HOLIP®

133R0313

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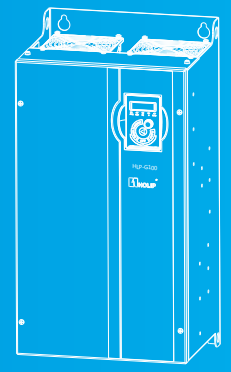
HLP-G100

Series Operating Manual



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Due to product upgrades or specification changes, the contents of the manual will be timely revised. It is subject to change without notice.

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ZHEJIANG HOLIP ELECTRONIC TECHNOLOGY CO.,LTD.

HLP-G100 Series

Operating Manual

Introduction

Thank you for purchasing and using the general-purpose vector drive of HLP-G100 series.

Please read carefully the operation manual before putting the drive to use so as to correctly install and operate the drive, give full play to its functions and ensure the safety. Please keep the operation manual handy for future reference, maintenance, inspection and repair.

Due to the drive of a kind of power electronics product it must be installed, tested and adjusted with specialized electrical engineering workers.

The marks of ⚠ (Danger) , ⚠ (Caution) and other symbols in the manual remind you of the safety and prevention cautions during the handling, installation, running and inspection. Please follow these instructions to make sure the safe use of the drive. In case of any doubt please contact our local agent for consultation. Our professional persons are willing and ready to serve you.

The manual is subject to change without notice.

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Chapter 1 Safety Precautions

Caution Indicates misuse may damage the drive or mechanical system .

Danger Indicates misuse may result in casualty.

1.1 Before Power-up

Caution

- Check to be sure that the voltage of the main circuit AC power supply matches the input voltage of the drive.
- Install the drive in a safe location, avoiding high temperature, direct sunlight, humid air or water.
- The drive can only be used at the places accredited by our company. Any unauthorized working environment may have the risks of fire, gas explosion, electric shock and other incidents.
- If more than one drive installed on the same control cabinet, make additional cooling fan, so that the inside temperature is lower than 40℃ , in order to prevent overheating or fire occurs.
- It will affect the service life of the drive if a contactor is installed on the input side to control the start and stop. Generally it is required to control it through terminal commands. Special attention should be paid to its use in the case of the start and stop more frequently places.
- Do not install any switch component like circuit breaker or contactor at the output of the drive. If any of such components must be installed due process and other needs, it must be ensured that the drive has no output when the switch acts. In addition, it is forbidden to install any capacitor for improvement of power factor or any varistor against thunder at the output. Otherwise it will cause malfunctions, tripping protection and damages of components of the drive.
- Please use an independent power supply for the drive. Do avoid using the common power supply with an electrical welder and other equipment with strong disturbance. Otherwise it will cause the drive to protect or even damage the drive.
- Motor overload protection is not included in the default settings. If this function is desired, set C01.90 (motor thermal protection) to date value ETR trip or date value ETR

warning.

- Do not make any high voltage test with any component inside the drive. These semi-conductor parts are subject to the damage of high voltage.
- The IC board of the drive are susceptible to the effect and damage of static electricity. Don't touch the main circuit board.
- Installation, commissioning and maintenance must be performed by qualified professional personnel.
- Don't carry the front cover of the drive directly when handling. It should be handled with the base to prevent the front cover off and avoid the dropping of the drive, which may possibly cause the injuries to people and the damages to the drive.

Danger

- Be sure to turn off the power supply before wiring.
- Mount the drive in the metal and other non-combustible materials to avoid the risk of fire.
- Don't install the drive in a space with explosive gas, otherwise, they lead to explosion.
- R, S, T terminals are power input terminals, never mixed with U.V.W terminals. Be sure that the wiring of the main circuit is correct. Otherwise it will cause damages of the drive when the power is applied to it.
- The terminal of must be grounded separately and never connected to N-line. Otherwise it will easily cause the protection or errors of the drive.
- Do not dissemble or modify any internal connecting cord, wiring or component of the drive by yourself.
- Never remodel it or exchange control boards and components by yourself. It may expose you to an electrical shock or explosion, etc.
- Keep the drive from the reach of children or persons not concerned.

1.2 During the Power-up

Danger

- Do not plug the connectors of the drive during the power up to avoid any surge into the main control board due to plugging, which might cause the damage of the drive.
- Always have the protective cover in place before the power up to avoid electrical shock injury.

1.3 During the Operation

Caution

- Do not measure the signals on circuit boards while the drive is running to avoid danger.
- The drive has been optimized before sold. Please make proper adjustments according to the desired functions.
- Do consider the vibration, noise and the speed limit of the motor bearings and the mechanical devices.

Danger

- Never connect or disconnect the motor set while the drive is in running. Otherwise it will cause over-current trip and even burn up the main circuit of the drive.
- Never remove the front cover of the drive while the drive is powered up to avoid any injury of electric shock.
- Do not come close to the machine when the Reset Function is used to avoid anything unexpected. The motor may automatically recover from fault.

1.4 After the Power-off

Caution

- Even in the case of the main power, the other voltage inputs and the share load (linkage of DC intermediate circuit) all have been disconnected from the mains; the internal of the drive may still have residual energy. Before touching any potentially live parts of the drive, please wait at least 4 minutes for the drives of less than 22kW (including 22kW), and wait at least 15 minutes for the drives of more than 30kW (including 30kW). Otherwise, it may expose you to a risk of electrical shock.

Chapter 2 Standards and Specifications

2.1 Label Description

Significance of the product type code:

T/C: HLP-G10007D543P20XBX1CX0AXXVXXX

1-8 9-12 13-14 15-17 18 19 20 21 22 23 24 25 26-27 28-31

1-8	HLP-G100	Indicate Product Series
9-12	07D5	Indicate 7.5kW
13-14	21	Indicate 1-Phase AC 220V
	23	Indicate 3-Phase AC 220V
	43	Indicate 3-Phase AC 380V
15-17	P20	IP rating is 20
18	X	Without AC choke
	A	With AC choke
19	X	Without Brake unit
	B	With Brake unit
20	X	Without DC choke
	B	With DC choke
21	1	Control panel with LED display and potentiometer
22	C	With coating on PCB
23	X	Reserved
24	0	Domestic sale
	1	Overseas sale
25-27	XXX	Reserved
28-31	VXXX	Indicate software version number, such as V235 means the version number is 2.35.

2.2 Particular Specifications

Model	Input voltage	Input current (A)	Output current (A)	Rated power (kW)	Power	Air flow rate (m^3/h)	Net weight (kg)
HLP-G1000D3721	1×200-240V	7.0	2.5	0.37	17.7	51	1.3
HLP-G1000D7521	1×200-240V	13.9	5.0	0.75	33.3	51	1.3
HLP-G10001D521	1×200-240V	20.6	7.5	1.5	53.8	51	1.3
HLP-G10002D221	1×200-240V	30.4	11	2.2	75.0	51	1.3
HLP-G10003D721	1×200-240V	49.7	17	3.7	115.7	51	2.0
HLP-G10005D521	1×200-240V	62.4	25	5.5	160	124	5.6
HLP-G10007D521	1×200-240V	84	32	7.5	225	230	7.8
HLP-G1000D3723	3×200-240V	4.0	2.5	0.37	16.8	51	1.3
HLP-G1000D7523	3×200-240V	8.0	5	0.75	31.5	51	1.3
HLP-G10001D523	3×200-240V	12.0	7.5	1.5	51.0	51	1.3
HLP-G10002D223	3×200-240V	17.7	11	2.2	73.7	51	1.3
HLP-G10003D723	3×200-240V	27.2	17	3.7	110.9	51	2.0
HLP-G10005D523	3×200-240V	35.1	25	5.5	155	124	5.6
HLP-G10007D523	3×200-240V	43.4	32	7.5	210	124	5.6
HLP-G100001123	3×200-240V	61	45	11	323	272	7.8
HLP-G100001523	3×200-240V	73	61	15	447	300	18.5
HLP-G1000D7543	3×380-440V	3.7	2.3	0.75	38.5	51	1.3
	3×440-480V	3.2	2.1				
HLP-G10001D543	3×380-440V	6.4	4	1.5	49.0	51	1.3
	3×440-480V	5.5	3.6				
HLP-G10002D243	3×380-440V	8.9	5.6	2.2	65.2	51	1.3
	3×440-480V	7.7	5.1				
HLP-G10004D043	3×380-440V	15.8	9.9	4.0	122.9	51	2.0
	3×440-480V	13.6	9				
HLP-G10005D543	3×380-440V	21.3	13.3	5.5	139.4	51	2.0
	3×440-480V	18.4	12.1				
HLP-G10007D543	3×380-440V	28.3	17.7	7.5	211.6	68	2.5
	3×440-480V	24.4	16.1				
HLP-G100001143	3×380-440V	35.9	25	11	262.4	124	5.8
	3×440-480V	31.4	22.7				
HLP-G100001543	3×380-440V	43.4	32	15	339.3	170	5.8
	3×440-480V	38.8	29.1				
HLP-G10018D543	3×380-440V	51.5	38	18.5	418.0	230	8
	3×440-480V	46.1	34.5				

Model	Input voltage	Input current (A)	Output current (A)	Rated power (kW)	Power	Air flow rate (m^3/h)	Net weight (kg)
HLP-G100002243	3×380-440V	61.0	45	22	468.2	272	8
	3×440-480V	54.5	40.9				
HLP-G100003043	3×380-440V	73	61	30	676.3	303	19
	3×440-480V	64	52				
HLP-G100003743	3×380-440V	72	75	37	795.0	374	22
	3×440-480V	65	68				
HLP-G100004543	3×380-440V	86	91	45	974.8	408	26
	3×440-480V	80	82				
HLP-G100005543	3×380-440V	110	112	55	1246	476	26
	3×440-480V	108	110				
HLP-G100007543	3×380-440V	148	150	75	1635	595	37
	3×440-480V	135	140				
HLP-G100009043	3×380-440V	175	180	90	2204	646	60
	3×440-480V	154	160				
HLP-G100011043	3×380-440V	206	215	110	2600	714	60
	3×440-480V	183	190				
HLP-G100013243	3×380-440V	251	260	132	3178	850	60
	3×440-480V	231	240				
HLP-G100016043	3×380-440V	304	315	160	3689	1029	99
	3×440-480V	291	302				
HLP-G100018543	3×380-440V	350	365	185	4268	1190	99
	3×440-480V	320	335				
HLP-G100020043	3×380-440V	381	395	200	4627	1292	99
	3×440-480V	348	361				
HLP-G100022043	3×380-440V	420	435	220	4935	1411	99
	3×440-480V	383	398				
HLP-G100025043	3×380-440V	472	480	250	5323	1564	250
	3×440-480V	436	443				
HLP-G100028043	3×380-440V	525	540	280	6543	1700	250
	3×440-480V	475	490				
HLP-G100031543	3×380-440V	590	605	315	7251	1870	250
	3×440-480V	531	540				
HLP-G100035543	3×380-440V	647	660	355	7497	2125	250
	3×440-480V	580	590				
HLP-G100041543	3×380-440V	718	745	415	8284	2380	250
	3×440-480V	653	678				

2.3 Technical Specifications

Item		Specification
Power supply	Supply voltage	Single/Three phase 200~240V -20%~+10%; Three phase 380~480V -20%~+10%;
	Frequency	48~62Hz;
	Max. imbalance	3%;
Motor output	Output voltage	Three phase 0-100% of supply voltage;
	Output frequency	V/F : 0-400Hz , VVC+: 0-200Hz;
Main control functions	Control mode	V/F, VVC+;
	Start torque	0.5Hz 150%;
	Overload capacity	150% 60s, 200% 1s;
	PWM switch frequency	2~16kHz;
	Speed setting resolution	Digital: 0.001Hz; Analogy: 0.5‰ of the max. operating frequency ;
	Speed open-loop control accuracy	30~4000 rpm: tolerance±8 rpm;
	Control command source	LCP, digital terminal, local bus;
	Frequency setting source	LCP, analog, pulse, local bus;
	Ramp control	Selectable 4-speed steps ramp up and down times 0.05-3600.00s;
Basic Functions	Speed Open-loop Control; Process Closed-loop Control; Torque Open-loop Control; AMA Function; Motor Magnetisation; Slip Compensation; Torque compensation; Automatic Voltage Regulation; V/F Control, DC Brake; AC brake; Speed Limit; Current Limit; Flying Start; Reset Function; Counter; Timer;	
Application Functions	Wobble Function; Jogging; Multi-speed Control via Digital input; SLC(including Order Control and Parallel Control); Mechanical Braking; UP/DOWN ; Catch up / Slow down; Relative Scaling Reference etc.	
Protection Functions	Missing Motor Phase Protection; Low-voltage Protection; Over-voltage Protection; Over-current Protection; Output Phase Loss Protection; Output Short Circuit Protection; Output Grounding Fault Protection; Motor Thermal Protection; Live Zero Timeout Function; AMA Fails; CPU Fault; EEPROM Faults; Button freeze; Duplicate Fails; LCP Invalid; LCP Incompatible; Parameter Read-only; Reference Out of Range; Invalid While Running etc.	

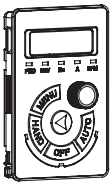
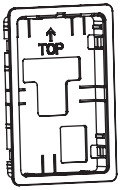
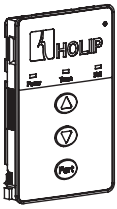
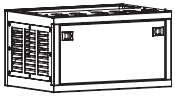
Item		Specification
IO board control terminals	Input	6 digital inputs（1 supports pulse input, pulse range: 1Hz~100kHz); 2 analog input, both can receive voltage or current signals.
	Output	2 digital output (1 supports pulse output, pulse range: 1Hz~100kHz); 2 relay output; 2 analog input (1 can be selected as current output or voltage output via jumper switch).
	Power supply	1 +10V, max current output 10mA; 1 +24V, max current output 200mA;
	Communication	RS+, RS-, max baud rate 115200bit/s;
Display	8 segments, 5 numeric displays	Display frequency, warnings, status and so on;
	Indicator	Light FWD, REV, HZ, A, RPM display various status of the drive;
	Data read-outs	Frequency setting, output frequency, feedback value, output current, DC link voltage, output voltage, output power, input terminals state, output terminals state, analogue input , analogue output, 1-10 fault records and accumulated working time etc.;
Environment	Enclosure	IP20;
	Ambient temperature	-10℃ ~50℃ , derating use when over 40℃ ;
	Humidity	5%-85% (95% without condensation);
	Vibration test	≤75kW: 1.14g; ≥90kW: 0.7g;
	Max. altitude above sea level	1000m, derating use when more than 1000 meters;
	Motor cable length	Shield cable: 50 meters, unshield cable: 100 meters;
others	DC choke	≥37kW Built-in
	Braking unit	≤22kW Built-in

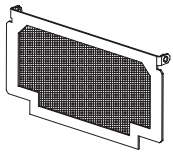
2.4 Derating Specifications

Derating for ambient temperature: If the drive is operated over 40℃ ambient temperature, the continuous output current should be decreased. The drive has been designed for operation at max 50℃ ambient temperation with one motor size smaller than normal. Continuous operation at full load at 50℃ ambient temperation will reduce the lifetime of the drive.

Derating for low air pressure: The cooling capability of air is decreased at low air pressure. Below 1000m altitude no de-rating is necessary but above 1000m the ambient temperature or the maximum output current should be decreased. Dcrease the output by 1% per 100m altitude above 1000m or reduce the max. ambient temperature by 1 degree per 200m.

2.5 Accessories

	Model: LCP-02 Function: Local Control Panel (LCP) is used to modify parameters, monitor status and control the drive. The standard length of extension cable is 15 meters when mounting LCP-02 on control cabinet. Standard configuration.
	Model: Cradle-01 Function: For the LCP-02 is mounted on the control cabinet Product No: 133B4264
	Model: CopyCard-01 Function: Copy Card can copy parameters from one drive to another. Product No: 133B5806
	Model: Base-01~03 Function: Used for cabinet installation Product No: 133B5809, Base-01, for Frame G9 133B5810, Base-02, for Frame G10 133B6320, Base-03, for Frame G11

	Model: Sieve-01~07 Function: Used for preventing dust sucked into the drive wind way. Product No: 133B9655, Sieve-01, for Frame G1 133B9656, Sieve-02, for Frame G2 133B9657, Sieve-03, for Frame G3 133B9658, Sieve-04, for Frame G4 133B9659, Sieve-05, for Frame G5 133B9660, Sieve-06, for Frame G6/G7 133B9661, Sieve-07, for Frame G8
	Model: IP50 Box-01~05 Function: Install this option box allows the drive to achieve IP50 enclosure. Product No: 133B5835, IP50 Box-01, for Frame G1 133B5836, IP50 Box-02, for Frame G2 133B5837, IP50 Box-03, for Frame G3 133B5838, IP50 Box-04, for Frame G4 133B5839, IP50 Box-05, for Frame G5
	Model: Flange-01~08 Function: Used for flange installation Product No: 133B9802, Flange-01, for Frame G1 133B9803, Flange-02, for Frame G2 133B9804, Flange-03, for Frame G3 133B9805, Flange-04, for Frame G4 133B9807, Flange-05, for Frame G5 133B6175, Flange-06, for Frame G6 133B6176, Flange-07, for Frame G7 133B6177, Flange-08, for Frame G8

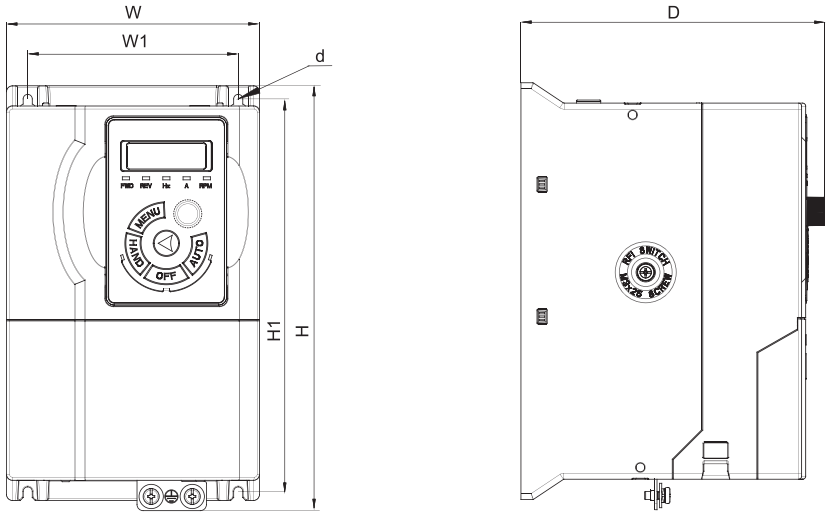
Chapter 3 Mechanical and Electrical Installation

3.1 Mechanical Installation

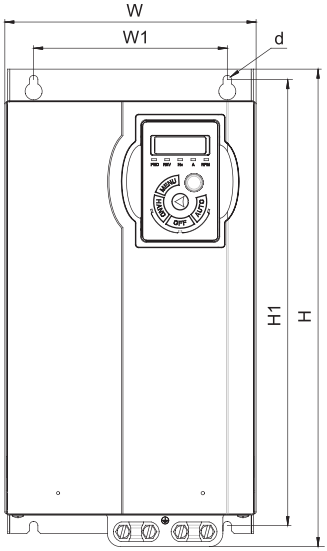
3.1.1 Installation Environment Requirements

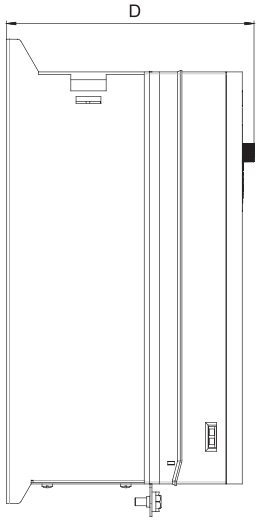
1. Ambient temperature in the range of -10℃ ~ 50℃ ;
2. Drive should be installed on surface of flame retardant object, with adequate surrounding space for heat dissipation;
3. Installation should be performed where vibration is less than 1.14g (<= 75kW) or 0.7g (>= 90kW);
4. Avoid from moisture and direct sunlight;
5. Do not expose to an atmosphere with flammable gases, corrosive gases, explosive gases or other harmful gases;
6. Protect the cooling fan by avoiding oil, dust and metal particles;
7. Prevent drilling residues, wire ends and screws falling into drive;

3.1.2 External and Installation Dimensions

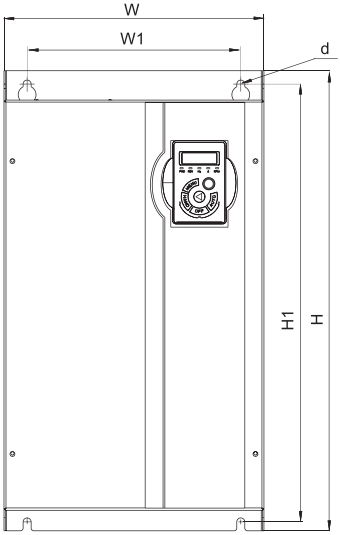


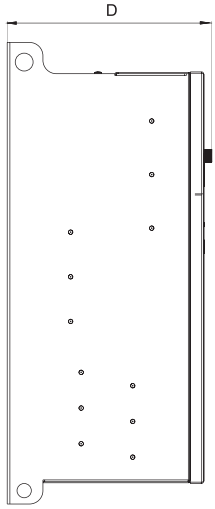
Frame G1~G3



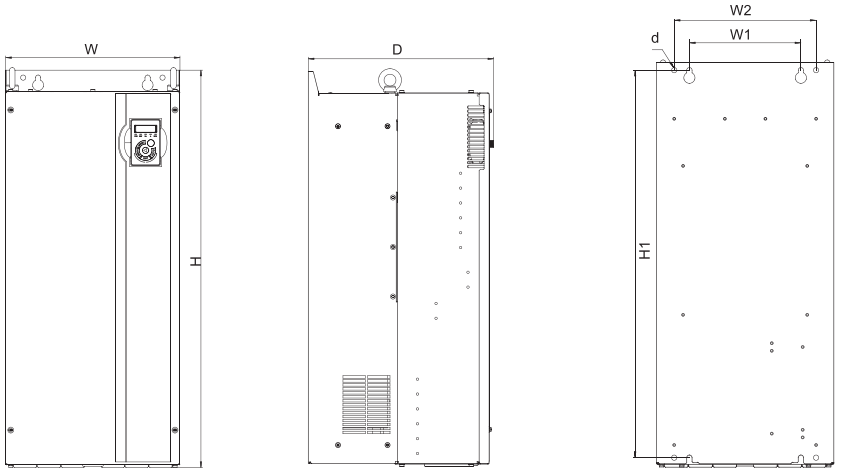


Frame G4~G5

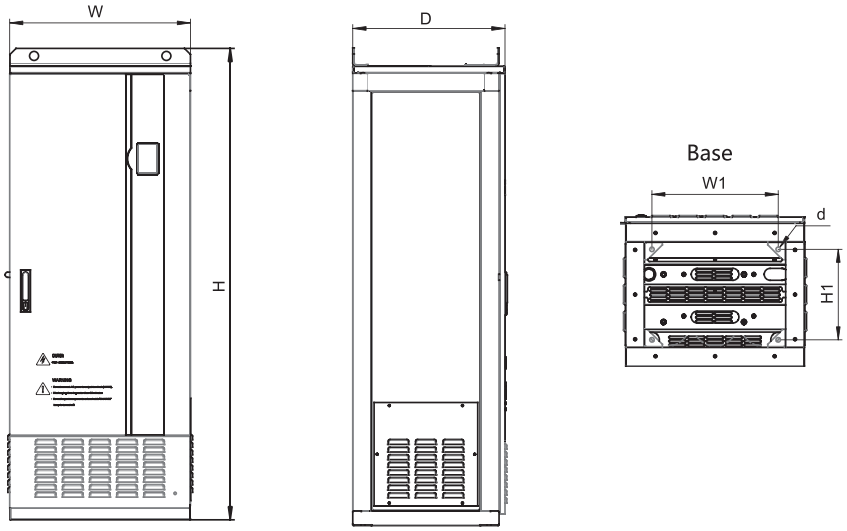




Frame G6~G8



Frame G9~G10



Frame G11

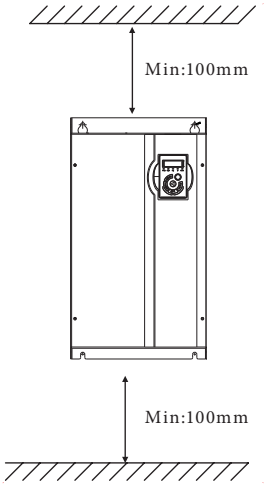
External and installation dimensions (unit: mm)

Frame	Voltage & Power			Dimensions (mm)						
	1×200-240V	3×200-240V	3×380-480V	W	H	D	W1	H1	W2	d
G1	0.37-1.5kW	0.37-1.5kW	0.75-2.2kW	125	210	152	104	194	-	4.5
G2	2.2-3.7kW	2.2-3.7kW	4.0-5.5kW	145	250	167	124	230	-	4.5
G3	-	-	7.5kW	155	263	177	133	243	-	4.5
G4	5.5kW	5.5-7.5kW	11-15kW	192	365	189	150	340	-	6.5
G5	7.5kW	11kW	18.5-22kW	216	420	194	150	395	-	6.5
G6	-	15kW	30-37kW	292	517	229	240	492	-	9
G7	-	-	45-55kW	292	562	249	240	537	-	9
G8	-	-	75kW	292	665	277	240	640	-	9
G9	-	-	90-132kW	350	799	375	220	765	280	10.5
G10	-	-	160-220kW	486	900	390	345	863	410	10.5
G11	-	-	250-415kW	600	1568	509	424	304	-	15

3.1.3 Installation and Direction

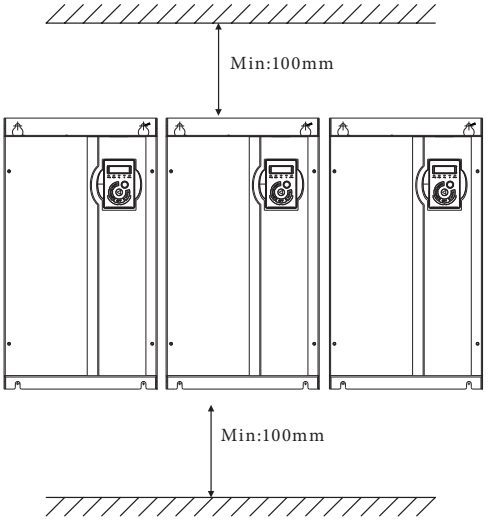
1. Single Installation

The drive must be installed vertically with smooth ventilation. Enough space must be left around the drive to ensure good cooling, as shown below:



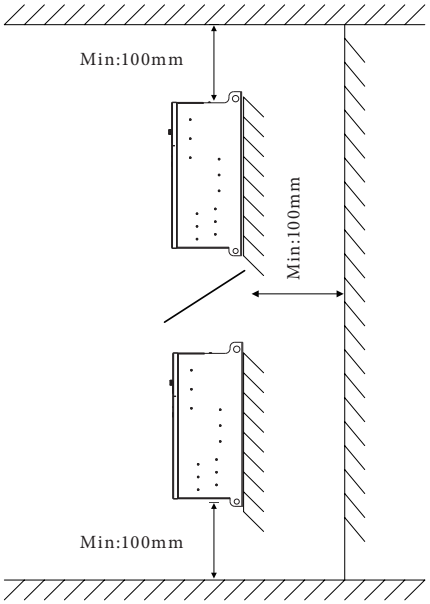
2. Side by Side Installation

The drive can be mounted side by side, a minimum space must be reserved above and below the enclosure, as shown below:



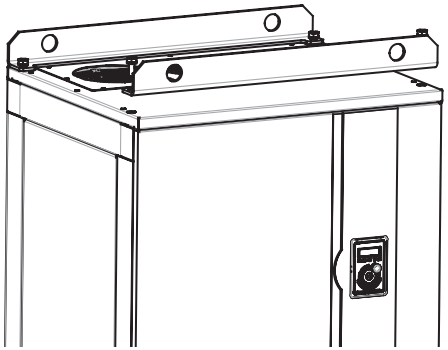
3. Upper and Lower Installation

If several drives need to be installed together in one cabinet, upper and lower installation can be adopted. Enough space must be reserved to ensure effective cooling, as shown below:

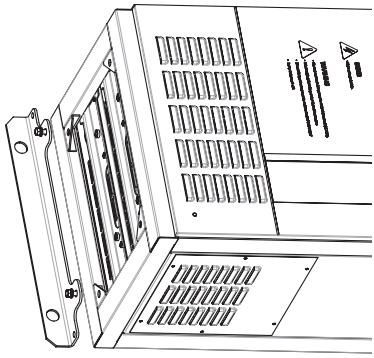


4. Frame G11 Wall Installation

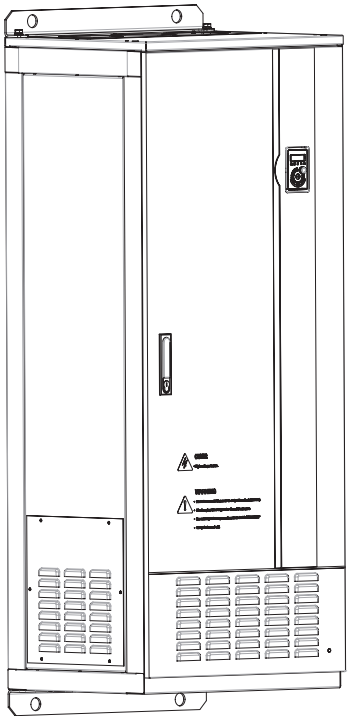
Step 1: Remove the sheet metal near the door.



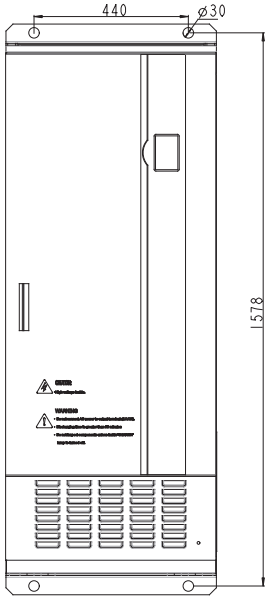
Step 2: Fix the removed sheet metal in step 1 to the bottom of the drive with removed bolts and nuts in attachment.



Step 3: Install the drive in the control cabinet.



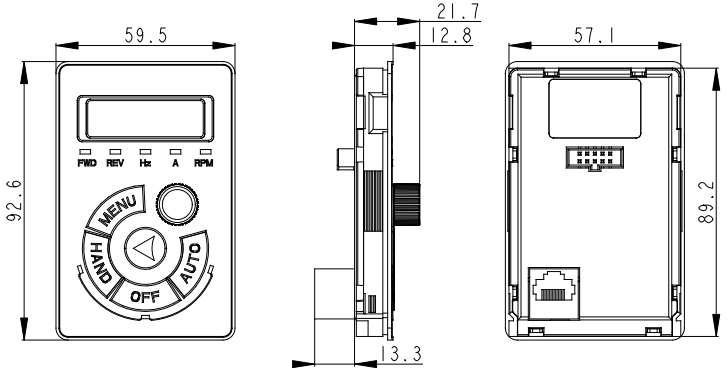
Note: Wall installation dimensions:



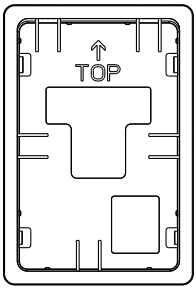
3.1.4 Local Control Panel External Installation

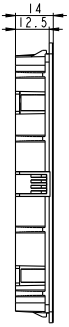
1. LCP-02 Installation

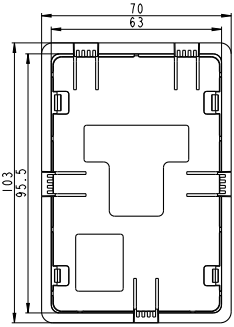
The external dimensions of LCP-02 are shown below (unit: mm):



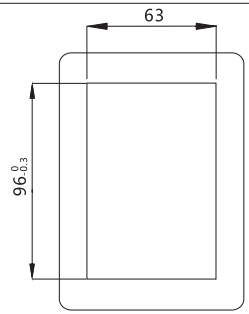
When installing LCP-02 outside, a cradle is needed. The external dimensions of the cradle are shown below (unit: mm):





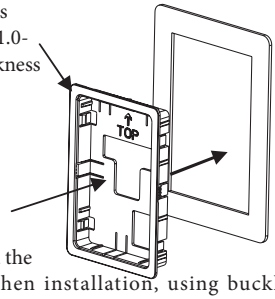


The installation steps of LCP-02 are shown below:



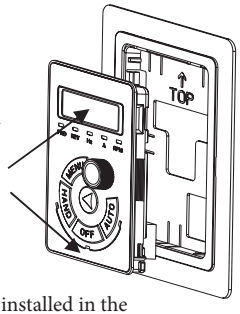
Stepl: Open a hole in line with the size of the control panel in the position need to install the LCP, hole size, as shown;

This cradle is suitable for 1.0-2.0mm thickness sheet metal parts.

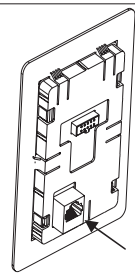


Press and hold the snap roots when installation, using buckle deformation install sheet metal.
Step2: Install the LCP according to the diection of the arrow

Recommended to install vertical mounting position arrow, press with uniform force.



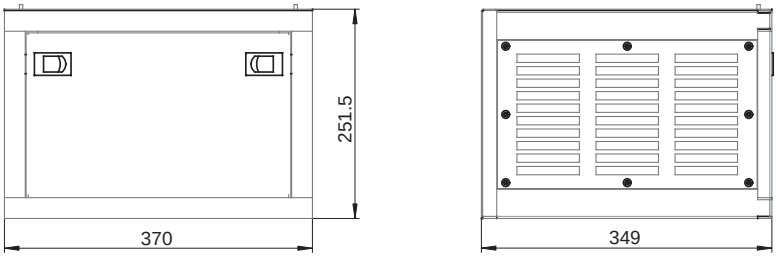
Step 3: The LCP is installed in the cradle, according to the direction of the arrow.



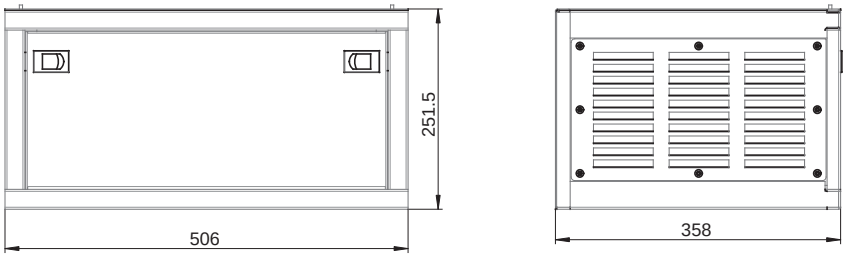
Step 4: Install the external LCP communication cable, insert into RJ45 terminal from the bottom of hole.

3.1.5 Base Installation

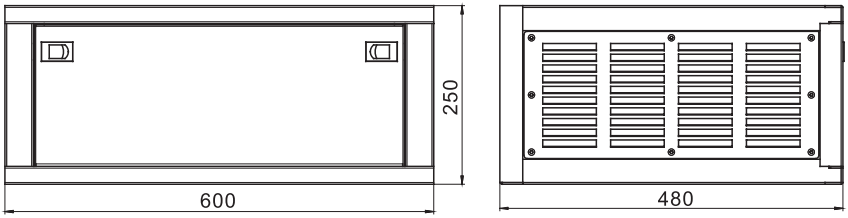
Base-01 is for frame G8, its external dimensions are shown below (unit: mm):



Base-02 is for frame G9, its external dimensions are shown below (unit: mm):

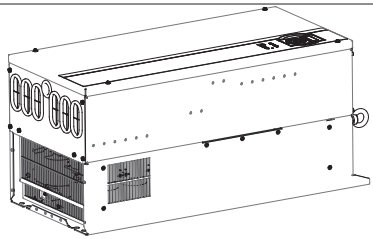


Base-03 is for frame G11, its external dimensions are shown below (unit: mm):

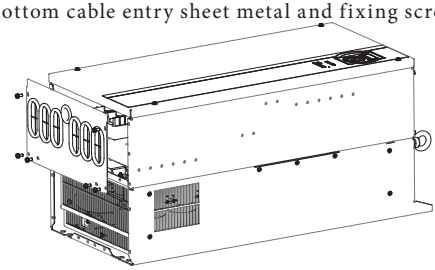


The installation steps of Base-01 and Base-02 are the same, shown below:

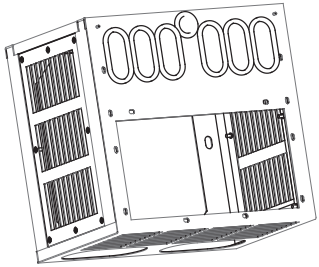
Step1: Original state.



