1 format, even parity, ASCII 5: 1-7-1 format, odd parity, ASCII	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	0ms	1ms	×	
F17.04	Time threshold for detecting communication status	0.0－1000.0s When F17.04 = 0, it will not detect communication time out.	0.0s	0.1s	×	
F17.05	Detecting time at communication error	0.0－1000.0s When F17.05 = 0, it will not detect the communication error.	0.0s	0.1s	×	
F17.06	Action selection at communication time out	0: Coast to stop 1: Emergency stop 2: Decelerate 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	0: Communication write function parameter without storage EEPROM. 1: Communication write function parameter with storage EEPROM.	1	1	×	
Group F18 Display Control Parameters (refer to pages 107－109)						

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
F18.00	Language selection	0: Chinese 1: English	0	1	○	
F18.01	Displaying contrast of the LCD display panel	1－10	5	1	○	
F18.02	Set the display parameter 1 during operation	0: Reserved 1: Inverter's rated current 2: Inverter's extension function 3: Inverter status 4: Master setting frequency source 5: Master setting frequency 6: Auxiliary setting frequency 7: Setting frequency 8: Reference frequency (after acceleration/ deceleration) 9: Output frequency 10: Setting speed 11: Running speed 12: Three-phase power supply input phase sequence 13: Output voltage 14: Output current 15: Reserved 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 31: High-speed output pulse	8	1	○	
F18.03	Set the display parameter 2 during operation		7	1	○	
F18.04	Set the display parameter 3 during operation		9	1	○	
F18.05	Set the display parameter 4 during operation		13	1	○	
F18.06	Set the display parameter 5 during operation		14	1	○	
F18.07	Set the display parameter 6 during operation		18	1	○	
F18.08	Set the display parameter 1 at stop		7	1	○	
F18.09	Set the display parameter 2 at stop		18	1	○	

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
F18.10	Set the display parameter 3 at stop	frequency 32: Heatsink temperature 33: Set the line speed 34: Reference line speed 35－36: Reserved 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)	20	1	○	
F18.11	Set the display parameter 4 at stop		22	1	○	
F18.12	Set the display parameter 5 at stop		43	1	○	
F18.13	Set the display parameter 6 at stop		44	1	○	
F18.14	Reserved					
F18.15	Maximum 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	×	
Group F19 Function-boost Parameters (refer to pages 109－116)						
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 display panel) 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	0	1	○	

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
F19.01	Master/Auxiliary setting calculation	0: Master setting + auxiliary setting 1: Master setting – auxiliary setting 2: MAX (master setting, auxiliary setting) 3: MIN (master setting, auxiliary setting) 4: Master setting + auxiliary setting × master setting / max. value of master setting 5: Master setting – auxiliary setting × master setting / max. value of master setting	0	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	Units: 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 Tens: Frequency disposal when the inverter stops (Only when F19.00 = 1 or 2 will F19.04 be enabled) 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	0	1	○	

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
		when power on				
F19.08	Cooling fan controls delaying time	0.0－600.0s	30.0s	0.1s	○	
F19.09	Droop control	0.00－10.00Hz	0.00Hz	0.01Hz	×	
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	Deceleration time at voltage compensation	0.1－6000.0s	5.0s	0.1s	○	
F19.14	Voltage rise diagnosis time of trip-free operation at momentary power loss	0.00－10.00s	0.10s	0.01s	○	
F19.15	Reference voltage of trip-free operation at momentary power loss	0－1200V	220V inverter: 248V; 380V inverter: 430V	1V	×	
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	Protection of stall overvoltage	0: Disabled (with braking resistance) 1: Enabled	1	1	×	
F19.19	Stall overvoltage point	0－1200V	220V inverter: 390V; 380V inverter: 740V	1V	×	
F19.20	Auto current limiting selection	0: Disabled 1: Enabled in Acc./Dec. running process, but disabled in constant speed runnng process 2: Enabled both in Acc./Dec.	1	1	×	

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
		and in constant speed running proces				
F19.21	Auto current limiting threshold	20.0－200.0%	G：150.0% P：110.0%	0.1%	×	
F19.22	Deceleration time at auto current limiting	0.0－6000.0s 0.00: Limit current without deceleration.	15kW and below: 10.0s 18.5－55 kW inverter: 30.0s 75kW and above: 60.0s	0.1s	×	
F19.23	Enabled mode of terminal run command	0: Rise edge enabled mode 1: Level enabled mode	0	1	○	
F19.24	Action voltage of braking unit	220V inverter: 330－400V	380V	1V	×	
		380V inverter: 630－750V	720V			
		660V inverter: 850－1200	1130V			
F19.25	Reserved					
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	×	
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	Reserved					
F19.36	Reserved					
F19.37	Reserved					
F19.38	Reserved					
Group F20 Protection of Fault Parameters (refer to pages 116－119)						
F20.00	Overload pre-alarm detection	Units: Overload pre-alarm detection 0: It is active all the time in	00000	1	×	

