HD50 Series

High Performance

Vector Control Driver

HD50 Series

High Performance

Vector Control Driver

User Manual

V1.7 2020.11

FOREWORD

Thank you for purchasing HD50 series high performance vector control driver manufactured by Shenzhen Hpmont Technology Co., Ltd.

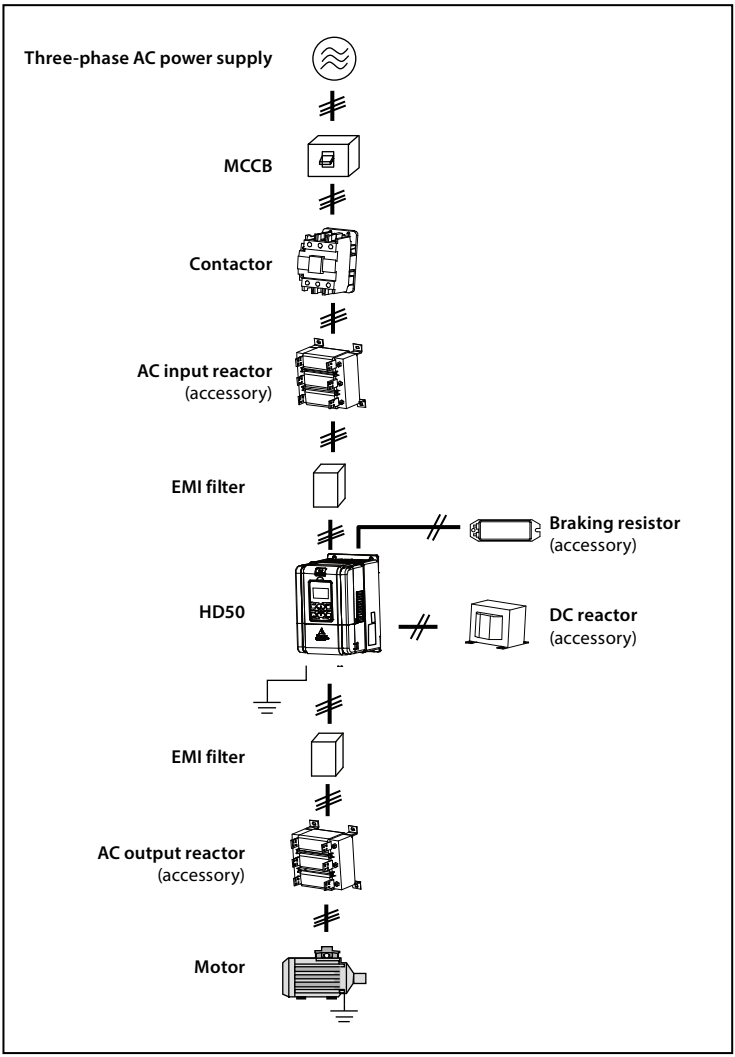
This User Manual describes how to use HD50 series drivers and their installation wiring, parameter setting, troubleshooting and daily maintenance etc.

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

Note:

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

Connection with Peripheral Devices



Version and Revision Records

Time: 2020/10

Version: V1.7

Revised Chapter	Revised Contents
Chapter 4	• Modify rotary transformer encoder card, see section 4.5.9

CONTENTS

Chapter 1 Safety Information and Precautions

1.1 Safety Definition

Danger

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

Warning

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

Note

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

1.2 Motor and Mechanical Load

Compared to the Industrial Frequency Operation

The HD50 series drives are voltage-type drives and their output is PWM wave with certain harmonic wave. Therefore, the temperature, noise and vibration of the motor will be a little higher than that at industrial frequency running.

Run at Constant Torque and Low Speed

Driver drive ordinary motor in long-term low-speed operation, the motor cooling effect will become poor, the output torque will be reduced, if operating is under long-term and low-speed constant torque operation, the proposed selection of variable frequency motor.

Thermal Protection of Motor

When choose the adaptive motor, HD50 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 running.

Operate Above the Motor Rated Frequency

If the motor is running over its rated frequency, the noise will increase, and the vibration of the motor will be attained, and the motor bearing and mechanism should be able to meet the requirements of the operating speed range.

Lubrication of Mechanical Devices

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

Mechanical Resonance Point

The mechanical resonance of the load device or motor is avoided by setting the jump frequency of the drive (F05.17 - F05.19).

Check the Insulation of the Motor

For the first time using the motor or after long time storage, it needs check the insulation of the motor. Worse insulation can cause damage to HD50.

Note:

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

Negative Torque Load

In the case of lifting loads, there are often negative torques. The drive often generates overcurrent or overvoltage faults and trips. Consider the brake components with appropriate parameters.

Requirement for Leakage Current Protector RCD

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

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

Warning for Ground Mass Leakage Current

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

1.3 About HD50

No Capacitor or Varistor on the Output Side

Since HD50 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 HD50 fault trip or component damage.

Contactors and Circuit Breakers Connected to the Output of HD50

If circuit breaker or contactor needs to be connected between HD50 and the motor, be sure to operate these circuit breakers or contactor when HD50 has no output, so as to avoid any damage to HD50.

Running Voltage

HD50 is prohibited to be used beyond the specified range of running voltage. If needed, please use the suitable voltage regulation device to change the voltage.

Capacitor Energy Storage

When the AC power supply is cut off, capacitor of HD50 sustains deadly power for a while. So to disassemble HD50 that is powered, please cut off the AC power supply for more than 10 minutes, confirm the internal charge indicator is off and the voltage between (+) and (-) of the main circuit terminals is below 36V.

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

Change Three-phase Input to Single-phase Input

For three-phase input drive, users should not change it to be single-phase input.

To use single-phase power supply, 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 drive. In that case, the drive must be derating and should be 60% within rated value of drive.

Lightning Surge Protection

HD50 internal design has lightning surge over-current protection circuit, and has certain self-protection capacity against the lightning.

Altitude and Derating

In area where altitude exceeds 1000 meters, HD50 should be derating since the heatsink efficiency will be reduced because of the tenuous air.

The rated value of output current derates by 1% for each 100m increase of the altitude. I.e for the altitude of 3000m, derated rate is 20% for rated current of HD50. Figure 1-1 is the derating curve of rated current and the altitude.

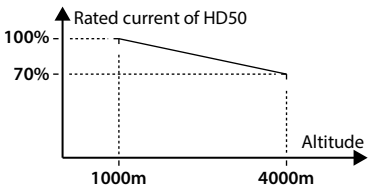
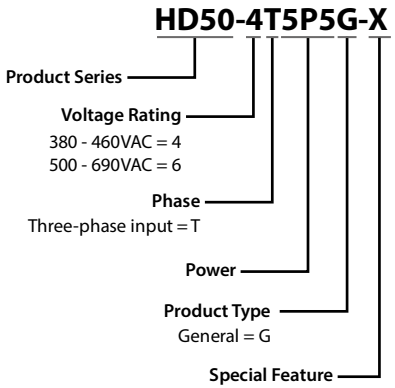


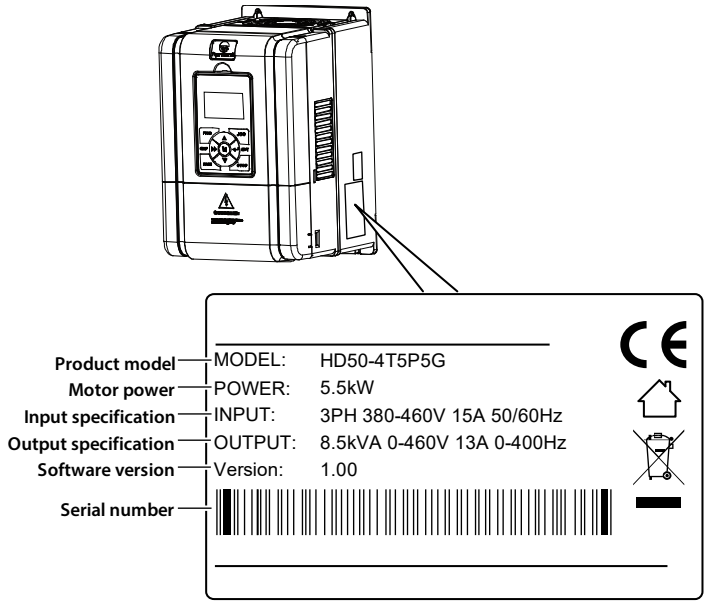
Figure 1-1 Derating curve of rated current and altitude

Chapter 2 Product Information

2.1 Model



2.2 Nameplate



2.3 Rated Value

Model	Motor (kW)	Rated Capacity (kVA)	Rated Input Current (A)	Rated Output Current (A)	Size
Three-phase power supply: 380 - 460V, 50/60Hz					
HD50-4T0P7G	0.75	1.5	3.4	2.3	Frame1
HD50-4T1P5G	1.5	2.5	5.2	3.8	Frame1
HD50-4T2P2G	2.2	3.4	7.3	5.1	Frame1
HD50-4T3P7G	3.7	5.9	11.9	9.0	Frame2
HD50-4T5P5G	5.5	8.5	15	13	Frame2
HD50-4T7P5G	7.5	11	19	17	Frame3
HD50-4T011G	11	16	28	25	Frame3
HD50-4T015G	15	21	35	32	Frame4
HD50-4T018G	18.5	24	39	37	Frame4
HD50-4T022G	22	30	47	45	Frame5
HD50-4T030G	30	39	62	60	Frame5
HD50-4T037G	37	49	77	75	Frame6
HD50-4T045G	45	59	92	90	Frame6
HD50-4T055G	55	72	113	110	Frame6
HD50-4T075G	75	100	156	152	Frame7
HD50-4T090G	90	116	180	176	Frame7
HD50-4T110G	110	138	214	210	Frame7
HD50-4T132G HD50-4T132G-C	132	167	256	253	Frame8
HD50-4T160G HD50-4T160G-C	160	200	307	304	Frame8
HD50-4T200G HD50-4T200G-C	200	250	385	380	Frame8
HD50-4T220G HD50-4T220G-C	220	280	430	426	Frame9
HD50-4T250G HD50-4T250G-C	250	309	475	470	Frame9
HD50-4T280G HD50-4T280G-C	280	349	535	530	Frame9
HD50-4T315G HD50-4T315G-C	315	398	609	600	Frame10
HD50-4T355G HD50-4T355G-C	355	434	664	660	Frame10
HD50-4T400G HD50-4T400G-C	400	494	754	750	Frame10
Three-phase power supply: 500 - 690V, 50/60Hz					
HD50-6T018G	18.5	24	26	22	Frame12
HD50-6T022G	22	30	33	27	Frame12

Model	Motor (kW)	Rated Capacity (kVA)	Rated Input Current (A)	Rated Output Current (A)	Size
HD50-6T030G	30	39	39	36	Frame12
HD50-6T037G	37	49	46	43	Frame12
HD50-6T045G	45	59	55	52	Frame12
HD50-6T055G	55	72	75	63	Frame12
HD50-6T075G	75	100	89	85	Frame13
HD50-6T090G	90	116	128	100	Frame13
HD50-6T110G	110	138	144	125	Frame13
HD50-6T132G	132	167	170	144	Frame14
HD50-6T160G	160	200	200	175	Frame14
HD50-6T200G	200	250	235	215	Frame14
HD50-6T220G	220	280	247	245	Frame15
HD50-6T250G	250	309	265	260	Frame15
HD50-6T280G	280	349	305	299	Frame15
HD50-6T315G	315	398	350	330	Frame15
HD50-6T355G	355	434	382	374	Frame16
HD50-6T400G	400	494	435	410	Frame16

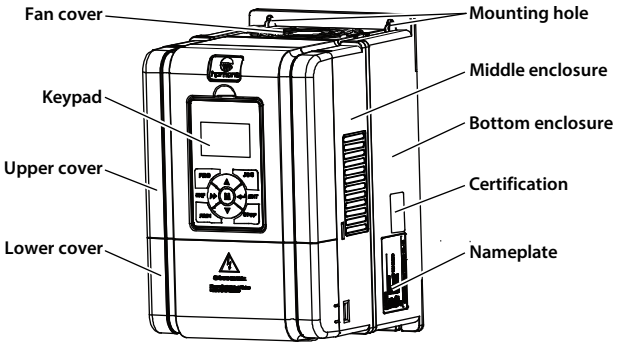
2.4 Technical Data

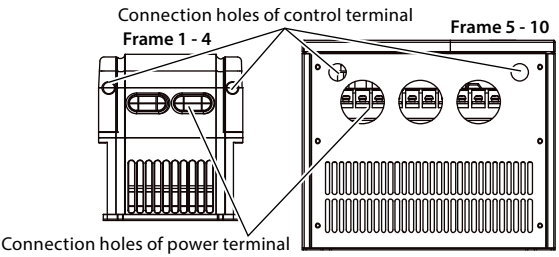
Electrical		
Input voltage	Three phases: 380 - 460V, 50/60Hz Three phases: 500 - 690V, 50/60Hz Fluctuating within ±10%, unbalance rate <3%	
Input frequency	50/60Hz ± 5%	
Output voltage	0V - input voltage	
Output frequency	0.00 - 400.00Hz	
Performance		
Overload capacity	150% rated output current for 2 min 180% rated output current for 10 secs	
Control mode	V/f control; Open loop vector control (SVC); Close vector control (VC)	
Running command setting mode	Keypad; Terminal; SCI communication	
Speed setting	Digital; Analogue; SCI communication	
Speed resulotion	Digital setting: 0.01Hz Analogue setting: 0.1% × max-frequency	
Speed control accuracy	SVC: ±0.5%	VC: ±0.05%
Speed control range	SVC: 1:100	VC: 1:1000
Torque control response	SVC: <200ms	VC: <50ms
Start torque	SVC: 180% rated torque/0.5Hz	VC: 180% rated torque/0Hz
Torque control accuracy	±5%	

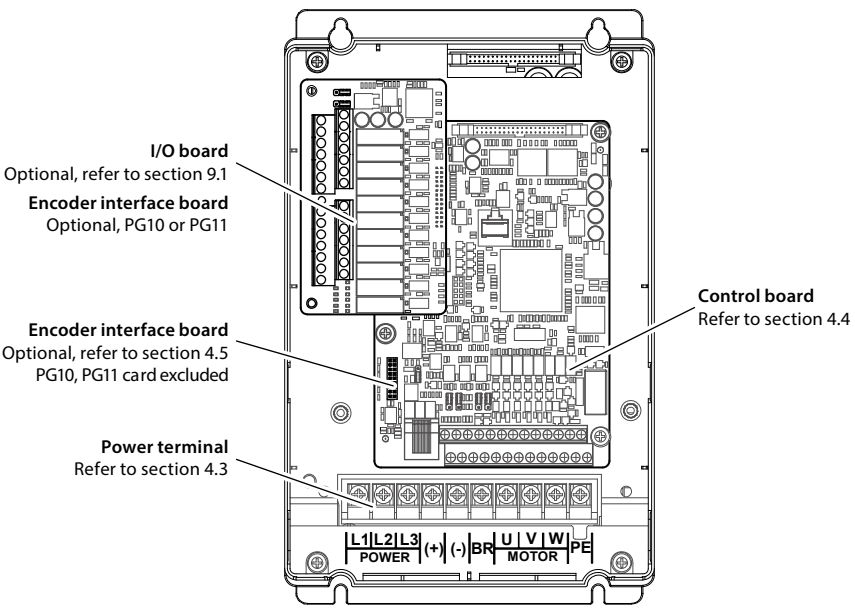
Characteristic Functions	
Customized menu	A total of 16 user-defined mapping, the user can edit
Parameter upload and download function	You can achieve two sets of parameters uploaded to keypad for backup
Programmable input and output interface	Input terminal function can be edited and output terminal function can be edited
Progress PID adjustment	Built-in progress PID module
Simple PLC function	Built-in simple PLC module, can achieve timing, multi-frequency output
Textile wobble function	Built-in textile wobble function module
Fixed length control function	Built-in fixed length control module
Compatible with a variety of communication protocols	Standard Modbus communication protocol. Optional PROFIBUS bus module compatible with PROFIBUS protocol; Optional DeviceNet bus module compatible with DeviceNet protocol; Optional CAN bus module is compatible with CAN communication protocol
Protection Functions	
Overvoltage speed loss	Busbar voltage is automatically controlled to prevent overvoltage faults
Automatic current limiting protection	Output current is automatically limited to prevent overcurrent fault
Overload pre-alarm and alarm	Overload pre-alarm and alarm
Output drop protection	Drop alarm function
Input and output phase loss protection	Input and output phase loss automatic detection and alarm function
Brake tube fault protection	Brake tube detection and alarm function
Process PID given, feedback Loss detection	The process PID automatically recognizes whether the reference and feedback are lost and the loss alarm function
Output ground short circuit protection	Output the ground short circuit effective protection function
Output interphase short circuit protection	Protection function when output interphases short-circuit is invalid
Input/Output	
Analogue power supply	+10V, load capacity 100mA; -10V, load capacity 10mA
Digital power supply	+24V, load capacity 200mA
Analogue input	AI1 (control board): Voltage 0 - 10V AI2, AI3 (control board): -10 - +10V/0 - 20mA (voltage/current optional) AI4 (I/O card): -10 - +10V/0 - 20mA (voltage/current optional, support differential input)
Analogue output	AO1, AO2: 0 - 10V/0 - 20mA (voltage/current optional)
Digital input	DI1 - DI6 (control board), DI7 - DI12 (I/O card)
Digital output	DO1, DO2
Programmable relay output	R1A/R1B/R1C (control board) R2A/R2B/R2C, R3A/R3B/R3C, R4A/R4B/R4C (I/O card) Contact capacity: 250VAC/3A or 30VDC/1A
SCI communicaiton	RJ45 interface

Operation Display	
LCD display	Functions parameter settting, status parameter checking, fault code checking and so on
Parameter copy	Parameters can copied quickly
Environment	
Work temperature	-10 - +40℃, highest 50℃, air temperature change is less than 0.5℃/min 40 - 50℃ to be derated use: 1℃ more than output current derating 2%
Storage temperature	-40 - +70℃
Work environment	Indoors, free from direct sunlight, dust-free, corrosive gases, combustible gases, oil mist, water vapor, drip or salt
Altitude	Less than 1000 meters, more than 1000 meters to be used in derating
Humidity	Less than 95%RH, no water condensation
Vibration	2 - 9Hz in 3.5m/s^2, 9 - 200Hz in 10m/s^2 (IEC60721-3-3)
Protection class	IP20
Pollution class	2 class (dry, non-conductive dust pollution)
Accessaries	
Encoder card	OC encoder card (HD-PG1-OC) With frequency output OC encoder card (HD-PG2-OC-FD) With frequency output sincos encoder card (DC-PG5-SINCOS-FD) With frequency output long-line drive encoder card (HD-PG6-UVW-FD) With frequency output long-line drive encoder card (HD-PG8-ABZ-FD) Rotary transformer encoder card (HD-PG10-RES-FD-A) With differential output serial communication encoder card (HD-PG11-SC-FD)
Extension card	Extended I/O card (HD50-EIO) Function technology expansion card (HD-PFT-N)
Bus communicaiton	PROFIBUS bus module (HDFB-PROFIBUS-DP) DeviceNet bus module (HDFB-DeviceNet) CAN bus module (HDFB-CAN)
Keypads	Keypad external mounting base (HD-KMB) 1m extension cable for keypad (HD-CAB-1M) 2m extension cable for keypad (HD-CAB-2M) 3m extension cable for keypad (HD-CAB-3M) 6m extension cable for keypad (HD-CAB-6M)
Power unit	Energy consumption braking unit (HDBU) Energy recovery unit (HDRU)

2.5 Parts


Fan cover
Mounting hole
Middle enclosure
Keypad
Bottom enclosure
Upper cover
Certification
Lower cover
Nameplate


Connection holes of control terminal
Frame 1 - 4
Frame 5 - 10
Connection holes of power terminal


I/O board
Optional, refer to section 9.1
Encoder interface board
Optional, PG10 or PG11
Encoder interface board
Optional, refer to section 4.5
PG10, PG11 card excluded
Power terminal
Refer to section 4.3
Control board
Refer to section 4.4
L1 L2 L3
POWER
(+)
(-)
BR
U V W
MOTOR
PE

Chapter 3 Mechanical Installation

3.1 Precautions of Installation

Danger

- Do not install if HD50 is incomplete or impaired.
- Please see the drive size and weight to take appropriate tools for handing, avoid harming from sharp edges or injured by a dropped drive.
- Make sure that HD50 is far from the explosive and flammable things.
- Do not do wiring operation until power supply is cut off for more than 10 minutes, the internal charge indicator of HD50 is off and the voltage between (+) and (-) of the main circuit terminals is below 36V.

Warning

- It is required not only carry the keypad and the cover but also bottom enclosure of HD50.
- Do not let wires, screws or residues fall into HD50 when installing.

3.2 Installation Site Requirement

Ensure the Installation Site Meets the Following Requirements:

- Do not install at the direct sunlight, moisture, water droplet location;
- Do not install at flammable, explosive, corrosive gas and liquid location;
- Do not install at oily dust, fiber and metal powder location;
- Be vertical installed on fire-retardant material with a strong support;
- Make sure adequate cooling space for HD50 so as to keep ambient temperature between -10 - +40°C;
- Install at where the vibration is 3.5m/s^2 in 2 - 9Hz, 10m/s^2 in 9 - 200Hz (IEC60721-3-3);
- Install at where the humidity is less than 95%RH and non-condensing location;
- Protection level of HD50 is IP20 and pollution level is 2 (dry, non-conducting dust pollution).

Note:

1. It needs derating use running temperature exceeds 40°C. The derating value of the output current of HD50 shall be 2% for each degree centigrade. Max. allowed temperature is 50°C.

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

3.3 Installation Direction and Space Requirements

To achieve good cooling efficiency, install HD50 perpendicularly and always provide the following space to allow normal heat dissipation.

The requirements on mounting space and clearance are shown in Table 3-1.

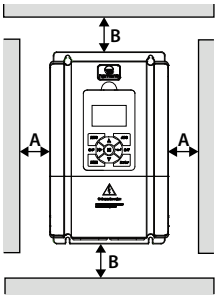


Table 3-1 Installation size

Class	≤55kW	≥75kW
A (left and right)	≥50mm	≥150mm
B (up and down)	≥100mm	≥350mm
C (up air duct)	≥50mm	≥100mm
D (down air duct)	≥50mm	≥100mm

HD50 are installed in upper and lower, flow-guiding plates shall be installed in the middle. Installation space size see Table 3-2.

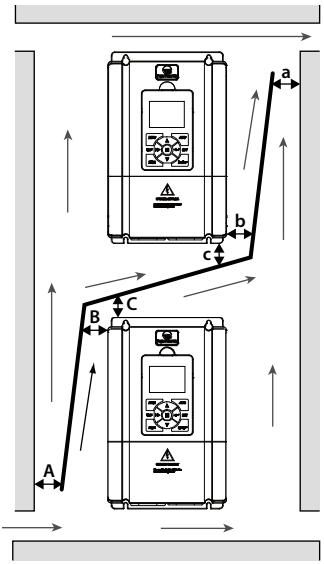


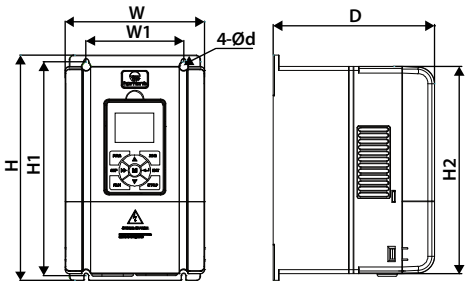
Table 3-2 Multiple drive installation space size table

Class	≤55kW	≥75kW
A	≥50mm	≥100mm
B	≥50mm	≥100mm
C	≥50mm	≥100mm
a	≥50mm	≥100mm
b	≥50mm	≥100mm
c	≥50mm	≥100mm

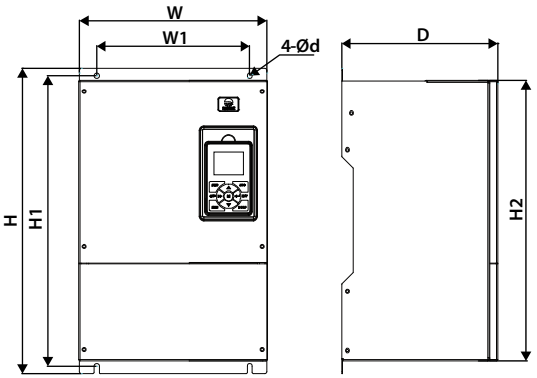
3.4 Dimensions and Weight

HD50 appearance and installation dimensions see Table 3-3, cabinet see Table 3-4.

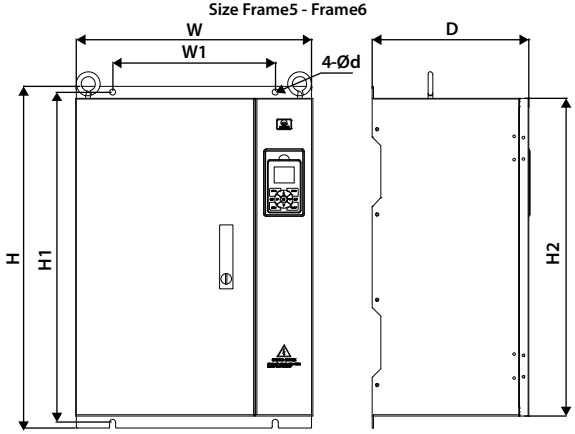
See section 2.3, page 6. For details on the specific dimensions.



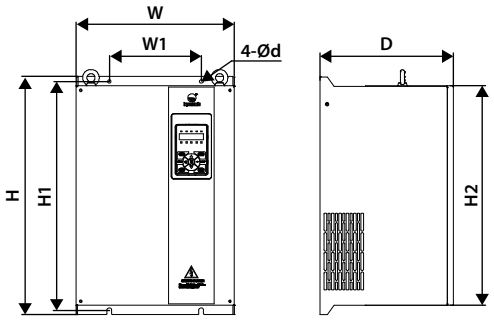
Size Frame1 - Frame4



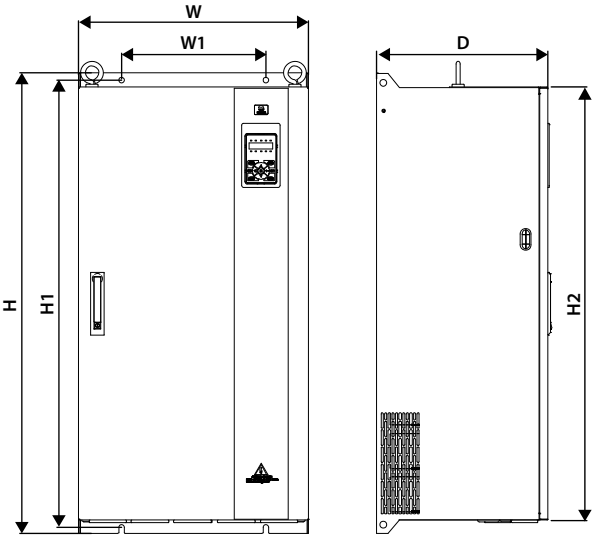
Size Frame5 - Frame6



Size Frame7 - Frame10



Size Frame12 - Frame14

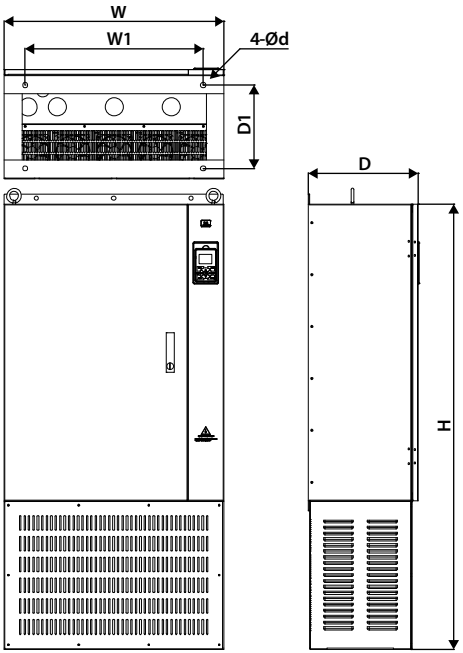


Size Frame15 - Frame16

Table 3-3 HD50 dimension

Size	Dimension (mm)			Mounting Size (mm)				GW
	W	H	D	W1	H1	H2	d	(kg)
Frame1	135	241	162	91	226	220	5	2.4
Frame2	165	266	190	115	253	245	5	4.4
Frame3	200	299	210	146	286	280	5	5.8
Frame4	235	353	222	167	337	330	7	8.2
Frame5	290	469	240	235	448	430	8	20.4
Frame6	380	598	290	260	576	550	10	48
Frame7	500	721	330	343	696	670	12	80
Frame8	620	917	360	450	890	850	12	115
Frame9	740	1067	370	520	1040	1000	14	150
Frame10	970	1316	380	620	1286	1250	14	190

Size	Dimension (mm)			Mounting Size (mm)				GW
	W	H	D	W1	H1	H2	d	(kg)
Frame12	345	520	290	200	500	480	8	30
Frame13	415	650	360	320	626	600	10	55
Frame14	415	710	380	320	686	660	12	75
Frame15	510	1020	380	320	992	960	12	120
Frame16	620	1050	395	520	1020	977	14	150



Frame8 - Frame10 cabinet dimension

Table 3-4 HD50 cabinet demension

Size (with -C)	Dimension (mm)			Mounting Size (mm)		
	W	H	D	W1	D1	d
Frame8	620	1250	360	500	270	18
Frame9	740	1500	370	600	280	18
Frame10	970	1650	380	700	280	18

3.5 Mounting and Dismantling of Keypad

Press the keypad in the direction shown in Figure 3-1 until you hear "click". Do not install the keypad from other directions, otherwise it will cause poor operation of keypad.

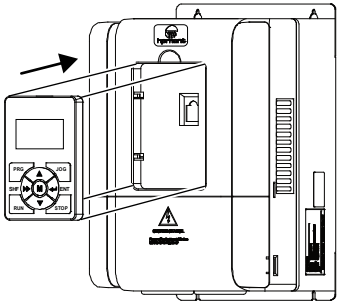


Figure 3-1 Keypad mounting

Press the hook of the keypad in the direction of Figure 3-2 and pull out the keypad in 2 directions.

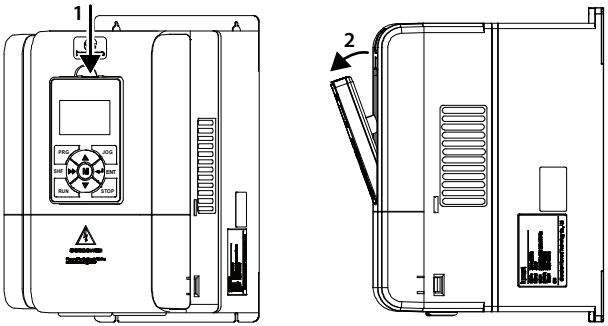
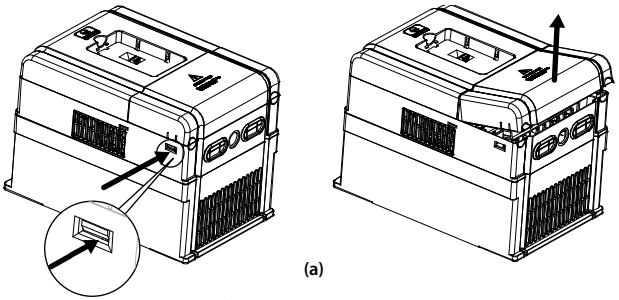


Figure 3-2 Keypad dismantling

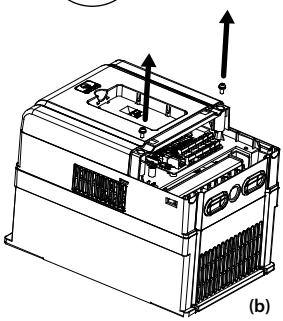
3.6 Dismantle Plastic Cover

The upper cover and the lower cover of HD50 are removable. The dismantle steps are shown as following.

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



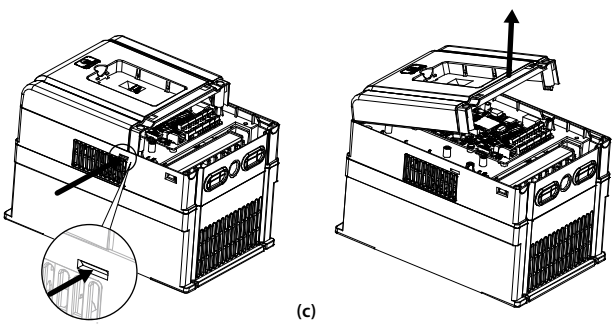
(a)



(b)

The removing processes of plastic cover board:

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



(c)

Figure 3-3 Removal of plastic cover

Chapter 4 Electrical Installation

4.1 Precautions

Danger

- Only qualified electrical engineer can perform wiring job.
- To facilitate the input side over-current protection and outage maintenance, connect HD50 with power supply via the MCCB or fuse.
- Do not dismantle HD50 or do wiring operation until the power is cut-off for more than 10 minutes, the internal charge indicator of HD50 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.
- There is more than 3mA leakage current in HD50 grounding, depending on the operating conditions. To ensure safety, HD50 and the motor must connect to separate and independent grounding wire, so as to ground reliably. It must use Type B mode when utilize ground leakage protection devices (ELCB/RCD).
- Do not touch the wire terminals of HD50 when it is live. The main circuit terminals are neither allowed connecting to the enclosure nor short-circuiting.

Warning

- Do not do dielectric strength test on HD50.
- For HD50 with more than 2 year's storage, please use regulator to power it slowly.
- Do wiring connection of the braking resistor or the braking unit according to the wiring figure.
- Make sure the terminals are fixed tightly.
- Do not connect the AC supply cable to the output terminals U/V/W of HD50.
- Do not connect the phase-shifting capacitors to the output circuit.
- Be sure HD50 has ceased output before switching motor or change-over switches.
- The HD50 DC bus terminals must not be short-circuited.

4.2 Peripheral Accessories Selection

4.2.1 Wiring Specifications of Input and Output

A disconnecting device such as an air switch (MCCB) or a fuse with overcurrent protection must be installed between the power supply and the driver to avoid an increase in the range of influence caused by the failure of the rear equipment, so as to ensure equipment and personal safety.

The recommended specification of MCCB, contactor&cables are shown as Table 4-2.

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

Table 4-1 Sectional area of ground protective conductor

Sectional Area S of Phase Conductor (Supply Cable) while Installing (mm^2)	S ≤ 2.5	2.5 < S ≤ 16	16 < S ≤ 35	S > 35
Min. Sectional Area Sp of Relative Protective Conductor (Ground Cable) (mm^2)	2.5	S	16	S/2

Table 4-2 Input and output wiring options

Model	MCCB (A)	Contactor (A)	Supply Cable (mm^2)	Motor Cable (mm^2)	Ground Cable (mm^2)	Size
Three phase power supply: 380 - 460V, 50/60Hz						
HD50-4T0P7G	10	10	0.5	0.5	2.5	Frame1
HD50-4T1P5G	16	10	0.75	0.5	2.5	Frame1
HD50-4T2P2G	16	10	1.5	0.75	2.5	Frame1
HD50-4T3P7G	25	16	2.5	1.5	2.5	Frame2
HD50-4T5P5G	32	25	2.5	2.5	2.5	Frame2
HD50-4T7P5G	40	32	4	4	4	Frame3
HD50-4T011G	63	40	6	6	6	Frame3
HD50-4T015G	63	40	10	10	10	Frame4
HD50-4T018G	100	63	10	10	10	Frame4
HD50-4T022G	100	63	16	16	16	Frame5
HD50-4T030G	125	100	25	25	16	Frame5
HD50-4T037G	160	100	35	35	16	Frame6
HD50-4T045G	200	125	35	35	16	Frame6
HD50-4T055G	200	125	35	35	16	Frame6
HD50-4T075G	250	160	50	50	25	Frame7
HD50-4T090G	250	160	95	70	50	Frame7
HD50-4T110G	350	350	120	120	50	Frame7
HD50-4T132G HD50-4T132G-C	400	400	120	120	50	Frame8
HD50-4T160G HD50-4T160G-C	500	400	185	185	95	Frame8
HD50-4T200G HD50-4T200G-C	600	600	240	240	120	Frame8
HD50-4T220G HD50-4T220G-C	600	600	120 * 2	120 * 2	120	Frame9
HD50-4T250G HD50-4T250G-C	800	600	120 * 2	120 * 2	120	Frame9
HD50-4T280G HD50-4T280G-C	800	800	150 * 2	150 * 2	150	Frame9
HD50-4T315G HD50-4T315G-C	800	800	185 * 2	185 * 2	185	Frame10
HD50-4T355G HD50-4T355G-C	800	800	240 * 2	240 * 2	240	Frame10
HD50-4T400G HD50-4T400G-C	1000	1000	240 * 2	240 * 2	240	Frame10
Three phase power supply: 500 - 690V, 50/60Hz						
HD50-6T018G	100	63	6	6	6	Frame12
HD50-6T022G	100	63	6	6	6	Frame12
HD50-6T030G	125	100	10	10	10	Frame12

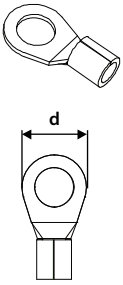
Model	MCCB (A)	Contactor (A)	Supply Cable (mm^2)	Motor Cable (mm^2)	Ground Cable (mm^2)	Size
HD50-6T037G	160	100	16	16	16	Frame12
HD50-6T045G	200	125	16	16	16	Frame12
HD50-6T055G	200	125	35	25	16	Frame12
HD50-6T075G	250	160	35	35	16	Frame13
HD50-6T090G	250	160	50	35	16	Frame13
HD50-6T110G	350	350	50	50	25	Frame13
HD50-6T132G	400	400	70	50	25	Frame14
HD50-6T160G	500	400	95	70	35	Frame14
HD50-6T200G	600	600	120	120	50	Frame14
HD50-6T220G	600	600	120	120	50	Frame15
HD50-6T250G	800	600	150	150	70	Frame15
HD50-6T280G	800	800	185	185	70	Frame15
HD50-6T315G	800	800	70 * 2	70 * 2	70	Frame15
HD50-6T355G	800	800	95 * 2	95 * 2	95	Frame16
HD50-6T400G	1000	1000	120 * 2	120 * 2	120	Frame16
*Note: * 2 refers to two power cables in parallel.*						

4.2.2 Power Terminal Lug

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

Take the round terminal as an example.

Table 4-3 Selection of power terminal lug

Structure	Screw	Torque (N. M)	Allow the Max. Diameter of the Eard (mm)	
Frame1	M3.5	0.8 - 1.2	7	
Frame2	M4	1.2 - 1.5	9.9	
Frame3 - Frame4	M5	2.5 - 3.0	12	
Frame5	M6	4.0 - 5.0	15.5	
Frame6	M8	9.0 - 10.0	24	
Frame7	M10	17.6 - 22.5	30	
Frame8 - Frame9	M12	31.4 - 39.2	35	
Frame10	M16	48.6 - 59.4	55	
Frame12	M8	9.0 - 10.0	18	
Frame13	M8	9.0 - 10.0	23	
Frame14	M10	17.6 - 22.5	27	
Frame15	M12	31.4 - 39.2	30	
Frame16	M12	31.4 - 39.2	33	

4.3 Power Terminals and Wiring

Danger

- The metal terminal part of the power terminal wiring must be wrapped with an insulating tape.

Warning

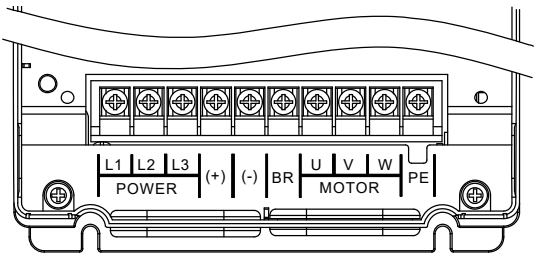
- Make sure that the AC source voltage is consistent with the drive's nominal input voltage.

4.3.1 Power Terminals

Table 4-4 Description

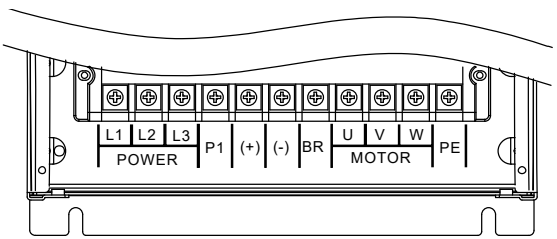
Frame1 - Frame2

- L1, L2, L3: Three-phase AC power input terminals
- U, V, W: Output terminals, connect to three-phase AC motor
- (+), (-): DC supply input terminals; DC input terminals of power regenerative unit
- (+), BR: Braking resistor connection terminals
- PE: Ground terminal, connect to the ground



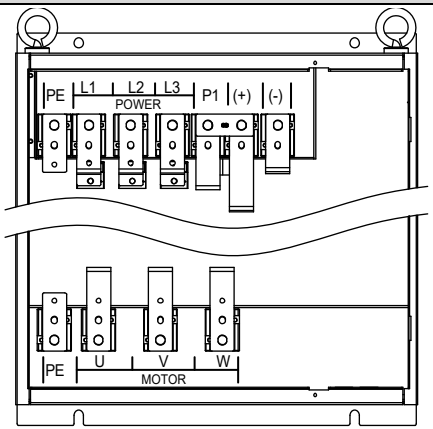
Frame3 - Frame6

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



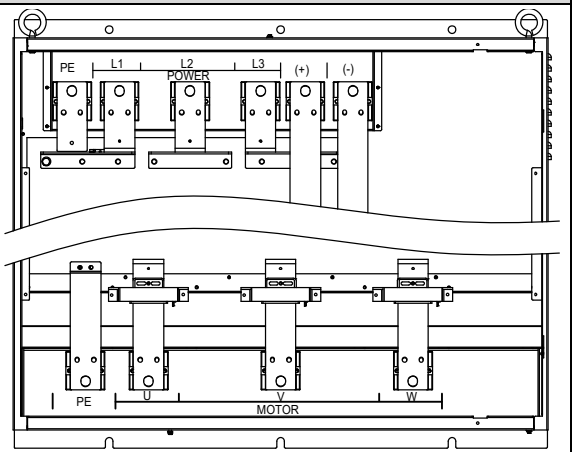
Frame7 - Frame9 (Contain -C)

- L1, L2, L3: Three-phase AC power input terminals
- U, V, W: Output terminals, connect to three-phase AC motor
- P1, (+): DC reactor connection terminals
- (+), (-): DC supply input terminals; DC input terminals of power regenerative unit
- PE: Ground terminal, connect to the ground



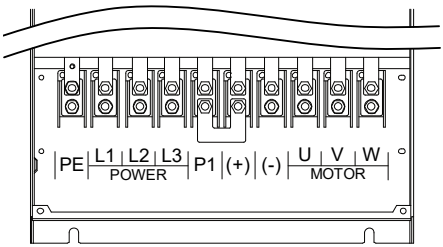
Frame10 (Contain -C)

- L1, L2, L3: Three-phase AC power input terminals
- U, V, W: Output terminals, connect to three-phase AC motor
- (+), (-): DC supply input terminals; DC input terminals of power regenerative unit
- PE: Ground terminal, connect to the ground



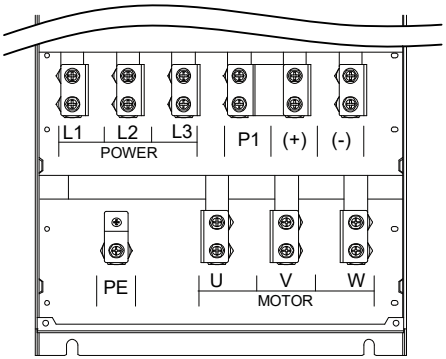
Frame12 - Frame13

- L1, L2, L3: Three-phase AC power input terminals
- U, V, W: Output terminals, connect to three-phase AC motor
- (+), (-): DC supply input terminals; DC input terminals of power regenerative unit
- PE: Ground terminal, connect to the ground



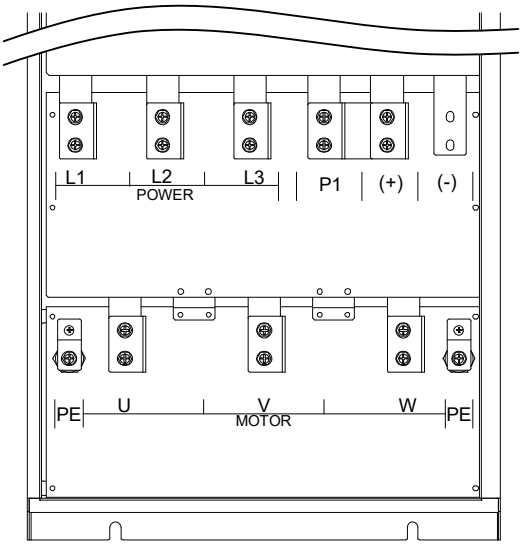
Frame14

- L1, L2, L3: Three-phase AC power input terminals
- U, V, W: Output terminals, connect to three-phase AC motor
- (+), (-): DC supply input terminals; DC input terminals of power regenerative unit
- PE: Ground terminal, connect to the ground



Frame15 - Frame16

- L1, L2, L3: Three-phase AC power input terminals
- U, V, W: Output terminals, connect to three-phase AC motor
- (+), (-): DC supply input terminals; DC input terminals of power regenerative unit
- PE: Ground terminal, connect to the ground



4.3.2 Power Terminal Wiring

In commissioning, please ensure motor positive rotation under positive command. If the motor is reversed, replace any two-phase wiring of the drive U/V/W terminal (or change F00.17) to change the motor.

The power terminal wiring is shown in Table 4-5.

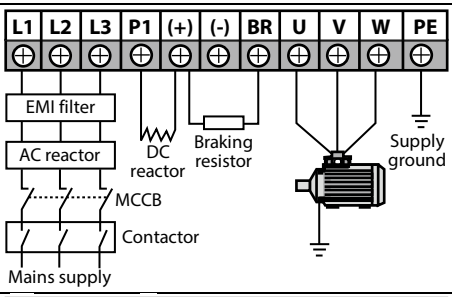
For selection of contactor, MCCB, power cable, motor cable and ground cable, refer to 4.2.1 Wiring Specifications of Input and Output, page 19.

Refer to 8.3 Brake Unit and Brake Resistor Selection (page 138) for braking resistor and unit.

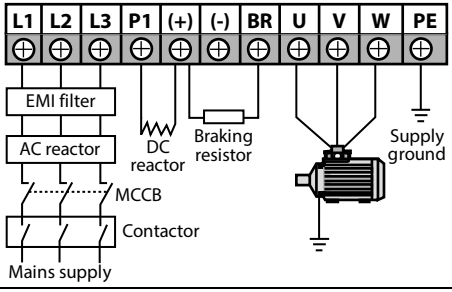
Refer to 8.4 Reactor Selection (page 140) for AC reactors and DC reactors.

Table 4-5 Power terminal wiring

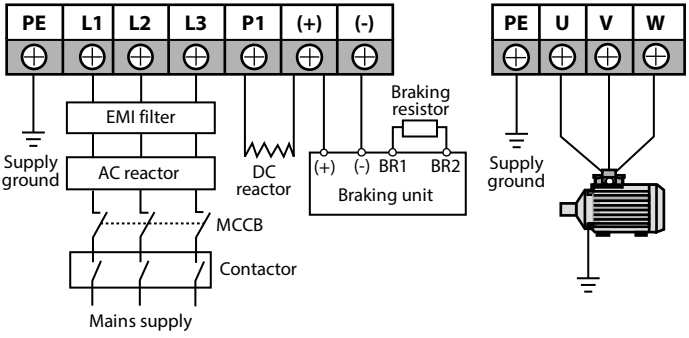
Frame1 - Frame2



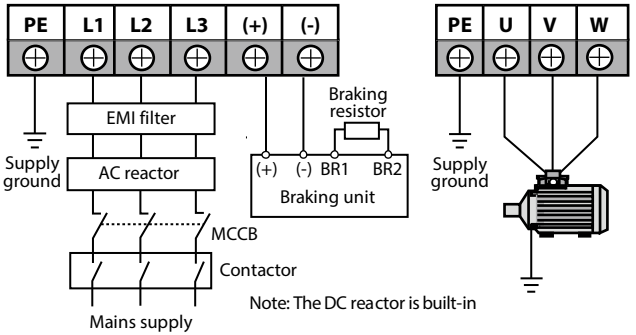
Frame3 - Frame6



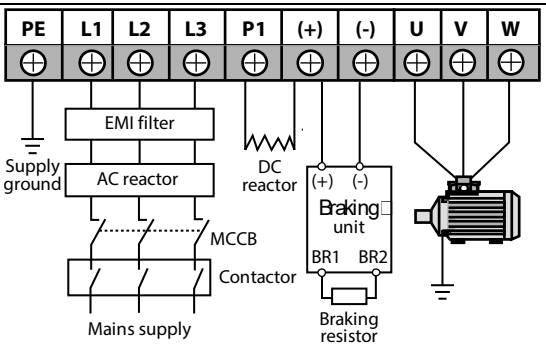
Frame7 - Frame9 (-C)



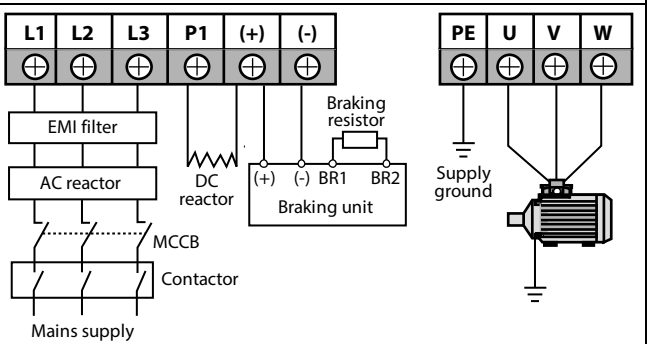
Frame10 (-C)

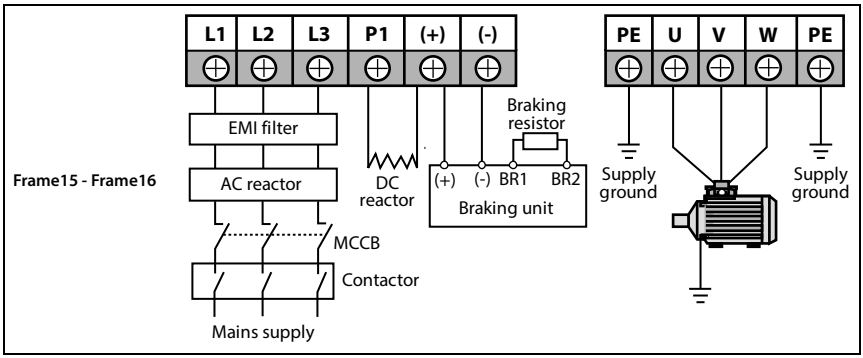


Frame12 - Frame13



Frame14





4.4 Control Board Specification

Danger

- The control circuit is basically isolated with the power circuit. Do not touch HD50 after it is powered.