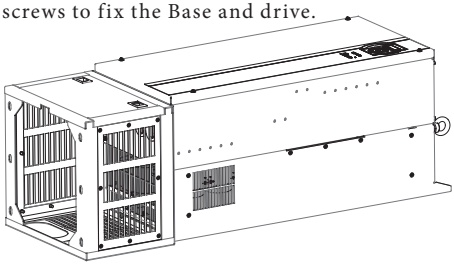
Step2: Remove the bottom cable entry sheet metal and fixing screws.



Step3: Move the rubber pieces from the bottom of the sheet metal to the Base.

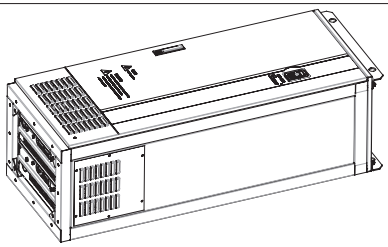


Step4: Use M5 * 12 screws to fix the Base and drive.

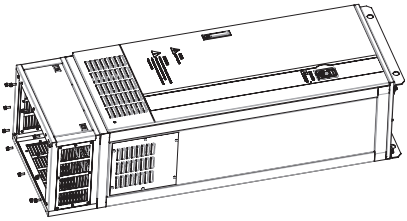


The installation steps of Base-03 are shown below:

Step1: Original state



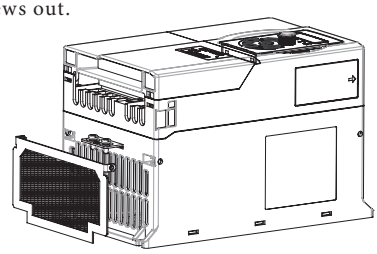
Step2: Use 12 M8 * 20 screws to fix the Base and drive.



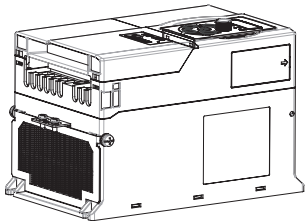
3.1.6 Sieve Installation

1. Sieve-01~03 Installation

Step1: Take two groud screws out.

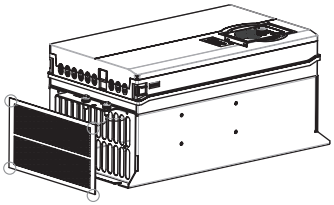


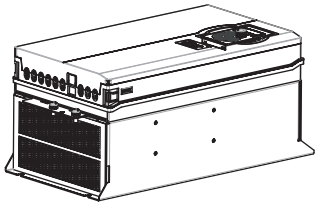
Step2: Both sides use M4 screw locking, and the screw length must not exceed 10mm.



2. Sieve-04~07 Installation

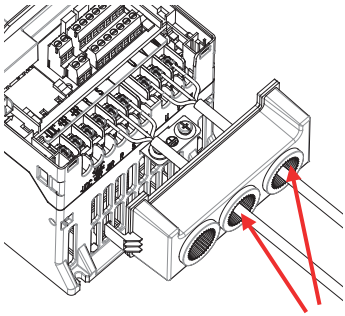
Step1: Adsorbe the sieve (with four magnets) to the inlet at the bottom of the machine directly.



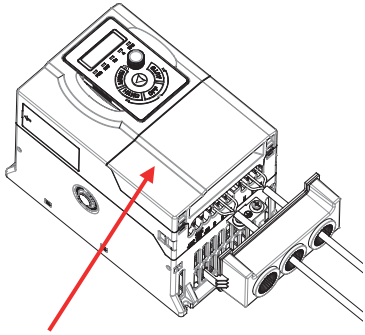


3.1.7 IP50 Box Installation

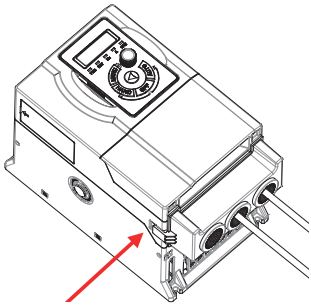
1. IP50 Box 01~03 Installation



Step 1: Enter the main circuit cable through the rubber ring of IP50 box, connect the cable to the drive main circuit terminals.

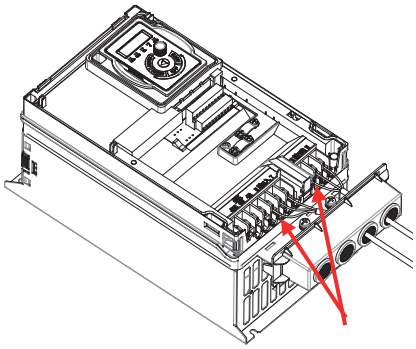


Step2: Install the cover.

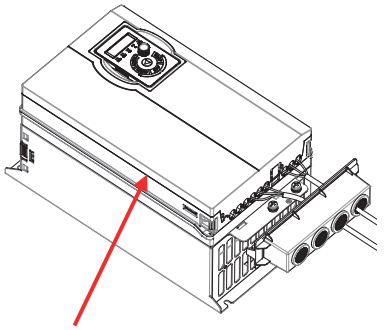


Step 3: The IP50 box is installed on the drive by two snap-fits.

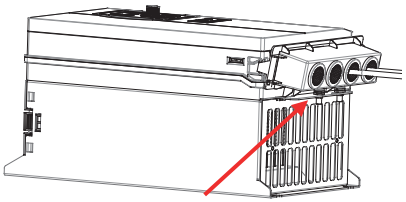
2. IP50 Box 04~05 Installation



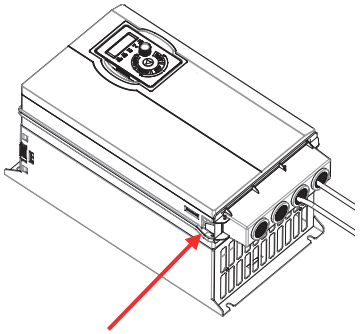
Step 1: Enter the main circuit cable through the rubber ring of IP50 box, connect the cable to the drive main circuit terminals.



Step2: Install the cover.



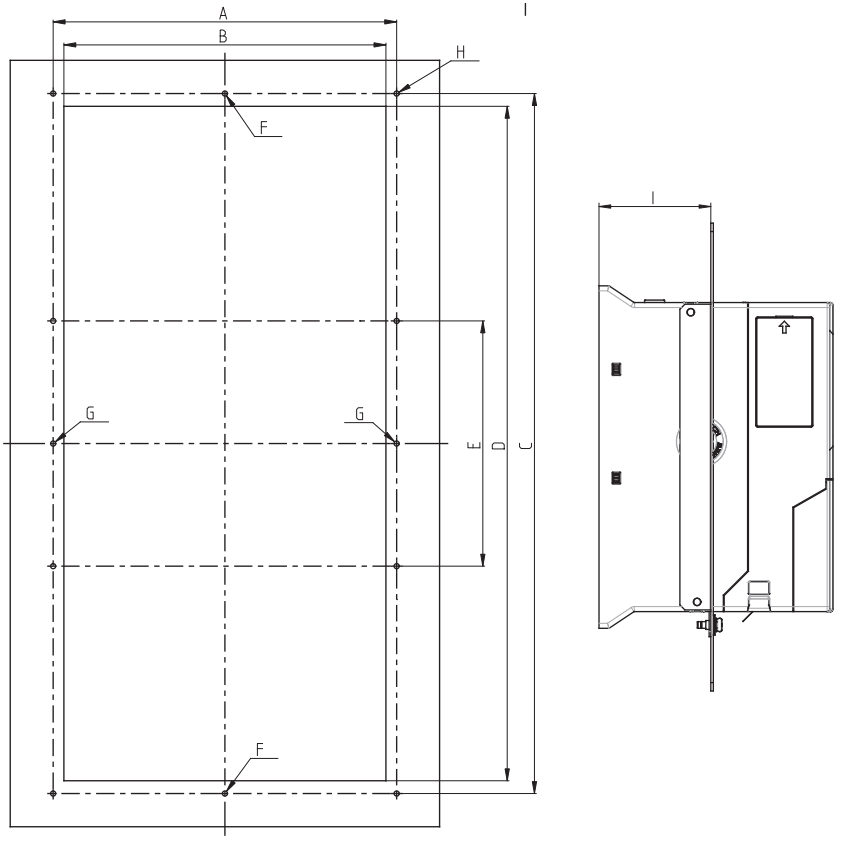
Step3: Insert the two plastic feets of the IP50 box into the two positioning holes in sheet metal.



Step 4: The IP50 box is installed on the drive by two snap-fits.

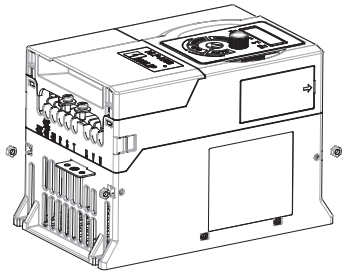
3.1.8 Flange Installation

Open a hole in the device, the size of the hole and mounting hole are shown below:

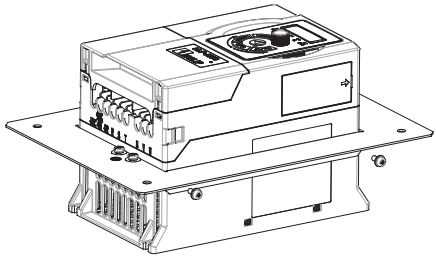


Frame	A	B	C	D	E	F	G	H	I
G1	160	150	240	220	-	-	-	4xM4	68.5
G2	180	164	270	260	-	-	-	4xM4	83.7
G3	190	170	274	270	-	-	-	4xM4	90.8
G4	238	210	378	385	-	-	2xM4	4xM4	111
G5	254	233	430	440	-	-	2xM4	4xM4	127.5
G6	336	315	525	512	-	2xM5	2xM5	4xM5	122.5
G7	336	315	567	557	-	2xM5	2xM5	4xM5	142
G8	336	315	685	660	240	2xM5		8xM5	171

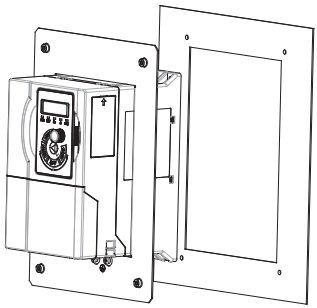
1. Flange 01~03 Installation



Step 1: Remove the two ground screws, take the nuts from the accessory kit and insert them into the slots.

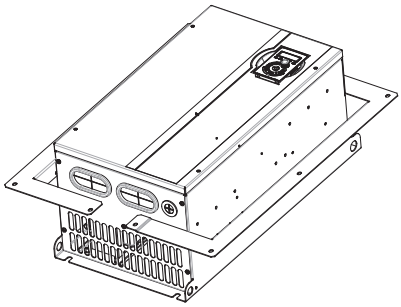


Step 2: Place the flange on the drive front cover, use the four screws (in accessory kit) to fasten the flange, and install the ground screws.

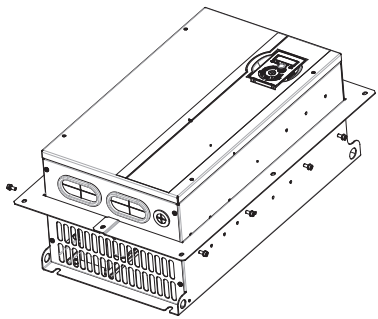


Step 3: Fix the drive in the device hole by four screws.

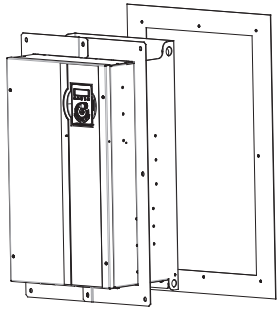
2. Flange 04~08 Installation



Step 1: Install the two flange metals from the drive side.



Step 2: Screw the flange metals and drive together.



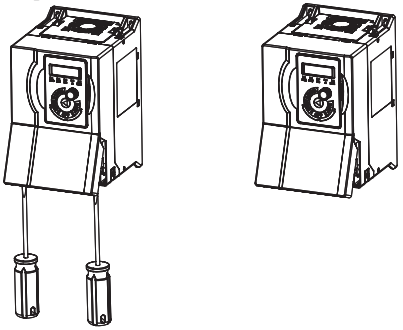
Step 3: Fix the drive in the device hole.

3.1.9 Removal of the Front Cover

It is needed to remove the front cover before wiring the main circuit and control circuit.

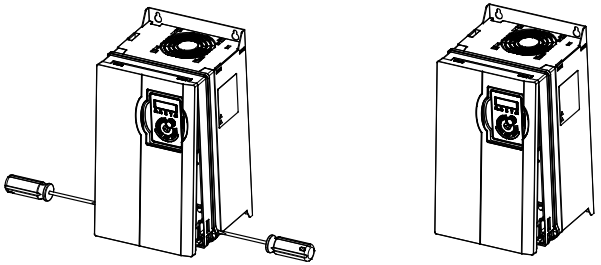
Frame G1~G3

Use a screwdriver to push out the hook of the front cover inward.



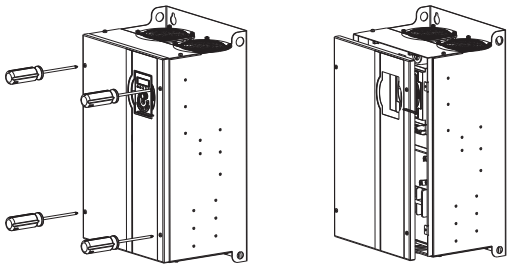
Frame G4~G5

Use a screwdriver to push out the hook of the front cover inward.



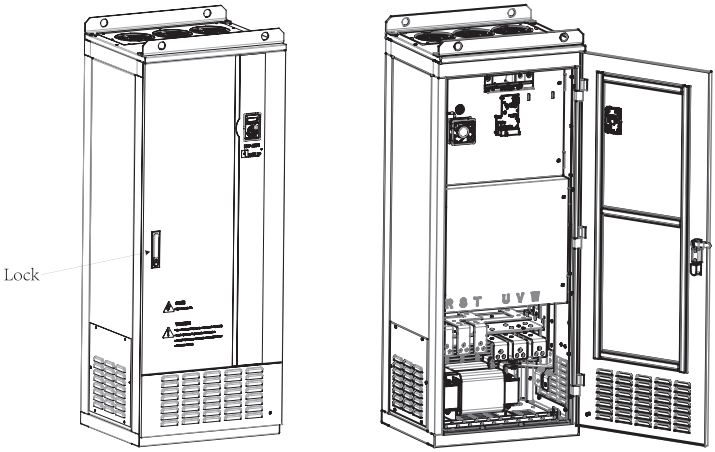
Frame G6~G10

Use a screwdriver to loosen the screws on the front cover.



Frame G11

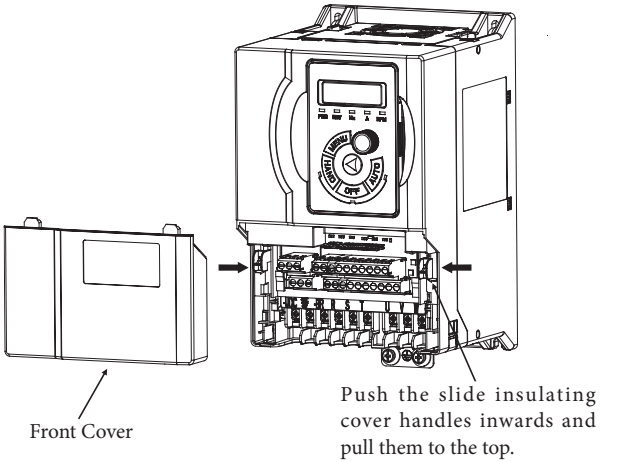
Screw the lock on the door.



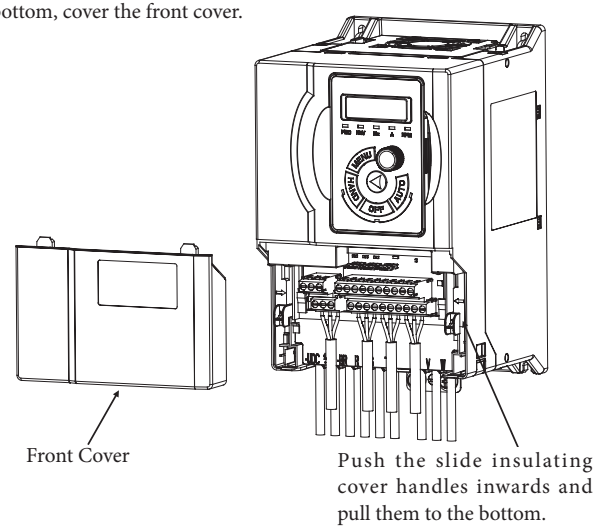
3.1.10 Slide Insulating Cover Operation

Frame G1~G3 has built-in slide insulating cover between main circuit and control circuit. Its operation is shown below:

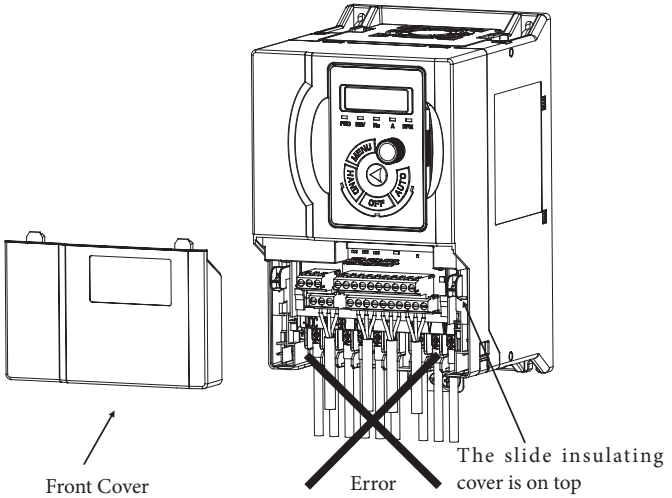
Step 1: Open the front cover, push the slide insulating cover handles inwards and pull them to the top.



Step 2: Wiring IO and main circuit, push the slide insulating cover handles inwards and pull them to the bottom, cover the front cover.

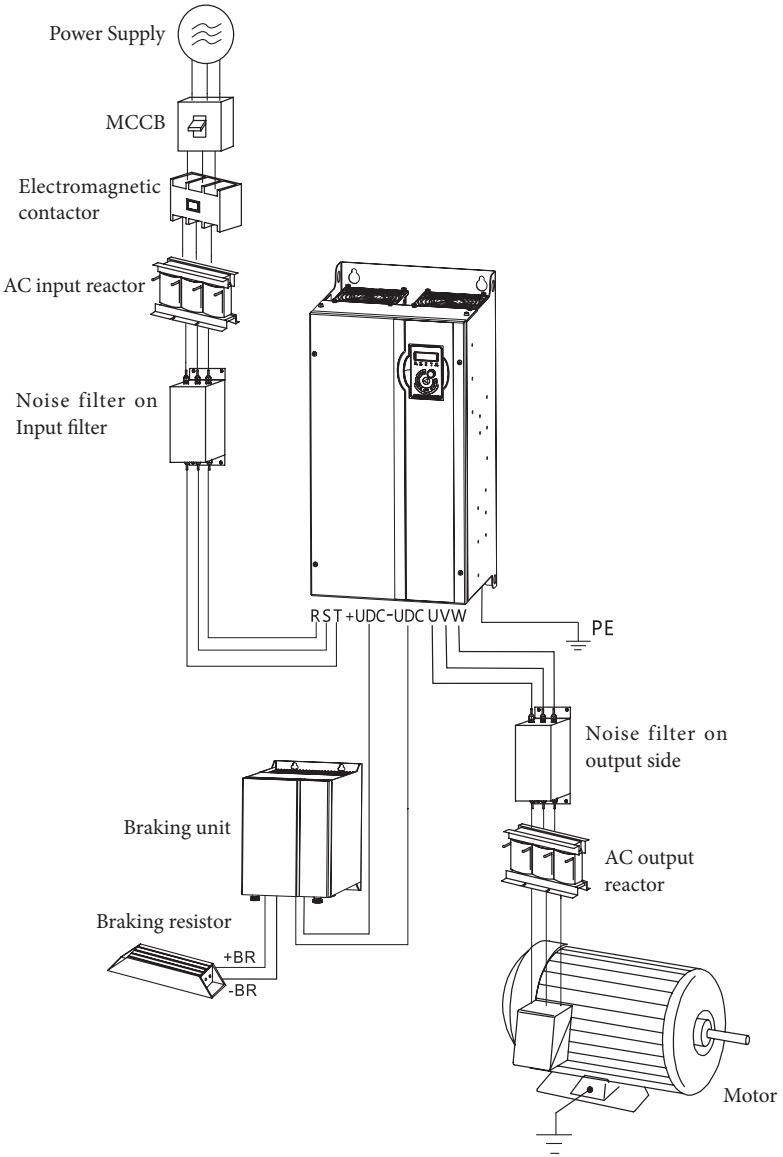


Note: If the slide insulating cover is not be pulled down, the front cover will be not assembled in place.



3.2 Peripheral Electrical Devices

The peripheral electrical devices of the drive are shown below:



Part	Mounting Location	Function Description
MCCB	Power receiving side	Interrupt the power supply when overcurrent occurs on downstream devices.
Contactor	Between MCCB and drive input side	Do not start and stop the drive frequently by switching the contactor on and off (less than twice per minute) nor use it to directly start the drive.
AC input reactor	Drive input side	Improve the power factor of the input side; Eliminate the input current unbalance due to unbalance between the power phases; Eliminate the higher harmonics of the input side effectively; prevent other devices from being damaged due to distortion of the voltage waveform;
EMC Input filter	Drive input side	Decrease the conduction interference flowing from the power end to the drive and improve the antiinterference capacity of the drive; Reduce the external conduction and radiation interference of the drive;
Braking unit Braking resistor	≤22kW Braking unit is standard configuration	Consume the motor feedback energy to achieve rapid braking.
EMC Output filter	Drive output side	Reduce the external conduction and radiation interference of the drive.
AC output reactor	Between the drive output side and the motor, close to the drive	Degrade the motor insulation performance and damage the motor in the long run; Generate large leakage current and cause frequent AC drive protection trips; If the distance between the drive and the motor is greater than 100 m, install an AC output reactor;

3.2.1 Selection of MCCB/Fuse/Contactor

Model	MCCB (A)	Fuse (A)	Contactor (A)
HLP-G1000D3721	10	10	10
HLP-G1000D7521	25	25	16
HLP-G10001D521	32	32	25
HLP-G10002D221	40	40	32
HLP-G10003D721	63	63	63
HLP-G10005D521	100	100	100
HLP-G10007D521	150	150	100
HLP-G1000D3723	10	10	10
HLP-G1000D7523	10	10	10

Model	MCCB (A)	Fuse (A)	Contactor (A)
HLP-G10001D523	25	25	16
HLP-G10002D223	25	25	25
HLP-G10003D723	40	40	32
HLP-G10005D523	63	63	40
HLP-G10007D523	63	63	63
HLP-G100001123	100	100	100
HLP-G100001523	100	100	100
HLP-G1000D7543	10	10	10
HLP-G10001D543	10	10	10
HLP-G10002D243	16	16	10
HLP-G10004D043	25	25	25
HLP-G10005D543	32	32	25
HLP-G10007D543	40	40	32
HLP-G100001143	63	63	40
HLP-G100001543	63	63	63
HLP-G10018D543	100	100	63
HLP-G100002243	100	100	100
HLP-G100003043	150	150	100
HLP-G100003743	150	150	100
HLP-G100004543	175	175	135
HLP-G100005543	200	200	150
HLP-G100007543	250	250	200
HLP-G100009043	300	300	240
HLP-G100011043	350	350	260
HLP-G100013243	400	400	350
HLP-G100016043	500	500	450
HLP-G100018543	630	630	450
HLP-G100020043	630	630	550
HLP-G100022043	800	800	550
HLP-G100025043	800	800	630
HLP-G100028043	800	800	630
HLP-G100031543	1000	1000	630
HLP-G100035543	1000	1000	800
HLP-G100041543	1200	1200	800

3.2.2 Selection of Braking Unit and Braking Resistor

Users can select different braking resistor for different application, it is calculated as follows. But

the resistance should not be less than the minimum recommended in the table, otherwise there is a risk of damage caused by the drive, the power of braking resistor can be greater. the greater system inertia, the short deceleration time, the more frequent braking, the greater the power of the braking resistor, the smaller the braking resistor value.

1. Selection of the Braking resistor value

   The braking resistor value: $R = U_{DH} \times U_{DH} \div (K_B \times P_{MN})$

   UDH is the limit of the DC bus, generally it is 700V for 400V model , 400V for 200V model.

   PMN is rated motor power;

   KB is braking torque coefficient, it is between 0.8 to 2.0. For general machine, it is 1.0, for greater inertia machine, it is 1.5 to 2.

2. Selection of the Braking resistor power

   Braking power: $P_b = U_{DH} \times U_{DH} \div R$

   Theoretically braking resistor power and braking power can be the same, But in actual choice, it will be multiplied by a correction factor, braking resistor power

   $Pr = a\ P_b$

   correction factor : a = 0.12~ 0.9

   For not frequent acceleration and deceleration application, a can be set as 0.12, for frequent acceleration and deceleration application, it should be increased.

3. Recommended selection

Model	Braking Resistor Recommended Power	Braking Resistor Recommended value	Braking Unit
HLP-G1000D3721	100W	≧ 130Ω	Built-in
HLP-G1000D7521	150W	≧ 80Ω	
HLP-G10001D521	300W	≧ 50Ω	
HLP-G10002D221	300W	≧ 50Ω	
HLP-G10003D721	500W	≧ 30Ω	
HLP-G10005D521	900W	≧ 40Ω	
HLP-G10007D521	1200W	≧ 30Ω	
HLP-G1000D3723	100W	≧ 130Ω	
HLP-G1000D7523	150W	≧ 80Ω	
HLP-G10001D523	300W	≧ 50Ω	
HLP-G10002D223	300W	≧ 50Ω	
HLP-G10003D723	500W	≧ 30Ω	
HLP-G10005D523	900W	≧ 40Ω	
HLP-G10007D523	1200W	≧ 30Ω	
HLP-G100001123	2000W	≧ 20Ω	

Model	Braking Resistor Recommended Power	Braking Resistor Recommended value	Braking Unit
HLP-G1000D7543	150W	≧ 300Ω	Built-in
HLP-G10001D543	250W	≧ 200Ω	
HLP-G10002D243	500W	≧ 100Ω	
HLP-G10004D043	500W	≧ 100Ω	
HLP-G10005D543	700W	≧ 80Ω	
HLP-G10007D543	900W	≧ 65Ω	
HLP-G100001143	1200W	≧ 40Ω	
HLP-G100001543	1500W	≧ 30Ω	
HLP-G10018D543	2000W	≧ 25Ω	
HLP-G100002243	2500W	≧ 20Ω	

For the power greater than 30kW (including) models, braking unit is optional, so the selection of braking resistor depends on the selection of braking unit.

3.2.3 Selection of AC Input and Output Reactor

1. The guide of AC input reactor selection

Model	Rated current (A)	Maximum continuous current (A)	Inductance (mH) & 3% Impedance
HLP-G1000D3721	7	10.5	2.31
HLP-G1000D7521	14	20.85	1.16
HLP-G10001D521	21	30.9	0.78
HLP-G10002D221	30	45.6	0.53
HLP-G10003D721	50	74.55	0.33
HLP-G10005D521	62	93.6	0.26
HLP-G10007D521	84	126	0.19
HLP-G1000D3723	4	6	4.04
HLP-G1000D7523	8	12	2.02
HLP-G10001D523	12	18	1.35
HLP-G10002D223	18	26.55	0.91
HLP-G10003D723	27	40.8	0.59
HLP-G10005D523	35	52.65	0.46
HLP-G10007D523	43	65.1	0.37
HLP-G100001123	61	91.5	0.27
HLP-G100001523	73	109.5	0.22
HLP-G1000D7543	3.7	5.55	8.74
HLP-G10001D543	6.4	9.6	5.05

Model	Rated current (A)	Maximum continuous current (A)	Inductance (mH) & 3% Impedance
HLP-G10002D243	8.9	13.35	3.63
HLP-G10004D043	15.8	23.7	2.05
HLP-G10005D543	21.3	31.95	1.52
HLP-G10007D543	28.3	42.45	1.14
HLP-G100001143	35.9	53.85	0.90
HLP-G100001543	43.4	65.1	0.75
HLP-G10018D543	51.5	77.25	0.63
HLP-G100002243	61	91.5	0.53
HLP-G100003043	80	120	0.45
HLP-G100003743	80	120	0.36
HLP-G100004543	100	150	0.3
HLP-G100005543	120	180	0.25
HLP-G100007543	160	240	0.18
HLP-G100009043	200	300	0.15
HLP-G100011043	250	375	0.12
HLP-G100013243	300	450	0.1
HLP-G100016043	350	525	0.085
HLP-G100018543	400	600	0.07
HLP-G100020043	450	675	0.065
HLP-G100022043	500	750	0.06
HLP-G100025043	560	710	0.05
HLP-G100028043	630	780	0.03
HLP-G100031543	700	880	0.0215
HLP-G100035543	770	970	0.017
HLP-G100041543	860	1070	0.012

2. the guide of AC output reactor selection

Model	Rated current (A)	Saturation current (A)	Inductance (mH) & 3% Impedance
HLP-G1000D3721	2.5	3.75	6.47
HLP-G1000D7521	5	7.5	3.23
HLP-G10001D521	7.5	11.25	2.16
HLP-G10002D221	11	16.5	1.47
HLP-G10003D721	17	25.5	0.95
HLP-G10005D521	25	37.5	0.65
HLP-G10007D521	32	48	0.51

Model	Rated current (A)	Saturation current (A)	Inductance (mH) & 3% Impedance
HLP-G1000D3723	2.5	3.75	6.47
HLP-G1000D7523	5	7.5	3.23
HLP-G10001D523	7.5	11.25	2.16
HLP-G10002D223	11	16.5	1.47
HLP-G10003D723	17	25.5	0.95
HLP-G10005D523	25	37.5	0.65
HLP-G10007D523	32	48	0.51
HLP-G100001123	45	67.5	0.36
HLP-G100001523	61	91.5	0.27
HLP-G1000D7543	2.3	3.45	14.06
HLP-G10001D543	4	6	8.08
HLP-G10002D243	5.6	8.4	5.77
HLP-G10004D043	9.9	14.85	3.27
HLP-G10005D543	13.3	19.95	2.43
HLP-G10007D543	17.7	26.55	1.83
HLP-G100001143	25	37.5	1.29
HLP-G100001543	32	48	1.01
HLP-G10018D543	38	57	0.85
HLP-G100002243	45	67.5	0.72
HLP-G100003043	61	129	0.362
HLP-G100003743	75	159	0.294
HLP-G100004543	91	193	0.242
HLP-G100005543	112	238	0.197
HLP-G100007543	150	318	0.147
HLP-G100009043	180	382	0.123
HLP-G100011043	215	456	0.103
HLP-G100013243	260	551	0.085
HLP-G100016043	315	668	0.070
HLP-G100018543	365	774	0.060
HLP-G100020043	395	838	0.056
HLP-G100022043	435	923	0.051
HLP-G100025043	480	1020	0.009
HLP-G100028043	540	1145	0.008
HLP-G100031543	605	1280	0.0055
HLP-G100035543	660	1400	0.004
HLP-G100041543	745	1580	0.0035

3.2.4 Selection of EMC Filter

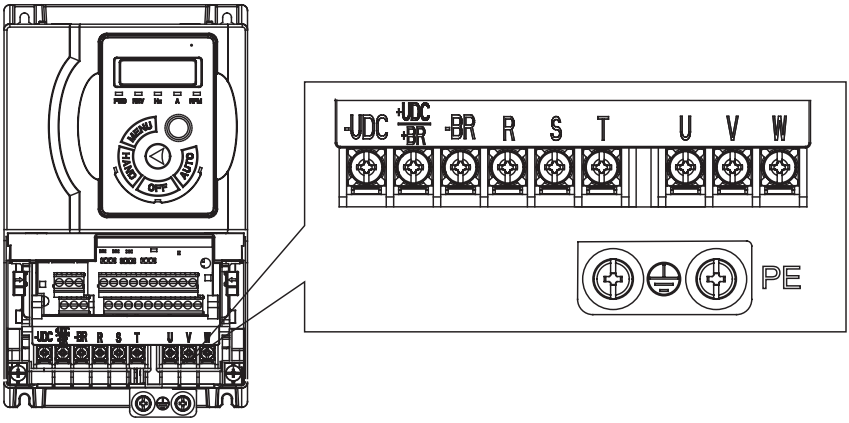
Model	EMC Input Filter		EMC Output Filter	
	Rated Current (A)	Recommended Model *		Rated Current (A)
HLP-G1000D3721	10	NFI-010	5	NFO-005
HLP-G1000D7521	20	NFI-020	5	NFO-005
HLP-G10001D521	20	NFI-020	10	NFO-010
HLP-G10002D221	36	NFI-036	20	NFO-020
HLP-G10003D721	50	NFI-050	20	NFO-020
HLP-G10005D521	80	NFI-080	36	NFO-036
HLP-G10007D521	100	NFI-100	36	NFO-036
HLP-G1000D3723	5	NFI-005	5	NFO-005
HLP-G1000D7523	10	NFI-010	5	NFO-005
HLP-G10001D523	10	NFI-010	10	NFO-010
HLP-G10002D223	20	NFI-020	20	NFO-020
HLP-G10003D723	36	NFI-036	20	NFO-020
HLP-G10005D523	36	NFI-036	36	NFO-036
HLP-G10007D523	50	NFI-050	36	NFO-036
HLP-G100001123	80	NFI-080	50	NFO-050
HLP-G100001523	80	NFI-080	80	NFO-080
HLP-G1000D7543	5	NFI-005	5	NFO-005
HLP-G10001D543	5	NFI-005	5	NFO-005
HLP-G10002D243	10	NFI-010	10	NFO-010
HLP-G10004D043	10	NFI-010	10	NFO-010
HLP-G10005D543	20	NFI-020	20	NFO-020
HLP-G10007D543	20	NFI-020	20	NFO-020
HLP-G100001143	36	NFI-036	36	NFO-036
HLP-G100001543	36	NFI-036	36	NFO-036
HLP-G10018D543	50	NFI-050	50	NFO-050
HLP-G100002243	50	NFI-050	50	NFO-050
HLP-G100003043	65	NFI-065	65	NFO-065
HLP-G100003743	80	NFI-080	80	NFO-080
HLP-G100004543	100	NFI-100	100	NFO-100
HLP-G100005543	150	NFI-150	150	NFO-150
HLP-G100007543	150	NFI-150	150	NFO-150
HLP-G100009043	200	NFI-200	200	NFO-200
HLP-G100011043	250	NFI-250	250	NFO-250

Model	EMC Input Filter		EMC Output Filter	
	Rated Current (A)	Recommended Model *		Rated Current (A)
HLP-G100013243	250	NFI-250	250	NFO-250
HLP-G100016043	300	NFI-300	300	NFO-300
HLP-G100018543	400	NFI-400	400	NFO-400
HLP-G100020043	400	NFI-400	400	NFO-400
HLP-G100022043	600	NFI-600	600	NFO-600
HLP-G100025043	900	NFI-900	900	NFO-900
HLP-G100028043	900	NFI-900	900	NFO-900
HLP-G100031543	900	NFI-900	900	NFO-900
HLP-G100035543	1200	NFI-1200	1200	NFO-1200
HLP-G100041543	1200	NFI-1200	1200	NFO-1200

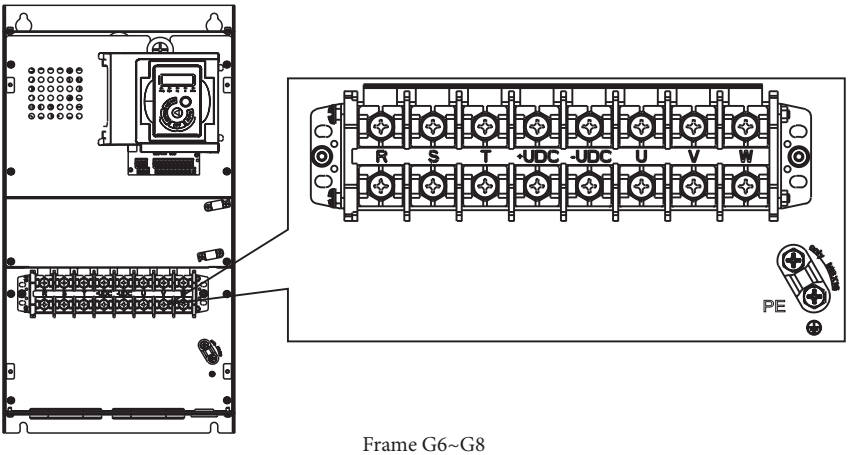
* Recommended models is the Shanghai Eagtop Electronic Technology Co., Ltd. products, website http://www.eagtop.com/

3.3 Description of Main Circuit

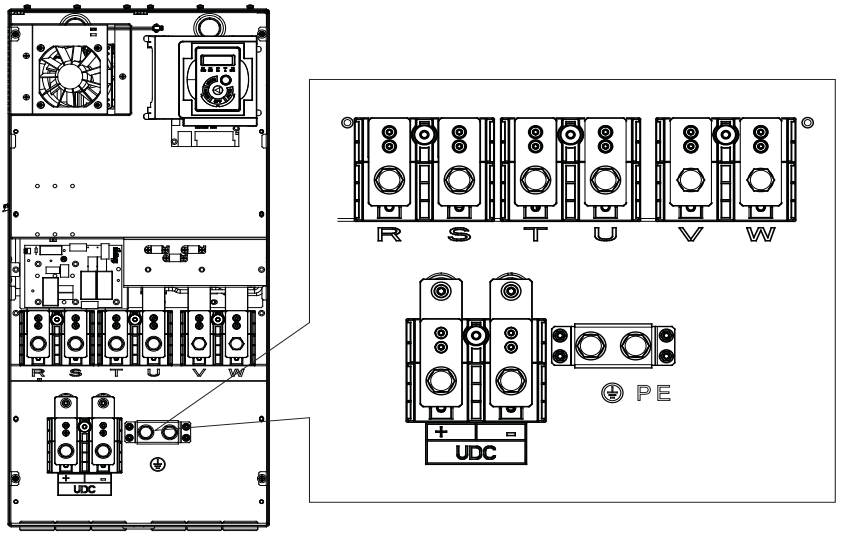
3.3.1 Schematic of Main Circuit Terminals



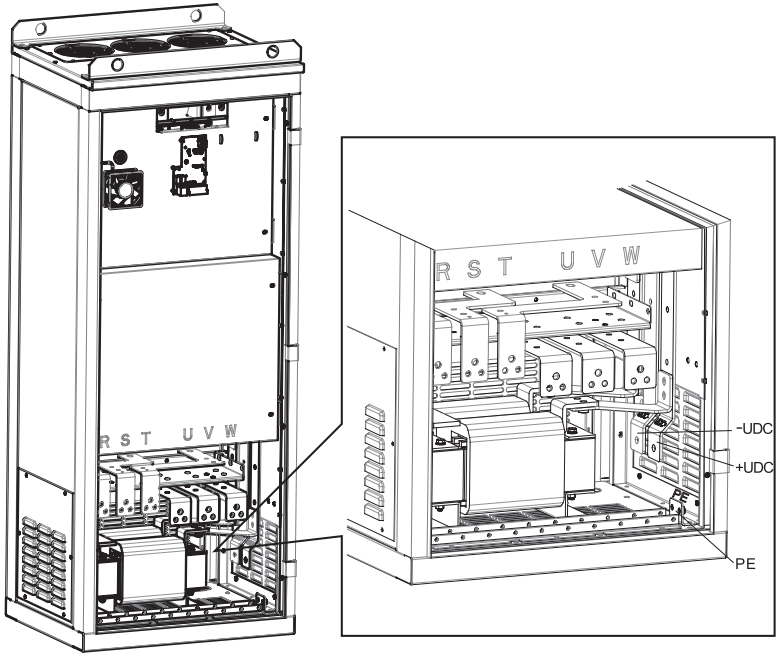
Frame G1~G5



Frame G6~G8



Frame G9~G10



Frame G11

Description of main circuit terminals:

Symbol	Function
R, S, T	Power input, Single phase connected to R, T
U, V, W	Power output, connect to the motor
+BR, -BR	Connect the brake resistor, make sure to set C02.10, C02.11 etc.
+UDC, -UDC	DC bus
PE	Ground terminal

Note: For the power less than 22kW (including) models, +UDC and +BR is the same terminal, for the power greater than 30kW (including) models, there are no +BR,-BR Terminal.