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
		running status 1: It is active only at constant speed Tens: 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 Hundreds: 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) Thousands: Motor type selection 0: Standard motor 1: Variable frequency Ten thousands: Overload protection 0: Overload protection is enabled 1: Overload protection is disabled				
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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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
		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%	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	0－50%	30%	1%	×	
F20.09	Input phase loss detection time	1.00－5.00s	1.00s	0.01s	×	
F20.10	Output phase loss detection reference	0－50%	20%	1%	×	
F20.11	Output phase loss detection time	0.00－20.00s	3.00s	0.01s	×	
F20.12	PID reference lose detected value	0－100% 0: Does not detect PID reference lose	0%	1%	×	
F20.13	PID reference loss detection time	0.00－10.00s When set to 0, does not detect PID reference loss	0.20s	0.01s	×	
F20.14	PID feedback loss detected value	0－100% 0: Does not detect PID feedback loss	0%	1%	×	
F20.15	PID feedback loss detection time	0.00－10.00s When set to 0, does not detect PID feedback loss	0.20s	0.01s	×	
F20.16	Detection value at PID feedback out of the limit	0－100% 100%: Does not detect PID feedback out of the limit	100%	1%	×	
F20.17	Detection time at PID	0.00－10.00s	0.20s	0.01s	×	

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
	feedback out of the limit	When set to 0, does not detect PID feedback out of the limit				
F20.18	Auto reset times	0－100 0: No auto reset function	0	1	×	
F20.19	Auto reset interval	2.0－20.0s/times	5.0s/ times	0.1s/ times	×	
F20.20	Faulted relay action selection	Units: In auto reset process 0: Faulted relay doesn't act 1: Faulted relay acts Tens: 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	0: No fault history 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: CPUfault 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 display panel EEPROM (only displaying without any protection)	0	1	*	

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
		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				
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	0－999V	0V	1V	*	
F20.25	Output voltage at the last fault	0－999V	0V	1V	*	
F20.26	Output current at the last fault	7.5kW or above: actual value	0.0A	0.1A	*	
		5.5kW 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	0－6553.5 hours	0.0	0.1h	*	
F20.32	Type of third latest fault	0－99	0	1	*	
F20.33	Interval of third latest fault	0－6553.5 hours	0.0	0.1h	*	
F20.34	Type of second latest fault	0－99	0	1	*	
F20.35	Interval of second latest fault	0－6553.5 hours	0.0	0.1h	*	
F20.36	Type of first latest fault	0－99	0	1	*	
F20.37	Interval of first latest fault	0－6553.5 hours	0.0	0.1h	*	
Group F21 Reserved						
Group F22 Reserved						
Group F23 PWM Control Parameters (refer to pages 120－120)						

No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
F23.00	Set the carrier frequency	1－16kHz	Dependent on inverter model	1kHz	×	
F23.01	Reserved					
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	×	
Group U User Menu Mode Display Parameters (refer to parameters 120—122)						
U00.00	User menu map of setting 1	00.00－23.02,99.99 99.99 is corresponding to no parameter mapping function	00.01	0.01	○	
U00.02	User menu map of setting 2		00.06	0.01	○	
U00.04	User menu map of setting 3		00.08	0.01	○	
U00.06	User menu map of setting 4		00.13	0.01	○	
U00.08	User menu map of setting 5		00.10	0.01	○	
U00.10	User menu map of setting 6		00.11	0.01	○	
U00.12	User menu map of setting 7		02.13	0.01	○	
U00.14	User menu map of setting 8		03.01	0.01	○	
U00.16	User menu map of setting 9		03.02	0.01	○	
U00.18	User menu map of setting 10		08.00	0.01	○	
U00.20	User menu map of setting 11		08.01	0.01	○	
U00.22	User menu map of setting 12		08.02	0.01	○	
U00.24	User menu map of setting 13		08.03	0.01	○	
U00.26	User menu map of setting 14		08.04	0.01	○	
U00.28	User menu map of setting 15		—	0.01	○	
U00.30	User menu map of setting 16		—	0.01	○	
U00.01	The setting value of map 1	—	—		—	