Warning

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

4.4.1 Control Board Terminal

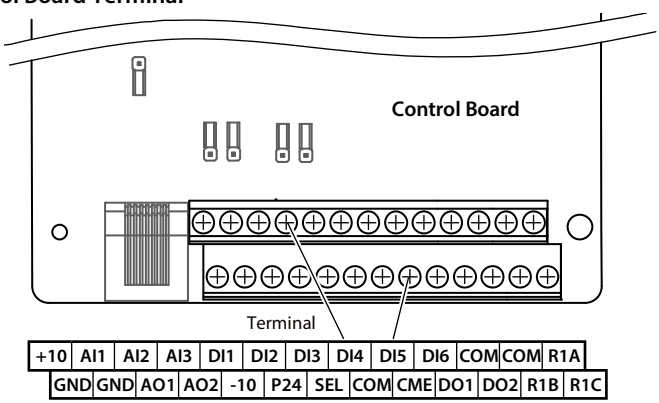


Figure 4-1 Control board terminals

Table 4-6 Control board terminal description

Terminals		Description
+10, GND	Analogue power supply	Analogue input use +10V power supply, Max. output current is 100mA Analogue input use -10V power supply, Max. output current is 10mA • GND is isolated to COM
-10, GND		
AI1 - AI3	Anglogue input	AI1 input voltage: 0 - 10V (input impedance: 34kΩ) AI2, AI3 input voltage: -10 - +10V (input impedance: 34kΩ) AI2, AI3 input current: 0 - 20mA (input impedance: 500Ω) • AI2, AI3 can select voltage/current
AO1, AO2	Anglogue output	Output voltage/current signal: 0 - 10V/0 - 20mA Programmable output
GND	Anglogue ground	
DI1 - DI6	Digital input	Programmable bipolar optional input signal Input voltage: 0 - 30VDC DI1 - DI5 input impedance: 4.7kΩ, DI6 input impedance: 1.6kΩ • DI6 can be selectable for high-frequency input, max-frequency 50kHz
P24, COM	Digital power supply	Digital input use +24V as supply, Max. output current is 200mA COM is isolated to CME
SEL	Digital input common terminal	SEL and P24 are connected by default (factory setting) • Disconnect SEL and P24 when use external power to drive DI
DO1, CME	Digital output	Programmable optical-coupled isolation, open collector output • DO1, DO2 open collector output, output voltage: 0 - 30VDC, Max. output current 50mA • DO2 can be selectable for high-frequency output, max-frequency 50kHz CME is isolated to COM, shortly connected to COM by default • Disconnect CME and COM when they are isolating output
DO2, COM		
R1A/R1B/R1C	Relay output	Programmable output, contact rating: 250VAC/3A or 30VDC/1A • R1B, R1C: Normally closed; R1A, R1C: Normally open

Note:

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

4.4.2 Jumper

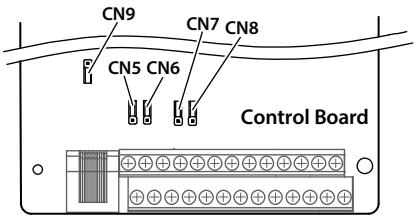
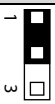
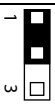
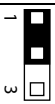
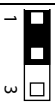
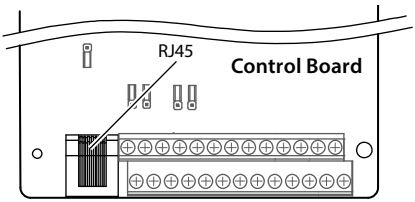


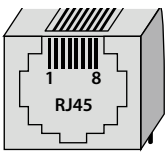
Figure 4-2 Jumper position

Table 4-7 Jumper description

Jumper	Description
CN5 	AI2 can select voltage or current signal. • Pin 1&2 are short-connected, AI2 inputs voltage signal (factory setting). • Pin 2&3 are short-connected, AI2 inputs current signal.
CN6 	AI3 can select voltage or current signal. • Pin 1&2 are short-connected, AI3 inputs voltage signal (factory setting). • Pin 2&3 are short-connected, AI3 inputs current signal.
CN7 	AO1 can select voltage or current signal. • Pin 1&2 are short-connected, AO1 outputs voltage signal (factory setting). • Pin 2&3 are short-connected, AO1 outputs current signal.
CN8 	AO2 can select voltage or current signal. • Pin 1&2 are short-connected, AO2 outputs voltage signal (factory setting). • Pin 2&3 are short-connected, AO2 outputs current signal.
CN9 	SCI communication can select proper resistance. • Pin 1&2 are short-connected, select the proper resistance. • Pin 2&3 are short-connected, no resistance (factory setting).

4.4.3 Communication Terminal





RJ45 Pin	Pin Signal
1, 3	+5V
2	485+
4, 5, 6	GND
7	485-
8	Reserved

4.4.4 Control Terminal Wiring

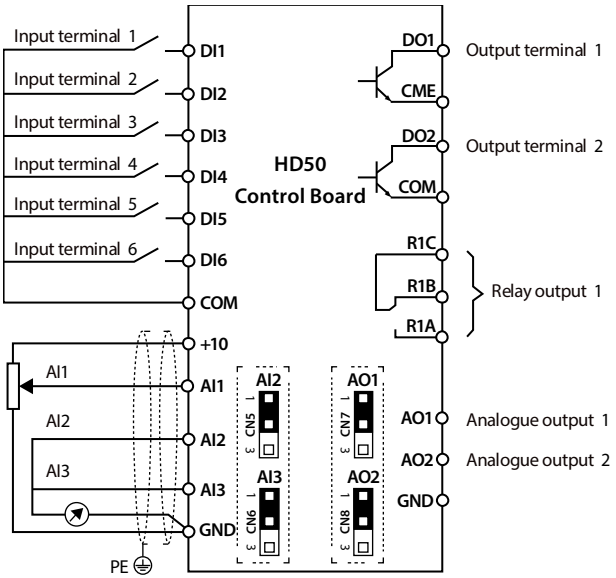


Figure 4-3 HD50 control board connection

Digital Input (DI) Connection

Dry Contact

Using the internal 24V power supply (SEL and P24 are short-connected at factory) or external power supply (remove the connector between SEL and P24), their connections are shown in Figure 4-4.

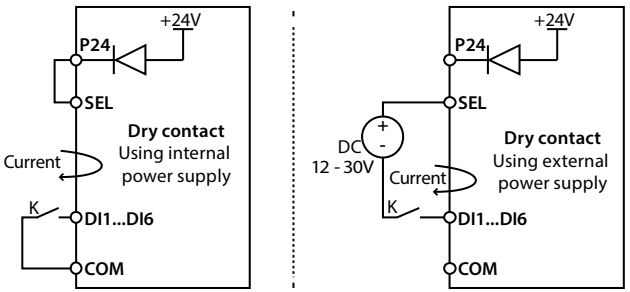


Figure 4-4 Dry contact connection

Source/Drain

Using external power supply, the source/drain connection are shown in Figure 4-5 (remove the connector between SEL and P24).

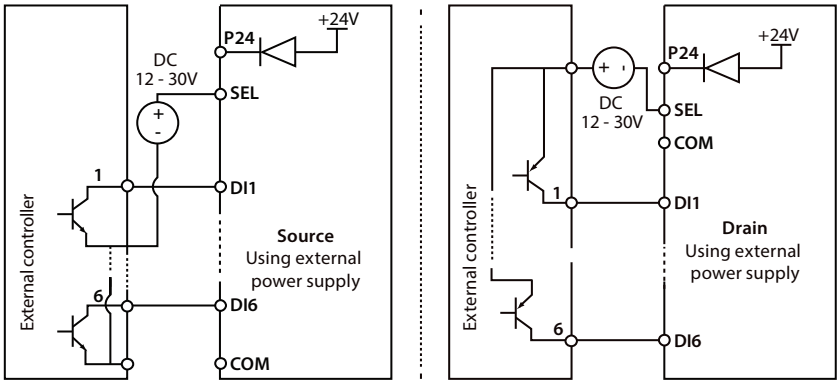


Figure 4-5 Source/Drain connection when using external power

Using internal 24V power supply of HD50, it is NPN/PNP connection in which external drive is common emitter output, as shown in Figure 4-6 (for PNP, remove the connector between SEL and P24).

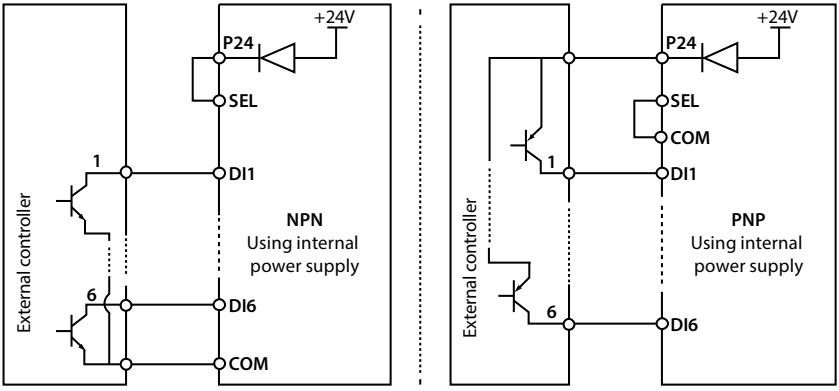


Figure 4-6 NPN (source)/PNP (drain) connection when using internal power supply

Analogue Input (AI) Connection

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

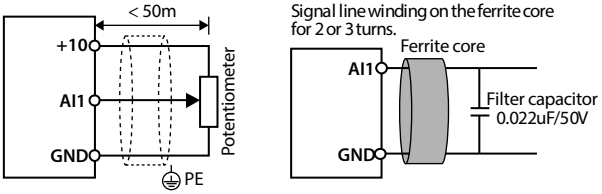


Figure 4-7 AI1 connection

Note:

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

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

AI2/AI3 are selected as voltage input and the range is -10 - +10V. When selecting internal +10V of HD50, refer to Figure 4-7; Selecting +/-10V external supply, refer to Figure 4-8.

AI2/AI3 are selected as current input and the range is 0 - 20mA, refer to Figure 4-8.

AI3 should correctly set jumper CN2.

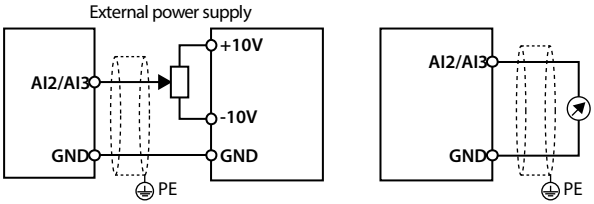


Figure 4-8 AI2 connection

Digital Output Terminals (DO) Wiring

DO1 can use internal 24V power supply of HD50 or external power supply, the connection is shown in Figure 4-9.

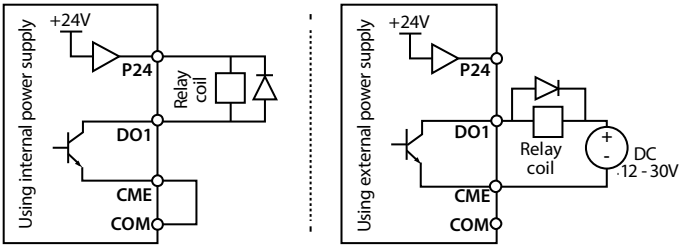


Figure 4-9 DO1 connection

DO2 is open collective output, refer to Figure 4-9.

DO2 is pulse frequency output; DO2 can use internal 24V power supply of drive or external power supply. The connection is shown in Figure 4-10.

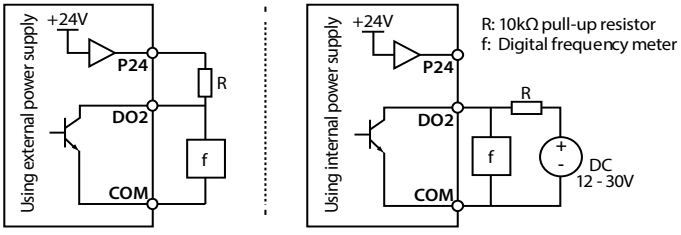


Figure 4-10 DO2 connection

4.5 Encoder Interface Boards

4.5.1 Encoder Introduction

There are 7 kinds encoder interface boards provided for HD50 series drive. And their models and functions are shown as Table 4-8.

Table 4-8 Encoder interface boards

Encoder Interface Boards	Functions
OC encoder card (HD-PG1-OC)	• Support ABZ signal; • Apply to Asyn. motor closed-loop vector control (VC)
OC encoder interface board with frequency demultiplication (FD) output (HD-PG2-OC-FD)	• Support the differential ABZ signals and the pulse FD output; • Apply to Asyn. motor closed-loop vector control (VC)
SINCOS encoder interface board with FD output (HD-PG5-SINCOS-FD)	• Support the SINCOS signal and the pulse FD output; • Apply to Syn. motor closed-loop vector control (VC)
Line drive encoder interface board with FD output (HD-PG6-UVW-FD)	• Support the differential ABZ and UVW signal and the pulse FD output; • Apply to Syn. motor closed-loop vector control (VC)
Line drive encoder card with FD output (HD-PG8-ABZ-FD)	• Support the differential ABZ signals and the pulse FD output; • Apply to Asyn. motor closed-loop vector control (VC)
Rotary transformer encoder card (HD-PG10-RES-FD-A)	• Support feedback signal SIN+/-, COS+/- input and the pulse FD output; • Support rotary transformer excitation signal EXC+/- output; • Apply to Syn. motor closed-loop vector control (VC); *Note: Can not be used with the expansion I/O card (HD50-EIO), 2.2kW and below can not be selected*
SC encoder interface board with FD output (HD-PG11-SC-FD)	• Support the serial communication signal and endat protocol; • Apply to Syn. motor closed-loop vector control (VC); *Note: Can not be used with the expansion I/O card (HD50-EIO), 2.2kW and below can not be selected*

4.5.2 FD Description

To change the FD coefficient, shift 6-digit FD switches.

- When the switch shifts to ON, it means "1", otherwise means "0".
- Convert the 6-digit binary number into decimal number. Multiple the decimal number by 2, the result is FD coefficient, as shown in Figure 4-11.
- Max. value is "111111" which is 63 * 2 FD.

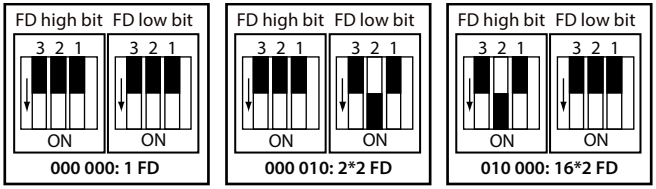


Figure 4-11 Encoder interface board FD description

4.5.3 Wiring Requirement

1. Encoder card wire should be laid separately and keep distance from power cables and forbidden to parallel with them.

2. Encoder card wire should be installed inside separated metal conduits and connected to ground firmly.

4.5.4 HD-PG1-OC

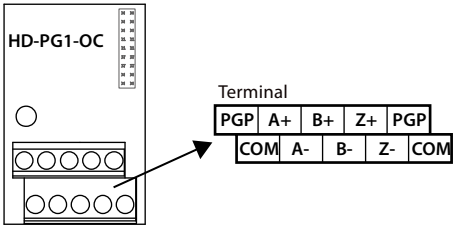


Figure 4-12 HD-PG1-OC

Terminals Description

Table 4-9 Terminals description

Terminal	Description	Terminal	Description
PGP	+12V power output	A+/A-	Encoder A+/A- signal
COM	Power ground	B+/B-	Encoder B+/B- signal
		Z+/Z-	Encoder Z+/Z- signal

Wiring

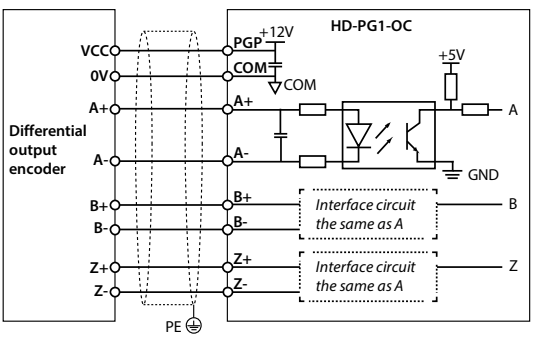


Figure 4-13 Differential output encoder wiring sketch

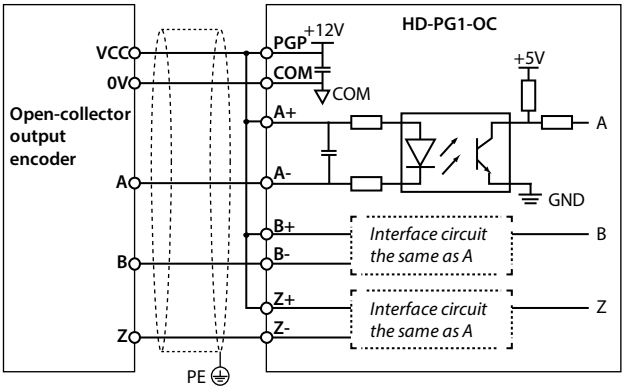


Figure 4-14 Open-collector output encoder wiring sketch

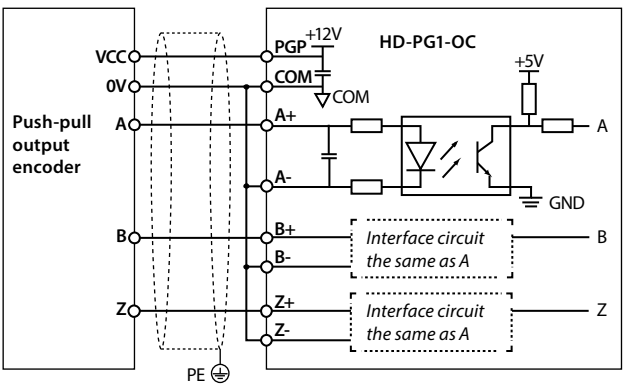


Figure 4-15 Push-pull output encoder wiring sketch

4.5.5 HD-PG2-OC-FD

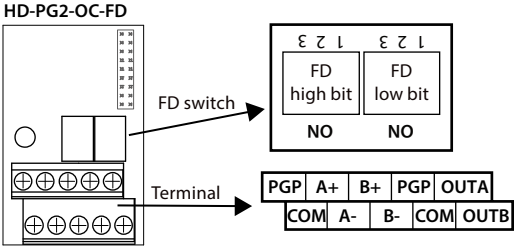


Figure 4-16 HD-PG2-OC-FD

FD Switch

The frequency divider switch is shown in section 4.5.2.

Table 4-10 Terminals description

Terminals	Description	Terminals	Description
PGP	+12V power supply output	OUTA	FD output A signal, NPN type OC output
COM	Power ground	OUTB	FD output B signal, NPN type OC output
A+/A-	Encoder signal A+/A-	COM	FD output singal ground
B+/B-	Encoder signal B+/B-		

Wiring

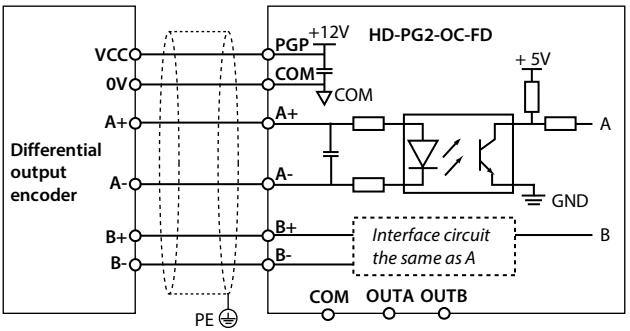


Figure 4-17 FD output encoder wiring sketch

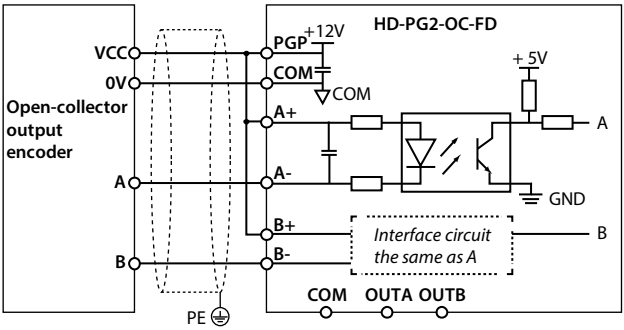


Figure 4-18 Collective open output encoder wiring sketch

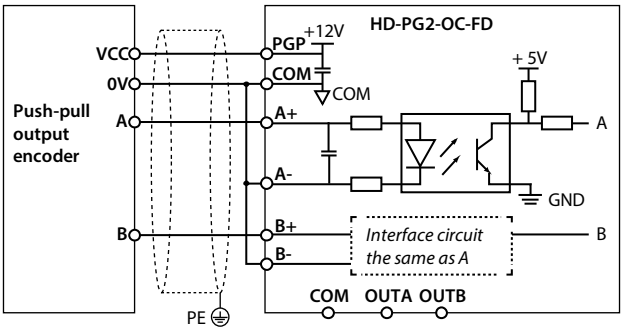


Figure 4-19 Pull-push output encoder wiring sketch

4.5.6 HD-PG5-SINCOS-FD

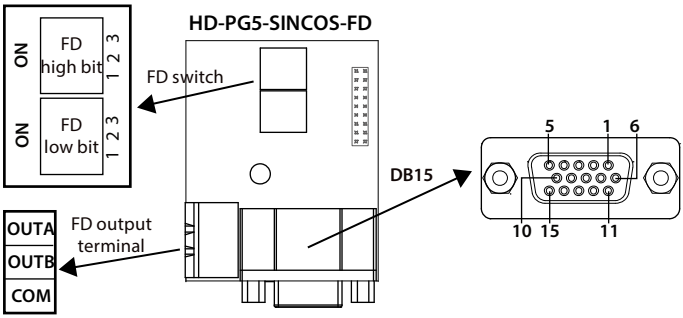


Figure 4-20 HD-PG5-SINCOS-FD

FD Switch

The frequency divider switch is shown in section 4.5.2.

Terminal Description

When used, DB15 and motor encoder signal line DB15 head can be reliably connected.

Table 4-11 DB15 and frequency output terminal description

Terminals		Description	Terminals		Description
1/8	B-/B+	Encoder differential signal B-/B+	12/13	D+/D-	Encoder differential signal D+/D-
3/4	R+/R-	Encoder differential signal R+/R-	2/14/15		Empty
5/6	A+/A-	Encoder differential signal A+/A-			
7	GND	Power supply	OUTA		FD output signal A, NPN OC output
9	PGVCC	+5V power supply	OUTB		FD output signal B, NPN OC output
10/11	C+/C-	Encoder differential signal C+/C-	COM		FD output signal ground, insolated with GND

Wiring

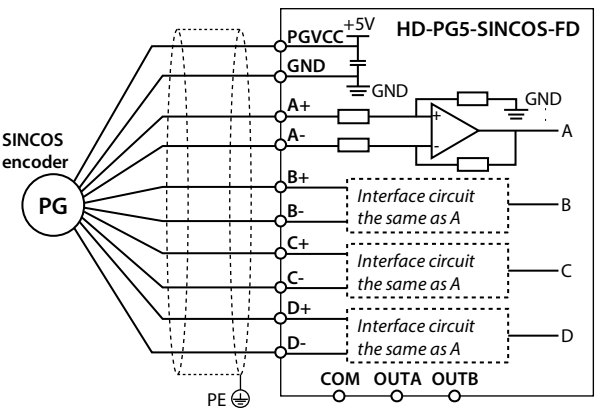


Figure 4-21 Sincos encoder wiring sketch

4.5.7 HD-PG6-UVW-FD

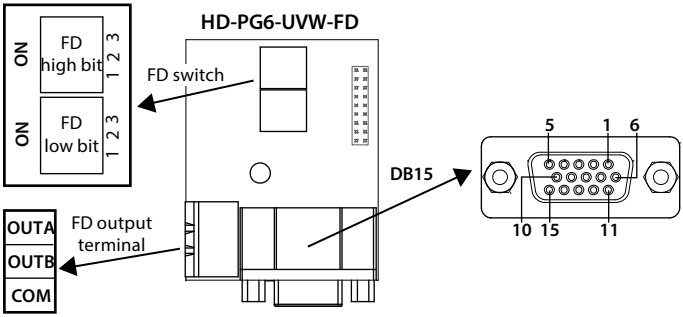


Figure 4-22 HD-PG6-UVW-FD

FD Switch

The frequency divider is shown in section 4.5.2.

Terminal Description

When using, DB15 and motor encoder signal line DB15 head can be reliably connected.

Table 4-12 Description of DB15 and FD output terminals

Terminals		Description	Terminals		Description
1/2	A+/A-	Encoder differential signal A+/A-	13	PGVCC	+5V power supply
3/4	B+/B-	Encoder differential signal B+/B-	14	PGGND	Power supply ground
5/6	Z+/Z-	Encoder differential signal Z+/Z-	15		Empty
7/8	U+/U-	Encoder differential signal U+/U-	OUTA		FD output signal A, NPN OC output
9/10	V+/V-	Encoder differential signal V+/V-	OUTB		FD output signal B, NPN OC output
11/12	W+/W-	Encoder differential signal W+/W-	COM		FD output signal ground, isolated with GND

Wiring

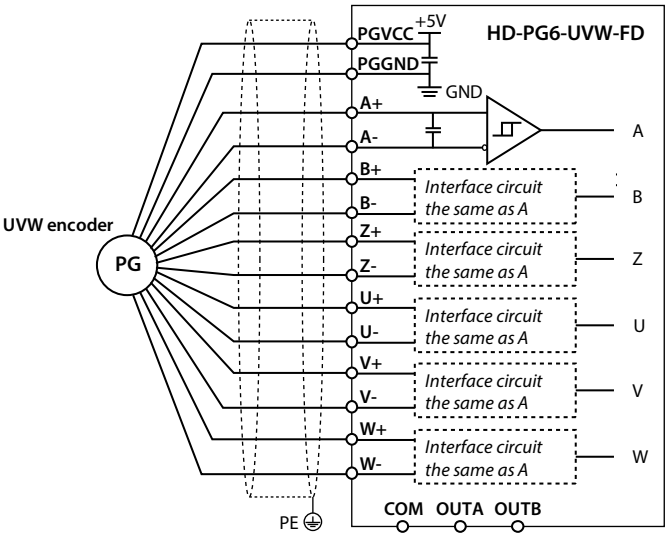


Figure 4-23 UVW encoder wiring sketch

4.5.8 HD-PG8-ABZ-FD

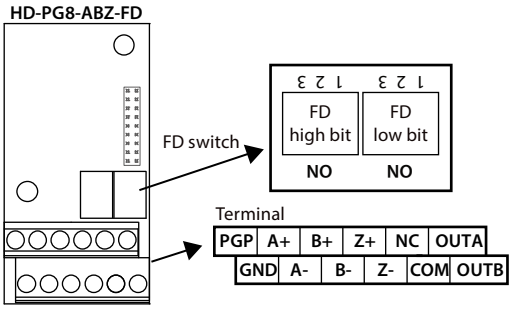


Figure 4-24 HD-PG8-ABZ-FD

FD Switch

The frequency divider is shown in section 4.5.2.

Terminals Description

Table 4-13 Terminals description

Terminals	Description	Terminals	Description
PGP	+5V power supply output	NC	Empty
GND	Power supply ground		
A+/A-	Encoder signal A+/A-	OUTA	FD output A signal, NPN OC output
B+/B-	Encoder signal B+/B-	OUTB	FD output B signal, NPN OC output
Z+/Z-	Encoder signal Z+/Z-	COM	FD output signal ground, isolated with GND

Wiring

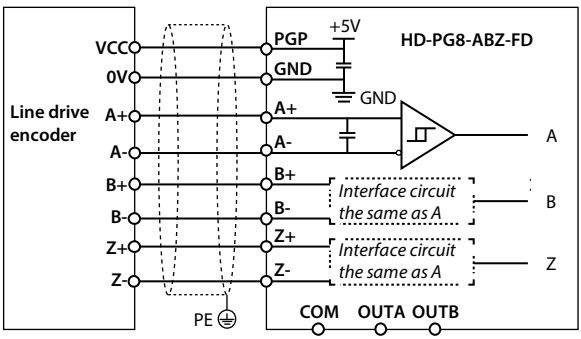


Figure 4-25 Line drive encoder card wirng sketch

4.5.9 HD-PG10-RES-FD-A

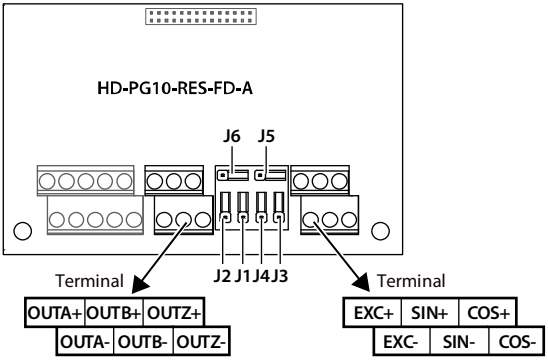


Figure 4-26 HD-PG10-RES-FD-A

Terminals Description

Table 4-14 Terminals description

Description	Description
EXC+/EXC-	Rotary transformer excitation signal
SIN+/SIN-	Rotary transformer feedback signal
COS+/COS-	
OUTA+/OUTA-	FD output signal A+/A-
OUTB+/OUTB-	FD output signal B+/B-
OUTZ+/OUTZ-	Absolute zero signal

Note:

1. Relay terminal, such as AC 220V voltage signal, must be limited to within 3A.

2. Can not be used with the expansion I/O card (HD50-EIO) at the same time.

3. 2.2kW and below can not be matching.

4. A/B pulse signal output is orthogonal, and its default output is 16384 lines. The FD coefficient can be modified by function parameter.

5. When 1 and 2 pins of J1 - J6 jumper had short-circuited at the same time, the excitation output voltage is 4V (default setting); When 2 and 3 pins of J1 - J6 jumper had short-circuited at the same time, the excitation output voltage is 7V.

EXC/SIN/COS Signal Description

Rotary transformer encoder card excitation signal (EXC) and feedback signal (SIN/COS) waveform shown in Figure 4-27.

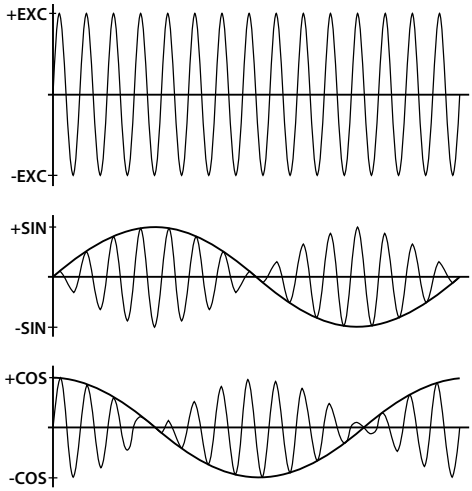


Figure 4-27 Excitation signal and feedback signal waveform

4.5.10 HD-PG11-SC-FD

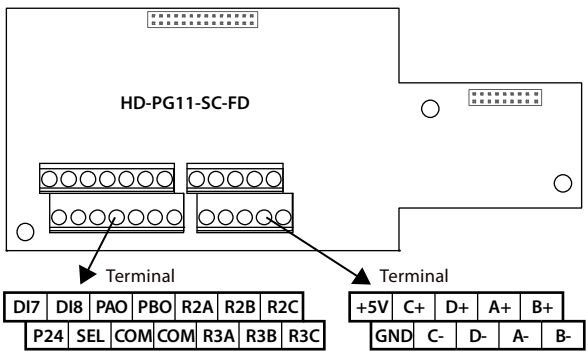


Figure 4-28 HD-PG11-SC-FD

Terminal Description

Table 4-15 Terminals description

Terminal		Description
DI7 - DI8	Digital input 7 - 8	Programmable bipolar optional input signal Input voltage range 0 - 30VDC, input impedance 4.7kΩ
P24, COM	Digital power supply	Digital input with +24V power supply, the Max. allow output current 200mA
SEL	Digital input common	Factory and P24 shorted When driving DI with an external power supply, disconnect the shorting between SEL and P24
PAO/PBO	FD signal	FD output A/B signal
R2A/R2B/R2C R3A/R3B/R3C	Relay contact output	Programmable output, contact capacity: 250VAC/3A or 30VDC/1A RB, RC normally closed. RA, RC normally open
+5V, GND	+5V power supply	Encoder with +5V power supply
C+/C-	Clock signal	Encoder differential clock signal C+/C-
D+/D-	Data signal	Encoder differential data signal D+/D-
A+/A-/B+/B-	Sine and cosine analogue signals	Encoder differential signal A+/A-/B+/B-

1. If relay terminal AC 220V voltage signal, must be limited within 3A.

2. Can not be used with the expansion I/O card (HD50-EIO) at the same time.

3. 2.2kW and below can not be matching.

Wiring

Taking the HEIDENHAIN 1313 and 413 encoders as an example, the pin numbers and wiring of the encoder side plug are shown in Figure 4-34 (positioning the pinholes from the wiring side).

The signal colors in the figure are the encoder lines supplied by the HEIDENHAIN 1313 encoder. If the customer-made encoder line, the encoder signal line color in the wiring diagram is meaningless.

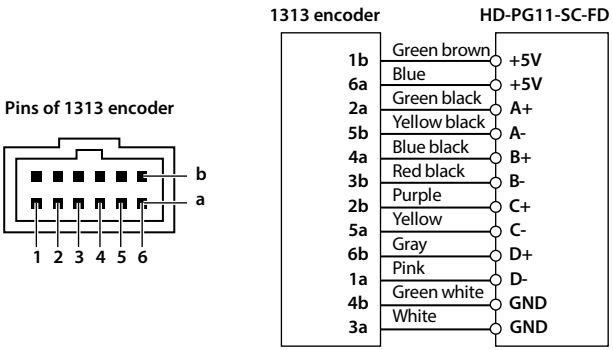


Figure 4-29 Wiring sketch with 1313 encoder

4.6 Meet EMC Requirement of Installation

4.6.1 Correct EMC Installation

According to national standards GB/T12668.3, the drive 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.

HD50 are designed and produced according to the requirements of IEC/61800-3. Please install the drive as per the description below so as to achieve good electromagnetic compatibility (EMC).

- In a drive system, the drive, control equipment and sensors are installed in the same cabinet; The electromagnetic noise should be suppressed at the main connecting points, and the EMI filter and AC 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 drive, 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 electrical characteristics. The recommended installation positions are shown in Figure 4-30.

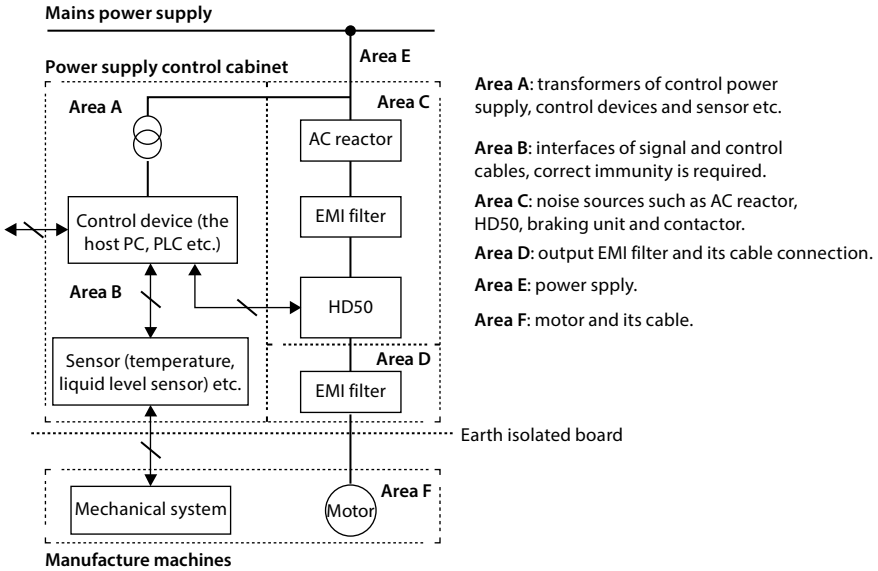


Figure 4-30 System wiring

- All areas should be isolated in space to achieve electromagnetic decoupling effect.
- The min. distance between areas should be 20cm, and use grounding 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.

4.6.2 Wiring Requirement

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

The signal cables should cross the power supply cables or motor cables, keep it perpendicular (90°) as shown in Figure 4-31.

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

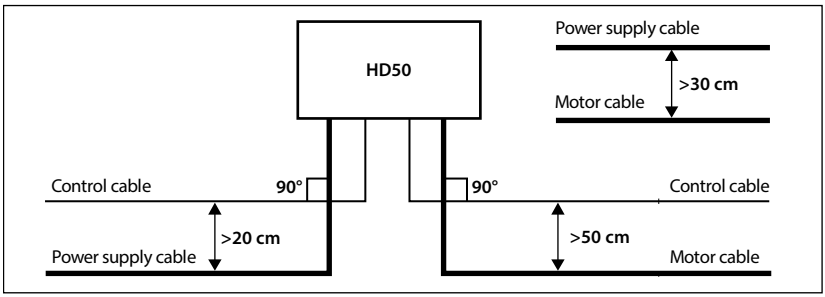


Figure 4-31 System wiring

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 drive by cable clamps as shown in Figure 4-32.

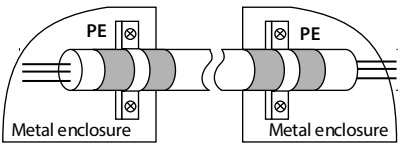


Figure 4-32 Shielded cable connection

4.6.3 Motor Connection

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

When the cable length is longer than 100 meters, it is recommended to install AC output reactor and adjust the carrier frequency according to Table 4-16.

Table 4-16 Carrier frequency and the cable length between drive and motor

Cable Length	<30m	30 - 50m	50 - 100m	≥100m
Carrier Frequency	15kHz below	10kHz below	5kHz below	2kHz below

The cross sectional area (CSA) of drive cables should refer to 4.2.1 Wiring Specifications of Input and Output, on page 19.

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

4.6.4 Ground Connection

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

Do not share the grounding wire with other devices (A). HD50 can share grounding pole with other devices (C). It achieves the best effect if HD50 and other devices use dedicated grounding poles (B), as shown in Figure 4-33.

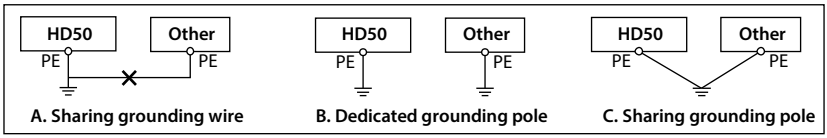


Figure 4-33 Grounding method

When using more than one drive, be careful not to loop the ground wire as shown in Figure 4-34.

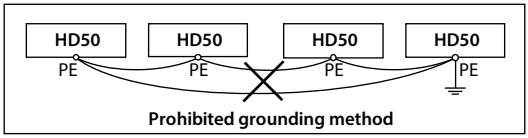


Figure 4-34 Prohibited grounding method

4.6.5 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 is 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 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 drive** 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 grounding of the EMI filter** The enclosure of EMI filter must be grounded properly to the metal case of the drive. In order to achieve better grounding effect, make use of a special grounding terminal on the enclosure. If using one cable to connect the filter to the case, the grounding 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 grounding contact.

4.6.6 Countermeasures for Conduction, Radiation and Radio Frequency Interference

EMI of the Drive

The operating theory of drive means that some EMI is unavoidable. The drive 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 drive 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

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.

Reducing RF Interference

The I/O cables and the drive produce radio frequency interference. A noise filter can be installed both on the input side and output side, and shield them with iron utenil to reduce RF interference.

The wiring distance between the drive and the motor should be as short as possible shown in Figure 4-35.

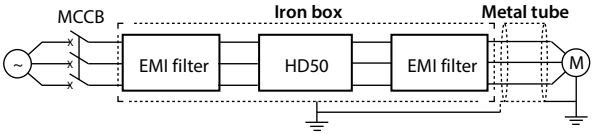


Figure 4-35 Reducing RF interference

4.6.7 Reactor

AC Input Reactor

The purpose of installing an AC input reactor: 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.

DC Reactor

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

AC Output Reactor

When the length of cable between drive and motor is more than 100m, it will cause leakage current and drive tripping. It is suggested that user should consider installing an AC output reactor.

Chapter 5 Operation Instructions

Danger

- Only when the terminal cover of HD50 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 HD50 starts.
- Keep away from HD50 if the auto-restart function is enabled at power outage.
- To change the main control PCBA, correctly set the parameters before operating.

Warning

- Do not check or detect the signal during HD50 running.
- Do not randomly change HD50 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 HD50.
- 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 HD50 description many times. Please read this section. It will help you to correctly understand and use the functions to be discussed.

5.1.1 Running Command Channel

The physical channel of HD50 receiving of the run command (start, run, stop, jog, etc.) can be selected by F00.11 and DI terminals:

Running Command Channel	Description
Keypad	Driver is started, stop and spot moved with the keypad button **RUN**, **STOP**, **JOG**.
Control terminals	Use the control terminal to start the drive and stop the operation control.
SCI communication	Start and stop running under SCI communication.

5.1.2 Frequency Setting Channel

The final frequency set in HD50 is calculated (F19.01) with main setting channel (F00.10) and the auxiliary setting channel (F19.00). When the auxiliary setting channel is the same as the main setting channel (except analogue) the frequency is set by the main setting channel.

Main Set Frequency (F00.10)	Auxiliary Set Frequency (F19.00)	Remark
/	0: No auxiliary frequency channel	
0: Keypad setting, F00.13 set initial value	1: Keypad setting, F19.03 set initial value	Keypad ▲, ▼adjustment
1: Terminal setting, F00.13 set initial value	2: Terminal setting, F19.03 set initial value	Terminal UP/DN adjust
2: SCI communication setting, the initial value is 0	3: SCI communication setting, the initial value is 0	
3: Analogue setting	4: Analogue setting	
4: Terminal pulse settting	5: Terminal pulse setting	DI6 terminal F15.05 set as 53
/	6: PID output setting	

5.1.3 Working Status

Working Status	Description
Stop status	After the drive is powered on, if no operation command input or the stop command is executed during operation. The drive U/V/W terminal has no output and status indicator flashes.
Running status	After the drive is connected to the run command, the drive U/V/W terminal starts to have output, and the operation status indicator of keypad is on.
Motor parameter auto tuning state	F08.06/F13.07 set to 1 or 2, the drive receives the run command, enter the motor parameter auto-tuning state. Automatically enter the shut down state after auto tuning is complete.

5.1.4 Operating Mode

Operating Mode	Description
Jog operation	• In the keypad control mode, press the key and run at the jogging frequency (F00.15, F03.15 and F03.16 must be set). • In the terminal control mode, the drive receives the DI terminal jog command (functions No.20 - 25) and runs at the corresponding jog frequency (F00.15, F03.15, F03.16 and F05.21 must be set).
Process PID regulation operation	• The function of process PID adjustment running is valid (F04.00 = 1), the drive will select process PID regulation running mode, that is PID adjustment according to the setting and feedback amount (set group F04). • The process PID tuning can be disabled via the DI terminal (function No.33) to switch to another mode of operation.
Multi-speed	• Select multi-segment frequency 1 - 15 (F06.00 - F06.14) for multi-speed operation by logic combination of DI terminal (function No.13 - 16).
Simple	• Simple PLC function selection is valid (F06.15 = 1), the drive will run in simple PLC mode, and the drive will run according to the pre-set operating parameters (see group F06). • Simple PLC operation can be suspended via the DI terminal (function No.30).
Swing frequency operation	• Wobble running function selection is valid (F07.00 = 1), the drive will swing frequency running according to the pre-set operating parameters (see group F07).

5.2 Operation Guide

5.2.1 Keypad Description

HD50 comes standard with LCD keypad, keypad keys and functions as shown in Table 5-1.

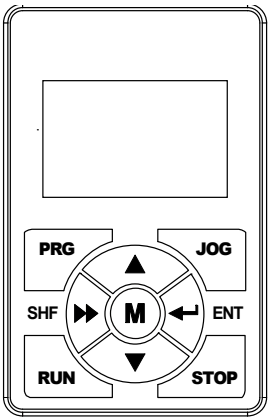


Table 5-1 Keypad button description

Button	Function
PRG	Enter, exit programming button
JOG	When the keypad controls, start the driver by jogging
RUN	When operating keypad control, start the drive
STOP	a. When the operator keypad controls, stop the drive b. When the fault is detected, reset the fault for the fault
M	Set the specific function by F00.12
▲	Function parameters or parameter settings increase
▼	Function parameters and parameter settings decreased
▶▶	a. Select the setting data modification bit b. Cycle to stop/run the display status parameters
↵	a. Enter the submenu b. Confirm the settings after setting

5

5.2.2 Keypad Display Status

The display status of HD50 keypad is as follows: Shutdown parameter display status, running parameter display status, function parameter edit display status, fault alarm display status.

Note:

1. LCD anti-color display: Black and white display, such as STOP, RUN, F03: , 0 5 0.0 0 Hz *and so on.*

2. Such as the parameters and the value of anti-color display, said the bit can be modified, for example, 0 5 0.0 0 Hz *that the unit can be modified settings.*

3. If the status is displayed in reverse color, it indicates that it is in this status, for example, RUN *it indicates that the drive is out of running status.*

Shutdown/Operating Parameters Display Status

The drive is in stop/running state, the keypad shows stop/running status and parameters, as shown in Figure 5-1.

Press key ▶▶ to cycle different stop (F18.08 - F18.13)/running status parameter (F18.02 - F18.07).

Figure 5-1 Keypad display status

Function Parameter Edit Display Status

In the state of stop, running or fault alarm, press the key to enter the function parameter editing state (if there is a user password, see F01.00 description and user password in section 5.2.3 to unlock or modify), as shown in Figure 5-2.

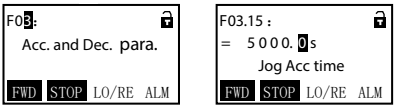


Figure 5-2 Parameter edit status

Fault Alarm Display Status

If the drive is faulty, the keypad will enter the fault alarm display status. The LCD displays the fault code and name and displays in reverse color ALM, as shown in Figure 5-3.

To view the fault record information, you can enter the F17 group to view the fault record information.

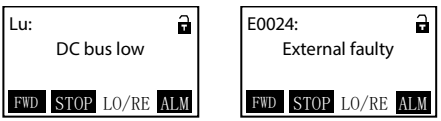


Figure 5-3 Fault alarm status

The fault reset operation can be performed through the keypad key **STOP**, external fault reset terminal or communication reset command.

5.2.3 Keypad Usage Examples

Four Level Menu Switching Operation

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

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

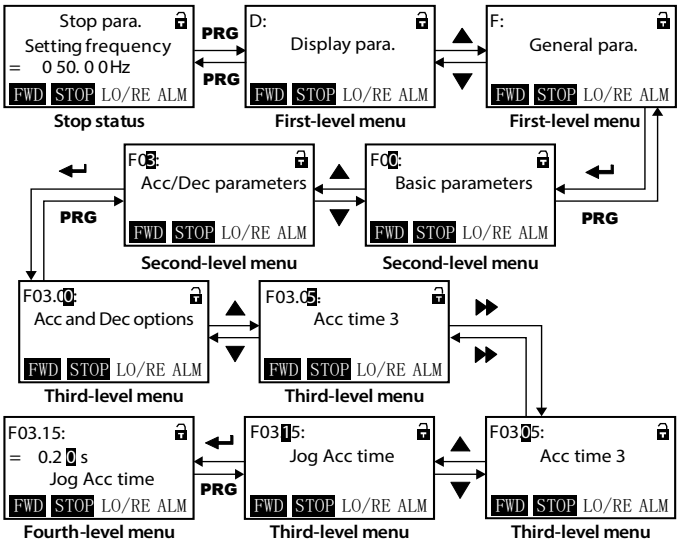


Figure 5-4 Four level menu operation flow chart

Table 5-2 Press to switch to the fourth level menu

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

Function Parameter Setting

For example, change the setting value of F00.06 from 50.00Hz to 55.00Hz, as shown in Figure 5-5.

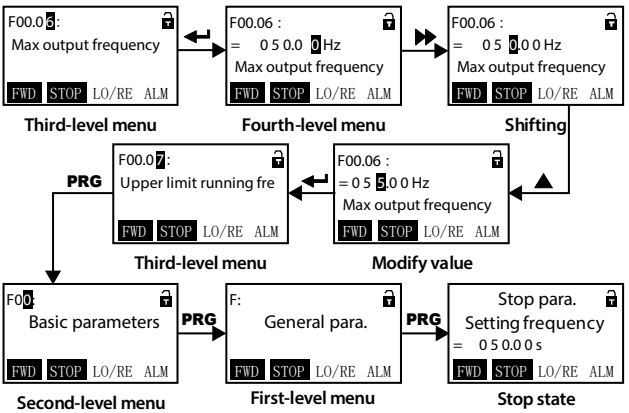


Figure 5-5 Function parameter setting

When the fourth level menu is set, if the parameter is not displayed in reverse color, it means the function parameter can not be modified.

Possible reasons are as follows:

- This parameter can not be modified, such as the actual detection parameters, operating record parameters.
- This parameter can not be modified during operation, it needs to be stopped before it can be modified.
- If you have a user password, you need to input the correct user password to unlock and then modify the parameters.

Shutdown Status Parameter Switch Display

There are six kinds of stop status parameters (F18.08 - F18.13) displayed in the HD50 cycle. For the parameter setting, the factory setting is used as an example.

Figure 5-6 shows the operation process of the stop parameter displayed on the keypad.

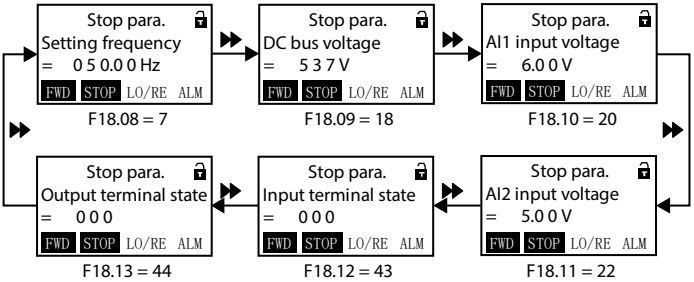


Figure 5-6 Shutdown status parameter switch display

User Password to Unlock

After the user set F01.00 to non-zero value, press the key **PRG** to exit the stop/running display state or the keypad key is not detected within 5 minutes, the password of the user will take effect automatically. At this time, the lock status of the keypad will be displayed.

Figure 5-7 shows the procedure for unlocking the user password, taking the set password as 4 as an example. After the unlock is successful, the lock identifier is in status.

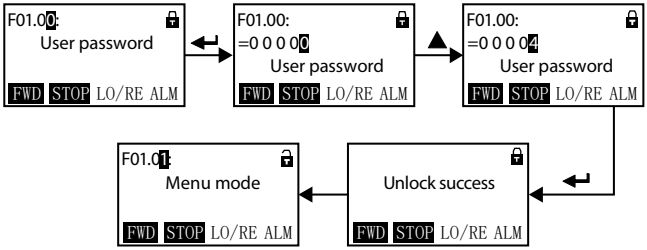


Figure 5-7 User password to unlock

User Password Change

When there is no password, press Figure 5-8 directly to modify the value of F01.00.

If you have a password, you need to press Figure 5-7 to unlock. After the unlock is successful, the lock is in the status of lock . Press Figure 5-8 to set a new password.

If the new password is "02004", the password is validated, the lock is identified as the status .

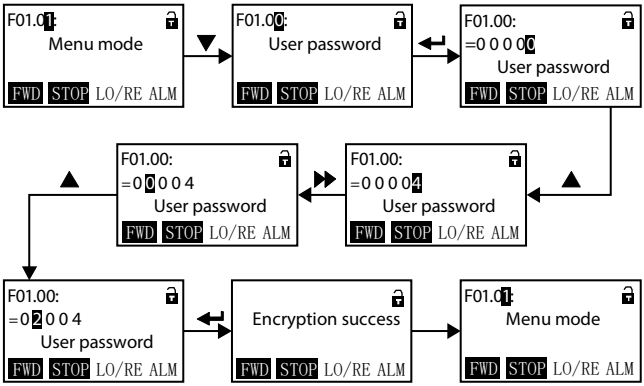


Figure 5-8 User password change

User Password Cleared

If you have a password, you need to press Figure 5-7 to unlock. After unlocking, the lock is in the status of lock. Press Figure 5-9 to clear the password.