3.3.2 Main Circuit Terminal Screws and Wiring Recommended Specifications

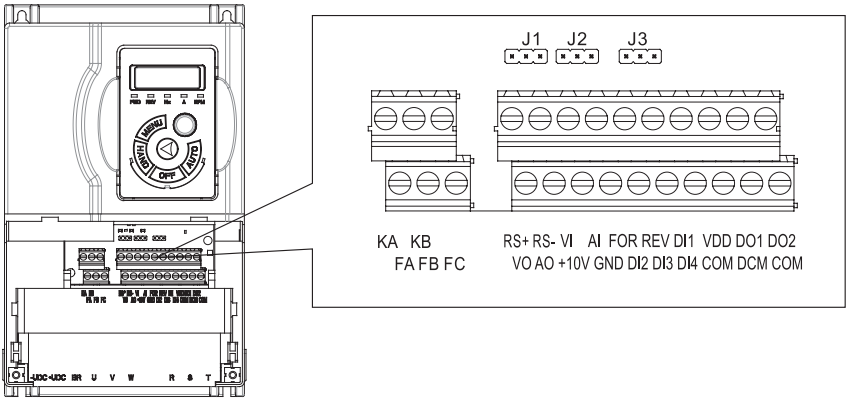
Model	Input Cable (mm2)	Output Cable (mm2)	Input and Output Terminals' Screws	Input and Output Terminals' Torque (N·m)	Ground Terminal Screw	Ground Terminal Torque (N·m)
HLP-G1000D3721	1	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-G1000D7521	1.5	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-G10001D521	1.5	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-G10002D221	2.5	1.5	M3.5	0.8-1.0	M4	1.0-1.2
HLP-G10003D721	6	1.5	M4	1.0-1.2	M4	1.0-1.2
HLP-G10005D521	10	2.5	M4	1.0-1.2	M6	2.0-2.5
HLP-G10007D521	16	4	M5	1.6-2.0	M6	2.0-2.5
HLP-G1000D3723	1	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-G1000D7523	1	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-G10001D523	1.5	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-G10002D223	1.5	1.5	M3.5	0.8-1.0	M4	1.0-1.2
HLP-G10003D723	2.5	1.5	M4	1.0-1.2	M4	1.0-1.2
HLP-G10005D523	4	2.5	M4	1.0-1.2	M6	2.0-2.5
HLP-G10007D523	6	4	M4	1.0-1.2	M6	2.0-2.5
HLP-G100001123	10	6	M5	1.6-2.0	M6	2.0-2.5
HLP-G100001523	10	10	M8	8-10	M6	2.0-2.5
HLP-G1000D7543	1	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-G10001D543	1	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-G10002D243	1	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-G10004D043	1.5	1.5	M4	1.0-1.2	M4	1.0-1.2
HLP-G10005D543	1.5	1.5	M4	1.0-1.2	M4	1.0-1.2
HLP-G10007D543	2.5	1.5	M4	1.0-1.2	M4	1.0-1.2
HLP-G100001143	4	2.5	M4	1.0-1.2	M6	2.0-2.5
HLP-G100001543	6	4	M4	1.0-1.2	M6	2.0-2.5
HLP-G10018D543	10	4	M5	1.6-2.0	M6	2.0-2.5
HLP-G100002243	10	6	M5	1.6-2.0	M6	2.0-2.5
HLP-G100003043	10	10	M8	8-10	M6	2.0-2.5
HLP-G100003743	16	16	M8	8-10	M6	2.0-2.5
HLP-G100004543	16	16	M8	8-10	M6	2.0-2.5
HLP-G100005543	25	25	M8	8-10	M6	2.0-2.5
HLP-G100007543	35	35	M8	8-10	M6	2.0-2.5

Model	Input Cable (mm2)	Output Cable (mm2)	Input and Output Terminals' Screws	Input and Output Terminals' Torque (N·m)	Ground Terminal Screw	Ground Terminal Torque (N·m)
HLP-G100009043	70	70	M10	12-16	M10	12-16
HLP-G100011043	70	70	M10	12-16	M10	12-16
HLP-G100013243	95	95	M10	12-16	M10	12-16
HLP-G100016043	120	150	M12*1 (M10*2)	12-16	M10*2	12-16
HLP-G100018543	150	185	M12*1 (M10*2)	12-16	M10*2	12-16
HLP-G100020043	185	185	M12*1 (M10*2)	12-16	M10*2	12-16
HLP-G100022043	240	240	M12*1 (M10*2)	12-16	M10*2	12-16
HLP-G100025043	70*2	70*2	M10*1	26-33	M8*1	13-16
HLP-G100028043	95*2	95*2	M10*1	26-33	M8*1	13-16
HLP-G100031543	95*2	95*2	M10*1	26-33	M8*1	13-16
HLP-G100035543	120*2	120*2	M10*1	26-33	M8*1	13-16
HLP-G100040043	120*2	120*2	M10*1	26-33	M8*1	13-16
HLP-G100041543	120*2	120*2	M10*1	26-33	M8*1	13-16

Note: This specification is under using single-core line VV and 25℃, if use other cables or under higher temperature environment, please refer to electrical manual.

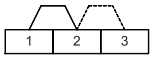
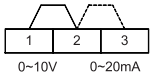
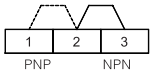
3.4 Description of Control Circuit

3.4.1 Schematic of Control Circuit Terminals



Terminals' specification:

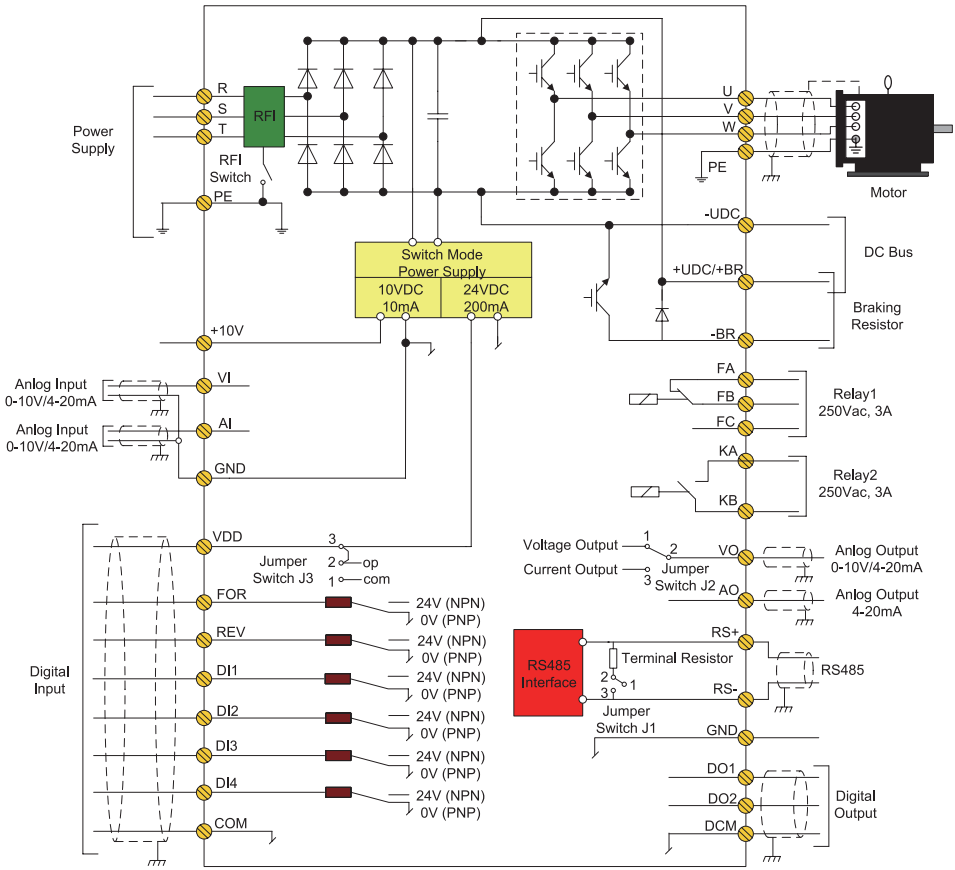
Symbol	Description	Specification
KA-KB, FA-FB-FC	Relay output	1. Resistive Load: 250VAC 3A/30VDC 3A; 2. Inductive Load: 250VAC 0.2A/24VDC 0.1A (cos ϕ =0.4);
RS+, RS-	RS485 communication	Max baud rate: 115200bit/s;
VI, AI	Analog input	Both VI and AI can be configurated to 0-20mA or 0-10V by paramters: 1. Input Impedance: about 10kΩ; 2. Input Impedence: ≤ 200Ω;
FOR, REV, DI1, DI2, DI3, DI4	Digital input	1. Logic: >DC 19V Logic: 0; <DC 14V Logic: 1; 2. Voltage: DC 0-24V; 3. Input resistance: 5kΩ; 4. Input voltage Rang: Max ±30V; 5. Digital input can be selected to NPN or PNP mode by Jump switch J3, the default is: NPN mode;
DI4	Pulse input	1. Pulse input: 0.00-100.00kHz; 2. Voltage range: 24V ± 20%; 3. Input duty ratio: 40%-60%;
VDD	24V power supply	Max load 200 mA, with over load and short circuit protection functions.
DO1, DO2	Digital output	1. Open collector output; 2. Output current range: DO1: 0-30mA; DO1: 0-50mA; 3. Max voltage 30V;
DO1	Pulse output	DO1 can also be configured as pulse output channels: 1. Pulse output range: 0.00-100.00kHz; 2. Voltage range: 0-24V; 3. Duty ratio: 40%-60%; 4. Resistive load >1kΩ, Capacitive Load < 10nf;
VO, AO	Analog output	VO can be selected to the current output or voltage output via J2, default is: voltage output; AO only has current output mode; 1. Output Mode: 0~20mA or 0~10V; 2. Voltage Output: load larger than 500Ω; 3. Current Output: load larger than 500Ω;

Symbol	Description	Specification
+10V	10V power supply	Max load 10mA, with over load and short circuit protection functions.
GND	Analog and communication ground	Isolated from internal COM.
COM	Digital ground	Isolated from internal GND.
DCM	Digital output common terminal	Connect COM as Digital output reference ground.
J1	RS485 termination resistor jumper switch	 Jumper switch 1-2 connected: OFF, termination resistor not connected, default state; Jumper switch 2-3 connected: ON, termination resistor connected;
J2	VO jumper switch	 Jumper switch 1-2 connected: 0~10V , default state; Jumper switch 2-3 connected: 0~20mA;
J3	Digital input jumper switch	 Jumper switch 1-2 connected: PNP mode; Jumper switch 2-3 connected: NPN mode, default state;

3.4.2 Control Terminals' Screws and Wiring Recommended Specifications

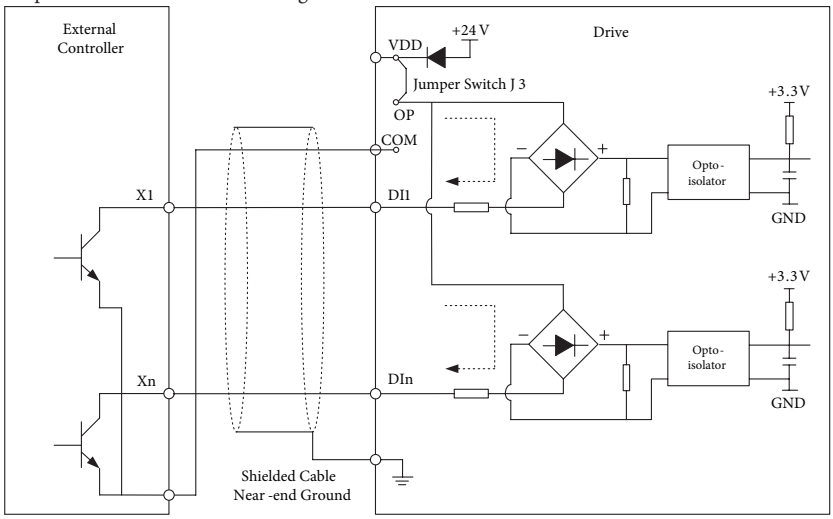
Cable types	Cable specifications (mm2)	Torque (N·m)
Shielded cables	0.4	0.4

3.4.3 Control Circuit Wiring



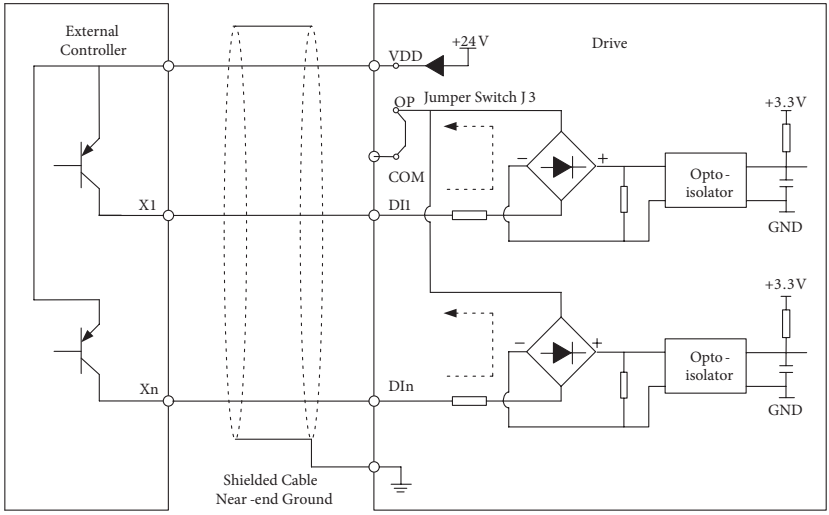
3.4.4 Digital Input Terminals Usage Specification

1. Open collector NPN mode wiring



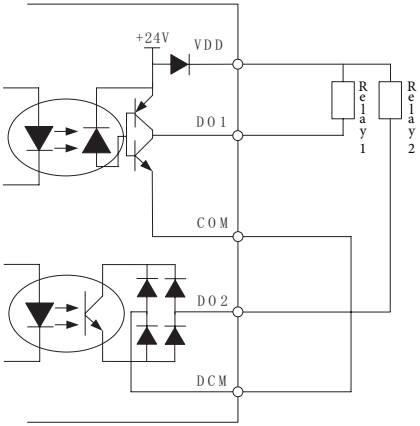
While using this mode, J3 1-2 must be connected (default state: VDD connects to OP).

2. Open collector PNP mode wiring

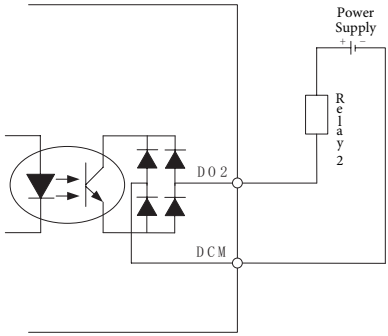


While using this mode, J3 2-3 must be connected (COM connects to OP).

3.4.5 Digital Output Terminal Usage Specification



a. Use internal power supply



b. DO2 uses external power supply isolation

3.5 EMC instructions

3.5.1 Introduction to EMC Standard

The HLP-G100 series satisfies the requirements of standard IEC/EN61800-3: 2004 (Adjustable speed electrical power drive systems part 3: EMC requirements and specific test methods).

3.5.2 Noise Abatement

1. When peripheral equipment and the drive share the power supply of one system, noise from the drive may be transmitted to other equipment in this system via power lines and result in misoperation and/or faults. In such a case, the following measures could be taken:

   a. Mount input noise filter at input terminal of the drive;
   b. Mount power supply filter at power input terminal of affected equipment;
   c. Use isolation transformer to isolate the noise transmission path between other equipment and the drive.

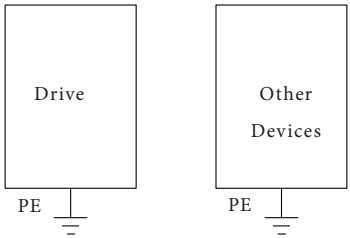
2. As the wiring of peripheral equipment and the drive constitutes a circuit, the unavoidable earthing leakage current of drive will cause equipment misoperation and/or faults. Disconnect the grounding connection of equipment may avoid this misoperation and/or faults.

3. Sensitive equipment and signal lines shall be mounted as far away from drive as possible.

4. Signal lines should be provided with shielded layer and reliably grounded. Alternatively, signal cable could be put into metallic conduits between which the distance shall be no less than 20cm, and shall be kept as far away from drive and its peripheral devices, cables as possible. Never make signal lines in parallel with power lines or bundle them up.
5. Signal lines must orthogonally cross power lines if this cross inevitable.
6. Motor cables shall be placed in thick protective screen like more than 2mm-thick pipelines or buried cement groove, also, power lines can be put into metallic conduit and grounded well with shielded cables.
7. Use 4-core motor cables of which one is grounded at close side of the drive and the other side is connected to motor enclosure.
8. Input and output terminals of drive are respectively equipped with radio noise filter and linear noise filter. For example, ferrite common mode choke can restrain radiation noise of power lines.

3.5.3 Grounding

Recommended ground electrode is shown in the figure below:



1. Use to the fullest extent the maximum standard size of grounding cables to reduce the impedance of grounding system;
2. Grounding wires should be as short as possible;
3. Grounding point shall be as close to the drive as possible;
4. One wire of 4-core motor cables shall be grounded at the drive side and connected to grounding terminal of motor at the other side. Better effect will be achieved if motor and drive are provided with dedicated ground electrodes;
5. When grounding terminals of various parts of system are linked together, leakage current turns into a noise source that may influence other equipment in the system, thus, grounding terminals of the drive and other vulnerable equipment should be separated;
6. Grounding cable shall be kept away from input & output of noise-sensitive equipment.

3.5.4 Leakage Current Suppression

Leakage current passes through the line-to-line and ground distributed capacitors at input & output sides of drive, and its size is associated with the capacitance of distributed capacitor and the carrier frequency. Leakage current is classified into ground leakage current and line-to-line leakage current.

1. Ground leakage current not only circulates inside drive system, but may also influence other equipment via ground loop. Such a leakage current may result in malfunction of RCD and other equipment. The higher the carrier frequency of drive is, the bigger the ground leakage current would be. The longer the motor cables and the bigger the parasitic capacitance are, the bigger the ground leakage current would be. Therefore, the most immediate and effective method for suppression of ground leakage current is to reduce carrier frequency and minimize the length of motor cables.
2. The higher harmonics of line-to-line leakage current that passes through between cables at output side of drive will accel the aging of cables and may bring about malfunction of other equipment. The higher the carrier frequency of drive is, the bigger the line-to-line leakage current would be. The longer the motor cables and the bigger the parasitic capacitance are, the bigger the line-to-line leakage current would be. Therefore, the most immediate and effective method for suppression of ground leakage current is to reduce carrier requency and minimize the length of motor cable. Line-to-line leakage current can also be effectively suppressed by mounting additional output reactors.
3. For the HLP-G100 serials, the models which power is less than 22kW (including) can be removed RFI screws; the models which power is greater than 30kW (including) can be set C14.50 = 0 to cut RFI filter to reduce the leakage current;

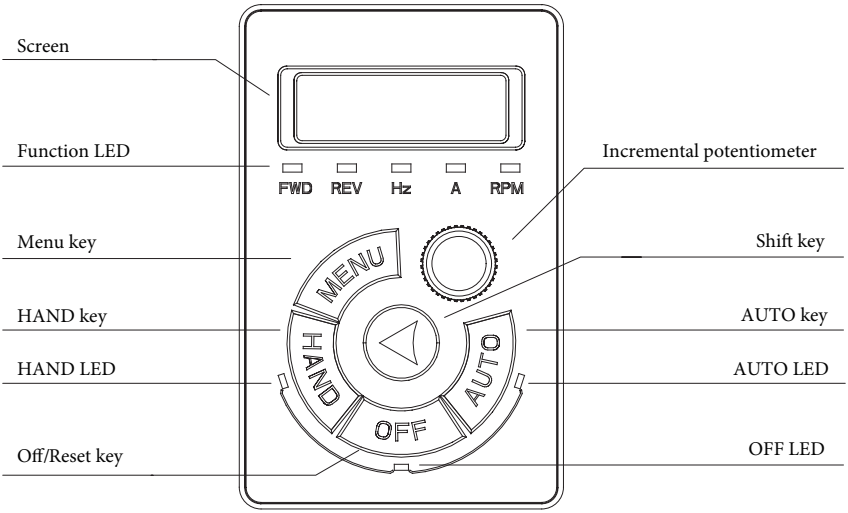
3.5.5 Induction Voltage Suppression

The drive outputs pulse voltage which will form induction voltage in the surface of the motor when the drive is not grounded. The induction voltage can be reduced by connecting the drive's PE terminal to the motor and closing RFI screws (models which power <= 22kW) or setting C14.50 = 1 (models which power >= 30kW).

Chapter 4 Operation and Display Interface

4.1 Local Control Panel

Local Control Panel (LCP) can do the operation of parameters modifications, status monitoring and drive control (start, stop), its appearance is shown blow:



1. State LED

The drive has three operating states: HAND control state, AUTO control state and OFF state. The operating states are indicated by HAND, AUTO and OFF Led.

HAND LED: The drive is in the HAND control state when it is on. The frequency can be changed by turning the incremental potentiometer. Push “HAND” key to set the drive in the HAND state.

OFF Led: The drive is in the OFF state when it is on. Push “OFF” key to set the drive in the HAND state.

AUTO LED: The drive is in the AUTO state when it is on. In the AUTO state, the drive is controlled by control terminals or communication. Push “AUTO” key to set the drive in the AUTO state.

2. Function Led

FWD, REV Led: Indicates that the drive runs forwards or reverse.

Hz, A, RPM Led: Indicates the meaning of data displayed on the screen.

Local remote running lights running lights, OFF LEDs, three LED lights indicate.

3. Screen

There are 5 LED which can display reference, output frequency, monitoring data and warning/alarm code.

4. Keys

Symbol	Name	Function
MENU	Programming	Enter or exit menu.
	Shift	Select the displayed parameters in turn in the stop or running state; Select the digit to be modified when modifying parameters.
HAND	Hand	Push it to set the drive in the HAND control state.
OFF	Off/Reset	Stop the drive when it is in the running state and perform the reset operation when it is in the fault state.
AUTO	Auto	Push it to set the drive in the AUTO control state.
	Confirm	Push the incremental potentiometer. Enter the menu or confirm the parameter setting.

5. Incremental Potentiometer

Increase/decrease data or parameter, clockwise to increase, counter-clockwise to decrease.

4.2 Parameter Setting

Example: Set C03.10 [0] to 20.5:

Key-press	LCP Display	Action Description
	C00.03	Press  key to display the first basic C00.03
	C03.00	Turn  clockwise to select parameter group C03
	C03.00	Press  key to shift to fractional part

Key-press	LCP Display	Action Description
	C03.10	Turn  clockwise to select parameter C03.10
	[0]	Press  key show the first option of C03.10
	0000	Press  key to show the value of the first option of parameter C03.10
	000.5	Turn  clockwise to change the fractional part to 5
	000.5	Press  key to shift to integral part
	020.5	Press  key to change the integral part to 20
	END	Press  key to accept the change and save it as 20.5

4.3 FWD/REV Status

Confirm the direction of the motor according to the set value, as shown in the following table:

Reference:	Running status	Indicator Display
≥ 0	**STOP**	☀ FWD ○ REV
< 0	**STOP**	○ FWD ☀ REV
≥ 0	**FWD**	● FWD ○ REV
≥ 0	**REV**	☀ FWD ● REV
< 0	**FWD**	● FWD ☀ REV
< 0	**REV**	○ FWD ● REV

Note: A flash light denotes the status coming, Light on indicates the current state, and light off means not in this state.

Example 1: The first line of the table indicates the drive is stop and the reference is greater than or equal to 0, means the dirve at some time in the future will run forward.

Example 2: The fourth line of the table represents the current drive is reverse running, and the reference setting is greater than or equal to 0, it means the drive at some time in the future will run forward.

4.4 Data Read-outs

Press ◀ key to change the display items on LCP while displaying output frequency.

Display Items	Key-press	LCP Display	Action Description
Output Frequency	Initial interface		Show the output frequency C16.13 is 50.0Hz, display accuracy: 0.1
Reference	◀		Show the reference C16.01 is 50.000, display accuracy: 0.001
Motor Current	◀		Show the motor current C16.14 is 9.00A, display accuracy: 0.01
Motor Voltage	◀		Show the motor voltage C16.12 is 380V, display accuracy: 1
Motor Speed	◀		Show the motor speed C16.05 is 1440rpm, display accuracy:1
DC Voltage	◀		Show the DC Voltage C16.30 is 540 V, display accuracy: 1
Drive temperature	◀		Show the drive temperature C16.34 is 45℃ , display accuracy:1
Feedback Value	◀		Show the feedback value C16.52 is 28.000, display accuracy: 0.001
Counter A	◀		Show counter A C16.72 is 65535, display accuracy: 1
Counter B	◀		Show counter B C16.72 is 65535, diaplay accuracy: 1
Analog in VI	◀		Show analog in VI C16.62 is 10.00V, display accuracy: 0.01

Display Items	Key-press	LCP Display	Action Description
Analog in AI			Show Analog in AI C16.63 is 20.00mA, display accuracy: 0.01
Pulse Input			Show pulse input C16.68 is 50.000kHz, display accuracy: 0.001
Pulse Output			Show pulse output (C16.69) is 50000Hz, display accuracy: 1

Note: The drive only monitor output frequency, reference and output current reference by default. For monitoring other status (DC voltage, etc.), please set the parameter C00.33 (refer to instructions).

4.5 View Alarm Record

If the drive trips, fault code will be showed to illustrate the reason, the drive will save the last 10 trip record.

Key-press	LCP Display	Action Description
	C00.03	Press  key to display the first basic C00.03.
	C15.00	Turn  clockwise to select par. group No. C15.
	C15.00	Press  to select parameter number.
	C15.30	Turn  clockwise to select C15.30
	[0]	Press  to show the first option of C15.30
	**	Press  to show the first fault record.
	[1]	Press  to show the second fault record, it can display up to ten recent fault records in turn.

4.6 View State Parameter

By viewing the group 16th parameters can learn the current status of the drive. For example: C16.60 indicators the current state of digital input terminals.

Key-press	LCP Display	Action Description
MENU	C00.03	Press MENU to display the first basic parameter C00.03.
	C16.00	Turn  clockwise to select Par. group No. C16
	C16.00	Press  to select parameter No.
	C16.60	Turn  clockwise to select C16.60
	2	Press  to view the value in C16.60, 2 indicates status of FOR, DI1, DI2, DI3, DI4 is 0, and status of REV is 1.

4.7 LED Display

0	1	2	3	4	5	6	7	8	9
A	B	C	D	E	F	G	H	I	J
K	L	M	N	O	P	Q	R	S	T
U	V	W	X	Y	Z	-	+	.	=
a	b	c	d	e	f	g	h	i	j
k	l	m	n	o	p	q	r	s	t
u	v	w	x	y	z				

Chapter 5 Parameter Overview

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 00: Operati--on / Display	*C00.03	Regional Settings	0: 50Hz 1: 60Hz		0
	C00.04	Operating State at Power-up	0: Resume 1: Forced stop, ref=old 2: Forced stop, ref=0		0
	*C00.06	Grid Type	0~122		*
	C00.10	Active Set-up	1: Set-up 1 2: Set-up 2 9: Multi set-up		1
	C00.11	Edit Set-up	1: Set-up 1 2: Set-up 2		1
	*C00.12	Link Set-up	0: Not linked 20: Linked		20
	C00.31	Custom Readout Min. Value	0.00~99999.00		0.00
	C00.32	Custom Readout Max. Value	0.00~99999.00		100.00
	C00.33	LCP Display Option	0~4095		0
	C00.34	Parameter Type	0: Word mode 1: Double word mode		0
	C00.40	HAND Key Option	0: Disabled 1: Enabled		0
	C00.41	OFF Key Option	0: Disabled 1: Enabled 2: Enabled reset only		1
	C00.42	AUTO Key Option	0: Disabled 1: Enabled		1
	C00.46	One Key Recovery Time	0: Disabled 5: 5s 10: 10s 15: 15s 20: 20s		1
	C00.47	LCP Potentiometer Step	0: 0.1 1: 1 2: 10		1
	*C00.51	Set-up Copy	0: No copy 1: Copy from set-up 1 2: Copy from set-up 2 9: Copy from factory setting		0
	C00.60	Set-up Locked	0: Disabled 1: Enabled		0
	C00.62	Password	0~65535		
	C00.63	Password Comfirm	0~65535		
	C00.64	Drive Running Time	0~65535	h	

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 01: Load / Motor	C01.00	Configuration Mode	0: Speed open loop 3: Process closed loop 4: Torque open loop		0
	*C01.01	Motor Control Principle	0: V/F 1: VVC+		0
	*C01.03	Torque Characteristics	0: Constant torque 1: Variable torque 3: Auto Energy Optimization (AEO)		0
	*C01.07	Application Configuration Mode	0: No function 1: Wobble		0
	*C01.10	Motor Construction	0: Asynchron 1: spmsm 3: ipmsm		0
	C01.14	Damping Gain	0~250	%	120
	C01.15	Low Speed Filter Time Const.	0.01~20.00	s	0.80
	C01.16	High Speed Filter Time Const.	0.01~20.00	s	0.80
	C01.17	Voltage filter time const.	0.001~1.000	s	0.500
	*C01.20	Motor Power	Motor dependant	kW	*
	*C01.22	Motor Voltage	50~1000	V	*
	*C01.23	Motor Frequency	20~400	Hz	*
	*C01.24	Motor Current	Motor dependant	A	*
	*C01.25	Motor Speed	100~9999	rpm	*
	*C01.26	Motor Torque	0. 1~10000.0	N·m	*
	*C01.29	Automatic Motor Adaption (AMA)	0: Disabled 1: Enable complete AMA 2: Enable reduced AMA		0
	*C01.30	Stator Resistance (Rs)	Motor dependant	Ω	*
	*C01.31	Rotor Resistance(Rr)	Motor dependant		
	*C01.33	Stator Leakage Reactance (X1)	Motor dependant	Ω	*
	*C01.35	Main Reactance (Xh)	Motor dependant	Ω	*
	*C01.37	D-axis inductance	Motor dependant	mH	*
	*C01.38	Q-axis inductance	Motor dependant	mH	*
	*C01.39	Motor Poles	2~100	P	4
	*C01.40	Back EMF at 1000rpm	0~9000		*
	*C01.42	Motor Cable Length	0~150	m	*
	*C01.44	D-axis saturation inductance	C1.37 Min~C1.37*0.95	Ω	C01.37*0.95
	*C01.45	Q-axis saturation inductance	C1.44~C1.38*0.95	Ω	C01.38*0.95

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 01: Load / Motor	*C01.48	D-axis inductance saturation current	20~200	%	100
	*C01.49	Q-axis inductance saturation current	20~200	%	100
	C01.50	Motor Magnetisation at Zero Speed	0~300	%	100
	C01.52	Min Speed Normal Magnetising	0.0~10.0	Hz	0.0
	C01.55	V/F Characteristic-V	0.0~999.9	V	*
	C01.56	V/F Characteristic-F	0.0~400.0	Hz	*
	C01.60	Low Speed Load Compensation	0~199	%	100
	C01.61	High Speed Load Compensation	0~199	%	100
	C01.62	Slip Compensation	-400~399	%	100
	C01.63	Slip Compensation Time Constant	0.05~5.00	s	0.10
	C01.64	Resonance Dampening	0~3000	%	50
	C01.65	Resonance Dampening Time constant	0.005~0.050	s	0.005
	C01.70	PM Start Mode	0: No IPD 1: IPD		1
	C01.71	Start Delay	0.0~10.0	s	0.0
	C01.72	Start Function	0: DC hold 2: Coast		2
	*C01.73	Flying Start	0: Disabled 1: Enabled		0
	*C01.75	Min. Start Frequency	0.00~50.00	Hz	0.00
	C01.76	Jump Frequency	0.0~20.0	Hz	0.0
	C01.80	Function at Stop	0: Coast 1: DC hold		0
	C01.82	Min Speed for Function at Stop	0.0~400.0	Hz	0.0
	C01.88	AC Brake Gain	1.0~2.0		1.4
	C01.90	Motor Thermal Protection	0: No protection 1: Thermistor warning 2: Thermistor trip 3: ETR warning 4: ETR trip 5: ETR warning (Self-cooling mode) 6: ETR trip (Self-cooling mode)		0
	*C01.93	Thermistor Resource	0: None 1: Terminal VI		0