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No.	Name	Range	Factory Default	Unit	Modified attributes	Setting
U00.03	The setting value of map 2		—		—	
U00.05	The setting value of map 3		—		—	
U00.07	The setting value of map 4		—		—	
U00.09	The setting value of map 5		—		—	
U00.11	The setting value of map 6		—		—	
U00.13	The setting value of map 7		—		—	
U00.15	The setting value of map 8		—		—	
U00.17	The setting value of map 9		—		—	
U00.19	The setting value of map 10		—		—	
U00.21	The setting value of map 11		—		—	
U00.23	The setting value of map 12		—		—	
U00.25	The setting value of map 13		—		—	
U00.27	The setting value of map 14		—		—	
U00.29	The setting value of map 15		—		—	
U00.31	The setting value of map 16		—		—	

Appendix B User Menu Setting Table

No.	Mapping parameter	Setting value
U00.00		
U00.02		
U00.04		
U00.06		
U00.08		
U00.10		
U00.12		
U00.14		
U00.16		
U00.18		
U00.20		
U00.22		
U00.24		
U00.26		
U00.28		
U00.30		

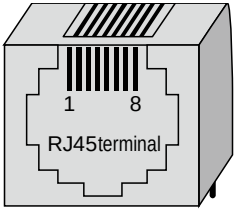
Appendix C Communication Protocol

1. Peripherals Support

HD30 series Inverters provide two RS485 communication interfaces which both use 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.

2. Interfaces

1) Interface mode and pin definition



Pin	1	2	3	4	5	6	7	8
Signal	+5V	485+	+5V	GND	GND	GND	485-	Reserved

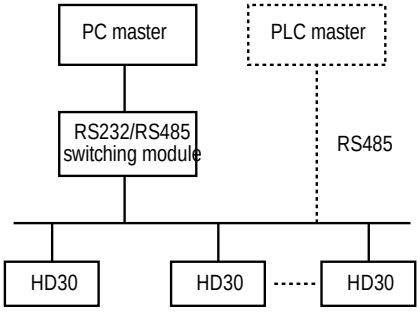
Definition of the RJ45 pin signal

2) Communication mode

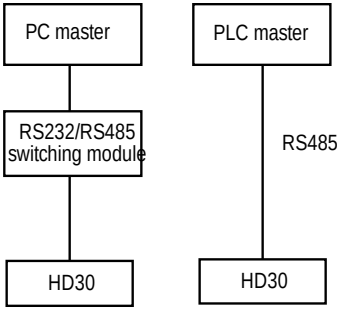
RS485 interface: asynchronous, semi-duplex.

Default: 8-N-2, 9600bps.

3. Network Mode



Single-master and multi-slave



Single-master and single-slave

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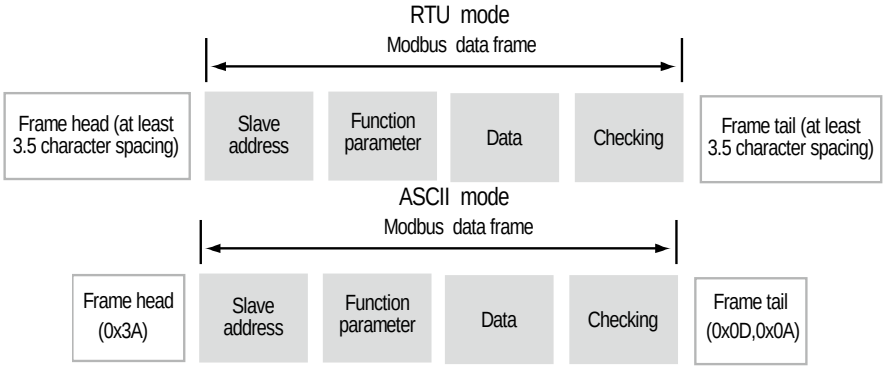
4. Protocol Format

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



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

1) RTU mode

In the RTU mode, the idle time of frame head and frame tail passing bus should be not less than 3.5 bytes, and data checking relies on CRC-16. The whole information need be checked. The concrete CRC checking is referred to the page 194.

Take RTU data for example: To read internal register F00.08 of No. 1 inverter:

The command frame:

Address	Parameter	Register Address		Read char no.		Checksum	
0x01	0x03	0x00	0x08	0x00	0x01	0x5	0xC8

The response frame:

Address	Parameter	Response Byte	Content of register		Checksum	
0x01	0x03	0x02	0x13	0x88	0xB5	0x12

2) ASCII mode

In ASCII mode, the frame head is “0x3A”, while the frame tail default is “0x0D”“0x0A” and the frame tail can be set by the users. In ASCII mode, all the data bytes will be sent via ASCII code except frame head and frame tail, higher 4-byte prior to lower 4-byte at sending. In ASCII mode, data is 7-byte and for the “A”—“F” will adopt their uppercase of the ASCII code. The data adopts LRC checking, covering the slave address and data. Checksum is the character of data that is involved in checking and the complement code of carry bit.

Take ASCII data for example: To write 4000 (0x0FA0) to the internal register F00.08 of Slave 1.