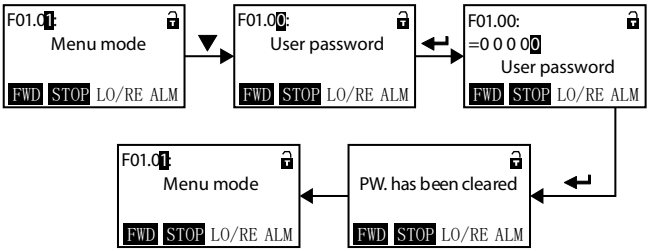


Figure 5-9 User password clear operation

Parameter Upload and Download

Upload: When F01.03 = 1/2, it means it is uploaded to the keypad, after jumps to F01.00.

Download: When F01.02 = 2/3/5/6, it means to download from the keypad, after jumps to F01.03.

The keypad uploading and downloading display is as shown in Figure 5-10.

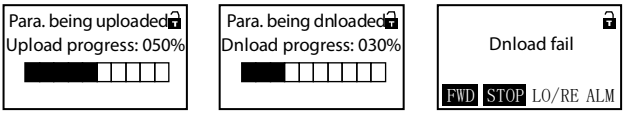


Figure 5-10 Parameter upload, download shows

Note:

1. If parameter download fails, "parameter download failed" will be displayed, as shown in Figure 5-10, indicating that the keypad EEPROM memory parameters do not match the current drive function parameters. The correct function code settings must be uploaded to the keypad EEPROM, then download.

2. If "E0022 (keypad EEPROM error)" is displayed during parameter upload or download, jump to the next function after 10 seconds see section 7.1, on page 129 for troubleshooting.

5.3 Initial Power On

Before power-on, check the wiring according to the technical requirements provided in this manual.

After checking the wiring and power supply, close the air switch of the AC power supply on the input side of the driver, power on the driver, and power on the driver. The keypad is shown in Figure 5-11.

Figure 5-11 Initialize the operator keypad display

Chapter 6 Detailed Function Introduction

This chapter will detail the function of each parameter separately.

6.1 Group D: Display Parameters

6.1.1 D00: Status Display Parameters

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>D00.00</td><td>Drive series</td><td>[Actual value]</td></tr>
<tr><td>D00.01</td><td>Software version of the control board</td><td>[Actual value]</td></tr>
<tr><td>D00.03</td><td>Special software version of the control board</td><td>[Actual value]</td></tr>
<tr><td>D00.05</td><td>Software version of the keypad</td><td>[Actual value]</td></tr>
<tr><td>D00.06</td><td>Customized series No.</td><td>[Actual value]</td></tr>
<tr><td>D00.07</td><td>Motor and control options</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display the current motor and control mode.
Unit: Displays the currently driven motor
• 0: Motor 1.
• 1: Motor 2.
Ten: The current control method of driving motor
• 0: V/f control without PG.
• 2: IM without PG vector control.
• 3: IM with PG vector control.
• 5: PM with PG vector control.
Note: IM stands for Asyn. motors and PM stands for Syn. motors.</td></tr>
<tr><td>D00.08</td><td>Rated current of the drive</td><td>[Actual value]</td></tr>
<tr><td>D00.09</td><td>Extended function of the drive</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display drive expansion function.
0: Standard drive.
2: Tension control.</td></tr>
<tr><td>D00.10</td><td>Drive status</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display HD50 status, as shown in the following table:
<table>
<tr><td>Thousand</td><td>Bit15: Reserved</td><td>Bit14: Reversed</td><td>Bit13: Automatic current limit
0: No current limit
1: Automatic current limiting</td><td>Bit12: Stall overvoltage
0: No over-pressure stall
1: Over-voltage stall state</td></tr>
<tr><td>Hundred</td><td>Bit11: Control mode
0: Speed control
1: Torque control</td><td>Bit10: Speed limiter
0: Not reached
1: Reaches</td><td>Bit9: Torque limit
0: Not in torque limit
1: Torque limit</td><td>Bit8: Parameter auto-tuning
0: Non-parameter self-tuning
1: Parameter self-tuning</td></tr>
<tr><td>Ten</td><td>Bit7: DC braking
0: Not DC braking
1: DC braking</td><td>Bit6: Reserved</td><td colspan="2">Bit5&Bit4: Acc./Dec./constant speed
00: Constant speed 01: Acc.
11: Constant speed 10: Dec.</td></tr>
<tr><td>Unit</td><td>Bit3: Zero speed operation
0: Non-zero speed operation
1: Zero speed operation</td><td>Bit2: Forward/Reverse
0: Forward
1: Reverse</td><td>Bit1: Run/Stop
0: Stop
1: Run</td><td>Bit0: Drive failure
0: No problem
1: Faulty</td></tr>
</table></td></tr>
</table>

Ref. Code	Function Description	Setting Range [Default]
D00.11	**Main setting frequency channel**	**[Actual value]**
	Display main setting frequency channel, see F00.10.	
D00.12	**Main setting frequency (Hz)**	**[Actual value]**
D00.13	**Auxiliary setting frequency (Hz)**	**[Actual value]**
D00.14	**Set frequency (Hz)**	**[Actual value]**
D00.15	**Given frequency (after Acc./Dec.) (Hz)**	**[Actual value]**
D00.16	**Output frequency (Hz)**	**[Actual value]**
D00.17	**Set speed (rpm)**	**[Actual value]**
D00.18	**Running speed (rpm)**	**[Actual value]**
	Display running speed. • If an encoder is installed, the actual motor speed detected by the encoder is displayed (set F14 parameters correctly).	
D00.19	**Three phase power supply input sequency**	**[Actual value]**
	0: Positive sequence: L1 (R) lead L2 (S) lead L3 (T). 1: Negative sequence: L1 (R) leads L3 (T) leads L2 (S).	
D00.20	**Output voltage (V)**	**[Actual value]**
D00.21	**Output current (A)**	**[Actual value]**
D00.22	**Torque reference (%)**	**[Actual value]**
	Display torque reference, relative to the rated torque percentage.	
D00.23	**Output torque (%)**	**[Actual value]**
	The output torque, relative to the motor rated torque percentage, is displayed.	
D00.24	**Output power (kW)**	**[Actual value]**
	Output power, relative to the percentage of motor rated power.	
D00.25	**DC bus voltage (V)**	**[Actual value]**
D00.27	**AI1 input voltage (V)**	**[Actual value]**
D00.28	**AI1 input voltage (after processing) (V)**	**[Actual value]**
	Display gain, offset, analogue curve, and filter processed AI1 input voltage.	
D00.29	**AI2 input voltage (V)**	**[Actual value]**
	When AI2 select current input: 0.00V corresponds to 0mA, 10.00V corresponds to 20mA.	
D00.30	**AI2 input voltage (after processing) (V)**	**[Actual value]**
	Display gain, offset, analogue curve and filter processed AI2 input voltage.	
D00.31	**AI3 input voltage (V)**	**[Actual value]**
	When AI3 select current input: 0.00V corresponds to 0mA, 10.00V corresponds to 20mA.	
D00.32	**AI3 input voltage (after processing) (V)**	**[Actual value]**
	Display gain, offset, analogue curve, and filter processed AI3 input voltage.	
D00.33	**AI4 input voltage (V)**	**[Actual value]**
	When AI4 select current input: 0.00V corresponds to 0mA, 10.00V corresponds to 20mA.	
D00.34	**AI4 input voltage (after processing) (V)**	**[Actual value]**
	Displays gain, offset, analogue curve, and filter processed AI4 input voltage.	
D00.35	**DI6 terminal pulse input frequency (Hz)**	**[Actual value]**
D00.36	**AO1 output**	**[Actual value]**
D00.37	**AO2 output**	**[Actual value]**
	When AO1/AO2 select current output: 0.00V corresponds to 0mA, 10.00V corresponds to 20mA.	

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>D00.38</td><td>High-speed output pulse frequency (Hz)</td><td>[Actual value]</td></tr>
<tr><td>D00.39</td><td>Radiator temperature (°C)</td><td>[Actual value]</td></tr>
<tr><td>D00.40</td><td>Set the line speed</td><td>[Actual value]</td></tr>
<tr><td>D00.41</td><td>Given the linear speed</td><td>[Actual value]</td></tr>
<tr><td>D00.44</td><td>Process PID reference (%)</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">The process PID reference is displayed as a percentage of full scale (10.00V).</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 as a percentage of full scale (10.00V).</td></tr>
<tr><td>D00.46</td><td>Process PID error (%)</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">The process PID error is displayed as a percentage of full scale (10.00V).</td></tr>
<tr><td>D00.47</td><td>Process PID integral term (%)</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Displays the percentage of process PID integral relative to full scale (10.00V).</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 as a percentage of full scale (10.00V).</td></tr>
<tr><td>D00.49</td><td>External count value</td><td>[Actual value]</td></tr>
<tr><td>D00.50</td><td>Input terminal status</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display the status of input terminal. Each bit (binary) represents a physical channel, see table below.
• 0: Input terminal is disconnected from the corresponding common terminal.
• 1: Input terminal is connected to the corresponding common terminal.
<table>
<tr><td>Bit11</td><td>Bit10</td><td>Bit9</td><td>Bit8</td><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td>DI12</td><td>DI11</td><td>DI10</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: DI7 - DI12 is only valid when HD50-EIO is optional.</td></tr>
<tr><td>D00.51</td><td>Output terminal status</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display the status of output terminal. Each bit (binary) represents a physical channel, see table below.
• 0: Output terminal is disconnected from the corresponding common terminal.
• 1: Output terminal is connected to the corresponding common terminal.
<table>
<tr><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td>-</td><td>-</td><td>RLY4</td><td>RLY3</td><td>RLY2</td><td>RLY1</td><td>DO2</td><td>DO1</td></tr>
</table>
Note: RLY2 - RLY4 is only valid when HD50-EIO is optional.</td></tr>
<tr><td>D00.52</td><td>Modbus communication status</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">0: Normal.
1: Communication timeout.
2: Data Frameheader error.
3: Data Framecheck error.
4: The data Framecontent is wrong.</td></tr>
<tr><td>D00.53</td><td>Actual length (m)</td><td>[Actual value]</td></tr>
<tr><td>D00.54</td><td>Cumulative length (km)</td><td>[Actual value]</td></tr>
<tr><td>D00.55</td><td>Total power time (h)</td><td>[Actual value]</td></tr>
<tr><td>D00.56</td><td>Total running time (h)</td><td>[Actual value]</td></tr>
<tr><td>D00.57</td><td>Motor total energy consumption high (k kW.h)</td><td>[Actual value]</td></tr>
<tr><td>D00.58</td><td>Motor total energy consumption low (kW.h)</td><td>[Actual value]</td></tr>
<tr><td>D00.59</td><td>The running high energy consumption (k kW.h)</td><td>[Actual value]</td></tr>
<tr><td>D00.60</td><td>This run low energy consumption (kW.h)</td><td>[Actual value]</td></tr>
<tr><td>D00.61</td><td>The current fault</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">When 100 is displayed, it indicates undervoltage.</td></tr>
</table>

6.1.2 D01: Tension Control Status Parameters

Ref. Code	Function Description	Setting Range [Default]
D01.00	Tension setting (after calculation) (N)	[Actual value]
	The calculated tension setting is displayed.	
D01.01	Tension balance position feedback	[Actual value]
	Display tension feedback.	
D01.02	Current roll diameter (mm)	[Actual value]
D01.03	Current line speed (m/min)	[Actual value]
D01.04	Tension balance position setting	[Actual value]
D01.05	Tension setting (before calculation)	[Actual value]
	The pre-calculation tension setting is displayed.	

6.1.3 D03: Simple Servo Status Parameters

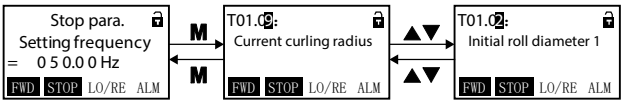
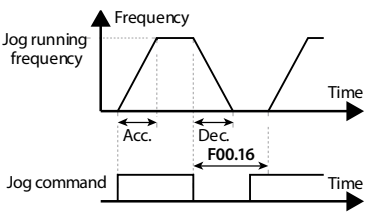
Ref. Code	Function Description	Setting Range [Default]
D03.00	Servo control position error	[Actual value]
D03.01	Carry amount command value high	[Actual value]
D03.02	Carry amount command value is low	[Actual value]
D03.03	The current carry volume is high	[Actual value]
D03.04	The current carry amount is low	[Actual value]
D03.05	Spindle orientation stop position	[Actual value]
D03.06	Current encoder position	[Actual value]

6.2 Group F: General Function Parameters

6.2.1 F00: Basic Parameters

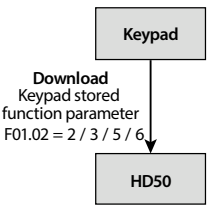
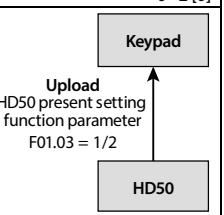
Ref. Code	Function Description	Setting Range [Default]
F00.00	**Control mode selection**	**0,1 [0]**
	0: Speed control. 1: Torque control.	
F00.01	**Motor 1 control mode selection**	**0 - 5 [0]**
	0: V/f control without PG. Constant voltage/frequency ratio control. • Ldeal for applications where one drive drives more than one motor to improve the current speed control system. • When V/f control is selected, set the F09 group V/f control parameters reasonably to achieve a good control effect. 2: IM1 without PG vector control. That is, the speed sensorless vector control operation method. • For general purpose variable speed drive with high performance and torque requirements. • Motor parameter self-tuning needs to be done before setting the motor nameplate parameters correctly to F08.00 - F08.04, starting motor parameter auto-tuning to get the correct motor parameters and setting the vector control parameters of F10 group to exert excellent vector control effects. 3: IM1 with PG vector control. • Encoders must be installed for high-precision control or torque control applications. One drive can only drive one motor, such as high-speed papermaking, hoisting machinery, elevators, tension and curl control. 5: PM with PG vector control for closed-loop vector control of synchronous machine. *Note: IM stands for Asyn. motors and PM stands for Syn. motors.*	
F00.03	**Motor selection**	**0,1 [0]**
	0: Motor 1. 1: Motor 2. *Note: Two sets of motor parameters can be preset, and when two motors are separately driven, they can be switched off during shutdown, eliminating the need to input parameters.*	
F00.04	**Expansion card selection**	**0,1 [0]**
	0: Expansion card is invalid. 1: HD50-EIO expansion card is valid.	
F00.05	**Extended application capabilities**	**0 - 2 [0]**
	0: No extension application. 2: Tension control.	
F00.06	**The Max. output frequency of the drive**	**50.00 - 400.00 [50.00Hz]**
	Defines the Max. frequency that the drive allows for output. • It needs to be prudently and reasonably set according to the nameplate parameters of the controlled motor and the actual operating conditions.	

Ref. Code	Function Description	Setting Range [Default]
F00.07	**Upper limit running frequency setting channel**	**0 - 2 [0]**
	It defines the Max. frequency allowed to run by the user. Through F00.07, the upper limit frequency can be set by different setting channels. 0: Digital setting. • Set the upper limit frequency by F00.08. 1: Analogue input setting. • See group F16. 2: Terminal pulse setting. • The Max. pulse input frequency set by F16.17 corresponds to F00.06 (Max. output frequency).	
F00.08	**Max. operating frequency**	**0.00 - F00.06 [50.00Hz]**
	F00.07 = 0, the upper limit frequency is set by F00.08.	
F00.09	**Lower limit of operating frequency**	**0.00 - upper limit [0.00Hz]**
	F00.09 is used to limit the actual output frequency value. When the zero frequency threshold value (F19.10) < set frequency < F00.09, it runs at the lower limit frequency. • It needs to be prudently and reasonably set according to the nameplate parameters of the controlled motor and the actual operating conditions. • Motor parameter auto tuning operation is invalid. • In addition to the upper/lower limit frequency limits, the drive output frequency is also affected by start/stop DWELL frequency (F02.02, F02.14), zero frequency threshold (F19.10), stop DC brake starting frequency (F02.16), skip frequency (F05.17, F05.18, F05.19) and other parameter settings.	
F00.10	**Frequency setting channel selection**	**0 - 4 [0]**
	0: Keypad setting. • Through the keypad key ▲, ▼, the initial value is set by F00.13. 1: Terminal setting. • It is adjusted by terminal UP/DN, the initial value is set by F00.13. 2: SCI communication setting. • Change the setting frequency through SCI communication frequency setting command. • SCI communication frequency initial value is 0. 3: Analogue setting. • Set by analogue input voltage. See group F16. • For the correspondence between the analogue and the drive operating frequency setting, see group F05. 4: Terminal pulse setting. • Set by terminal pulse DI6. • Input pulse signal specifications: Voltage range 15 - 30V; Frequency range 0.0 - 50.0kHz. • Refer to F05 for the correspondence between terminal pulse frequency and drive operating frequency setting.	
F00.11	**Command to set the channel selection**	**0 - 2 [0]**
	0: Keypad run command channel. • Use the **RUN**, **STOP**, **JOG** keys on the keypad to start and stop. 1: Terminal run command channel start/stop with corresponding external terminal. • External terminals forward rotation (DI terminal set to 2), reverse rotation (DI terminal set to 3), JOGF1 (DI terminal set to 20), JOGR1 (DI terminal set to 22), JOGR2 (DI terminal set to 23), see group F15. 2: SCI communication run command channel. • Through SCI communication port in accordance with the communication protocol to start and stop.	

Ref. Code	Function Description	Setting Range [Default]
F00.12	**Multi-function key function selection**	**0 - 3 [2]**
	0: Keypad direction switching. • Switch the direction of operation by pressing the key **M**. • Valid when F00.11 = 0. Power-down is not saved. 1: Remote local switch. • Switch between remote control and local control by keys **M**. • F00.11 = 0, 1 is valid. 2: Multi-function button is invalid. 3: Shortcut key function enable. • Press key **M** to quickly access parameters T01.09 and T01.02, as shown below. 	
F00.13	**Initial operating frequency digital setting**	**0.00 - upper limit [50.00Hz]**
	F00.10 = 0,1, F00.13 determines the initial value of the set frequency.	
F00.14	**Frequency setting control**	**0000 - 1111 [1001]**
	Valid only when F00.10 = 0,1. • When the value of F00.13 is changed by parameter setting, the new value will replace the current setting frequency value. **Unit: Set frequency power-down storage option** • 0: Not saved. • 1: Store to F00.13. **Ten: Set frequency stop control selection** • 0: Set the frequency hold. • 1: Restored to F00.13. **Hundred: Communication frequency power-off storage option** • 0: Not saved. • 1: Store to F00.13. **Thousand: Digital setting frequency keep choice** • 0: Not saved. • 1: Save. When the frequency setting channel is switched from keypad setting to terminal digital setting, and then back to the keypad setting, the setting frequency of the keypad remains the last changed frequency.	
F00.15	**Jog frequency setting 1**	**0.00 - upper limit [5.00Hz]**
F00.16	**Jog run interval**	**0.0 - 100.0 [0.0s]**
	After the jog command is canceled, the driver will not respond to jog command within the time set by F00.16. • If the jog command is issued after the jog interval elapses, jog will be executed immediately. • In JOG mode, the starting frequency function, DC braking start, speed tracking start and stop DC braking are invalid. 	
F00.17	**Operating direction selection**	**0,1 [0]**
	0: The same direction. 1: The direction is reversed.	

Ref. Code	Function Description	Setting Range [Default]
F00.18	**Anti-reversal choice**	0,1 [0]
	This function is valid when F00.11 = 0,1,2. 0: Reverse allowed. 1: Reverse rotation is prohibited. After setting, only forward rotation is allowed. • F00.18 = 1, the drive will not respond to the reverse run command when it is stopped. If the reverse command is received during operation, the drive will immediately stop according to the stop mode set by F02.13. • F00.18 = 1, when the amount of analogue is set to positive and negative voltage and the negative voltage corresponds to the inverting frequency, the drive will immediately stop according to the stop mode set by F02.13. • F00.18 = 1, when the simple PLC runs to the segment set in the reverse direction, the drive immediately stops according to the stop mode set by F02.13.	
F00.19	**Positive and negative dead time**	0.0 - 3600.0 [0.0s]
	Drive transitions from forward to reverse, or transitions from reverse to forward during the zero-frequency output transition, as shown to the right.	
F00.20	**Foreign cited keypad key enable**	0,1 [0]
	0: Enabled. • When the drive is connected to a double keypad, the button operation can be performed when using the communication interface outside introduction keypad. 1: Invalid. • When the drive is connected to a double keypad, key operation can not be performed when using the communication interface outside introduction keypad.	

6.2.2 F01: Protection Function Parameters

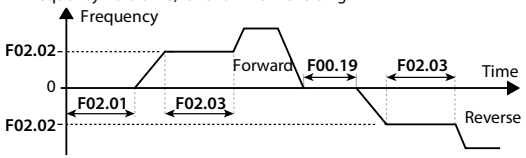
<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>F01.00</td><td>User password</td><td>00000 - 65535 [00000]</td></tr>
<tr><td></td><td colspan="2">XXXXX: Password protection function is enabled after user password is set (any non-zero digital).
• After setting the password, enter the parameter setting status again, input the correct password; Otherwise, all the parameters can not be changed through the keypad and can only be viewed.
• After entering the correct password, press the key to exit the stop/running display state or the keypad key is not detected within 5 minutes, the user password will be automatically activated. If you want to modify the parameters, you need to input the correct password, then 5 minutes to restart.
00000: Factory setting of HD50, no user password.
• If the user unlocks the password, the user password is cleared.
• User password unlock, modify, clear see section 5.2.3 for usage examples.</td></tr>
<tr><td>F01.01</td><td>Menu mode selection</td><td>00 - 11 [10]</td></tr>
<tr><td></td><td colspan="2">Unit:
0: Standard menu mode.
• All function parameters are displayed.
1: Check the menu mode.
• Only the parameters different from the factory settings are displayed.
Ten:
0: Does not lock the mapping between group U and F parameters.
1: Lock the mapping between group U and F parameters.</td></tr>
<tr><td>F01.02</td><td>Function code parameter initialization</td><td>0 - 6 [0]</td></tr>
<tr><td></td><td colspan="2">0: No operation. The drive is in normal parameter read and write status.
• The parameters can be changed depending on the setting status of the user's password and the current operating conditions of the drive.
1: Restore factory parameters.
• F01.00, F01.02, F01.03, group F08, F13.01 - F13.15, group F14, F19.19, F19.24, F19.25, F20.21 - F20.37, F23.00 except.
• Operation steps: Set F01.02 = 1, press ↵ to ensure. At this time, the factory parameters will be restored. The keypad will display "Restoring factory parameters". After the factory parameters are restored, the keypad will display the parameters of stop status.
 
2,3: Keypad storage parameters 1/2 copy to the control board and update the current function code settings.
4: Clear error information clear the error information recorded by F20.21 - F20.37.
5,6: Keypad storage parameters 1/2 copy to the control board and update the current function code settings (including motor parameters).</td></tr>
<tr><td>F01.03</td><td>Keypad EEPROM parameter initialization</td><td>0 - 2 [0]</td></tr>
<tr><td></td><td colspan="2">0: No operation. The drive is in normal parameter read and write status.
1,2: The current function code setting value is uploaded to the keypad EEPROM storage parameter 1/2.
 
Note: F01.00, F01.02, F01.03, F20.21 - F20.37 are not uploaded or downloaded.</td></tr>
</table>

6.2.3 F02: Start and Stop Control Parameters

Ref. Code	Function Description	Setting Range [Default]
F02.00	**Start mode selection**	**0 - 2 [0]**

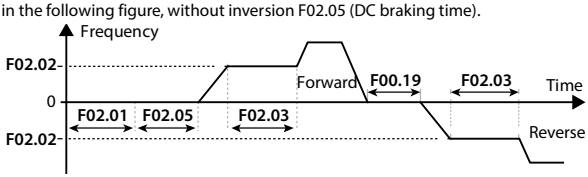
0: Start from starting DWELL frequency.

- Start DWELL frequency see F02.02 - F02.03.
- When FWD/REV switchover, DWELL frequency (F02.02) is still valid, as shown in the following figure, F02.03 (DWELL frequency hold time) is valid when reversing.



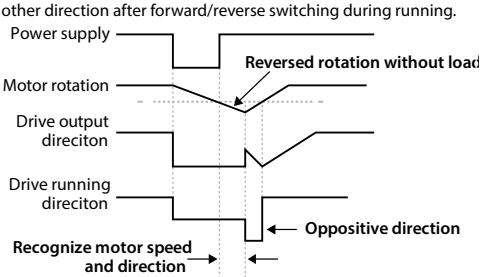
1: Brake first and then start from the starting DWELL frequency.

- DC braking see F02.04 - F02.05.
- Starting DC braking is valid only during the start-up from stop to running status. The Acc. start up in the other direction is invalid after switching between positive and negative running conditions, as shown in the following figure, without inversion F02.05 (DC braking time).

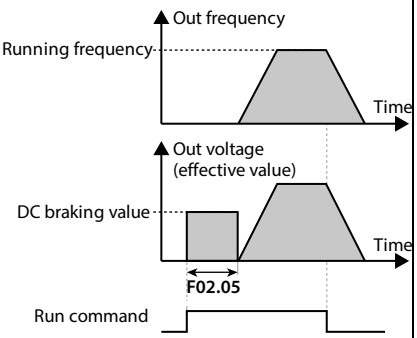
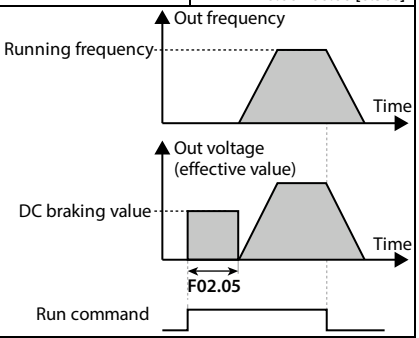


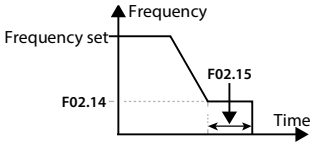
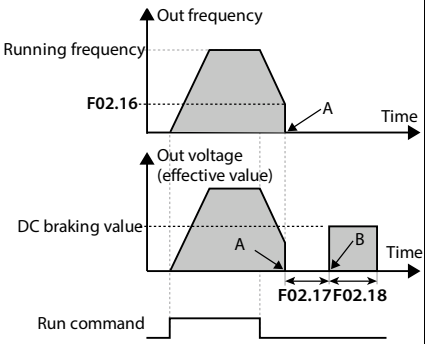
2: Speed tracking restarting. Search results below F02.02, start from starting DWELL frequency.

- Automatically track the speed and direction of the motor for a smooth and shock-free starting of the rotating motor, as shown to the right.
- Speed tracking is only valid for start-up when switching from stop to running status, but not for start-up in the other direction after forward/reverse switching during running.

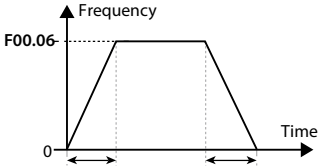
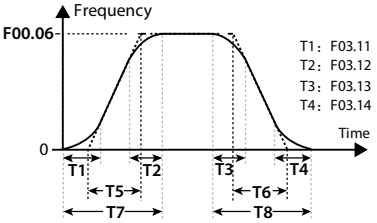


F02.01	**Start delay time**	**0.00 - 10.00 [0.00s]**
	The drive receives the run command and waits for the delay time set by F02.01 to start running.	

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>F02.02</td><td>Start DWELL frequency setting</td><td>0.00 - upper limit [0.00Hz]</td></tr>
<tr><td>F02.03</td><td>Start DWELL frequency hold time</td><td>0.00 - 10.00 [0.00s]</td></tr>
<tr><td></td><td colspan="2">F02.02 defines the DWELL frequency at the start of the drive.
F02.03 refers to the drive during startup, keep running to start DWELL frequency (F02.02) of the time.
• After the start command is valid, you need to delay the time set by F02.01, then start according to the start mode set by F02.00.
• F02.02 and F02.03 are valid only when F02.00 = 0 and 1.
• F02.02 or F02.03 = 0, DWELL frequency is invalid.
  </td></tr>
<tr><td>F02.04</td><td>DC brake current setting</td><td>0 - 100 (drive rating current) [50%]</td></tr>
<tr><td>F02.05</td><td>Start DC braking time</td><td>0.00 - 60.00 [0.50s]</td></tr>
<tr><td></td><td colspan="2">F02.04 is a percentage relative to the rated current of the drive. Set the current value of DC braking at start and stop.
• If the set DC brake current is greater than 2 times the motor rated current, the injected current is 2 times the rated motor current.
• DC braking current is valid for both DC braking and DC braking.
F02.05 = 0.0s, no DC braking process.
• F02.05 is valid only when F02.00 = 1.
  </td></tr>
<tr><td>F02.13</td><td>Stop mode selection</td><td>0 - 2 [0]</td></tr>
<tr><td></td><td colspan="2">0: Dec. to stop.
• After the drive receives the stop command, it gradually decreases the output frequency according to the Dec. time and decelerates to F02.14 and stops after the time set in F02.15.
• Refer to the diagrams in F02.14 - F02.15.
1: Freewheel stop.
• After receiving the stop command, the drive will stop output immediately and the load will stop freely according to the mechanical inertia.
2: Dec. stop + DC brake.
• After the drive receives the stop command, it will decrease the output frequency according to the Dec. time. When the frequency reaches F02.16, DC braking will start.
• Stop DC braking function see F02.16 - F02.18 and illustration.
• Dec. time see F03.00 - F03.08.</td></tr>
</table>

Ref. Code	Function Description	Setting Range [Default]
F02.14	**Stop DWELL frequency setting**	0.00 - upper limit [0.00Hz]
F02.15	**Downtime DWELL frequency hold time**	0.00 - 10.00 [0.00s]
	F02.14 defines the DWELL frequency when the drive is stopped. F02.15 refers to the time when the drive keeps running under the stop DWELL frequency (F02.14) while the drive is stopped. • Valid only when F02.13 = 0. • F02.14 or F02.15 = 0, stop DWELL frequency is invalid.	
F02.16	**Stop DC brake starting frequency**	0.00 - 50.00 [0.50Hz]
F02.17	**Stop DC brake waiting time**	0.00 - 60.00 [0.00s]
F02.18	**Stop DC braking time**	0.00 - 60.00 [0.50s]
	F02.17 refers to the time interval from right to left (running frequency reaches F02.16) to B (starting to apply DC braking) during Dec. and stop. • The drive has no output during stop brake waiting. The setting of F02.17 can effectively prevent the current overshoot at the start of braking (point B) for high-power motors. • F02.04 set DC injection braking current. F02.18 = 0.00s, no DC braking process. • F02.16 - F02.18 valid only when F02.13 = 2.	
F02.19	**Jog control**	0,1 [0]
	0: Jog function such as start mode and stop mode is invalid. 1: Start mode, stop mode and other functions jog enabled.	

6.2.4 F03: Acc. and Dec. Parameters

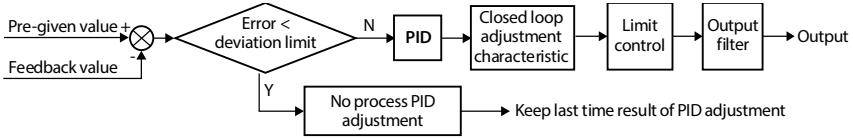
Ref. Code	Function Description	Setting Range [Default]
F03.00	**Acc. and Dec. options**	**0,1 [0]**
	0: Linear Acc./Dec.. The output frequency increases or decreases at a constant slope. 1: S-curve Acc./Dec.. The output frequency increases or decreases according to the S-curve. • T5 is the Acc. time setting, T7 is the actual Acc. time, T6 is the Dec. time setting, and T8 is the actual Dec. time.  	
F03.01	**Acc. time 1**	**0.1 - 6000.0** **[15kW and below drive: 10.0s]** **[18.5 - 55kW drive: 30.0s]** **[75kW and above drive: 60.0s]**
F03.02	**Dec. time 1**	
F03.03	**Acc. time 2**	
F03.04	**Dec. time 2**	
F03.05	**Acc. time 3**	
F03.06	**Dec. time 3**	
F03.07	**Acc. time 4**	
F03.08	**Dec. time 4**	
	Acc. time is the time required for the drive to ramp up from zero to F00.06 in a straight line. Dec. time is the time required for the drive to reduce linearly from F00.06 to zero frequency. • Add Dec. time can only choose one group. • Refer to the illustration in F03.00.	
F03.09	**Acc. time 2 and 1 toggle the frequency**	**0.00 - upper limit [0.00Hz]**
F03.10	**Dec. time 2 and 1 toggle the frequency**	
	When the running frequency is less than F03.09, press Acc. time 2 to accelerate; Otherwise, Acc. time 1 to accelerate. When the running frequency is less than F03.10 set value, press Dec. time 2 to decelerate; Otherwise, Dec. time1 to decelerate. • Invalid when using terminal selection plus Dec. time (DI terminal set to function No.26, No.27).	
F03.11	**S-character at the beginning of the Acc. time**	**0.00 - 2.50 [0.20s]**
F03.12	**S-curve characteristic time at the end of Acc.**	**0.00 - 2.50 [0.20s]**
F03.13	**S character characteristic time when Dec. starts**	**0.00 - 2.50 [0.20s]**
F03.14	**S-curve characteristic time at the end of Dec.**	**0.00 - 2.50 [0.20s]**
	See the illustration in F03.00.	
F03.15	**Jog Acc. time**	**0.1 - 6000.0 [6.0s]**
F03.16	**Jog Dec. time**	**0.1 - 6000.0 [6.0s]**
	F03.15, F03.16 define the Acc./Dec. time during jogging operation.	
F03.17	**Emergency stop**	**0.1 - 6000.0 [10.0s]**
	Dec. time is defined for emergency stop.	

6.2.5 F04: Process PID Control Parameters

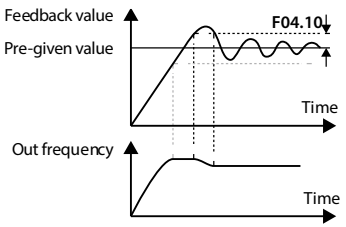
The closed loop can be formed by analogue feedback and feedback, and the closed loop can also be formed by the pulse quantity given and feedback.

Under normal circumstances, the process PID control is used to control physical quantities such as pressure, liquid level and temperature in the field.

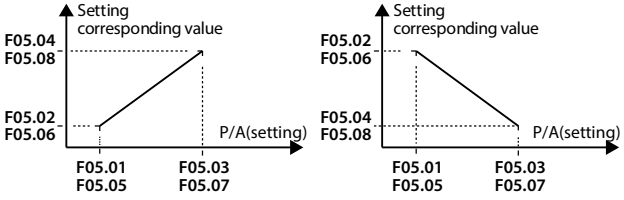
The block diagram is as follows:



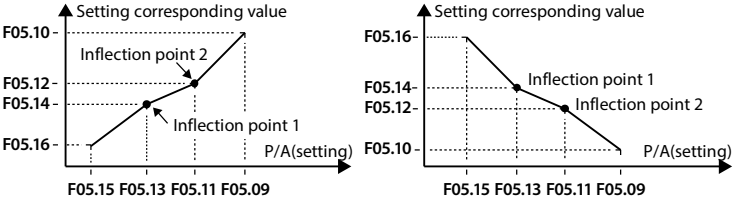
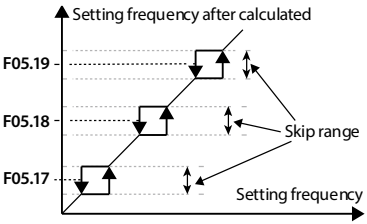
Ref. Code	Function Description	Setting Range [Default]
F04.00	**Process PID control selection**	**0,1 [0]**
	0: PID control is invalid. 1: PID control is valid.	
F04.01	**Given channel selection**	**0 - 2 [0]**
	0: Digital given. • Given by F04.03. 1: Analogue given. • Given by analogue input voltage, see group F16. 2: Terminal pulse given. • By the terminal pulse input given, the Max. input pulse frequency corresponding PID given 10V.	
F04.02	**Feedback channel selection**	**0 - 2 [0]**
	0: Analogue feedback. 1: Terminal pulse feedback. 2: Line speed feedback.	
F04.03	**Given the amount of digital settings**	**-100.0 - +100.0 [0.0%]**
	The definition of the process PID regulator is valid when F04.01 = 0 (digital reference).	
F04.04	**Proportional gain (P)**	**0.0 - 100.0 [20.0]**
F04.05	**Integration time (I)**	**0.01 - 10.00 [1.00s]**
F04.06	**Points limit**	**0.00 - upper limit [3.50Hz]**
F04.07	**Derivative time (D)**	**0.00 - 10.00 [0.00s]**
F04.08	**Differential limit value**	**0.00 - upper limit [2.50Hz]**
F04.09	**Sampling period (T)**	**0.01 - 50.00 [0.10s]**
	F04.04, F04.05, F04.07 define process PID parameters. F04.06 defines the upper limit of process PID integral term, F04.08 defines the upper limit of process PID differential term. F04.09 defines the sampling period for the feedback amount, which is calculated once per sampling period by the PID regulator. • F04.07 = 0, the derivative item does not work.	

Ref. Code	Function Description	Setting Range [Default]
F04.10	**Deviation limit**	0.0 - 20.0 [2.0%]
	The Max. allowable deviation of the system output value from the process PID setpoint. • When the feedback amount is within this range, the PID regulator stops adjusting as shown on the right. • The proper setting of this function helps to balance the accuracy and stability of the system output. • Setting too large F04.10 may result in drastic adjustment of the process PID gap and consequent unconformity oscillations throughout the process. 	
F04.11	**PID regulator upper limit channel selection**	0 - 2 [0]
	0: F04.13 setting. 1: Analogue setting. Set by the amount of analogue input voltage, see group F16. 2: Terminal pulse input setting.	
F04.12	**PID regulator lower limit channel selection**	0 - 2 [0]
	0: F04.14 setting. 1: Analogue setting. Set by the amount of analogue input voltage, see group F16. 2: Terminal pulse setting.	
F04.13	**PID regulator upper limit**	0.00 - upper limit [50.00Hz]
	Defines the digital setting for the upper limit of the process PID regulator output.	
F04.14	**PID regulator lower limit**	0.00 - upper limit [0.00Hz]
	Defines the digital setting for the lower limit of the process PID regulator output.	
F04.15	**PID regulator adjustment characteristics**	0,1 [0]
	0: Positive characteristic. When the given increase, the motor speed is required to increase. 1: Negative characteristic. When the given increase, the request of the motor speed decreases.	
F04.16	**Integral adjustment options**	0,1 [1]
	0: Integral items stop integrating when they reach the upper and lower integral points. 1: Integral items continue to integrate when they reach the upper and lower points of the integral item. • For systems that require quick response, you can discontinue the integral adjustment after the frequency reaches the upper and lower limits.	
F04.17	**PID output filter time**	0.01 - 10.00 [0.05s]
	Defines the time to process the output of the process PID.	
F04.18	**PID output reverse choice**	0,1 [0]
	0: PID regulation is prohibited from reverse rotation. When PID output is negative, 0 is the limit. 1: PID regulation is allowed to reverse. When F00.18 = 1 (inversion prohibited), 0 is the limit.	
F04.19	**PID output reverse frequency limit**	0.00 - upper limit [50.00Hz]
	The upper limit frequency of PID inversion is defined, which is valid when F04.18 = 1.	
F04.20	**The amount of analogue corresponds to the Max. line speed**	0.1 - 1000.0 [10.0m/min]
F04.21	**Pulse per revolution**	1 - 9999 [1024]
F04.22	**Reel diameter**	1 - 5000 [1mm]
	Through DI6 measured high-speed pulse frequency P, calculate the actual line speed S, in order to achieve linear speed closed loop.	

6.2.6 F05: External Given Curve Parameters

Ref. Code	Function Description	Setting Range [Default]
F05.00	**External given curve selection**	**00000 - 22222 [00000]**
	Unit: AI1 characteristic curve selection **Ten: AI2 characteristic curve selection** **Hundred: AI3 characteristic curve selection** **Thousand: AI4 characteristic curve selection** **Ten thousand: Pulse input characteristic curve selection** Each one set: • 0: Line 1. • 1: Line 2. • 2: Polylines. *Note: Thousand is only valid with optional HD50-EIO expansion card.*	
F05.01	**Line 1 is given minimum**	**0.0 - F05.03 [0.0%]**
F05.02	**Line 1 minimum given the corresponding value**	**0.0 - 100.0 [0.0%]**
F05.03	**Line 1 is the Max. given**	**F05.01 - 100.0 [100.0%]**
F05.04	**Line 1 gives the Max. corresponding value**	**0.0 - 100.0 [100.0%]**
F05.05	**Line 2 minimum given**	**0.0 - F05.07 [0.0%]**
F05.06	**Line 2 minimum given corresponding value**	**0.0 - 100.0 [0.0%]**
F05.07	**Line 2 Max. given**	**F05.05 - 100.0 [100.0%]**
F05.08	**Line 2 should be given the Max. value**	**0.0 - 100.0 [100.0%]**
F05.09	**Polyline Max. given**	**F05.11 - 100.0 [100.0%]**
F05.10	**Polyline Max. given corresponding value**	**0.0 - 100.0 [100.0%]**
F05.11	**Polyline inflection point 2 given**	**F05.13 - F05.09 [100.0%]**
F05.12	**Inflection point 2 corresponding value**	**0.0 - 100.0 [100.0%]**
F05.13	**Polyline inflection point 1 given**	**F05.15 - F05.11 [0.0%]**
F05.14	**Inflection point 1 corresponds to the value**	**0.0 - 100.0 [0.0%]**
F05.15	**Polyline minimum given**	**0.0 - F05.13 [0.0%]**
F05.16	**Polyline minimum given the corresponding value**	**0.0 - 100.0 [0.0%]**
	F05.01 - F05.04 define line 1, F05.05 - F05.08 define line 2, F05.09 - F05.16 define polyline. All three independently implement the positive and negative characteristics, as shown in the following figure. If the setting of the minimum and Max. polyline settings is the same, this is a straight line, and the default frequency is the frequency corresponding to the minimum given polyline. **Positive and negative characteristic of line**  	

6

Ref. Code	Function Description	Setting Range [Default]
	Positive and negative characteristic of polyline  Picture: • P is given by terminal pulse, A is given by terminal analogue. • When P is 100%, corresponds to the Max. input pulse frequency defined by F16.17. • A corresponds to 10V or 20mA at 100%.	
F05.17	**Jump frequency 1**	**F00.09 - upper limit [0.00Hz]**
F05.18	**Jump frequency 2**	
F05.19	**Jump frequency 3**	
F05.20	**Jump frequency range**	**0.00 - 30.00 [0.00Hz]**
	The skip frequency is set so that the output frequency of the drive avoids the resonant frequency point of the mechanical load. • The setting frequency of the driver can be skipped around some frequency points as shown in the figure. • Acc./Dec. running through the skip frequency zone in continuous output frequency mode during Acc./Dec. running, but it can not stop at constant speed in skip frequency zone. • Frequency setting is skip, frequency output is continuous. 	
F05.21	**JOG operation frequency digital setting 2**	**0.00 - upper limit [5.00Hz]**
	When JOG operation 2 is selected by terminal, it will run according to the JOG frequency set by F05.21.	

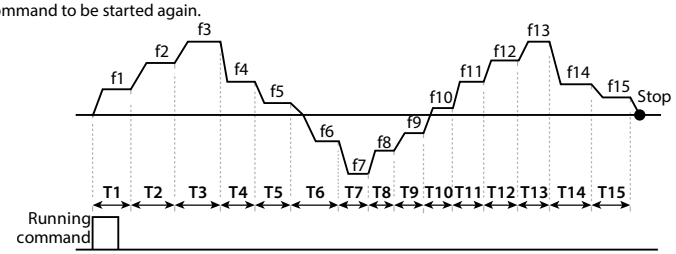
6.2.7 F06: Multi-speed and Simple PLC

Ref. Code	Function Description	Setting Range [Default]
F06.00	Multi-frequency command 1	F00.09 - upper limit [5.00Hz]
F06.01	Multi-frequency command 2	F00.09 - upper limit [5.00Hz]
F06.02	Multi-frequency command 3	F00.09 - upper limit [5.00Hz]
F06.03	Multi-frequency command 4	F00.09 - upper limit [5.00Hz]
F06.04	Multi-frequency command 5	F00.09 - upper limit [5.00Hz]
F06.05	Multi-frequency command 6	F00.09 - upper limit [5.00Hz]
F06.06	Multi-frequency command 7	F00.09 - upper limit [5.00Hz]
F06.07	Multi-frequency command 8	F00.09 - upper limit [5.00Hz]
F06.08	Multi-frequency command 9	F00.09 - upper limit [5.00Hz]
F06.09	Multi-frequency command 10	F00.09 - upper limit [5.00Hz]
F06.10	Multi-frequency command 11	F00.09 - upper limit [5.00Hz]
F06.11	Multi-frequency command 12	F00.09 - upper limit [5.00Hz]
F06.12	Multi-frequency command 13	F00.09 - upper limit [5.00Hz]
F06.13	Multi-frequency command 14	F00.09 - upper limit [5.00Hz]
F06.14	Multi-frequency command 15	F00.09 - upper limit [5.00Hz]
	It defines the initial value of each speed section in multi-speed operation mode and PLC operation mode.	
F06.15	**Simple PLC control selection**	0,1 [0]
	0: Invalid. 1: Enable. Then set F06.16 - F06.46 according to actual working conditions.	
F06.16	**Simple PLC operation mode selection**	0000 - 1122 [0000]

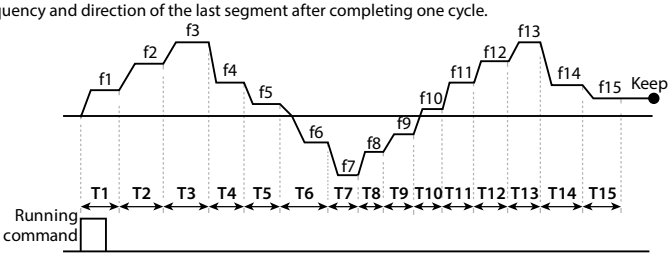
The parameter setting has 4 digits: Unit (0 - 2), ten (0 - 2), hundred (0,1), thousand (0,1).

Unit: PLC operation mode selection (take 15 segment PLC as an example)

- 0: Stop after single cycle. The drive automatically stops after completing one cycle and requires the run command to be started again.

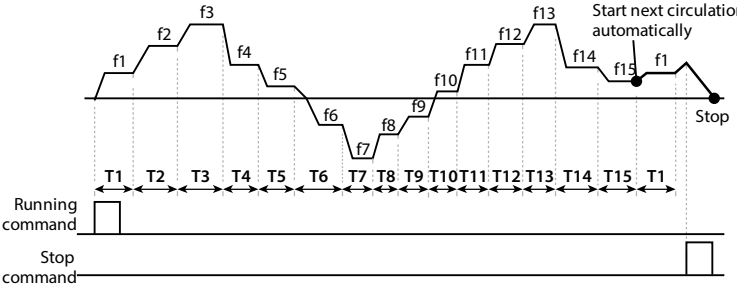


- 1: Maintain the final value after a single cycle. The drive automatically maintains the operating frequency and direction of the last segment after completing one cycle.



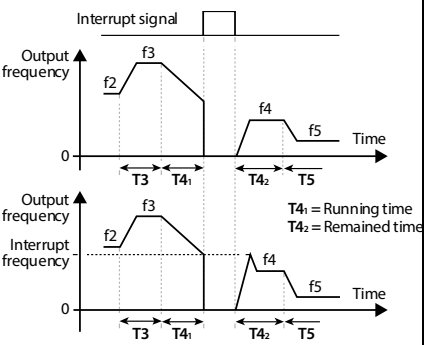
6

Ref. Code	Function Description	Setting Range [Default]
	• 2: Continuous cycle. The drive automatically completes one cycle after the next cycle until there is a stop command.	



Ten: PLC interrupt operation restart mode selection

- 0: Run from the first stage.
  - Stop during operation (stop command, fault or power-down) and start from the first stage after restarting.
- 1: Continue operating from the operating frequency at the phase of the interruption.
  - Shutdown during operation (stop command or fault), the drive automatically records the time the current phase has run.
  - This phase is entered automatically after restarting, and the remaining time is continued at the frequency defined in this phase, see right figure.
- 2: Continue running at the operating frequency at the time of interruption.
  - During operation stop (stop command or fault), the drive automatically records the running time of the current stage and the operation frequency at the stop time.
  - Restart to the operating frequency at the down time after restarting, and then continue to the rest of the run, see diagram to the right.



Note: Mode 2 stores more than one mode 1 operating frequency at the time of shutdown, and resumes operation at this frequency after restart.

Hundred: PLC state parameter storage selection when power off

- 0: Not store, do not memorize PLC running state when power off, after power on, restart from the first section.
- 1: Save. The state of PLC running during power-down is recorded, including the phase of power-off time, running frequency and running time. After power-on, run according to PLC restart mode (defined by F06.16).

Thousand: PLC time period unit choice

- 0: Second (s).
- 1: Minute (m).

F06.17	PLC stage 1 setting	000 - 321 [000]
F06.19	PLC stage 2 setting	000 - 321 [000]
F06.21	PLC stage 3 setting	000 - 321 [000]
F06.23	PLC stage 4 setting	000 - 321 [000]

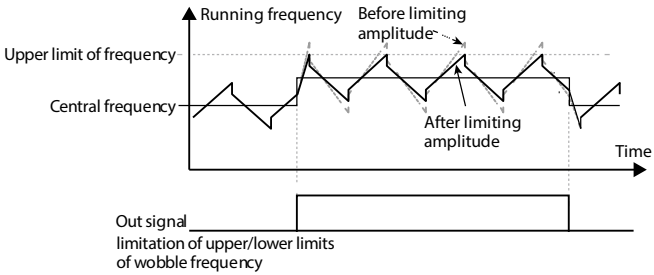
Ref. Code	Function Description	Setting Range [Default]
F06.25	PLC stage 5 setting	000 - 321 [000]
F06.27	PLC stage 6 setting	000 - 321 [000]
F06.29	PLC stage 7 setting	000 - 321 [000]
F06.31	PLC stage 8 setting	000 - 321 [000]
F06.33	PLC stage 9 setting	000 - 321 [000]
F06.35	PLC stage 10 setting	000 - 321 [000]
F06.37	PLC stage 11 setting	000 - 321 [000]
F06.39	PLC stage 12 setting	000 - 321 [000]
F06.41	PLC stage 13 setting	000 - 321 [000]
F06.43	PLC stage 14 setting	000 - 321 [000]
F06.45	PLC stage 15 setting	000 - 321 [000]
	Define the running frequency, direction and adding Dec. time of each stage of PLC. **Unit: PLC operating frequency selection** • 0: Multi-frequency command. Stage the operating frequency absolute value is the same as the corresponding multi-segment frequency setting. • For example: The absolute value of the operating frequency of PLC stage 15 is the setting of F06.14. • 1: Determined by F00.10. Selection of the operating frequency channel selected by F00.10. **Ten: PLC operating direction of the stage selection** • 0: Forward. • 1: Reverse. • 2: Set by the run command. Change by the external direction command in real time, the running direction is the direction set by the run command. • If the direction can not be set, the direction of the previous paragraph is followed. **Hundred: PLC each stage plus Dec. time choice** • 0: Add Dec. time 1. • 1: Add Dec. time 2. • 2: Add Dec. time 3. • 3: Add Dec. time 4.	
F06.18	Stage 1 running time	0.0 - 3276.7 [5.0]
F06.20	Stage 2 running time	0.0 - 3276.7 [0.0]
F06.22	Stage 3 running time	0.0 - 3276.7 [0.0]
F06.24	Stage 4 running time	0.0 - 3276.7 [0.0]
F06.26	Stage 5 running time	0.0 - 3276.7 [0.0]
F06.28	Stage 6 running time	0.0 - 3276.7 [0.0]
F06.30	Stage 7 running time	0.0 - 3276.7 [0.0]
F06.32	Stage 8 running time	0.0 - 3276.7 [0.0]
F06.34	Stage 9 running time	0.0 - 3276.7 [0.0]
F06.36	Stage 10 running time	0.0 - 3276.7 [0.0]
F06.38	Stage 11 running time	0.0 - 3276.7 [0.0]
F06.40	Stage 12 running time	0.0 - 3276.7 [0.0]
F06.42	Stage 13 running time	0.0 - 3276.7 [0.0]
F06.44	Stage 14 running time	0.0 - 3276.7 [0.0]
F06.46	Stage 15 running time	0.0 - 3276.7 [0.0]
	Defines the running time of each stage of PLC. • When the running time of a certain section is set to 0, it indicates that the PLC of this section is invalid.	