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 02: Brake Function	C02.00	DC Hold Current	0~150	%	50
	C02.01	DC Brake Current	0~150	%	50
	C02.02	DC Braking Time	0.0~60.0	s	10.0
	C02.04	DC Brake Cut in Speed	0.0~400.0	%	0.0
	C02.08	Motor Demagnetization	0~100	%	100
	C02.10	Brake Function	0: Off 1: Resistor brake 2: AC brake		0
	C02.11	Brake Resistor	5~65535	Ω	*
	*C02.14	Brake Resistor Threshold Voltage	Grid type dependant	V	*
	C02.15	Over-voltage Control Threshold Voltage	Grid type dependant	V	*
	C02.16	AC Brake Max Current	0~150	%	100
	C02.17	Over-voltage Control	0: Disabled 2: Mode 1 3: Mode 2		0
	C02.18	Over-voltage Control Integral Time	0.01~0.10	s	0.05
	C02.19	Over-voltage Control Proportional Gain	0~200	%	100
	C02.20	Release Brake Current	0.00~1200.00	A	0.00
	C02.22	Activate Brake Speed	0.0~400.0	Hz	0.0
Par. Group 03: Reference / Ramps	C03.00	Reference Range	0: 0~C03.03 1: -C03.03~C03.03		0
	C03.03	Maximum Reference	00~6553.5		50.0
	C03.07	Main Reference Calculation	0: Preset reference + Reference source1, 2, 3 1: Preset reference priority 2: Reference source 2,3 operation 3: Switchover between Reference source 1 and Reference source 2 4: Switchover between Reference source 1 and Reference source 2,3 operation		0
	C03.08	Reference source 2,3 operation mode	0: Reference source 2 + Reference source 3 1: Reference source 2 - Reference source 3 2: Max(Reference source 2, Reference source 3) 3: Min(Reference source 2, Reference source 3)		0
	C03.10	Preset Reference	-100.00~100.00	%	0.00
	C03.11	Jog speed	0.0~400.0	Hz	0.0

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 03: Reference / Ramps	C03.12	Catch up/Slow down Value	0.00~100.00	%	0.00
	C03.13	Speed Up/Down Value	0.01~50.00	Hz	0.10
	C03.14	Preset Relative Reference	-100.00~100.00	%	0.00
	C03.15	Reference Source 1	0: No function 1: Terminal VI 2: Terminal AI 8: Pulse input DI4 10: Preset reference [0] 11: Local bus 21: LCP potentiometer		1
	C03.16	Reference Source 2			2
	C03.17	Reference Source 3			11
	C03.18	Relative Reference Source			0
	C03.19	Speed Up/Down Value Store	0: No function 1: Stop save 2: Power down save		0
	C03.39	Ramp Time Scale	0: 0.1s 1: 0.01s		1
	C03.40	Ramp 1 Type	0: Linear 2: S ramp		0
	C03.41	Ramp 1 Ramp Up Time	0.05~655.35	s	*
	C03.42	Ramp 1 Ramp Down Time	0.05~655.35	s	*
	C03.50	Ramp 2 Type	0: Linear 2: S ramp		0
	C03.51	Ramp 2 Ramp Up Time	0.05~655.35	s	*
	C03.52	Ramp 2 Ramp Down Time	0.05~655.35	s	*
	C03.60	Ramp 3 Type	0: Linear 2: S ramp		0
	C03.61	Ramp 3 Ramp Up Time	0.05~655.35	s	*
	C03.62	Ramp 3 Ramp Down Time	0.05~655.35	s	*
	C03.70	Ramp 4 Type	0: Linear 2: S ramp		0
	C03.71	Ramp 4 Ramp Up Time	0.05~655.35	s	*
	C03.72	Ramp 4 Ramp Down Time	0.05~655.35	s	*
	C03.80	Jog Ramp Time	0.05~655.35	s	*
Par. Group 04: Limits / Warnings	*C04.10	Motor Speed Direction	0: Clockwise 1: Counter clockwise 2: Both directions		2
	*C04.12	Motor Speed Low Limit	0.0~C04.14	Hz	0.0
	*C04.14	Motor Speed High Limit	C04.12~C04.19	Hz	65.0
	C04.16	Torque Limit Motor Mode	0~1000	%	1000
	C04.17	Torque Limit Generator Mode	0~1000	%	1000

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 04: Limits / Warnings	C04.18	Current Limit	0~300	%	150
	*C04.19	Max Output Frequency	0.0~400.0	Hz	65
	*C04.21	Frequency Upper Limit Source	0: No function 1: Terminal VI 2: Terminal AI 8: Pulse input DI4 10: Preset reference [0] 11: Local bus 21: LCP potentiometer		1
	C04.28	Low Voltage Overload Limit	5~100	%	100
	C04.29	Low Voltage Udc Limit	50~1000	V	220/380
	C04.42	Counter Store at Power down	0: Disable 1: Counter A save 2: Counter B save 3: Both counter A and B save		0
	C04.50	Warning Current Low	0.00~C16.37	A	0.00
	C04.51	Warning Current High	0.00~C16.37	A	*
	C04.52	Warning Frequency Low	0.0~400.0	Hz	0.0
	C04.53	Warning Frequency High	0.1~400.0	Hz	65.0
	C04.54	Warning Reference Low	-200.00~200.00	%	0.00
	C04.55	Warning Reference High	-200.00~200.00	%	100.00
	C04.56	Warning Feedback Low	-200.00~200.00	%	0.00
	C04.57	Warning Feedback High	-200.00~200.00	%	100.00
	*C04.58	Missing Motor Phase Function	0: Disable 1: Enable		1
	C04.59	Current/Torque Limit Warning Selection	0: Disable 1: Enable		1
	C04.61	Bypass Speed From	0.0~400.0	Hz	0.0
	C04.63	Bypass Speed to	0.0~400.0	Hz	0.0
	C04.70	Minimum Torque at Zero Speed	0~100	%	5
	C04.71	Minimum Torque Cut-off Frequency	0.1~50.0	Hz	3.0
	C04.72	Torque open loop stop mode	0: Torque mode 1: Speed mode		0
	C04.80	Unbalance Detection Frequency	5.0-400.0		15.0
	C04.81	Grear Ratio	1.0~100.0	%	9.0
	C04.82	Unbalance Detection Threshold Value	10~300	s	300
	C04.83	Unbalance WaitingTime	0~100	s	5
	C04.84	Unbalance DetectionTime	0~100	Hz	10

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 05: Digital In / Out	C05.04	DI Filter Time	2~16	ms	4
	C05.05	DI Terminal Logic Selection	0~255		0
	C05.06	DO/Relay Terminal Logic Selection	0~255		0
	C05.09	Function at External Alarm	0: Off 2: Stop and warning 3: Jogging and warning 4: Max. speed and warning 5: Stop and trip		0
	C05.10	Terminal FOR	0: No operation 1: Reset 2: Coast inverse 3: Coast and reset inverse 6: Stop inverse 8: Start 9: Latched start 10: Reversing 11: Start reversing 12: Enable start forward only 13: Enable start reverse only 14: Jog 15: Preset ref. bit0 16: Preset ref. bit1 17: Preset ref. bit2 18: Preset ref. bit3 19: Freeze reference 20: Freeze output 21: Speed up 22: Speed down 23: Set-up select 24: Main reference calculation switchover 28: Catch up 29: Slow down 32: Pulse input 34: Ramp bit0 35: Ramp bit1 37: Latched reversing 42: Coast 43: External alarm input 46: Stop 50: Speed control/torque control switchover 60: Counter A 62: Reset counter A 63: Counter B 65: Reset counter B 70: Wobble start command 71: Wobble reset 72: Wobble initialization		8
	C05.11	Terminal REV			11
	C05.12	Terminal DI1			15
	C05.13	Terminal DI2			16
	C05.14	Terminal DI3			17
	C05.15	Terminal DI4			18

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 05: Digital In / Out	C05.30	Terminal DO1	0: No operation 1: Drive ready 3: Remote control ready 4: Drive running/No warning 5: Drive running 7: Run in range/No warning 8: Run on reference/No warning 9: Alarm 10: Alarm or warning 12: Out of current range 13: Below current low 14: Above current high 15: Out of frequency range 16: Below frequency low 17: Above frequency high 18: Out of feedback range		0
	C05.31	Terminal DO2	19: Below feedback low 20: Above feedback high 21: Thermal warning 22: Ready 23: Remote ready 24: Ready, voltage OK 25: Reverse 26: Bus OK 32: Mech. brake control 36: Control word bit 11 37: Control word bit 12 40: Out of reference range 41: Below reference low 42: Above reference high 43: External alarm 44: Unbalance warning		0
	C05.40	Relay Function	51: Drive in HAND state 52: Drive in AUTO state 53: No alarm 56: Drive in HAND state 57: Drive in AUTO state 60: Comparator 0 61: Comparator 1 62: Comparator 2 63: Comparator 3 70: Logic rule 0 71: Logic rule 1 72: Logic rule 2 73: Logic rule 3 80: Simple PLC digital output 1 81: Simple PLC digital output 2 82: Simple PLC relay 1 83: Simple PLC relay 2 90: Up to wobble limit 91: Up to wobble ref.		9, 5

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 05: Digital In / Out	C05.41	Relay On Delay Time	0.00~600.00	s	0.00
	C05.42	Relay Off Delay Time	0.00~600.00	s	0.00
	C05.55	Terminal DI4 Low Frequency	0.00~C05.56	kHz	0.00
	C05.56	Terminal DI4 High Frequency	C05.55~100.00	kHz	50.00
	C05.57	Terminal DI4 Low Ref./ Feedb. Value	-200.00~200.00	%	0.00
	C05.58	Terminal DI4 High Ref./ Feedb. Value	-200.00~200.00	%	100.00
	C05.59	Terminal DI4 Filter Time	1~1000	ms	100
	C05.60	Terminal DO1 Pulse Output	0: Digital output 10: Output frequency 11: Reference 12: Feedback 13: Output current 16: Power 17: Speed 18: Motor voltage 20: Bus control 21: Terminal DI4 pulse input 22: Terminal VI input 23: Terminal AI input 26: DC link voltage 30: Output torque		0
	C05.61	Pulse Output Min. Freq.	0.00~C05.62	kHz	0.00
	C05.62	Pulse Output Max. Freq.	C05.61~100.00	kHz	50.00
	C05.63	Pulse Output Min. Scale	0.00~200.00	%	0.00
	C05.64	Pulse Output Max. Scale	0.00~200.00	%	100.00
Par. Group 06: Analog In/ Out	C06.00	Live Zero Timeout Time	1~99	s	10
	C06.01	Live Zero Timeout Function	0: Off 1: Freeze output 2: Stop 3: Jogging 4: Max. speed 5: Stop and trip		0
	C06.10	Terminal VI Low Voltage	0.00~C06.11	V	0.07
	C06.11	Terminal VI High Voltage	C06.10~10.00	V	10.00
	C06.12	Terminal VI Low Current	0.00~C06.13	mA	0.14
	C06.13	Terminal VI High Current	C06.12~20.00	mA	20.00
	C06.14	Terminal VI Low Ref./Feedb. Value	0.00~200.00	%	0.00

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 06: Analog In/ Out	C06.15	Terminal VI High Ref./ Feedb. Value	0.00~200.00	%	100.00
	C06.16	Terminal VI Filter Time	0.01~10.00	s	0.01
	C06.18	Terminal VI Zero Dead Band	0.0~20.00	V/ mA	0.00
	C06.19	Terminal VI Mode	0: Voltage mode 1: Current mode		0
	C06.20	Terminal AI Low Voltage	0.00~C06.21	V	0.07
	C06.21	Terminal AI High Voltage	C06.20~10.00	V	10.00
	C06.22	Terminal AI Low Current	0.00~C06.23	mA	0.14
	C06.23	Terminal AI High Current	C06.22~20.00	mA	20.00
	C06.24	Terminal AI Low Ref./Feedb. Value	0.00~200.00	%	0.00
	C06.25	Terminal AI High Ref./ Feedb. Value	0.00~200.00	%	100.00
	C06.26	Terminal AI Filter Time	0.01~10.00	s	0.01
	C06.28	Terminal AI Zero Dead Band	0.0~20.00	V/ mA	0.00
	C06.29	Terminal AI Mode	0: Voltage mode 1: Current mode		0
	C06.70	Terminal VO Mode	0: 0-20mA 1: 4-20mA 3: 0-10V		3
	C06.71	Terminal VO Analog Output	0: Digital output 10: Output frequency 11: Reference 12: Feedback 13: Output current 16: Power 17: Speed 18: Motor voltage 20: Bus control 21: Terminal DI4 pulse input 22: Terminal VI input 23: Terminal AI input 26: DC link voltage 30: Output torque		0
	C06.73	Terminal VO Output Min. Scale	0.00~200.00	%	0.00
	C06.74	Terminal VO Output Max. Scale	0.00~200.00	%	100.00
	C06.75	Terminal VO Min. Output	0.00~C06.76		0.00 /4.00

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 06: Analog In/ Out	C06.76	Terminal VO Max. Output	C06.75~10.00/20.00		10.00 /20.00
	C06.81	LCP Pot. Min. Ref.	0.00~200.00	%	0.00
	C06.82	LCP Pot. Max. Ref.	0.00~200.00	%	100.00
	C06.90	Terminal AO Mode	0: 0~20mA 1: 4~20mA		0
	C06.91	Terminal AO Analog Output	See C06.71		0
	C06.93	Terminal AO Output Min. Scale	0.00~200.00	%	0.00
	C06.94	Terminal AO Output Max. Scale	0.00~200.00	%	100.00
	C06.95	Terminal AO Min. Output	0.00~C06.96		0.00
	C06.96	Terminal AO Max. Output	C06.95~20.00		10.00
Par. Group 07: Controllers	C07.12	Torque PI Proportional Gain	0~500	%	100
	C07.13	Torque PI Integration Time	0.002~2.000	s	0.020
	C07.20	Process PID Feedback Source	0: No function 1: Terminal VI 2: Terminal AI 8: Pulse input DI4 11: Local bus		0
	C07.30	Process PID Normal/Inverse	0: Normal 1: Inverse		0
	C07.31	Process PID Anti Windup	0: Disable 1: Enable		0
	C07.32	Process PID Start	0.0~200.0	Hz	0.0
	C07.33	Process PID Proportional Gain	0.00~10.00		0.01
	C07.34	Process PID Integral Time	0.01~655.35	s	655.35
	C07.35	Process PID Differentiation Time	0.00~10.00	s	0.00
	C07.38	Process PID Feed Forward Factor	0~400	%	0
	C07.39	On Reference Bandwidth	0.0~200.0	%	0
	C07.41	Process PID Output Low	-100.00~100.00	%	0.00
	C07.42	Process PID Output High	-100.00~100.00	%	100.00
Par. Group 08: Communic tion	C08.01	Control Site	0: Digital and communication 1: Digital only 2: Communication only		0
	C08.03	Communication Timeout Time	0.01~650.0	s	1.0

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 08: Communication	C08.04	Communication Timeout Function	0: Off 1: Freeze output 2: Stop 3: Jogging 4: Max. speed 5: Stop and trip		0
	C08.06	Reset Communication Timeout	0: Do not reset 1: Do reset		0
	C08.29	Communication Warning Mode	0: Bit mode 1: Alarm number mode		0
	C08.30	Protocol	0: FC 2: Modbus RTU 6: Modbus ASCII		0
	C08.31	Address	0~247		1
	C08.32	Baud Rate	0: 2400 1: 4800 2: 9600 3: 19200 4: 38400 5: 57600 6: 76800 7: 115200 8~9: Reserved	bit/s	2
	C08.33	Parity/Stop Bits	0: Even parity (1 stop bit) 1: Odd parity (1 stop bit) 2: No parity (1 stop bit) 3: No parity (2 stop bit)		2
	C08.35	Min. Response Delay	0.000~0.500	s	0.002
	C08.36	Max. Response Delay	0.010~10.000	s	5.000
	C08.38	Message Response	0: Normal 1: Only response exception message 2: Not response		0
	C08.39	Modbus Parameter Write Store	0: Not saved at power down 1: Saved at power down		0
	C08.50	Coasting Select	0: Digital input 1: Bus 2: Logic AND 3: Logic OR		3
	C08.53	Start Select			3
	C08.54	Reversing Select			3
	C08.55	Set-up Select			3
	C08.56	Preset Reference Select			3
Par. Group 13: Simple PLC	C13.00	Simple PLC Mode	0: Off 1: Order execution 2: Parallel execution		0

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 13: Simple PLC	C13.01	Start Event	0: False 1: True 2: Running 3: In current range-No warning 4: On reference-No warning 7: Out of current range 8: Below current low 9: Above current high 10: Out of frequency range 11: Below frequency low 12: Above frequency high 13: Out of feedback range 14: Below feedback low 15: Above feedback high 16: Thermal warning 17: Mains out of range 18: Reversing 19: Warning 20: Alarm (trip) 21: Alarm (trip lock) 22: Comparator 0 23: Comparator 1 24: Comparator 2 25: Comparator 3 26: Logic rule 0 27: Logic rule 1 28: Logic rule 2 29: Logic rule 3 30: Simple PLC time-out 0 31: Simple PLC time-out 1 32: Simple PLC time-out 2 33: Terminal FOR 34: Terminal REV 35: Terminal DI1 36: Terminal DI2 37: Terminal DI3 38: Terminal DI4 39: Start command 40: Drive stopped 50: Simple PLC time-out 3 51: Simple PLC time-out 4 52: Simple PLC time-out 5 53: Simple PLC time-out 6 54: Simple PLC time-out 7		39

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 13: Simple PLC	C13.02	Stop Event	See C13.01		40
	C13.03	Reset Simple PLC	0: Do not reset 1: Do reset		0
	C13.04	Simple PLC Store	0: No function 1: Power down save 2: Stop save 3: Both power down and stop save		0
	C13.10	Comparator Operand	0: Disabled 1: Reference 2: Feedback 3: Motor speed 4: Motor current 6: Motor power 7: Motor voltage 12: Terminal VI input 13: Terminal AI input 20: Fault number 30: Counter A 31: Counter B		0
	C13.11	Comparator Operator	0: Less than 1: Approx. Equal 2: Greater than		1
	C13.12	Comparator Value	-9999.0~9999.0		0.0
	C13.20	Simple PLC Timer	0.0~99999.0	s	0.0
	C13.40	Logic Rule Boolean 1	See C13.01		0
	C13.41	Logic Rule Operator 1	0: Disabled 1: AND 2: OR 3: AND NOT 4: OR NOT 5: NOT AND 6: NOT OR 7: NOT AND NOT 8: NOT OR NOT		0
	C13.42	Logic Rule Boolean 2	See C13.01		0
	C13.43	See C13.01	See C13.41		0
	C13.44	Logic Rule Boolean 3	See C13.01		0
	C13.51	Simple PLC Event	See C13.41		0

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 13: Simple PLC	C13.52	Simple PLC Action	0: Disabled 1: No action 2: Select set-up 1 3: Select set-up 2 10: Select preset ref 0 11: Select preset ref 1 12: Select preset ref 2 13: Select preset ref 3 14: Select preset ref 4 15: Select preset ref 5 16: Select preset ref 6 17: Select preset ref 7 18: Select ramp 1 19: Select ramp 2 20: Select ramp 3 21: Select ramp 4 22: Run 23: Run reverse 24: Stop 27: Coast 28: Freeze output 29: Start timer 0 30: Start timer 1 31: Start timer 2 32: Set terminal DO1 low 33: Set terminal DO2 low 34: Set relay 1 low 35: Set relay 2 low 38: Set terminal DO1 high 39: Set terminal DO2 high 40: Set relay 1 high 41: Set relay 2 high 50: Select preset ref 8 51: Select preset ref 9 52: Select preset ref 10 53: Select preset ref 11 54: Select preset ref 12 55: Select preset ref 13 56: Select preset ref 14 57: Select preset ref 15 60: Reset counter A 61: Reset counter B 65: Start timer 3 66: Start timer 4 67: Start timer 5 68: Start timer 6 69: Start timer 7 70: Reverse		0

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 14: Special Functions	C14.01	Switching Frequency	2~6: 2~6kHz 7: 8kHz 8: 10kHz 9: 12kHz 10: 16kHz		*
	*C14.03	Overmodulation	0: Off 1: On		1
	C14.08	Damping Gain Factor	0~200	%	96
	C14.10	Action at Mains Failure	0: No function 1: Ctrl ramp-down 2: Ctrl ramp-down, trip 3: Coasting 4: Kinetic back-up 5: Kinetic back-up, trip 6: Alarm		0
	C14.11	Mains Voltage at Mains Failure	100~800	V	*
	C14.12	Function at Mains Imbanlance	0: Trip (Low sensitivity) 1: Warning (Low sensitivity) 2: Disabled 4: Warning (Middle sensitivity) 5: Trip (Middle sensitivity) 6: Trip (High sensitivity)		0
	C14.16	Low Voltage Mode	0: Disable 1: Enable		0
	C14.17	Automatic Voltage Regulation	0: Disable 1: Enable		1
	C14.18	Delay Time of Auto Restart When Power up Again	0.0~3600.0	s	0.0
	C14.20	Reset Mode	0: Manual reset 1~10: Auto reset 1-10 times 11: Auto reset 15 times 12: Auto reset 12 times 13: Infinite auto reset		0
	C14.21	Automatic Restart Time	0~600	s	10
	C14.22	Operation Mode	0: Normal operation 2: Initialization 3: Backup user settings 4: Recover user settings		0
	C14.23	Trip lock	0: Disable 1: Enable		0
	C14.27	Action at Drive Fault	0: Trip 1: Warning		0
	C14.30	Current Controller 1 Proportional Gain	0~500	%	100
	C14.31	Current Controller 1 Integration Time	0.000~2.000	s	0.020

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 14: Special Functions	C14.32	Current Controller Filter Time	2.0~100.0	ms	*
	C14.33	Current Controller 2 Proportional Gain	0~300	%	0
	C14.34	Current Controller 2 Integration Time	0.000~2.000	s	0.020
	*C14.40	VT Level	40~90	%	90
	*C14.41	AEO Min. Magnetisation	40~75	%	66
	*C14.50	RFI Filter Selection	0: Off 1: On 2: Reserved		1
	*C14.51	DC Link Compensation	0: Off 1: On		0
	C14.68	Overheat warning relative temperature	0~25	℃	5
Par. Group 15: Drive Information	C15.00	Operating Days	0~9999	d	
	C15.01	Running Hours	0~65535	h	
	C15.02	kWh Counter	0~65535	kWh	
	C15.03	Power Up's	0~65535		
	C15.04	Over Temperatures	0~65535		
	C15.05	Over Voltages	0~65535		
	C15.06	Reset kWh Counter	0: Do not reset 1: Do reset		0
	C15.07	Reset Running Hours Counter	0: Do not reset 1: Do reset		0
	C15.30	Alarm Code	0~255		
	C15.31	Internal Fault Reason	-32767~32767		
	C15.38	Warning Code	0~255		
	C15.43	Software Version			
Par. Group 16: Data Readouts	C16.00	Control Word	0~65535		
	C16.01	Reference	-4999.000~4999.000		
	C16.02	Reference	-200.0~200.0	%	
	C16.03	Status Word	0~65535		
	C16.04	Active Set-up	0: Set-up 1 1: Set-up 2 2: Multi Set-up		
	C16.05	Motor Speed	0~9999	rpm	
	C16.06	Low Voltage Frequency Limit	0.0~400.0	Hz	

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 16: Data Readouts	C16.09	Custom Readout	0.00~9999.00		
	C16.10	Output Power	0.00~655.35	kW	
	C16.12	Motor Voltage	0~65535	V	
	C16.13	Output Frequency	0.0~400.0	Hz	
	C16.14	Output Current	0.00~655.35	A	
	C16.15	Output Frequency	0.0~200.0	%	
	C16.16	Output Torque	-200.0~200.0	%	
	C16.18	Motor Thermal	0~100	%	
	C16.30	DC Link Voltage	0~65535	V	
	C16.31	IO Temperature	-128~127	℃	
	C16.34	IGBT Temperature	-128~127	℃	
	C16.35	Drive Thermal	0~255	%	
	C16.36	Drive Nominal Current	0.0~6553.5	A	
	C16.37	Drive Max. Current	0.0~6553.5	A	
	C16.38	Simple PLC State	0~255		
	C16.40	Wobble Length	0.000~60.00	km	
	C16.44	Line Speed	0.000~4999.000	m /min	
	C16.48	Power Board Temperature	-128~127	℃	
	C16.49	Rectifier Temperature	-128~127	℃	
	C16.50	Main Reference	-200.0~200.0	%	
	C16.51	Pulse Reference	-200.0~200.0	%	
	C16.52	Feedback	-200.0~200.0	%	
	C16.57	Unbalance Value	0~300	%	
	C16.60	Digital Input	0~65535		
	C16.61	Terminal VI Setting	0: 0~20mA 1: 0~10V		
	C16.62	Analog Input VI	0.00~20.00	V /mA	
	C16.63	Terminal AI Setting	0: 0~20mA 1: 0~10V		
	C16.64	Analog Input AI	0.00~20.00	V /mA	
	C16.65	Analog Output VO	0.00~20.00	V /mA	
	C16.66	Digital Output	0~255		

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 16: Data Readouts	C16.68	Pulse Input DI4	0.00~100.00	kHz	
	C16.69	Pulse Output DO1	0.00~100.00	kHz	
	C16.71	Relay Output	0~65535		
	C16.72	Counter A	0~65535		
	C16.73	Counter B	0~65535		
	C16.78	Analog Output AO	0.00~20.00	mA	
	C16.86	Communication Reference	-32768~32767		
	C16.90	Alarm Word 1	0~0xFFFFFFFFUL		
	C16.91	Alarm Word 2	0~0xFFFFFFFFUL		
	C16.92	Warning Word 1	0~0xFFFFFFFFUL		
	C16.93	Warning Word 2	0~0xFFFFFFFFUL		
Par. Group 30: Wobble	C30.00	Wobble Start Mode	0: Auto 1: Manual		0
	C30.01	Dwell Frequency	0.000-200.000	Hz	0.000
	C30.02	Dwell Time	0.0~3600.0	s	0.0
	C30.10	Centre Frequency Rate	0.000~30.000	Hz	0.500
	C30.11	Centre Frequency Low Limit	0.000~200.000	Hz	10.000
	C30.12	Centre Frequency Mode	0: Fixed 1: Auto decrease		0
	C30.13	Delta Frequency Mode	0: Relative to speed high 1: Relative to centre frequency		0
	C30.14	Delta Frequency Percentage	0~100	%	0
	C30.15	Jump Frequency Percentage	0~100	%	0
	C30.16	Wobble Up Time	1.0~1000.0	s	10.0
	C30.17	Wobble Jump Time	1~50	ms	1
	C30.18	Wobble Down Time	1.0~1000.0	s	10.0
	C30.20	Random Function Mode	0: Disable 1: Enable		0
	C30.21	Max. Random Ratio	-20~20	%	10
	C30.22	Min. Random Ratio	-20~20	%	-10
	C30.30	Wobble Length Source	0: Digital input 8: Pulse input		0
	C30.31	Count Per Meter	0.01~600.00		1.00
	C30.32	Length Setting	0.000~60.000	km	10.000
	C30.33	Action at Length Reached	0: No action 1: Stop		0

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 30: Wobble	C30.38	Wobble Restore Mode	0: Dcentre stage 1: Dwell stage		0
	C30.39	Wobble Stage Store	0: Disable 1: Power down and stop save 2: Power down save 3: Stop save		0
Par. Group 39: Communication User-Defined Par.	C39.00	Communication User-Defined Par. 0	0~9999		310
	C39.01	Communication User-Defined Par. 1	0~9999		310
	C39.02	Communication User-Defined Par. 2	0~9999		310
	C39.03	Communication User-Defined Par. 3	0~9999		310
	C39.04	Communication User-Defined Par. 4	0~9999		310
	C39.05	Communication User-Defined Par. 5	0~9999		310
	C39.06	Communication User-Defined Par. 6	0~9999		310
	C39.07	Communication User-Defined Par. 7	0~9999		310
	C39.08	Communication User-Defined Par. 8	0~9999		310
	C39.09	Communication User-Defined Par. 9	0~9999		310
	C39.10	Communication User-Defined Par. 10	0~9999		310
	C39.11	Communication User-Defined Par. 11	0~9999		310
	C39.12	Communication User-Defined Par. 12	0~9999		310
	C39.13	Communication User-Defined Par. 13	0~9999		310
	C39.14	Communication User-Defined Par. 14	0~9999		310
	C39.15	Communication User-Defined Par. 15	0~9999		310
	C39.16	Communication User-Defined Par. 16	0~9999		0
	C39.17	Communication User-Defined Par. 17	0~9999		0
	C39.18	Communication User-Defined Par. 18	0~9999		0
	C39.19	Communication User-Defined Par. 19	0~9999		0

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 39: Communication User-Defined Par.	C39.20	Communication User-Defined Par. 20	0~9999		0
	C39.21	Communication User-Defined Par. 21	0~9999		0
	C39.22	Communication User-Defined Par. 22	0~9999		0
	C39.23	Communication User-Defined Par. 23	0~9999		0
	C39.24	Communication User-Defined Par. 24	0~9999		0
	C39.25	Communication User-Defined Par. 25	0~9999		0
	C39.26	Communication User-Defined Par. 26	0~9999		0
	C39.27	Communication User-Defined Par. 27	0~9999		0
	C39.28	Communication User-Defined Par. 28	0~9999		0
	C39.29	Communication User-Defined Par. 29	0~9999		0
	C39.30	Communication User-Defined Par. 30	0~9999		0
	C39.31	Communication User-Defined Par. 31	0~9999		0
	C39.32	Communication User-Defined Par. 32	0~9999		0
	C39.33	Communication User-Defined Par. 33	0~9999		0
	C39.34	Communication User-Defined Par. 34	0~9999		0
	C39.35	Communication User-Defined Par. 35	0~9999		0
	C39.50	Communication User-Defined Par. 0 index	0~9999		0
	C39.51	Communication User-Defined Par. 1 index	0~9999		1
	C39.52	Communication User-Defined Par. 2 index	0~9999		2
	C39.53	Communication User-Defined Par. 3 index	0~9999		3
	C39.54	Communication User-Defined Par. 4 index	0~9999		4
	C39.55	Communication User-Defined Par. 5 index	0~9999		5
	C39.56	Communication User-Defined Par. 6 index	0~9999		6

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 39: Communication User-Defined Par.	C39.57	Communication User-Defined Par. 7 index	0~9999		7
	C39.58	Communication User-Defined Par. 8 index	0~9999		8
	C39.59	Communication User-Defined Par. 9 index	0~9999		9
	C39.60	Communication User-Defined Par. 10 index	0~9999		10
	C39.61	Communication User-Defined Par. 11 index	0~9999		11
	C39.62	Communication User-Defined Par. 12 index	0~9999		12
	C39.63	Communication User-Defined Par. 13 index	0~9999		13
	C39.64	Communication User-Defined Par. 14 index	0~9999		14
	C39.65	Communication User-Defined Par. 15 index	0~9999		15
	C39.66	Communication User-Defined Par. 16 index	0~9999		0
	C39.67	Communication User-Defined Par. 17 index	0~9999		0
	C39.68	Communication User-Defined Par. 18 index	0~9999		0
	C39.69	Communication User-Defined Par. 19 index	0~9999		0
	C39.70	Communication User-Defined Par. 20 index	0~9999		0
	C39.71	Communication User-Defined Par. 21 index	0~9999		0
	C39.72	Communication User-Defined Par. 22 index	0~9999		0
	C39.73	Communication User-Defined Par. 23 index	0~9999		0
	C39.74	Communication User-Defined Par. 24 index	0~9999		0
	C39.75	Communication User-Defined Par. 25 index	0~9999		0
	C39.76	Communication User-Defined Par. 26 index	0~9999		0
	C39.77	Communication User-Defined Par. 27 index	0~9999		0
	C39.78	Communication User-Defined Par. 28 index	0~9999		0
	C39.79	Communication User-Defined Par. 29 index	0~9999		0

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 39: Communication User-Defined Par.	C39.80	Communication User-Defined Par. 30 index	0~9999		0
	C39.81	Communication User-Defined Par. 31 index	0~9999		0
	C39.82	Communication User-Defined Par. 32 index	0~9999		0
	C39.83	Communication User-Defined Par. 33 index	0~9999		0
	C39.84	Communication User-Defined Par. 34 index	0~9999		0
	C39.85	Communication User-Defined Par. 35 index	0~9999		0

Note: Reference signed with "*" in Par. No. column means this parameter can't be modified when the motor is running. In factory setting column, "*" means the default setting for this parameter is determined by the drive type.

Chapter 6 Parameter Description

6.1 Group 00: Operation/Display

C00.0* Basic Settings

Par. No.	Name	Range	Unit	Default
*C00.03	Regional Settings	0: 50Hz 1: 60Hz		0

This parameter is used to select motor frequency default value according to different regions.

0: 50Hz, Motor frequency default value is 50 Hz, see C01.23;

1: 60Hz, Motor frequency default value is 60 Hz, see C01.23;

Attention: This parameter can not be adjusted when motor is running. Change this parameter may result in changes in the value of the following parameters: C01.23, C01.25, C01.39, C01.56, C01.30, C01.31, C01.33, C01.35, C01.39 and C01.56.

Par. No.	Name	Range	Unit	Default
C00.04	Operating State at Power-up	0: Resume 1: Forced stop, ref=old 2: Forced stop, ref=0		0

Selects the operating mode upon reconnection of the drive to mains voltage after power down in Hand operation mode.

0: Resume, restarts the drive maintaining the same local reference and the same start/stop settings as before the drive was powered down.

1: Forced stop, ref=old, restarts the drive with a saved local reference, after mains voltage reappears and after pressing HAND key.

2: Forced stop, ref=0, resets the local reference to 0 upon restarting the drive.

Attention: This parameter is only active in Hand operation mode.

Par. No.	Name	Range	Unit	Default
*C00.06	Grid Type	0~122		*

Selects the grid type. Output frequency and voltage will be changed according to the grid type.

0: 200-240V/50Hz/IT-Grid

1: 200-240V/50Hz/IT-Delta

2: 200-240V/50Hz

10: 380-440V/50Hz/IT-Grid

11: 380-440V/50Hz/IT-Delta

12: 380-440V/50Hz

20: 440-480V/50Hz/IT-Grid

21: 440-480V/50Hz/IT-Delta

22: 440-480V/50Hz
100: 200-240V/60Hz/IT-Grid
101: 200-240V/60Hz/IT-Delta
102: 220-240V/60Hz
110: 380-440V/60HZ/IT-Grid
111: 380-440V/60Hz/IT-Delta
112: 380-440V/60Hz
120: 440-480V/60Hz/IT-Grid
121: 440-480V/60Hz/IT-Delta
122: 440-480V/60Hz

C00.1* Set-up Operations

Define and control the individual parameter setups.

The drive has two parameter setups that can be programmed independently of each other. This makes the drive very flexible and able to solve advanced control functionality problems, often saving the cost of external control equipment. For example these can be used to program the drive to operate according to one control scheme in one setup (e.g. motor 1 for horizontal movement) and another control scheme in another setup (e.g. motor 2 for vertical movement). Alternatively they can be used by an OEM machine builder to identically program all their factory fitted drives for different machine types within a range to have the same parameters and then during production/commissioning simply select a specific setup depending on which machine the drive is installed on.

Par. No.	Name	Range	Unit	Default
C00.10	Active Set-up	1: Set-up 1 2: Set-up 2 9: Multi Set-up		1

Selects the set-ups to control the drive functions.

1: Set-up 1, Set-up 1 to Set-up 2 are the two separate parameter set-ups within which all parameters can be programmed.
2: Set-up 2
9: Multi Set-up, two set-ups can be changed each other via digital input or communication commands.

Par. No.	Name	Range	Unit	Default
C00.11	Edit Set-up	1: Set-up 1 2: Set-up 2		1

Selects the set-up to be edited during operation, either the active set-up or one of the inactive set-ups.

Par. No.	Name	Range	Unit	Default
C00.12	Link Set-up	0: Not linked 20: Linked		20

0: Not linked, parameters between two set-ups can not be changed each other while the motor is running;

20: Linked, parameters between two set-ups can be changed each other while the motor is running via digital input or communication commands. But this facility is best for the same motor, else the link will synchronize the parameters that can not be changed while the motor is running (mainly motor parameters).