LRC checking = the complement code of (0x01+0x41+0x00+0x08+0x0F+0xA0) =0x07

	Frame head	Address		Parameter		Register address				Written content				LRC checking		Frame tail	
Character	:	0	1	4	1	0	0	0	8	0	F	A	0	0	7	CR	LF
ASCII	3A	30	31	34	31	30	30	30	38	30	46	41	30	30	37	0D	0A

5. Scaling of Inverter Transmitting Values

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

Remarks:

1) Communication data 0－2000 of F04.03, F21.01, F16.05, F16.08, F16.11, F16.14, F16.22 and F16.24 corresponds to data -1000 － +1000.

2) Communication data 0－200 of F16.06, F16.09, F16.12 and F16.15 corresponds to data -100 － +100.

3) Communication data 0－16000 of state parameter 0x3318 corresponds to data -8000 － +8000.

6. Protocol Function

1) Supported function

MODBUS protocol supports the below parameter operation:

Function code	Instructions
0x03	To read the inverter's function parameters and parameters in operating status
0x06	To rewrite function parameter (whether can be saved by F17.09 at power off) or control parameter of single inverter
0x08	Circuit diagnosis
0x41	To rewrite function parameter (cannot be saved at power off) or control parameter of single inverter
0x42	Function parameters management
0x10	To rewrite function parameter (whether can be saved by F17.09 at power off) or control parameter of certain inverters
0x43	To rewrite function parameter (can be saved at power off) or control parameter of certain inverters

If the operation command fails, the response is fault code. For instance, continuously read 13 function codes from F00.00 then the return frame will be as follows:

Address	Parameter	Error code	Checksum	
0x01	0x83	0x03	0x01	0x31

The fault code is the same as (function parameter＋0x80), and its instruction is as follows:

Exception code	Instructions
0x1	Illegal function parameters.
0x2	Illegal register address.
0x3	Data fault. Data is beyond the upper/lower limit.
0x4	Slave operation fails (including fault caused by data invalid).

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Exception code	Instructions
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 inverter is in running status.
0x22	Parameters are protected by password.

2) The command and response frame of MODBUS protocol parameter (in RTU mode)

① To read inverter parameters (function code 0x03)

	Protocol data unit	Length of data (byte)	Range
Command frame	Address	1	0－247, 0 is broadcast address
	Function code	1	0x03
	Starting register address	2	0x0000－0xFFFF
	No. of register	2	0x0001－0x000C
	CRC/LRC checking	2/1	
Response frame	Address	1	1－247
	Function code	1	0x03
	Read byte no.	1	2* no. of registers
	Register content	2* no. of registers	
	CRC/LRC checking	2/1	

② To rewrite function parameter (whether can be saved by F17.09 at power off) or control parameter (function code 0x06) of single inverter (function code 0x06)

③ To rewrite function parameter (cannot be saved at power off) or control parameter of single inverter (function code 0x41)

	Protocol data unit	Length of data (byte)	Range
Command frame	Address	1	0－247, 0 is broadcast address
	Function code	1	0x06. 0x41
	Register address	2	0x0000－0xFFFF
	Register content	2	0x0000－0xFFFF
	CRC/LRC checking	2/1	
Response frame	Address	1	1－247
	Function code	1	0x06. 0x41
	Register address	1	0x0000－0xFFFF
	Register content	2	0x0000－0xFFFF
	CRC/LRC checking	2/1	

④ Circuit diagnosis (function code 0x08)

	Protocol data unit	Length of data (byte)	Range
Command frame	Address	1	0－247, 0 is broadcast address
	Function code	1	0x08
	Subfunction code	2	0x0000－0x0030
	Data	2	0x0000－0xFFFF
	CRC /LRC checking	2/1	
Response frame	Address	1	1－247
	Function code	1	0x08
	Subfunction code	2	0x0000－0x0030
	Data	2	0x0000－0xFFFF
	CRC /LRC checking	2/1	

Subfunction code of circuit diagnosis:

Code	Data (command)	Data (response)	Subfunction meanings
0x0001	0x0000	0x0000	Reinitialize communication, disabling no-response mode
	0xFF00	0xFF00	Reinitialize communication, disabling no-response mode
0x0003	“New frame tail” and “00” occupy higher and lower bytes respectively	“New frame tail” and “00” occupy higher and lower bytes respectively	Set ASCII frame tail, and the new frame tail will replace the old newline characters, but it will not be saved at power loss. Note: new frame tail cannot be larger than 0x7F, and shouldn’t be 0x3A.
0x0004	0x0000	No response	After select no-response mode, the slaves then only answer to “reinitialize communication command”. It can tell and isolate the faulty slaves.
0x0030	0x0000	0x0000	To set slave no-response invalid command and faulty command.
	0x0001	0x0001	To set slave response invalid command and faulty command.