6.2.8 F07: Textile Swing Frequency Parameters

The Wobble Operation Process is Shown as Below:

First, the drive accelerates to the preset frequency of wobble operation (F07.02) within the Acc. time and then waits for certain time (F07.03). Hinterher the drive transits to the central frequency of the wobble operation as per the Acc. 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 Dec. time.

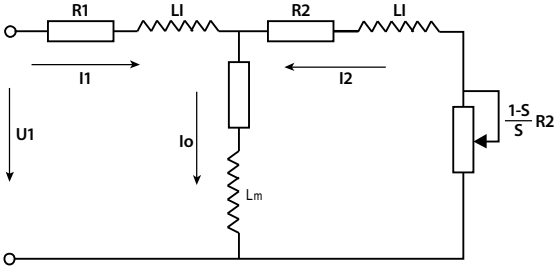
The process is shown in figure:



Ref. Code	Function Description	Setting Range [Default]
F07.00	**Wobble operation selection**	**0,1 [0]**
	0: Disabled. 1: Enabled.	
F07.01	**Wobble operation mode**	**0000 - 1111 [0000]**
	Unit: Start mode of wobble operation • 0: Auto start. The drive 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 drive will enter wobble mode. If the terminal is disabled, the drive will end wobble operation and operate at the preset frequency of wobble operation (F07.02). **Ten: Wobble operation amplitude.** Refer to F07.04. • 0: The wobble central frequency. • 1: The Max. output frequency. **Hundred: Restart mode of wobble operation** • 0: The drive restarts the wobble operation as per the recorded frequency and direction when it stops last time. • 1: The drive restarts the wobble operation from 0Hz. **Thousand: Save the wobble operation parameters at power outage** • 0: Saved. When the hundred of F07.01 is set as 0, the wobble operation parameters will be saved when power outage occurs. • 1: Not 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 drive's running frequency before entering wobble mode. F07.03 defines the time that the drive operates at the preset wobble frequency. • Only when select auto start (set unit of F07.01 as 0) will F07.03 be enabled.	

Ref. Code	Function Description	Setting Range [Default]
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 Max. output frequency: F_W = Max. 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 F08: Asyn. Motor 1 Parameters



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

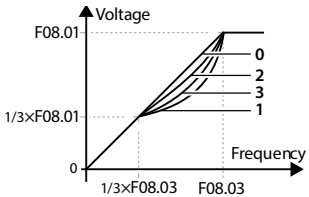
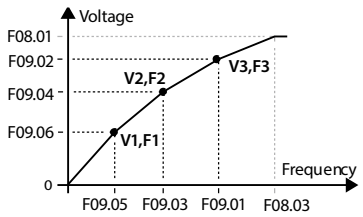
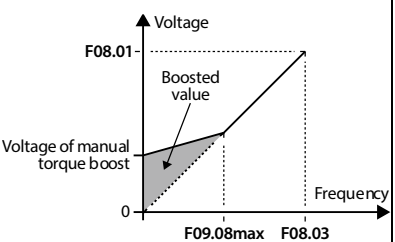
Mutual inductance is calculated by the following formula:

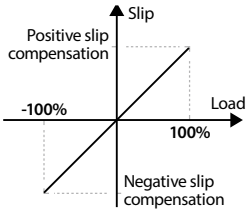
$$\text{Mutual inductance F08.10} = \frac{\text{F08.01}/\sqrt{3}}{2\pi \times \text{F08.03} \times \text{F08.11}} - \text{F08.09}$$

Ref. Code	Function Description		Setting Range [Default]
F08.00	**Rated power of Asyn. motor 1**		**0.2 - 500.0kW [Depend on HD50]**
F08.01	**Rated voltage of Asyn. motor 1**		**0 - 999V [Depend on HD50]**
F08.02	**Rated current of Asyn. motor 1**	**5.5kW above motor**	**0.1 - 999.9A [Depend on HD50]**
		5.5kW and below motor	**0.01 - 99.99A [Depend on HD50]**
F08.03	**Rated frequency of Asyn. motor 1**		**1.0 - 400.0 [50.0Hz]**
F08.04	**Rated RPM of Asyn. motor 1**		**1 - 24000 [1500rpm]**
	F08.03 and F08.04 must be set according to motor nameplate parameter.		
F08.05	**Power factor of Asyn. motor 1**		**0.001 - 1.000 [Depend on HD50]**

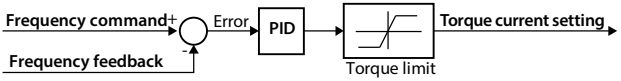
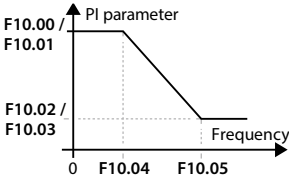
Ref. Code	Function Description		Setting Range [Default]
F08.06	**Parameter auto-tuning of Asyn. motor 1**		**0 - 2 [0]**
	Note: Motor parameter auto-tuning can only be started in the keypad control (F00.11 = 0) mode. 0: Auto-tuning is disabled. 1: Stationary auto-tuning. • In the process of stationary 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. • The motor is in a standstill state. The stator resistance, rotor resistance and leakage inductance of the motor are automatically measured. Then the motor is rotating and the motor mutual inductance and no-load excitation current are measured automatically. The measured parameters are automatically written to F08.07 - F08.11 automatically. • During motor rotation, shock or overcurrent may occur. Please press the **STOP** key to stop the parameter tuning and adjust F09.16 (damping factor) to reduce possible oscillation. **Self-tuning steps:** 1. Set the motor nameplate parameters (F08.00 - F08.04) correctly. 2. When F08.06 = 2 is selected, set reasonable Acc. time 1 (F03.01) and Dec. time 1 (F03.02), and take the motor shaft out of the load and carefully check its safety. 3. Set F08.06 to 1 or 2, press the key ↵, and then press **RUN** to start self-tuning. The LCD displays "Motor Parameter Self-tuning". 4. When the operation indicator blinks on the keypad, it indicates that the auto-tuning is finished and returns to the stop status display. F08.06 automatically returns to 0.		
F08.07	**Stator resistance of Asyn. motor 1**	**Motor above 5.5kW**	**0.000 - 9.999Ω [Depend on HD50]**
		Motor below 5.5kW	**0.00 - 99.99Ω [Depend on HD50]**
F08.08	**Rotor resistance of Asyn. motor 1**	**Motor above 5.5kW**	**0.000 - 9.999Ω [Depend on HD50]**
		Motor below 5.5kW	**0.00 - 99.99Ω [Depend on HD50]**
F08.09	**Leakage inductance of Asyn. motor 1**	**Motor above 5.5kW**	**0.0 - 999.9mH [Depend on HD50]**
		Motor below 5.5kW	**0 - 9999mH [Depend on HD50]**
F08.10	**Mutual inductance of Asyn. motor 1**	**Motor above 5.5kW**	**0.0 - 500.0mH [Depend on HD50]**
		Motor below 5.5kW	**0 - 5000mH [Depend on HD50]**
F08.11	**Idling exciting current of Asyn. motor 1**	**Motor above 5.5kW**	**0.0 - 999.9A [Depend on HD50]**
		Motor below 5.5kW	**0.00 - 99.99A [Depend on HD50]**
F08.12	**Asyn. motor 1 core saturation coefficient 1**		**0.00 - 1.00 [1.00]**
F08.13	**Asyn. motor 1 core saturation coefficient 2**		**0.00 - 1.00 [1.00]**
F08.14	**Asyn. motor 1 core saturation coefficient 3**		**0.00 - 1.00 [1.00]**
F08.15	**Asyn. motor 1 core saturation coefficient 4**		**0.00 - 1.00 [1.00]**
F08.16	**Asyn. motor 1 core saturation coefficient 5**		**0.00 - 1.00 [1.00]**

6.2.10 F09: Asyn. Motor 1 V/f Control Parameters

Ref. Code	Function Description	Setting Range [Default]
F09.00	**Asyn. motor 1 V/f curve setting**	**0 - 4 [0]**
	Define a variety of V/f settings to meet different load characteristics. • 4 fixed curves and one custom curve can be selected. 0: Straight line. 1: Square curve. 2: 1.2 power curve. 3: 1.7 power curve. 4: User-defined curve. 	
F09.01	**Asyn. motor 1 V/f frequency value F3**	**F09.03 - F08.03 [0.00Hz]**
F09.02	**Asyn. motor 1 V/f voltage value V3**	**F09.04 - F08.01 [0V]**
F09.03	**Asyn. motor 1 V/f frequency value F2**	**F09.05 - F09.01 [0.00Hz]**
F09.04	**Asyn. motor 1 V/f voltage value V2**	**F09.06 - F09.02 [0V]**
F09.05	**Asyn. motor 1 V/f frequency value F1**	**0.00 - F09.03 [0.00Hz]**
F09.06	**Asyn. motor 1 V/f voltage value V1**	**0 - F09.04 [0V]**
	F09.01 - F09.06 is user-defined V/f curve. • Valid when F09.00 = 4 (user setting curve). • Define the V/f curve with three-point polylines (V1, F1), (V2, F2), (V3, F3) to suit specific load characteristics. • According to the actual conditions set reasonable curve, in order to maximize the load characteristics. 	
F09.07	**Asyn. motor 1 torque boost**	**0.0 - 30.0** **[45kW and below drive: 2.0%]** **[55 - 132kW drive: 1.0%]** **[160kW and above drive: 0.5%]**
F09.08	**Asyn. motor 1 manual torque boost cut-off point**	**0.0 - 50.0 (F08.03) [30.0%]**
	To compensate for low frequency torque characteristics, some boost compensation can be made for the output voltage. • Torque boost any V/f curve set in F09.00 is valid. • When F09.07 ≠ 0, it indicates manual torque boost mode. • When F09.07 = 0, the automatic torque boost mode is indicated, motor rated frequency (F08.03) and rated speed (F08.04) should be correctly set according to the motor nameplate parameters, and the accurate motor stator resistance (F08.07); Setting slip compensation gain F09.09 = 100.0%, enable slip compensation, in order to obtain a good carrying capacity. • F09.08 is the percentage of the motor rated frequency (F08.03). 	

Ref. Code	Function Description	Setting Range [Default]
F09.09	**Asyn. motor 1 slip compensation gain**	**0.0 - 300.0 [100.0%]**
F09.10	**Asyn. motor 1 slip compensation filter time**	**0.01 - 10.00 [0.10s]**
F09.11	**Asyn. motor 1 slip compensation limited**	**0.0 - 250.0 [200.0%]**
F09.12	**Asyn. motor 1 compensates the time constant**	**0.1 - 25.0 [2.0s]**
	Changes in motor load torque can affect the motor running slip and result in changes in motor speed, which can be reduced by slip compensation. • The motorized state and power generation state gradually increase the compensation gain (F09.09). • The amount of automatic slip compensation is related to the rated slip of the motor. When used, set the motor rated frequency (F08.03) and rated speed (F08.04) correctly. Slip compensation range = F09.11 × rated slip. Rated slip = F08.03 - F08.04 × Np/60. • Np is the number of motor pole pairs. 	
F09.13	**Asyn. motor 1 V/f speed loop output limited**	**0.0 - 20.0 (F00.06) [5.0%]**
F09.14	**Asyn. motor 1 AVR (Automatic Voltage Regulation) function**	**0 - 2 [1]**
	0: No action. 1: Always action. 2: Only slow down does not move. • When the input voltage deviates from the rated value, the output voltage is kept constant by the AVR function, so the AVR should operate normally under normal conditions, especially when the input voltage is higher than the rated value. • F09.14 = 0 or F09.14 = 2, the current is slightly larger. F09.14 = 1, the motor decelerates smoothly and the running current is smaller.	
F09.16	**Asyn. motor 1 suppresses the oscillation coefficient**	**0 - 200 [50]**
	Used to suppress the drive and the motor with the natural oscillation generated. • If output current changes repeatedly with constant load, F09.16 can be set based on the factory parameters to eliminate the oscillation and make the motor run smoothly.	

6.2.11 F10: Motor 1 Vector Control Speed Loop Parameters

Ref. Code	Function Description	Setting Range [Default]
F10.00	**Motor 1 speed control proportional gain 1**	**0.1 - 200.0 [20.0]**
F10.01	**Motor 1 speed control integration time 1**	**0.00 - 10.00 [0.20s]**
F10.02	**Motor 1 speed control proportional gain 2**	**0.1 - 200.0 [20.0]**
F10.03	**Motor 1 speed control integration time 2**	**0.00 - 10.00 [0.20s]**
F10.04	**Motor 1 speed loop PI switching frequency 1**	**0.00 - 50.00 [10.00Hz]**
F10.05	**Motor 1 speed loop PI switching frequency 2**	**0.00 - 50.00 [15.00Hz]**
	F10.00 - F10.05, F10.07 set the PID parameters of the speed regulator (ASR). The block diagram of the speed regulator is shown in the figure below:  As shown on the right: • When running in the 0 - F10.04 interval, the vector control PI parameters are F10.00 and F10.01. • When running at the frequency above F10.05, the vector control PI parameters are F10.02 and F10.03. • When operating in the frequency range between F10.04 - F10.05, the vector control P parameter is the intermediate linear interpolation of F10.00 and F10.02 and the vector control I parameter is the mid-linearity of F10.01 and F10.03 Interpolation.  • Increase the ASR proportional gain P to speed up the dynamic response of the system; However, P is too large and oscillates easily. • Reducing the ASR integral time constant Ti accelerates the system's dynamic response; However, Ti is too small for oscillations and large overshoots. • If the integral time constant is set to 0, there is no integral effect and the speed loop is simply a proportional regulator. • Generally, adjust the proportional gain P first, and try to increase P if the system does not oscillate. Then adjust the integral time constant Ti to make the system have fast response characteristics and little overshoot. • Low frequency operation to improve the dynamic response, increase the proportional gain P and decrease the integral time constant Ti.	
F10.06	**Motor 1 speed loop integral limit**	**0.0 - 200.0 (F08.02) [180.0%]**
	The Max. integrated value of the integral of speed vector control loop is limited.	
F10.07	**Motor 1 speed loop differential time**	**0.00 - 1.00 [0.00s]**
	Normally, no need to set it. When it is necessary to speed up the dynamic response, setting may be appropriate. • F10.07 = 0, there is no differential term in the speed loop.	
F10.08	**Motor 1 speed loop output filter time**	**0.000 - 1.000 [0.020s]**
	Filter the output of the ASR (speed loop) regulator. • F10.08 = 0, the speed loop is not filtered.	
F10.09	**Motor 1 motor torque limited channel**	**0 - 2 [0]**
F10.10	**Motor 1 regenerative torque defines the channel**	**0 - 2 [0]**
	0: Torque limit set by digital. 1: The torque limit is determined by analogue input. 2: Torque limit given by the terminal pulse.	

6

Ref. Code	Function Description	Setting Range [Default]
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	
	Please be careful setting F10.11 - F10.14, setting too large may damage the motor.	

6.2.12 F11: Current Ring Parameters

Ref. Code	Function Description	Setting Range [Default]
F11.00	Motor 1 current loop KP	1 - 8000 [1000]
F11.01	Motor 1 current loop KI	1 - 4000 [500]
	The PI parameters for a given current loop adjuster (ACR) are defined. • In general, it is not advisable to adjust the current loop parameters.	
F11.02	Motor 1 current loop output filter frequency	0 - 31 [3]
	The current loop regulator output filtering.	

6.2.13 F12: Synchronous Motor Parameters

Ref. Code	Function Description	Setting Range [Default]
F12.00	Syn. motor type	0,1 [0]
	0: IPM. 1: SMPM.	
F12.01	Syn. motor rated power	0.2 - 500.0kW [Depend on HD50]
F12.02	Syn. motor rated voltage	0 - 999V [Depend on HD50]
F12.03	Syn. motor rated current	0.1 - 999.9A [Depend on HD50]
F12.04	Syn. motor rated power	1.0 - 400.0 [50.0Hz]
F12.05	Syn. motor rated RPM	1 - 24000 [1500rpm]
F12.06	Syn. motor stator resistance	0.000 - 9.999 [0.000Ω]
F12.07	Syn. motor cross-axis inductance	0.0 - 999.9 [0.0mH]
F12.08	Syn. motor direct-axis inductance	0.0 - 999.9 [0.0mH]
F12.09	Syn. motor back EMF	0 - F12.02 [380V]
F12.10	Syn. motor angle self-tuning	0 - 2 [0]
	0: No action. 1: Static self-tuning. 2: Rotation self-tuning.	
F12.11	Syn. motor rotation self-tuning current setting	0.0 - 100.0 (F12.03) [5.0%]
	If the Syn. motor static self-tuning reported overcurrent failure, may be appropriate to reduce the set value.	
F12.12	Syn. motor initial angle	0.0 - 359.9 [0.0°]
F12.13	Syn. motor Z pulse initial angle	0.0 - 359.9 [0.0°]
F12.14	Syn. motor angle static self - tuning voltage	0.0 - 100.0 (F12.02) [100.0%]
F12.15	Syn. motor cosine encoder C amplitude	0 - 9999 [2048]
F12.16	Syn. motor cosine encoder C zero bias	0 - 9999 [2048]
F12.17	Syn. motor cosine encoder D amplitude	0 - 9999 [2048]
F12.18	Syn. motor cosine encoder D zero bias	0 - 9999 [2048]

6.2.14 F13: Asyn. Motor 2 Parameters

This group of parameters can set the second group of motor parameters and control parameters, corresponding to the parameters of the first group of motor (motor 1), refer to the relevant parameters of the first group of motors, which can achieve flexible switching of 2 sets of motors respectively (refer to DI terminal 47 features).

Among them:

F13.01 - F13.15, F13.53 - F13.54 refer to F08: Asyn. Motor 1 Parameters.

F13.16 - F13.32 refer to F09: Asyn. Motor 1 V/f Control Parameters.

F13.35 - F13.49 refer to F10: Motor 1 Vector Control Speed Loop Parameters.

F13.50 - F13.52 refer to F11: Current Ring Parameters.

Ref. Code	Function Description		Setting Range [Default]
F13.00	**Asyn. motor 2 control method selection**		**0 - 3 [0]**
	0: V/f control without PG. 2: IM2 without PG vector control. 3: IM2 with PG vector control.		
F13.01	**Asyn. motor 2 rated power**		**0.2 - 500.0kW [Depend on HD50]**
F13.02	**Asyn. motor 2 rated voltage**		**0 - 999V [Depend on HD50]**
F13.03	**Asyn. motor 2 rated current**	**5.5kW above motor**	**0.1 - 999.9A [Depend on HD50]**
		5.5kW and below motor	**0.01 - 99.99A [Depend on HD50]**
F13.04	**Asyn. motor 2 rated frequency**		**1.0 - 400.0 [50.0Hz]**
F13.05	**Asyn. motor 2 rated RPM**		**1 - 24000 [1500rpm]**
F13.06	**Asyn. motor 2 power factor**		**0.001 - 1.000 [Depend on HD50]**
F13.07	**Asyn. motor 2 parameters self-tuning**		**0 - 2 [0]**
	0: No action. 1: Motor self-tuning at rest. 2: Motor rotation self-tuning.		
F13.08	**Asyn. motor 2 stator resistance**	**5.5kW above motor**	**0.000 - 9.999Ω [Depend on HD50]**
		5.5kW and below motor	**0.00 - 99.99Ω [Depend on HD50]**
F13.09	**Asyn. motor 2 rotor resistance**	**5.5kW above motor**	**0.000 - 9.999Ω [Depend on HD50]**
		5.5kW and below motor	**0.00 - 99.99Ω [Depend on HD50]**
F13.10	**Asyn. motor 2 leakage inductance**	**5.5kW above motor**	**0.0 - 999.9mH [Depend on HD50]**
		5.5kW and below motor	**0 - 9999mH [Depend on HD50]**
F13.11	**Asyn. motor 2 mutual inductance**	**5.5kW above motor**	**0.0 - 500.0mH [Depend on HD50]**
		5.5kW and below motor	**0 - 5000mH [Depend on HD50]**
F13.12	**Asyn. motor 2 no-load excitation current**	**5.5kW above motor**	**0.0 - 999.9A [Depend on HD50]**
		5.5kW and below motor	**0.00 - 99.99A [Depend on HD50]**
F13.13	**Asyn. motor 2 core saturation coefficient 1**		**0.00 - 1.00 [1.00]**
F13.14	**Asyn. motor 2 core saturation coefficient 2**		**0.00 - 1.00 [1.00]**
F13.15	**Asyn. motor 2 core saturation factor 3**		**0.00 - 1.00 [1.00]**
F13.16	**Asyn. motor 2 V/f curve setting**		**0 - 4 [0]**
	0: Straight line. 1: Square curve. 2: 1.2 power curve. 3: 1.7 power curve. 4: User-defined curve.		
F13.17	**Asyn. motor 2 V/f frequency value F3**		**F13.19 - F13.04 [0.00Hz]**

Ref. Code	Function Description	Setting Range [Default]
F13.18	Asyn. motor 2 V/f voltage value V3	F13.20 - F13.02 [0V]
F13.19	Asyn. motor 2 V/f frequency value F2	F13.21 - F13.17 [0.00Hz]
F13.20	Asyn. motor 2 V/f voltage value V2	F13.22 - F13.18 [0V]
F13.21	Asyn. motor 2 V/f frequency value F1	0.00 - F13.19 [0.00Hz]
F13.22	Asyn. motor 2 V/f voltage value V1	0 - F13.20 [0V]
F13.23	Asyn. motor 2 torque boost	0.0 - 30.0 [45kW and below drive: 2.0%] [55 - 132kW drive: 1.0%] [160kW and above drive: 0.5%]
F13.24	Asyn. motor 2 manual torque boost cut-off point	0.0 - 50.0 (F13.04) [30.0%]
F13.25	Asyn. motor 2 slip compensation gain	0.0 - 300.0 [100.0%]
F13.26	Asyn. motor 2 slip compensation filter time	0.01 - 10.00 [0.10s]
F13.27	Asyn. motor 2 slip compensation limited	0.0 - 250.0 [200.0%]
F13.28	Asyn. motor 2 compensates time constant	0.1 - 25.0 [2.0s]
F13.29	Asyn. motor 2 V/f speed loop output limited	0.0 - 20.0 (F00.06) [5.0%]
F13.30	Asyn. motor 2 AVR function	0 - 2 [1]
	0: No action. 1: Always action. 2: Only slow down does not move.	
F13.32	Asyn. motor 2 suppresses oscillation factor	0 - 200 [50]
F13.35	Asyn. motor 2 speed control proportional gain 1	0.1 - 200.0 [20.0]
F13.36	Asyn. motor 2 speed control integration time 1	0.00 - 10.00 [0.20s]
F13.37	Asyn. motor 2 speed control proportional gain 2	0.1 - 200.0 [20.0]
F13.38	Asyn. motor 2 speed control integration time 2	0.00 - 10.00 [0.20s]
F13.39	Asyn. motor 2 speed loop PI switching frequency 1	0.00 - 50.00 [10.00Hz]
F13.40	Asyn. motor 2 speed loop PI switching frequency 2	0.00 - 50.00 [15.00Hz]
F13.41	Asyn. motor 2 speed loop integral limit	0.0 - 200.0 (F13.03) [180.0%]
F13.42	Asyn. motor 2 speed loop differential time	0.00 - 1.00 [0.00s]
F13.43	Asyn. motor 2 speed loop output filter time	0.000 - 1.000 [0.020s]
F13.44	Asyn. motor 2 electric torque limit channel	0 - 2 [0]
F13.45	Asyn. motor 2 regenerative torque limited channels	0 - 2 [0]
	0: Torque limit set by digital. 1: The torque limit is determined by analogue input. 2: The torque limit value is given by the terminal pulse.	
F13.46	Asyn. motor 2 positive torque limit	0.0 - 200.0 (F13.03) [180.0%]
F13.47	Asyn. motor 2 reverses the motor torque limit	
F13.48	Asyn. motor 2 regenerative torque limit forward	
F13.49	Asyn. motor 2 regenerative torque limit when limited	
F13.50	Asyn. motor 2 current loop KP	1 - 8000 [1000]
F13.51	Asyn. motor 2 current ring KI	1 - 4000 [500]
F13.52	Asyn. motor 2 current loop output filter frequency	0 - 31 [3]
F13.53	Asyn. motor 2 core saturation factor 4	0.00 - 1.00 [1.00]
F13.54	Asyn. motor 2 core saturation factor 5	0.00 - 1.00 [1.00]

6.2.15 F14: Encoder Parameters

Ref. Code	Function Description	Setting Range [Default]
F14.00	**Encoder feedback signal type**	**0 - 5 [0]**
	0: Encoder card is invalid. 1: ABZ signal. 2: UVW signal. 3: SINCOS signal. 4: 1313 serial communication encoder signal. 5: Resolver encoder signal.	
F14.01	**Encoder pulse per revolution**	**1 - 9999 [1024]**
	Defined the closed-loop vector control mode, the pulse encoder installed on the motor pulse per revolution, also known as the number of encoder lines.	
F14.02	**Encoder rotation direction setting**	**0,1 [0]**
	0: The same direction. 1: The direction is reversed.	
F14.03	**Encoder signal filtering times**	**0x00 - 0xFF [0x33]**
	Unit: Low-speed filtering times **Ten: High-speed filtering times** If there is current vibration at low speed, increase the number of low-speed filtering times, otherwise reduce the number of low-speed filtering to increase the response of the system.	
F14.04	**Motor 1 encoder disconnection detection action selection**	**0 - 2 [1]**
	Defines the protection action of motor 1 after encoder break (E0031) fault. 0: Freewheel stop. 1: Emergency stop. 2: Dec. stop.	
F14.05	**Motor 1 motor speed action selection**	**0 - 3 [0]**
F14.06	**Motor 1 speed deviation is too large action selection**	**0 - 3 [0]**
	F14.05 defines the protection action when motor 1 overspeeds. F14.06 defines the protection action when the deviation of motor 1 is too large. 0: Freewheel stop. 1: Emergency stop. 2: Dec. stop. 3: Continue to run.	
F14.07	**Motor 1 PG disconnection detection time**	**0.00 - 2.00 [0.00s]**
	F14.07 = 0, do not detect encoder disconnection.	
F14.08	**Motor 1 PG reverse detection time**	**0.00 - 2.00 [0.00s]**
	F14.08 = 0, encoder inversion is not detected.	
F14.09	**Motor 1 motor speed detection value**	**0.0 - 120.0 (F00.06) [110.0%]**
F14.10	**Motor 1 motor speed detection time**	**0.00 - 2.00 [0.00s]**
	When the motor speed exceeds the frequency set by F14.09 and the duration exceeds the time set by F14.10, the drive will report E0032 fault (motor speed overrun). • F14.10 = 0, the drive does not detect the motor speeding.	
F14.11	**Motor 1 speed deviation detection value is too large**	**0.0 - 30.0 (F00.06) [20.0%]**
F14.12	**Motor 1 speed deviation detection time is too large**	**0.00 - 2.00 [0.00s]**
	If the deviation between motor speed and given speed exceeds the frequency set by F14.11 and the duration exceeds the time set by F14.12, the drive will report E0033 fault (motor speed over tolerance). • F14.12 = 0, the drive does not detect that the motor speed deviation is too large.	
F14.13	**Motor 2 encoder disconnection detection action selection**	**0 - 2 [1]**
F14.14	**Motor 2 motor speed action selection**	**0 - 3 [0]**

Ref. Code	Function Description	Setting Range [Default]
F14.15	Motor 2 speed deviation is too large when action selection	0 - 3 [0]
F14.16	Motor 2 PG disconnection detection time	0.00 - 2.00 [0.00s]
F14.17	Motor 2 PG reverse detection time	0.00 - 2.00 [0.00s]
F14.18	Motor 2 motor speed detection value	0.0 - 120.0 (F00.06) [110.0%]
F14.19	Motor 2 motor speed detection time	0.00 - 2.00 [0.00s]
F14.20	Motor 2 speed deviation is too large detection value	0.0 - 30.0 (F00.06) [20.0%]
F14.21	Motor 2 speed deviation detection time is too large	0.00 - 2.00 [0.00s]
	F14.13 - F14.21 see F14.04 - F14.12.	
F14.22	Motor and encoder speed ratio	0.001 - 30.000 [1.000]
	If the encoder is mounted directly on the motor shaft, set F14.22 = 1. If the encoder is not mounted directly on the motor shaft, there is a speed ratio between the motor shaft and the encoder, set at the actual speed setting.	
F14.23	Speed method selection	0,1 [0]
	0: Full M method. 1: M/T method.	
F14.24	Resolver encoder card frequency coefficient setting	1 - 126 [1]
F14.25	Serial encoder communication protocol selection	0,1 [0]
	0: Endat. 1: Rotary encoder communication.	

6.2.16 F15: Digital I/O Terminal Parameters

Ref. Code	Function Description	Setting Range [Default]
F15.00	DI1 terminal function	0 - 86 [2]
F15.01	DI2 terminal function	0 - 86 [3]
F15.02	DI3 terminal function	0 - 86 [0]
F15.03	DI4 terminal function	0 - 86 [0]
F15.04	DI5 terminal function	0 - 86 [0]
F15.05	DI6 terminal function	0 - 86 [61]
F15.06	DI7 terminal function	0 - 86 [0]
F15.07	DI8 terminal function	0 - 86 [0]
F15.08	DI9 terminal function	0 - 86 [0]
F15.09	DI10 terminal function	0 - 86 [0]
F15.10	DI11 terminal function	0 - 86 [0]
F15.11	DI12 terminal function	0 - 86 [0]
	Note: F15.06 - F15.11 is only valid when HD50-EIO is optional. 0: Reserved. • Set the terminal to be in a non-functional state, and do nothing even if there is a signal input. • Unused terminals can be set to no function to prevent misconnection or malfunction. 1: Drive is enabled. • When enabled, the drive enables operation. • In case of invalid state, stop operation is forbidden to stop operation, and operation state is free to stop. • No terminal is selected this function, the default drive enable status.	

Ref. Code	Function Description	Setting Range [Default]

2,3: Forward/reverse (FWD/REV).

- Can set any DI terminal for the forward/reverse terminal to control the drive start and stop.
- Forward/reverse rotation function is valid only in terminal control mode.
- See F15.16.

4: Three-wire operation control.

- See F15.16.

5 - 7: Frequency setting channel selection 1 - 3.

- Switching between 2^n frequency setting channel selections (including holding status) can be achieved by a logic combination of terminals, setting n (up to 3) selection terminals, see the table below.

Set channel 3 (No.7)	Set channel 2 (No.6)	Set channel 1 (No.5 function)	Set the channel selection
0	0	0	Maintain
0	0	1	Keypad digital setting
0	1	0	Terminal digital setting
0	1	1	SCI communication digital settings
1	0	0	Analogue setting
1	0	1	Terminal pulse setting
1	1	X	Maintain

8: Frequency switch to analogue.

- When valid, the frequency setting channel is forcibly switched to the analogue setting.
- Frequency setting channel selection priority:
  The frequency is switched to analogue. The setting channel of the frequency setting channel selection terminal 1 - 3 (DI terminal is set to function 5 - 7) > the setting frequency of F00.10 aisle.

9,10: Operation command channel switching 1,2.

- By selecting the logic combination of terminals 1 and 2 by running the command channel, four control command selections can be made, see table below.

Command channel selection 2 (No.10)	Command channel selection 1 (No.9)	Command channel
0	0	Run command channel to keep
0	1	Keypad operation
1	0	Terminal operation
1	1	SCI communication operation

- Run command channel switching can be switched while the drive is running, but all switching takes effect when it is down.

11: Command to switch to terminal.

- When enabled, the run command channel is forcibly switched to the terminal run command channel.
- Priority of running command channel selection:
  Command to switch to terminal (DI terminal set to function No.11) > keypad local remote switch function (F00.12 = 1) > operation command channel select the command channel set by terminals 1 and 2 (DI terminal is set as No.9 and No.10 functions) > run command channel set by F00.11.
- Only valid in stop.

12: External stop command input.

- When enabled, the drive will stop according to the setting of F02.13 (stop mode selection).
- Valid for all run command channels.

Ref. Code	Function Description	Setting Range [Default]

13 - 16: Multi-frequency terminals 1 - 4.

- By means of the logical combination of the terminals, you can define up to 15-speed operating curves.
- Setting of 4 terminal functions, the frequency can be given channel frequency and 15 frequency switching operation control.
- Setting 3 terminal functions, which can control the frequency of 7 channels and the frequency of the given channel.
- Setting 2 terminal functions, which can control the frequency of the given frequency channel and the 3-band frequency switching operation.
- Setting a terminal function, which can realize the switching of frequency and multi-segment frequency determined by frequency reference channel.
- Refer to the following table and the following figure: K1 corresponds to multi-band frequency terminal 1, K2 corresponds to multi-band frequency terminal 2, K3 corresponds to multi-band frequency terminal 3, and K4 corresponds to multi-band frequency terminal 4.

K4 (No.16)	K3 (No.15)	K2 (No.14)	K1 (No.13)	Frequency setting
0	0	0	0	Setting frequency
0	0	0	1	Multi-frequency 1 (F06.00)
0	0	1	0	Multi-frequency 2 (F06.01)
0	0	1	1	Multi-frequency 3 (F06.02)
0	1	0	0	Multi-frequency 4 (F06.03)
0	1	0	1	Multi-frequency 5 (F06.04)
0	1	1	0	Multi-frequency 6 (F06.05)
0	1	1	1	Multi-frequency 7 (F06.06)
1	0	0	0	Multi-frequency 8 (F06.07)
1	0	0	1	Multi-frequency 9 (F06.08)
1	0	1	0	Multi-frequency 10 (F06.09)
1	0	1	1	Multi-frequency 11 (F06.10)
1	1	0	0	Multi-frequency 12 (F06.11)
1	1	0	1	Multi-frequency 13 (F06.12)
1	1	1	0	Multi-frequency 14 (F06.13)
1	1	1	1	Multi-frequency 15 (F06.14)

17,18: Frequency UP (UP)/DOWN (DN) instructions.

- Control terminals increase or decrease the frequency instead of using the keypad for remote control.
- The rate of increase or decrease is set by F15.12. The function table is shown in the table below.
- Normal operation is valid when F00.10 = 1 (terminal digital setting) or as auxiliary frequency F19.00 = 2 (terminal digital setting).

Frequency UP (UP) instruction (No.17)	Frequency DOWN (DN) instruction (No.18)	Frequency trend
0	0	Maintain the current setting frequency
0	1	Set the frequency decreases
1	0	The set frequency increases
1	1	Maintain the current setting frequency

Ref. Code	Function Description	Setting Range [Default]

19: Auxiliary setting frequency is cleared.

- When enabled, the auxiliary frequency setting value is cleared to 0. The setting frequency is completely determined by the main setting.

20,21: Forward/reverse jogging 1 command control input (JOGF1/JOGR1).

22,23: Forward/reverse jogging 2 command control input (JOGF2/JOGR2).

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

- For control of jogging operation in control terminal mode, JOGF is jog forward operation and JOGR is jog reverse operation.
- Define parameters F00.15 (Jog frequency), F00.16 (Jog interval), F03.15 (Acc. time), F03.16 (Dec. time), see table below.

Jog direction input (No.25)	Jog direction input (No.24)	Run the 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 functions 20 and 21 are selected, functions 24 and 25 are invalid.

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

- Acc./Dec. time priority:
  Dec. time > determined by Dec. time > F03.09, F03.10 determined by terminals 26, 27.
- Dec. time1 - 4 can be selected by adding a logical combination of Dec. time terminals 1 and 2. See the table below.
- The drive can realise 4 groups Acc./Dec. time selection through the function of 2 Acc./Dec. terminals.
- The drive can realise 2 groups Acc./Dec. time selection through the function of 1 Acc./Dec. terminals.

Acc./Dec. terminal 2 (No.27)	Acc./Dec. terminal 1 (No.26)	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

28: Acc./Dec. mode selection.

- When enabled, select S curve Acc./Dec. mode; If invalid, select linear Acc./Dec. mode.
- Acc./Dec. method priority: Acc./Dec. method determined by terminal No.28 function > Acc./Dec. method set by F03.00.

29: Acc./Dec. prohibited.

- Maintains the motor at all speeds without any external signals (except stop command).
- It is invalid during Dec. stop.

30: Switch to normal operation mode.

- When valid, the frequency command (including multi-speed, simple PLC, process PID, wobble etc.) is forcibly switched to normal operation mode.

31: PLC shutdown status reset.

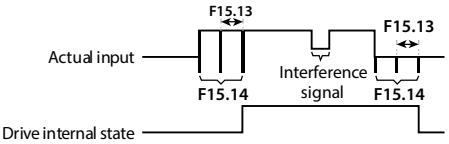
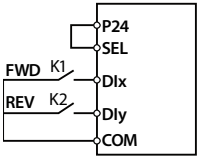
- When enabled, clear PLC running stage, running time, running frequency and other information of PLC stop memory, see group F06.

32: Process PID paused.

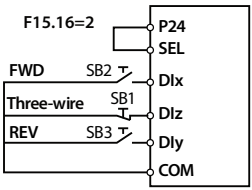
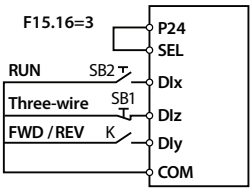
- When enabled, the process PID function is temporarily disabled and the drive maintains the current frequency output to continue running.

Ref. Code	Function Description	Setting Range [Default]
	33: Prohibition of process PID. • Used to realize the flexible switching between low-level operation and process PID operation. • When it is valid, the operation mode is switched to the low-level operation mode. • The operating modes are in order of priority: Jog operation > process PID operation > multi-speed operation > PLC operation > normal operation. 34: PID integral hold. • When active, the process PID stops accumulating points and the integrator maintains the current integral result unchanged. 35: PID integral clear. • Process PID integrator is cleared when it is valid. 36: Swing frequency input. • Swing frequency start mode selection is manual input (F07.01 unit = 1). • When in effect, enter the wobble frequency state. 37: Swing frequency state reset. • When wobbling function is selected (F07.00 = 1), closing this terminal will clear the wobble status information stored in the drive regardless of the automatic or manual mode (set by F07.01). 38: Stop DC brake input. • Use the control terminals to apply DC braking to the motor during the stoppage. Brake current is defined in F02.04. • This terminal is valid during decelerating and stopping, and DC braking will be performed on the motor immediately. After stopping, the DC braking will be stopped. 39,40: External interrupt normally open/normally closed contact input. • The drive immediately stops output when an external interrupt terminal signal is received while the drive is running. • After the external interrupt signal is canceled and the operating conditions are met, the drive starts flying fast. 41,42: Freewheel stop normally open/normally closed input. • After receiving the terminal command, the drive will terminate the output immediately and the load will stop freely according to the mechanical inertia. 43: Emergency stop. • The drive decelerates to stop after receiving the terminal command. F03.17 set the Dec. time. 44,45: External fault normally open/normally closed input. • The driver detects the fault signal of the external device through this terminal, and protects it according to the value set in F15.17. • The drive indicates an external device error after receiving an external device fault signal. • The fault signal is normally open or normally closed two input methods. 46: External reset (RST) input. • After a drive failure alarm, the terminal can be used to reset the fault. • The function is the same as the key reset function on the keypad. 47: Motor 1,2 switch. • When it is valid, it is possible to switch between two motor parameters. 48: Timer function input. • Input terminal that can be used for timer function. See F15.25, F15.26 for details. 49: The actual length is cleared input. • Can be used to fixed length control of the actual length of the zero input terminal. • See F19.26 - F19.34 for details.	

Ref. Code	Function Description	Setting Range [Default]
	50: Counter clear signal input. • Clears the built-in counter of the drive. • Used with function number 51 (counter trigger input). 51: Counter trigger signal input. • Built-in counter count pulse input port, power-down memory can be stored when the current count value. • The Max. pulse frequency: 200Hz. • See F15.37, F15.38. 52: Length count input (DI6 only). • Length input terminal in fixed length control. See F19.26 - F19.34 for details. 53: Pulse frequency input (DI6 only). • This function terminal receives the pulse signal as the frequency setting. • The relationship between the input signal pulse frequency and the set frequency, see group F05. 54: Pre-excitation input. 55: Zero servo instruction input. 56: Speed control/torque control switch. 57: Torque control torque direction switching. 58: Torque bias enabled. 59: Torque bias hold. 60: Position loop gain switching. 61: Position pulse input (DI6 only). 62 - 64: Position digital reference selection terminal 1 - 3. 65: Position deviation clear. 66: Spindle orientation starts. 67,68: Spindle stop position selection terminal 1/2. 69: Tension control mode and other mode switch. 85: Simple PLC suspends the operation instruction. • It is used to realize the pause control of the running PLC process. • When it is valid, keep running in current segment, PLC runs without timing; Continue counting after invalid. 86: Terminal stop DC braking. • After the drive receives the stop command, the drive will start DC braking if the stop mode is Dec. stop + DC braking (F02.13 = 2) and the running frequency is lower than the stop DC braking start frequency (F02.16). • Brake current is set by F02.04. • The braking time is longer for both the terminal function holding time and stopping DC braking time (F02.18).	
F15.12	**Terminal UP/DN Acc./Dec. rate**	**0.00 - 99.99 [1.00Hz/s]**
	Define the change rate of the set frequency by UP/DN terminal.	
F15.13	**Terminal detection interval time**	**0 - 2 [0]**
	0: 2ms. 1: 4ms. 2: 8ms.	

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>F15.14</td><td>Terminal detection filter times</td><td>0 - 10000 [2]</td></tr>
<tr><td></td><td colspan="2">The digital input terminal signal delay, confirm the processing to prevent DI terminal malfunction.
 
</td></tr>
<tr><td>F15.15</td><td>Terminal input positive and negative logic settings</td><td>000 - 0xFFF [000]</td></tr>
<tr><td></td><td colspan="2">Each bit (binary) represents a different physical channel, as shown in the following table:
• 0: Positive logic: When DI terminals are connected to corresponding common port, this logic is enabled. Otherwise the logic is disabled.
• 1: Negative logic: When DI terminals are connected to corresponding common port, this logic is disabled. Otherwise the logic is enabled.
<table>
<tr><th colspan="4">Hundred</th><th colspan="4">Ten</th><th colspan="4">Unit</th></tr>
<tr><td>Bit11</td><td>Bit10</td><td>Bit9</td><td>Bit8</td><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td>DI12</td><td>DI11</td><td>DI10</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: DI7 - DI12 is only valid when HD50-EIO is selected.</td></tr>
<tr><td>F15.16</td><td>Forward/reverse operation mode setting</td><td>0 - 3 [0]</td></tr>
<tr><td></td><td colspan="2">Define the four different ways in which external terminals control the operation of the drive.
• The input terminal DIx is defined as function No.2, indicated as "forward."
• The input terminal DIy is defined as function No.3, indicated as "invert".
• The input terminal DIz is defined as function No.4 and is indicated as "three-wire run control".
0: Two-line operation mode 1.
1: Two-wire operation mode 2.
• In the terminal control mode, when the drive is stopped when the stop command is generated by another source (or single-cycle stop of PLC, fixed-length stop or digital input terminal set to function 12, 41 - 45) even though terminal level is valid, even if the control terminal forward/reverse is still valid, it will not generate a run command.
• If the drive is to be operated again, the forward/reverse valid status must be triggered again.
 

<table>
<tr><th rowspan="2">K2</th><th rowspan="2">K1</th><th colspan="2">Run Command</th></tr>
<tr><th>F15.16=0</th><th>F15.16=1</th></tr>
<tr><td>0</td><td>0</td><td>Stop</td><td>Stop</td></tr>
<tr><td>1</td><td>0</td><td>Reverse</td><td>Stop</td></tr>
<tr><td>0</td><td>1</td><td>Forward</td><td>Forward</td></tr>
<tr><td>1</td><td>1</td><td>Stop</td><td>Reverse</td></tr>
</table></td></tr>
</table>

Ref. Code	Function Description	Setting Range [Default]
	2: Three-wire operation mode 1. • When SB2 and SB3 do not change, keep the current running direction. 3: Three-wire operation mode 2. • When SB2 changes from active to inactive, the drive operating status remains unchanged.  *SB1: Normally closed stop button* *SB2: Normally open forward button* *SB3: Normally open reverse button*  *K: Direction selection terminal (level on)* *K = 0 (forward) K = 1 (reverse)* *SB1: Normally closed stop button* *SB2: Normally open run button*	
F15.17	**Terminal external device fault action selection**	**0 - 3 [0]**
	When a terminal external device fault occurs, the protection action selection. 0: Freewheel stop. 1: Emergency stop. 2: Decelerate stop. 3: Continue to run.	
F15.18	**DO1 terminal function**	**0 - 41 [2]**
F15.19	**DO2 terminal function**	**0 - 41 [0]**
F15.20	**RLY1 relay function**	**0 - 41 [31]**
F15.21	**RLY2 relay function**	**0 - 41 [0]**
F15.22	**RLY3 relay function**	**0 - 41 [0]**
F15.23	**RLY4 relay function**	**0 - 41 [0]**
	Note: F15.21 - F15.23 is only valid when HD50-EIO is optional. 0: Reserved. The output terminal is in a non-functional state and no action is taken. 1: The drive is ready. • When the driver is powered on and the driver is enabled (when input 1 is selected as input terminal DI) and no fault occurs, output can operate normally. 2: The drive is running. • The drive is running, the output indicates the signal. 3: The drive is running forward. • The drive is running forward indicating signal. 4: Drive reversing operation. • Drive reversing operation indication signal. 5: Drive DC brake. • Drive DC brake indication signal. 6: Drive is in zero-frequency status. • In the zero-frequency range the drive's output frequency (including in stop status) outputs the indication signal. • Refer to parameters F15.28 and F15.29. 7: Drive is in zero-frequency running. • In the zero-frequency range the drive's output frequency outputs the indicating signal. • Refer to parameters F15.28 and F15.29.	

Ref. Code	Function Description	Setting Range [Default]

8: Torque limit action (speed control).

9,10: Frequency level detection signal 1/2 (FDT1/FDT2).

- See F15.31 - F15.35.

11: Frequency arrival (FAR).

- When the output frequency of the driver is within the positive and negative detection width of the set frequency, the output indicates the signal.
- The detection width is set by F15.27.

12: Upper limit of frequency.

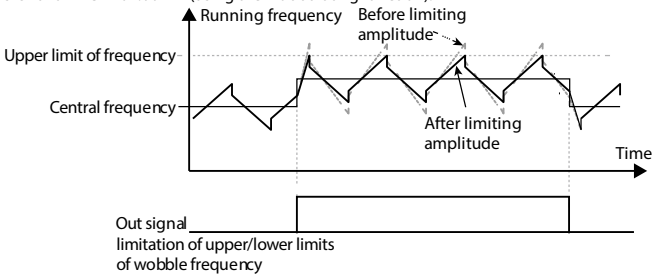
- When set frequency ≥ upper limit frequency, output indicates signal.

13: Frequency lower limit.

- When the setting frequency ≤ lower limit frequency, the output indicates the signal.

14: Swing frequency limit.

- If the range of wobble frequency calculated from the center frequency exceeds the upper limit frequency or below the lower limit frequency (F00.09), the output indicator will be displayed as shown below.
- This is valid when F07.00 = 1 (using the wobbulating function).



15: Simple PLC running indication.

- When the drive is in simple PLC running status, output indicates signal.

16: Simple PLC operation pause instruction.

- In simple PLC operation, external terminal pause PLC operation, output instruction signal.

17: Simple PLC cycle complete instructions.

- Simple PLC completed a running cycle, the output indicates the signal.

18: Simple PLC stage operation complete instructions.

- Simple PLC current stage operation is completed, the output indicates the signal.

19: Simple PLC operation completion indication.

- After simple PLC operation is completed, output indicates signal.

Note: The function of output signal of No.17 - 19 is a single pulse signal, the width is 500ms.

20: Data from SCI communication output.

- SCI communication directly controls the output signal from the open collector output terminal or relay.

21: Set the running time to arrive.

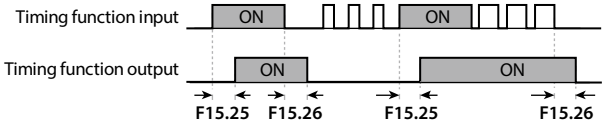
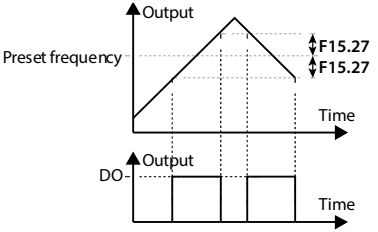
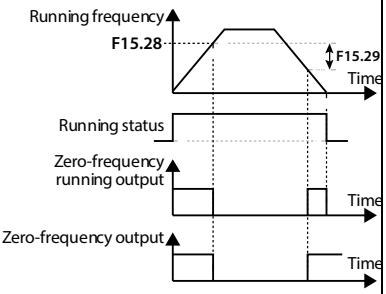
- When the drive is powered on this time, the accumulated running time reaches the set running time (F15.36), the output indicates the signal.

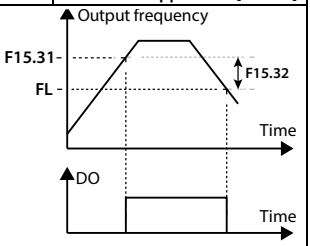
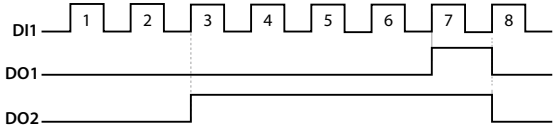
Note: Function 21 output signal for a single pulse signal, the width of 500ms.

22: Timing function output.

- The terminal of this function is selected as the output terminal of the timing function.
- See F15.25, F15.26.