C00.3* LCP Custom Readout

Par. No.	Name	Range	Unit	Default
C00.31	Custom Readout Min. Value	0.00~99999.00		0.00
C00.32	Custom Readout Max. Value	0.00~99999.00		100.00

It is possible to customize a readout value in the drive. Custom Readout Value is linear proportional to speed, it is stored in parameter C16.09.

The calculation of Custom Readout Value (C16.09) is shown below:

C16.09 = (C00.32 - C00.31) × C16.13 ÷ C04.14 + C00.31

Par. No.	Name	Range	Unit	Default
C00.33	LCP Display Option	0~4095		0

The LCP is fixed to display the output frequency、reference and motor current (switch by ◄ key). This parameter is used to show another 11 basic operating states of the drive, each states corresponds to a binary code : "1" means display the item, "0" means does not display the item. For example, if you want to display the states of the temperature and the terminal VI on LCP. Transform the binary code to decimal digit,

C00.33=$1\times2^3+1\times2^7$=136.

Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Custom Readout	Pulse Output	Pulse Input	AI	VI	Counter B	Counter A	Feedback Value	Temperature	DC-Voltage	Motor Speed	Motor Voltage
0	0	0	0	1	0	0	0	1	0	0	0

Par. No.	Name	Range	Unit	Default
C00.34	Parameter Type	0: Word mode 1: Double word mode		0

This parameter is used for compatible with the previous software version (version number less than 1.34). These previous software use double word to read some parameters.

C00.4* LCP Keypad

Enable, disable individual keys on the LCP.

Par. No.	Name	Range	Unit	Default
C00.40	HAND Key Option	0: Disabled 1: Enabled		0

0: Disabled, No effect when HAND key is pressed. Select [0] Disabled to avoid accidental start of the drive in Hand operation mode;

1: Enabled, HAND key is functional;

Par. No.	Name	Range	Unit	Default
C00.41	OFF Key Option	0: Disabled 1: Enabled 2: Enabled reset only		1

0: Disabled, avoids accidental stop of the drive;

1: Enabled, OFF key stop signal and reset of any fault;

2: Enabled reset only, reset only (fault), stop (off) function is disabled;

Par. No.	Name	Range	Unit	Default
C00.42	AUTO Key Option	0: Disabled 1: Enabled		1

0: Disabled, avoids accidental start of the drive in AUTO operation mode;

1: Enabled, AUTO key is functional;

Par. No.	Name	Range	Unit	Default
C00.46	One Key Recovery Time	0: Disabled 5: 5s 10: 10s 15: 15s 20: 20s		1

"One Key Recovery" is that user can press OFF key to recover the backup settings if the settings have been backuped. If the settings have not been backuped, this function is disabled.

One key Recovery Time is used to determine how many seconds should OFF key pressed to recover the backup settings, it is set to 0 to disable one key recovery function.

Note: If an alarm happens, press OFF key will reset alarm first.

Par. No.	Name	Range	Unit	Default
C00.47	LCP Potentiometer Step	0: 0.1 1: 1 2: 10		1

This parameter determines the reference value increase or decrease when the LCP potentiometer rotates.

C00.5* Copy/Save

Par. No.	Name	Range	Unit	Default
C00.51	Set-up Copy	0: No copy 1: Copy from set-up 1 2: Copy from set-up 2 9: Copy from factory setting		0

0: No copy;

1: Copy from set-up 1, Copies all parameters in the Set-up 1 to the edit set-up (defined in C00.11);

2: Copy from set-up 2, Copies all parameters in the Set-up 2 to the edit set-up (defined in C00.11);

9: Copy from factory setting, Copies factory setting to the edit set-up (defined in C00.11);

Attention: When selected set-up is the same to the edit set-up, copy function doesn't work; both LCP and parameter database are locked while copying.

C00.6* Protection

Par. No.	Name	Range	Unit	Default
C00.60	Set-up Locked	0: Disabled 1: Enabled		0

0: Disabled

1: Enabled, prevent unauthorized editing of parameters.

Attention: This function is only valid to LCP, not active to local bus.

Par. No.	Name	Range	Unit	Default
C00.62	Password	0~65535		
C00.63	Password Comfirm	0~65535		
C00.64	Drive Running Time	0~65535	h	

These parameters are used to set the timer to stop the drive.

Initial state: C00.62 password is "0", C00.64 drive running time is "0", the password and drive running time are invalid;

Setting the Password: Enter C00.62, it shows "0", change the parameter value (such as 2003), Re-

enter C00.62 shows "0"; Enter C00.63, it shows "0", after modifying the parameter value, and if the parameter value is the same as C00.62 (such as 2003), it displays "P.Set" 2s, password has been set; After the password has been set, re-enter the C00.62 shows "0"; If the parameter value is not the same as C00.62, it shows "Err" 2s, password setting fails; Back to the initial state.

Setting the drive running the time: After the password has been set, change the C00.64 value (such as 2000h) to set the drive running the time. After setting, the C00.64 cannot be changed. If the password has been set, but not set C00.64, reboot the drive, it will report "A.96", please set the correct password into C00.62 to clear the warning.

Clear password and the drive running time: If the password has been set, enter C00.62, it shows "0"; set the correct password into C00.62, it will display "P.Yes" 2s, then the password and the drive running time are cleared; If set the wrong password value, it will display "P.No", after 3 consecutive wrong password, the drive locked, you can not modify the parameter, it displays "A.96". It must be powered off and on again to clear "A.96" warning.

12h before the drive running time, the drive shows "A.96" to prompt the user that the running time will be over. If the running time is over, the drive can still be used; if you stop the drive, the drive will not accept any command to start, the drive displays "A.96".

Note: The drive running time refers to the drive power-up time.

6.2 Group 01: Load and Motor

C01.0* General Settings

Par. No.	Name	Range	Unit	Default
C01.00	Configuration Mode	0: Speed open loop 3: Process closed loop 4: Torque open loop		0

0: Speed open loop, Enables speed control (without feedback signal from motor) with automatic slip compensation for almost constant speed at varying loads. Compensations are active but can be disabled in the Load/Motor par. group C01.0*;

3: Process closed loop, Enables the use of process control in the drive. The process control parameters are set in par. groups 7-2* and 7-3*.

4: Torque open loop, Enables the use of torque open loop in VVC+ mode (C01.01 Motor Control Principle). The torque PID parameters are set in par. group C07.1*;

Attention: If configuration mode is changed, C03.00, C03.03 will be restored to factory setting.

Par. No.	Name	Range	Unit	Default
*C01.01	Motor Control Principle	0: V/F 1: VVC+		0

Selects which motor control principle to employ.

0: V/F, for special motor or parallel connected motors in special motor applications. When V/F is selected the characteristic of the control principle can be edited in C01.55 V/F Characteristic - V and C01.56 V/F Characteristic – F;

1: VVC+, Voltage Vector Control principle suitable for higher requirements on control performance applications. The main benefit of VVC+ operation is that it uses a robust motor model;

Attention: When V/F control principle is selected, slip compensation and load compensation are invalid; When VVC+ control principle is selected, it includes slip compensation and load compensation itself.

Par. No.	Name	Range	Unit	Default
*C01.03	Torque Characteristics	0: Constant torque 1: Variable torque 3: Auto Energy Optimization (AEO)		0

Select the torque characteristic required. VT and AEO are both energy saving operations.

0: Constant torque, Motor shaft output provides constant torque under variable speed control.

1: Variable torque, Motor shaft output provides variable torque under variable speed control, usually used for fan or pump applications. Set the variable torque level in C14.40 VT Level.

3: Auto Energy optimization (AEO), Automatically optimises energy consumption by minimising magnetisation and frequency via C14.41 AEO Minimum Magnetisation;

Par. No.	Name	Range	Unit	Default
*C01.07	Application Configuration Mode	0: No function 1: Wobble		0

This parameter enables a choice of a configuration setting that fits different applications. Wobble function is only valid under speed open loop. If wobble function is selected, parameter C03.00 will be set to "0".

0: No function;

1: Wobble function, see parameter group C30.*;

Par. No.	Name	Range	Unit	Default
*C01.10	Motor Construction	0: Asynchron 1: SPMSM 3: IPMSM		0

This parameter enables a choice of a configuration setting that fits different motor.

0: Asynchronousmotor (ASM);

1: Surface mount type synchronous motor (SPMSM);

3: Embedded type synchronous motor (IPMSM);

Notice: the parameter can't change in ruuning.

Par. No.	Name	Range	Unit	Default
C01.14	Damping Gain	0~250	%	120

The damping gain will stabilize the PM machine in order to run the PM machine smooth and stable. The value of Damping gain will control the dynamic performance of the PM machine. High damping gain will give high dynamic performance and low damping gain will give low dynamic performance. The dynamic performance is related to the machine data and load type. If the damping gain is too high or low the control will become unstable.

Par. No.	Name	Range	Unit	Default
C01.15	Low Speed Filter Time Const.	0.01~20.00	s	0.80

This time constant is used below 10% rated speed. Obtain quick control through a short damping time constant. However, if this value is too short, the control gets unstable.

Par. No.	Name	Range	Unit	Default
C01.16	High Speed Filter Time Const.	0.01~20.00	s	0.80

This time constant is used above 10% rated speed. Obtain quick control through a short damping time constant. However, if this value is too short, the control gets unstable.

Par. No.	Name	Range	Unit	Default
C01.17	Voltage filter time const.	0.001~1.000	s	0.500

Reduces the influence of high frequency ripple and system resonance in the calculation of supply voltage. Without this filter, the ripples in the currents can distort the calculated voltage and affect the stability of the system.a

C01.2* Motor Date

Par. No.	Name	Range	Unit	Default
*C01.20	Motor Power	Motor dependant	kW	*
*C01.22	Motor Voltage	50~1000	V	*
*C01.23	Motor Frequency	20~400	Hz	*
*C01.24	Motor Current	Motor dependant	A	*
*C01.25	Motor Speed	100~9999	rpm	*
*C01.26	Motor Torque	0.1~6553.5	N•m	*

Set the parameters according to the motor nameplate no matter whether V/F control or VVC+ control is adopted.

Changing the value of C01.20-C01.22, C01.30-C01.35 will be automatically modified to factory settings.

Par. No.	Name	Range	Unit	Default
*C01.29	Automatic Motor Adaption (AMA)	0: Disabled 1: Enable complete AMA 2: Enable reduced AMA		0

The AMA function optimises dynamic motor performance by automatically optimising the advanced motor parameters (C01.30 Stator Resistance (Rs) to C01.35 Main Reactance (Xh)) at motor standstill.

Activate the AMA function by pressing HAND key after selecting [1] or [2]. See also the chapter 7.

0: Disabled;

1: Enable complete AMA, Performs AMA of the stator resistance RS, the rotor resistance Rr, the stator leakage reactance X1 and the main reactance Xh. Do not select this option if an LC filter is used between the drive and the motor;

2: Enable reduced AMA, Performs a reduced AMA of the stator resistance Rs in the system only.

C01.3* Adv.Motor Data

Par. No.	Name	Range	Unit	Default
*C01.30	Stator Resistance (Rs)	Motor dependant	Ω	*
*C01.31	Rotor Resistance (Rr)	Motor dependant	Ω	*
*C01.33	Stator Leakage Reactance (X1)	Motor dependant	Ω	*
*C01.35	Main Reactance (Xh)	Motor dependant	Ω	*

Parameters for advanced motor data. The motor data in C01.30 Stator Resistance (Rs) to C01.35 Main Reactance (Xh) must match the relevant motor in order to run the motor optimally. The default settings are figures based on common motor parameter values from standard motors. If the motor parameters are not set correctly, a malfunction of the drive system may occur. If the motor data is not known, running an AMA (Automatic Motor Adaptation) is recommended.

Par. No.	Name	Range	Unit	Default
*C01.37	D-axis inductance	Motor dependant	mH	*
*C01.38	Q-axis inductance	Motor dependant	mH	*

Parameters for advanced motor data. The motor data in C01.30 Stator Resistance (Rs) to C01.37 D-axis inductance and C01.38 Q-axis inductance must match the relevant motor in order to run the motor optimally. The default settings are figures based on common motor parameter values from standard motors. If the motorparameters are not set correctly, a malfunction of the

drive system may occur. If the motor data is not known, running an AMA (Automatic Motor Adaptation) is recommended.

Par. No.	Name	Range	Unit	Default
*C01.39	Motor Poles	2~100	P	4

Enter the motor poles from the nameplate data.

Par. No.	Name	Range	Unit	Default
*C01.40	Back EMF at 1000rpm	0~9000		*

Set the nominal back EMF for the motor when running at 1000 RPM. Back EMF is the voltage generated by a PM motor when no frequency converter is connected and the shaft is turned externally. Back EMF is normally specified for nominal motor speed or for 1000 RPM measured between 2 lines.

C01.4* Motor Cable Length

Par. No.	Name	Range	Unit	Default
*C01.42	Motor Cable Length	0~150	m	*

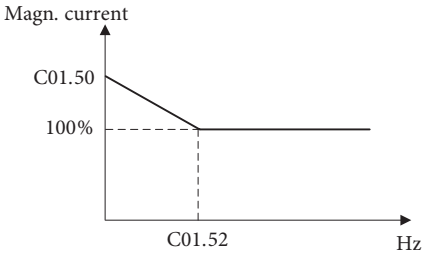
Enter the motor cable length connected between the motor and the drive. Set correct cable length can suppress noises resulted from the motor.

C01.5* Load Indep.Setting

Par. No.	Name	Range	Unit	Default
C01.50	Motor Magnetisation at Zero Speed	0~300	%	100
C01.52	Min Speed Normal Magnetising	0.0~10.0	Hz	0.0

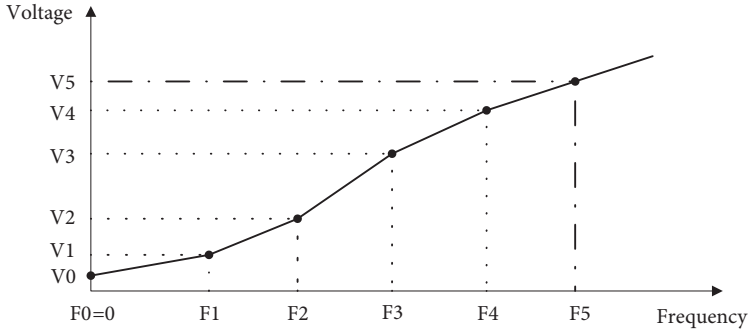
Use C01.50 Motor Magnetisation at Zero Speed along with C01.52 Min Speed Normal Magnetising to obtain a different thermal load on the motor when running at low speed (under C01.52).

The value of C01.50 is a percentage of the motor current. If the setting is too low, the torque on the motor shaft may be reduced.



Par. No.	Name	Range	Unit	Default
C01.55	V/F Characteristic-V	0.0~999.9	V	*
C01.56	V/F Characteristic-F	0.0~400.0	Hz	*

These parameters are array parameters [0-5], used to manually form a V/F characteristic matching the motor. The frequency points [F0-F5] are defined in C01.56 V/F Characteristic - F. The voltage at each point [V0-V5] is defined in C01.55 V/F Characteristic - V. These parameters are only accessible when C01.01 Motor Control Principle is set to V/F.

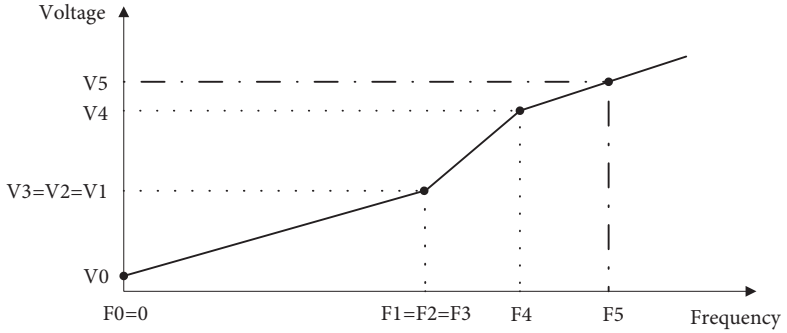


C01.55[0]~C01.55[5] is respective to V0~V5, C01.56[0]~C01.56[5] is respective to F0~F5, Vn is motor rated voltage, Fn is the motor rated frequency.

The set of C01.56 must met F0=0 and F1≤F2≤F3≤F4≤F5.

Simplify V/F characteristic by merging 2 or more points (voltages and frequencies), which respectively are set equal.

The slope (ratio of V/F) after point (F5, V5) must be equal to the slope between point (F5, V5) and the previous point.



The default settings of V/F Characteristic are:

200V model:

	[0]	[1]	[2]	[3]	[4]	[5]
C01.55	0.0	7.0	230.0	230.0	230.0	230.0
C01.56	0.0	0.5	50.0	50.0	50.0	50.0

400V model:

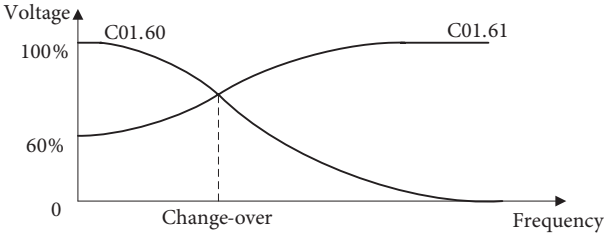
	[0]	[1]	[2]	[3]	[4]	[5]
C01.55	0.0	12.0	400.0	400.0	400.0	400.0
C01.56	0.0	0.5	50.0	50.0	50.0	50.0

C01.6* Load Depen.Setting

Par. No.	Name	Range	Unit	Default
C01.60	Low Speed Load Compensation	0~199	%	100
C01.61	High Speed Load Compensation	0~199	%	100

Enter the % value to compensate voltage in relation to load when the motor is running at low speed (C01.60)/high speed (C01.61) and obtain the optimum V/F characteristic.

The low speed and high speed change-over point is automatically calculated based on motor size. Usually it is 5Hz.



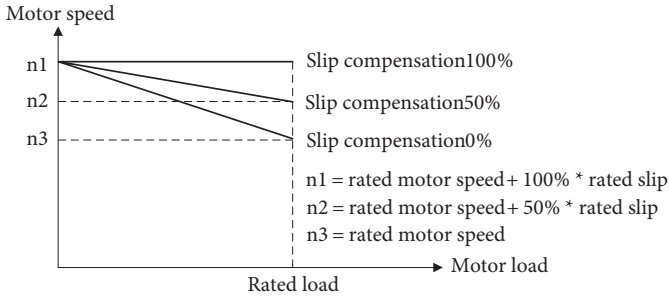
Par. No.	Name	Range	Unit	Default
C01.62	Slip Compensation	-400~399	%	100

When the motor is driving an electric-driven load, motor speed drops with the increase of load. When the motor is driving a power generating load, motor speed will increase with the increase of load. Appropriate slip compensation can maintain constant motor speed when the motor load is

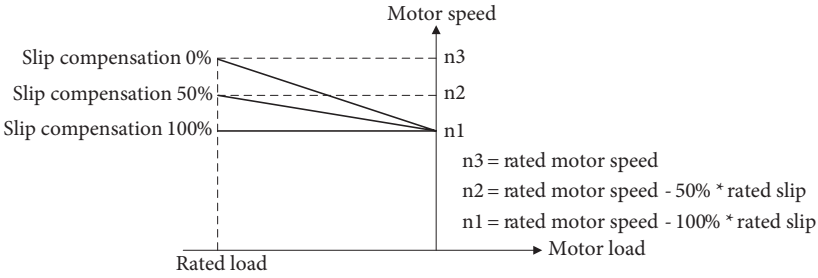
changing.

If this parameter is set to 100%, it indicates that the compensation when the motor bears rated load is the rated motor slip.

Diagram of slip compensation is shown below:



slip compensation on electric driven load



slip compensation on power generating load

When having more than one motor on the same shaft there is a need for some kind of load share between the drives controlling the motors. This has typically been made with two drives running in speed open loop mode and one with negative slip compensation.

Par. No.	Name	Range	Unit	Default
C01.63	Slip Compensation Time Constant	0.05~5.00	s	0.10

Enter the slip compensation reaction speed. A high value results in slow reaction, and a low value results in quick reaction. If low-frequency resonance problems arise, use a longer time setting.

Par. No.	Name	Range	Unit	Default
C01.64	Resonance Dampening	0~3000	%	50

Motor (especially >=30kW motor) speed and current resonance is likely to occur due to load vibration, and may lead to system failure even over current protection. This is particularly obvious during no-load or light-load applications.

Do not change this parameter if the motor has no resonance. Increase the value properly only when the motor has obvious resonance. The larger the value is, the better the resonance dampening result will be.

Par. No.	Name	Range	Unit	Default
C01.65	Resonance Dampening Time constant	0.005~0.050	s	0.005

Enter the resonance dampening reaction speed. A high value results in slow reaction, and a low value results in quick reaction.

C01.7* Start Adjustments

Par. No.	Name	Range	Unit	Default
C01.71	Start Delay	0.0~10.0	s	0.0

This parameter enables a delay of the starting time. The drive begins with the start function selected in C01.72. Enter the time delay required before commencing acceleration. Setting start delay to 0.0 sec. disables start function when start command is given.

Par. No.	Name	Range	Unit	Default
C01.72	Start Function	0: DC hold 2: Coast		2

Select the start function during start delay. This parameter is linked to C01.71 Start Delay.

0: DC Hold, Energizes motor with a DC holding current (C02.00 DC Hold Current) during the start delay time;

2: Coast, Motor coasted during the start delay time (drive off);

Par. No.	Name	Range	Unit	Default
*C01.73	Flying Start	0: Disabled 1: Enabled		0

This function applies for the inertia load to restart due to mains drop-out; If [0] Clockwise is selected in C04.10, and no rotating motor is found, It is possible to use DC-brake command to ramp down the motor speed to 0 rpm, and then start the motor in the normal way; If [2] Both directions is selected in C04.10, and no rotating motor is found, the drive will assume the motor is stationary or in low-speed rotation, and then start the motor in the normal way. When Flying start is enabled, C01.71 Start delay and C01.72 Start function is disabled.

Warning: This function is not suitable for hoisting applications.

Par. No.	Name	Range	Unit	Default
C01.75	Min. Start Frequency	0.00~50.00	Hz	0.00

If the drive frequency reference is less than C01.75 Min. Start Frequency, the drive will not run even the start command is given (the start command will be shielded). Only the drive frequency reference is greater than or equal C01.75, then the drive starts to run. The drive still accelerates from 0 to frequency reference using ramp time.

Par. No.	Name	Range	Unit	Default
C01.76	Jump Frequency	0.0~20.0	Hz	0.0

If the drive frequency reference's absolute value (not zero, frequency reference maybe negative) is less than C01.76 Jump Frequency, the drive will run at jump frequency (maybe reversing if the reference is negative).

For example:

Set C01.76 = 3. if the frequency reference is 2, the drive will run forward at 3Hz; If the frequency reference is -2, the drive will run reversing at 3Hz; If the frequency reference is 0, the drive will stop. If the frequency reference is 20, the drive will run at 3Hz immediately, then accelerates from 3Hz to 20Hz using ramp time.

Note: it is not recommended for using C01.75 and C01.76 together.

If C01.75 and C01.76 are used together, the following talbe is its behaviour.

Freq. ref. / Par. setting	3Hz	8Hz	15Hz
C01.75 = 5.00 C01.76 = 10.0	Freq. ref < C01.75 the start command is shielded, the drive stop.	Freq. ref > C01.75, the start command is given, Freq. ref < C01.76 the drive runs at 10.0Hz	Freq. ref > C01.75, the start command is given, Freq. ref > C01.76 the drive runs at 10Hz immediately, then accelerates from 10Hz to 15Hz using ramp time.
C01.75 = 10.00 C01.76 = 5.0	Freq. ref < C01.75 the start command is shielded, the drive stop.	Freq. ref < C01.75 the start command is shielded, the drive stop.	Freq. ref > C01.75, the start command is given, Freq. ref > C01.76 the drive runs at 5Hz immediately, then accelerates from 5Hz to 15Hz using ramp time.

Attention: When C01.76 Jump Frequency and C02.04 DC Brake Cut in Speed are not zero, DC brake will only be active when C02.04 > C01.76.

C01.8* Stop Adjustments

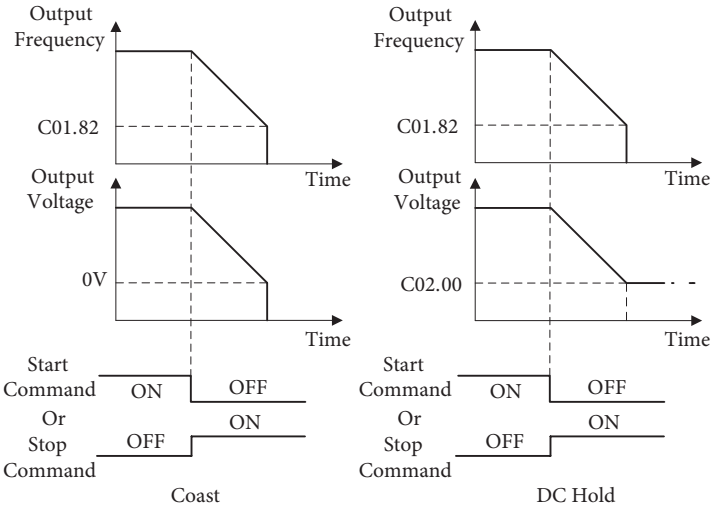
Par. No.	Name	Range	Unit	Default
C01.80	Function at Stop	0: Coast 1: DC hold		0

Select the drive function after stop command is given or start command is removed (standby), and output frequency is ramped down to C01.82 Min Speed for Function at Stop.

0: Coast, Leaves motor in free mode. the drive is off;

1: DC hold, the motor is energized with a DC current. See C02.00 DC Hold Current for more information;

Diagram of Function at Stop is shown below:



Par. No.	Name	Range	Unit	Default
C01.82	Min Speed for Function at Stop	0.0~400.0	Hz	0.0

Set the output frequency at which to activate C01.80 Function at Stop.

Par. No.	Name	Range	Unit	Default
C01.88	AC Brake Gain	1.0~2.0		1.4

Enter AC brake reaction speed. A high value results in slow reaction, and a low value results in quick reaction.

NOTE: Generally do not need adjustments.

C01.9* Motor Temperature

Par. No.	Name	Range	Unit	Default
C01.90	Motor Thermal Protection	0: No protection 1: Thermistor warning 2: Thermistor trip 3: ETR warning 4: ETR trip 5: ETR warning (Self-cooling mode) 6: ETR trip (Self-cooling mode)		0

The drive determines the motor temperature for motor protection in two different ways:

- Via a thermistor sensor connected to the analog input terminal VI (C01.93 Thermistor Source).
- Via calculation (ETR = Electronic Terminal Relay) of the thermal load,

based on the actual load and time. The calculated thermal load is compared with the rated motor current IM,N and the rated motor frequency fM,N. The calculations estimate the need for a lower load at lower speed due to less cooling from the fan incorporated in the motor.

0: No protection;

1: Thermistor warning, a thermistor connected to analog input VI gives a warning if upper limit of motor temperature range is exceeded, (see 01.93, Thermistor Resource);

2: Thermistor trip, a thermistor connected to analog input VI gives an alarm and makes the drive trip if upper limit of motor temperature range is exceeded, (see 01.93, Thermistor Resource);

3: ETR warning, if calculated upper limit of motor temperature range is exceeded, a warning occurs

4: ETR trip, if calculated upper limit of motor temperature range is exceeded, an alarm occurs and the drive trips.

5: ETR warning (Self-cooling mode)

6: ETR trip (Self-cooling mode)

Option [5]/[6] is similar with the option [3]/[4], it uses ETR function to protect the motor, if the motor exceeds the maximum temperature range, the drive will report a "A.10" warning, or "E.10" alarm, this two options are suitable for motor with no forced cooling (Self-cooling). When the drive is going into the protected status, it requires more stop time to wait motor temperature down.

Par. No.	Name	Range	Unit	Default
*C01.93	Thermistor Resource	0: None 1: Terminal VI		0

Select the input to which the thermistor (PTC sensor) should be connected.

0: None

1: Terminal VI, Connect thermistor to analog input terminal VI;

Attention: Analog input can't be selected for other purpose when selected as thermistor resource.

Thermistor specifications:

Input Signal Type	Voltage Supply	Termistor Threshold
Analog	10V	<0.8kΩ, >2.9kΩ

6.3 Group 02: Brakes

C02.0* DC-Brake

Par. No.	Name	Range	Unit	Default
C02.00	DC Hold Current	0~150	%	50

Enter a value for holding current as a percentage of the rated motor current set in C01.24 Motor Current. 100% DC holding current corresponds to IM,N. This parameter either holds the motor (holding torque) or pre-heats the motor. This parameter is active if DC Hold has been selected in either C01.72 Start Function or C01.80 Function at Stop.

Attention: Avoid 100% current too long as it may overheat the motor.

Par. No.	Name	Range	Unit	Default
C02.01	DC Brake Current	0~150	%	50

Enter a value for current as a percentage of the rated motor current IM,N, see C01.24 Motor Current. 100% DC braking current corresponds to IM,N.

DC brake current is applied on a stop command, when the speed is lower than the limit set in C02.04 DC Brake Cut In Speed; or via the serial communication port. The braking current is active during the time period set in C02.02 DC Braking Time.

Par. No.	Name	Range	Unit	Default
C02.02	DC Braking Time	0.0~60.0	s	10.0

This parameter defines DC brake current (C02.01) time during which DC-brake current is applied to the motor.

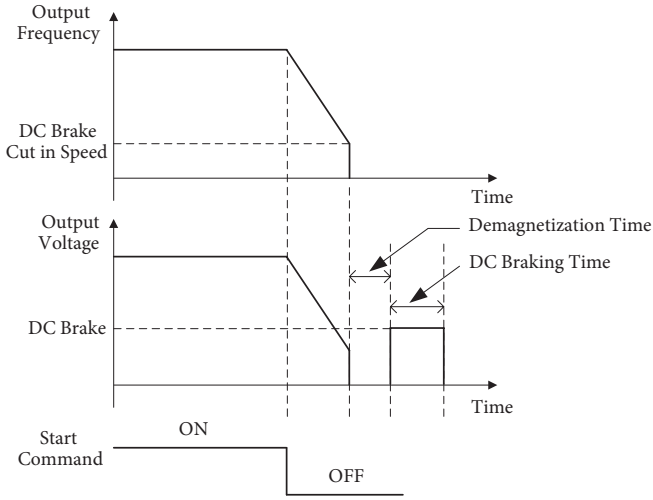
Par. No.	Name	Range	Unit	Default
C02.04	DC Brake Cut in Speed	0.0~400.0	%	0.0

Set the DC brake cut-in speed for activation of the DC braking current set in C02.01 DC Brake Current, upon a stop command.

Par. No.	Name	Range	Unit	Default
C02.08	Motor Demagnetization	0~100	%	100

when the drive output frequency less than DC brake cut in frequencies, motor demagnetization process needs to be done before starting a DC brake for preventing overcurrent at a high speed or great inertia starting DC brake. The smaller this parameter is, the faster motor demagnetization will be done, the time shorter entering the DC brake. If the Load inertia is small and DC brake cut in frequency is lower, this parameter can be reduced to 0.

Diagram of DC Brake process is shown below:



C02.1* Brake Energy Funct.

Par. No.	Name	Range	Unit	Default
C02.10	Brake Function	0: Off 1: Resistor brake 2: AC brake		0

0: Off;

1: Resistor brake, use the resistor brake to consume surplus energy resulting from motor braking, and prevent the drive to trip due to over-voltage in the intermediate circuit;

2: AC brake, dissipate surplus energy in the motor core, and prevent the energy back into drive causing trips. It is important to keep in mind that frequent use of this function will cause an increase in motor temperature;

Attention: Resistor brake is only functional when the drive build-in braking unit or external braking unit must be installed.

Par. No.	Name	Range	Unit	Default
C02.11	Brake Resistor	5~65535	Ω	*

Set brake resistor value. This parameter is only active in drives with an integral brake unit.

Par. No.	Name	Range	Unit	Default
*C02.14	Resistor Brake Threshold Voltage	Grid type dependant	V	*

This parameter takes effect only to the drives with built-in brake unit.

If C02.10 is set to 1, When the DC link voltage exceeds the value of C02.14, resistor brake will perform, the energy will be rapidly consumed through brake resistor. This value is used to regulate the brake effect of brake unit.

The following table is the Resistor Brake Threshold Voltage's range and default value which depends on C00.06 Grid Type:

Grid Type	Range	Default
200~240V	360~395V	390V
380~440V	680~780V	700V
440~480V	750~780V	770V

Par. No.	Name	Range	Unit	Default
C02.15	Over-voltage Control Threshold Voltage	Grid type dependant	V	*

When the DC link voltage exceeds the value of C02.15, over-voltage control is active.

The following table is the Over-voltage Control Threshold Voltage's range and default value which depends on C00.06 Grid Type:

Grid Type	Range	Default
200~240V	360~395V	395V
380~440V	680~780V	710V
440~480V	750~780V	780V

Par. No.	Name	Range	Unit	Default
C02.16	AC Brake, Max Current	0~150	%	100

Enter the maximum permissible current when using AC brake to avoid overheating of motor windings. 100% equals motor current set in C01.24.

Par. No.	Name	Range	Unit	Default
C02.17	Over-voltage Control	0: Disabled 2: Mode 1 3: Mode 2		0

Over-voltage control (OVC) reduces the risk of the drive tripping due to an over voltage on the DC link caused by generative power from the load.

0: Disabled;

2: Mode 1, used to consume surplus energy by increasing the output frequency;

3: Mode 2, used for very short deceleration;

Attention: If C02.10 = 1 (Resistor brake), C02.17 = 2 or 3, resistor brake function starts first, if the DC link voltage still can not be controlled, OVC starts.

Par. No.	Name	Range	Unit	Default
C02.18	Over-voltage Control Integral Time	0.01~0.10	s	0.05
C02.19	Over-voltage Control Proportional Gain	0~200	%	100

Over-voltage control (OVC) reduces the risk of the drive tripping due to an over voltage on the DC link caused by generative power from the load.

Note: These parameters are only active when selecting [2] Mode 1or [3] Mode 2 in C02.17 Over-voltage Control

C02.2* Mechanical Brake

Parameters for controlling operation of an electro-magnetic (mechanical) brake, typically required in hoisting applications.

To control a mechanical brake, a relay output (FA-FB-FC or KA-KB) or a programmed digital output (DO1 or DO2) is required. Normally this output must be closed during periods when the drive is unable to 'hold' the motor, e.g. due to an excessive load. Select [32] Mechanical Brake Control for applications with an electro-magnetic brake in C05.40 Relay output, C05.30 DO1 Output, or C05.31 DO2 Output. When selecting [32] Mechanical brake control, the mechanical brake is closed from start up until the output current is above the level selected in C02.20 Release Brake Current. During stop, the mechanical brake activates when the speed falls below the level specified in C02.22 Activate Brake Speed. If the drive enters an alarm condition or an over-current

or over-voltage situation, the mechanical brake immediately cuts in. This is also the case during safe stop.

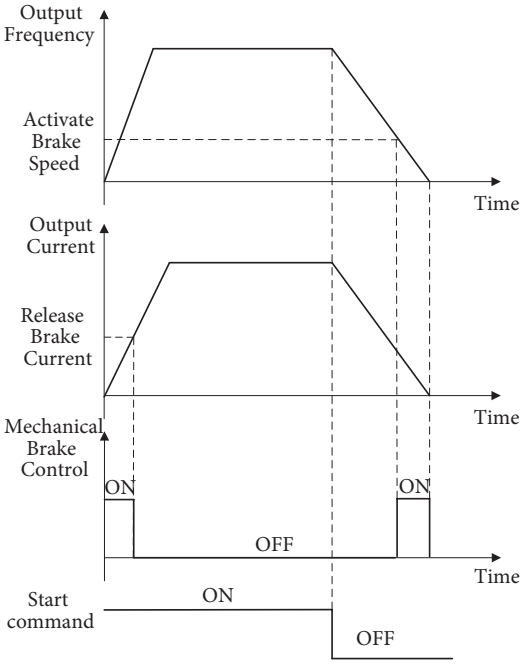
Par. No.	Name	Range	Unit	Default
C02.20	Release Brake Current	0.00~1200.00	A	0.00

Set the motor current for release of the mechanical brake, when a start condition is present.

Attention: When Mechanical brake control output is selected but no mechanical brake is connected, the function will not work. If start delay time has passed, and motor current is below Release brake current, the drive trips.