⑤ To rewrite function parameter (whether can be saved by F17.09 at power off) or control parameter of certain inverters (function code 0x10)

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To rewrite function parameter (can be saved at power off) or control parameter of certain inverters (function code 0x43)

	Protocol data unit	Length of data (byte)	Range
Command frame	Address	1	0－247, 0 is broadcast address
	Function code	1	0x10, 0x43
	Starting register address	2	0x0000－0xFFFF
	Operation register number	2	0x0000－0x0004
	Register content bytes	1	2*operation register number
	Register content	2*operation register number	
	CRC /LRC checking	2/1	
Response frame	Address	1	1－247
	Function code	1	0x10, 0x43
	Starting register address	2	0x0000－0xFFFF
	Operation register number	2	0x0000－0x0004
	CRC /LRC checking	2/1	

This command rewrites the contents of continuous data unit from starting register address where is mapped as inverter's function parameter and control parameter 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 operation will return from the first faulty address if it isn't completely success.

⑥ Function parameters management (function code 0x42)

The inverter function parameters management includes reading the upper/lower limit of parameters, to read parameter characteristics, to read the biggest intergroup index of function parameters, to read the previous and next function parameter group number, to read index of the parameter being displayed and to display next status parameter. The parameter characteristics include read-write ability, parameter units and scaling. These commands are used to adjust remotely inverter parameters.

The command and response frames of the function parameters management are as follows:

	Protocol data unit	Length of data (byte)	Range
Command frame	Address	1	0－247, 0 is broadcast address
	Function code	1	0x42
	Subfunction code	2	0x0000－0x0008
	Data	2	Depends on inverter model
	CRC /LRC checking	2/1	
Response frame	Address	1	1－247
	Function code	1	0x42
	Subfunction code	2	0x0000－0x0008
	Data	2	0x0000－0xFFFF
	CRC /LRC checking	2/1	

On condition that the operation command fails, response is fault code and exception code.

Subfunction under function parameter management:

Code	Data (command)	Data (response)	Subfunction meanings
0x0000	The function parameter group no. and intergroup index occupy the higher and lower bytes respectively.	The upper limit of function parameter.	To read the upper limit of function parameter. (Unsupported this operation of reading upper limit in status and control parameters)
0x0001	The function parameter group no. and intergroup index occupy the higher and lower bytes respectively.	The lower limit of function parameter.	To read the lower limit of function parameter. (Unsupported this operation of reading lower limit in status and control parameters)
0x0002	The function parameter group no. and intergroup index occupy the higher and lower bytes respectively.	Characteristics of function parameters and see the table of parameter's characteristics for more details.	To read the characteristic of function parameters. (Unsupported this operation of reading characteristic in control parameters)
0x0003	The function parameter group no. occupies the higher byte, and the lower byte is "00".	The max. value of intergroup index.	To read the max value of intergroup index.
0x0004	The function parameter group no. occupies the higher byte, and the lower byte is "00".	Next function parameter group no. occupies the higher byte, and the lower byte is "00".	To read next function parameter group no.
0x0005	The function parameter group no. occupies the higher byte, and the lower byte is "00".	Previous function parameter group no. occupier the higher byter, and the lower byte is "00".	To read previous function parameter group no.
0x0006	0x3300	The status parameter index at current displaying.	To read status parameter index at current display.
0x0007	0x3300	The parameter index at next status.	To display next status parameter.
0x0008	The parameter group no. and intergroup index occupy the higher and lower bytes respectively.	Factory default.	To read factory default of function parameter. (Unsupported this operation in status and control parameters)

The function parameter characteristics are 2-byte, with definition shown as below:

Characteristics (Bit)	Value	Definition
Bit0	0B	To modify the upper limit as per character restriction.
	1B	To modify the upper limit as per 4-byte restriction.
Bit2－Bit1	00B	without decimal fraction
	01B	1 decimal fraction
	10B	2 decimal fraction
	11B	3 decimal fraction
Bit5－Bit3	001B	To display length 1
	010B	To display length 2
	011B	To display length 3
	100B	To display length 4
	101B	To display length 5
	Reserved	
Bit7－Bit6	00B	Actual parameters, unchangeable
	01B	Changeable
	10B	Unchangeable in running status
	11B	Set by the manufacturer. The users are not allowed to make any modification.
Bit12－Bit8	00000B	Without char
	00001B	Unit is Hz
	00010B	Unit is A
	00011B	Unit is V
	00100B	Unit is rpm
	00101B	Unit is %
	Reserved	
Bit15－Bit13	Manufacturer reserved	

7. Address Mapping

The inverter's function parameters, control parameters and status parameters are all mapped as MODBUS's read-write register. And their group numbers are mapped as the higher bytes of register address while the relationships are shown as below table.