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td></td><td colspan="2">23: Set count value reached.
23: Set count value reached.
24: The specified count value arrived.
• See F15.37, F15.38.
25: Set the length to reach.
• The fixed length control, the actual length reaches the set length output indicator.
26: Motor 1,2 indication.
• Signal according to the currently selected motor output.
• This signal is not valid when the drive is controlling motor 1; The output indicator is when the drive is controlling motor 2.
29: Undervoltage lockout is stopped.
• When the DC link voltage is below the undervoltage limit, the output indicates the signal.
• The LCD on the keypad shows "Lu".
30: Overload detection.
• The drive output current exceeds F20.01 (overload pre-alarm detection level), and the time is greater than F20.02 (overload pre-alarm detection time), output indicator signal.
31: Drive failure.
• If the drive fails, the output indicates the signal.
32: External fault.
• The output signal is indicated when the drive detects the external device fault signal through the terminal.
33: During a drive fault auto-reset.
• The output signal is indicated when the drive is in automatic fault reset.
34: Three phase power supply input forward.
• Driver three-phase input power forward, output indicating signal.
• Power forward: L1 (R) lead L2 (S) lead L3 (T).
35: Speed limit operation (torque control).
• In the torque control mode, when the speed limit is reached, the output indicates the signal.
36: Zero servo positioning completed.
37: Encoder phase A leads phase B.
• Only effective if encoder expansion card is installed.
38: High-speed pulse output (DO2 only).
• DO2 is used as high-speed pulse output. See F16.21.
39: Positioning completed.
40: Positioning close.
41: The position deviation is too large.</td></tr>
<tr><td>F15.24</td><td>Output terminal positive and negative logic settings</td><td>00 - 0x3F [00]</td></tr>
<tr><td></td><td colspan="2">Each bit (binary) represents a different physical channel, as shown in the following table:
• 0: Positive logic: When output terminals are connected to corresponding common port, this logic is enabled. Otherwise the logic is disabled.
• 1: Negative logic: When output terminals are connected to corresponding common port, this logic is disabled. Otherwise the logic is enabled.
<table>
<tr><th colspan="4">Ten</th><th colspan="4">Unit</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: RLY2 - RLY4 is only valid with optional HD50-EIO expansion card.</td></tr>
</table>

Ref. Code	Function Description	Setting Range [Default]
F15.25	**Timing function ON side delay time**	0.00 - 300.00 [0.00s]
F15.26	**Timing function OFF side delay time**	
	F15.25 and F15.26 are used to set the delay time (dead band) on the output ON side and OFF side of the timer function relative to the timer function input. • When the ON time of the timer function input is longer than the setting of F15.25, the timer function output is ON. • The timer function output turns off when the OFF time of the timer function input is delayed by the time set by F15.26. Timing function action diagram is as follows: 	
F15.27	**Frequency arrival (FAR) detection width**	0.00 - 100.00 [2.50Hz]
	When the output frequency of the driver is within the positive and negative detection width of the set frequency, the output pulse signal is shown on the right. 	
F15.28	**Zero-frequency signal detection value**	0.00 - upper limit [0.00Hz]
F15.29	**Zero-frequency return deviation**	
	F15.28 and F15.29 define the zero-frequency output control function, as shown on the right. 	
F15.30	**FDT1 detection method**	0,1 [0]
	0: Detected by the given frequency. 1: Press the output frequency detection.	

Ref. Code	Function Description	Setting Range [Default]
F15.31	**FDT1 level**	**0.00 - upper limit [50.00Hz]**
F15.32	**FDT1 lag**	**0.00 - upper limit [1.00Hz]**
	When the frequency selected by F15.30 exceeds a certain set frequency (F15.31), the output signal will be output until the output frequency drops below the FDT1 hysteresis frequency (F15.31 - F15.32). 	
F15.33	**FDT2 detection method**	**0,1 [0]**
	0: Detected by the given frequency. 1: Press the output frequency detection.	
F15.34	**FDT2 level**	**0.00 - upper limit [50.00Hz]**
F15.35	**FDT2 lag**	**0.00 - upper limit [1.00Hz]**
	Refer to F15.31, F15.32.	
F15.36	**Set running time**	**0 - 65535 [0h]**
	When the current running time reaches the running time set by F15.36, a valid flag of 500ms will be generated inside the driver. Output terminal/relay selection No.21 function (set running time arrival), the driver controls the correct status output according to the internal flag.	
F15.37	**Set the count value reaches the given**	**F15.38 - 9999 [0]**
F15.38	**The specified count value reaches the given**	**0 - F15.37 [0]**
	F15.37 defines DI terminal (set as function No.51). When the input pulse number, DO terminal or relay output an indication signal, while the external counter is also automatically cleared. F15.38 defines how many pulses are input to the DI terminal (set to function No.51), DO terminal or relay outputs an indication signal until the setting count value is reached. **For example:** F15.37 = 7, F15.38 = 3, DO1 set to the counter arrival (F15.18 = 23), DO2 set to the specified counter arrival (F15.19 = 24), DI1 set to counter trigger signal input (F15.00 = 51). As the picture shows: • When DI1 input the third pulse, DO2 output an indication signal until the set count reaches 7. • When DI1 input is the 7th pulse, DO1 output is an indication signal. When DI1 input is the 8th pulse, the DO1 output signal returns to low level. 	
F15.43	**Terminal output delay**	**0.0 - 100.0 [0.0s]**

6

6.2.17 F16: Analogue I/O Terminal Parameters

Ref. Code	Function Description	Setting Range [Default]
F16.01	AI1 terminal function	0 - 15 [2]
F16.02	AI2 terminal function	0 - 15 [5]
F16.03	AI3 terminal function	0 - 15 [0]
F16.04	AI4 terminal function	0 - 15 [0]

Note: F16.04 is only valid when HD50-EIO is optional.

0: Reserved.

1: Upper limit frequency to set the channel.

- When F00.07 = 1 (AI setting), upper limit frequency will be set by input voltage corresponding to the analogue channel whose function is selected.

2: Frequency setting channel.

- When F00.10 = 3 (AI setting), the setting frequency will be set by the input volume value corresponding to the analogue channel whose function is selected.

3: Auxiliary frequency setting.

- When F19.00 = 4 (AI setting), the auxiliary frequency setting will be set by the input volume value corresponding to the analogue channel whose function is selected.

4: Process PID reference.

- When F04.01 = 1 (AI setting), the process PID reference will be set by input voltage corresponding to the analogue channel whose function is selected.

5: Process PID feedback.

- When F04.02 = 0 (AI setting), the process PID feedback will be set by input voltage corresponding to the analogue channel whose function is selected.

6: Process PID regulation upper limit.

- When F04.11 = 1 (AI setting), the upper limit of the process PID adjustment will be set by the corresponding input voltage value of the analogue channel whose function is selected.

7: Process PID regulation lower limit.

- When F04.12 = 1 (AI setting), the lower limit of the process PID adjustment will be set by the corresponding input voltage value of the analogue channel whose function is selected.

8: Motor overheat signal input (AI4 only).

- The wiring see section 8.1, thermistors see F20.06, F20.07.
- Only valid with optional HD50-EIO expansion card.

9: Motor 1 motor torque limit.

- When F10.09 = 1 (AI setting), the motor 1 motor torque limit is set by the input volume value corresponding to the analogue channel whose function is selected.

10: Motor 1 regenerative torque limit.

- When F10.10 = 1 (AI setting), motor 1 regenerative torque limit is set by input voltage value corresponding to the analogue channel whose function is selected.

11: Motor 2 electric torque limit.

12: Motor 2 regenerative torque limit.

13: Torque command given.

- When F21.00 = 1 (AI setting), the set torque will be set by input voltage corresponding to the analogue channel whose function is selected.

14: Torque bias given.

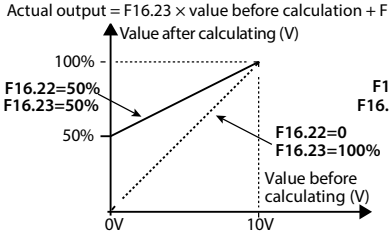
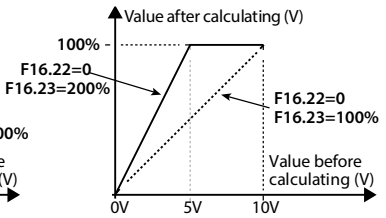
- When F21.07 = 1 (AI setting), the torque offset will be set by the input volume value corresponding to the analogue channel whose function is selected.

15: Torque control upper limit frequency.

- When F21.04 = 2 (AI setting), the speed limit is set by input voltage corresponding to the analogue channel whose function is selected.

Ref. Code	Function Description	Setting Range [Default]
F16.05	**AI1 offset**	**-100.0 - +100.0 [0.0%]**
F16.08	**AI2 offset**	
F16.11	**AI3 offset**	
F16.14	**AI4 offset**	
F16.06	**AI1 gain**	**-10.0 - +10.0 [1.0]**
F16.09	**AI2 gain**	
F16.12	**AI3 gain**	
F16.15	**AI4 gain**	
F16.07	**AI1 filter time**	**0.01 - 10.00 [0.05s]**
F16.10	**AI2 filter time**	
F16.13	**AI3 filter time**	
F16.16	**AI4 filter time**	
	Note: F16.14 - F16.16 is only valid when HD50-EIO card is optional. When AI1 - AI4 input is selected as the open-loop frequency setting channel, the amount of analogue after the filtering, offset and gain processing are calculated, as shown below. • The relationship between the AI and the set frequency is set by F05. Analogue actual value → Analogue input filtering → Analogue input gain / Analogue input bias → Analogue value after calculating • Calculation formula: Calculated amount = AI gain × the value before adjustment + AI offset. • Gain is F16.06, F16.09, F16.12, F16.15; Offset is F16.05, F16.08, F16.11, F16.14. • F16.07, F16.10, F16.13 and F16.16 define the AI filter time, which filters the input signal. • The longer the filter time is, the stronger the anti-disturbance capability is, but the response is slower. • The shorter the filter time is, the longer the response time is fast, but immunity to weakening.	
F16.17	**Max. input pulse frequency**	**0.0 - 50.0 [10.0kHz]**
	Set the Max. input pulse frequency when DI6 terminal is pulse input.	
F16.18	**Input pulse filter time**	**0 - 500 [10ms]**
	The input pulse frequency filtering process to filter out small fluctuations in pulse frequency.	
F16.19	**AO1 terminal function**	**0 - 19 [1]**
F16.20	**AO2 terminal function**	**0 - 19 [0]**
F16.21	**High-speed pulse output function**	**0 - 19 [0]**
	0: Reserved. 1: Output frequency (0 –Max. output frequency). 2: Given frequency (0 - Max. output frequency). 3: Motor speed (0 - Max. output frequency corresponding speed). 4: Output current (0 - 2 times the drive rated current). 5: Output current (0 - 2 times the motor rated current). 6: Torque command (0 - 1 times motor rated torque). 7: Flux command (0 - 1 times motor rated current). 10: Output torque (0 - 3 times rated motor torque). 11: Output voltage (0 - 1.2 times drive rated voltage). 12: DC bus voltage (0 - 2.2 times drive rated voltage). 13: Output power (0 - 2 times the motor 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 - +1 times the Max. output frequency). 19: Given frequency (-1 - +1 times the Max. output frequency).	

6

Ref. Code	Function Description	Setting Range [Default]
F16.22	**AO1 offset**	**-100.0 - +100.0 [0.0%]**
F16.23	**AO1 gain**	**0.0 - 200.0 [100.0%]**
	If you need to adjust the proportion of AO1 output relationship, you can achieve output gain. • The amount of analogue output gain and offset the formula for calculating the amount of analogues: Actual output = F16.23 × value before calculation + F16.22  	
F16.24	**AO2 offset**	**-100.0 - +100.0 [0.0%]**
F16.25	**AO2 gain**	**0.0 - 200.0 [100.0%]**
	Refer to F16.22, F16.23.	
F16.26	**DO2 Max. output pulse frequency**	**0.1 - 50.0 [10.0kHz]**
	Defines the Max. frequency that the DO2 terminal allows output.	

6.2.18 F17: SCI Communication Parameters

Ref. Code	Function Description	Setting Range [Default]
F17.00	**Data format**	**0 - 6 [0]**
	0: 1-8-2 format, no parity, RTU. 1: 1-8-1 format, even parity, RTU. 2: 1-8-1 format, odd parity, RTU. 3: 1-7-2 format, no parity, ASCII. 4: 1-7-1 format, even parity, ASCII. 5: 1-7-1 format, odd parity, ASCII. 6: 1-8-1 format, no parity, RTU.	
F17.01	**Baud rate selection**	**0 - 8 [3]**
	0: 1200bps. 1: 2400bps. 2: 4800bps. 3: 9600bps. 4: 19200bps. 5: 38400bps. 6: 57600bps. 7: 76800bps. 8: 115200bps.	
F17.02	**Local address**	**0 - 247 [2]**
	F17.02 = 0, it indicates as broadcast address.	
F17.03	**Local response time**	**0 - 1000 [0ms]**
F17.04	**Communication timeout detection time**	**0.0 - 1000.0 [0.0s]**
	The drive will report E0028 fault (SCI communication time-out) when there is no data communication and the duration time exceeds F17.04 setting. • F17.04 = 0, the drive does not detect the communication timeout.	
F17.05	**Communication error detection time**	**0.0 - 1000.0 [0.0s]**
	Drive will report E0029 fault (SCI communication error) when communication error occurs and the duration time exceeds F17.05 setting. • When F17.05 = 0, the drive does not detect a communication error.	
F17.06	**Communication overtime action choice**	**0 - 3 [3]**
F17.07	**Communication error action selection**	**0 - 3 [3]**
F17.08	**Communication external device fault action selection**	**0 - 3 [1]**
	F17.06 defines the protection action when communication timeout detection. F17.07 defines the protection action when communication error is detected. F17.08 defines the protection action when external communication fault occurs in communication command setting mode. 0: Freewheel stop. 1: Emergency stop. 2: Decelerate stop. 3: Continue to run.	
F17.09	**Communication write function parameters save EEPROM mode selection**	**0,1 [1]**
	0: Communication write function parameter does not save EEPROM. 1: Communication write function parameters saved EEPROM. *Note: F17.09 is valid only when the function parameters are written by communication and the function code is 0x06 or 0x10. See Appendix C for details.*	
F17.10	**Master and slave options**	**0,1 [0]**
	0: Slave. The status parameter selected by F17.11 is sent regularly under master status. 1: Host.	
F17.11	**Host write slave address selection**	**0 - 2 [0]**
	0: Operating frequency. 1: Auxiliary frequency. 2: Current line speed.	
F17.12	**Slave calculate the factor**	**0.00 - 600.00 [100.00%]**
	Data received by the slave = F17.12 × the master sends data.	

6.2.19 F18: Shows the Control Parameters

Ref. Code	Function Description	Setting Range [Default]
F18.00	**Language selection**	0,1 [0]
	Defines the language displayed on the LCD operator keypad. 0: Chinese. 1: English.	
F18.01	**Keypad LCD display contrast**	1 - 10 [5]
F18.02	**Running display para. 1 setting**	0 - 306 [8]
F18.03	**Running display para. 2 setting**	0 - 306 [7]
F18.04	**Running display para. 3 setting**	0 - 306 [9]
F18.05	**Running display para. 4 setting**	0 - 306 [13]
F18.06	**Running display para. 5 setting**	0 - 306 [14]
F18.07	**Running display para. 6 setting**	0 - 306 [18]
F18.08	**Stop display para. 1 setting**	0 - 306 [7]
F18.09	**Stop display para. 2 setting**	0 - 306 [18]
F18.10	**Stop display para. 3 setting**	0 - 306 [20]
F18.11	**Stop display para. 4 setting**	0 - 306 [22]
F18.12	**Stop display para. 5 setting**	0 - 306 [43]
F18.13	**Stop display para. 6 setting**	0 - 306 [44]
	The definition of the keypad display. Can be displayed cyclically through the key ▶▶ of the operator keypad. 0: Reserved. 1: Drive rated current. 2: Drive expansion function. • 0: No expansion function. • 2: Tension control. 3: Drive status. • See parameter D00.10 for details. 4: Main setting frequency channel. 5: Main setting frequency. 6: Auxiliary setting frequency. 7: Set the frequency. 8: Given frequency (after Acc./Dec.). 9: Output frequency. 10: Set the speed. 11: Running speed. 12: Three phase power supply input phase sequence. • 0: Positive sequence, L1 (R) leading L2 (S) leading L3 (T). • 1: Negative Sequence, L1 (R) Leading L3 (T) Leading L2 (S). 13: Output voltage. 14: Output current. 15: Torque reference. 16: Output torque. 17: Output power. 18: DC bus voltage. 20, 22, 24, 26: AI1 - AI4 input voltage. 21, 23, 25, 27: AI1 - AI4 input voltage (after processing). 28: DI6 terminal pulse input frequency. 29: AO1 output. 30: AO2 output. 31: High-speed output pulse frequency. 32: Radiator temperature. 33: Set the line speed. 34: Given line speed. 37: Process PID reference. 38: Process PID feedback. 39: Process PID error. 40: Process PID integral value. 41: Process PID output. 42: External count value. 43: Input terminal status. • Bit0 - Bit11 corresponds to DI1 - DI12. 44: Output terminal status. • Bit0 - Bit5 corresponds to DO1, DO2, RLY1 - RLY4. 45: Modbus communication status. 46: Actual length. 47: Accumulated length. 48: Total power-up time (hours). 49: Running time total (hours). 100: Tension set (after calculation). 101: Tension balance position feedback. 102: Current curling radius. 103: Current line speed. 104: Tension balance position setting. 105: Tension setting (before calculation). 300: Servo control position error. 301,302: Carry instruction refers to high/low. 303,304: The current carry amount is high/low. 305: Spindle orientation stop position. 306: Current encoder position.	

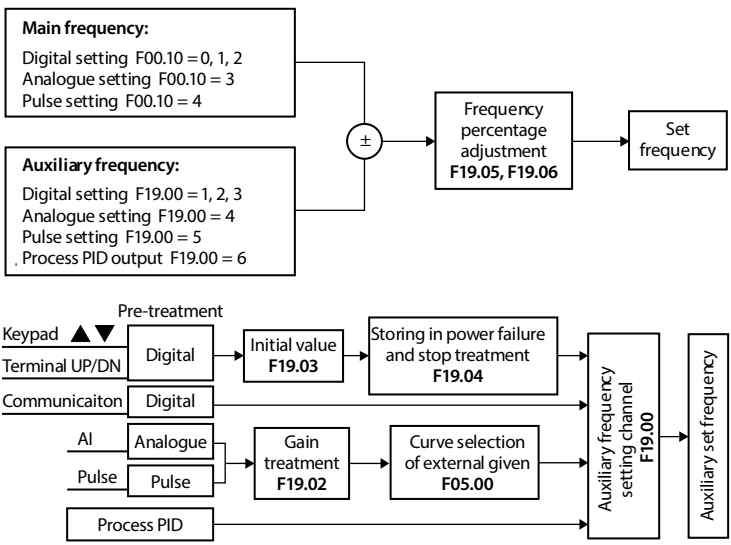
Ref. Code	Function Description	Setting Range [Default]
F18.15	Max. line speed	0 - 65535 [1000]
F18.16	Line speed display accuracy	0 - 3 [0]
	0: Integer. 1: 1 decimal place. 2: 2 decimal places. 3: 3 decimal places.	

6.2.20 F19: Enhanced Function Parameters

Auxiliary Frequency Setting Channel (F19.00 - F19.06)

The final setting frequency of HD50 can be composed of main setting frequency and auxiliary setting frequency.

F19.00 is used to define the auxiliary frequency setting channel. When the auxiliary frequency setting channel is the same as the main frequency setting channel (except the analog quantity setting), the auxiliary setting channel is invalid.



Ref. Code	Function Description	Setting Range [Default]
F19.00	**Auxiliary frequency setting channel selection**	**0 - 6 [0]**
	Define the auxiliary frequency setting channel. • Set 1 and 2, the initial value is set by F19.03, and the modified frequency can be saved to F19.03 according to F19.04 setting. • Set 4 and 5, set by the actual analogue input, see F05.00 for frequency-dependent characteristic curve selection. • Set 6, the auxiliary frequency setting is set according to the relationship between PID setting and feedback. • See the picture above. 0: No auxiliary channel. 1: Keypad setting. Press the key ▲ and ▼ on the keypad to adjust. 2: Terminal setting. Adjust with terminal UP/DN. 3: SCI communication setting. 4: Analogue setting. 5: Terminal pulse setting. 6: PID output setting.	
F19.01	**Main and auxiliary setting operation**	**0 - 5 [0]**
	Define the relationship between the final set frequency and the primary and secondary frequencies. 0: Main setting + auxiliary setting. 1: Main setting - auxiliary setting. 2: MAX (main setting, auxiliary setting). 3: MIN (main setting, auxiliary setting). 4: Main setting + auxiliary setting × main setting/Max. output frequency. 5: Main setting - auxiliary setting × main setting/Max. output frequency.	
F19.02	**Auxiliary setting coefficient**	**0.00 - 9.99 [1.00]**
	First use F19.02 to gain calculation, and then calculate the auxiliary frequency according to the frequency characteristic curve defined by F05 group. • F19.00 = 4 and 5 are valid.	
F19.03	**Digital auxiliary frequency initial value**	**0.00 - upper limit [0.00Hz]**
	It is valid only for F19.00 = 1 and 2, and is the initial value set for the auxiliary frequency in these two modes.	
F19.04	**Digital auxiliary frequency control selection**	**00 - 11 [00]**
	Valid only for F19.00 = 1, 2. **Unit: Power-down storage options** • 0: Auxiliary frequency is not stored. • 1: Stores auxiliary frequency to F19.03. **Ten: Stop frequency processing** • 0: Maintain auxiliary frequency after stop. • 1: Auxiliary frequency returns to F19.03 after stop.	
F19.05	**Set the frequency ratio adjustment selection**	**0 - 2 [1]**
F19.06	**Set the frequency scaling factor**	**0.0 - 200.0 [100.0%]**
	F19.05, F19.06 define the adjustment method of the set frequency (the frequency after the main set frequency and auxiliary set frequency are calculated, referred to as the synthesized frequency). 0: Do not adjust. • Set frequency = composite frequency. 1: Relative Max. output frequency (F00.06) adjustment. • Setting frequency = composite frequency + F00.06 × (F19.06 - 100%). 2: Relative to the current frequency adjustment. • Setting frequency = composite frequency × F19.06.	

Fan Control (F19.07 - F19.08)

Ref. Code	Function Description	Setting Range [Default]
F19.07	**Cooling fan control selection**	**0 - 2 [0]**
F19.08	**Cooling fan control delay time**	**0.0 - 600.0 [30.0s]**
	Defines how the cooling fan is controlled, and if there is over-temperature protection, the fan is running. 0: Stop automatically. • If the fan is running while the drive is running, the fan will automatically stop if the overtemperature protection does not occur after the drive has stopped down for the time set in F19.08. 1: Stop immediately. • The fan is running while the drive is running, and the fan stops immediately after stop. 2: The fan is running during power-on. • The fan is running after the drive is powered on.	

Droop Control (F19.09)

Suitable for driving more than one driver when multiple motors drag the same load, this function can make multiple drivers achieve even power distribution.

Ref. Code	Function Description	Setting Range [Default]
F19.09	**Droop control amount**	**0.00 - 10.00 [0.00Hz]**
	When a drive load is heavy, the drive will automatically set the parameters according to this function automatically reduce the output frequency, in order to remove part of the load.	

Zero Frequency Operation (F19.10 - F19.11)

See below for details.

Fcmd 1 = Final set frequency 1

Fcmd 2 = Final setting frequency 2

Fstart = Start DWELL frequency (F02.02)

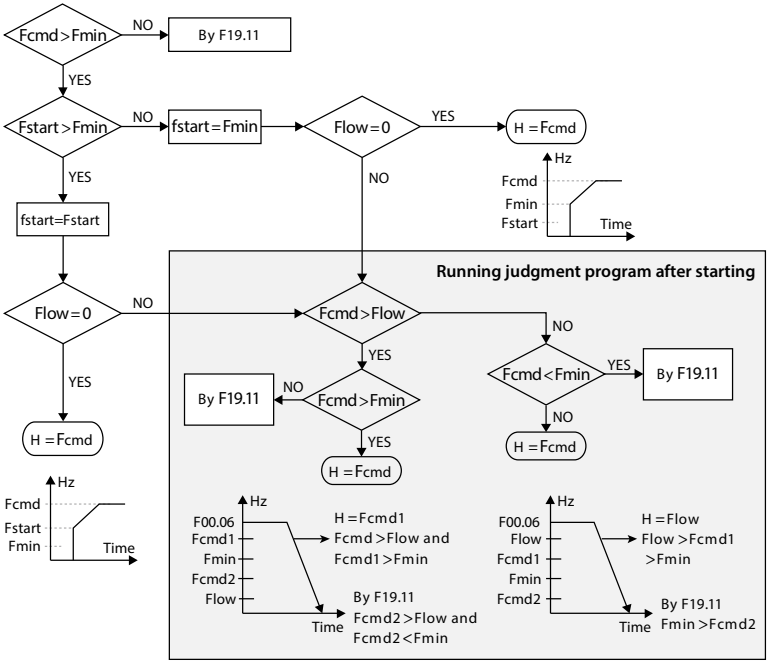
fstart = Actual start DWELL frequency

Flow = Lower limit frequency (F00.09)

H = Target frequency

Fmin = Zero frequency threshold (F19.10)

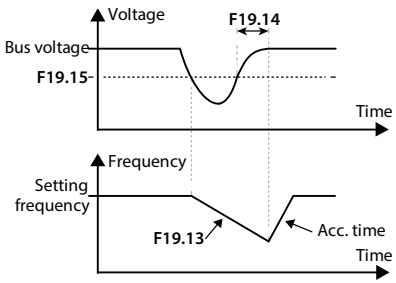
Start Instant Judgment Program



Ref. Code	Function Description	Setting Range [Default]
F19.10	Zero-frequency threshold	0.00 - upper limit [1.00Hz]
F19.11	Set the frequency below the zero-frequency threshold action selection	0 - 3 [0]
	0: Run according to the frequency command. 1: Maintain shutdown, drive has no output. 2: Press zero frequency threshold to run. 3: Run at zero frequency.	

Instantaneous Loss of Power without Stopping Function (F19.12 - F19.15)

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

Ref. Code	Function Description	Setting Range [Default]
F19.12	**Instantaneous loss of power non-stop function selection**	**0,1 [0]**
	0: Disable instantaneous stop non-stop. 1: Enable instantaneous stop non-stop. Make low voltage compensation. • When the bus voltage is lower than F19.15, the driver decreases the operating frequency according to the time set by F19.13. • When the bus voltage rises over F19.15 for a period of time (F19.14), the driver resumes the set frequency operation; Otherwise, the drive will continue to decrease the operating frequency. 	
F19.13	**Instant stop function Dec. time**	**0.1 - 6000.0 [5.0s]**
	Setting is too large, load feedback energy is small, can not be effective compensation for low voltage; Too small, the load feedback energy is large, can cause overvoltage protection.	
F19.14	**Instantaneous loss of power does not stop voltage recovery time to judge**	**0.00 - 10.00 [0.10s]**
F19.15	**Instantaneous loss of power to determine the action of non-stop voltage**	**0 - 1200V [380V drive: 460V] [660V drive: 747V]**

Power Failure Restart Function (F19.16 - F19.17)

This function enables the driver to wait for the drive to start running automatically and before it runs automatically under the terminal running command channel when the power is turned off during the operation of the driver.

Ref. Code	Function Description	Setting Range [Default]
F19.16	**Power failure restart function selection**	**0,1 [0]**
	0: No power failure restart. 1: Enable power failure and restart. • When the drive is in terminal two-wire control mode and suddenly power failure occurs during operation, if the operation terminal is still enabled after power on again, after waiting for the time defined by F19.17, The drive will start running motor speed tracking.	
F19.17	**Power failure restart time**	**0.00 - 10.00 [2.00s]**

Overvoltage Stalling Function (F19.18 - F19.19)

During the operation of the drive, due to the load, the DC bus voltage of the drive may rise and the overvoltage protection may occur. The increase of the DC bus voltage of the drive usually occurs during the Dec. of the drive and sudden load dump.

Ref. Code	Function Description	Setting Range [Default]
F19.18	**Overvoltage stalling options**	**0,1 [1]**
	0: Overvoltage stalling is forbidden. • In this case, it is advisable to install the energy-dissipating brake unit and the braking resistor. 1: Overvoltage stalling allowed. • During the Dec. of the drive, the detected bus voltage is compared with F19.19. • If the detected bus voltage exceeds F19.19, the output frequency of the driver will stop decreasing and be detected again. If the bus voltage is lower than F19.19, continue to decelerate. *Note: After the overvoltage stall state is maintained for more than 1 minute, the drive will report E0007 fault (overvoltage stall) and stop the output at the same time.*	
F19.19	**Overvoltage stall point**	**0 - 1200V [380V drive: 740V] [660V drive: 1150V]**
	Stall point is low, should be properly extended Dec. time.	

Automatic Current Limiting Action Function (F19.20 - F19.22)

Through the real-time control of the load current, it automatically limits the automatic current-limit level (F19.21) not to exceed the set current limit to prevent the trip caused by current overshoot. For some load cases with large inertia or heavy load, function is especially suitable.

Automatic current limiting, the output frequency of the driver may vary, so the request of constant speed output frequency when the operation is more stable occasions, should not use the automatic current limiting function.

Ref. Code	Function Description	Setting Range [Default]
F19.20	**Automatic current limiting action selection**	**0 - 2 [1]**
	0: Invalid. 1: Acc. and Dec. effective, constant speed is invalid. 2: Acc., Dec. and constant speed are valid. • When automatic current limiting is enabled, if the current limit setting is low, it may affect the drive overload capability.	
F19.21	**Automatic current limit level**	**20.0 - 200.0 [150.0%]**
	The current threshold for automatic current-limit actions is defined as a percentage of the drive's rated current.	
F19.22	**Dec. time during automatic current limiting**	**0.0 - 6000.0 [15kW and below drive: 10.0s] [18.5 - 55kW drive: 30.0s] [75kW and above drive: 60.0s]**
	Defines the rate at which the output frequency is adjusted for automatic current-limiting actions. • Setting is too large, it is not easy to get rid of the automatic current limiting status and may eventually lead to overload failure. • Setting is too small, the degree of frequency adjustment is aggravated. The driver may be in a state of generating electricity for a long time, resulting in overvoltage protection. • F19.22 = 0, the current limit is not decelerated.	

Terminal Detection (F19.23)

Ref. Code	Function Description	Setting Range [Default]
F19.23	**Power-on instantaneous terminal detection**	**0,1 [0]**
	0: Rising edge is valid. • For many application sites, it is not allowed to operate automatically after power-on to prevent the device from being damaged and personal safety. In these occasions, it is necessary to initialize the drive after the power is turned on and ready for operation, the given terminal run command initiates the drive operation. 1: Level effective. • In some applications, personal safety and equipment safety have been ensured, and in order to increase the degree of automation and efficiency of the equipment, the drive needs to be powered up immediately, in which case the drive will run as soon as the terminal run command is given, regardless of the command given before the drive is powered on, or given after power-on.	

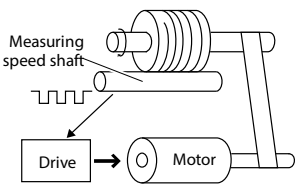
Brake Unit (F19.24 - F19.25)

Ref. Code	Function Description		Setting Range [Default]
F19.24	**Braking unit action voltage**	**380V drive:**	**630 - 750 [720V]**
		660V drive:	**850 - 1200 [1130V]**
	Note: Brake is only valid when drive is running.		
F19.25	**Braking unit operation enabled**		**0,1 [0]**
	0: Braking unit active. 1: Braking unit is invalid. *Note: Valid only with built-in brake unit.*		

Fixed-length Arrival Stop Function (F19.26 - F19.34)

This group of functions is used to achieve fixed-length shutdown function. As shown on the right:

The driver receives the counting pulses from the DI terminal (function No.52) 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 = calculated length × F19.28 ÷ F19.29 ÷ 100

Calculated length = number of counting pulses ÷ F19.31 × F19.30 × π

When F19.27 ≥ F19.26, the drive will automatically send a stop command to stop machine, and then reset or modify F19.27 before running again F19.27 < F19.26, otherwise it will not start.

Ref. Code	Function Description	Setting Range [Default]
F19.26	**Set the length**	**0 - 65535 [0m]**
F19.27	**Actual length**	**0 - 65535 [0m]**
F19.28	**Length ratio**	**0.001 - 30.000 [1.000]**
F19.29	**Length correction factor**	**0.001 - 1.000 [1.000]**
F19.30	**Measuring shaft diameter**	**1.00 - 100.00 [10.00cm]**

Ref. Code	Function Description	Setting Range [Default]
F19.31	**Axis per pulse**	**1 - 9999 [1]**
F19.32	**The length reaches the output function selection**	**0,1 [0]**
	0: Output level signal. 1: Output 500ms pulse.	
F19.33	**Processing of length arrival**	**0,1 [0]**
F19.34	**Downtime record length processing**	**0,1 [0]**
	0: Automatically cleared. 1: Stay the same.	

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

Ref. Code	Function Description	Setting Range [Default]
F19.35	**Auxiliary PID output limit**	**0.0 - 100.0 [100.0%]**
	When the auxiliary frequency is selected as PID, PID output is set by F19.35 × master as the PID regulation upper limit.	
F19.36	**Auxiliary PID output limits rising**	**0.0 - 100.0 [0.0%]**
	Auxiliary PID output limited = output limited by F19.35 + F19.36 × F00.06.	

6.2.21 F20: Fault Protection Parameter

Overload Fault (F20.00 - F20.02)

Ref. Code	Function Description	Setting Range [Default]
F20.00	**Overload pre-alarm detection options**	**00000 - 11111 [00000]**
	Unit: Overload pre-alarm detection options • 0: Detected continuously during operation. • 1: Detection at constant speed operation only. **Ten: Overload pre-alarm action options** • 0: No alarm and continue running when overload detection is enabled. • 1: Alarm, stop when overload detection is enabled. **Hundred: Overload pre-alarm detection amount selection** • 0: Relative to the motor rated current (alarms: motor overload "E0019"). • 1: Relative to drive rated current (alarm: drive overload "E0017"). **Thousand: Motor type selection** • 0: Normal motor. Since the heat dissipation of the ordinary motor deteriorates at low speed, the driver automatically adjusts the motor overload protection time appropriately. • 1: Variable frequency motor. The motor for frequency conversion adopts forced air cooling, the heat dissipation is not affected by the speed, and the driver does not adjust the motor overload protection time. **Ten thousand: Overload protection choice** • 0: Enabled. • 1: Shield.	
F20.01	**Overload pre-alarm detection level**	**20.0 - 200.0 [150.0%]**
	The current threshold at which an overload pre-alarm action is defined. The setpoint is the percentage relative to the motor/drive rated current.	
F20.02	**Overload pre-alarm detection time**	**0.0 - 60.0 [5.0s]**
	The drive will indicate E0017 fault (drive overload) or E0019 fault (motor overload) when drive output current is greater than the overload pre-alarm detection level (F20.01) for longer than the overload pre-alarm detection time (F20.02).	

Driver Output Error Detection (F20.03 - F20.05)

Ref. Code	Function Description	Setting Range [Default]
F20.03	**Driver output load detection action selection**	**0 - 4 [0]**
	0: Invalid, do not detect the drive output load. 1: Always check during running, keep running after detecting (alarm). 2: Detects only at constant speed, continues to run after detection (alarm). 3: Always check during operation, cut off the output after detection. 4: Detects only at constant speed and turns off after detection.	
F20.04	**Driver output load detection level**	**0 - 100 [30%]**
	The current threshold for load shedding pre-alarm action is defined as a percentage of the drive's rated current.	
F20.05	**Drive output load detection time**	**0.00 - 20.00 [1.00s]**
	When the output current of the drive is continuously less than the load detection level (F20.04) for a period longer than the load detection time (F20.05), the drive report E0018 fault (drive output load). • F20.04 or F20.05 = 0, the drive does not detect output load failure.	

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

The thermistor input embedded in the stator coil of the motor can be connected to the analogue input of the drive, where by the motor can be overheated, as shown in 8.1 HD50-EIO, page 135.

Ref. Code	Function Description	Setting Range [Default]
F20.06	**Motor overheat signal input type**	**0 - 2 [0]**
	0: Do not detect motor overheating. 1: Positive characteristics (PTC). 2: Negative characteristic (NTC). *Note: It is valid only when the HD50-EIO expansion board is selected, and the CN2 and CN3 jumpers of this card need to be set correctly to detect overheating of the motor.*	
F20.07	**Motor overheating thermistor value**	**0 - 10.0 [5.0kΩ]**

Input, Output Phase Loss Failure (F20.08 - F20.11)

Ref. Code	Function Description	Setting Range [Default]
F20.08	**Input phase loss detection reference**	**0 - 50 (drive rated voltage) [30%]**
F20.09	**Input phase loss detection time**	**1.00 - 5.00 [1.00s]**
	The F20.08 setting is a percentage of the drive's rated voltage. When the drive detects that phase input voltage has not reached the detection reference (F20.08) for longer than the detection time (F20.09), the drive reports E0015 fault (input phase loss). • F20.08 = 0, the drive does not detect input phase failure.	
F20.10	**Output phase failure detection reference**	**0 - 50 (drive rated current) [20%]**
F20.11	**Output phase failure detection reference**	**0.00 - 20.00 [3.00s]**
	The F20.10 setting is a percentage of the drive's rated current. when the drive detects that phase output current has not reached the detection reference (F20.10) for longer than the detection time (F20.11), the drive reports E0016 fault (output phase loss). • F20.10 or F20.11 = 0, the drive does not detect output phase failure.	

PID Fault (F20.12 - F20.17)

Ref. Code	Function Description	Setting Range [Default]
F20.12	**PID given lost detection value**	**0 - 100 [0%]**
F20.13	**PID given loss detection time**	**0.00 - 10.00 [0.20s]**
	F20.12 the setpoint is the percentage relative to the Max. value of the given channel. When PID reference is lower than the detection value (F20.12) within the detection time (F20.13), the drive will report E0025 fault (PID reference is lost). • F20.12 or F20.13 = 0, the drive does not detect a PID reference loss fault.	
F20.14	**PID feedback loss detection value**	**0 - 100 [0%]**
F20.15	**PID feedback loss detection time**	**0.00 - 10.00 [0.20s]**
	F20.14 the set value is a percentage of the Max. feedback channel. When PID feedback is lower than the detection value (F20.14) within the detection time (F20.15), the drive will report E0026 fault (PID feedback loss). • F20.14 or F20.15 = 0, the drive does not detect a loss of PID feedback loss.	
F20.16	**PID feedback overrun detection value**	**0 - 100 [100%]**
F20.17	**PID feedback overrun detection time**	**0.00 - 10.00 [0.20s]**
	F20.16 the setting is a percentage of the Max. feedback channel. When PID feedback exceeds the detection value (F20.16) within the detection time (F20.17), the drive will report E0027 fault (PID feedback overrun). • F20.16 = 100 or F20.17 = 0, the drive does not detect a PID feedback overrun fault.	

Automatic Fault Reset Function and Fault Relay Operation (F20.18 - F20.20)

This function automatically resets the faults that occur during operation according to the set number of times (F20.18) and interval time (F20.19).

During the reset interval output block, automatic reset is completed, if the run command is valid, automatically start running with speed tracking.

The following failure without automatic 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

Ref. Code	Function Description	Setting Range [Default]
F20.18	**Automatic reset times**	**0 - 100 [0]**
F20.19	**Automatic reset interval time**	**2.0 - 20.0 [5.0s/time]**
	When F20.18 = 0, it indicates that auto-reset is forbidden and fault protection should be performed immediately. If no fault is detected within 5 minutes, the fault reset automatically clears. • When an external fault is reset, the fault auto reset count is cleared.	
F20.20	**Fault relay action selection**	**00 - 11 [00]**
	Unit: During automatic reset **Ten: Undervoltage period** • 0: Fault relay does not operate. • 1: Fault relay action. *Note: The setting relay function is 31 function.*	

Fault Records (F20.21 - F20.37)

Ref. Code	Function Description	Setting Range [Default]
F20.21	Fifth (last) type of fault	[Actual value]
F20.22	The given frequency at the latest fault	
F20.23	The output frequency of the last failure	
F20.24	The bus voltage of the last failure	
F20.25	The output current of the last failure	
F20.26	The output current of the last failure	
F20.27	Input terminal state at the latest fault	
F20.28	The status of the output terminal at the latest fault	
F20.29	The last failure interval	
F20.30	The fourth fault type	
F20.31	Fourth fault interval	
F20.32	The third fault type	
F20.33	The third fault interval	
F20.34	The second fault type	
F20.35	Second fault interval	
F20.36	The first fault type	
F20.37	The first fault interval	
	F20.22 - F20.29 records the drive status parameters at the most recent failure. F20.30 - F20.37 record the type of the first four faults and each fault interval, in 0.1 hour interval.	

6.2.22 F21: Torque Control Parameters

Ref. Code	Function Description	Setting Range [Default]
F21.00	**Torque command given channel selection**	**0 - 3 [0]**
	0: F21.01 setting. 1: Analogue setting. 2: Terminal pulse setting. 3: SCI communication settings.	
F21.01	**Torque command digital setting**	**-100.0 - +100.0 (F21.02) [0.0%]**
	Defines the torque reference for digital given torque command (F21.00 = 0).	
F21.02	**Max. torque setting**	**0.0 - 500.0 (motor rated torque) [100.0%]**
	Defines the Max. torque allowed for output.	
F21.03	**Torque command filter time**	**0.000 - 1.000 [0.000s]**
	Defines the time for the external torque command to pass through a delay filter via the torque reference channel. • Setting an appropriate filter time to prevent the motor from shaking due to a sudden change in the torque command.	
F21.04	**Torque control speed limit selection**	**0 - 2 [1]**
	0: F21.05, F21.06 limited. 1: F00.06 (Max. output frequency) limit. 2: Analogue limit. When the AI terminal (F16.01 - F16.04) is set to the 15th function, the speed is limited by the Analogue.	
F21.05	**Forward speed limit during torque control**	**0 - 100 (F00.06) [100%]**
F21.06	**Reverse speed limit during torque control**	**0 - 100 (F00.06) [100%]**
	Define the speed limit value for forward and reverse operation in torque control mode (F00.00 = 1).	
F21.07	**Torque offset given channel**	**0 - 2 [0]**
	Torque offset adjustable torque reference given torque = torque command + torque offset. 0: F21.08 setting. 1: Analogue setting. 2: Terminal pulse setting.	
F21.08	**Torque offset value digital setting**	**0.0 - 300.0 (F21.02) [0.0%]**
F21.09	**Torque offset start delay**	**0.00 - 10.00 [0.00s]**
	Defines the delay time before the torque offset is added to the torque current reference. • Valid only when F21.07 = 1, 2. • No delay when F21.09 = 0.	

6.2.23 F22: Servo Positioning Parameters

Ref. Code	Function Description	Setting Range [Default]
F22.00	**Servo control selection**	**0 - 5 [0]**
	0: Servo control is invalid. 1: Zero servo (frequency reached effective). 2: Zero servo (terminal command valid). 3: Pulse train position control. 4: Simple carry control. 5: Spindle orientation control.	
F22.01	**Position loop gain 1**	**1 - 9999 [50]**
F22.02	**Position loop gain 2**	**1 - 9999 [50]**
F22.03	**Position loop gain switch mode**	**0 - 2 [0]**
	0: Do not switch. 1: Switch according to position deviation. 2: Switch by terminal.	
F22.04	**Position loop gain switching deviation**	**0 - 10000 [0]**
F22.05	**Positioning completion range**	**1 - 1000 [10]**
F22.06	**Positioning completion time**	**0.000 - 20.000 [0.200s]**
F22.07	**Zero servo start frequency**	**0.00 - 10.00 [0.30Hz]**
F22.09	**Position given command filter time**	**0 - 2000 [10ms]**
F22.10	**Electronic gear ratio numerator**	**1 - 4000 [1000]**
F22.11	**Electronic gear ratio denominator**	**1 - 4000 [1000]**
F22.12	**Position loop feedforward gain**	**0.0 - 200.0 [100.0%]**
F22.13	**Simple carry control mode**	**11 - 00 [00]**
	Unit: Return to zero choice 0: Do not look for zero. 1: Find zero.	**Ten: Return to zero direction choice** 0: Forward rotation. 1: Reverse.
F22.14	**Zero positioning speed 1**	**0.00 - 50.00 [10.00Hz]**
F22.15	**Zero positioning speed 2**	**0.00 - 50.00 [1.00Hz]**
F22.16	**Location digital given 1 high**	**0 - 9999 [0]**
F22.17	**Location digital given 1 low bit**	**0 - 9999 [0]**
F22.18	**Location digital given 2 high bit**	**0 - 9999 [0]**
F22.19	**Location digital given 2 low bit**	**0 - 9999 [0]**
F22.20	**Location digital given 3 high bit**	**0 - 9999 [0]**
F22.21	**Location digital given 3 low bit**	**0 - 9999 [0]**
F22.22	**Location digital given 4 high bit**	**0 - 9999 [0]**
F22.23	**Location digital given 4 low bit**	**0 - 9999 [0]**
F22.24	**Location digital given 5 high bit**	**0 - 9999 [0]**
F22.25	**Location digital given 5 low bit**	**0 - 9999 [0]**
F22.26	**Location digital given 6 high bit**	**0 - 9999 [0]**
F22.27	**Location digital given 6 low bit**	**0 - 9999 [0]**
F22.28	**Location digital given 7 high bit**	**0 - 9999 [0]**
F22.29	**Location digital given 7 low bit**	**0 - 9999 [0]**
F22.30	**Location digital given 8 high bit**	**0 - 9999 [0]**
F22.31	**Location digital given 8 low bit**	**0 - 9999 [0]**

Ref. Code	Function Description	Setting Range [Default]
F22.32	**Spindle orientation direction**	**0 - 2 [0]**
	0: Direction from the current rotation direction. 1: Forward direction orientation. 2: Reverse the reverse orientation.	
F22.33	**Spindle orientation frequency**	**0.00 - 50.00 [5.00Hz]**
F22.34	**Spindle orientation plus Dec. time**	**0.0 - 100.0 [10.0s]**
F22.35	**Spindle orientation target location selection**	**0,1 [0]**
	0: Terminal selection. 1: SCI communication setting.	
F22.36	**Spindle directional shutdown location 1**	**0 - (4 × F14.01 - 1) [0]**
F22.37	**Spindle directional shutdown location 2**	**0 - (4 × F14.01 - 1) [0]**
F22.38	**Spindle directional shutdown location 3**	**0 - (4 × F14.01 - 1) [0]**
F22.39	**Spindle directional shutdown location 4**	**0 - (4 × F14.01 - 1) [0]**

6.2.24 F23: PWM Control Parameter

Ref. Code	Function Description	Setting Range [Default]
F23.00	**Carrier frequency setting**	**1 - 16kHz [Depend on HD50]**

Define drive output PWM wave carrier frequency.

Drive Power	Setting Range	Factory Setting
0.75 - 22kW	1 - 16kHz	8kHz
30 - 37kW	1 - 12kHz	6kHz
45kW	1 - 6kHz	4kHz
55kW and its above power level	1 - 4kHz	2kHz

- The carrier frequency will affect the noise of the motor, the higher the carrier frequency, the smaller the noise. Please set the carrier frequency reasonably.
- If the carrier frequency setting is greater than the factory setting, the drive needs to be derated by 5% for each additional 1kHz.

F23.02	**PWM over modulation enabled**	**0,1 [1]**
	0: Invalid. 1: Enabled.	

6.3 Group T: Tension Function Parameters

6.3.1 T00: Tension Control Mode

Ref. Code	Function Description	Setting Range [Default]
T00.00	**Tension control mode**	**0 - 2 [2]**
	0: No tension feedback torque control. 1: Tension feedback torque control. 2: Tension feedback speed control.	
T00.01	**Rewind volume mode**	**0,1 [0]**
	0: Winding mode. 1: Unwinding mode.	
T00.02	**Rewind and reverse the tightening options**	**00 - 11 [10]**
	Unit: • 0: Unwinding prohibits reverse tightening of materials. • 1: Unwinding allows reverse tightening of the material. **Ten:** • 0: Rewinding prohibits reverse relaxation of materials. • 1: Winding allows material to be relaxed in the opposite direction.	
T00.03	**Mechanical transmission ratio**	**0.01 - 300.00 [1.00]**

6.3.2 T01: Volume Diameter Calculation Parameters

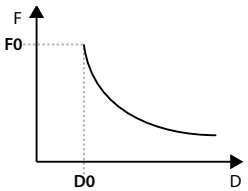
Ref. Code	Function Description	Setting Range [Default]
T01.00	**Max. roll diameter**	**1 - 5000 [1000mm]**
	Defines the Max. reel diameter that the coiling tool can process.	
T01.01	**Initial volume source selection**	**0 - 3 [0]**
	0: T01.02 - T01.04 setting. 1: Analogue setting. 2: Terminal pulse setting. 3: SCI communication setting.	
T01.02	**Initial roll diameter 1**	**1 - 5000 [100mm]**
T01.03	**Initial roll diameter 2**	**1 - 5000 [100mm]**
T01.04	**Initial roll diameter 3**	**1 - 5000 [100mm]**
T01.05	**Initial roll diameter**	**1 - 5000 [100mm]**
	Coils are generally rolled in a certain diameter of the reel, there is no winding reel called empty core reel, reel diameter is the air core diameter. In general, the end of unwinding the remaining empty core reel, rewinding from empty core reel.	
T01.06	**Winding diameter calculation method selection**	**0 - 4 [0]**
	0: Calculated by line speed. 1: Analogue setting. 2: Terminal pulse setting. 3: SCI communication settings. 4: Accumulation of thickness calculation. Correct setting T01.15 - T01.23.	
T01.07	**Volume diameter calculation interval**	**0.0 - 100.0 [0.1s]**
T01.08	**Volume diameter filter time**	**0.0 - 100.0 [5.0s]**
	Setting a reasonable roll diameter filter time, to ensure that the roll diameter is truly and accurately reflect the current actual roll diameter, to avoid the system roll diameter disturbance. • Valid only when T01.06 = 0.	