Par. No.	Name	Range	Unit	Default
C02.22	Activate Brake Speed	0.0~400.0	Hz	0.0

Set the motor frequency for activation of the mechanical brake, when a stop condition is present.
Diagram of Mechanical Brake Control process is shown below:



6.4 Group 03: Reference/Ramps

C03.0* Reference Limits

Reference is the drive control target. Reference value is a dimensionless number, reference unit depends on configuration mode (C01.00). When select [0] speed open loop in configuration mode, motor frequency is the drive control target, the reference unit is Hz; When select [4] torque open loop in configuration mode, motor torque is the drive control target, the reference unit is Nm; When select [3] process closed loop in configuration mode, process variable (such as temperature, pressure) is the drive control target, the reference unit may be °C or kg, etc.

Par. No.	Name	Range	Unit	Default
C03.00	Reference Range	0: 0~C03.03 1: -C03.03~C03.03		0

Select the range of the reference.

0: 0~Max, Reference set point ranges can have positive values only;

1: -Max~+Max, Ranges can have both positive and negative values;

Par. No.	Name	Range	Unit	Default
C03.03	Maximum Reference	0.0~6553.5		50.0

Enter value for Maximum Reference. The Maximum Reference is the highest value obtainable by summing all references.

Par. No.	Name	Range	Unit	Default
C03.07	Main Reference Calculation	0: Preset reference + Reference source1, 2, 3 1: Preset reference priority 2: Reference source 2,3 operation 3: Switchover between Reference source 1 and Reference source 2 4: Switchover between Reference source 1 and Reference source 2,3 operation		0

Select main reference calculation method.

0: Preset reference + reference source1, 2, 3

Main reference = Preset reference + reference source1, 2, 3

1: Preset reference priority

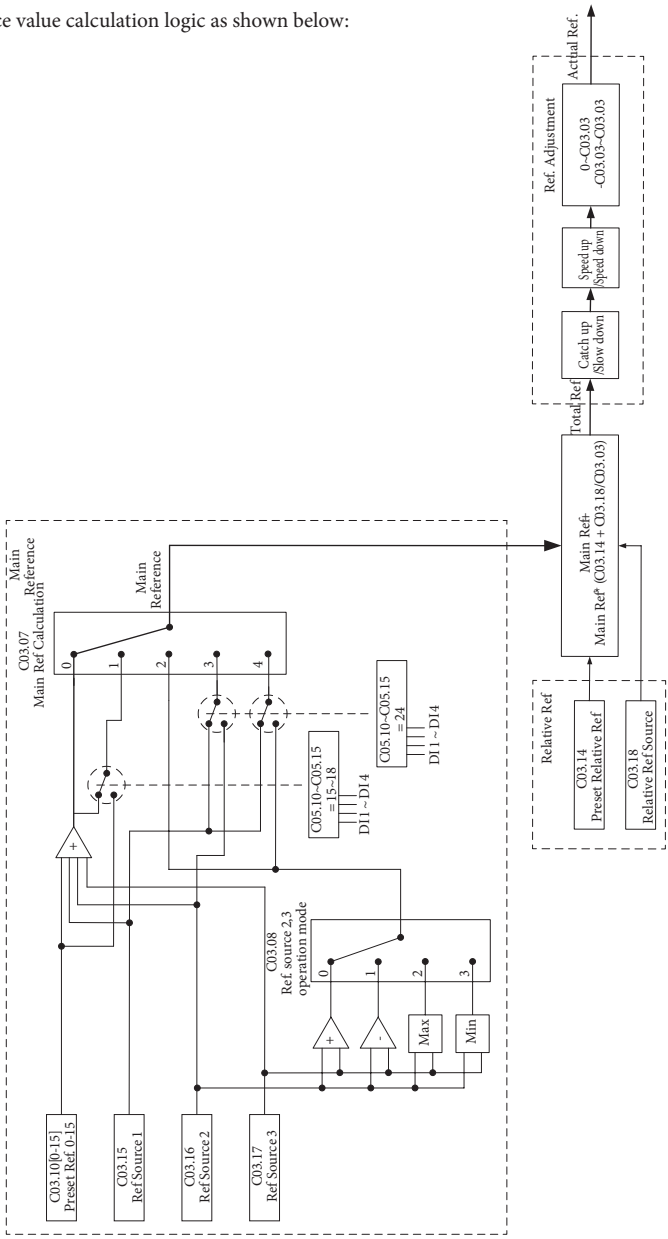
Main reference = Preset reference[1-N], use preset ref.[1]-[N]

Main reference = Preset reference [0] + Reference source 1, 2, 3, use preset ref.[0]

Par. No.	Name	Range	Unit	Default
C03.08	Reference source 2,3 operation mode	0: Reference source 2 + Reference source 3 1: Reference source 2 - Reference source 3 2: Max(Reference source 2, Reference source 3) 3: Min(Reference source 2, Reference source 3)		0

This parameter is used to set the reference value calculation source 2,3, the results can be used for parameter C03.07 options [2] and [4].

The reference value calculation logic as shown below:



C03.1* References

Par. No.	Name	Range	Unit	Default
C03.10	Preset Reference	-100.00~100.00	%	0.00

This parameter is an array-16 to be used for presetting different references. 16 preset references are selectable via digital terminals or local bus. See C05.1*. 0% equals 0, 100% equals value set in C03.03.

Par. No.	Name	Range	Unit	Default
C03.11	Jog Speed	0.0~400.0	Hz	0.0

The jog speed is a fixed output speed at which the drive is running when the jog function is activated.

The drive with the highest priority will operate at jog speed when a variety of run command activates. Removing the jog signal makes the drive run according to the selected configuration, this parameter is set limited by C04.14.

Par. No.	Name	Range	Unit	Default
C03.12	Catch up/Slow down Value	0.00~100.00	%	0.00

This parameter enables the entry of a percentage value (relative) which will to be either added to or deducted from the total reference.
The Catch up/Slow down function is activated by a digital input terminal (See C05.1* , choose [28]/[29]). If this function is active, the catch up/slow down value will be added to the total reference constituting new setting at which the drive is going to run, calculated as follows:
Reference = total reference ± total reference × (Catch up/Slowdown value)

If this function is inactive, the reference returns to its original value.

Par. No.	Name	Range	Unit	Default
C03.13	Speed Up/Down Value	0.01~50.00	Hz	0.10

Enter the Speed Up/Down value.

Par. No.	Name	Range	Unit	Default
C03.14	Preset Relative Reference	-100.00~100.00	%	0.00

Define an adjustable Preset Relative Reference which is to be added to the total reference as a percentage value of the actual reference. Its calculation refers to Reference Calculation Diagram.

Par. No.	Name	Range	Unit	Default
C03.15	Reference Source 1	0: No function 1: Terminal VI 2: Terminal AI 8: Pulse input DI4 10: Preset reference [0] 11: Local bus 21: LCP potentiometer		1
C03.16	Reference Source 2			2
C03.17	Reference Source 3			11

Select the reference input to be used for the first, second and third reference source.

0: No function;

1: Terminal VI, use analog input VI as reference source, see C06.1*;

2: Terminal AI, use analog input AI as reference source, see C06.2*;

8: Pulse input DI4, use pulse input DI4 as reference source, see C05.5*;

10: Preset reference [0], use preset reference [0], see C03.10;

11: Local bus, use local bus reference as reference source, see C08.**;

21: LCP potentiometer, use LCP potentiometer as reference source, see C06.8*;

Par. No.	Name	Range	Unit	Default
C03.18	Relative Reference Source	0: No function 1: Terminal VI 2: Terminal AI 8: Pulse input DI4 10: Preset reference [0] 11: Local bus 21: LCP potentiometer		0

Relative Reference is similar to Preset Relative Reference (see C03.14). It adds a variable value to total reference. Its calculation refers to Reference Calculation Diagram.

0: No function;

1: Terminal VI, use analog input VI as relative reference source, see C06.1*;

2: Terminal AI, use analog input AI as relative reference source, see C06.2*;

8: Pulse input DI4, use pulse input DI4 as relative reference source, see C05.5*;

10: Preset reference [0], use preset reference [0], see C03.10;

11: Local bus, use local bus reference as relative reference source, see C08.**;

21: LCP potentiometer, use LCP potentiometer as relative reference source, see C06.8*;

Par. No.	Name	Range	Unit	Default
C03.19	Speed Up/Down Value Store	0: No function 1: Stop save 2: Power down save		0

This parameter is used for setting whether to save the data changed in the Speed Up/Down function if the drive stops or after it power down.

Par. No.	Name	Range	Unit	Default
C03.39	Ramp Time Scale	0: 0.1s 1: 0.01s		1

HLP-G100 series offers two kinds of ramp time scale for different applications.
After modifying the parameter, ramp time scale will be changed, the ramp time will be changed too.

C03.4* Ramp1

There are 4 ramps built in the drive. For each of four ramps (C03.4*, C03.5*, C03.6* and C03.7*), configure the ramp parameters: ramp type, ramp up time and ramp down time.

Par. No.	Name	Range	Unit	Default
C03.40	Ramp 1 Type	0: Linear 2: S ramp		0
C03.41	Ramp 1 Ramp Up Time	0.05~655.35	s	*
C03.42	Ramp 1 Ramp Down Time	0.05~655.35	s	*
C03.50	Ramp 2 Type	0: Linear 2: S ramp		0
C03.51	Ramp 2 Ramp Up Time	0.05~655.35	s	*
C03.52	Ramp 2 Ramp Down Time	0.05~655.35	s	*
C03.60	Ramp 3 Type	0: Linear 2: S ramp		0
C03.61	Ramp 3 Ramp Up Time	0.05~655.35	s	*
C03.62	Ramp 3 Ramp Down Time	0.05~655.35	s	*
C03.70	Ramp 4 Type	0: Linear 2: S ramp		0
C03.71	Ramp 4 Ramp Up Time	0.05~655.35	s	*
C03.72	Ramp 4 Ramp Down Time	0.05~655.35	s	*

Ramp Type:

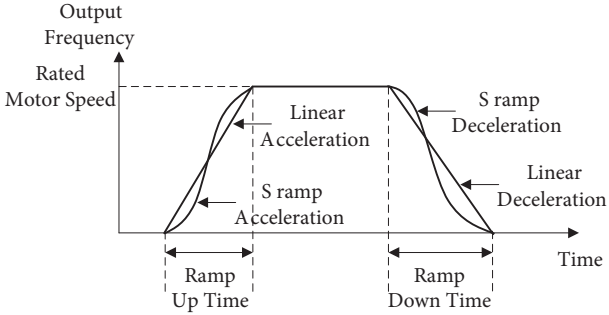
0: Linear, motor ramps up/down with constant acceleration/deceleration;

2: S ramp, motor ramps up/down with non-linear acceleration/deceleration;

Ramp Up Time is the time motor accelerates from 0Hz to rated motor frequency (C01.25).

Ramp Down Time is the time motor decelerates from rated motor frequency (C01.25) to 0Hz.

Diagram of Ramp Type, Ramp Up Time and Ramp Down Time are shown below:



C03.8* Other Ramps

Par. No.	Name	Range	Unit	Default
C03.80	Jog Ramp Time	0.05~655.35	s	*

Enter the jog ramp time, i.e. the acceleration/deceleration time between 0Hz and the rated motor frequency (C01.25).

Jog ramp time starts upon activation of a jog signal via a selected digital input or serial communication port.

6.5 Group 04: Limits/Warnings

C04.1* Motor Limits

Par. No.	Name	Range	Unit	Default
*C04.10	Motor Speed Direction	0: Clockwise 1: Counter clockwise 2: Both directions		2

Select the motor speed direction(s) required. Use this parameter to prevent unwanted reversing.

0: Clockwise, the motor shaft rotates in clockwise direction, this setting prevents the motor from running in counter clockwise direction;

1: Counter clockwise, motor shaft rotates in counter clockwise direction, this setting prevents the motor from running in clockwise direction;

2: Both directions, with this setting, the motor can run in both directions;

Par. No.	Name	Range	Unit	Default
*C04.12	Motor Speed Low Limit	0.0~C04.14	Hz	0.0

Set the minimum limit for Motor Speed, the motor speed low limit can be set to correspond to the minimum output frequency of the motor shaft. The Motor Speed Low
Limit must not exceed the setting in C04.14 Motor Speed High Limit

Par. No.	Name	Range	Unit	Default
*C04.14	Motor Speed High Limit	C04.12~C04.19	Hz	65.0

Set the maximum limit for Motor Speed, the motor speed high limit can be set to correspond to the maximum manufacture's rated motor speed. The motor speed high limit must exceed the Motor Speed Low Limit in C04.12.

Par. No.	Name	Range	Unit	Default
C04.16	Torque Limit Motor Mode	0~1000	%	160
C04.17	Torque Limit Generator Mode	0~1000	%	160

These parameters limit the torque on the shaft to protect the mechanical installation. 100% equals motor rated torque set in C01.26. If the motor torque is bigger than C04.16/C04.17, the drive will report "A.12".

Par. No.	Name	Range	Unit	Default
*C04.19	Max. Output Frequency	0.0~400.0	Hz	65

Provides a final limit on the output frequency for improved safety in applications where you want to avoid accidental over-speeding. This limit is final in all configurations (independent of the setting in C01.00 Configuration Mode).

Par. No.	Name	Range	Unit	Default
*C04.21	Frequency Upper Limit Source	0: No function 1: Terminal VI 2: Terminal AI 8: Pulse input DI4 11: Local bus 21: LCP potentiometer		1

In some occasions, it needs to set a dynamic frequency upper limit. For example, to avoid runaway in torque control mode in winding application, you can set the frequency upper limit by means of analog input. When the drive reaches the upper limit, it will continue to run at this speed.

0: No function, use C04.19 as frequency upper limit;

1: Terminal VI, use analog input VI as frequency upper limit, see C06.1*;

2: Terminal AI, use analog input AI as frequency upper limit, see C06.2*;

8: Pulse input DI4, use pulse input DI4 as frequency upper limit, see C05.5*;

11: Local bus, use local bus reference as frequency upper limit, see C08.**;

21: LCP potentiometer, use LCP potentiometer as frequency upper limit, see C06.8*;

Par. No.	Name	Range	Unit	Default
C04.28	Low Voltage Overload Limit	5~100	%	100

When the grid voltage is low, the drive will limit output frequency for overload protection.
When C16.35 Drive Thermal factor is greater than C04.28 Low Voltage Overload Limit, the drive goes into the low voltage output frequency limit protection and reports "A.101"; When C16.35 is less than 1%, the drive quits from the protection and runs at the original frequency, the warning disappears.

When C04.28 is set to 100, the low voltage frequency limit protection is disabled; When setting to other values, it is turned on; The smaller the value is, the more likely the drive goes into the low voltage frequency limit protection.

Par. No.	Name	Range	Unit	Default
C04.29	Low Voltage Udc Limit	50~1000	V	220/380

When entering the low-voltage protection limit frequency, the inverter maximum output frequency:

Fmax(C16.06) = Grid voltage/C04.29 * C01.23

Par. No.	Name	Range	Unit	Default
C04.42	Counter Store at Power down	0: Disable 1: Counter A save 2: Counter B save 3: Both counter A and B save		0

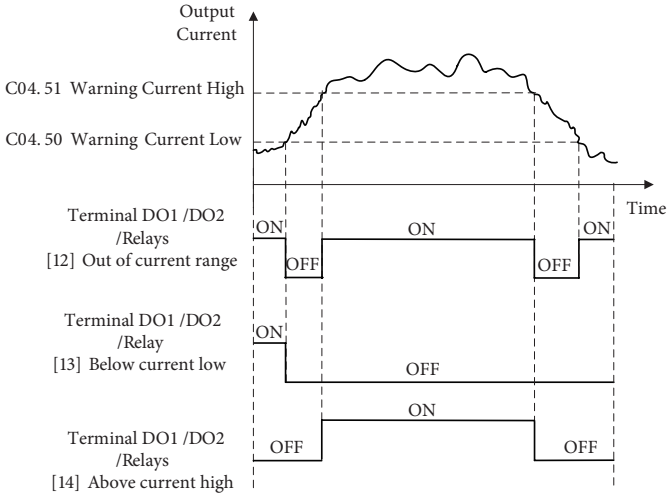
This parameter is used to control whether counter A/B's value is saved at power down.

C04.5* Adjustable Warnings

This parameter group is used to adjust warning limits for current, speed, reference and feedback. Warnings can be programmed as an output or sent via serial bus.

Par. No.	Name	Range	Unit	Default
C04.50	Warning Current Low	0.00~C16.37	A	0.00
C04.51	Warning Current High	0.00~ C16.37	A	*

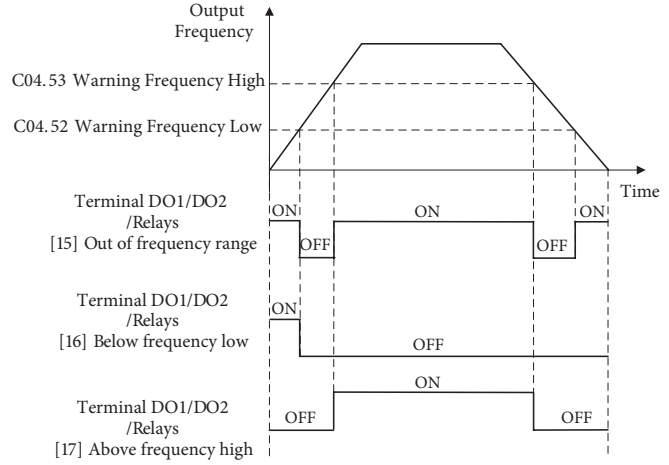
When the motor current falls below C04.50 or exceeds C04.51, a signal can be produced on relays or terminal DO1/DO2. See [12] Out of current range, [13] Below current low and [14] Above current high in C05.30/31/40.
Diagram of Warning Current Low and Warning Current High are shown below:



Par. No.	Name	Range	Unit	Default
C04.52	Warning Frequency Low	0.0~400.0	Hz	0.0
C04.53	Warning Frequency High	0.1~400.0	Hz	65.0

When the motor frequency falls below C04.52 or exceeds C04.53, a signal can be produced on relays or terminal DO1/DO2. See [15] Out of frequency range, [16] Below frequency low and [17] Above frequency high in C05.30/31/40.

Diagram of Warning Frequency Low and Warning Frequency High are shown below:



Par. No.	Name	Range	Unit	Default
C04.54	Warning Reference Low	-200.00~200.00	%	0.00
C04.55	Warning Reference High	-200.00~200.00	%	100.00

When the actual reference falls below C04.54 or exceeds C04.55, a signal can be produced on relays or terminal DO1/DO2. 100% equals value set in C03.03.

See [40] Out of reference range, [41] Below reference low and [42] Above reference high in C05.30/31/40.

Par. No.	Name	Range	Unit	Default
C04.56	Warning Feedback Low	-200.00~200.00	%	0.00
C04.57	Warning Feedback High	-200.00~200.00	%	100.00

When the feedback falls below C04.56 or exceeds C04.57, a signal can be produced on relays or terminal DO1/DO2. 100% equals value set in C03.03.

See [18] Out of feedback range, [19] Below feedback low and [20] Above feedback high in C05.30/31/40.

Par. No.	Name	Range	Unit	Default
*C04.58	Missing Motor Phase Function	0: Disable 1: Enable		1

Displays an alarm in the event of a missing motor phase (alarm 30, 31 or 32). Select disabled for no missing motor phase alarm. It is strongly recommended to make an active setting to avoid motor damage.

Par. No.	Name	Range	Unit	Default
*C04.59	Current/Torque Limit Warning Selection	0: Disable 1: Enable		1

This parameter is used to control whether the drive reports A.12/A.59 warning or not when the motor torque exceeds C04.16/C04.17, the output current exceeds C04.18.

Note: Even if you select disable warning, C14.3* current limit controller still works.

C04.6* Speed Bypass

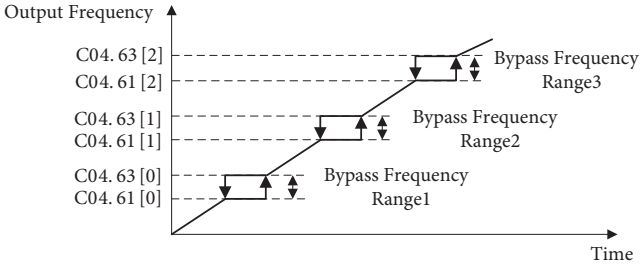
Par. No.	Name	Range	Unit	Default
C04.61	Bypass Speed From	0.0~400.0	Hz	0.0
C04.63	Bypass Speed to	0.0~400.0	Hz	0.0

Some systems call for avoiding certain output frequencies, due to resonance problems in the system. A maximum of three frequency ranges can be avoided. The drive will pass quickly when it

approaching to the Bypass Speed area.

These parameters are dyadic array, [0] is used to set the bypass speed range 1, [1] is used to set the bypass speed range 2, and [2] is used to set the bypass speed range 3.

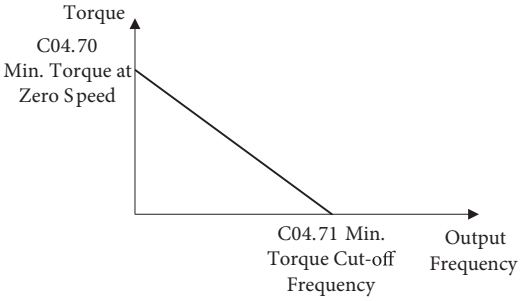
Diagram of bypass speed ranges are shown below:



Par. No.	Name	Range	Unit	Default
C04.70	Minimum Torque at Zero Speed	0~100	%	5
C04.71	Minimum Torque Cut-off Frequency	0.1~50.0	Hz	3.0

In torque control mode, the device may not start if the torque reference is too small due to the presence of static friction. So it needs a minimum torque reference at low speed.

The following figure is a graph showing the minimum torque at zero speed and minimum torque cut-off frequency. When the output frequency is less than the minimum torque cutoff frequency, if the torque reference is greater than the corresponding value in curve, then use torque reference; If the torque reference is less than the corresponding value in curve, then use curve corresponding value;



Par. No.	Name	Range	Unit	Default
C04.72	Torque open loop stop mode	0: Torque mode 1: Speed mode		0

This parameter is used to set the stop mode in torque open loop configuration mode:

0: Torque mode

When the stop signal is activated, the drive torque is reduced to zero according to the ramp down time.

1: Speed mode

When the stop signal is activated, the drive speed is reduced to zero according to the ramp down time.

Par. No.	Name	Range	Unit	Default
C04.80	Unbalance Detection Frequency	5.0-400.0		15.0
C04.81	Grear Ratio	1.0~100.0	%	9.0
C04.82	Unbalance Detection Threshold Value	10~300	s	300
C04.83	Unbalance WaitingTime	0~100	s	5
C04.84	Unbalance DetectionTime	0~100	Hz	10

6.6 Group 05: Digital In/Out

C05.1* Digital Input

Par. No.	Name	Range	Unit	Default
C05.04	DI Filter Time	2~16	ms	4

It is used to set the software filter time of DI terminal status. If DI terminals are liable to interference and may cause malfunction, increase the value of this parameter to enhance the anti-interference capability. However, increase of DI filter time will reduce the response of DI terminals.

Par. No.	Name	Range	Unit	Default
C05.05	DI terminal logic selection	0~255		0

This parameter is used to control the digital input terminal positive or negative logic. Each digital input terminal corresponds to a bit: "1" indicates that the digital input terminal is negative logic; "0" indicates that the digital input terminal is positive logic.

For example: If you want to set FOR and DI2 terminal as negative logic, set the C05.05 to 9.

$$C05.05 = 1\times2^{0} + 1\times2^{3} = 9$$

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reversed	Reversed	DI4	DI3	DI2	DI1	REV	FOR
0	0	0	0	1	0	0	1

Positive/Negative logic Note:

For NPN mode:

When the digital input selects positive logic, connecting the digital input terminal and COM terminal is ON state (active), disconnecting is OFF state (inactive);

When the digital input selects negative logic, connecting the digital input terminal and COM terminal is OFF state (inactive), disconnecting is ON state (active);

For PNPmode:

When the digital input selects positive logic, connecting the digital input terminal and VDD terminal is ON state (active), disconnecting is OFF state (inactive);

When the digital input selects negative logic, connecting the digital input terminal and VDD terminal is OFF state (inactive), disconnecting is ON state (active);

Note: There are some digital input function is inverse. If the terminal logic is set as negative and the function of the terminal is inverse, then the function of the terminal is

positive. For example: When C05.10 Terminal FOR is set to [6] Stop inverse, C05.05 is set to 1 (The logic of terminal FOR is negative), then connect the terminal FOR and COM (NPN mode), function "stop" is active, disconnect the terminal FOR and COM, function "stop" is inactive.

Par. No.	Name	Range	Unit	Default
C05.06	DO/Relay terminal logic selection	0~255		0

This parameter is used to control the DO/Relay terminal positive or negative logic. Each DO/Relay terminal corresponds to a bit: "1" indicates that the terminal is negative logic; "0" indicates that the terminal is positive logic.

For example: If you want to set DO1 and Relay1 terminal as negative logic, set the C05.06 to 5.
C05.06 = 1×20 + 1×22 = 5

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reversed	Reversed	Reversed	Reversed	Relay2	Relay1	DO2	DO1
0	0	0	0	0	1	0	1

Positive logic: When the selected function of DO/Relay terminals is activated, the DO/Relay terminal outputs ON signal, else outputs OFF signal.
Negative logic: When the selected function of DO/Relay terminals is activated, the DO/Relay terminal outputs OFF signal, else outputs ON signal.

Par. No.	Name	Range	Unit	Default
C05.09	Function at External Alarm	0: Off 2: Stop and warning 3: Jogging and warning 4: Max. speed and warning 5: Stop and trip		0

The function activates when the digital input terminal function [43] external alarm input is active.

0: Off, resumes control via serial bus using the most recent control word;

2: Stop and warning, drive stops and reports "A.102";

3: Jogging and warning, overruled to jog speed and reports "A.102";

4: Max. speed, overruled to max.speed and reports "A.102";

5: Stop and trip, overruled to stop with subsequent trip ("E.102").

Par. No.	Name	Range	Unit	Default
C05.10	Terminal FOR	0~72		8
C05.11	Terminal REV			11
C05.12	Terminal DI1			15
C05.13	Terminal DI2			16
C05.14	Terminal DI3			17
C05.15	Terminal DI4			18

The digital inputs are used for selecting various functions in the drive. All digital inputs can be set to the following functions:

0: No operation, no reaction to signals transmitted to the terminal;

1: Reset, reset the drive after a Trip/Alarm;

2: Coast inverse, no output, leaving the motor coasting to stop. Terminal logic '0' => coasting stop;

3: Coast and reset inverse, the drive resets leaving the motor coasting to stop. Terminal logic '0' => coasting stop;

6: Stop inverse, the drive is stopped according to selected ramp time. Terminal logic '0' => stop;

8: Start, select start for a start/stop command. Terminal logic '1' = start, logic '0' = stop;

9: Latched start, the motor starts, if a pulse is applied for min. 4ms. The motor stops when [6]

Stop inverse/[46] Stop is activated;

10: Reversing, change direction of motor shaft rotation, reversing signal only changes direction of rotation, it does not activate start function, C04.10 must choose [2] Both directions;

11: Start reversing, used for start/stop and for reversing at the same time;

12: Enable start forward only, disengages the counterclockwise movement and allows for the clockwise direction;

13: Enable start reverse only, disengages the clockwise movement and allows for the counterclockwise direction;

14: Jog, used for activating jog speed, see C03.11;

15: Preset ref. bit0, Preset ref.bit0, bit1, bit2, bit3 enables a choice between one of the sixteen preset references (see C03.10) according to the table below;

16: Preset ref. bit1, same as [15];

17: Preset ref. bit2, same as [15];

18: Preset ref. bit3, same as [15];

Terminal of Preset ref. bit3	Terminal of Preset ref. bit2	Terminal of Preset ref. bit1	Preset ref. bit0	Parameter
OFF	OFF	OFF	OFF	C03.10[0]
OFF	OFF	OFF	ON	C03.10[1]
OFF	OFF	ON	OFF	C03.10[2]
OFF	OFF	ON	ON	C03.10[3]
OFF	ON	OFF	OFF	C03.10[4]
OFF	ON	OFF	ON	C03.10[5]
OFF	ON	ON	OFF	C03.10[6]
OFF	ON	ON	ON	C03.10[7]
ON	OFF	OFF	OFF	C03.10[8]
ON	OFF	OFF	ON	C03.10[9]
ON	OFF	ON	OFF	C03.10[10]
ON	OFF	ON	ON	C03.10[11]
ON	ON	OFF	OFF	C03.10[12]
ON	ON	OFF	ON	C03.10[13]
ON	ON	ON	OFF	C03.10[14]
ON	ON	ON	ON	C03.10[15]

19: Freeze reference, freezes the actual reference, if freezing reference is active, stop the drive via a terminal programmed for [2] Coast inverse, [3] Coast and reset inverse, [42] Coast and [46] Stop;

20: Freeze output, freezes the output frequency, If freezing output is active, stop the drive via a terminal programmed for [2] Coast inverse, [3] Coast and reset inverse, [42] Coast and [46] Stop;

21: Speed up, when speed up is activated for less than 400 ms. the resulting reference will be increased by C03.13 Speed Up/Down Value. If Speed up is activated for more than 400 ms, the resulting reference will ramp according to ramp 4;

22: Speed down, similar to [21] Speed up;

23: Set-up select, select one of the two set-ups, see C00.10;

24: Main reference calculation switchover;

This function is used C03.07 Main Reference Calculation option [3] Switchover between Reference source 1 and Reference source 2, [4] Switchover between Reference source 1 and Reference source 2,3 operation. When the terminal is in the ON state, the main reference value is Reference Source 1; when the terminal is in the OFF state, the main reference is Reference source 2 or Reference source 2,3 operation results;

28: Catch up, select catch up to increase the resulting reference value by the percentage set in C03.12 Catch up/slow Down Value;

29: Slow down, similar to [28] Catch up;

32: Pulse input, select pulse input when using a pulse sequence as either reference or feedback. Scaling is done in par. group C05.5*, the function is available for C05.15 Terminal DI4 only;

34: Ramp bit0, ramp bit0, bit1 are used for select one of the four ramps;

35: Ramp bit1, same as [34];

Terminal of Ramp bit1	Terminal of Ramp bit0	Parameters
OFF	OFF	Ramp1 (C03.41, C03.42)
OFF	ON	Ramp2 (C03.51, C03.52)
ON	OFF	Ramp3 (C03.61, C03.62)
ON	ON	Ramp4 (C03.71, C03.72)

37: Latched Reversing, motor starts counter-clockwise if a pulse is applied for min. 4ms. The motor stops when [6] Stop inverse/[46] Stop is activated;

42: Coast, similar to [2] coast reverse, but logic contrary: Terminal logic '1' => coasting stop;

43: External alarm input, When terminal is in ON state, the drive will run as C05.09 specified.

46: Stop, similar to [6] stop reverse, but logic contrary: Terminal logic '1' => stop;

50: Speed control/torque control switchover;

When C01.00 Configuration Mode is set to [4] Torque open loop, torque open loop and speed open loop can be switched via digital input terminal. The terminal is in the OFF state, it is torque open loop; The terminal is in the ON state, it is speed open loop;

60: Counter A, to count the pulse number inputted into the terminal;

62: Reset counter A, to clear counter A to "0";

63: Counter B, to count the pulse number inputted into the terminal;

65: Reset counter B, to clear counter B to "0";

70: Wobble start command, see par. group C30.**;

71: Wobble reset, see par. group C30.**;

72: Wobble initialization, see par. group C30.**;

C05.3* Digital Output

Par. No.	Name	Range	Unit	Default
C05.30	Terminal DO1	0~91		0
C05.31	Terminal DO2			0

Set the Terminal DO1/DO2 output function.

Terminal DO1 is a programmable multiplex terminal, it can be a high-speed pulse output terminal, also available as a collector's digital output terminal. if C05.60 = 0, DO1 is as a collector's digital output terminal; If C05.60 is not set to 0, DO1 is as a high-speed pulse output terminal.

Terminal DO2 can only be as a collector's digital output terminal.

If terminal DO1 and DO2 are as collector's digital output terminals, their output function options are the same as C05.40 relay output.

C05.4* Relay

Par. No.	Name	Range	Unit	Default
C05.40	Relay Function	0~91		9, 5

This parameter is an array[2] parameter. C05.40[0] corresponds to the relay 1 (FA-FB-FC), C05.40[2] the corresponds to relay 2 (KA-KB).

0: No operation;

1: Drive ready, the drive control card have received supply voltage;

3: Remote control ready, the drive is ready for operation and is in AUTO mode;

4: Drive running/No warning, the drive is running and no warning is present;

5: Drive running, the drive is running;

7: Run in range/No warning, the drive is running within the programmed speed ranges set in C04.12 Motor Speed Low Limit and C04.14 Motor Speed High Limit. No warnings are present;

8: Run on reference/No warning, the drive runs at reference speed without warnings;

9: Alarm, the drive alarms;
10: Alarm or warning, an alarm or warning occurs;
12: Out of current range, output current is outside the range set in C04.50 and C04.51;
13: Below current low, output current is lower than set in C04.50;
14: Above current high, output current is higher than set in C04.51;
15: Out of frequency range, output frequency is outside the range set in C04.52 and C04.53;
16: Below frequency low, output frequency is lower than set in C04.52;
17: Above frequency high, output frequency is higher than set in C04.53;
18: Out of feedback range, feedback is outside the range set in C04.56 and C04.57;
19: Below feedback low, feedback is lower than set in C04.56;
20: Above feedback high, feedback is higher than set in C04.57;
21: Thermal warning, a thermal warning occurs;
22: Ready, no thermal warning, the drive is ready for operation and no over-temperature warning is present;
23: Remote ready, no thermal warning, the drive is ready for operation in AUTO mode, and no over-temperature warning is present;
24: Ready, voltage OK, the drive is ready for operation, no over-voltage or under-voltage is present;
25: Reverse, the drive runs in counter clockwise;
26: Bus OK, local bus communication is normal;
32: Mech. brake control, enter mechanical brake control signal, see C02.2*;
36: Control word bit 11, bit 11 in control word is active;
37: Control word bit 12, bit 12 in control word is active;
40: Out of reference range, reference is outside the range set in C04.54 and C04.55;
41: Below reference low, reference is lower than set in C04.54;
42: Above reference high, reference is higher than set in C04.55;
43: External alarm, the digital input terminal function [43] external alarm input is active;
44: Unbalance warning, unbalance occurs, see C04.8*;
51: Drive in HAND state;
52: Drive in AUTO state;
53: No alarm;
56: Drive in HAND state;
57: Drive in AUTO state;
60: Comparator 0, using a simple PLC, the results of comparator 0;
61: Comparator 1, using a simple PLC, the results of comparator 1;
62: Comparator 2, using a simple PLC, the results of comparator 2;
63: Comparator 3, using a simple PLC, the results of comparator 3;
70: Logic rule 0, using a simple PLC, the results of logic rule 0;

71: Logic rule 1, using a simple PLC, the results of logic rule 1;
72: Logic rule 2, using a simple PLC, the results of logic rule 2;
73: Logic rule 3, using a simple PLC, the results of logic rule 3;
80: Simple PLC digital rutput 1, only active for DO1;
81: Simple PLC digital output 2, only active for DO2;
82: Simple PLC relay 1, only active for relay 1;
83: Simple PLC relay 2, only active for relay 2;
90: Up to wobble limit, see C30.**;
91: Up to wobble ref., see C30.**;

Par. No.	Name	Range	Unit	Default
C05.41	Relay On Delay Time	0.00~600.00	s	0.00
C05.42	Relay Off Delay Time	0.00~600.00	s	0.00

These parameters an array-2 parameters which are used to set the relay output turn-on and turn-off delay time. Array[0] is corresponding to the relay 1; array [1] is corresponding to the relay 2.
E.g:
When the relay 1 function is satisfied, it delays C05.41[0] time, then outputs ON.
When the relay 1 function is not satisfied, it delays C05.42[0] time, then outputs OFF.

C05.5* Pulse Input

Terminal DI4 is a programmable multiplex terminals. It can be a high-speed pulse input terminal, also available as a normal digital input terminal. When select [32] pulse input in C05.15, DI4 is as a high-speed pulse input terminal; when select other options in C05.15, DI4 is as a normal digital input terminal. Other digital input terminals without this feature.

C05.55~C05.58 are used to configure the scale of the pulse input. The scale is similar to the analog input VI, please refer to the diagram of analog input VI (See C06.1*).