High bytes of register address	Group number	High bytes of register address	Group number
0x00	F00	0x01	F01
0x02	F02	0x03	F03
0x04	F04	0x05	F05
0x06	F06	0x07	F07
0x08	F08	0x09	F09
0x0a	F10	0x0b	F11
0x0d	F13	0x0f	F15
0x10	F16	0x11	F17
0x12	F18	0x13	F19
0x14	F20	0x17	F23
0x28	P00	0x29	P01
0x2a	P02	0x2b	P03
0x2c	P04	0x2d	P05
0x18	U00	0x32	Control parameter group
0x33	Status parameter group		

Their intergroup indexes are mapped as the lower bytes. Please refer to the instruction manual for more details on function parameters F00—F23, P00—P05 and U00.

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.

1) Control parameters

The inverter's control parameter intergroup indexes are as follows:

Register address	Parameter name	Retained or not at power loss
0x3200	Control command character	No
0x3201	Running frequency setting	No
0x3202	Auxiliary running frequency setting	No
0x3203	Reserved	
0x3204	Virtual terminal control setting	No

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Definition of inverter control command words:

Control word (Bit)	Value	Definition	Function description
Bit0	1	Run command enabled	To control the inverter's starting and stop (in edge triggering mode)
	0	Run command disabled	
Bit1	0	Forward	Running direction: have the same function as terminal FWD/ REV
	1	Reverse	
Bit2	1	Stop mode: Decelerate to stop	Decelerate to stop the inverter (in edge triggering mode)
	0	Reserved	
Bit3	1	Stop mode: emergency to stop	Emergency to stop the inverter (in edge triggering mode)
	0	Reserved	
Bit4	1	Stop mode: coast to stop	Coast to stop the inverter (in edge triggering mode)
	0	Reserved	
Bit5	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
	0	Reserved	
Bit6	1	Jog forward run	Jog forward control
	0	Jog forward stop	
Bit7	1	Jog reverse run	Jog reverse control
	0	Jog reverse stop	
Bit8	1	Fault reset enabled	Fault reset control
	0	Fault reset disabled	
Bit9—Bit11	0	Reserved	
Bit12	1	Present control enabled	The present sending control word is valid
	0	Present control disabled	The present sending control word is valid
Bit13－Bit15	0	Reserved	

Inverter control command (word logic combinations of control commands):

Register content	Control command	Register address	Parameter name
0x1001	Forward running	0x1020	Stop due to external fault
0x1003	Reverse running	0x1040	Forward jog
0x1004	Decelerate to stop	0x1080	Reverse jog
0x1008	Emergency to stop	0x1100	Fault reset
0x1010	Coast to stop		

Definition of virtual terminal control setting word:

Control word (Bit)	Value	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	RLY1output 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	0	RLY5 output is disabled
	1	RLY5 output is enabled
Bit7	0	RLY6 output is disabled
	1	RLY6 output is enabled
Bit8	0	RLY7 output is disabled
	1	RLY7 output is enabled
Bit9	0	RLY8 output is disabled
	1	RLY8 output is enabled
Bit10	0	RLY9 output is disabled
	1	RLY9 output is enabled
Bit11	0	RLY10 output is disabled
	1	RLY10 output is enabled
Bit12－Bit15	Reversed	Reversed

2) Status parameter

Inverter status parameter intergroup index is as following table:

Register address	Parameter name	Register address	Parameter name
0x3300	Inverter's series	0x3311	Setting speed
0x3301	Software version of the U1	0x3312	Running speed
0x3303	Special software version of the U1	0x3313	Three-phase power input phase sequence
0x3305	Software version of the display panel	0x3314	Output voltage
0x3306	Custom series No.	0x3315	Output current
0x3307	Units: the present motor 0: Motor 1 1: Motor 2	0x3317	Output torque
		0x3318	Output power
		0x3319	DC bus voltage
		0x331A	Input voltage of display panel of