Ref. Code	Function Description	Setting Range [Default]
T01.09	**Current curling radius**	**1 - 5000 [100mm]**
	Define the actual calculation of the current roll diameter, roll diameter storage unit, can be modified when downtime. • The value of the initial roll diameter can be input to T01.09 instead of the roll diameter reset function before the system starts running this parameter value is dynamically updated in real time.	
T01.10	**Reach the roll diameter set value**	**1 - 5000 [1000mm]**
	If the specified roll diameter has been set to reach the output terminal function, when the actual roll diameter reaches the setting of T01.10, the roll diameter reaches the output terminal operation and output signal.	
T01.11	**Max. line speed**	**0.1 - 6500.0 [600.0m/min]**
	Defines the Max. line speed that can be run in the system.	
T01.12	**Winding diameter calculation of the lowest line speed**	**0.1 - 6500.0 [1.0m/min]**
	When the running speed is lower than the setting value of T01.12, the coil diameter calculation will not be performed. • The coil diameter calculation starts only when the actual line speed exceeds the T01.12 setting.	
T01.13	**Line speed input source**	**0 - 3 [1]**
	0: No input. 1: Analogue setting. 2: Terminal pulse setting. 3: SCI communication setting.	
T01.14	**Actual line speed**	**0.0 - 6500.0 [0.0m/min]**
T01.15	**The Max. thickness of the coil**	**0.01 - 100.00 [1.00mm]**
T01.16	**Coil thickness setting source selection**	**0 - 3 [0]**
	The method of setting the thickness of the web is defined. 0: T01.17 - T01.20 setting. 1: Analogue setting. 2: Terminal pulse setting. 3: SCI communication settings.	
T01.17	**Coil thickness 0**	**0.01 - 100.00 [0.01mm]**
T01.18	**Coil thickness 1**	
T01.19	**Coil thickness 2**	
T01.20	**Coil thickness 3**	
T01.21	**The number of pulses per revolution**	**1 - 60000 [1]**
T01.22	**Pulse counter pulse source selection**	**0 - 2 [0]**
	0: Multi-function terminal count signal input. 1: Multi-function terminal single-phase speed measurement input. 2: Motor shaft side encoder signal input (need to install encoder card).	
T01.23	**The number of laps per layer**	**1 - 10000 [1]**
T01.24	**Volume diameter change rate limit**	**0.0 - 10.0 [0.0mm/s]**
	T01.24 = 0, the curling radius is not limited.	
T01.25	**Roll diameter reset operation enabled**	**0,1 [0]**
	0: Prohibited. 1: Enabled.	
T01.26	**Stop the integration speed**	**0.0 - 6500.0 [0.0m/min]**

6.3.3 T02: System Inertia Compensation Parameters

Ref. Code	Function Description	Setting Range [Default]
T02.00	**System inertia compensation coefficient self-tuning torque setting 1**	**0.0 - 100.0 (motor rated torque) [20.0%]**
	Used to define the torque setting during system inertia compensation.	
T02.01	**System inertia self-tuning**	**0,1 [0]**
	0: No operation. 1: Start self-tuning.	
T02.02	**Static friction compensation factor**	**0.0 - 50.0 (motor rated torque) [0.0%]**
	Define the static friction torque compensation factor, used to overcome the static friction torque when starting the system. • Static friction torque compensation is invalid when the motor is started.	
T02.03	**Dynamic friction compensation coefficient**	**0.0 - 50.0 (motor rated torque) [0.0%]**
	Define the sliding friction torque compensation, used to overcome the system operating friction torque.	
T02.04	**System Acc. inertia compensation factor**	**0.00 - 655.35 [0.00]**
	Used to compensate for the Acc. and Dec. of the system to overcome the mechanical moment of inertia required additional torque.	
T02.05	**Material density**	**0 - 60000 [0kg/m³]**
T02.06	**Material width**	**0 - 60000 [0mm]**
	Material density and material width are used to calculate the system inertia.	
T02.07	**Upper limit frequency**	**0.0 - 100.0 [10.0%]**
T02.08	**Torque given filter coefficient**	**0 - 9999 [0]**
T02.09	**Upper limit frequency limitaition**	**000 - 111 [111]**
	Unit: No tension feedback torque control upper limit frequency limit **Ten: There is tension feedback torque control upper limit frequency limit** **Hundred: Tension feedback speed control upper limit frequency limit** • 0: Invalid. • 1: Effective.	
T02.10	**System Dec. inertia compensation factor**	**0.00 - 655.35 [0.00]**
T02.11	**System inertia compensation coefficient self-tuning torque setting 2**	**0.0 - 100.0 [20.0%]**
T02.12	**Mechanical inertia compensation factor**	**0.0 - 100.0 [0.0%]**
T02.13	**High-speed torque compensation factor**	**0.00 - 99.99 [0.00%]**
T02.14	**High-speed compensation switching mode**	**0,1 [0]**
	0: Frequency. 1: Line speed.	
T02.15	**High-speed compensation switching point**	**0.00 - 99.99 [0.00%]**

6.3.4 T03: Tension PID Control Parameters

Ref. Code	Function Description	Setting Range [Default]
T03.00	**Tension setting source selection**	**0 - 3 [0]**
	0: T03.02 setting. 1: Analogue setting. 2: Terminal pulse setting. 3: SCI communication settings.	
T03.01	**Max. tension**	**0 - 4096 [4096N]**
	It defines the tension upper limit in tension control mode, which is used to control the calculation calibration.	
T03.02	**Tension digital setting**	**0 - 4096 [2048N]**
	T03.00 = 0 effective.	
T03.03	**Zero speed tension increase**	**0.0 - 50.0 (T03.01) [0.0%]**
T03.04	**Zero speed match frequency threshold**	**0 - 20 (F00.06) [0%]**
	Defined the need to adopt zero speed tension control processing conditions, namely zero speed threshold. • When running speed is lower than T03.04, it is considered as zero speed status.	
T03.05	**The first tension taper choice**	**0 - 3 [0]**
	0: T03.06 setting. 1: Analogue setting. 2: Terminal pulse setting. 3: SCI communication setting.	
T03.06	**The first tension taper coefficient**	**0.0 - 200.0 [0.0%]**
	The winding process requires a corresponding reduction in tension as the roll diameter increases to prevent damage to the reel and to improve the coiling process. • The formula for tension taper is: F = F0 × [1 - K (1 - D0/D)] • Where F: Actual output tension, F0: Set tension, K: Tension taper coefficient, D0: Air core diameter, D: Roll diameter real-time value. • T03.05 = 0 is valid. 	
T03.07	**Tension taper compensation correction**	**0 - 65535 [0mm]**
T03.08	**Tension feedback source selection**	**0 - 2 [0]**
	0: Analogue setting. 1: Terminal pulse setting. 2: SCI communication setting.	
T03.09	**Tension PID ratio gain 1**	**0.0 - 100.0 [20.0]**
T03.10	**Tension PID integration time 1**	**0.01 - 10.00 [1.00s]**
T03.11	**Tension PID differential time 1**	**0.000 - 1.000 [0.000s]**
T03.12	**Tension PID ratio gain 2**	**0.0 - 100.0 [20.0]**
T03.13	**Tension PID integration time 2**	**0.01 - 10.00 [1.00s]**
T03.14	**Tension PID differential time 2**	**0.000 - 1.000 [0.000s]**
	The differential term does not work when T03.11 = 0 or T03.14 = 0.	

Ref. Code	Function Description	Setting Range [Default]
T03.15	**Tension PID parameter adjustment basis**	**0 - 4 [0]**
	0: The second group of PID parameters is invalid. 1: Adjust according to the roll diameter. • The initial roll diameter corresponds to the first group of PID coefficients. The full roll diameter corresponds to the second group of PID coefficients. The middle roll diameter uses 2 sets of PID linear interpolation. 2: Adjust according to the operating frequency. • Zero frequency corresponds to the first group of PID coefficients. The Max. output frequency corresponds to the second group of PID coefficients. The intermediate frequency adopts 2 groups of PID linear interpolation. 3: Adjust according to the line speed. • The lowest line speed corresponds to the first group of PID coefficients, the Max. line speed corresponds to the second group of PID coefficients, and the intermediate line speed uses 2 sets of PID linear interpolation. 4: Based on PID error adjustment. • There is no error corresponding to the first group of PID parameters, the largest error corresponds to the second group of PID parameters, and the intermediate error adopts 2 groups of PID linear interpolation.	
T03.16	**Tension PID sampling period**	**0.01 - 30.00 [0.01s]**
	Defined PID regulation period.	
T03.17	**Tension deviation limit**	**0.0 - 20.0 [0.0%]**
	The limit of tension deviation is defined. • When the deviation between the tension feedback and the tension given is less than the value set in T03.17, the tension PID pauses.	
T03.18	**Tension PID output filter time**	**0.01 - 30.00 [0.05s]**
T03.19	**Tension PID output limiting method**	**0 - 2 [0]**
	0: No limitation. 1: Relative to the Max. output frequency (F00.06). 2: Relative to the linear speed setting.	
T03.20	**Tension PID output limit value**	**0.0 - 100.0 [50.0%]**
T03.23	**The first tension taper switch point**	**1 - 5000 [5000mm]**
T03.24	**The second tension taper coefficient**	**0.0 - 200.0 [0.0%]**
T03.25	**The second tension taper switch point**	**1 - 5000 [5000mm]**
T03.26	**Third tension taper coefficient**	**0.0 - 200.0 [0.0%]**
T03.27	**Third tension taper switch point**	**1 - 5000 [5000mm]**
T03.28	**Fourth tension taper coefficient**	**0.0 - 200.0 [0.0%]**
T03.29	**Fourth tension taper switch point**	**1 - 5000 [5000mm]**
T03.30	**The fifth tension taper coefficient**	**0.0 - 200.0 [0.0%]**
T03.31	**Taper calculation options**	**0,1 [0]**
	0: Curve taper. 1: Straight taper.	
T03.32	**Tension detection location setting**	**0.00 - 10.00 [0.00V]**
T03.33	**Tension detection location setting channel**	**0 - 3 [0]**
	0: T03.32 setting. 2: Terminal pulse setting. 1: Analogue setting. 3: SCI communication settings.	
T03.34	**Tension PID integral limit**	**0.00 - upper limit [3.50Hz]**

6.3.5 T04: Pre-drive Control Parameters

Ref. Code	Function Description	Setting Range [Default]
T04.00	**Pre-drive speed gain**	**0.0 - 200.0 [100.0%]**
	Pre-drive terminal (T05.04 - T05.12 set to No.10 function) is valid, enter the pre-drive mode. Pre-drive speed = T04.00 × T01.11 (Max. linear speed).	
T04.01	**Pre-drive torque gain**	**0.0 - 200.0 [100.0%]**
	When pre-driving, the actual output tension = T04.01 × T03.01 (Max. tension).	
T04.02	**Pre-drive volume diameter calculation is enabled**	**0,1 [0]**
	0: Invalid. 1: Valid.	
T04.03	**Torque adjustment factor**	**0.0 - 200.0 [120.0%]**
	When the torque boost terminal (T05.04 - T05.12 is set to No.11 function) is valid, the increased output torque = T04.03 × the current given torque.	
T04.04	**Line speed increase**	**0.0 - 50.0 [1.0%]**
	When line speed is 0, actual line speed = current line speed + T04.04 × T01.11 is considered.	
T04.05	**Pre-drive end torque gain**	**0.0 - 200.0 [0.0%]**
T04.06	**Pre-drive end torque compensation time**	**0.0 - 99.9 [0.0s]**
T04.07	**Pre-drive end coil diameter calculation pause time**	**0.0 - 99.9 [0.0s]**

6.3.6 T05: I/O Terminal Function Extension

Ref. Code	Function Description	Setting Range [Default]
T05.00	**AI1 expansion function**	**0 - 8 [1]**
T05.01	**AI2 expansion function**	**0 - 8 [2]**
T05.02	**AI3 expansion function**	**0 - 8 [0]**
T05.03	**AI4 expansion function**	**0 - 8 [0]**
	0: Reserved. 1: Line speed setting. 2: Tension feedback location. 3: Tension setting. 4: Initial curling setting. 5: Current curling radius feedback. 6: Tension taper set. 7: Web thickness setting. 8: Tension pendulum balance location setting. *Note: When the tension control is enabled, the priority set by this group is higher than that set by F16.01 - F16.04.*	
T05.04	**DI1 expansion function**	**0 - 14 [0]**
T05.05	**DI2 expansion function**	**0 - 14 [0]**
T05.06	**DI3 expansion function**	**0 - 14 [0]**
T05.07	**DI4 expansion function**	**0 - 14 [0]**
T05.08	**DI5 expansion function**	**0 - 14 [0]**
T05.09	**DI6 expansion function**	**0 - 14 [0]**
T05.10	**DI7 expansion function**	**0 - 14 [0]**
T05.11	**DI8 expansion function**	**0 - 14 [0]**
T05.12	**DI9 expansion function**	**0 - 14 [0]**
	0: Reserved. 1: Roll diameter reset. 2, 3: Initial roll diameter selection terminal 1/2. 4: Diameter calculation is paused. 5: Rewind roll switch. 6: Broken material detection switch. 7,8: Coil thickness selection terminals 1/2. 9: Circle signal input.	

Ref. Code	Function Description	Setting Range [Default]
	10: Pre-drive. 11: Torque boost. 12: Direction switch. Speed control and torque control are valid. 13: Open loop tension torque control and closed loop tension speed control switch. 14: PID regulator adjustment feature selection. • 0: Positive characteristic. • 1: Negative characteristic. *Note: When the tension control is enabled, the function set by this group has higher priority than the function set by the terminal of group F15 (F15.00 - F15.08).*	
T05.13	**DO1 expansion function**	**0 - 5 [0]**
T05.14	**DO2 expansion function**	**0 - 5 [0]**
T05.15	**RLY1 expansion function**	**0 - 5 [0]**
T05.16	**RLY2 expansion function**	**0 - 5 [0]**
T05.17	**RLY3 expansion function**	**0 - 5 [0]**
T05.18	**RLY4 expansion function**	**0 - 5 [0]**
	0,1: Reserved. 2: The Max. diameter reached. 3: The specified diameter reached. 4: Brake output. 5: Off material output. *Note: When the tension control is enabled, the function set by this group has higher priority than the function set by the terminal of group F15 (F15.18 - F15.23).*	
T05.19	**AO1 expansion function**	**0 - 5 [0]**
T05.20	**AO2 expansion function**	**0 - 5 [0]**
	0: Reserved. 1: Current curling radius. 2: Tension detection location setting (10V corresponds to 10V). 3: Tension detection location feedback (10V corresponds to 10V). 4: Given tension (before calculation, 10V corresponds to the Max. tension). 5: Given tension (calculated, 10V corresponds to the Max. tension). *Note: When the tension control is enabled, the function priority set by this group is higher than the function set by the terminals of group F16 (F16.19 - F16.20).*	
T05.21	**High-speed pulse output expansion function**	**0 - 5 [0]**
	0: Reserved. 1: Current curling radius. 2: Tension detection location setting (F16.26 corresponds to 10V). 3: Tension detection location feedback (F16.26 corresponds to 10V). 4: Given tension (before calculation, F16.26 corresponds to the Max. tension). 5: Given tension (after calculation, F16.26 corresponds to the Max. tension). • F16.26 is the Max. output pulse frequency. *Note: When the tension control is enabled, the priority set by this group is higher than the function set by F16.21.*	

6.3.7 T06: Broken Material Detection Setting

Ref. Code	Function Description	Setting Range [Default]
T06.00	**Broken material automatic detection function selection**	**0 - 3 [0]**
	0: Broken material detection is invalid. 1: Detects according to the cutout detection switch. 2: According to PID feedback detection. 3: Judge according to the change of roll diameter.	
T06.01	**Broken material automatically detects the minimum line speed**	**0.1 - 1000.0 [0.1m/min]**
T06.02	**Broken material automatically detect the error range**	**0.1 - 50.0 [10.0%]**
T06.03	**Automatic detection of broken material to determine the delay time (start)**	**0.1 - 60.0 [2.0s]**
T06.04	**Broken down mode**	**00 - 13 [00]**
	Unit: Broken material downtime method definition • 0: Freewheel stop. • 1: Dec. stop + DC brake. • 2: Dec. stop. • 3: Continue to run. **Ten: Breaking alarm mode definition** • 0: No alarm, stop according to the unit-defined stop mode. • 1: Alarm.	
T06.05	**Brake starting frequency**	**0.00 - 50.00 [0.00Hz]**
T06.06	**Brake time**	**0.0 - 360.0 [0.0s]**
	When normal stop, and the running frequency is lower than the frequency of T06.05 setting, the output signal of holding brake and holding brake will continue for the time set by T06.06. When the system detects the material, the output brake signal, brake signal for the time set by T06.06.	
T06.07	**Automatic detection of broken material to determine the delay time (after starting).**	**0.1 - 60.0 [0.5s]**

6.4 Group U: User Menu Mode Displays the Parameters

See Appendix A for details.

For example: If you need to map F00.13 (initial running frequency digital setting) to user menu map 1 (U00.00), you only need to set U00.00 to 00.13 (corresponding to F00.13), then you can read writing U00.01 (set value of map 1) directly controls F00.13, which has the same effect as direct operation F00.13.

Ref. Code	Function Description	Setting Range [Default]
U00.00	User menu mapping setting 1	00.00 - 23.02, 99.99 [00.01]
U00.02	User menu mapping setting 2	00.00 - 23.02, 99.99 [00.06]
U00.04	User menu mapping setting 3	00.00 - 23.02, 99.99 [00.08]
U00.06	User menu mapping setting 4	00.00 - 23.02, 99.99 [00.13]
U00.08	User menu mapping setting 5	00.00 - 23.02, 99.99 [00.10]
U00.10	User menu mapping setting 6	00.00 - 23.02, 99.99 [00.11]
U00.12	User menu mapping setting 7	00.00 - 23.02, 99.99 [02.13]
U00.14	User menu mapping setting 8	00.00 - 23.02, 99.99 [03.01]
U00.16	User menu mapping setting 9	00.00 - 23.02, 99.99 [03.02]
U00.18	User menu mapping setting 10	00.00 - 23.02, 99.99 [08.00]
U00.20	User menu mapping setting 11	00.00 - 23.02, 99.99 [08.01]
U00.22	User menu mapping setting 12	00.00 - 23.02, 99.99 [08.02]
U00.24	User menu mapping setting 13	00.00 - 23.02, 99.99 [08.03]
U00.26	User menu mapping setting 14	00.00 - 23.02, 99.99 [08.04]
U00.28	User menu mapping setting 15	-
U00.30	User menu mapping setting 16	-
	When set to 99.99, there is no parameter mapping function.	
U00.01	Mapping value of 1	The same as the selected parameter [0]
U00.03	Mapping value of 2	
U00.05	Mapping value of 3	
U00.07	Mapping value of 4	
U00.09	Mapping value of 5	
U00.11	Mapping value of 6	
U00.13	Mapping value of 7	
U00.15	Mapping value of 8	
U00.17	Mapping value of 9	
U00.19	Mapping value of 10	
U00.21	Mapping value of 11	
U00.23	Mapping value of 12	
U00.25	Mapping value of 13	
U00.27	Mapping value of 14	
U00.29	Mapping value of 15	
U00.31	Mapping value of 16	

6.5 Group r: Communication Read and Write Parameters Address Setting

6.5.1 r00: Communicaiton Read Parameters Address Setting

Ref. Code	Function Description	Setting Range [Default]
r00.00	Communication read parameter method	0,1 [0]
	0: Press the register address of the communication frame setting to read continuously as the initial value. 1: Read by the address of setting of group r00. *Note: The number of read request Frameread parameters.*	
r00.01	First to read parameter address	0x0000 - 0xffff [0x330e]
r00.02	Second to read parameter address	0x0000 - 0xffff [0x330f]
r00.03	Third to read parameter address	0x0000 - 0xffff [0x3310]
r00.04	Fourth to read parameter address	0x0000 - 0xffff [0x3311]
r00.05	Fifth to read parameter address	0x0000 - 0xffff [0x3312]
r00.06	Sixth to read parameter address	0x0000 - 0xffff [0x3314]
r00.07	Seventh to read parameter address	0x0000 - 0xffff [0x3315]
r00.08	Eighth to read parameter address	0x0000 - 0xffff [0x3317]
r00.09	Ninth to read parameter address	0x0000 - 0xffff [0x3318]
r00.10	Tenth to read parameter address	0x0000 - 0xffff [0x3319]
r00.11	Eleventh to read parameter address	0x0000 - 0xffff [0x331b]
r00.12	Twelfth to read parameter address	0x0000 - 0xffff [0x331d]

6.5.2 r01: Communicaiton Write Parameters Address Setting

Ref. Code	Function Description	Setting Range [Default]
r01.00	Communication write parameters	0,1 [0]
	0: Write to the initial value by the register address of the communication frame setting. 1: Written by the address of the group r01 setting.	
r01.01	The first to write parameter address	0x0000 - 0xffff [0x0000]
r01.02	The second to write parameter address	0x0000 - 0xffff [0x0000]
r01.03	The third to write parameter address	0x0000 - 0xffff [0x0000]
r01.04	The forth to write parameter address	0x0000 - 0xffff [0x0000]

6.6 Group Y: Manufacturer Function Parameters

Y group parameters is the manufacturer parameter group, non-change without authorization.

Chapter 7 Troubleshooting and Maintenance

7.1 Troubleshooting

When the drive fails, the keypad fault alarm display screen, while the fault relay action, the drive to stop output, the motor free stop.

After a fault alarm, you should log the fault in detail and troubleshoot and clear it with reference to Table 7-1. For technical support, contact your supplier or call Shenzhen Hpmont Technology Co., Ltd. directly.

Table 7-1 Fault alarm contents and countermeasures

Fault		Reasons	Countermeasure
Lu	DC bus undervoltage	• Power-on initial state, power-off state • Input voltage is too low • Improper wiring leads to hardware undervoltage	• Normal power-on, power-down state • Check input power voltage • Check the wiring, standard wiring
E0001	Driver output overcurrent (Acc. process)	• Incorrect driver and motor wiring • The motor parameters are incorrect • Driver power selection is too small • Add Dec. time too short • An instantaneous stop occurs and the rotating motor restarts	• Correct drive and motor wiring • Correct setting motor parameters (F08.00 - F08.04, F13.01 - F13.05) • Choose the right drive power • Setting the appropriate Dec. time (F03.01 - F03.08) • Select speed tracking start mode (F02.00 = 2)
E0002	Drive output overcurrent (Dec. process)		
E0003	Driver output overcurrent (constant speed process)		
E0004	DC bus overvoltage (Acc. process)	• Input voltage is too high • Dec. time is too short • Improper wiring leads to hardware overvoltage • An instantaneous stop occurs and the rotating motor restarts • Improper selection of brake components	• Check input power voltage • Setting the appropriate Dec. time (F03.02, F03.04, F03.06, F03.08) • Check the system wiring and standard wiring • Select speed tracking start mode (F02.00 = 2) • Select the brake assembly as per section 8.3
E0005	DC bus overvoltage (Dec. process)		
E0006	DC bus overvoltage (constant speed process)		
E0007	Overvoltage stall	• The bus voltage is too high • Overvoltage stall point setting is too small	• Check input power or energy dissipation brake components • Setting a reasonable overvoltage stall point (F19.19)
E0008	Power module fault	• Phase output short circuit • Short to ground • Output current is too large • The power module is damaged	• Check the wiring, standard wiring • Check the wiring, standard wiring • Check wiring and machinery • Contact factory maintenance
E0009	Radiator overheated	• Ambient temperature exceeds specifications • Poor external ventilation of the drive • Fan failure	• Derating, power amplification • Rectification of the external ventilation of the drive • Replace the fan • Seek technical support

Fault		Reasons	Countermeasure
		• There is a problem with the temperature detection circuit	
E0010	Braking unit failure	• Braking circuit defective	• Seek technical support
E0012	Parameter auto-tuning fault	• Parameter auto tuning timed out	• Check the motor wiring • Input correct motor parameters (F08.00 - F08.04, F13.01 - F13.05) • Seek technical support
E0013	Power-on buffer contactor is not engaged	• Contactor failure • The control circuit is faulty	• Replace contactor • Seek technical support
E0014	Current detection circuit fault	• Current detection circuit fault	• Contact factory maintenance
E0015	Input phases loss	• For three-phase input drivers, the three-phase input power is out of phase	• Check the three-phase input power • Seek technical support
E0016	Output phases loss	• The three phases of the drive are disconnected or missing • The drive has a three-phase load that is heavily unbalanced	• Check the wiring between the drive and the motor • Check the motor quality
E0017	Drive overload	• Acc. time setting is too short • Improper V/f curve or torque boost setting causes current to be excessive • An instantaneous stop occurs and the rotating motor restarts • Grid voltage is too low • The motor is overloaded	• Adjust Acc. time (F03.01, F03.03, F03.05, F03.07) • Adjust V/f curve (F09.00 - F09.06) or torque boost (F09.07, F09.08) • Select speed tracking start mode (F02.00 = 2) • Check input grid voltage • Use a power-matched drive
E0018	Drive output is offloaded	• The load disappears or abruptly • Parameter setting is not correct	• Check load and mechanical transmission • Setting the appropriate parameter (F20.03 - F20.05)
E0019	Motor overload	• Incorrect V/f curve setting • Grid voltage is too low • Non-variable frequency general motor low-speed large-load long-term operation • Motor blocked or overloaded	• Adjust the appropriate V/f curve (F09.00 - F09.06) • Check input power • Long-term low-speed high-load operation, the replacement of variable frequency motor • Check load and mechanical transmission
E0020	Motor overheat	• Motor overheat • Motor parameter setting mistakes	• Reduce the load; Repair, replace the motor • Increase Dec. time (F03.01 - F03.08) • Correct setting motor parameters (F08.00 - F08.04, F13.01 - F13.05)
E0021	Control board EEPROM read and write error	• Control board EEPROM memory circuit failure	• Contact factory maintenance

Fault		Reasons	Countermeasure
E0022	Keypad EEPROM read and write problems	• The control keypad EEPROM memory circuit has failed	• Replace the operator keypad • Contact factory maintenance
E0023	Parameter setting error	• The rated power of the motor deviates too far from the rated power of the drive • Improper motor parameter setting	• Select the motor that matches the drive power • Correct setting motor parameters (F08.00 - F08.04, F13.01 - F13.05)
E0024	External device failure	• External device fault terminal action	• Check external equipment
E0025	PID given loss	• Analogue given signal is less then F20.12 • Analogue input circuit fault	• Check the connection • Seek technical support
E0026	PID feedback loss	• Analogue feedback signal is less F20.14 • Analogue input circuit fault	• Check the connection • Seek technical support
E0027	PID feedback over-limitation	• Analogue feedback signal is more than F20.16 • Analogue input circuit fault	• Check the connection • Seek technical support
E0028	SCI communication timeout	• Incorrect communication cable • The communication cable is disconnected or loose	• Check the wiring
E0029	SCI communicaiton error	• Incorrect communication cable • The communication cable is disconnected or loose • Communication setting error • The communication data is wrong	• Check the wiring • Check the wiring • Correct setting communication format (F17.00) and baud rate (F17.01) • Send data by Modbus protocol
E0030	Encoder reverse	• Encoder wiring phase sequence does not match motor phase sequence	• Check the encoder wiring • Check the motor wiring
E0031	Encoder disconnected	• The encoder is damaged • Wrong encoder wiring	• Check the encoder and replace • Check the encoder wiring and correct wiring
E0032	Motor speeding	• Motor exceeds given speed	• Check the motor and load
E0033	Motor speed out of tolerance	• Motor speed deviation is too large	• Check the motor and load
E0034	Tension control system broken material	• Broken wire • The encoder is disconnected	• Check the wire • Check the encoder
Note: E0022 does not affect the drive's normal operation.			

7.2 Reset Fault

After the fault is removed, you can reset the fault in the following ways:

1. Keypad reset.
2. External reset terminal (DI terminal set to No. 46 function) reset.
3. Communication failure reset.
4. Turn the drive off completely before powering on again.

7.3 Maintenance

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

- If HD50 has been transported for a long distance, check whether the components of HD50 are complete and the screws are well tightened.
- Periodically clean the dust inside HD50 and check whether the screws are loose.

Danger

- Only a trained and qualified professional person can maintain the controller.
- Maintenance personnel should take off all metal jewellery before carrying out maintenance or internal measurements in the controller. Suitable clothes and tools must be used.
- High voltage exists when the controller is powered up or running.
- Checking and maintaining can only be done after AC power of HD50 is cut off and wait for at least 10 minutes. The cover maintenance can only be done after ensured that the charge indicator inside HD50 and the indicators on the keypad are off and the voltage between power terminals (+) and (-) is below 36V.

Warning

- For HD50 with more than 2 years storage, please use voltage regulator to increase the input voltage gradually.
- Do not leave metal parts like screws or pads inside HD50.
- Do not make modification on the inside of controller without instruction from the supplier.
- There are IC components inside the controller, which are sensitive to stationary electricity. Directly touch the components on the PCB board is forbidden.

Daily Maintenance and Maintenance

The HD50 must operate in the specified environment, see section 3.2, page 11.

Please press Table 7-2 for routine maintenance work in order to detect anomalies and prolong the lifespan of the HD50.

Table 7-2 Daily check items

Items	Content	Criteria
Running environment	Temperature and humidity	-10 - +40°C, derating at 40 - 50°C Less than 95%RH, non-condensing
	Dust and water dripping	No conductive dust accumulating, no water dripping
	Gas	No strange smell
HD50	Oscillation and heating	Stable oscillation and proper temperature
	Noise	No abnormal sound
Motor	Heating	No overheat
	Noise	Low and regular noise
Running status parameters	Output current	Within rated range
	Output voltage	Within rated range

Periodical Maintenance

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

General inspection:

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

Note:

1. The driver has passed the withstand voltage test before leaving the factory. The user no longer needs to test the withstand voltage. Otherwise, improper testing may damage the driver.

2. When performing insulation tests on the motor, the U/V/W terminals of the drive must be disconnected and the motor tested separately or the drive may be damaged.

3. Long-term storage drives a power-on experiment must be conducted within two years. Use a voltage regulator to slowly raise the input voltage of the drive to its nominal value for at least 5 hours.

Replacing Damaged Parts

The components that are easily damaged are: Cooling fan and electrolytic capacitors of filters.

Their lifetime depends largely on their application environment and preservation. The users can decide the time when the components should be replaced according to their service time.

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

Unwanted Driver Recycling

When scrapped, please note:

- Electrolytic capacitors inside the drive may explode when they are burned.
- Plastic parts will produce toxic gases when burned.
- Please dispose of as industrial waste.

Chapter 8 Optional Accessaries

8.1 HD50-EIO

HD50 optional I/O card (HD50-EIO), can realize analogue quantity, digital quantity input and relay contact output expansion.

Terminal Description

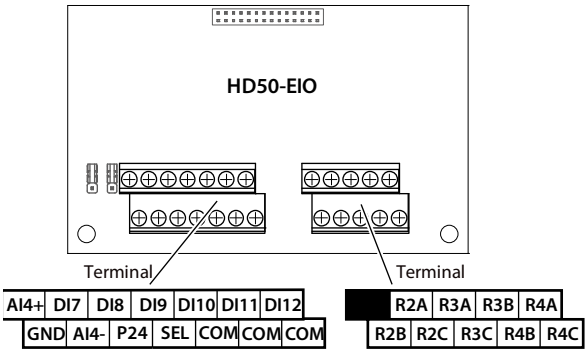


Figure 8-1 Terminals

Table 8-1 Terminals description

Terminals		Description
AI4+/AI4-	Analogue differential input	Input voltage/current option • Input voltage range -10 - +10V, input resistior 34kΩ • Inputcurrent range 0 - 20mA, input resistor 500Ω
GND	Analogue ground	GND is isolated with COM
DI7 - DI12	Digital input	Programmable bipolar optional input signal • Input voltage range 0 - 30VDC, input resistor 4.7kΩ
P24, COM	Digital power supply	Digital input use +24V as supply, Max. output current is 200mA
SEL	Digital input common terminal	Factory and P24 shorted • Disconnected SEL and P24 when use external power to drive DI
R2A/R2B/R2C R3A/R3B/R3C R4A/R4B/R4C	Relay output	Programmable output, contact capacity: 250VAC/3A or 30VDC/1A • RB, RC normally closed. RA, RC normally open

Note:

1. If the relay terminal connected to the AC 220V voltage signal, the current limit must be within 3A.

2. Can not be used with HD-PG10-RES-FD and HD-PG11-SC-FD encoder cards.

3. 2.2kW and below can not match.

Jumper Description

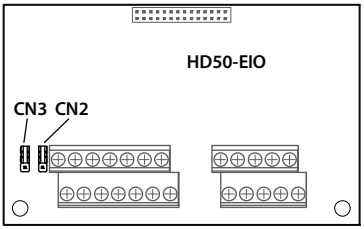
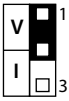
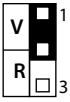


Figure 8-2 Jumper

Table 8-2 Jumper description

Jumper	Description
CN2 	AI4 analogue input channel voltage/current selection: • Pin 1&2 are short-connected, AI4 input is the voltage amount (factory setting). • Pin 2&3 are short-connected, AI4 input is the current amount. *Note: CN3 2, 3 feet short.*
CN3 	AI4 analogue input channel thermistor options: • Pin 1&2 are short-connected, AI4 input is the amount of user given analogue (factory setting). • Pin 2&3 are short-connected, AI4 external thermistor can be used as a traction machine overheating detection signal input.

Terminal Wiring

Digital Input Terminal (DI) Wiring

DI7 - DI12 wiring is the same as DI1 - DI6 of control board. See the DI terminal wiring of the control terminal wiring in 4.4.4.

Analogue Input Terminal (AI) Wiring

When AI4 is used as the user-supplied analogue input terminal, the wiring is as shown in Figure 8-3. AI4+ is used as the analogue input signal input.

When the AI4 is used as the overheat detection signal input terminal of the traction machine, the wiring is shown in Figure 8-3. The thermistor embedded in the stator coil of the traction machine is connected to the analogue input, and the jumper of the correct setting is needed.

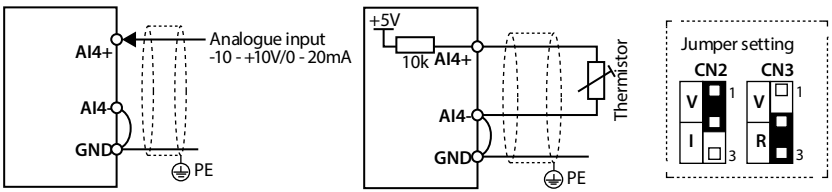


Figure 8-3 AI4 connection

8.2 Keypad Mounting Kit

Keypad mounting kit includes: Mounting base and extension cable.

If needed, please order goods.

Table 8-3 Keypad mounting kit selection

Keypad Mounting Kit	Model
Mounting base	HD-KMB
1m/2m/3m/6m extension cable for keypad outside	HD-CAB-1M/2M/3M/6M

The mounting base and its size are shown as Figure 8-4, the unit is mm.

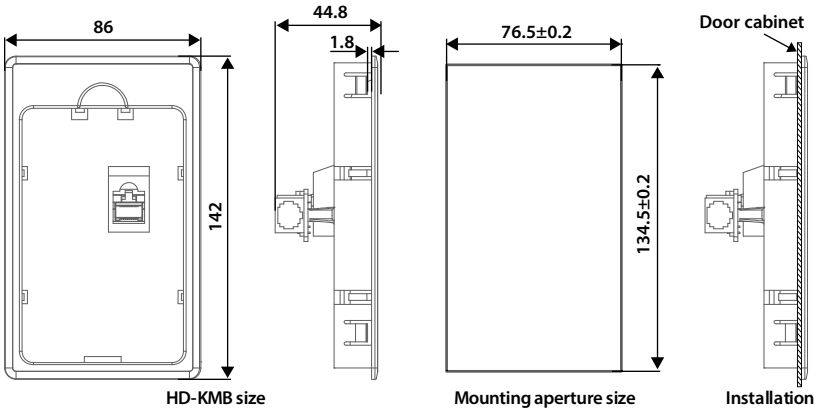


Figure 8-4 Mounting base and its size

8

8.3 Brake Unit and Brake Resistor Selection

There are 4 kinds of braking unit: HDBU-4T150/HDBU-6T150 (the Max. braking current of 150A) and HDBU-4T250/HDBU-6T250 (the Max. braking current of 250A).

If necessary, please order separately.

Braking unit and braking resistor selection as shown in Table 8-4, wiring see 4.3.2 Power Terminal Wiring, page 25.

Table 8-4 The braking unit and braking resistor selection

Model	Motor (kW)	Braking Unit	Braking Resistor			
			Lift Load		Non-lift Load	
			Min. Resistance	Min. Power	Resistance	Min. Power
Three phase power supply: 380 - 460V						
HD50-4T0P7G	0.75kW	Built-in	150Ω	300W	250 - 350Ω	100W
HD50-4T1P5G	1.5kW	Built-in	120Ω	600W	200 - 300Ω	200W
HD50-4T2P2G	2.2kW	Built-in	100Ω	750W	150 - 250Ω	250W
HD50-4T3P7G	3.7kW	Built-in	80Ω	1.2kW	100 - 150Ω	400W
HD50-4T5P5G	5.5kW	Built-in	60Ω	1.8kW	80 - 100Ω	600W
HD50-4T7P5G	7.5kW	Built-in	45Ω	2.4kW	60 - 80Ω	800W
HD50-4T011G	11kW	Built-in	40Ω	3.6kW	40 - 50Ω	1.2kW
HD50-4T015G	15kW	Built-in	25Ω	4.5kW	30 - 40Ω	1.5kW
HD50-4T018G	18.5kW	Built-in	20Ω	6kW	25 - 30Ω	2kW
HD50-4T022G	22kW	Optional	18Ω	7.5kW	20 - 25Ω	2.5kW
HD50-4T030G	30kW	Optional	15Ω	9kW	15 - 20Ω	3kW
HD50-4T037G	37kW	Optional	12Ω	12kW	15 - 20Ω	4kW
HD50-4T045G	45kW	Optional	10Ω	13.5kW	10 - 15Ω	4.5kW
HD50-4T055G	55kW	Optional	9Ω	16.5kW	10 - 15Ω	5.5kW
HD50-4T075G	75kW	HDBU-4T150	6Ω	22.5kW	8 - 10Ω	7.5kW
HD50-4T090G	90kW	HDBU-4T150	6Ω	27kW	8 - 10Ω	9kW
HD50-4T110G	110kW	HDBU-4T150	6Ω	33kW	6 - 8Ω	11kW
HD50-4T132G HD50-4T132G-C	132kW	HDBU-4T250	4Ω	40kW	6 - 8Ω	13.2kW
HD50-4T160G HD50-4T160G-C	160kW	HDBU-4T250	4Ω	48kW	4 - 6Ω	16kW
HD50-4T200G HD50-4T200G-C	200kW	HDBU-4T250	4Ω	60kW	4 - 6Ω	20kW
HD50-4T220G HD50-4T220G-C	220kW	HDBU-4T250 * 2	4Ω * 2	33kW * 2	6 - 8Ω * 2	11kW * 2
HD50-4T250G HD50-4T250G-C	250kW	HDBU-4T250 * 2	4Ω * 2	37.5kW * 2	6 - 8Ω * 2	12.5kW * 2
HD50-4T280G HD50-4T280G-C	280kW	HDBU-4T250 * 2	4Ω * 2	42kW * 2	4 - 6Ω * 2	14kW * 2

Model	Motor (kW)	Braking Unit	Braking Resistor			
			Lift Load		Non-lift Load	
			Min. Resistance	Min. Power	Resistance	Min. Power
HD50-4T315G HD50-4T315G-C	315kW	HDBU-4T250 * 2	4Ω * 2	48kW * 2	4 - 6Ω * 2	16kW * 2
HD50-4T355G HD50-4T355G-C	355kW	HDBU-4T250 * 3	4Ω * 3	33kW * 3	4 - 6Ω * 3	11kW * 3
HD50-4T400G HD50-4T400G-C	400kW	HDBU-4T250 * 3	4Ω * 3	42kW * 3	4 - 6Ω * 3	14kW * 3
Three phase power supply: 500 - 690V						
HD50-6T018G	18.5kW	Built-in	10Ω	4.5kW	80 - 100Ω	1.5kW
HD50-6T022G	22kW	Built-in	10Ω	6kW	70 - 80Ω	2kW
HD50-6T030G	30kW	Built-in	10Ω	9kW	50 - 60Ω	3kW
HD50-6T037G	37kW	Built-in	10Ω	10.5kW	40 - 50Ω	3.5kW
HD50-6T045G	45kW	Built-in	10Ω	13.5kW	35 - 40Ω	4.5kW
HD50-6T055G	55kW	Built-in	10Ω	16.5kW	30 - 35Ω	5.5kW
HD50-6T075G	75kW	Built-in	10Ω	22.5kW	20 - 25Ω	7.5kW
HD50-6T090G	90kW	Built-in	10Ω	27kW	15 - 20Ω	9kW
HD50-6T110G	110kW	Optional	10Ω	33kW	15 - 20Ω	11kW
HD50-6T132G	132kW	Optional	6Ω	39kW	10 - 15Ω	13kW
HD50-6T160G	160kW	Optional	6Ω	48kW	8 - 10Ω	16kW
HD50-6T200G	200kW	Optional	6Ω	60kW	8 - 10Ω	20kW
HD50-6T220G	220kW	Optional	6Ω	66kW	8 - 10Ω	22kW
HD50-6T250G	250kW	HDBU-4T150	6Ω * 2	39kW * 2	10 - 15Ω * 2	13kW * 2
HD50-6T280G	280kW	HDBU-4T150	6Ω * 2	39kW * 2	10 - 15Ω * 2	13kW * 2
HD50-6T315G	315kW	HDBU-4T150	6Ω * 2	48kW * 2	8 - 10Ω * 2	16kW * 2
HD50-6T355G	355kW	HDBU-4T250	6Ω * 2	60kW * 2	8 - 10Ω * 2	20kW * 2
HD50-6T400G	400kW	HDBU-4T250	6Ω * 2	60kW * 2	8 - 10Ω * 2	20kW * 2
Note: * 2, * 3 refers to 2, 3 parallel mode.						

Note:

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

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

8.4 Reactor Selection

The reactor selections are shown as Tablo 8-5, Tablo 8-6 and Tablo 8-7.

Tablo 8-5 AC reactor selection (three phase 380 - 460V)

Model	AC Input Reactor		AC Output Reactor	
	Model	Parameter (mH-A)	Model	Parameter (mH-A)
HD50-4T037G	HD-AIL-4T037	0.19/75	HD-AOL-4T037	0.08/80
HD50-4T045G	HD-AIL-4T045	0.16/90	HD-AOL-4T045	0.06/100
HD50-4T055G	HD-AIL-4T055	0.13/115	HD-AOL-4T055	0.04/125
HD50-4T075G	HD-AIL-4T075	0.093/150	HD-AOL-4T075	0.035/160
HD50-4T090G	HD-AIL-4T090	0.08/180	HD-AOL-4T090	0.03/200
HD50-4T110G	HD-AIL-4T110	0.067/210	HD-AOL-4T110	0.02/225
HD50-4T132G HD50-4T132G-C	HD-AIL-4T132	0.055/255	HD-AOL-4T132	0.016/280
HD50-4T160G HD50-4T160G-C	HD-AIL-4T160	0.046/305	HD-AOL-4T160	0.013/320
HD50-4T200G HD50-4T200G-C	HD-AIL-4T200	0.037/380	HD-AOL-4T200	0.011/400
HD50-4T220G HD50-4T220G-C	HD-AIL-4T220	0.034/415	HD-AOL-4T220	0.01/450
HD50-4T250G HD50-4T250G-C	HD-AIL-4T250	0.026/530	HD-AOL-4T250	0.009/560
HD50-4T280G HD50-4T280G-C	HD-AIL-4T280		HD-AOL-4T280	
HD50-4T315G HD50-4T315G-C	HD-AIL-4T315	0.023/600	HD-AOL-4T315	0.007/630
HD50-4T355G HD50-4T355G-C	HD-AIL-4T355	0.019/760	HD-AOL-4T355	0.006/800
HD50-4T400G HD50-4T400G-C	HD-AIL-4T400		HD-AOL-4T400	

Tablo 8-6 DC reactor selection (three phase 380 - 460V)

Model	DC Reactor	
	Model	Parameter (mH-A)
HD50-4T037G	HD-DCL-4T037	0.35/100
HD50-4T045G	HD-DCL-4T045	0.29/120
HD50-4T055G	HD-DCL-4T055	0.23/150
HD50-4T075G	HD-DCL-4T075	0.17/200
HD50-4T090G	HD-DCL-4T090	0.14/240
HD50-4T110G	HD-DCL-4T110	0.12/290
HD50-4T132G HD50-4T132G-C	HD-DCL-4T132	0.11/330
HD50-4T160G HD50-4T160G-C	HD-DCL-4T160	0.09/400

Model	DC Reactor	
	Model	Parameter (mH-A)
HD50-4T200G HD50-4T200G-C	HD-DCL-4T200	0.07/500
HD50-4T220G HD50-4T220G-C	HD-DCL-4T220	0.06/550
HD50-4T250G HD50-4T250G-C	HD-DCL-4T250	0.05/700
HD50-4T280G HD50-4T280G-C	HD-DCL-4T280	
HD50-4T315G HD50-4T315G-C	Bild-in	-
HD50-4T355G HD50-4T355G-C	Bild-in	-
HD50-4T400G HD50-4T400G-C	Bild-in	-

Tablo 8-7 Reactor selection (three phase 500 - 690V)

Model	AC Input Reactor Parameter (mH)	AC Output Reactor Parameter (mH)	DC Reactor Parameter (mH)
HD50-6T018G	0.93044	0.5498	1.67479
HD50-6T022G	0.73307	0.44799	1.31953
HD50-6T030G	0.62029	0.33599	1.11652
HD50-6T037G	0.5295	0.28129	0.94662
HD50-6T045G	0.43984	0.23261	0.79171
HD50-6T055G	0.32255	0.19199	0.58059
HD50-6T075G	0.27181	0.1423	0.48926
HD50-6T090G	0.18899	0.12096	0.34018
HD50-6T110G	0.16799	0.09676	0.30238
HD50-6T132G	0.1423	0.08399	0.25614
HD50-6T160G	0.12096	0.06912	0.21773
HD50-6T200G	0.10294	0.05626	0.18529
HD50-6T220G	0.09794	0.04937	0.17629
HD50-6T250G	0.09129	0.04652	0.16432
HD50-6T280G	0.07931	0.04045	0.14276
HD50-6T315G	0.06912	0.03665	0.12441
HD50-6T355G	0.06333	0.03234	0.11399
HD50-6T400G	0.05561	0.0295	0.1001

Appendix A User Menu Group U Start Guide

User Menu Group U

After mapping the used parameters to the U group, only to operate group U, and then can read and write the parameters.

When the function parameter is used less, but in the function menu it is relatively decentralized, the used function parameters can be mapped to group U. This avoids frequent switching of function parameters, and can arrange the menu order according to their own habits, to ensure easy memory and operation.

Note:

1. Need to set ten bit as zero in F01.01 (not locking parameter mapping between the U group and F group), in order to modify the group U.

2. The factory default is 1 (the mapping relationship is locked between U group and F group).

Examples

Need to connect F00.13 with user menu mapping 1 (U00.00), F03.01 and user menu mapping 2 (U00.02).

Just need setting U00.00 and U00.02, without setting map (U00.01 and U00.03), see the table below.

Where in the functional group number in front of the decimal point, two digital values are representative of the group F, 2 digits after decimal digital number on behalf of the group.

Ref. Code	Function	Setting Value	Predetermined Area
U00.00	User menu mapping setting 1	00.13	00.00 - 23.03,99.99 [Factory value] *99.99: No parameter mapping function*
U00.01	Map 1 settings	Not set	
U00.02	User menu mapping setting 2	03.01	00.00 - 23.03,99.99 [Factory value] *99.99: No parameter mapping function*
U00.03	Map 2 settings	Not set	

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

Factory Setting

U group can be up to setting 16 parameters, factory setting 14 parameters, see the table below.