Par. No.	Name	Range	Unit	Default
C05.55	Terminal DI4 Low Frequency	0.00~C05.56	kHz	0.00

Enter the low frequency corresponding to the low referece/feedback value in C05.57.

Par. No.	Name	Range	Unit	Default
C05.56	Terminal DI4 High Frequency	C05.55~100.00	kHz	50.00

Enter the high frequency corresponding to the high referece/feedback value in C05.58.

Par. No.	Name	Range	Unit	Default
C05.57	Terminal DI4 Low Ref./ Feedb. Value	-200.00~200.00	%	0.00

Enter low ref. /feedb. value corresponding to value in C05.55. 0% equals 0, 100% equals value set in C03.03.

Par. No.	Name	Range	Unit	Default
C05.58	Terminal DI4 High Ref./ Feedb. Value	-200.00~200.00	%	100.00

Enter high ref./feedb. value corresponding to value in C05.56. 0% equals 0, 100% equals value set in C03.03.

Par. No.	Name	Range	Unit	Default
C05.59	Terminal DI4 Filter Time	1~1000	ms	100

Enter the pulse filter time, the low pass filter reduces the influence on and dampends the oscillations on the feedback signal from the control.

C05.6* Pulse Output

Par. No.	Name	Range	Unit	Default
C05.60	Terminal DO1 Pulse Output	0~30		0

Terminal DO1 pulse output function and the corresponding scales are as follows:

Option	Name	
0	Digital output	DO1 is as a collector's digital output terminal
10	Output frequency	In torque open loop and Process closed loop mode: 0% = 0, 100% = C04.19 In speed open loop mode: 0% = 0, 100% = C03.03

11	Reference	If C03.00 = 0,
		then 0% = 0, 100% = C03.03;
		If C03.00 = 1,
		then 0% = -C03.03, 100% = C03.03;

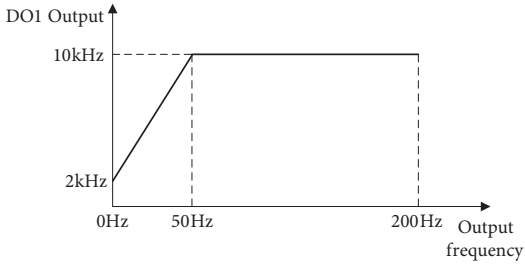
12	Feedback	
13	Output current	0% = 0, 100% = C16.37
16	Power	0% = 0, 100% = C01.20
17	Speed	0% = 0, 100% = C01.25
18	Motor voltage	0% = 0, 100% = C01.22
20	Bus control	
21	Terminal DI4 pulse input	0% = C05.55, 100% = C05.56
22	Terminal VI input	0% = C06.10/C06.12, 100% = C06.11/C06.13

Option	Name	
23	Terminal AI input	0% = C06.20/C06.22, 100% = C06.21/C06.23
26	DC link voltage	0% = 0V, 100% = 1000V
30	Output torque	0% = 0N•m, 100% = C01.26

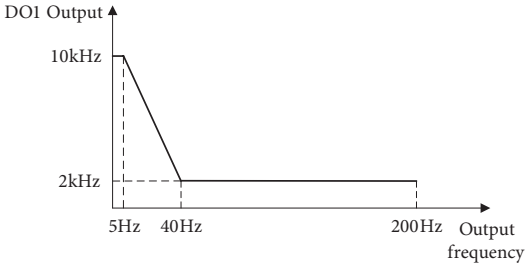
Par. No.	Name	Range	Unit	Default
C05.61	Pulse Output Min. Freq.	0.00~C05.62	kHz	0.00
C05.62	Pulse Output Max. Freq.	C05.61~100.00	kHz	50.00
C05.63	Pulse Output Min. Scale	0.00~200.00	%	0.00
C05.64	Pulse Output Max. Scale	0.00~200.00	%	100.00

C05.61 and C05.62 are used to set minimum and maximum frequency of the pulse output; C05.63 and C05.64 are used to set minimum and maximum scale corresponding to minimum and maximum frequency.

For example: In speed open loop mode, Set C03.03 = 50.0, C05.60 = 10 (0% = 0Hz, 100% = 50Hz), C05.61 = 2kHz, C05.62 = 10kHz, if C05.63 = 0.00% (0Hz), C05.64 = 100.00% (50Hz), then the relationship between the output frequency and terminal DO1 pulse output frequency is shown below:



If C05.63 = 80.00% (40Hz), C05.64 = 10.00% (5Hz), then the relationship between the output frequency and DO1 pulse output frequency is shown below:



6.7 Group 06: Analog In/Out

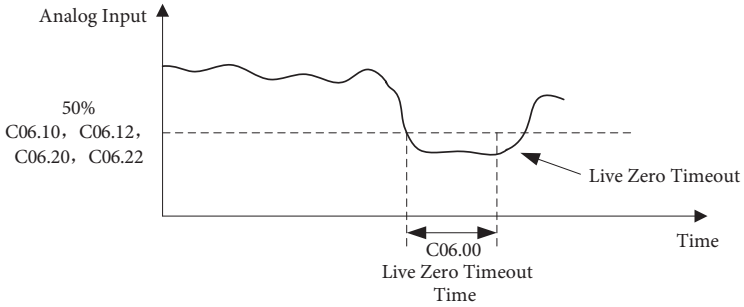
C06.0* Analog I/O Mode

Par. No.	Name	Range	Unit	Default
C06.00	Live Zero Timeout Time	1~99	s	10

Live Zero Time-out Function is used for analog input signal detection. To active the Live Zero Timeout Function, if voltage input is selected, then the low input voltage (C06.10, C06.20) settings must be greater than 1V; if current input is selected, the low input current (C06.12, C06.22) settings must be greater than 2mA or more. If the analog input signal is lower than 50% of the settings of parameters of C06.10, C06.12, C06.20, C06.22, and lasts longer than the settings of C06.00 Live Zero Timeout Time, this feature takes effect.

If the analog input signal is back to normal within the delay time, then reset the timer.

Diagram of Live Zero Timeout Function is shown below:



Par. No.	Name	Range	Unit	Default
C06.01	Live Zero Timeout Function	0: Off 1: Freeze output 2: Stop 3: Jogging 4: Max. speed 5: Stop and trip		0

Select the live zero time-out function.

0: Off;

1: Freeze output, frozen at the present value;

2: Stop, overruled to stop;

3: Jogging, overruled to jog speed;

4: Max. speed, overruled to Max.speed;

5: Stop and trip, overruled to stop with subsequent trip.

C06.1*Analoge Input VI

Parameters for configuring the scaling and limits for analog input VI.

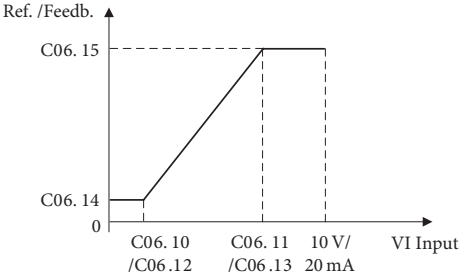
Par. No.	Name	Range	Unit	Default
C06.10	Terminal VI Low Voltage	0.00~C06.11	V	0.07
C06.11	Terminal VI High Voltage	C06.10~10.00	V	10.00
C06.12	Terminal VI Low Current	0.00~C06.13	mA	0.14
C06.13	Terminal VI High Current	C06.12~20.00	mA	20.00
C06.14	Terminal VI Low Ref./ Feedb. Value	-200.00~200.00	%	0.00
C06.15	Terminal VI High Ref./ Feedb. Value	-200.00~200.00	%	100.00

C06.10 is used to set low voltage input; C06.12 is used to set low current input; The low voltage and current analog input scaling value corresponds to the low ref./feedb. value, set in C06.14.

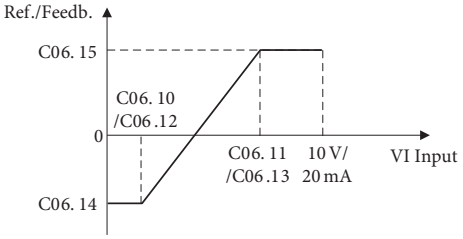
C06.11 is used to set high voltage input; C06.12 is used to set high current input; The high voltage and current analog input scaling value corresponds to the high ref./feedb. value, set in C06.15.

For C06.14 and C06.15, 0% equals 0, 100% equals value set in C03.03.

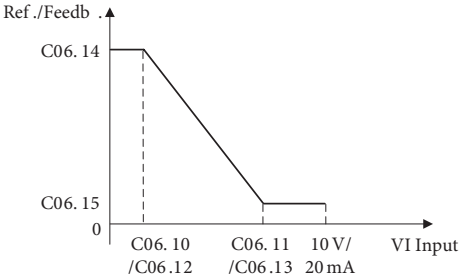
There are 4 kind of curves between terminal VI input voltage/current and its scale value:



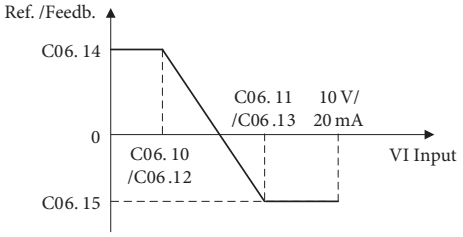
C06.14 < C06.15 and C06.14 >= 0



C06.14 < C06.15 and C06.14 < 0



C06.14 > C06.15 and C06.15 >= 0



C06.14 > C06.15 and C06.15 < 0

Terminal VI reference/feedback value calculated as follows:

If C06.10 <= VI Input <= C06.11,

VI Ref./Feedb. Value = ((C06.15 - C06.14) ÷ (C06.11 - C06.10) × (VI input - C06.10) + C06.14) × C03.03;

If VI Input < C06.10, VI Ref./Feedb. Value = C06.14 × C03.03;

If VI Input > C06.11, VI Ref./Feedb. Value = C06.15 × C03.03;

Note: Above formulas are for voltage input. If it is a current input, C06.10 and C06.11 use C06.12 and C06.13 instead respectively.

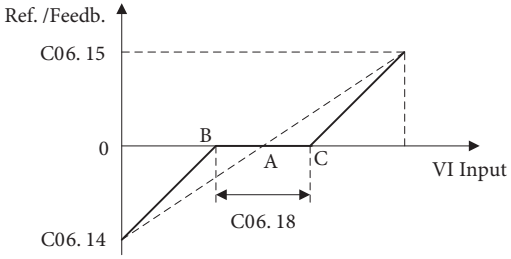
Par. No.	Name	Range	Unit	Default
C06.16	Terminal VI Filter Time	0.01~10.00	s	0.01

Enter the terminal VI filter time. This is a first-order digital low pass filter for suppressing electrical noise in terminal VI. A high time constant value improves dampening but also increases the time delay through the filter.

Par. No.	Name	Range	Unit	Default
C06.18	Terminal VI Zero Dead Band	0.0~20.00	V/mA	0.00

Set the dead-band of VI at 0 speed. When analog input VI ref. low and ref. high have opposite signs, there must be a set point that corresponding to an analogue value equals 0. In order to

prevent the set point jitter at zero point due to analog interference, this parameter should be set properly.



Point A as shown in the figure is the analog value that corresponds to a setpoint that equals 0. It is calculated via analog low, high values and low, high reference/feedback values. After set terminal VI zero dead band, UAB=UAC=C06.18/2. If the VI input is between B and C, the VI reference/feedback is 0.

Par. No.	Name	Range	Unit	Default
C06.19	Terminal VI Mode	0: Voltage mode 1: Current mode		0

Select the input to be present on analog input VI.

C06.2* Analog Input AI

Par. No.	Name	Range	Unit	Default
C06.20	Terminal AI Low Voltage	0.00~C06.21	V	0.07
C06.21	Terminal AI High Voltage	C06.20~10.00	V	10.00
C06.22	Terminal AI Low Current	0.00~C06.23	mA	0.14
C06.23	Terminal AI High Current	C06.22~20.00	mA	20.00
C06.24	Terminal AI Low Ref./ Feedb. Value	-200.00~200.00	%	0.00
C06.25	Terminal AI High Ref./ Feedb. Value	-200.00~200.00	%	100.00
C06.26	Terminal AI Filter Time	0.01~10.00	s	0.01
C06.28	Terminal AI Zero Dead Band	0.0~20.00	V/mA	0.00
C06.29	Terminal AI Mode	0: Voltage mode 1: Current mode		0

The usage of terminal AI is similar to terminal VI, please refer to C06.1* Analog Input VI.

C06.7* Analog Output VO

Par. No.	Name	Range	Unit	Default
C06.70	Terminal VO Mode	0: 0-20mA 1: 4-20mA 3: 0-10V		3

Select output to be present on analog output VO.

Attention: This parameter is in relation with the jumper switch, if voltage output is selected, junmper swith J2 leg1, 2 should be asserted on; if current output is selected, junmper swith J2 leg2, 3 should be asserted on.

Par. No.	Name	Range	Unit	Default
C06.71	Terminal VO Analog Output	0~30		0

Select choices of the analog output VO.

Option	Function	Scale
0	No function	
10	Output frequency	In torque open loop and Process closed loop mode: 0% = 0Hz, 100% = C04.19 In speed open loop mode: 0% = 0Hz, 100% = C03.03

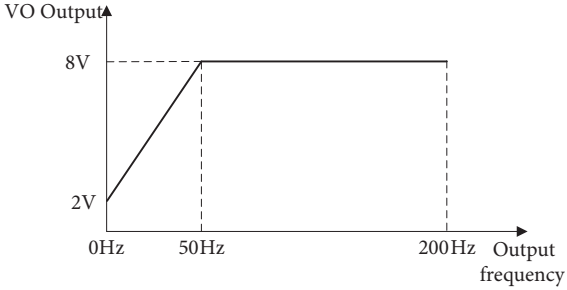
11	Reference	If C03.00 = 0,
		then 0% = 0, 100% = C03.03;
		If C03.00 = 1,
		then 0% = -C03.03, 100% = C03.03;

12	Feedback	
13	Output current	0% = 0, 100% = C16.37
16	Power	0% = 0, 100% = C01.20
17	Speed	0% = 0, 100% = C01.25
18	Motor voltage	0% = 0, 100% = C01.22
20	Bus control	
21	Pulse input	0% = C05.55, 100% = C05.56
22	Terminal VI input	0% = C06.10/C06.12, 100% = C06.11/C06.13
23	Terminal AI input	0% = C06.20/C06.22, 100% = C06.21/C06.23
26	DC link voltage	0% = 0V, 100% = 1000V
30	Output torque	0% = 0N•m, 100% = C01.26

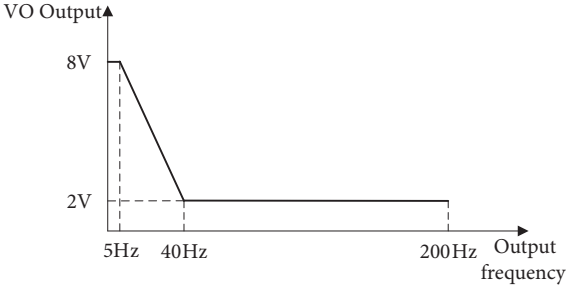
Par. No.	Name	Range	Unit	Default
C06.73	Terminal VO Output Min. Scale	0.00~200.00	%	0.00
C06.74	Terminal VO Output Max. Scale	0.00~200.00	%	100.00
C06.75	Terminal VO Min. Output	0.00~C06.76		0.00/4.00
C06.76	Terminal VO Max. Output	C06.75~10.00/20.00		10.00 /20.00

Scale minmum/maximum output of selected ananlog signal at terminal VO as percentage of minmum/maximum signal value.

For example: In speed open loop mode, set C03.03 = 50.0, C06.70 = 3 (0~10V), C06.70 = 10 (Output frequency 0% = 0.0Hz, 100% = 50.0Hz), C06.73 = 0.00% (0.0Hz), C06.74 =100.00% (50.0Hz), C06.75 = 2V, C06.76 = 8V, the relationship between the output frequency and VO output is shown below:



If C06.73 = 80.00% (40Hz), C06.74 = 10.00% (5Hz), then the relationship between the output frequency and VO output is shown below:



C06.8* LCP Potentiometer

The LCP Potentiometer can be select either as reference resource or relative reference source.

Par. No.	Name	Range	Unit	Default
C06.81	LCP Pot. Min. Ref.	-200.00~200.00	%	0.00
C06.82	LCP Pot. Max. Ref.	-200.00~200.00	%	100.00

These parameters are used to set the minimum/maximum reference of LCP Potentiometer. The reference of LCP potentiometer's per division depends on the set of the C00.47 LCP potentiometer step.

C06.9* Analog Output AO

Par. No.	Name	Range	Unit	Default
C06.90	Terminal AO Mode	0: 0-20mA 1: 4-20mA		0
C06.91	Terminal AO Analog Output	0~23		0
C06.93	Terminal AO Output Min. Scale	0.00~200.00	%	0.00
C06.94	Terminal AO Output Max. Scale	0.00~200.00	%	100.00
C06.95	Terminal AO Min. Output	0.00~C06.96		0.00
C06.96	Terminal AO Max. Output	C06.95~20.00		10.00

The usage of terminal AO is similar to terminal VO, please refer to C06.7* Analog Output VO.

6.8 Group 07: Controllers

C07.1* Torque PI Control

Parameters for configuring the torque PI control in torque open loop (C01.00 Configuration Mode).

Par. No.	Name	Range	Unit	Default
C07.12	Torque PI Proportional Gain	0~500	%	100

Enter the proportional gain value for the torque controller. Selection of a high value makes the controller react faster. Too high a setting leads to control instability.

Par. No.	Name	Range	Unit	Default
C07.13	Torque PI Integration Time	0.002~2.000	s	0.020

Enter the integration time for the torque controller. Selection of a low value makes the controller react faster. Too low a setting leads to control instability.

C07.2* Process PID Feedback

Par. No.	Name	Range	Unit	Default
C07.20	Process PID Feedback Source	0: No function 1: Terminal VI 2: Terminal AI 8: Pulse input DI4 11: Local bus		0

Select source of feedback signal.

C07.3* Process PID Control

This parameter is active in closed loop process control mode (See C01.00 Configuration Mode).

Par. No.	Name	Range	Unit	Default
C07.30	Process PID Normal/ Inverse	0: Normal 1: Inverse		0

Normal and inverse control are implemented by introducing a difference between the reference signal and the feedback signal.

0: Normal, the drive is to reduce/increase the output frequency if the feedback signal is larger/ lower than reference;

1: Inverse, the drive is to reduce/increase the output frequency if the feedback signal is lower/ larger than reference;

Par. No.	Name	Range	Unit	Default
C07.31	Process PID Anti Windup	0: Disable 1: Enable		0

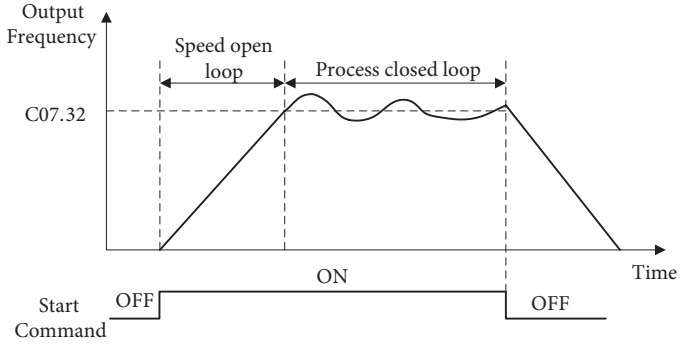
This function ensures the output frequency reaches to frequency limit. PID-controller will be initialized to the current frequency when the output frequency can not be changed. This can prevent the integrator continue to integrate on an error when the PID-controller can't adjust output frequency.

0: Disable, continue regulation of a given error even when the output frequency can't be increased/decreased;

1: Enable, ceases regulation of a given error when the output frequency can't be increased/ decreased;

Par. No.	Name	Range	Unit	Default
C07.32	Process PID Start	0.0~200.0	Hz	0.0

Enter the motor speed to be attained as a start signal for commencement of PID control. When the power is switched on, the drive will commence ramping and then operate under speed open loop control. Thereafter, when the Process PID Start Speed is reached, the drive will change over to Process PID Control.



Par. No.	Name	Range	Unit	Default
C07.33	Process PID Proportional Gain	0.00~10.00		0.01

Enter the PID proportional gain. The proportional gain multiplies the error between the set point and the feedback signal.

Attention: This function is disabled when it is set to "0".

Par. No.	Name	Range	Unit	Default
C07.34	Process PID Integral Time	0.01~655.35	s	655.35

Enter the PID integral time. The integrator provides an increasing gain at a constant error between the set point and the feedback signal. The integral time is the time needed by the integrator to reach the same gain as the proportional gain.

Par. No.	Name	Range	Unit	Default
C07.35	Process PID Differentiation Time	0.00~10.00	s	0.00

Enter the PID differentiation time. The differentiator does not react to a constant error, but provides a gain only when the error changes. The shorter the PID differentiation time, the stronger the gain from the differentiator.

Par. No.	Name	Range	Unit	Default
C07.38	Process PID Feed Forward Factor	0~400	%	0

Enter the PID feed forward (FF) factor. The FF factor sends a constant fraction of the reference signal to bypass the PID control, so the PID control only affects the remaining fraction of the control signal. Any change to this parameter will thus affect the motor speed. When the FF factor is activated it provides less overshoot, and high dynamics when changing the set point.

Par. No.	Name	Range	Unit	Default
C07.39	On Reference Bandwidth	0.0~200.0	%	0.1

Enter the On Reference Bandwidth. When the PID Control Error (the difference between the reference and the feedback) is less than the set value of this parameter, the PID control stops.

Par. No.	Name	Range	Unit	Default
C07.41	Process PID Output Low	-100.00~100.00	%	0.00
C07.42	Process PID Output High	-100.00~100.00	%	100.00

These parameters are used to set process PID controller output low/high limit, 100% corresponds to C04.19.

6.9 Group 08: Communication

C08.0* Comm. General Settings

Par. No.	Name	Range	Unit	Default
C08.01	Control Site	0: Digital and Communication 1: Digital only 2: Communication only		0

The drive start, stop, reverse, jog commands can be given both through digital input terminals and communication, this parameter is used to set the drive control command site.

0: Digital and Communication, controlled by using both digital input and Communication;

1: Digital only, controlled by using digital inputs only;

2: Communication only, controlled by using communication only;

Par. No.	Name	Range	Unit	Default
C08.03	Communication Timeout Time	0.00~650.00	s	1.00

Enter the maximum time expected to pass between the reception of two consecutive telegrams. If this time is exceeded, it indicates that the serial communication has stopped. The function selected in C08.04 Communication Timeout Function will then be carried out. The time-out counter is triggered by a valid communication.

Par. No.	Name	Range	Unit	Default
C08.04	Communication Timeout Function	0: Off 1: Freeze output 2: Stop 3: Jogging 4: Max. speed 5: Stop and trip		0

The communication time-out function activates when the communication fails to be updated within the time period specified in C08.03 Communication Timeout Time.

0: Off, resumes control via serial bus using the most recent control word;

1: Freeze output, frozen at the present value;

2: Stop, overruled to stop;

3: Jogging, overruled to jog speed;

4: Max. speed, overruled to max.speed;

5: Stop and trip, overruled to stop with subsequent trip ("E.17").

Par. No.	Name	Range	Unit	Default
C08.06	Reset Communication Timeout	0: Do not reset 1: Do reset		0

Resetting communication timeout will remove any timeout function. After communication timeout occurs, a communication interrupt flag will be within the drive. It must be use the parameter to clear the flag (Do reset), else even to restore communication or clear "E.17" alarm, the drive will continue to report communication timeout.

0: Do not reset, communication timeout is not reset;

1: Do reset, communication timeout is reset;

Par. No.	Name	Range	Unit	Default
C08.29	Communication Alarm Mode	0: Bit mode 1: Code mode		0

Register 51101 is used to store the drive fault information, it has two warning/alarm modes:

0: Bit mode

Each register bit represents a different warning and failure.

1: Code mode

Warning/alarm code is stored in the register. For example: When the drive occurs E.13 alarm, the value of register 51101 is 13.

C08.3* Port Setting

Par. No.	Name	Range	Unit	Default
C08.30	Protocol	0: FC 2: Modbus RTU 6: Modbus ASCII		0

Select the protocol to be used.

Par. No.	Name	Range	Unit	Default
C08.31	Address	0~247		1

Select the address for the bus. FC-bus range is 1-126, and Modbus range is 1-247.

Par. No.	Name	Range	Unit	Default
C08.32	Baud Rate	0: 2400 1: 4800 2: 9600 3: 19200 4: 38400 5: 57600 6: 76800 7: 115200 8~9: Reserved	bit/s	2

Select baud rate for communication.

Par. No.	Name	Range	Unit	Default
C08.33	Parity/Stop Bits	0: Even parity (1 stop bit) 1: Odd parity (1 stop bit) 2: No parity (1 stop bit) 3: No parity (2 stop bit)		2

This parameter only effective for Modbus and FC bus always has even parity.

Par. No.	Name	Range	Unit	Default
C08.35	Min. Response Delay	0.000~0.500	s	0.002

Specify the minimum delay time between receiving a request and transmitting a response. This is used for overcoming modem turnaround delays.

Par. No.	Name	Range	Unit	Default
C08.36	Max. Response Delay	0.010~10.000	s	5.000

Specify the maximum permissible delay time between transmitting a request and receiving a response. If exceeds this delay time, the drive will not respond to received data.

Par. No.	Name	Range	Unit	Default
C08.38	Message Response	0: Normal 1: Only response exception message 2: Not response		0

This parameter is used to control Modbus message response.
Attention: the drive will response the READ instruction no matter what C08.38 set.

Par. No.	Name	Range	Unit	Default
C08.39	Modbus Parameter Write Store	0: Not saved at power down 1: Saved at power down		0

This parameter is used to control whether the parameters which is changed by Modbus WRITE instruction are saved or not at power down.

C08.5* Digital/Bus

This parameter only active only when C08.01 Control site is set to [0] digital and control word.

Par. No.	Name	Range	Unit	Default
C08.50	Coasting Select	0: Digital input 1: Bus 2: Logic AND 3: Logic OR		3
C08.53	Start Select			3
C08.54	Reversing Select			3
C08.55	Set-up Select			3
C08.56	Preset Reference Select			3

Select control of the coasting, start, reverse, set-up and preset reference function via the terminals (digital input) and/or via the bus.

0: Digital input, activate via a digital input;

1: Bus, activate via serial communication port;

2: Logic AND, activate via serial communication port and a digital input;

3: Logic OR, activate via serial communication port or a digital input;

6.10 Group 13: Simple PLC

Simple PLC is a user-defined sequence of operation (C13.52[x]). When the associated user-defined envents (C13.51[x]) is set to true, Sample PLC will perform these operations.

Events and related operations are paired, that is , once an event is “true”, will execute its associated action. You can set up to 54 events and operations.

Start and stop simple PLC: Selects order or parallel control in C13.00 Sample PLC Mode, when start event (C13.01) is “true”, start simple PLC, when stop event (C13.02) is “true”, simple PLC will

be stopped. In addition, you can also choose [0] off (C13.00) to stop the simple PLC.

Attention: Simple PLC function is only valid in AUTO mode.

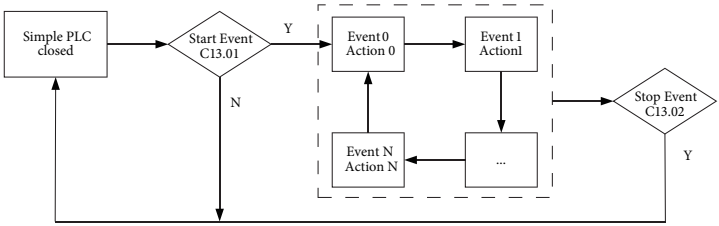
C13.0* Simple PLC Settings

Par. No.	Name	Range	Unit	Default
C13.00	Simple PLC Mode	0: Off 1: Order execution 2: Parallel execution		0

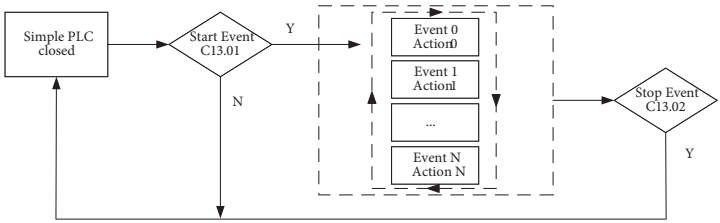
Set the simple PLC control mode.

0: Off;

1: Order execution, after simple PLC start event is "true", the control event executes orderly: from the control event 0 (C13.51[0]) to control events n (C13.51[N], N is the last non-empty event) and then back to control event 0, as shown in the following figure:



2: Parallel execution, after simple PLC start event is "true", the control event executes parallelly: control event 0~N executes at the same time (cycle) , as shown in the following figure:



Par. No.	Name	Range	Unit	Default
C13.01	Start Event	0~54		39

Enter the simple PLC start event.

0: False, enter the fixed value - FALSE;

1: True, enter the fixed value - TRUE;

2: Running, the motor is running;

3: In current range-No warning, The motor is running within the programmed current ranges set in C04.50 Warning Current Low and C04.51 Warning Current High, and no warning is present;
4: On reference-No warning, the motor is running on reference,and no warning is present;
7: Out of current range, output current is outside the range set in C04.50 and C04.51;
8: Below current low, output current is lower than set in C04.50;
9: Above current high, output current is higher than set in C04.51;
10: Out of frequency range, output frequency is outside the range set in C04.52 and C04.53;
11: Below frequency low, output frequency is lower than set in C04.52;
12: Above frequency high, output frequency is higher than set in C04.53;
13: Out of feedback range, feedback is outside the range set in C04.56 and C04.57;
14: Below feedback low, feedback is lower than set in C04.56;
15: Above feedback high, feedback is higher than set in C04.57;
16: Thermal warning, a thermal warning occurs;
17: Mains out of range, over-voltage or under-voltage occurs;
18: Reversing, the drive runs in counter clockwise;
19: Warning, if the drive issues a warning, this event is TRUE;
20: Alarm (trip), if the drive alarms and trip is actived, this event is TRUE;
21: Alarm (trip lock), if the drive alarms and trip lock is actived, this event is TRUE;
22: Comparator 0, output of comparator 0 is used in logic rules;
23: Comparator 1, output of comparator 1 is used in logic rules;
24: Comparator 2, output of comparator 2 is used in logic rules;
25: Comparator 3, output of comparator 3 is used in logic rules;
26: Logic rule 0, result of logic rule 0 is used in logic rules;
27: Logic rule 1, result of logic rule 1 is used in logic rules;
28: Logic rule 2, result of logic rule 2 is used in logic rules;
29: Logic rule 3, result of logic rule 3 is used in logic rules;
30: Simple PLC time-out 0, result of timer 0 is used in logic rules;
31: Simple PLC time-out 1, result of timer 1 is used in logic rules;
32: Simple PLC time-out 2, result of timer 2 is used in logic rules;
33: Terminal FOR, input value entered via terminal FOR is used in logic rules;
34: Terminal REV, input value entered via terminal REV is used in logic rules;
35: Terminal DI1, input value entered via terminal DI1 is used in logic rules;
36: Terminal DI2, input value entered via terminal DI2 is used in logic rules;
37: Terminal DI3, input value entered via terminal DI3 is used in logic rules;
38: Terminal DI4, input value entered via terminal DI4 is used in logic rules;
39: Start command, if the drive starts in any way, this event is TRUE;
40: Drive stopped, if the drive stops in any way, this event is TRUE;

50: Simple PLC time-out 3, result of timer 3 is used in logic rules;
51: Simple PLC time-out 4, result of timer 4 is used in logic rules;
52: Simple PLC time-out 5, result of timer 5 is used in logic rules;
53: Simple PLC time-out 6, result of timer 6 is used in logic rules;
54: Simple PLC time-out 7, result of timer 7 is used in logic rules;

Par. No.	Name	Range	Unit	Default
C13.02	Stop Event	0~54		40

Enter the simple PLC stop event. For options, see C13.01 Start Event.

Par. No.	Name	Range	Unit	Default
C13.03	Reset Simple PLC	0: Do not reset 1: Do reset		0

0: Do not reset, retains programmed settings in all group 13 parameters;
1: Do reset, resets all group 13 parameters to default settings;

Par. No.	Name	Range	Unit	Default
C13.04	Simple PLC Store	0: No function 1: Power down save 2: Stop save 3: Both power down and stop save		0

This parameter is used to select whether the simple PLC state is saved or not at power down/stop.

C13.1* Comparators

Comparators are used for comparing continuous variables (e.g. output frequency, output current, analog input etc.) with fixed preset values. In addition, there are some constant value in conjunction with the preset value for comparison, please refer to options in C13.10. In each of the scanning integral the comparator will be evaluated once. And directly use the results (true or false). Parameters in this group are all array-type parameter with index 0-4 . Select 0 to programme Comparator 0, select index 1 to programme Comparator 1, and so on.

For example: Motor current is 25A, C13.10 [0] =4, C13.12 [0] =23, C13.11 [0] =2, then the output of comparator 0 is TRUE.

Par. No.	Name	Range	Unit	Default
C13.10	Comparator Operand	0~31		0

0: Disabled;
1: Reference;
2: Feedback;
3: Motor speed [Hz];

4: Motor current [A];
6: Motor power [kW];
7: Motor Voltage [V];
12: Terminal VI input, depending on your choice is current input or voltage input;
13: Terminal AI input, depending on your choice is current input or voltage input;
20: Fault number, please refer to chapter 8;
30: Counter A;
31: Counter B;

Par. No.	Name	Range	Unit	Default
C13.11	Comparator Operator	0: Less than 1: Approx. Equal 2: Greater than		1

0: Less than, if the variable selected in C13.10 is less than the set value in C13.12, the comparator output is TRUE, else FALSE;
1: Approx. Equal, if the variable selected in C13.10 equals the set value in C13.12, the comparator output is TRUE, else FALSE;
2: Greater than, opposite with option [0];

Par. No.	Name	Range	Unit	Default
C13.12	Comparator Value	-9999.0~9999.0		0.0

Enter the "trigger level" for the variable that is monitored by this comparator.

C13.2* Timers

Use the timer output to define an event (see C13.51) or acts as Boolean inputs of the logic rules (see C13.40, C13.42 or C13.44).

Par. No.	Name	Range	Unit	Default
C13.20	Simple PLC Timer	0.00~3600.00	s	0.00

This parameter is an array [8] parameters with index 0 to 7. Select index 0 to Timer 0, select index 1 to Timer 1, and so on.

Timer is started by option [29]~[31], [65]~[69] in C13.52 Simple PLC Action, and becomes TRUE if its value has exceeded the set time.

C13.4* Logic Rules

Combine up to three boolean inputs (TRUE or FALSE inputs) from timers, comparators, digital inputs, status bits and events using the logical operators AND, OR and NOT. C13.40, C13.42 and C13.44 are used to select logic rule Booleans, and C13.41, C13.43 is for selecting logic rule operators.

Caculation order: First, select three Boolean inputs from C13.40, C13.41 and C13.42 for the selected logic rule, and then the result ("TRUE or FALSE") as a logic boolean value, together with other two boolean inputs got from C13.43 and C13.44 to obtain the final result of the calculation ("TRUE or FALSE").

All parameters in this parameter group are array [4] parameters with index 0 to 3. Select index 0 to logic rule 0, select index 1 to logic ruler 1, and so on.

Par. No.	Name	Range	Unit	Default
C13.40	Logic Rule Boolean 1	The same as C13.01's		0

Select the first boolean (TRUE or FALSE) input for the selected logic rule. Options refer to C13.01.

Par. No.	Name	Range	Unit	Default
C13.41	Logic Rule Operator 1	0~8		0

Select the first logic operator to be used on the boolean inputs from C13.40 Logic Rule Boolean 1 and C13.42 Logic Rule Boolean 2.

0: Disabled, ignoring C13.40 and C13.42;

1: AND, evaluates the expression [C13.40] AND [C13.42];

2: OR, evaluates the expression [C13.40] OR [C13.42];

3: AND NOT, evaluates the expression [C13.40] AND NOT [C13.42];

4: OR NOT, evaluates the expression [C13.40] OR NOT [C13.42];

5: NOT AND, evaluates the expression NOT [C13.40] AND [C13.42];

6: NOT OR, evaluates the expression NOT [C13.40] OR [C13.42];

7: NOT AND NOT, evaluates the expression NOT [C13.40] AND NOT [C13.42];

8: NOT OR NOT, evaluates the expression NOT [C13.40] OR NOT [C13.42];

Par. No.	Name	Range	Unit	Default
C13.42	Logic Rule Boolean 2	The same as C13.01's		0

Select the second boolean (TRUE or FALSE) input for the selected logic rule. Options refer to C13.01.