C

Register address	Parameter name	Register address	Parameter name
	Tens: control modes 0: V/f control without PG 1: Reversed 2: Vector control without PG		potentiometer
		0x331B	AI1 input voltage
		0x331C	AI1 input voltage (after disposal)
		0x331D	AI2 input voltage
		0x331E	AI2 input voltage (after disposal)
0x3308	Inverter's rated current	0x331F	AI3 input voltage
0x3309	Inverter's extension function	0x3320	AI3 input voltage (after disposal)
0x330A	Units: Bit0: Inverter fault Bit1: Run/stop Bit2: Forward/reverse Bit3: Zero speed to run Tens: Bit0&1: Acc./ Dec./ constant Bit2: Reversed Bit3: DC braking (includes starting DC braking and stop DC braking) Hundreds: Bit0: Parameter auto-tuning Bit1: Reversed Bit2: Speed limitation Bit3: Reversed Thousands: Bit0: Stall overvoltage Bit1: Stall overcurrent Bit2: Reversed Bit3: Reversed	0x3321	AI4 input voltage
		0x3322	AI4 input voltage (after disposal)
		0x3323	DI6 terminal pulse input frequency
		0x3324	AO1 output
		0x3325	AO2 output
		0x3326	High-speed output pulse frequency
		0x3327	Heatsink temperature
		0x332C	Process PID reference
		0x332D	Process PID feedback
		0x332E	Process PID error
		0x332F	Process PID integral
		0x3330	Process PID output
		0x3331	External counting value
		0x3332	Input terminal status
		0x3333	Output terminal status
		0x3334	MODBUS communication status
		0x3335	Actual length
		0x3336	Total length
		0x3337	Total time at power on (hour)
		0x3338	Total time at running (hour)
0x330B	Master setting frequency source	0x3339	High byte of motor total energy
0x330C	Master setting frequency	0x333A	Low byte of motor total energy
0x330D	Auxiliary setting frequency	0x333B	High byte of this running energy
0x330E	Setting frequency	0x333C	Low byte of this running energy
0x330F	Reference frquency (after Acc./Dec.)	0x333D	The present fault code
0x3310	Output frequency	0x3345	The current moment (hours)

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

8. Special instruction

1) For the data frame in ASCII mode, if the frame length is an even number, the frame is abandoned.

2) Group F08 (Asynchronous motor 1 parameter setting), Group F12 (Reserved), F13.00－F13.15 (Asynchronous 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.

3) 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.

4) 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.

9. CRC checking

In order to satisfy speed increasing needs, CRC-16 normally adopts form mode. The following is CRC-16 C language channel code. Please note the final result has exchanged the higher and lower bytes. That is the right CRC checksum to be sent.

```
unsigned short CRC16 ( unsigned char *msg, unsigned char length)
/* The function returns the CRC as a unsigned short type */
{
    /* high byte of CRC initialized */
    unsigned char uchCRCHi = 0xFF ;
    /* low byte of CRC initialized */
    unsigned char uchCRCLo = 0xFF ;
    /* index into CRC lookup table */
    unsigned uIndex ;
    /* pass through message buffer */
    While (length--)
    {
        /* calculate the CRC */
        uIndex = uchCRCLo ^ *msg++ ;
        uchCRCLo = uchCRCHi ^ (crcvalue[uIndex] >>8);
        uchCRCHi =crcvalue[uIndex]&0xff;
     }
     return (uchCRCHi | uchCRCLo<<8) ;
}
/* Table of CRC values */
const unsigned int crcvalue[ ] = {
0x0000,0xC1C0,0x81C1,0x4001,0x01C3,0xC003,0x8002,0x41C2,0x01C6,0xC006,0x8007,
0x41C7,0x0005,0xC1C5,0x81C4,0x4004,0x01CC,0xC00C,0x800D,0x41CD,0x000F,0xC1CF,
0x81CE,0x400E,0x000A,0xC1CA,0x81CB,0x400B,0x01C9,0xC009,0x8008,0x41C8,0x01D8,
0xC018,0x8019,0x41D9,0x001B,0xC1DB,0x81DA,0x401A,0x001E,0xC1DE,0x81DF,0x401F,
0x01DD,0xC01D,0x801C,0x41DC,0x0014,0xC1D4,0x81D5,0x4015,0x01D7,0xC017,0x8016,
0x41D6,0x01D2,0xC012,0x8013,0x41D3,0x0011,0xC1D1,0x81D0,0x4010,0x01F0,0xC030,
0x8031,0x41F1,0x0033,0xC1F3,0x81F2,0x4032,0x0036,0xC1F6,0x81F7,0x4037,0x01F5,
0xC035,0x8034,0x41F4,0x003C,0xC1FC,0x81FD,0x403D,0x01FF,0xC03F,0x803E,0x41FE,
0x01FA,0xC03A,0x803B,0x41FB,0x0039,0xC1F9,0x81F8,0x4038,0x0028,0xC1E8,0x81E9,
0x4029,0x01EB,0xC02B,0x802A,0x41EA,0x01EE,0xC02E,0x802F,0x41EF,0x002D,0xC1ED,
0x81EC,0x402C,0x01E4,0xC024,0x8025,0x41E5,0x0027,0xC1E7,0x81E6,0x4026,0x0022,
0xC1E2,0x81E3,0x4023,0x01E1,0xC021,0x8020,0x41E0,0x01A0,0xC060,0x8061,0x41A1,
0x0063,0xC1A3,0x81A2,0x4062,0x0066,0xC1A6,0x81A7,0x4067,0x01A5,0xC065,0x8064,
0x41A4,0x006C,0xC1AC,0x81AD,0x406D,0x01AF,0xC06F,0x806E,0x41AE,0x01AA,0xC06A,
0x806B,0x41AB,0x0069,0xC1A9,0x81A8,0x4068,0x0078,0xC1B8,0x81B9,0x4079,0x01BB,
```