Ref. Code	Setting Value	Ref. Code	Setting Value
U00.00	00.01 (Speed control mode selection)	U00.14	03.01 (Acc. time)
U00.02	00.06 (Max. output frequency of the driver)	U00.16	03.02 (Dec. time)
U00.04	00.08 (Upper limit operating frequency)	U00.18	08.00 (Motor 1 rated power)
U00.06	00.13 (Initial operating frequency digital setting)	U00.20	08.01 (Motor 1 rated voltage)
U00.08	00.10 (Frequency setting channel selection)	U00.22	08.02 (Motor 1 rated current)
U00.10	00.11 (Command setting channel selection)	U00.24	08.03 (Motor 1 rated frequency)
U00.12	02.13 (Shutdown method selection)	U00.26	08.04 (Motor 1 rated speed)

Recording Table for User Menu Content

Ref. Code	Mapping Parameters	Mapping Parameter Settings
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 B Parameters

Attributes are Changed:

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

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

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

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

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
D00: Status Display Parameters (on page 58 - 61)						
D00.00	Drive series	0x10 - 0x50			*	
D00.01	Software version of the control board	0.00 - 99.99			*	
D00.03	Special software version of the control board	0.00 - 99.99			*	
D00.05	Software version of the keypad	0.00 - 99.99			*	
D00.06	Customized series No.	0000 - 9999			*	
D00.07	Motor and control options	Unit: Displays the currently driven motor 0: Motor 1 1: Motor 2 Ten: The current control method of driving motor 0: V/f control without PG 2: IM without PG vector control 3: IM with PG vector control 5: PM with PG vector control			*	
D00.08	Rated current of the drive	5.5kW and below drive: 0.01A 7.5kW and below drive: 0.1A			*	
D00.09	Extended function of the drive	0: Standard drive 2: Tension control			*	
D00.10	Drive status	Bit0: Drive failure Bit1: Run/Stop Bit2: Forward/Reverse Bit3: Zero speed operation Bit5&4: Acc./Dec./constant speed Bit6: Reserved Bit7: DC braking Bit8: Parameter auto-tuning Bit9: Torque limit Bit10: Speed limiter Bit11: Control mode Bit12: Stall overvoltage Bit13: Automatic current limit			*	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
D00.11	Main setting frequency channel	0 - 4			*	
D00.12	Main setting frequency (Hz)	0.01 - 400.00Hz			*	
D00.13	Auxiliary setting frequency (Hz)	0.01 - 400.00Hz			*	
D00.14	Set frequency (Hz)	0.01 - 400.00Hz			*	
D00.15	Given frequency (after Acc./Dec.) (Hz)	0.01 - 400.00Hz			*	
D00.16	Output frequency (Hz)	0.01 - 400.00Hz			*	
D00.17	Set speed (rpm)	0 - 60000rpm			*	
D00.18	Running speed (rpm)	0 - 60000rpm			*	
D00.19	Three phase power supplyinput sequency	0: Positive sequence: L1 (R) lead L2 (S) lead L3 (T) 1: Negative sequence: L1 (R) leads L3 (T) leads L2 (S)			*	
D00.20	Output voltage (V)	0 - 999V			*	
D00.21	Output current (A)	0.1 - 999.9A			*	
D00.22	Torque reference (%)	-250.0 - +250.0% (rated torque)			*	
D00.23	Output torque (%)	0.0 - 300.0% (rated torque)			*	
D00.24	Output power (kW)	Actual value, unit: 0.1kW			*	
D00.25	DC bus voltage (V)	Actual value, unit: V			*	
D00.27	AI1 input voltage (V)	0.00 - 10.00V			*	
D00.28	AI1 input voltage (after processing) (V)	0.00 - 10.00V			*	
D00.29	AI2 input voltage (V)	-10.00 - +10.00V			*	
D00.30	AI2 input voltage (after processing) (V)	-10.00 - +10.00V			*	
D00.31	AI3 input voltage (V)	-10.00 - +10.00V			*	
D00.32	AI3 input voltage (after processing) (V)	-10.00 - +10.00V			*	
D00.33	AI4 input voltage (V)	-10.00 - +10.00V			*	
D00.34	AI4 input voltage (after processing) (V)	-10.00 - +10.00V			*	
D00.35	DI6 terminal pulse input frequency (Hz)	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 (Hz)	0 - 50000Hz			*	
D00.39	Radiator temperature (°C)	0.0 - 999.9°C			*	
D00.40	Set the line speed	0 - 65535			*	
D00.41	Given the linear speed	0 - 65535			*	
D00.44	Process PID reference (%)	-100.00 - +100.00%			*	
D00.45	Process PID feedback (%)	-100.00 - +100.00%			*	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
D00.46	Process PID error (%)	-100.00 - +100.00%			*	
D00.47	Process PID integral term (%)	-100.0 - +100.0%			*	
D00.48	Process PID output (%)	-100.0 - +100.0%			*	
D00.49	External count value	0 - 9999			*	
D00.50	Input terminal status	Bit0 - Bit11 corresponds to DI1 - DI12 0: Input terminal is disconnected from the corresponding common terminal 1: Input terminal is connected to the corresponding common terminal			*	
D00.51	Output terminal status	Bit0 - Bit1 corresponds to DO1 - DO2 Bit2 - Bit5 corresponds to RLY1 - RLY4 0: Output terminal is disconnected from the corresponding common terminal 1: Output terminal is connected to the corresponding common terminal			*	
D00.52	Modbus communication status	0: Normal 1: Communication timeout 2: Data Frameheader error 3: Data Framecheck error 4: The data Framecontent is wrong			*	
D00.53	Actual length (m)	0 - 65535m			*	
D00.54	Cumulative length (km)	0 - 65535km			*	
D00.55	Total power time (h)	0 - 65535h			*	
D00.56	Total running time (h)	0 - 65535h			*	
D00.57	Motor total energy consumption high (k kW.h)	0 - 65535k kW.h			*	
D00.58	Motor total energy consumption low (kW.h)	0.0 - 999.9kW.h			*	
D00.59	The running high energy consumption (k kW.h)	0 - 65535k kW.h			*	
D00.60	This run low energy consumption (kW.h)	0.0 - 999.9kW.h			*	
D00.61	The current fault	0 - 100 *100: Under voltage*			*	
D01: Tension Control Status Parameters (on page 61 - 61)						
D01.00	Tension setting (after calculation) (N)	0 - 100%			*	
D01.01	Tension balance position feedback	0 - 100%			*	

B

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
D01.02	Current roll diameter (mm)	1.0 - 5000.0mm			*	
D01.03	Current line speed (m/min)	0.1 - 6500.0rpm			*	
D01.04	Tension balance position setting	0 - 100%			*	
D01.05	Tension setting (before calculation)	0 - 100%			*	
D03: Simple Servo Status Parameters (on page 61 - 62)						
D03.00	Servo control position error	0 - 100%			*	
D03.01	Carry amount command value high	0 - 9999			*	
D03.02	Carry amount command value is low	0 - 9999			*	
D03.03	The current carry volume is high	0 - 9999			*	
D03.04	The current carry amount is low	0 - 9999			*	
D03.05	Spindle orientation stop position	0 - (4 × F14.01 - 1)			*	
D03.06	Current encoder position	0 - 65535			*	
F00: Basic Parameters (on page 62- 66)						
F00.00	Control mode selection	0: Speed control 1: Torque control	0	1	×	
F00.01	Motor 1 control mode selection	0: V/f control without PG 2: IM1 without PG vector control 3: IM1 with PG vector control 5: PM with PG vector control	0	1	×	
F00.03	Motor selection	0: Motor 1 1: Motor 2	0	1	×	
F00.04	Expansion card selection	0: Expansion card is invalid 1: HD50-EIO expansion card is valid	0	1	×	
F00.05	Extended application capabilities	0: No extension application 2: Tension control	0	1	×	
F00.06	The Max. output frequency of the drive	50.00 - 400.00Hz	50.00Hz	0.01Hz	×	
F00.07	Upper limit running frequency setting channel	0: Digital setting (F00.08) 1: Analogue input setting 2: Terminal pulse setting	0	1	×	
F00.08	Max. operating frequency	0.00Hz - F00.06	50.00Hz	0.01Hz	×	
F00.09	Lower limit of operating frequency	0.00Hz - upper limit	0.00Hz	0.01Hz	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F00.10	Frequency setting channel selection	0: Keypad setting 1: Terminal setting 2: SCI communication setting 3: Analogue setting 4: Terminal pulse setting	0	1	×	
F00.11	Command to set the channel selection	0: Keypad run command channel 1: Terminal run command channel 2: SCI communication run command channel	0	1	×	
F00.12	Multi-function key function selection	0: Keypad direction switching 1: Remote local switch 2: Multi-function button is invalid 3: Shortcut key function enable	2	1	○	
F00.13	Initial operating frequency digital setting	0.00Hz - upper limit	50.00Hz	0.01Hz	○	
F00.14	Frequency setting control	Unit: Set frequency power-down storage option 0: Not saved 1: Store to F00.13 Ten: Set frequency stop control selection 0: Set the frequency hold 1: Restored to F00.13 Hundred: Communication frequency power-off storage option 0: Not saved 1: Store to F00.13 Thousand: Digital setting frequency keep choice 0: Not save 1: Save	1001	1	×	
F00.15	Jog frequency setting 1	0.00Hz - upper limit	5.00Hz	0.01Hz	×	
F00.16	Jog run interval	0.0 - 100.0s	0.0s	0.1s	×	
F00.17	Operating direction selection	0: The same direction 1: The direction is reversed	0	1	×	
F00.18	Anti-reversal choice	0: Reverse allowed 1: Reverse rotation is prohibited	0	1	×	
F00.19	Positive and negative dead time	0.0 - 3600.0s	0.0s	0.1s	×	
F00.20	Foreign cited keypad key enable	0: Enabled 1: Invalid	0	1	○	
F01: Protection Function Parameters (on page 66 - 67)						

B

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F01.00	User password	00000 - 65535	00000	1	○	
F01.01	Menu mode selection	Unit: 0: Standard menu mode 1: Check the menu mode Ten: 0: Does not lock the mapping between group U and F parameters 1: Lock the mapping between group U and F parameters	10	1	○	
F01.02	Function code parameter initialization	0: No operation 1: Restore factory parameters 2, 3: Keypad storage parameters 1/2 copy to the control board and update the current function code settings 4: Clear error information 5, 6: Keypad storage parameters 1/2 copy to the control board and update the current function code settings (including motor parameters)	0	1	×	
F01.03	Keypad EEPROM parameter initialization	0: No operation 1, 2: The current function code setting value is uploaded to the keypad EEPROM storage parameter 1/2	0	1	○	
F02: Start and Stop Control Parameters (on page 67 - 70)						
F02.00	Start mode selection	0: Start from starting DWELL frequency 1: Brake first and then start from the starting DWELL frequency 2: Speed tracking restarting	0	1	×	
F02.01	Start delay time	0.00 - 10.00s	0.00s	0.01s	×	
F02.02	Start DWELL frequency setting	0.00Hz - upper limit	0.00Hz	0.01Hz	×	
F02.03	Start DWELL frequency hold time	0.00 - 10.00s	0.00s	0.01s	×	
F02.04	DC brake current setting	0 - 100% (drive rating current)	50%	1%	×	
F02.05	Start DC braking time	0.00 - 60.00s	0.50s	0.01s	×	
F02.13	Stop mode selection	0: Decelerate to stop 1: Freewheel stop 2: Dec. stop + DC brake	0	1	×	
F02.14	Stop DWELL frequency setting	0.00Hz - upper limit	0.00Hz	0.01Hz	×	
F02.15	Downtime DWELL frequency hold time	0.00 - 10.00s	0.00s	0.01s	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F02.16	Stop DC brake starting frequency	0.00 - 50.00Hz	0.50Hz	0.01Hz	×	
F02.17	Stop DC brake waiting time	0.00 - 60.00s	0.00s	0.01s	×	
F02.18	Stop DC braking time	0.00 - 60.00s	0.50s	0.01s	×	
F02.19	Jog control	0: Jog function such as start mode and stop mode is invalid 1: Start mode, stop mode and other functions jog enabled	0	1	×	
F03: Acc. and Dec. Parameters (on page 70 - 71)						
F03.00	Acc. and Dec. options	0: Linear Acc./Dec. 1: S-curve Acc./Dec.	0	1	×	
F03.01	Acc. time 1	0.1 - 6000.0s	15kW and below drive: 10.0s 18.5 - 55kW drive: 30.0s 75kW and above drive: 60.0s	0.1s	○	
F03.02	Dec. time 1	0.1 - 6000.0s		0.1s	○	
F03.03	Acc. time 2	0.1 - 6000.0s		0.1s	○	
F03.04	Dec. time 2	0.1 - 6000.0s		0.1s	○	
F03.05	Acc. time 3	0.1 - 6000.0s		0.1s	○	
F03.06	Dec. time 3	0.1 - 6000.0s		0.1s	○	
F03.07	Acc. time 4	0.1 - 6000.0s		0.1s	○	
F03.08	Dec. time 4	0.1 - 6000.0s		0.1s	○	
F03.09	Acc. time 2 and 1 toggle the frequency	0.00Hz - upper limit	0.00Hz	0.01Hz	×	
F03.10	Dec. time 2 and 1 toggle frequency	0.00Hz - upper limit	0.00Hz	0.01Hz	×	
F03.11	S-character at the beginning of the Acc. time	0.00 - 2.50s	0.20s	0.01s	×	
F03.12	S-curve characteristic time at the end of Acc.	0.00 - 2.50s	0.20s	0.01s	×	
F03.13	S character characteristic time when Dec. starts	0.00 - 2.50s	0.20s	0.01s	×	
F03.14	S-curve characteristic time at the end of Dec.	0.00 - 2.50s	0.20s	0.01s	×	
F03.15	Jog Acc. time	0.1 - 6000.0s	6.0s	0.1s	×	
F03.16	Jog Dec. time	0.1 - 6000.0s	6.0s	0.1s	×	
F03.17	Emergency stop	0.1 - 6000.0s	10.0s	0.1s	×	
F04: Process PID Control Parameters (on page 71 - 73)						
F04.00	Process PID control selection	0: PID control is invalid 1: PID control is valid	0	1	×	
F04.01	Given channel selection	0: Digital given 1: Analogue given 2: Terminal pulse given	0	1	×	

B

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F04.02	Feedback channel selection	0: Analogue feedback 1: Terminal pulse feedback 2: Line speed feedback	0	1	×	
F04.03	Given the amount of digital settings	-100.0 - +100.0%	0.0%	0.1%	○	
F04.04	Proportional gain (P)	0.0 - 100.0	20.0	0.1	○	
F04.05	Integration time (I)	0.01 - 10.00s	1.00s	0.01s	○	
F04.06	Points limit	0.00Hz - upper limit	3.50Hz	0.01Hz	○	
F04.07	Derivative time (D)	0.00 - 10.00s *0.00: Differential items invalid*	0.00s	0.01s	○	
F04.08	Differential limit value	0.00Hz - upper limit	2.50Hz	0.01Hz	○	
F04.09	Sampling period (T)	0.01 - 50.00s	0.10s	0.01s	○	
F04.10	Deviation limit	0.0 - 20.0%	2.0%	0.1%	○	
F04.11	PID regulator upper limit channel selection	0: F04.13 setting 1: Analogue setting 2: Terminal pulse input setting	0	1	×	
F04.12	PID regulator lower limit channel selection	0: F04.14 setting 1: Analogue setting 2: Terminal pulse setting	0	1	×	
F04.13	PID regulator upper limit	0.00Hz - upper limit	50.00Hz	0.01Hz	×	
F04.14	PID regulator lower limit	0.00Hz - upper limit	0.00Hz	0.01Hz	×	
F04.15	PID regulator adjustment characteristics	0: Positive characteristic 1: Negative characteristic	0	1	×	
F04.16	Integral adjustment options	0: Integral items stop integrating 1: Integral items continue to integrate	1	1	×	
F04.17	PID output filter time	0.01 - 10.00s	0.05s	0.01s	○	
F04.18	PID output reverse choice	0: Prohibited from reverse rotation 1: Allowed to reverse	0	1	×	
F04.19	PID output reverse frequency limit	0.00Hz - upper limit	50.00Hz	0.01Hz	×	
F04.20	The amount of analogue corresponds to the Max. line speed	0.1 - 1000.0m/min	10.0 m/min	0.1 m/min	○	
F04.21	Pulse per revolution	1 - 9999	1024	1	○	
F04.22	Reel diameter	1 - 5000mm	1mm	1mm	○	
F05: External Given Curve Parameters (on page 73 - 75)						
F05.00	External given curve selection	Unit/Ten/Hundred/Thousand: AI1 - AI4 characteristic curve selection Ten thousand: Pulse input characteristic curve selection 0: Line 1 1: Line 2	00000	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		2: Polylines				
F05.01	Line 1 is given minimum	0.0% - F05.03	0.0%	0.1%	○	
F05.02	Line 1 minimum given the corresponding value	0.0 - 100.0%	0.0%	0.1%	○	
F05.03	Line 1 is the Max. given	F05.01 - 100.0%	100.0%	0.1%	○	
F05.04	Line 1 gives the Max. corresponding value	0.0 - 100.0%	100.0%	0.1%	○	
F05.05	Line 2 minimum given	0.0% - F05.07	0.0%	0.1%	○	
F05.06	Line 2 minimum given corresponding value	0.0 - 100.0%	0.0%	0.1%	○	
F05.07	Line 2 Max. given	F05.05 - 100.0%	100.0%	0.1%	○	
F05.08	Line 2 should be given the Max. value	0.0 - 100.0%	100.0%	0.1%	○	
F05.09	Polyline Max. given	F05.11 - 100.0%	100.0%	0.1%	○	
F05.10	Polyline Max. given corresponding value	0.0 - 100.0%	100.0%	0.1%	○	
F05.11	Polyline inflection point 2 given	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	Polyline inflection point 1 given	F05.15 - F05.11	0.0%	0.1%	○	
F05.14	Inflection point 1 corresponds to the value	0.0 - 100.0%	0.0%	0.1%	○	
F05.15	Polyline minimum given	0.0% - F05.13	0.0%	0.1%	○	
F05.16	Polyline minimum given the corresponding value	0.0 - 100.0%	0.0%	0.1%	○	
F05.17	Jump frequency 1	F00.09 - upper limit	0.00Hz	0.01Hz	×	
F05.18	Jump frequency 2	F00.09 - upper limit	0.00Hz	0.01Hz	×	
F05.19	Jump frequency 3	F00.09 - upper limit	0.00Hz	0.01Hz	×	
F05.20	Jump frequency range	0.00 - 30.00Hz	0.00Hz	0.01Hz	×	
F05.21	JOG operation frequency digital setting 2	0.00Hz - upper limit	5.00Hz	0.01Hz	×	
F06: Multi-speed and Simple PLC (on page 75 - 78)						
F06.00	Multi-frequency command 1	F00.09 - upper limit	5.00Hz	0.01Hz	○	
F06.01	Multi-frequency command 2	F00.09 - upper limit	5.00Hz	0.01Hz	○	
F06.02	Multi-frequency command 3	F00.09 - upper limit	5.00Hz	0.01Hz	○	
F06.03	Multi-frequency command 4	F00.09 - upper limit	5.00Hz	0.01Hz	○	
F06.04	Multi-frequency command 5	F00.09 - upper limit	5.00Hz	0.01Hz	○	
F06.05	Multi-frequency command 6	F00.09 - upper limit	5.00Hz	0.01Hz	○	
F06.06	Multi-frequency command 7	F00.09 - upper limit	5.00Hz	0.01Hz	○	
F06.07	Multi-frequency command 8	F00.09 - upper limit	5.00Hz	0.01Hz	○	
F06.08	Multi-frequency command 9	F00.09 - upper limit	5.00Hz	0.01Hz	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F06.09	Multi-frequency command 10	F00.09 - upper limit	5.00Hz	0.01Hz	○	
F06.10	Multi-frequency command 11	F00.09 - upper limit	5.00Hz	0.01Hz	○	
F06.11	Multi-frequency command 12	F00.09 - upper limit	5.00Hz	0.01Hz	○	
F06.12	Multi-frequency command 13	F00.09 - upper limit	5.00Hz	0.01Hz	○	
F06.13	Multi-frequency command 14	F00.09 - upper limit	5.00Hz	0.01Hz	○	
F06.14	Multi-frequency command 15	F00.09 - upper limit	5.00Hz	0.01Hz	○	
F06.15	Simple PLC control selection	0: Invalid 1: Enable	0	1	×	
F06.16	Simple PLC operation mode selection	Unit: PLC operation mode selection 0: Stop after single cycle 1: Maintain the final value after a single cycle 2: Continuous cycle Ten: PLC interrupt operation restart mode selection 0: Run from the first stage 1: Continue operating from the operating frequency at the phase of the interruption 2: Continue running at the operating frequency at the time of interruption Hundred: PLC state parameter storage selection when power off 0: Not save 1: Save Thousand: PLC time period unit choice 0: Second (s) 1: Minute (m)	0000	1	×	
F06.17	PLC stage 1 setting	Unit: PLC operating frequency selection 0: Multi-frequency command 1: Determined by F00.10 Ten: PLC operating direction of the stage selection 0: Forward 1: Reverse	000	1	○	
F06.19	PLC stage 2 setting		000	1	○	
F06.21	PLC stage 3 setting		000	1	○	
F06.23	PLC stage 4 setting		000	1	○	
F06.25	PLC stage 5 setting		000	1	○	
F06.27	PLC stage 6 setting		000	1	○	
F06.29	PLC stage 7 setting		000	1	○	
F06.31	PLC stage 8 setting		000	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F06.33	PLC stage 9 setting	2: Set by the run command Hundred: PLC each stage plus Dec. time choice 0: Add Dec. time 1 1: Add Dec. time 2 2: Add Dec. time 3 3: Add Dec. time 4	000	1	○	
F06.35	PLC stage 10 setting		000	1	○	
F06.37	PLC stage 11 setting		000	1	○	
F06.39	PLC stage 12 setting		000	1	○	
F06.41	PLC stage 13 setting		000	1	○	
F06.42	PLC stage 14 setting		000	1	○	
F06.45	PLC stage 15 setting		000	1	○	
F06.18	Stage 1 running time	0.0 - 3276.7	5.0	0.1	○	
F06.20	Stage 2 running time	0.0 - 3276.7	0.0	0.1	○	
F06.22	Stage 3 running time	0.0 - 3276.7	0.0	0.1	○	
F06.24	Stage 4 running time	0.0 - 3276.7	0.0	0.1	○	
F06.26	Stage 5 running time	0.0 - 3276.7	0.0	0.1	○	
F06.28	Stage 6 running time	0.0 - 3276.7	0.0	0.1	○	
F06.30	Stage 7 running time	0.0 - 3276.7	0.0	0.1	○	
F06.32	Stage 8 running time	0.0 - 3276.7	0.0	0.1	○	
F06.34	Stage 9 running time	0.0 - 3276.7	0.0	0.1	○	
F06.36	Stage 10 running time	0.0 - 3276.7	0.0	0.1	○	
F06.38	Stage 11 running time	0.0 - 3276.7	0.0	0.1	○	
F06.40	Stage 12 running time	0.0 - 3276.7	0.0	0.1	○	
F06.42	Stage 13 running time	0.0 - 3276.7	0.0	0.1	○	
F06.44	Stage 14 running time	0.0 - 3276.7	0.0	0.1	○	
F06.46	Stage 15 running time	0.0 - 3276.7	0.0	0.1	○	
F07: Textile Swing Frequency Parameters (on page 78 - 79)						
F07.00	Wobble operation mode	0: Disabled 1: Enabled	0	1	×	
F07.01	Wobble operation mode	Unit: Start mode of wobble operation 0: Auto start 1: Manual start Ten: Wobble operation amplitude 0: The wobble central frequency 1: The Max. output frequency Hundred: Restart mode of wobble operation 0: The drive restarts the wobble operation as per the recorded frequency and direction when it stops last time 1: The drive restarts the wobble operation from 0Hz	0000	1	×	

B

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F07.01	Wobble operation mode	Thousand: Save the wobble operation parameters at power outage 0: Saved 1: Not be saved	0000	1	×	
F07.02	Preset wobble frequency	0.00Hz - 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%	×	
F07.05	Jump frequency	0.0% - F07.04	0.0%	0.1%	×	
F07.06	Wobble operation cycle	0.1 - 6000.0s	10.0s	0.1s	×	
F07.07	Rising time of triangle wave	0.0 - 100.0% (F07.06)	50.0%	0.1%	×	
F08: Asyn. Motor 1 Parameters (on page 79 - 81)						
F08.00	Rated power of Asyn. motor 1	0.2 - 500.0kW	Depend on HD50	0.1kW	×	
F08.01	Rated voltage of Asyn. motor 1	0 - 999V		1V	×	
F08.02	Rated current of Asyn. motor 1	5.5kW above motor: 0.1 - 999.9A		0.1A	×	
		5.5kW and below motor: 0.01 - 99.99A		0.01A		
F08.03	Rated frequency of Asyn. motor 1	1.0 - 400.0Hz	50.0Hz	0.1Hz	×	
F08.04	Rated RPM of Asyn. motor 1	1 - 24000rpm	1500rpm	1rpm	×	
F08.05	Power factor of Asyn. motor 1	0.001 - 1.000	Depend on HD50	0.001	×	
F08.06	Parameter auto-tuning of Asyn. motor 1	0: Auto-tuning is disabled 1: Stationary auto-tuning 2: Rotary auto-tuning	0	1	×	
F08.07	Stator resistance of Asyn. motor 1	Motor above 5.5kW: 0.000 - 9.999Ω	Depend on HD50	0.001Ω	×	
		Motor below 5.5kW: 0.00 - 99.99Ω		0.01Ω		
F08.08	Rotor resistance of Asyn. motor 1	Motor above 5.5kW: 0.000 - 9.999Ω		0.001Ω	×	
		Motor below 5.5kW: 0.00 - 99.99Ω		0.01Ω		
F08.09	Leakage inductance of Asyn. motor 1	Motor above 5.5kW: 0.0 - 999.9mH		0.1mH	×	
		Motor below 5.5kW: 0 - 9999mH		1mH		
F08.10	Mutual inductance of Asyn. motor 1	Motor above 5.5kW: 0.0 - 500.0mH		0.1mH	×	
		Motor below 5.5kW: 0 - 5000mH		1mH		
F08.11	Idling exciting current of Asyn. motor 1	Motor above 5.5kW: 0.0 - 999.9A		0.1A	×	
		Motor below 5.5kW: 0.00 - 99.99A		0.01A		
F08.12	Asyn. motor 1 core saturation coefficient 1	0.00 - 1.00	1.00	0.01	×	
F08.13	Asyn. motor 1 core saturation coefficient 2	0.00 - 1.00	1.00	0.01	×	
F08.14	Asyn. motor 1 core saturation coefficient 3	0.00 - 1.00	1.00	0.01	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F08.15	Asyn. motor 1 core saturation coefficient 4	0.00 - 1.00	1.00	0.01	×	
F08.16	Asyn. motor 1 core saturation coefficient 5	0.00 - 1.00	1.00	0.01	×	
F09: Asyn. Motor 1 V/f Control Parameters (on page 81 - 83)						
F09.00	Asyn. motor 1 V/f curve setting	0: Straight line 1: Square curve 2: 1.2 power curve 3: 1.7 power curve 4: User-defined curve	0	1	×	
F09.01	Asyn. motor 1 V/f frequency value F3	F09.03 - F08.03	0.00Hz	0.01Hz	×	
F09.02	Asyn. motor 1 V/f voltage value V3	F09.04 - F08.01	0V	1V	×	
F09.03	Asyn. motor 1 V/f frequency value F2	F09.05 - F09.01	0.00Hz	0.01Hz	×	
F09.04	Asyn. motor 1 V/f voltage value V2	F09.06 - F09.02	0V	1V	×	
F09.05	Asyn. motor 1 V/f frequency value F1	0.00Hz - F09.03	0.00Hz	0.01Hz	×	
F09.06	Asyn. motor 1 V/f voltage value V1	0V - F09.04	0V	1V	×	
F09.07	Asyn. motor 1 torque boost	0.0 - 30.0% *0.0: Automatic torque boost*	45kW and below drive: 2.0% 55 - 132kW drive: 1.0% 160kW and above drive: 0.5%	0.1%	×	
F09.08	Asyn. motor 1 manual torque boost cut-off point	0.0 - 50.0% (F08.03)	30.0%	0.1%	○	
F09.09	Asyn. motor 1 slip compensation gain	0.0 - 300.0%	100.0%	0.1%	○	
F09.10	Asyn. motor 1 slip compensation filter time	0.01 - 10.00s	0.10s	0.01s	○	
F09.11	Asyn. motor 1 slip compensation limited	0.0 - 250.0%	200.0%	0.1%	×	
F09.12	Asyn. motor 1 compensates the time constant	0.1 - 25.0s	2.0s	0.1s	○	

B

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F09.13	Asyn. motor 1 V/f speed loop output limited	0.0 - 20.0% (F00.06)	5.0%	0.1%	×	
F09.14	Asyn. motor 1 AVR (Automatic Voltage Regulation) function	0: No action 1: Always action 2: Only slow down does not move	1	1	○	
F09.16	Asyn. motor 1 suppresses the oscillation coefficient	0 - 200	50	1	○	
F10: Motor 1 Vector Control Speed Loop Parameters (on page 83 - 84)						
F10.00	Motor 1 speed control Proportional gain 1	0.1 - 200.0	20.0	0.1	○	
F10.01	Motor 1 speed control integration time 1	0.00 - 10.00s	0.20s	0.1s	○	
F10.02	Motor 1 speed control Proportional gain 2	0.1 - 200.0	20.0	0.1	○	
F10.03	Motor 1 speed control integration time 2	0.00 - 10.00s	0.20s	0.1s	○	
F10.04	Motor 1 speed loop PI switching frequency 1	0.00 - 50.00Hz	10.00Hz	0.1Hz	○	
F10.05	Motor 1 speed loop PI switching frequency 2	0.00 - 50.00Hz	15.00Hz	0.01Hz	○	
F10.06	Motor 1 speed loop integral limit	0.0 - 200.0% (F08.02)	180.0%	0.1%	○	
F10.07	Motor 1 speed loop differential time	0.00 - 1.00s *0.00: No different term*	0.00s	0.01s	○	
F10.08	Motor 1 speed loop output filter time	0.000 - 1.000s *0.000: Do not filter*	0.020s	0.001s	○	
F10.09	Motor 1 motor torque limited channel	0: Digital setting 1: Analogue input setting 2: Terminal pulse setting	0	1	×	
F10.10	Motor 1 regenerative torque defines the channel		0	1	×	
F10.11	Motor torque limitation when motor 1 is forward	0.0 - 200.0% (F08.02)	180.0%	0.1%	×	
F10.12	Motor torque limitation when motor 1 is reverse	0.0 - 200.0% (F08.02)	180.0%	0.1%	×	
F10.13	Recreated torque limitation when motor 1 is forward	0.0 - 200.0% (F08.02)	180.0%	0.1%	×	
F10.14	Recreated torque limitation when motor 1 is reverse	0.0 - 200.0% (F08.02)	180.0%	0.1%	×	
F11: Current Ring Parameters (on page 84 - 84)						
F11.00	Motor 1 current loop KP	1 - 8000	1000	1	○	
F11.01	Motor 1 current loop KI	1 - 4000	500	1	○	
F11.02	Motor 1 current loop output filter frequency	0 - 31	3	1	○	
F12: Synchronous Motor Parameters (on page 84 - 85)						
F12.00	Syn. motor type	0: IPM	0	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		1: SMPM				
F12.01	Syn. motor rated power	0.2 - 500.0kW	Depend on HD50	0.1kW	×	
F12.02	Syn. motor rated voltage	0 - 999V		1V	×	
F12.03	Syn. motor rated current	0.1 - 999.9A		0.1A	×	
F12.04	Syn. motor rated power	1.0 - 400.0Hz	50.0Hz	0.1Hz	×	
F12.05	Syn. motor rated RPM	1 - 24000rpm	1500rpm	1rpm	×	
F12.06	Syn. motor stator resistance	0.000 - 9.999Ω	0.000Ω	0.001Ω	×	
F12.07	Syn. motor cross-axis inductance	0.0 - 999.9mH	0.0mH	0.1mH	×	
F12.08	Syn. motor direct-axis inductance	0.0 - 999.9mH	0.0mH	0.1mH	×	
F12.09	Syn. motor back EMF	0V - F12.02	380V	1V	×	
F12.10	Syn. motor angle self-tuning	0: No action 1: Static self-tuning 2: Rotation self-tuning	0		×	
F12.11	Syn. motor rotation self-tuning current setting	0.0 - 100.0% (F12.03)	5.0%	0.1%	×	
F12.12	Syn. motor initial angle	0.0 - 359.9°	0.0°	0.1°	×	
F12.13	Syn. motor Z pulse initial angle	0.0 - 359.9°	0.0°	0.1°	×	
F12.14	Syn. motor angle static self - tuning voltage	0.0 - 100.0% (F12.02)	100.0%	0.1%	×	
F12.15	Syn. motor cosine encoder C amplitude	0 - 9999	2048	1	×	
F12.16	Syn. motor cosine encoder C zero bias	0 - 9999	2048	1	×	
F12.17	Syn. motor cosine encoder D amplitude	0 - 9999	2048	1	×	
F12.18	Syn. motor cosine encoder D zero bias	0 - 9999	2048	1	×	
F13: Asyn. Motor 2 Parameters (on page 85 - 87)						
F13.00	Asyn. motor 2 control method selection	0: V/f control without PG 2: IM2 without PG vector control 3: IM2 with PG vector control	0	1	×	
F13.01	Asyn. motor 2 rated power	0.2 - 500.0kW	Depend on HD50	0.1kW	×	
F13.02	Asyn. motor 2 rated voltage	0 - 999V		1V	×	
F13.03	Asyn. motor 2 rated current	5.5kW above motor: 0.1 - 999.9A		0.1A	×	
		5.5kW and below motor: 0.01 - 99.99A		0.01A		
F13.04	Asyn. motor 2 rated frequency	1.0 - 400.0Hz	50.0Hz	0.1Hz	×	
F13.05	Asyn. motor 2 rated RPM	1 - 24000rpm	1500rpm	1rpm	×	
F13.06	Asyn. motor 2 power factor	0.001 - 1.000	Depend on HD50	0.001	×	

B

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F13.07	Asyn. motor 2 parameters self-tuning	0: No action 1: Motor self-tuning at rest 2: Motor rotation self-tuning	0	1	×	
F13.08	Asyn. motor 2 stator resistance	5.5kW above motor: 0.000 - 9.999Ω	Depend on HD50	0.001Ω	×	
		5.5kW and below motor: 0.00 - 99.99Ω		0.01Ω		
F13.09	Asyn. motor 2 rotor resistance	5.5kW above motor: 0.000 - 9.999Ω		0.001Ω	×	
		5.5kW and below motor: 0.00 - 99.99Ω		0.01Ω		
F13.10	Asyn. motor 2 leakage inductance	5.5kW above motor: 0.0 - 999.9mH		0.01mH	×	
		5.5kW and below motor: 0 - 9999mH		1mH		
F13.11	Asyn. motor 2 mutual inductance	5.5kW above motor: 0.0 - 500.0mH		0.1mH	×	
		5.5kW and below motor: 0 - 5000mH		1mH		
F13.12	Asyn. motor 2 no-load excitation current	5.5kW above motor: 0.0 - 999.9A		0.1A	×	
		5.5kW and below motor: 0.00 - 99.99A		0.01A		
F13.13	Asyn. motor 2 core saturation coefficient	0.00 - 1.00	1.00	0.01	×	
F13.14	Asyn. motor 2 core saturation coefficient 2	0.00 - 1.00	1.00	0.01	×	
F13.15	Asyn. motor 2 core saturation factor 3	0.00 - 1.00	1.00	0.01	×	
F13.16	Asyn. motor 2 V/f curve setting	0: Straight line 1: Square curve 2: 1.2 power curve 3: 1.7 power curve 4: User-defined curve	0	1	×	
F13.17	Asyn. motor 2 V/f frequency value F3	F13.19 - F13.04	0.00Hz	0.01Hz	×	
F13.18	Asyn. motor 2 V/f voltage value V3	F13.20 - F13.02	0V	1V	×	
F13.19	Asyn. motor 2 V/f frequency value F2	F13.21 - F13.17	0.00Hz	0.01Hz	×	
F13.20	Asyn. motor 2 V/f voltage value V2	F13.22 - F13.18	0V	1V	×	
F13.21	Asyn. motor 2 V/f frequency value F1	0.00Hz - F13.19	0.00Hz	0.01Hz	×	
F13.22	Asyn. motor 2 V/f voltage value V1	0V - F13.20	0V	1V	×	
F13.23	Asyn. motor 2 torque boost	0.0 - 30.0% *0.0: Automatic torque boost*	45kW and below drive: 2.0%	0.1%	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
			55 - 132kW drive: 1.0% 160kW and above drive: 0.5%			
F13.24	Asyn. motor 2 manual torque boost cut-off point	0.0 - 50.0% (F13.04)	30.0%	0.1%	○	
F13.25	Asyn. motor 2 slip compensation gain	0.0 - 300.0%	100.0%	0.1%	○	
F13.26	Asyn. motor 2 slip compensation filter time	0.01 - 10.00s	0.10s	0.01s	○	
F13.27	Asyn. motor 2 slip compensation limited	0.0 - 250.0%	200.0%	0.1%	×	
F13.28	Asyn. motor 2 compensates time constant	0.1 - 25.0s	2.0s	0.1s	○	
F13.29	Asyn. motor 2 V/f speed loop output limited	0.0 - 20.0% (F00.06)	5.0%	0.1%	×	
F13.30	Asyn. motor 2 AVR function	0: No action 1: Always action 2: Only slow down does not move	1	1	○	
F13.32	Asyn. motor 2 suppresses oscillation factor	0 - 200	50	1	○	
F13.35	Asyn. motor 2 speed control proportional gain 1	0.1 - 200.0	20.0	0.1	○	
F13.36	Asyn. motor 2 speed control integration time 1	0.00 - 10.00s	0.20s	0.01s	○	
F13.37	Asyn. motor 2 speed control proportional gain 2	0.1 - 200.0	20.0	0.1	○	
F13.38	Asyn. motor 2 speed control integration time 2	0.00 - 10.00s	0.20s	0.01s	○	
F13.39	Asyn. motor 2 speed loop PI switching frequency 1	0.00 - 50.00Hz	10.00Hz	0.01Hz	○	
F13.40	Asyn. motor 2 speed loop PI switching frequency 2	0.00 - 50.00Hz	15.00Hz	0.01Hz	○	
F13.41	Asyn. motor 2 speed loop integral limit	0.0 - 200.0% (F13.03)	180.0%	0.1%	○	
F13.42	Asyn. motor 2 speed loop differential time	0.00 - 1.00s *0.00: There is no different term in the speed loop*	0.00s	0.01s	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F13.43	Asyn. motor 2 speed loop output filter time	0.000 - 1.000s *0.000: Do not filter*	0.020s	0.001s	○	
F13.44	Asyn. motor 2 electric torque limit channel	0: Torque limit set by digital 1: The torque limit is determined by analogue input 2: The torque limit value is given by the terminal pulse	0	1	×	
F13.45	Asyn. motor 2 regenerative torque limited channels		0	1	×	
F13.46	Asyn. motor 2 positive torque limit	0.0 - 200.0% (F13.03)	180.0%	0.1%	×	
F13.47	Asyn. motor 2 reverses the motor torque limit	0.0 - 200.0% (F13.03)	180.0%	0.1%	×	
F13.48	Asyn. motor 2 regenerative torque limit forward	0.0 - 200.0% (F13.03)	180.0%	0.1%	×	
F13.49	Asyn. motor 2 regenerative torque limit when limited	0.0 - 200.0% (F13.03)	180.0%	0.1%	×	
F13.50	Asyn. motor 2 current loop KP	1 - 8000	1000	1	○	
F13.51	Asyn. motor 2 current ring KI	1 - 4000	500	1	○	
F13.52	Asyn. motor 2 current loop output filter frequency	0 - 31	3	1	○	
F13.53	Asyn. motor 2 core saturation factor 4	0.00 - 1.00	1.00	0.01	×	
F13.54	Asyn. motor 2 core saturation factor 5	0.00 - 1.00	1.00	0.01	×	
F14: Encoder Parameters (on page 87 - 88)						
F14.00	Encoder feedback signal type	0: Encoder card is invalid 1: ABZ signal 2: UVW signal 3: SINCOS signal 3: SINCOS signal 4: 1313 serial communication encoder signal 5: Resolver encoder signal	0	1	×	
F14.01	Encoder pulse per revolution	1 - 9999	1024	1	×	
F14.02	Encoder rotation direction setting	0: The same direction 1: The direction is reversed	0	1	×	
F14.03	Encoder signal filtering times	0x00 - 0xFF Unit: Low-speed filtering times Ten: High-speed filtering times	0x33	1	○	
F14.04	Motor 1 encoder disconnection detection action selection	0: Freewheel stop 1: Emergency stop 2: Dec. stop	1	1	×	
F14.05	Motor 1 motor speed action selection	0: Freewheel stop 1: Emergency stop	0	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F14.06	Motor 1 speed deviation is too large action selection	2: Dec. stop 3: Continue to run	0	1	×	
F14.07	Motor 1 PG disconnection detection time	0.00 - 2.00s *0.00: Not detect encoder disconnection*	0.00s	0.01s	×	
F14.08	Motor 1 PG reverse detection time	0.00 - 2.00s *0.00: Not detected encoder inversion*	0.00s	0.01s	×	
F14.09	Motor 1 motor speed detection value	0.0 - 120.0% (F00.06)	110.0%	0.1%	×	
F14.10	Motor 1 motor speed detection time	0.00 - 2.00s *0.00: Not detect the motor speeding*	0.00s	0.01s	×	
F14.11	Motor 1 speed deviation detection value is too large	0.0 - 30.0% (F00.06)	20.0%	0.1%	×	
F14.12	Motor 1 speed deviation detection time is too large	0.00 - 2.00s *0.00: Not detect that the motor speed deviation is too large*	0.00s	0.01s	×	
F14.13	Motor 2 encoder disconnection detection action selection	0: Freewheel stop 1: Emergency stop 2: Dec. stop	1	1	×	
F14.14	Motor 2 motor speed action selection	0: Freewheel stop 1: Emergency stop 2: Dec. stop 3: Continue to run	0	1	×	
F14.15	Motor 2 speed deviation is too large when action selection		0	1	×	
F14.16	Motor 2 PG disconnection detection time	0.00 - 2.00s *0.00: Not detect encoder disconnection*	0.00s	0.01s	×	
F14.17	Motor 2 PG reverse detection time	0.00 - 2.00s *0.00: Not detected encoder inversion*	0.00s	0.01s	×	
F14.18	Motor 2 motor speed detection value	0.0 - 120.0% (F00.06)	110.0%	0.1%	×	
F14.19	Motor 2 motor speed detection time	0.00 - 2.00s *0.00: Not detect the motor speeding*	0.00s	0.01s	×	
F14.20	Motor 2 speed deviation is too large detection value	0.0 - 30.0% (F00.06)	20.0%	0.1%	×	
F14.21	Motor 2 speed deviation detection time is too large	0.00 - 2.00s *0.00: Not detect that the motor speed deviation is too large*	0.00s	0.01s	×	
F14.22	Motor and encoder speed ratio	0.001 - 30.000	1.000	0.001	×	
F14.23	Speed method selection	0: Full M method 1: M/T method	0	1	×	
F14.24	Resolver encoder card frequency coefficient setting	1 - 126	1	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F14.25	Serial encoder communication protocol selection	0: Endat 1: Rotary encoder communication	0	1	×	
F15: Digital I/O Terminal Parameters (on page 88 - 100)						
F15.00	DI1 terminal function	0: Reserved 1: Drive is enabled 2,3: Forward/reverse function 4: Three-wire operation control 5 - 7: Frequency setting channel selection 1 - 3 8: Frequency switch to analogue 9,10: Operation command channel switching 1,2 11: Command to switch to terminal 12: External stop command input 13 - 16: Multi-frequency terminals 1 - 4 17,18: Frequency up (UP)/down (DN) instructions 19: Auxiliary setting frequency is cleared 20,21: Forward/Reverse Jogging 1 command control input (JOGF1/JOGR1) 22,23: Forward/reverse jogging 2 command control input (JOGF2/JOGR2) 24,25: Jog 1 command/direction control input *Note: When functions 20 and 21 are selected, functions 24 and 25 are invalid* 26,27: Acc./Dec. time selection terminals 1 and 2 28: Acc./Dec. mode selection 29: Acc./Dec. prohibited 30: Switch to normal operation mode 31: PLC shutdown status reset 32: Process PID paused 33: Prohibition of process PID 34: PID integral hold 35: PID integral clear 36: Swing frequency input 37: Swing frequency state reset 38: Stop DC brake input 39,40: External interrupt normally open/normally closed contact input	2	1	×	
F15.01	DI2 terminal function		3	1	×	
F15.02	DI3 terminal function		0	1	×	
F15.03	DI4 terminal function		0	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F15.04	DI5 terminal function	41,42: Freewheel stop normally open/normally closed input 43: Emergency stop 44,45: External fault normally open/normally closed input 46: External reset (RST) input 47: Motor 1,2 switch 48: Timer function input 49: The actual length is cleared input 50: Counter clear signal input 51: Counter trigger signal input 52: Length count input (DI6 only) 53: Pulse frequency input (DI6 only) 54: Pre-excitation input 55: Zero servo instruction input 56: Speed/torque control switch 57: Torque control torque direction switching 58: Torque bias enabled 59: Torque bias hold 60: Position loop gain switching 61: Position pulse input (DI6 only) 62 - 64: Position digital reference selection terminal 1 - 3 65: Position deviation clear 66: Spindle orientation starts 67, 68: Spindle stop position selection terminal 1/2 69: Tension control mode and other mode switch 70 - 84: Reserved 85: Simple PLC suspends the operation instruction 86: Terminal stop DC braking	0	1	×	
F15.05	DI6 terminal function		61	1	×	
F15.06	DI7 terminal function		0	1	×	
F15.07	DI8 terminal function		0	1	×	
F15.08	DI9 terminal function		0	1	×	
F15.09	DI10 terminal function		0	1	×	
F15.10	DI11 terminal function		0	1	×	
F15.11	DI12 terminal function		0	1	×	
F15.12	Terminal UP/DN Acc./Dec. rate	0.00 - 99.99Hz/s	1.00Hz/s	0.01Hz/s	×	
F15.13	Terminal detection interval time	0: 2ms 1: 4ms 2: 8ms	0	1	○	
F15.14	Terminal detection filter times	0 - 10000	2	1	○	
F15.15	Terminal input positive and negative logic settings	Bit0 - Bit11 correspond to DI1 - DI12 Bitx: DIy terminal input positive and negative logic 0: Positive logic 1: Negative logic	000	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F15.16	Forward/reverse operation mode setting	0: Two-line 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 external device fault action selection	0: Freewheel stop 1: Emergency stop 2: Decelerate stop 3: Continue to run	0	1	×	
F15.18	DO1 terminal function	0: Reserved 1: The drive is ready 2: The drive is running 3: The drive is running forward 4: Drive reversing operation 5: Drive DC brake 6: Drive is in zero-frequency status 7: Drive is in zero-frequency running 8: Torque limit action (speed control) 9, 10: Frequency level detection signal 1, 2 (FDT1, FDT2) 11: Frequency arrival (FAR) 12: Upper limit of frequency 13: Frequency lower limit 14: Swing frequency limit 15: Simple PLC running indication 16: Simple PLC operation pause instruction 17: Simple PLC cycle complete instructions 18: Simple PLC stage operation complete instructions 19: Simple PLC operation completion indication 20: Data from SCI communication output 21: Set the running time to arrive 22: Timing function output 23: Set count value reached 24: The specified count value arrived 25: Set the length to reach 26: Motor 1,2 Indication 29: Undervoltage lockout is stopped 30: Overload detection 31: Drive failure 32: External fault	2	1	×	
F15.19	DO2 terminal function		0	1	×	
F15.20	RLY1 relay function		31	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F15.21	RLY2 relay function	33: During a drive fault auto-reset 34: Three phase power supply input forward 35: Speed limit operation (torque control) 36: Zero servo positioning completed 37: Encoder phase A leads phase B 38: High-speed pulse output (DO2 only) 39: Positioning completed 40: Positioning close 41: The position deviation is too large	0	1	×	
F15.22	RLY3 relay function		0	1	×	
F15.23	RLY4 relay function		0	1	×	
F15.24	Output terminal positive and negative logic settings	Bit0 - Bit1 corresponds to DO1 - DO2 Bit2 - Bit5 corresponds to RLY1 - RLY4 Bitx: DOy and RLYy terminal output positive and negative logic 0: Positive logic 1: Negative logic	00	1	○	
F15.25	Timing function ON side delay time	0.00 - 300.00s	0.00s	0.01s	○	
F15.26	Timing function OFF side delay time	0.00 - 300.00s	0.00s	0.01s	○	
F15.27	Frequency arrival (FAR) detection width	0.00 - 100.00Hz	2.50Hz	0.01Hz	○	
F15.28	Zero-frequency signal detection value	0.00Hz - upper limit	0.00Hz	0.01Hz	○	
F15.29	Zero-frequency return deviation	0.00Hz - upper limit	0.00Hz	0.01Hz	○	
F15.30	FDT1 detection method	0: The given frequency 1: The output frequency	0	1	○	
F15.31	FDT1 level	0.00Hz - upper limit	50.00Hz	0.01Hz	○	
F15.32	FDT1 lag	0.00Hz - upper limit	1.00Hz	0.01Hz	○	
F15.33	FDT2 detection method	0: The given frequency 1: The output frequency	0	1	○	
F15.34	FDT2 level	0.00Hz - upper limit	50.00Hz	0.01Hz	○	
F15.35	FDT2 lag	0.00Hz - upper limit	1.00Hz	0.01Hz	○	
F15.36	Set running time	0 - 65535h *0: Preset operating time is disabled*	0h	1h	○	
F15.37	Set the count value reaches the given	F15.38 - 9999	0	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F15.38	The specified count value reaches the given	0 - F15.37	0	1	○	
F15.43	Terminal output delay	0.0 - 100.0s	0.0s	0.1s	○	
F16: Analogue I/O Terminal Parameters (on page 100 - 103)						
F16.01	AI1 terminal function	0: Reserved 1: Upper limit frequency to set the channel 2: Frequency setting channel 3: Auxiliary frequency setting 4: Process PID reference 5: Process PID feedback 6: Process PID regulation upper limit 7: Process PID regulation lower limit 8: Motor overheat signal input (AI4 only) 9,11: Motor 1/2 motor torque limit 10,12: Motor 1/2 regenerative torque limit 13: Torque command given 14: Torque bias given 15: Torque control upper limit frequency	2	1	×	
F16.02	AI2 terminal function		5	1	×	
F16.03	AI3 terminal function		0	1	×	
F16.04	AI4 terminal function		0	1	×	
F16.05	AI1 offset	-100.0 - +100.0%	0.0%	0.1%	○	
F16.08	AI2 offset	-100.0 - +100.0%	0.0%	0.1%	○	
F16.11	AI3 offset	-100.0 - +100.0%	0.0%	0.1%	○	
F16.14	AI4 offset	-100.0 - +100.0%	0.0%	0.1%	○	
F16.06	AI1 gain	-10.0 - +10.0	1.0	0.1	○	
F16.09	AI2 gain	-10.0 - +10.0	1.0	0.1	○	
F16.12	AI3 gain	-10.0 - +10.0	1.0	0.1	○	
F16.15	AI4 gain	-10.0 - +10.0	1.0	0.1	○	
F16.07	AI1 filter time	0.01 - 10.00s	0.05s	0.01s	○	
F16.10	AI2 filter time	0.01 - 10.00s	0.05s	0.01s	○	
F16.13	AI3 filter time	0.01 - 10.00s	0.05s	0.01s	○	
F16.16	AI4 filter time	0.01 - 10.00s	0.05s	0.01s	○	
F16.17	Max. input pulse frequency	0.0 - 50.0kHz	10.0kHz	0.1kHz	○	
F16.18	Input pulse filter time	0 - 500ms	10ms	1ms	○	
F16.19	AO1 terminal function	0: Reserved 1: Output frequency (0 - Max. output frequency) 2: Given frequency (0 - Max. output frequency) 3: Motor speed (0 - Max. output frequency corresponding speed)	1	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F16.20	AO2 terminal function	4: Output current (0 - 2 times the drive rated current) 5: Output current (0 - 2 times the motor rated current) 6: Torque command (0 - 1 times motor rated torque) 7: Flux command (0 - 1 times motor rated current) 10: Output torque (0 - 3 times rated motor torque) 11: Output voltage (0 - 1.2 times drive rated voltage) 12: DC bus voltage (0 - 2.2 times drive rated voltage) 13: Output power (0 - 2 times the motor rated power) 14: AI1 input (0 - 10V) 15 - 17: AI2 - AI4 input (-10 - +10V/0 - 20mA) 18: Output frequency (-1 - +1 times the Max. output frequency) 19: Given frequency (-1 - +1 times the Max. output frequency)	0	1	○	
F16.21	High-speed pulse output function		0	1	○	
F16.22	AO1 offset	-100.0 - +100.0%	0.0%	0.1%	○	
F16.23	AO1 gain	0.0 - 200.0%	100.0%	0.1%	○	
F16.24	AO2 offset	-100.0 - +100.0%	0.0%	0.1%	○	
F16.25	AO2 gain	0.0 - 200.0%	100.0%	0.1%	○	
F16.26	DO2 Max. output pulse frequency	0.1 - 50.0kHz	10.0kHz	0.1%	○	
F17: SCI Communication Parameters (on page 103 - 104)						
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 6: 1-8-1 format, no parity, RTU	0	1	×	
F17.01	Baud rate selection	0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps 6: 57600bps 7: 76800bps 8: 115200bps	3	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F17.02	Local address	0 - 247	2	1	×	
F17.03	Local response time	0 - 1000ms	0ms	1ms	×	
F17.04	Communication timeout detection time	0.0 - 1000.0s *0.0: Not detect the communication timeout*	0.0s	0.1s	×	
F17.05	Communication error detection time	0.0 - 1000.0s *0.0: Not detect communication error*	0.0s	0.1s	×	
F17.06	Communication overtime action choice	0: Freewheel stop 1: Emergency stop 2: Decelerate stop 3: Continue to run	3	1	×	
F17.07	Communication error action selection		3	1	×	
F17.08	Communication external device fault action selection		1	1	×	
F17.09	Communication write function parameters save EEPROM mode selection	0: Not save EEPROM 1: Saved EEPROM	1	1	×	
F17.10	Master and slave options	0: Slave 1: Host	0	1	×	
F17.11	Host write slave address selection	0: Operating frequency 1: Auxiliary frequency 2: Current line speed	0	1	×	
F17.12	Slave calculate the factor	0.00 - 600.00%	100.00%	0.01%	○	
F18: Shows the Control Parameters (on page 104 - 105)						
F18.00	Language selection	0: Chinese 1: English	0	1	○	
F18.01	Keypad LCD display contrast	1 - 10	5	1	○	
F18.02	Running display para. 1 setting	0: Reserved 1: Drive rated current 2: Drive expansion function 3: Drive status 4: Main setting frequency channel 5: Main setting frequency 6: Auxiliary setting frequency 7: Set the frequency 8: Given frequency (after Acc./Dec.) 9: Output frequency 10: Set the speed 11: Running speed 12: Three phase power supply input phase sequence 13: Output voltage 14: Output current 15: Torque reference 16: Output torque	8	1	○	
F18.03	Running display para. 2 setting		7	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F18.04	Running display para. 3 setting	17: Output power 18: DC bus voltage 20: AI1 input voltage 21: AI1 input voltage (after processing) 22: AI2 input voltage 23: AI2 input voltage (after processing) 24: AI3 input voltage 25: AI3 input voltage (after processing) 26: AI4 input voltage 27: AI4 input voltage (after processing) 28: DI6 terminal pulse input frequency 29: AO1 output 30: AO2 output 31: High-speed output pulse frequency 32: Radiator temperature 33: Set the line speed 34: Given line speed 37: Process PID reference 38: Process PID feedback 39: Process PID error 40: Process PID integral value 41: Process PID output 42: External count value 43: Input terminal status 44: Output terminal status 45: Modbus communication status 46: Actual length 47: Accumulated length 48: Total power-up time (hours) 49: Running time total (hours) 100: Tension set (after calculation) 101: Tension balance position feedback 102: Current curling radius 103: Current line speed 104: Tension balance position setting 105: Tension setting (before calculation) 300: Servo control position error 301, 302: Carry instruction refers to high/low	9	1	○	
F18.05	Running display para. 4 setting		13	1	○	
F18.06	Running display para. 5 setting		14	1	○	
F18.07	Running display para. 6 setting		18	1	○	
F18.08	Stop display para. 1 setting		7	1	○	
F18.09	Stop display para. 2 setting		18	1	○	
F18.10	Stop display para. 3 setting		20	1	○	
F18.11	Stop display para. 4 setting		22	1	○	
F18.12	Stop display para. 5 setting		43	1	○	