0xC07B,0x807A,0x41BA,0x01BE,0xC07E,0x807F,0x41BF,0x007D,0xC1BD,0x81BC,0x407C,
0x01B4,0xC074,0x8075,0x41B5,0x0077,0xC1B7,0x81B6,0x4076,0x0072,0xC1B2,0x81B3,
0x4073,0x01B1,0xC071,0x8070,0x41B0,0x0050,0xC190,0x8191,0x4051,0x0193,0xC053,
0x8052,0x4192,0x0196,0xC056,0x8057,0x4197,0x0055,0xC195,0x8194,0x4054,0x019C,
0xC05C,0x805D,0x419D,0x005F,0xC19F,0x819E,0x405E,0x005A,0xC19A,0x819B,0x405B,
0x0199,0xC059,0x8058,0x4198,0x0188,0xC048,0x8049,0x4189,0x004B,0xC18B,0x818A,
0x404A,0x004E,0xC18E,0x818F,0x404F,0x018D,0xC04D,0x804C,0x418C,0x0044,0xC184,
0x8185,0x4045,0x0187,0xC047,0x8046,0x4186,0x0182,0xC042,0x8043,0x4183,0x0041,
0xC181,0x8180,0x4040}

It takes a comparatively long time to online calculate the CRC checksum of each byte, but it will save program space. 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));
}
```

10. 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 maximum output frequency of Slave 2 (to read F00.06)

Address	Code	Register address		Word no. of read		Checksum	
0x02	0x03	0x00	0x06	0x00	0x01	0x64	0x38

Corresponding answer frame (F00.06=50.00Hz):

Address	Code	Answer byte	Register content		Checksum	
0x02	0x03	0x02	0x13	0x88	0XF1	0x12

2. To read the DC bus voltage of Slave 2 (to read status parameter)

Address	Code	Register address		Word no. of read		Checksum	
0x02	0x03	0x33	0x19	0x00	0x01	0x5A	0xBA

Corresponding answer frame (the DC bus voltage is 537V)

Address	Code	Answer byte	Register content		Checksum	
0x02	0x03	0x02	0x02	0x19	0x3C	0xEE

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

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

Corresponding answer frame:

Address	Code	Register address		Register content		Checksum	
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 address 0x3201.

Address	Code	Register address		Register content		Checksum	
0x02	0x06	0x32	0x01	0x11	0x94	0xDB	0x7E

Corresponding answer frame:

Address	Code	Register address		Register content		Checksum	
0x02	0x06	0x32	0x01	0x11	0x94	0xDB	0x7E

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

Address	Code	Register address		Register content		Checksum	
0x02	0x06	0x32	0x00	0x10	0x03	0xCA	0x80

Corresponding answer frame:

Address	Code	Register address		Register content		Checksum	
0x02	0x06	0x32	0x00	0x10	0x03	0xCA	0x80

6. F00.11=2, give the deceleration stop command to the address 2 of Slave

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

Corresponding answer frame:

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

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

Address	Code	Register address		Register content		Checksum	
0x02	0x06	0x32	0x00	0x10	0x08	0x8B	0x42

Corresponding answer frame:

Address	Code	Register address		Register content		Checksum	
0x02	0x06	0x32	0x00	0x10	0x08	0x8B	0x42

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

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

Corresponding answer frame:

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

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

Address	Parameter	Register address		Register content		Checksum	
0x02	0x06	0x32	0x00	0x10	0x20	0x8B	0x59

Corresponding answer frame:

Address	Code	Register address		Register content		Checksum	
0x02	0x06	0x32	0x00	0x10	0x20	0x8B	0x59

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

Address	Parameter	Register address		Register content		Checksum	
0x02	0x06	0x32	0x00	0x11	0x00	0x8B	0x11

Corresponding answer frame:

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

11. Functional parameter management and read the lower limit of F02.03

Address	Code	Subfunction code		Data		Checksum	
0x02	0x42	0x00	0x01	0x02	0x03	0x69	0x57

Corresponding answer frame:

Address	Parameter	Subfunction code		Data		Checksum	
0x02	0x42	0x00	0x01	0x00	0x00	0x28	0x36