B

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F18.13	Stop display para. 6 setting	303, 304: The current carry amount is high/low 305: Spindle orientation stop position 306: Current encoder position	44	1	○	
F18.15	Max. line speed	0 - 65535	1000	1	○	
F18.16	Line speed display accuracy	0: Integer 1: 1 decimal place 2: 2 decimal places 3: 3 decimal places	0	1	×	
F19: Enhanced Function Parameters (on page 105 - 112)						
F19.00	Auxiliary frequency setting channel selection	0: No auxiliary channel 1: Keypad setting 2: Terminal setting 3: SCI communication setting 4: Analogue setting 5: Terminal pulse setting 6: PID output setting	0	1	○	
F19.01	Main and auxiliary setting operation	0: Main setting + auxiliary setting 1: Main setting - auxiliary setting 2: MAX (main setting, auxiliary setting) 3: MIN (main setting, auxiliary setting) 4: Main setting + auxiliary setting × main setting/Max. output frequency 5: Main setting - auxiliary setting × main setting/Max. output frequency	0	1	○	
F19.02	Auxiliary setting coefficient	0.00 - 9.99	1.00	0.01	○	
F19.03	Digital auxiliary frequency initial value	0.00Hz - upper limit	0.00Hz	0.01Hz	○	
F19.04	Digital auxiliary frequency control selection	Unit: Power-down storage options (valid only for F19.00 = 1, 2) 0: Auxiliary frequency is not stored 1: Stores auxiliary frequency to F19.03 Ten: Stop frequency processing (valid only for F19.00 = 1, 2) 0: Maintain auxiliary frequency after stop 1: Auxiliary frequency returns to F19.03 after stop	00	1	○	
F19.05	Set the frequency ratio adjustment selection	0: Do not adjust	1	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		1: Relative Max. output frequency (F00.06) adjustment 2: Relative to the current frequency adjustment				
F19.06	Set the frequency scaling factor	0.0 - 200.0%	100.0%	0.1%	○	
F19.07	Cooling fan control selection	0: Stop automatically 1: Stop immediately 2: The fan is running during power-on	0	1	○	
F19.08	Cooling fan control delay time	0.0 - 600.0s	30.0s	0.1s	○	
F19.09	Droop control amount	0.00 - 10.00Hz	0.00Hz	0.01Hz	×	
F19.10	Zero-frequency threshold	0.00Hz - upper limit	1.00Hz	0.01Hz	○	
F19.11	Set the frequency below the zero-frequency threshold action selection	0: Run according to the frequency command 1: Maintain shutdown, drive has no output 2: Run at zero frequency threshold 3: Run at zero frequency	0	1	×	
F19.12	Instantaneous loss of power non-stop function selection	0: Disable 1: Enable	0	1	×	
F19.13	Instant stop function Dec. time	0.1 - 6000.0s	5.0s	0.1s	○	
F19.14	Instantaneous loss of power does not stop voltage recovery time to judge	0.00 - 10.00s	0.10s	0.01s	○	
F19.15	Instantaneous loss of power to determine the action of non-stop voltage	0 - 1200V	380V drive: 460V 660V drive: 747V	1V	×	
F19.16	Power failure restart function selection	0: No power failure restart 1: Enable power failure and restart	0	1	×	
F19.17	Power failure restart time	0.00 - 10.00s	2.00s	0.01s	○	
F19.18	Overvoltage stalling options	0: Bidden 1: Allowed	1	1	×	
F19.19	Overvoltage stall point	0 - 1200V	380V drive: 740V 660V drive: 150V	1V	×	

B

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F19.20	Automatic current limiting action selection	0: Invalid 1: Acc. and Dec. effective, constant speed is invalid 2: Acc. and Dec., constant speed are valid	1	1	×	
F19.21	Automatic current limit level	20.0 - 200.0%	150.0%	0.1%	×	
F19.22	Dec. time during automatic current limiting	0.0 - 6000.0s	15kW and below drive: 10.0s 18.5 - 55kW drive: 30.0s 75kW and above drive: 60.0s	0.1s	×	
F19.23	Power-on instantaneous terminal detection	0: Rising edge is valid 1: Level effective	0	1	○	
F19.24	Braking unit action voltage	380V: 630 - 750V	720V	1V	×	
		660V: 850 - 1200V	1130V			
F19.25	Braking unit operation enabled	0: Braking unit active 1: Braking unit is invalid	0	1	○	
F19.26	Set the 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 correction factor	0.001 - 1.000	1.000	0.001	×	
F19.30	Measuring shaft diameter	1.00 - 100.00cm	10.00cm	0.01cm	×	
F19.31	Axis per pulse	1 - 9999	1	1	×	
F19.32	The length reaches the output function selection	0: Output level signal 1: Output 500ms pulse	0	1	○	
F19.33	Processing of length arrival	0: Automatically cleared 1: Stay the same	0	1	○	
F19.34	Downtime record length processing		0	1	○	
F19.35	Auxiliary PID output limit	0.0 - 100.0%	100.0%	0.1%	○	
F19.36	Auxiliary PID output limits rising	0.0 - 100.0%	0.0%	0.1%	○	
F20: Fault Protection Parameter (on page 112 - 116)						
F20.00	Overload pre-alarm detection options	Unit: Overload pre-alarm detection options 0: Detected continuously during operation 1: Detection at constant speed operation only	00000	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F20.00	Overload pre-alarm detection options	Ten: Overload pre-alarm action options 0: No alarm and continue running when overload detection is enabled 1: Alarm, stop when overload detection is enabled Hundred: Overload pre-alarm detection amount selection 0: The detected level is relative to the motor rated current (alarms: motor overload "E0019") 1: Detection level relative to drive rated current (alarm: drive overload "E0017") Thousand: Motor type selection 0: Normal motor 1: Variable frequency motor Ten thousand: Overload protection choice 0: Enabled 1: Shield	00000	1	×	
F20.01	Overload pre-alarm detection level	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	Driver output load detection action selection	0: Invalid, do not detect the drive output load 1: Always check during running, keep running after detecting (alarm) 2: Detects only at constant speed, continues to run after detection (alarm) 3: Always check during operation, cut off the output after detection (fault) 4: Detects only at constant speed and turns off after detection (fault)	0	1	×	
F20.04	Driver output load detection level	0 - 100%	30%	1%	×	
F20.05	Drive output load detection time	0.00 - 20.00s	1.00s	0.01s	×	
F20.06	Motor overheat signal input type	0: Do not detect motor overheating 1: Positive characteristics (PTC) 2: Negative characteristic (NTC)	0	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F20.07	Motor overheating thermistor value	0.0 - 10.0kΩ	5.0kΩ	0.1kΩ	×	
F20.08	Input phase loss detection reference	0 - 50% *0: Not detect input phase failure*	30%	1%	×	
F20.09	Input phase loss detection time	1.00 - 5.00s	1.00s	0.01s	×	
F20.10	Output phase failure detection reference	0 - 50% *0: Not detect output phase failure*	20%	1%	×	
F20.11	Output phase failure detection reference	0.00 - 20.00s *0.00: Not detect output phase failure*	3.00s	0.01s	×	
F20.12	PID given lost detection value	0 - 100% *0: Not detect PID reference loss fault*	0%	1%	×	
F20.13	PID given loss detection time	0.00 - 10.00s *0.00: Not detect PID reference loss fault*	0.20s	0.01s	×	
F20.14	PID feedback loss detection value	0 - 100% *0: Not detect loss of PID feedback loss*	0%	1%	×	
F20.15	PID feedback loss detection time	0.00 - 10.00s *0.00: Not detect loss of PID feedback loss*	0.20s	0.01s	×	
F20.16	PID feedback overrun detection value	0 - 100% *100: Not detect PID feedback overrun fault*	100%	1%	×	
F20.17	PID feedback overrun detection time	0.00 - 10.00s *0.00: Not detect PID feedback overrun fault*	0.20s	0.01s	×	
F20.18	Automatic reset times	0 - 100 *0: No automatic reset*	0	1	×	
F20.19	Automatic reset interval time	2.0 - 20.0s/time	5.0s/time	0.1s/time	×	
F20.20	Fault relay action selection	Unit: During automatic reset 0: Fault relay does not operate 1: Fault relay action Ten: Undervoltage period 0: Fault relay does not operate 1: Fault relay action	00	1	○	
F20.21	Fifth (last) type of fault	Lu: DC bus undervoltage E0001: Driver output overcurrent (Acc.) E0002: Drive output overcurrent (Dec.) E0003: Driver output overcurrent (constant speed process) E0004: DC bus overvoltage (Acc.) E0005: DC bus overvoltage (Dec.)	0	1	*	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F20.21	Fifth (last) type of fault	E0006: DC bus overvoltage (constant speed process) E0007: Over-voltage stall E0008: Power module fault E0009: Radiator overheated E0010: Braking unit failure E0012: Parameter auto-tuning fault E0013: Power-on buffer contactor is not engaged E0014: Current detection circuit fault E0015: Input phases loss E0016: Output phases loss E0017: Drive overload E0018: Drive output is offloaded E0019: Motor overload E0020: Motor overheat E0021: Control board EEPROM read and write error E0022: Keypad EEPROM read and write problems (only displaying without any protection) E0023: Parameter setting error E0024: External device failure E0025: PID given loss E0026: PID feedback loss E0027: PID feedback over-limitation E0028: SCI communication timeout E0029: SCI communicaiton error E0030: Encoder reverse E0031: Encoder disconnected E0032: Motor speeding E0033: Motor speed out of tolerance E0034: Tension control system broken material	0	1	*	
F20.22	The given frequency at the latest fault	0.00 - 400.00Hz	0.00Hz	0.01Hz	*	
F20.23	The output frequency of the last failure	0.00 - 400.00Hz	0.00Hz	0.01Hz	*	
F20.24	The bus voltage of the last failure	0 - 9999V	0V	1V	*	
F20.25	The output current of the last failure	0 - 999V	0V	1V	*	

B

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F20.26	The output current of the last failure	7.5kW and above drive: Actual value	0.0A	0.1A	*	
		5.5kW and below drive: Actual value	0.00A	0.01A		
F20.27	Input terminal state at the latest fault	0 - 0xFFF	0	1	*	
F20.28	The status of the output terminal at the latest fault	0 - 0x3F	0	1	*	
F20.29	The last failure interval	0.0 - 6553.5h	0.0h	0.1h	*	
F20.30	The fourth fault type	0 - 99	0	1	*	
F20.31	Fourth fault interval	0.0 - 6553.5h	0.0h	0.1h	*	
F20.32	The third fault type	0 - 99	0	1	*	
F20.33	The third fault interval	0.0 - 6553.5h	0.0h	0.1h	*	
F20.34	The second fault type	0 - 99	0	1	*	
F20.35	Second fault interval	0.0 - 6553.5h	0.0h	0.1h	*	
F20.36	The first fault type	0 - 99	0	1	*	
F20.37	The first fault interval	0.0 - 6553.5h	0.0h	0.1h	*	
F21: Torque Control Parameters (on page 116 - 117)						
F21.00	Torque command given channel selection	0: F21.01 setting 1: Analogue setting 2: Terminal pulse setting 3: SCI communication settings	0	1	×	
F21.01	Torque command digital setting	-100.0 - +100.0% (F21.02)	0.0%	0.1%	○	
F21.02	Max. torque setting	0.0 - 500.0% (motor rated torque)	100.0%	0.1%	×	
F21.03	Torque command filter time	0.000 - 1.000s	0.000s	0.001s	○	
F21.04	Torque control speed limit selection	0: F21.05, F21.06 limited 1: F00.06 limit 2: Analogue limit	1	1	×	
F21.05	Forward speed limit during torque control	0 - 120% (F00.06)	100%	1%	×	
F21.06	Reverse speed limit during torque control	0 - 120% (F00.06)	100%	1%	×	
F21.07	Torque offset given channel	0: F21.08 setting 1: Analogue setting 2: Terminal pulse setting	0	1	×	
F21.08	Torque offset value digital setting	0.0 - 300.0% (F21.02)	0.0%	0.1%	○	
F21.09	Torque offset start delay	0.00 - 10.00s *0.00: No delay*	0.00s	0.01s	○	
F22: Servo Positioning Parameters (on page 117 - 118)						
F22.00	Servo control selection	0: Invalid 1: Zero servo (frequency reached) 2: Zero servo (terminal command)	0	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		3: Pulse train position control 4: Simple carry control 5: Spindle orientation control				
F22.01	Position loop gain 1	1 - 9999	50	1	○	
F22.02	Position loop gain 2	1 - 9999	50	1	○	
F22.03	Position loop gain switch mode	0: Do not switch 1: According to position deviation 2: By terminal	0	1	○	
F22.04	Position loop gain switching deviation	0 - 10000	0	1	○	
F22.05	Positioning completion range	1 - 1000	10	1	○	
F22.06	Positioning completion time	0.000 - 20.000s	0.200s	0.001s	○	
F22.07	Zero servo start frequency	0.00 - 10.00Hz	0.30Hz	0.01Hz	○	
F22.09	Position given command filter time	0 - 2000ms	10ms	1ms	○	
F22.10	Electronic gear ratio numerator	1 - 4000	1000	1	○	
F22.11	Electronic gear ratio denominator	1 - 4000	1000	1	○	
F22.12	Position loop feedforward gain	0.0 - 200.0%	100.0%	0.1%	○	
F22.13	Simple carry control mode	Unit: Return to zero choice 0: Do not look for zero 1: Find zero Ten: Return to zero direction choice 0: Forward rotation 1: Reverse	00	1	×	
F22.14	Zero positioning speed 1	0.00 - 50.00Hz	10.00Hz	0.01Hz	○	
F22.15	Zero positioning speed 2	0.00 - 50.00Hz	1.00Hz	0.01Hz	○	
F22.16	Location digital given 1 high	0 - 9999	0	1	○	
F22.17	Location digital given 1 low bit	0 - 9999	0	1	○	
F22.18	Location digital given 2 high bit	0 - 9999	0	1	○	
F22.19	Location digital given 2 low bit	0 - 9999	0	1	○	
F22.20	Location digital given 3 high bit	0 - 9999	0	1	○	
F22.21	Location digital given 3 low bit	0 - 9999	0	1	○	
F22.22	Location digital given 4 high bit	0 - 9999	0	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F22.23	Location digital given 4 low bit	0 - 9999	0	1	○	
F22.24	Location digital given 5 high bit	0 - 9999	0	1	○	
F22.25	Location digital given 5 low bit	0 - 9999	0	1	○	
F22.26	Location digital given 6 high bit	0 - 9999	0	1	○	
F22.27	Location digital given 6 low bit	0 - 9999	0	1	○	
F22.28	Location digital given 7 high bit	0 - 9999	0	1	○	
F22.29	Location digital given 7 low bit	0 - 9999	0	1	○	
F22.30	Location digital given 8 high bit	0 - 9999	0	1	○	
F22.31	Location digital given 8 low bit	0 - 9999	0	1	○	
F22.32	Spindle orientation direction	0: The current rotation direction 1: Forward direction 2: Reverse the reverse	0	1	○	
F22.33	Spindle orientation frequency	0.00 - 50.00Hz	5.00Hz	0.01Hz	○	
F22.34	Spindle orientation plus Dec. time	0.0 - 100.0s	10.0s	0.1s	○	
F22.35	Spindle orientation target Location selection	0: Terminal selection 1: SCI communication setting	0	1	×	
F22.36	Spindle directional shutdown location 1	0 - (4 × F14.01 - 1)	0	1	○	
F22.37	Spindle directional shutdown location 2		0	1	○	
F22.38	Spindle directional shutdown location 3		0	1	○	
F22.39	Spindle directional shutdown location 4		0	1	○	
F23: PWM Control Parameter (on page 118 - 119)						
F23.00	Carrier frequency setting	1 - 16kHz	Depend on HD50	1kHz	×	
F23.02	PWM over modulation enabled	0: Invalid 1: Enabled	1	1	×	
T00: Tension Control Mode (on page 119 - 119)						
T00.00	Tension control mode	0: No tension feedback torque control 1: Tension feedback torque control 2: Tension feedback speed control	2	1	×	
T00.01	Rewind volume mode	0: Winding mode	0	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		1: Unwinding mode				
T00.02	Rewind and reverse the tightening options	Unit: 0: Unwinding prohibits reverse tightening of materials 1: Unwinding allows reverse tightening of the material Ten: 0: Rewinding prohibits reverse relaxation of materials 1: Winding allows material to be relaxed in the opposite direction	10	1	×	
T00.03	Mechanical transmission ratio	0.01 - 300.00	1.00	0.01	×	
T01: Volume Diameter Calculation Parameters (on page 119 - 121)						
T01.00	Max. roll diameter	1 - 5000mm	1000mm	1mm	×	
T01.01	Initial volume source selection	0: T01.02 - T01.04 setting 1: Analogue setting 2: Terminal pulse setting 3: SCI communication setting	0	1	×	
T01.02	Initial roll diameter 1	1 - 5000mm	100mm	1mm	×	
T01.03	Initial roll diameter 2	1 - 5000mm	100mm	1mm	×	
T01.04	Initial roll diameter 3	1 - 5000mm	100mm	1mm	×	
T01.05	Initial roll diameter	1 - 5000mm	100mm	1mm	×	
T01.06	Winding diameter calculation method selection	0: Calculated by line speed 1: Analogue setting 2: Terminal pulse setting 3: SCI communication settings 4: Accumulation of thickness calculation	0	1	×	
T01.07	Volume diameter calculation interval	0.0 - 100.0s	0.1s	0.1s	×	
T01.08	Volume diameter filter time	0.0 - 100.0s	5.0s	0.1s	×	
T01.09	Current curling radius	1 - 5000mm	100mm	1mm	*	
T01.10	Reach the roll diameter set value	1 - 5000mm	1000mm	1mm	○	
T01.11	Max. line speed	0.1 - 6500.0m/min	600.0 m/min	0.1 m/min	×	
T01.12	Winding diameter calculation of the lowest line speed	0.1 - 6500.0m/min	1.0 m/min	0.1 m/min	×	
T01.13	Line speed input source	0: No input 1: Analogue setting 2: Terminal pulse setting 3: SCI communication setting	1	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
T01.14	Actual line speed	0.0 - 6500.0m/min	0.0 m/min	0.1 m/min	*	
T01.15	The Max. thickness of the coil	0.01 - 100.00mm	1.00mm	0.01mm	○	
T01.16	Coil thickness setting source selection	0: T01.17 - T01.20 setting 1: Analogue setting 2: Terminal pulse setting 3: SCI communication settings	0	1	○	
T01.17	Coil thickness 0	0.01 - 100.00mm	0.01mm	0.01mm	○	
T01.18	Coil thickness 1	0.01 - 100.00mm	0.01mm	0.01mm	○	
T01.19	Coil thickness 2	0.01 - 100.00mm	0.01mm	0.01mm	○	
T01.20	Coil thickness 3	0.01 - 100.00mm	0.01mm	0.01mm	○	
T01.21	The number of pulses per revolution	1 - 60000	1	1	○	
T01.22	Pulse counter pulse source selection	0: Multi-function terminal count signal input 1: Multi-function terminal single-phase speed measurement input 2: Motor shaft side encoder signal input (need to install encoder card)	0	1	○	
T01.23	The number of laps per layer	1 - 10000	1	1	○	
T01.24	Volume diameter change rate limit	0.0 - 10.0mm/s *0.0: The curling radius is not limited*	0.0 mm/s	0.1 mm/s	○	
T01.25	Roll diameter reset operation enabled	0: Prohibited 1: Enabled	0	1	○	
T01.26	Stop the integration speed	0.0 - 6500.0m/min	0.0 m/min	0.1 m/min	×	
T02: System Inertia Compensation Parameters (on page 121 - 122)						
T02.00	System inertia compensation coefficient self-tuning torque setting 1	0.0 - 100.0%	20.0%	0.1%	×	
T02.01	System inertia self-tuning	0: No operation 1: Start self-tuning	0	1	×	
T02.02	Static friction compensation factor	0.0 - 50.0%	0.0%	0.1%	○	
T02.03	Dynamic friction compensation coefficient	0.0 - 50.0%	0.0%	0.1%	○	
T02.04	System Acc. inertia compensation factor	0.00 - 655.35	0.00	0.01	○	
T02.05	Material density	0 - 60000kg/m^3	0kg/m^3	1kg/m^3	○	
T02.06	Material width	0 - 60000mm	0mm	1mm	○	
T02.07	Upper limit frequency	0.0 - 100.0%	10.0%	0.1%	○	
T02.08	Torque given filter coefficient	0 - 9999	0	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
T02.09	Upper limit frequency limitaition	Unit: No tension feedback torque Ten: Tension feedback torque Hundred: Tension feedback speed 0: Invalid 1: Effective	111	1	○	
T02.10	System Dec. inertia compensation factor	0.00 - 655.35	0.00	0.01	○	
T02.11	System inertia compensation coefficient self-tuning torque setting 2	0.0 - 100.0%	20.0%	0.1%	×	
T02.12	Mechanical inertia compensation factor	0.0 - 100.0	0.0%	0.1%	○	
T02.13	High-speed torque compensation factor	0.00 - 99.99%	0.00%	0.01%	○	
T02.14	High-speed compensation switching mode	0: Frequency 1: Line speed	0	1	○	
T02.15	High-speed compensation switching point	0.00 - 99.99%	0.00%	0.01%	○	
T03: Tension PID Control Parameters (on page 122 - 124)						
T03.00	Tension setting source selection	0: T03.02 setting 1: Analogue setting 2: Terminal pulse setting 3: SCI communication setting	0	1	×	
T03.01	Max. tension	0 - 4096N	4096N	1N	×	
T03.02	Tension digital setting	0 - 4096N	2048N	1N	○	
T03.03	Zero speed tension increase	0.0 - 50.0% (T03.01)	0.0%	0.1%	○	
T03.04	Zero speed match frequency threshold	0 - 20% (F00.06)	0%	1%	○	
T03.05	The first tension taper choice	0: T03.06 setting 1: Analogue setting 2: Terminal pulse setting 3: SCI communication setting	0	1	×	
T03.06	The first tension taper coefficient	0.0 - 200.0%	0.0%	0.1%	○	
T03.07	Tension taper compensation correction	0 - 65535mm	0mm	1mm	○	
T03.08	Tension feedback source selection	0: Analogue setting 1: Terminal pulse setting 2: SCI communication setting	0	1	×	
T03.09	Tension PID ratio gain 1	0.0 - 100.0	20.0	0.01	○	
T03.10	Tension PID integration time 1	0.01 - 10.00s	1.00s	0.01s	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
T03.11	Tension PID differential time 1	0.000 - 1.000s *0.000: The differential term does not work*	0.000s	0.001s	○	
T03.12	Tension PID ratio gain 2	0.0 - 100.0	20.0	0.1	○	
T03.13	Tension PID integration time 2	0.01 - 10.00s	1.00s	0.01s	○	
T03.14	Tension PID differential time 2	0.000 - 1.000s *0.000: The differential term does not work*	0.000s	0.001s	○	
T03.15	Tension PID parameter adjustment basis	0: The second group of PID parameters is invalid 1: Adjust according to the roll diameter 2: Adjust according to the operating frequency 3: Adjust according to the line speed 4: Based on PID error adjustment	0	1	○	
T03.16	Tension PID sampling period	0.01 - 30.00s	0.01s	0.01s	○	
T03.17	Tension deviation limit	0.0 - 20.0%	0.0%	0.1%	○	
T03.18	Tension PID output filter time	0.01 - 30.00s	0.05s	0.01s	○	
T03.19	Tension PID output limiting method	0: No limitation 1: Relative to the Max. output frequency (F00.06) 2: Relative to the linear speed setting	0	1	×	
T03.20	Tension PID output limit value	0.0 - 100.0%	50.0%	0.1%	×	
T03.23	The first tension taper switch point	1 - 5000mm	5000mm	1mm	○	
T03.24	The second tension taper coefficient	0.0 - 200.0%	0.0%	0.1%	○	
T03.25	The second tension taper switch point	1 - 5000mm	5000mm	1mm	○	
T03.26	Third tension taper coefficient	0.0 - 200.0%	0.0%	0.1%	○	
T03.27	Third tension taper switch point	1 - 5000mm	5000mm	1mm	○	
T03.28	Fourth tension taper coefficient	0.0 - 200.0%	0.0%	0.1%	○	
T03.29	Fourth tension taper switch point	1 - 5000mm	5000mm	1mm	○	
T03.30	The fifth tension taper coefficient	0.0 - 200.0%	0.0%	0.1%	○	
T03.31	Taper calculation options	0: Curve taper	0	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		1: Straight taper				
T03.32	Tension detection location setting	0.00 - 10.00V	0.00V	0.01V	○	
T03.33	Tension detection location setting channel	0: T03.32 setting 1: Analogue setting	0	1	○	
T03.33	Tension detection location setting channel	2: Terminal pulse setting 3: SCI communication settings	0	1	○	
T03.34	Tension PID integral limit	0.00Hz - upper limit	3.50Hz	0.01Hz	○	
T04: Pre-drive Control Parameters (on page 124 - 124)						
T04.00	Pre-drive speed gain	0.0 - 200.0%	100.0%	0.1%	○	
T04.01	Pre-drive torque gain	0.0 - 200.0%	100.0%	0.1%	○	
T04.02	Pre-drive volume diameter calculation is enabled	0: Invalid 1: Valid	0	1	○	
T04.03	Torque adjustment factor	0.0 - 200.0%	120.0%	0.1%	○	
T04.04	Line speed increase	0.0 - 50.0%	1.0%	0.1%	○	
T04.05	Pre-drive end torque gain	0.0 - 200.0%	0.0%	0.1%	×	
T04.06	Pre-drive end torque compensation time	0.0 - 99.9s	0.0s	0.1s	×	
T04.07	Pre-drive end coil diameter calculation pause time	0.0 - 99.9s	0.0s	0.1s	×	
T05: I/O Terminal Function Extension (on page 124 - 126)						
T05.00	AI1 expansion function	0: Reserved 1: Line speed setting 2: Tension feedback location 3: Tension setting 4: Initial curling setting 5: Current curling radius feedback 6: Tension taper set 7: Web thickness setting 8: Tension pendulum balance location setting *When the tension control is enabled, the priority set by this group is higher than that set by the terminals of group F16 (F16.01 - F16.04)*	1	1	×	
T05.01	AI2 expansion function		2	1	×	
T05.02	AI3 expansion function		0	1	×	
T05.03	AI4 expansion function		0	1	×	
T05.04	DI1 expansion function	0: Reserved 1: Roll diameter reset 2,3: Initial roll diameter selection terminal 1,2 4: Diameter calculation is paused 5: Rewind roll switch 6: Broken material detection switch 7,8: Coil thickness selection terminals 1,2	0	1	×	
T05.05	DI2 expansion function		0	1	×	
T05.06	DI3 expansion function		0	1	×	
T05.07	DI4 expansion function		0	1	×	
T05.08	DI5 expansion function		0	1	×	

B

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
T05.09	DI6 expansion function	9: Circle signal input 10: Pre-drive 11: Torque boost 12: Direction switch (speed control and torque control are valid) 13: Open loop tension torque control and closed loop tension speed control switch 14: PID regulator adjustment feature selection *When the tension control is enabled, the function set by this group has higher priority than the function set by the terminals of group F15 (F15.00 - F15.08)*	0	1	×	
T05.10	DI7 expansion function		0	1	×	
T05.11	DI8 expansion function		0	1	×	
T05.12	DI9 expansion function		0	1	×	
T05.13	DO1 expansion function	0,1: Reserved 2: The Max. diameter reached 3: The specified diameter reached 4: Brake output 5: Off material output *When the tension control is enabled, the function set by this group has higher priority than the function set by the terminals of group F15 (F15.18 - F15.23)*	0	1	×	
T05.14	DO2 expansion function		0	1	×	
T05.15	RLY1 expansion function		0	1	×	
T05.16	RLY2 expansion function		0	1	×	
T05.17	RLY3 expansion function		0	1	×	
T05.18	RLY4 expansion function		0	1	×	
T05.19	AO1 expansion function	0: Reserved 1: Current curling radius 2: Tension detection location setting (10V corresponds to 10V) 3: Tension detection location feedback (10V corresponds to 10V) 4: Given tension (before calculation, 10V corresponds to the Max. tension) 5: Given tension (calculated, 10V corresponds to the Max. tension) *When the tension control is enabled, the function priority set by this group is higher than the function set by the terminals of group F16 (F16.19 - F16.20)*	0	1	×	
T05.20	AO2 expansion function		0	1	×	
T05.21	High-speed pulse output expansion function	0: Reserved 1: Current curling radius 2: Tension detection location setting (F16.26 corresponds to 10V)	0	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
T05.21	High-speed pulse output expansion function	3: Tension detection location feedback (F16.26 corresponds to 10V) 4: Given tension (before calculation, F16.26 corresponds to the Max. tension) 5: Given tension (after calculation, F16.26 corresponds to the Max. tension) *When the tension control is enabled, the priority set by this group is higher than the function set by the terminals of F16.21*	0	1	×	
T06: Broken Material Detection Setting (on page 126 - 127)						
T06.00	Broken material automatic detection function selection	0: Broken material detection is invalid 1: Detects according to the cutout detection switch 2: According to PID feedback detection 3: Judge according to the change of roll diameter	0	1	×	
T06.01	Broken material automatically detects the minimum line speed	0.1 - 1000.0m/min	0.1 m/min	0.1 m/min	○	
T06.02	Broken material automatically detect the error range	0.1 - 50.0%	10.0%	0.1%	○	
T06.03	Automatic detection of broken material to determine the delay time (start)	0.1 - 60.0s	2.0s	0.1s	○	
T06.04	Broken down mode	Unit: Broken material downtime method definition 0: Freewheel stop 1: Dec. stop + DC brake 2: Dec. stop 3: Continue to run Ten: Breaking alarm mode definition 0: No alarm, stop according to the unit-defined stop mode 1: Alarm	00	1	×	
T06.05	Brake starting frequency	0.00 - 50.00Hz	0.00Hz	0.01Hz	×	
T06.06	Brake time	0.0 - 360.0s	0.0s	0.1s	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
T06.07	Automatic detection of broken material to determine the delay time (after starting)	0.1 - 60.0s	0.5s	0.1s	○	
Group U: User Menu Mode Displays the Parameters (on page 127 - 128)						
U00.00	User menu mapping setting 1	00.00 - 23.02, 99.99 *99.99: There is no parameter mapping function*	00.01	0.01	○	
U00.02	User menu mapping setting 2		00.06	0.01	○	
U00.04	User menu mapping setting 3		00.08	0.01	○	
U00.06	User menu mapping setting 4		00.13	0.01	○	
U00.08	User menu mapping setting 5		00.10	0.01	○	
U00.10	User menu mapping setting 6		00.11	0.01	○	
U00.12	User menu mapping setting 7		02.13	0.01	○	
U00.14	User menu mapping setting 8		03.01	0.01	○	
U00.16	User menu mapping setting 9		03.02	0.01	○	
U00.18	User menu mapping setting 10		08.00	0.01	○	
U00.20	User menu mapping setting 11		08.01	0.01	○	
U00.22	User menu mapping setting 12		08.02	0.01	○	
U00.24	User menu mapping setting 13		08.03	0.01	○	
U00.26	User menu mapping setting 14		08.04	0.01	○	
U00.28	User menu mapping setting 15		-	0.01	○	
U00.30	User menu mapping setting 16		-	0.01	○	
U00.01	Mapping value of 1	-	-		-	
U00.03	Mapping value of 2		-		-	
U00.05	Mapping value of 3		-		-	
U00.07	Mapping value of 4		-		-	
U00.09	Mapping value of 5		-		-	
U00.11	Mapping value of 6		-		-	
U00.13	Mapping value of 7		-		-	
U00.15	Mapping value of 8		-		-	
U00.17	Mapping value of 9		-		-	
U00.19	Mapping value of 10		-		-	
U00.21	Mapping value of 11		-		-	
U00.23	Mapping value of 12		-		-	
U00.25	Mapping value of 13		-		-	
U00.27	Mapping value of 14		-		-	
U00.29	Mapping value of 15		-		-	
U00.31	Mapping value of 16		-		-	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
r00: Communicaiton Read Parameters Address Setting (on page 128 - 128)						
r00.00	Communication read parameter method	0: Press the register address of the communication frame setting to read continuously as the initial value 1: Read by the address of setting of r00 group	0	1	○	
r00.01	First to read parameter address	0x0000 - 0xffff	0x330e	1	○	
r00.02	Second to read parameter address	0x0000 - 0xffff	0x330f	1	○	
r00.03	Third to read parameter address	0x0000 - 0xffff	0x3310	1	○	
r00.04	Fourth to read parameter address	0x0000 - 0xffff	0x3311	1	○	
r00.05	Fifth to read parameter address	0x0000 - 0xffff	0x3312	1	○	
r00.06	Sixth to read parameter address	0x0000 - 0xffff	0x3314	1	○	
r00.07	Seventh to read parameter address	0x0000 - 0xffff	0x3315	1	○	
r00.08	Eighth to read parameter address	0x0000 - 0xffff	0x3317	1	○	
r00.09	Ninth to read parameter address	0x0000 - 0xffff	0x3318	1	○	
r00.10	Tenth to read parameter address	0x0000 - 0xffff	0x3319	1	○	
r00.11	Eleventh to read parameter address	0x0000 - 0xffff	0x331b	1	○	
r00.12	Twelfth to read parameter address	0x0000 - 0xffff	0x331d	1	○	
r01: Communicaiton Write Parameters Address Setting (on page 128 - 128)						
r01.00	Communication write parameters	0: Write to the initial value by the register address of the communication frame setting 1: Written by the address of the r01 group setting	0	1	×	
r01.01	The first to write parameter address	0x0000 - 0xffff	0x0000	1	×	
r01.02	The second to write parameter address	0x0000 - 0xffff	0x0000	1	×	
r01.03	The third to write parameter address	0x0000 - 0xffff	0x0000	1	×	
r01.04	The forth to write parameter address	0x0000 - 0xffff	0x0000	1	×	

B

Appendix C Modbus Communication Protocol

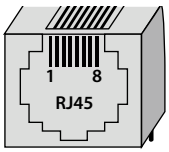
1. Overview

HD50 adopts standard Modbus communication protocol.

Users can do the following operation with upper host (including computers, PLCs and other communication devices): Read and write driver function parameters, read status parameters, write control commands etc., HD50 is in slave mode when communicating.

Communication Terminal

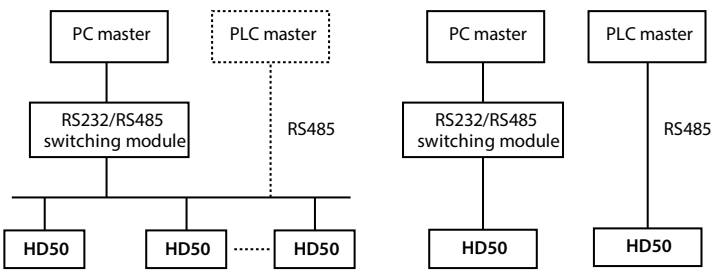
The communication terminal is shown in following table.

Terminal	Description	
 SCI communication terminal	**Pin**	**Difinition**
	1, 3	+5V
	2	485+
	4, 5, 6	GND
	7	485-
	8	Reserved

The transmitting mode is shown in following table.

Port	Asyn., half duplex
Format	1-8-2 (one start bit, 8 data bits, 2 stop bits), no parity, RTU
Baud Rate	9600bps
Relative Setting	See F17: SCI Communication Parameters, page 103

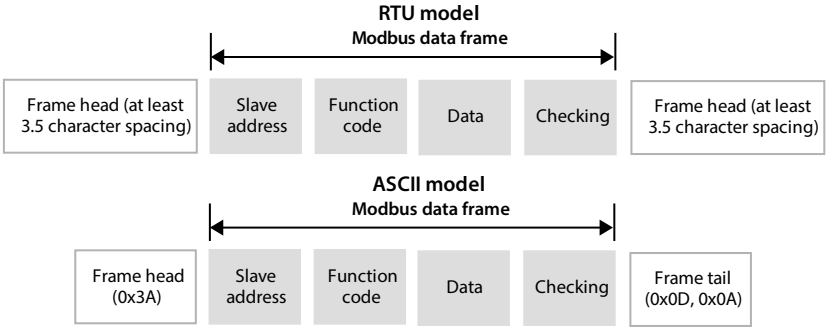
Network Mode



C

Protocol Format

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



Modbus uses "Big Endian" encoding, which is sent first High bit byte, then Low bit bytes.

In the RTU Mode

- In RTU mode, the frame header and frame trailer are defined by the bus idle time not less than 3.5 bytes.
- When the slave address is set to 0, it means the broadcast address.
- Data check using the CRC-16, the entire information involved in check, the CRC of the specific examples, please refer to page 199.

Example: Read slave internal register F00.08 = 50.00Hz with address 1.

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

In the ASCII Mode

- Header is as "0x3A", trailer is as"0x0D, 0x0A", but also the end of the frame by the user configuration setting.
- In addition to the header and trailer, all remaining data bytes are sent in ASCII mode, first sending higher bit-tuple, then lower 4 bits tuple.
- The data is 7 bits in length. For "A" - "F", using its uppercase ASCII code.
- The data adopts the LRC check. The check covers the characters from the slave address to the checksum equal to all the checksum data (discarded carry bit) of complement.

Example: Write 4000 (0x0FA0) to the internal register F00.08 of slave 1:

LRC check = (0x01 + 0x41 + 0x00 + 0x08 + 0x0F + 0xA0) 's complement = 0x07

	Frame Head	**Address**		**Code**		**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

2. Transmitted Value Corresponding to the Scaling Relationship

In addition to the parameters other than the remarks, other function parameter refer to the description of the "minimum modification unit" column in the user manual to determine the calibration relationship of the specified function code.

Remarks:

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

2. F16.06, F16.09, F16.12, F16.15 communication data 0 - 200 corresponding data -100 - +100.

3. State parameters: AI2 - AI4 input voltage, AI2 - AI4 input voltage (after processing), process PID given, process PID feedback, process PID error, process PID integral term and process PID output communication data 0 - 2000 corresponding data -1000 - +1000.

3. Protocol Function

Support Function

The Modbus protocol supports the following function code operations:

Supported Function	Code	Instructions
Read driver function parameters or status parameters	0x03	
Rewrite drive individual function parameters or control parameters	0x06	Whether to save the power-down set by F17.09
	0x41	Power off does not save
Rewrite multiple functional parameters or control parameters of the drive	0x10	Whether to save the power-down set by F17.09
	0x43	Power-off save

Read Driver Function Parameters or Status Parameters

Function code 0x03, command frame and response frame, see the table below, in example RTU mode.

Command Frame	Address	Code	Starting Register Address	No. of Register	CRC/LRC Checking
Data Framebytes	1	1	2	2	2/1
Value or range	0 - 247	0x03	0x0000 - 0xFFFF	0x0001 - 0x000C	

Response Frame	Address	Code	Read Byte No.	Register Content	CRC/LRC Checking
Data Framebytes	1	1	1	2 * no. of registers	2/1
Value or range	1 - 247	0x03	2 * no. of registers		

C

Rewrite Drive Individual Function Parameters or Control Parameters

Function code 0x06 (down to save a set F17.09), 0x41 (power down is not saved), command frame and response frame, see the table below, in example RTU mode.

Command Frame	Address	Code	Register Address	Register Content	CRC/LRC Checking
Data Framebytes	1	1	2	2	2/1
Value or range	0 - 247	0x06, 0x41	0x0000 - 0xFFFF	0x0000 - 0xFFFF	

Response Frame	Address	Code	Register Address	Register Content	CRC/LRC Checking
Data Framebytes	1	1	2	2	2/1
Value or range	1 - 247	0x06, 0x41	0x0000 - 0xFFFF	0x0000 - 0xFFFF	

Rewrite Multiple Functional Parameters or Control Parameters of the Drive

Function code 0x10 (down to save a set F17.09), 0x43 (power down saved), command frame and response frame, see the table below, in example RTU mode.

Command Frame	Address	Code	Starting Register Address	No. of Register	Byte No. of Register Content	Register Content	CRC/LRC Checking
Data Framebytes	1	1	2	2	1	2 * no. of operation registers	2/1
Value or range	0 - 247	0x10, 0x43	0x0000 - 0xFFFF	0x0000 - 0x0004	2 * no. of operation registers		

Response Frame	Address	Code	Starting Register Address	No. of Operation Registers	CRC Checking
Data Framebytes	1	1	2	2	2/1
Value or range	1 - 247	0x10, 0x43	0x0000 - 0xFFFF	0x0000 - 0x0004	

The request rewrites the contents of consecutive data unit starting at the start register address.

Register address mapping for the function parameters and the control parameters of the drive, etc.

Continuously storing a plurality of register references, the drive from the register to start storing the lowest address, up to the highest address register store operation if not completely successful, stores the first failure return address.

Errors and Exception Codes

If the operation request fails, the response is an error code, and the error code is function code + 0x80.

The meaning of the exception code is listed in the following table.

Exception Code	Note
0x01	Illegal function code
0x02	Illegal register address
0x03	Data error, that is, the data exceeds the upper or lower limit
0x04	Slave operation failed (includes data in the upper and lower limit range, but the error caused by invalid data)
0x16	Unsupported operation (mainly for control parameters and status parameters, such as unsupported attributes, factory values, reading of upper and lower limits, etc.)
0x17	The number of registers in the request frame is wrong
0x18	Information frame error: Including information length error and check error
0x20	Parameters can not be modified
0x21	Parameter can not be modified while running
0x22	Parameter is password protected

For example: F00.00 successively read from the slave 2, 13 function parameters, 0x0D write register contents at this time was overrun error code is 0x83 (0x03 + 0x80), exception code should be 0x03.

Command Frame	Address	Code	Register Address		Register Content		Checksum	
	0x02	0x03	0x00	0x00	0x00	0x0D	0x84	0x3C

Response Frame	Address	Code	Abnormal Code	Checksum	
	0x02	0x83	0x03	0xf1	0x31

C

4. Address Mapping

The function parameters, control parameters and status parameters of the HD50 can be mapped to Modbus read and write registers.

Function Parameter Address Mapping

The group number of the HD50 function parameter is mapped to the high byte of the register address. Correspondences are shown in the following table.

The group index is mapped to the low byte of the register address, function parameters F00 - F23, U00, r00 - r01, T00 - T06 index reference user manual.

Register Address High Byte	No.	Register Address High Byte	No.	Register Address High Byte	No.
0x00	F00	0x0c	F12	0x18	U00
0x01	F01	0x0d	F13	0x19	r00
0x02	F02	0x0e	F14	0x1A	r01
0x03	F03	0x0f	F15	0x20	T00
0x04	F04	0x10	F16	0x21	T01
0x05	F05	0x11	F17	0x22	T02
0x06	F06	0x12	F18	0x23	T03
0x07	F07	0x13	F19	0x24	T04
0x08	F08	0x14	F20	0x25	T05
0x09	F09	0x15	F21	0x26	T06
0x0a	F10	0x16	F22		
0x0b	F11	0x17	F23		

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

Control Parameters (0x32) Address Mapping

HD50 control parameters can complete the start, stop, set the operating frequency and other functions of the driver. Through the retrieval of the driver status parameters can obtain the drive operating frequency, output current and other parameters.

The control parameter group number (0x32) is mapped to the high byte of the register address. The index in the group is shown in the following table:

Address	Function	Address	Function
0x3200	Control command word	0x3207	Line speed input
0x3201	Operating frequency setting	0x3208	Coil thickness setting
0x3202	Auxiliary operating frequency setting	0x3209	Tension setting
0x3203	Torque setting	0x320a	Tension taper
0x3204	Virtual terminal control settings	0x320b	Tension feedback
0x3205	Initial roll diameter	0x320c	Tension detection position setting
0x3206	Current roll diameter		

Whether the 0x3201 power-off is saved by F00.14 hundred-bit setting, the remaining power-off is not saved.

The control word (0x3200) is defined in the following table.

Bit	Value and Meaning		Description
Bit0	0: Invalid run command	1: Run command is valid	Drive start, stop control (edge trigger mode)
Bit1	0: Forward	1: Reverse	Direction of operation, equivalent to forward/reverse rotation of the terminal
Bit2	0: Reserved	1: The stop mode is deceleration stop	Drive deceleration stop control (edge trigger mode)
Bit3	0: Reserved	1: The stop mode is emergency stop	Drive emergency stop control (edge trigger mode)
Bit4	0: Reserved	1: The stop mode is free stop	Drive free stop control (edge trigger mode)
Bit5	0: Reserved	1: External fault signal	External fault display drive, press F17.08 set down or continue running manner
Bit6	0: Jog forward stop	1: Jog forward	Jog forward control
Bit7	0: Jog reverse stop	1: Jog reverse	Jog reverse control
Bit8	0: Invalid reset is invalid	1: Fault reset effective	Drive fault reset control
Bit9 - Bit11	0: Reserved		
Bit12	0: Invalid current control	1: Current control is valid	Currently delivered control word is valid
Bit13 - Bit15	0: Reserved		

The contents of the register can be defined as the control command shown in the following table, which is the logic combination of the control command word word.

Register Content	Control Command	Register Address	Parameter Name
0x1001	Forward running	0x1020	External fault shutdown
0x1003	Reverse running	0x1040	Jog forward
0x1004	Decelerate to stop	0x1080	Jog inversion
0x1008	Emergency shutdown	0x1100	Fault reset
0x1010	Free stop		

Virtual terminal control settings (0x3204) the word bit definitions are shown in the table below.

Bit	Value and Meaning	
Bit0	0: DO1 output is invalid	1: DO1 output valid
Bit1	0: DO2 output is invalid	1: DO2 output valid
Bit2	0: RLY1 output is invalid	1: RLY1 output valid
Bit3	0: RLY2 output is invalid	1: RLY2 output valid
Bit4	0: RLY3 output is invalid	1: RLY3 output valid
Bit5	0: RLY4 output is invalid	1: RLY4 output valid
Bit6 - Bit15	Reserved	Reserved

State Parameters (0x33) Address Map

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

Address	Function	Address	Function
0x3300	Drive series	0x3326	High-speed output pulse frequency
0x3301	Software version control keypad board	0x3327	Radiator temperature
0x3303	Control board software non-standard version	0x3328	Set the line speed
0x3305	Keypad software version	0x3329	Given line speed
0x3306	Custom series number	0x332C	Process PID given
0x3307	Motor and control mode selection	0x332D	Process PID feedback
0x3308	Drive rated current	0x332E	Process PID error
0x3309	Drive expansion	0x332F	Process PID Integral
0x330A	Drive status	0x3330	Process PID output
0x330B	Setting the frequency of the main channel	0x3331	External count value
0x330C	Main setting frequency	0x3332	Input terminal status
0x330D	Auxiliary setting frequency	0x3333	Output terminal status
0x330E	Setting frequency	0x3334	Modbus communication status
0x330F	Given frequency (after Acc. and Dec.)	0x3335	Actual length
0x3310	Output frequency	0x3336	Cumulative length
0x3311	Set speed	0x3337	Cumulative power-on time (hours)
0x3312	Running speed	0x3338	Accumulated running time (hours)
0x3313	Three-phase power input phase sequence	0x3339	High cumulative motor energy consumption
0x3314	The output voltage	0x333A	Low cumulative motor energy consumption
0x3315	Output current	0x333B	The high energy consumption of this operation
0x3316	Torque given	0x333C	This operation consumes low energy
0x3317	Output torque	0x333D	Current fault
0x3318	Output power	0x333E	The current position of the lower 5 bits
0x3319	DC bus voltage	0x333F	The current position is 5 digits high
0x331B	AI1 input voltage	0x3340	5 position low position
0x331C	AI1 input voltage (after processing)	0x3341	Command position of the high 5
0x331D	AI2 input voltage	0x3342	Low position deviation 5
0x331E	AI2 input voltage (after processing)	0x3343	High five position deviation
0x331F	AI3 input voltage	0x3344	Encoder UVW status
0x3320	AI3 input voltage (after processing)	0x3349	Tension setting (after calculation)
0x3321	AI4 input voltage	0x334A	Tension balance position feedback
0x3322	AI4 input voltage (after processing)	0x334B	Current roll diameter
0x3323	DI6 terminal pulse input frequency	0x334C	Current line speed
0x3324	AO1 output	0x334D	Tension balance position setting
0x3325	AO2 output	0x334E	Tension setting (before calculation)

5. Special Instructions

No.	Special Instructions
1	For ASCII data frames, if the frame length is an even number, the frame is discarded.
2	Driver parameters that can be read by the host computer but cannot be changed: Group F08 (parameter setting for Asyn. motor 1), group F12 (synchronous motor parameter setting), F13.00 - F13.15 (parameter setting for Asyn. motor 2), group F17 (SCI communication configuration parameters).
3	PC communication can't be changed F01.00 (user password), but user password can be verified by writing F01.00. After the user password is verified, the host computer can obtain the permission to change the function parameters of the driver. After the change is completed, it can pass to F01.00. Write invalid password to the host computer without changing the permissions of the driver function parameters.
4	If multiple DI terminals have the same function setting, this will result in malfunction. To avoid this, user must modify the DI terminal function through Modbus protocol.

6. CRC Check

The online CRC calculation code is as follows:

```
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)) ;
}
```

C

7. Application Examples

When using the communication control driver, please confirm that the hardware connection is correct; At the same time, set the driver's communication data format, baud rate and communication address correctly.

1. Read the Max. output frequency of slave 2 (read F00.06), and answer should be 50.00Hz

Command	Address	Code	Register Address		Reading Words		Checksum	
Frame	0x02	0x03	0x00	0x06	0x00	0x01	0x64	0x38
Response	Address	Code	Answer Byte		Register Content		Checksum	
Frame	0x02	0x03	0x02		0x13	0x88	0XF1	0x12

2. Read the DC bus voltage (status parameter) of slave 2 and reply it should be 537V

Command	Address	Code	Register Address		Reading Words		Checksum	
Frame	0x02	0x03	0x33	0x19	0x00	0x01	0x5A	0xBA
Response	Address	Code	Answer Byte		Register Content		Checksum	
Frame	0x02	0x03	0x02		0x02	0x19	0x3C	0xEE

3. Write the setting frequency of slave 2 (F00.13) to 45.00Hz

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

4. When F00.10 = 2, the write operating frequency of slave 2 is set to 45.00Hz, register contents 0x11, 0x94

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

5. When F00.11 = 2, slave 2 reverses operation

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

6. When F00.11 = 2, slave 2 runs forward

Command	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x10	0x01	0x4B	0x41
Response	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x10	0x01	0x4B	0x41

7. When F00.11 = 2, slave 2 slows down

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

8. When F00.11 = 2, emergency stop of slave 2

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

9. When F00.11 = 2, free stop of slave 2

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

10. Slave 2 external fault

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

11. Slave 2 fault reset

Command	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x10	0x00	0x8B	0x11
Response	Address	Code	Register Address		Register Content		Checksum	
Frame	0x02	0x06	0x32	0x00	0x11	0x00	0x8B	0x11