Par. No.	Name	Range	Unit	Default
C13.43	Logic Rule Operator 2	0~8		0

Select the second logic operator to be used on the boolean input calculated in C13.40 Logic Rule Boolean 1, C13.42 Logic Rule Operator 1 and C13.43 Logic Rule Boolean 2 and the boolean input coming from C13.44 Logic Rule Boolean 3.

0: Disabled, ignoring C13.44;

1: AND, evaluates the expression [C13.40/C13.42] AND [C13.44];

2: OR, evaluates the expression [C13.40/C13.42] OR [C13.44];

3: AND NOT, evaluates the expression [C13.40/C13.42] AND NOT [C13.44];

4: OR NOT, evaluates the expression [C13.40/C13.42] OR NOT [C13.44];

5: NOT AND, evaluates the expression NOT [C13.40/C13.42] AND [C13.44];

6: NOT OR, evaluates the expression NOT [C13.40/C13.42] OR [C13.44];

7: NOT AND NOT, evaluates the expression NOT [C13.40/C13.42] AND NOT [C13.44];

8: NOT OR NOT, evaluates the expression NOT [C13.40/C13.42] OR NOT [C13.44];

Par. No.	Name	Range	Unit	Default
C13.44	Logic Rule Boolean 3	The same as C13.01's		0

Select the third boolean (TRUE or FALSE) input for the selected logic rule. Options refer to C13.01.

C13.5* Events/Actions

This group of parameter is used for setting evens or actions for Simple PLC. All parameters in this parameter group are array [30] parameters with index 0 to 29. Select index 0 to event/action 0, select index 1 to event/action 1, and so on.

Par. No.	Name	Range	Unit	Default
C13.51	Simple PLC Event	The same as C13.01's		0

Select the boolean input to define the Simple PLC event. Options refer to C13.01.

Par. No.	Name	Range	Unit	Default
C13.52	Simple PLC Action	0~69		0

Select the action corresponding to the C13.51 Simple PLC Events. Actions are executed when the corresponding event is evaluated as true.

0: Disabled, function is disabled;

1: No action, no action is operated;

2: Select set-up 1, select set-up 1 - changes the active set-up to "1";

3: Select set-up 2, select set-up 2 - changes the active set-up to "2";

10: Select preset ref 0;

11: Select preset ref 1;

12: Select preset ref 2;

13: Select preset ref 3;

14: Select preset ref 4;

15: Select preset ref 5;

16: Select preset ref 6;

17: Select preset ref 7;

18: Select ramp 1;
19: Select ramp 2;
20: Select ramp 3;
21: Select ramp 4;
22: Run, issues a start command to the drive;
23: Run reverse, issues a start reverse command to the drive;
24: Stop, issues a stop command to the drive;
27: Coast, the drive coasts immediately, all stop commands including the coast command stop the drive;
28: Freeze output, freezes the output frequency of the drive;
29: Start timer 0;
30: Start timer 1;
31: Start timer 2;
32: Set terminal DO1 low;
33: Set terminal DO2 low;
34: Set relay 1 low;
35: Set relay 2 low;
38: Set terminal DO1 high;
39: Set terminal DO2 high;
40: Set relay 1 high;
41: Set relay 2 high;
50: Select preset ref 8;
51: Select preset ref 9;
52: Select preset ref 10;
53: Select preset ref 11;
54: Select preset ref 12;
55: Select preset ref 13;
56: Select preset ref 14;
57: Select preset ref 15;
60: Reset counter A, reset counter A to “0”;
61: Reset counter B, reset counter B to “0”;
65: Start timer 3;
66: Start timer 4;
67: Start timer 5;
68: Start timer 6;
69: Start timer 7;
70: Reverse;

6.11 Group 14: Special Functions

Par. No.	Name	Range	Unit	Default
C14.01	Switching Frequency	2~6: 2~6kHz 7: 8kHz 8: 10kHz 9: 12kHz 10: 16kHz	kHz	*

Switching frequency has a significant influence to the drive and the motor. Select appropriate switch frequency can help to adjust acoustic noise from the motor, power consumption and the drive efficiency. When switching frequency increases, the consumption and the noise of the motor are reduced, but the drive's temperature will increase, and motor leakage and the interference to the external device will increase; the contrary, the opposite.

Par. No.	Name	Range	Unit	Default
*C14.03	Overmodulation	0: Off 1: On		1

The overmodulation function can obtain an output voltage greater than mains voltage.

0: Off, disable the overmodulation function to avoid torque ripple on the motor shaft. This feature may be useful for applications such as grinding machines.;

1: On, connects the overmodulation function to obtain an output voltage up to 5% greater than mains voltage. Overmodulation leads to increased torque ripple as harmonics are increased;

Par. No.	Name	Range	Unit	Default
C14.08	Damping Gain Factor	0~200	%	96

Damping gain factor can help to improve the response speed of the DC link of the drive making the DC loop signal more smooth.

C14.1* Mains On/Off

Par. No.	Name	Range	Unit	Default
C14.10	Action at Mains Failure	0: No function 1: Ctrl ramp-down 2: Ctrl ramp-down, trip 3: Coasting 4: Kinetic back-up 5: Kinetic back-up, trip 6: Alarm		0

This parameter is typically used to where very short mains interruptions (voltage dips) are present.

At 100% load and a short voltage interruption, the DC voltage on the main capacitors drops quickly. For larger drive it only takes a few milliseconds before the DC level is down to about 373V DC and the IGBTs cut off and looses the control over the motor. When the mains is restored, and the IGBTs start again, the output frequency and voltage vector does not correspond to the speed/ frequency of the motor, and the result is normally an overvoltage or overcurrent, mostly resulting in a trip lock. C14.10 Mains Failure can be programmed to avoid this situation.

This parameter is used to select the function to which the drive must act when the threshold in C14.11 Mains Voltage at Mains Fault has been reached.

0: No function

The drive will not compensate for a mains interruption. The voltage on the DC-link will drop quickly and motor control will be lost within milliseconds to seconds.

1: Ctrl ramp-down

This selection is particularly useful in pump applications, where the inertia is low and the friction is high. When the mains is restored, the output frequency will ramp the motor up to the reference speed (if the mains interruption is prolonged, the controlled ramp down might take the output frequency all the way down to 0rpm, and when the mains is restored, the application is ramped up from 0rpm to the previous reference speed via the normal ramp up). If the energy in the DC-link disappears before the motor is ramped to zero the motor will be coasted.

2: Ctrl ramp-down, trip

This selection is similar to selection [1] except that in [2] a reset is necessary for starting up after power-up.

3: Coasting

Centrifuges can run for an hour without power supply. In those situations it is possible to select a coast function at mains interruption, together with a flying start which occurs when the mains is restored.

4: Kinetic back-up

Kinetic back-up ensures that the frequency converter keeps running as long as there is energy in the system due to the inertia from motor and load. This is done by converting the mechanical energy to the DC-link and thereby maintaining control of the drive and motor. This can extend the controlled operation, depending on the inertia in the system. For fans it is typically several seconds, for pumps up to 2 seconds and for compressors only for a fraction of a second. Many industry applications can extend controlled operation for many seconds, which is often enough time for the mains to return.

5: Kinetic back-up, trip

The difference between kinetic back-up with and without trip is that the latter will always ramp down to 0RPM and trip, regardless of whether mains return or not.

The function is made so that it will not even detect if mains return, this is the reason for the

relatively high level on the DC-link during ramp down.

6: Alarm

The drive reports alarm “E.36”.

Note: For option [1] to [5], the drive will report warning "A.36" while doing the selected operation.

Par. No.	Name	Range	Unit	Default
C14.11	Mains Voltage at Mains Failure	100~800	V	*

This parameter defines the threshold votlage at which the selected function in C14.10 Mains Failure should be activated.

Par. No.	Name	Range	Unit	Default
C14.12	Function at Mains Imbanlance	0: Trip (Low sensitivity) 1: Warning (Low sensitivity) 2: Disabled 4: Warning (Middle sensitivity) 5: Trip (Middle sensitivity) 6: Trip (High sensitivity)		0

Select actions when a mains imbalance is detected. The dection of mains imbalance depends on load. In order to meet different applications, different sensitivity options are set for this parameter.

0: Trip (Low sensitivity), the drive trips (reports "E.04") when a mains imbalance is detected;

1: Warning (Low sensitivity), the drive issues a warning (reports "A.04") but continues to run when a mains imbalance is detected;

The dection method for option [0] and [1] is low sensitive, even if a severe mains imbalance occurs, the drive will continue to run and do not report warning if the load is low, the drive and motor will not damage in this occasion; The drive trips (option [0]) or issues a warning (option [1]) only the load exceeds a certain range.

2: Disabled, the drive does nothing when a mains imbalance is detected. Be attention to use this option;

4: Warning (Middle sensitivity), the drive issues a warning (reports "A.04") but continues to run when a mains imbalance is detected;

5: Trip (Middle sensitivity), the drive trips (reports "E.04") when a mains imbalance is detected;

The dection method for option [4] and [5] is middle sensitive. The drive trips (option [5]) or issues a warning (option [4]) at low frequency and heavy loaded, or high frequency and low load.

6: Trip (high sensitivity), the drive trips (reports "E.04") when a mains imbalance is detected;

The dection method for option [6] is high sensitive. Mains imbalance can be detected

immediately. But there is minimum risk of false positives (generally occurs in an abnormal grid or the drive over-current protection frequently).

Par. No.	Name	Range	Unit	Default
C14.16	Low Voltage Mode	0: Disable 1: Enable		0

If the power input voltage is low, enable low voltage mode can improve load capacity. If the voltage is 15% lower, enable low voltage mode can make the drive afford long-term full load; If the voltage is 20% lower, the drive needs to down load; If the voltage is normal, do not enable the low voltage mode, otherwise it will reduce the drive useful life.

Par. No.	Name	Range	Unit	Default
C14.17	Automatic Voltage Regulation	0: Disable 1: Enable		1

When motor voltage 12%~20% higher than rated, motor temperature will increase, insulation capability destroyed, the torque output is unstable, long-term operation will cause the motor shorten its life.

Automatic voltage regulation can automatically control the output voltage at the motor's rated voltage when the grid voltage exceed the rated motor voltage.

Turn off automatic voltage regulation will improve the ability of rapid deceleration, but turn off this option need to be cautious, it will cause the output voltage different due to different grid voltage, there is an increased risk of heat damage to the motor.

This feature can only be turned off when in VF mode.

Par. No.	Name	Range	Unit	Default
C14.18	Delay Time of Auto Restart When Power up Again	0.0~3600.0	s	0.0

This parameter is used to define the drive action when power up again after power loss during running.

If it is set to 3600.0, the drive does not respond to the start command valid upon drive power-on (for example, start terminal is ON before power-on). The drive responds only after the start command is cancelled and becomes valid again.

If it is set to 0.0~3599.9, the drive will respond to the start command delaying the C14.18 setting time upon drive power-on (for example, start terminal is ON before power-on).

C14.2* Trip Reset

Par. No.	Name	Range	Unit	Default
C14.20	Reset Mode	0: Manual reset 1~10: Auto reset 1-10 times 11: Auto reset 15 times 12: Auto reset 12 times 13: Infinite auto reset		0

Select reset function after tripping.

0: Manual reset, perform reset via "OFF" button or digital inputs;

1~10: Auto reset 1-10 times, can perform 1-10 automatic resets after trips;

11: Auto reset 15 times, can perform 15 automatic resets after trips;

12: Auto reset 20 times, can perform 20 automatic resets after trips;

13: Infinite auto reset, can perform an infinite number of automatic resets after trips;

Once option [1] - [13] is selected, the drive will be restarted after an alarm. If reset has been done and the running signal is active, the drive will restart automatically. For option [1] – [12], if the drive performs a set number of automatic reset, fault still cannot be removed, the drive will remain a trip state. It needs power off and on to reset the trip after shooting fault.

Be attention to select option [13], it may cause infinite auto reset.

Par. No.	Name	Range	Unit	Default
C14.21	Automatic Restart Time	0~600	s	10

Enter time interval from trip to start of automatic reset function after an alarm. This parameter is active when C14.20 Reset Mode is set to automatic reset [1]-[13].

Par. No.	Name	Range	Unit	Default
C14.22	Operation Mode	0: Normal operation 2: Initialization 3: Backup user settings 4: Recover user settings		0

0: Normal operation;

2: Initialization, initialise all the parameters except information about the drive itself and the recorded parameters.

3: Backup user settings;

4: Recover user settings;

For option [3] to [4], after modifying the drive parameters based on the functional requirements, OEM manufacturers can set C14.22 = 3 to backup settings. If the end users modify parameters and cannot be self-recovery, it can be recovered by setting C14.22 = 4 or pressing "OFF" key on LCP 5

seconds (the default time, can be modified by C00.46 One Key Recovery Time).

Par. No.	Name	Range	Unit	Default
C14.23	Trip lock	0: Disable 1: Enable		0

0: Disable, trip lock fault reset do not need power off;

1: Enable, trip lock fault reset need power off;

Par. No.	Name	Range	Unit	Default
C14.27	Action at Drive Fault	0: Trip 1: Warning		0

Select how the drive should react at inerter fault (output short circuit, over-current, earth fault or over-voltage).

0: Trip, drive issues an alarm and trips immediately if it detects a fault;

1: Warning, when a fault occurs, drive issues a warning and stops the PWM outputs, and repeatlly try to open the normal PWM, if the fault still can't be removed, the drive issues an alarm and trips.

C14.3* Current Limit Control

The drive contains two current limit controllers. The two controllers will be enabled when the current is over C04.18 current limit. Current controller 1 controls current by reducing the output frequency, and current controller 2 controls current by reducing the output voltage. Typically only recommended to use current controller 1, if it is still unable to control the current in some occasions (such as fast acceleration and deceleration), you can use the current controller 2.

Par. No.	Name	Range	Unit	Default
C14.30	Current Controller 1 Proportional Gain	0~500	%	100
C14.31	Current Controller 1 Integration Time	0.000~2.000	s	0.020
C14.32	Current Controller Filter Time	0.1~100.0	ms	10.0
C14.33	Current Controller 2 Proportional Gain	0~300	%	0
C14.34	Current Controller 2 Integration Time	0.000~2.000	s	0.020

It can adjust the dynamic response characteristics of the current controllers by setting the proportional gain and integration time.

Choose a higher value of proportional gain and lower integration time causes the controller response more quickly, but too high value of proportional gain and tow low value of integration time will cause the controller unstable.

C14.4* Energy Optimising

Par. No.	Name	Range	Unit	Default
*C14.40	VT Level	40~90	%	90

Enter the level of motor magnetisation at low speed. Selection of a low value reduces energy loss in the motor, but also reduces load capability.

Par. No.	Name	Range	Unit	Default
*C14.41	AEO Min. Magnetisation	40~75	%	66

Enter the minimum allowable magnetisation for AEO. Selection of a low value reduces energy loss in the motor, but can also reduce resistance to sudden load changes.

Par. No.	Name	Range	Unit	Default
*C14.50	RFI Filter Selection	0: Off 1: On 2: Reserved		1

0: Off, only the power supply is IT mains system can select [0] Off. In this mode, the linkage can be reduced;

1: On, to ensure the drive meets EMC standards, select [1] On;

2: Reserved;

Attention: The RFI Filter selection in the model (<=22kW) is not controlled by this parameter, but selected by screwing off/on the RFI switch.

Par. No.	Name	Range	Unit	Default
*C14.51	DC Link Compensation	0: Off 1: On		0

This function ensures the output voltage is independent of any voltage fluctuations in the DC link. Low torque ripple. In some cases, this dynamic compensation may cause resonance problems in DC link circuit and then this function should be disabled.

Par. No.	Name	Range	Unit	Default
C14.68	Overheat warning relative temperature	0~25	℃	5

This temperature is the overheat (E.69) relative temperature protection point, the default value is 5 ℃ , that is, 5℃ lower than the overheat (E.69) temperature protection point, When the drive temperature reaches the relative protection point for a few seconds, it will report A.69 warning. With this parameter, users can more easily control the overheat warning report.

6.12 Group 15: Drive Information

C15.0* Operating Data

Par. No.	Name	Range	Unit	Default
C15.00	Operating Days	0~9999	d	

View how many days the drive has run. The value is saved automatically at power off and can't be reset.

Par. No.	Name	Range	Unit	Default
C15.01	Running Hours	0~60000	h	

View how many hours the motor has run. Reset the counter in C15.07 Reset Running Hours Counter.

Par. No.	Name	Range	Unit	Default
C15.02	kWh Counter	0~65535	kWh	

View the power consumption of the motor as a mean value over one hour. Reset the counter in C15.06 Reset kWh Counter.

Par. No.	Name	Range	Unit	Default
C15.03	Power Up's	0~65535		

View the number of times the drive has been powered up. This parameter can't be reset.

Par. No.	Name	Range	Unit	Default
C15.04	Over Temperatures	0~65535		

View the number of the drive temperature faults that have occurred. This parameter can't be reset.

Par. No.	Name	Range	Unit	Default
C15.05	Over Voltages	0~65535		

View the number of drive over-voltages that have occurred. This parameter can't be reset.

Par. No.	Name	Range	Unit	Default
C15.06	Reset kWh Counter	0: Do not reset 1: Do reset		0

0: Do not reset;

1: Do reset, kWh counter is reset to zero (see C15.02 kWh Counter);

Attention: This parameter can't be set via local bus.

Par. No.	Name	Range	Unit	Default
C15.07	Reset Running Hours Counter	0: Do not reset 1: Do reset		0

0: Do not reset;

1: Do reset, running hours counter is reset to zero (see C15.01 Running Hours);

Attention: This parameter can't be set via local bus.

C15.3* Fault Log

Par. No.	Name	Range	Unit	Default
C15.30	Alarm Code	0~255		

View the alarm code and look up its meaning in chapter 8. This parameter is an array [10] parameters. It contains a alarm log showing reasons for the ten latest trips. C15.30[0] represents the latest, C15.30[9] is a recent 10th, this parameter cannot be reset.

Par. No.	Name	Range	Unit	Default
C15.31	Internal Fault Reason	-32767~32767		

This parameter contains internal fault reasons, mostly used in combination with alarm E.38.

Par. No.	Name	Range	Unit	Default
C15.38	Warning Code	0~255		

View the warning code and look up its meaning in chapter 8. This parameter is an array [10] parameters. It contains a warning log showing reasons for the ten latest warnings. C15.38[0] represents the latest, C15.38[9] is a recent 10th, this parameter cannot be reset.

C15.4* Drive Identification

Par. No.	Name	Range	Unit	Default
C15.43	Software Version			

View the software version of the drive.

6.13 Group 16: Data Readouts

This parameter group is read-only.

C16.0* General Status

Par. No.	Name	Range	Unit	Default
C16.00	Control Word	0~65535		

View latest valid control word that sent to the drive via local bus. Turn it into 16-bit binary code. For the meaning of each bits, please refer to register 2809 and coils 0~15 description in appendix A

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Par. No.	Name	Range	Unit	Default
C16.01	Reference	-4999.0~4999.0		

View the actual reference.

Par. No.	Name	Range	Unit	Default
C16.02	Reference	-200.0~200.0	%	

View the actual reference in percentage.

Par. No.	Name	Range	Unit	Default
C16.03	Status Word	0~65535		

View active status word, the following shows the definition for each bit.

Communication Status Word		
Bit	0	1
Bit00	Control Not Ready	Control Ready
Bit01	Drive Not Ready	Drive Ready
Bit02	Coasting	Enabled
Bit03	No Error	Trip
Bit04	Error	Error Without Trip
Bit05	Undefined	Undefined
Bit06	No Error	Trip
Bit07	No Warning	Warning
Bit08	Not On Reference	On Reference
Bit09	Local Control	Remote Control
Bit10	Frequency Not In Range	Frequency In Range
Bit11	Stop	Running
Bit12	Brake Resistor Is Normal	Brake Resistor Fault
Bit13	Voltage Limit	Out Of Voltage Limit
Bit14	Undefined	Undefined
Bit15	No Terminal Warning	Terminal Warning

Par. No.	Name	Range	Unit	Default
C16.04	Active Set-up	0: Set-up 1 1: Set-up 2 2: Multi Set-up		

View the drive active set-up.

Par. No.	Name	Range	Unit	Default
C16.05	Motor Speed	0~9999	rpm	

View motor speed.

Par. No.	Name	Range	Unit	Default
C16.06	Low Voltage Frequency Limit	0.0~400.0	Hz	

View Low Voltage Frequency Limit.

Par. No.	Name	Range	Unit	Default
C16.09	Custom Readout	0.00~99999.00		

View the value of user-defined readout corrected from C00.31, C00.32 and C04.14.

C16.1* Motor Status

Par. No.	Name	Range	Unit	Default
C16.10	Output Power	0.00~655.35	kW	

View output power in kW.

Par. No.	Name	Range	Unit	Default
C16.12	Motor Voltage	0~65535	V	

View motor phase voltage.

Par. No.	Name	Range	Unit	Default
C16.13	Output Frequency	0.0~400.0	Hz	

View output frequency.

Par. No.	Name	Range	Unit	Default
C16.14	Output Current	0.00~655.35	A	

View motor phase current.

Par. No.	Name	Range	Unit	Default
C16.15	Output Frequency	0.0~200.0	%	

View actual output frequency in percentage.

Par. No.	Name	Range	Unit	Default
C16.16	Output Torque	-200.0~200.0	%	

View actual output Torque.

Par. No.	Name	Range	Unit	Default
C16.18	Motor Thermal	0~100	%	

View calculated thermal motor load which is set as percentage of estimated thermal motor load.

C16.3* Drive Status

Par. No.	Name	Range	Unit	Default
C16.30	DC Link Voltage	0~65535	V	

View DC-link voltage.

Par. No.	Name	Range	Unit	Default
C16.31	IO Board Temperature	-128~127	℃	

View IO Board Temperature.

Par. No.	Name	Range	Unit	Default
C16.34	IGBT Temperature	-128~127	℃	

View the temperature of drive's IGBT Temperature.

Par. No.	Name	Range	Unit	Default
C16.35	Drive Thermal	0~255	%	

View calculated drive thermal load, which is set as a percentage of estimated drive thermal load.

Par. No.	Name	Range	Unit	Default
C16.36	Drive Nominal Current	0.0~6553.5	A	

View the drive nominal current.

Par. No.	Name	Range	Unit	Default
C16.37	Drive Max. Current	0.0~6553.5	A	

View the drive maximum current.

Par. No.	Name	Range	Unit	Default
C16.38	Simple PLC State	0~255		

View the state of the event under execution by the simple SLC.

C16.4* Application Message

Par. No.	Name	Range	Unit	Default
C16.40	Wobble Length	0.000~60.000	km	

View the current wobble length.

Par. No.	Name	Range	Unit	Default
C16.48	Power Board Temperature	-128~127	℃	

View the rectifier temperature, only active in >=90kW model.

Par. No.	Name	Range	Unit	Default
C16.49	Rectifier Temperature	-128~127	℃	

View the rectifier temperature, only active in >=90kW model.

C16.5* Ref./Feedb.

Par. No.	Name	Range	Unit	Default
C16.50	Main Reference	-200.0~200.0	%	

View sum of all external references in percentage.

Par. No.	Name	Range	Unit	Default
C16.51	Pulse Reference	-200.0~200.0	%	

View pulse input converted to a reference in percentage.

Par. No.	Name	Range	Unit	Default
C16.52	Feedback	-4999.000~4999.000		

View the feedback value.

C16.6*, C16.7* Inputs and Outputs

Par. No.	Name	Range	Unit	Default
C16.60	Digital Input	0~65535		

View signal states from active digital inputs, which indicates in a 16-bit binary code. If the drive detects digital input terminals connected, the corresponding position is set to “1”, otherwise “0”. Digital input terminal and the corresponding relationship between the binary code are as below:

Binary	Term. No.	Binary	Term. No.	Binary	Term. No.	Binary	Term. No.
bit0	FOR	bit4	DI3	bit8	Reserved	bit12	Reserved
bit1	REV	bit5	DI4	bit9	Reserved	bit13	Reserved
bit2	DI1	bit6	Reserved	bit10	Reserved	bit14	Reserved
bit3	DI2	bit7	Reserved	bit11	Reserved	bit15	Reserved

Par. No.	Name	Range	Unit	Default
C16.61	Terminal VI Setting	0: 0~20mA 1: 0~10V		

View actual state of analog input VI.

Par. No.	Name	Range	Unit	Default
C16.62	Analog Input VI	0.00~20.00	V/mA	

View actual input voltage or current value on analog input VI.

Par. No.	Name	Range	Unit	Default
C16.63	Terminal AI Setting	0: 0~20mA 1: 0~10V		

View actual state of analog input AI.

Par. No.	Name	Range	Unit	Default
C16.64	Analog Input AI	0.00~20.00	V/mA	

View actual input voltage or current value on analog input AI.

Par. No.	Name	Range	Unit	Default
C16.65	Analog Output VO	0.00~20.00	V/mA	

View actual output voltage or current on analog output VO.

Par. No.	Name	Range	Unit	Default
C16.66	Digital Output	0~255		

View actual state of digital output, which indicates in a 4-bit binary code; If the digital output terminal is active, the corresponding position is set to "1", otherwise "0". Corresponding relationship between state of the digital output terminals and the binary code are as below:

Binary	bit3	bit2	bit1	bit0
Term. No.	Reserved	Reserved	DO2	DO1

Par. No.	Name	Range	Unit	Default
C16.68	Pulse Input DI4	0.00~100.00	kHz	

View input frequency on pulse input terminal DI4.

Par. No.	Name	Range	Unit	Default
C16.69	Pulse Output DO1	0.00~100.00	kHz	

View output frequency on pulse output terminal DO1.

Par. No.	Name	Range	Unit	Default
C16.71	Relay Output	0~65535		

View the output status of the relay, the corresponding bit is set to "1"when the relay output is active, otherwise it will be set to "0".

Binary	Bit1	Bit0
Item. No.	Relay 2	Relay 1

Par. No.	Name	Range	Unit	Default
C16.72	Counter A	0~65535		

View present value of counter A.

Par. No.	Name	Range	Unit	Default
C16.73	Counter B	0~65535		

View present value of counter B.

Par. No.	Name	Range	Unit	Default
C16.78	Analog Output AO	0.00~20.00	mA	

View actual output current on analog output AO.

C16.8* Field bus/FC Port

Par. No.	Name	Range	Unit	Default
C16.86	Communication Reference	-32768~32767		

View the last received reference from communication.

C16.9* Diagnosis Readouts

Par. No.	Name	Range	Unit	Default
C16.90	Alarm Word 1	0~0xFFFFFFFFUL		
C16.91	Alarm Word 2	0~0xFFFFFFFFUL		
C16.92	Warning Word 1	0~0xFFFFFFFFUL		
C16.93	Warning Word 2	0~0xFFFFFFFFUL		

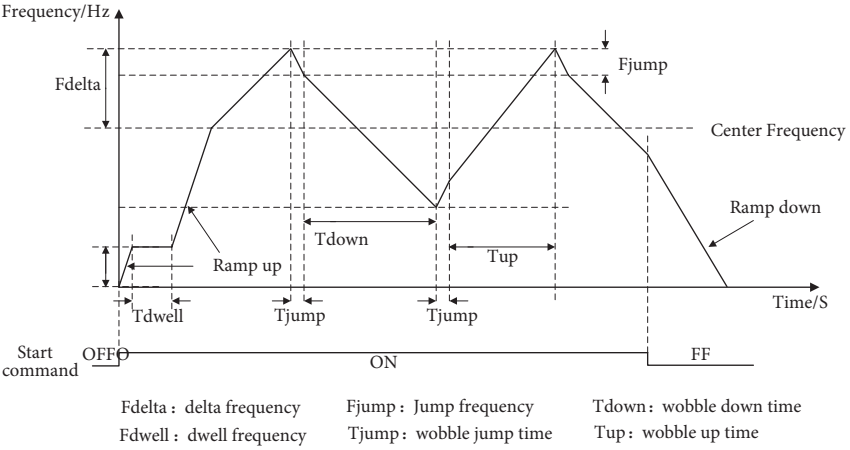
View the alarm/warning word sent via the serial communication port in hex code. Convert this parameter to a 32-bit binary code, definition of the bits in word showed in the table below, among which that reserved by manufacturers are undefined bits:

Bit	Alarm Word 1 C16.90	Alarm Word 2 C16.91	Warning Word 1 C16.92	Warning Word 2 C16.93
0	Brake Detect	Undefined	Undefined	Undefined
1	Power Card Over Temp.	Undefined	Power Card Over Temp.	Undefined
2	Earth Fault	Trip	Earth Fault	Undefined
3	Reserved	Option Part	Undefined	Undefined
4	Control Card Temp	Undefined	Control Card Temp	Undefined
5	Over Current	Undefined	Over Current	Undefined
6	Torque Limit	Undefined	Undefined	Undefined
7	Motor Over Thermal	Undefined	Motor Over Thermal	Undefined
8	Motor Over Thermal ETR	Damaged Part	Motor Over Thermal ETR	Damaged Part
9	Drive Overload	Undefined	Drive Overload	Undefined
10	Under Volt	Undefined	Under Volt.	Undefined
11	Over Volt	Undefined	Over Volt.	Undefined
12	Short Circuit	External Interlock	Undefined	Undefined
13	Undefined	Undefined	Undefined	Undefined
14	Mains Ph. Loss	Undefined	Mains Ph. Loss	Undefined
15	AMA Error	Undefined	No Motor	Undefined
16	Live Zero Error	Undefined	Live Zero Error	Undefined
17	Internal Fault	Undefined	Undefined	Undefined
18	Brake Overload	Fan Fault	Brake Overload	Fan Fault
19	U Phase Loss	Undefined	Undefined	Undefined
20	V Phase Loss	Undefined	Undefined	Undefined
21	W Phase Loss	Undefined	Undefined	Undefined
22	Undefined	Undefined	Undefined	Undefined
23	Control Voltage Fault	Undefined	Undefined	Undefined
24	Undefined	Undefined	Vdd Supply Low	Undefined
25	VDD Supply Low	Undefined	Current Limit	Undefined
26	Brake Resistor Error	Undefined	Undefined	Undefined

Bit	Alarm Word 1 C16.90	Alarm Word 2 C16.91	Warning Word 1 C16.92	Warning Word 2 C16.93
27	Brake Transistor Fault	Undefined	Undefined	Undefined
28	Bake Transistor Open Circuit	Undefined	Undefined	Undefined
29	Drive Initialize	Feedback Error	Undefined	Feedback Error
30	Undefined	Undefined	Overload DO1	Undefined
31	Mech. Brake Low	Undefined	Overload DO2	Undefined

6.14 Group 30: Wobble

Wobble function is generally divided into wobble cycle with fixed center frequency, wobble cycle with auto decreased center frequency and wobble random three ways. In any mode, we can set the delta, jump frequency, jump time, wobble start mode, wobble time, wobble stage store mode, dwell frequency and dwell time. In addition, there are two setting modes for delta, one is relative to center frequency, because center frequency can be set to Auto decrease, in this case, the delta is automatically reduced. The other is relative to motor speed high limit.



Fdelta：delta frequency　Fjump：Jump frequency　Tdown：wobble down time
Fdwell：dwell frequency　Tjump：wobble jump time　Tup：wobble up time

C30.0* Wobble Mode

Before wobble cycle starts, drive will ramp to center frequency(see C30.12) according to active ramp time if start command issued. During ramping, if dwell frequency (see C30.01) reached, ramp up stage will be interrupted and dirve will go to dwell stage. After dwell stage ended, drive will go back to ramp stage and continue to ramp to center frequency. After center frequency reached, drive will go to wobble cycle stage.

Par. No.	Name	Range	Unit	Default
C30.00	Wobble Start Mode	0: Auto 1: Manual		0

0: Auto, dirve must stay at dwell stage for a period of dwell time if no wobble cycle start command, but if wobble cycle start command occurs (lantched input type can be accepted also), dwell stage will end. In auto mode, there are running on center frequency and running on dwell frequency two ways to select for wobble reset;

1: Manual, dwell stage will end when wobble cycle start command issued, and if wobble cycle start command disappeared, drive will ramp to dwell stage and wait for wobble cycle start command to end dwell stage. In manul mode, only running on center frequency can be achieved.

Par. No.	Name	Range	Unit	Default
C30.01	Dwell Frequency	0.000-200.000	Hz	0.000

During dwell stage, the drive will run on this frequency until wobble cycle start command issued or dwell time has been used up.

Par. No.	Name	Range	Unit	Default
C30.02	Dwell Time	0.0~3600.0	s	0.0

When wobble start mode selecte [0] Auto (C30.00=0), the drive runs on dwell frequency (C30.01=0) in the period of the time set in this parameter.

C30.1* Wobble Cycle

Par. No.	Name	Range	Unit	Default
C30.10	Centre Frequency Rate	0.000~30.000	Hz	0.500

When Center Frequency Mode select [1] Auto Dcrease (C30.12=1), this parameter used to set the decrease rate for center frequency. And the center frequency can be defined via analog input, preset reference or local bus.

Par. No.	Name	Range	Unit	Default
C30.11	Centre Frequency Low Limit	0.000~200.000	Hz	10.000

When Center Frequency Mode select [1] Auto Dcrease (C30.12=1), this parameter used to set the low limit of the center frequency.

Par. No.	Name	Range	Unit	Default
C30.12	Centre Frequency Mode	0: Fixed 1: Auto decrease		0

0: Fixed, center frequency is unchangable;

1: Auto decrease, center frequency will decrease by the C30.10 Center Frequency Decreasing Rate untill C30.11 Center Frequency Low Limit reached. When decreasing, there is no transition process, the drive runs directly under the new frequency;

Par. No.	Name	Range	Unit	Default
C30.13	Delta Frequency Mode	0: Relative to speed high 1: Relative to centre frequency		0

0: Relative to speed high, fdelta = C30.14 * Motor Speed High Limit / 100;

1: Relative to centre frequency, fdelta = C30.14 * Center Frequency / 100;

Par. No.	Name	Range	Unit	Default
C30.14	Delta Frequency Percentage	0~100	%	0

Enter the value of the Delta Frequency Percentage.

Par. No.	Name	Range	Unit	Default
C30.15	Jump Frequency Percentage	0~100	%	0

Enter value of the Jump Frequency Percentage.

The jump frequency fjump = fdelta * C30.15

Par. No.	Name	Range	Unit	Default
C30.16	Wobble Up Time	1.0~1000.0	s	10.0

During the wobble cycle, this parameter used to set the time within which the drive ramps up to the wobble up (fcenter + fdelta).

Par. No.	Name	Range	Unit	Default
C30.17	Wobble Jump Time	1~50	ms	1

Set the jump time within which the drive ramps down by Jump Frequency.

Par. No.	Name	Range	Unit	Default
C30.18	Wobble Down Time	1.0~1000.0	s	10.0

During the wobble cycle, this parameter used to set the time within which the drive ramps down to wobble down reference (fcenter - fdelta).

C30.2* Wobble Random

Par. No.	Name	Range	Unit	Default
C30.20	Random Function Mode	0: Disable 1: Enable		0

0: Disable, wobble up time and wobble down time are not randomized;

1: Enable, the actual wobble up time (Tup) and wobble down time (Tdown)will be fluctuated by a random value in the way below:

Tup = Tup + frandom * min(Tup, Tdown) / 100;

Tdown = Tdown - frandom * min(Tup, Tdown) / 100;

Frandom is a random value between maximum randomized wobble ratio and minimum randomized wobble ratio.

Par. No.	Name	Range	Unit	Default
C30.21	Max. Random Ratio	-20~20	%	10
C30.22	Min. Random Ratio	-20~20	%	-10

These parameters determine the maximum/minimum wobble ratio which the random function is allowed to choose.

C30.3* Wobble Process Control

Par. No.	Name	Range	Unit	Default
C30.30	Wobble Length Source	0: Digital input 8: Pulse input		0

This parameter is used to select wobble length source.

0: Digital input, counter A is used as count source;

8: Pulse input, pulse input is used as count source;

Par. No.	Name	Range	Unit	Default
C30.31	Count Per Meter	0.01~600.00		1.00

This parameter is used to select wobble length source.

Wobble Length = (Digital input or Pulse input) * Count Per Meter

Par. No.	Name	Range	Unit	Default
C30.32	Length Setting	0.000~60.000	km	10.000

When wobble length reaches to the value set in this parameter, Action at Length Reached become active.

Par. No.	Name	Range	Unit	Default
C30.33	Action at Length Reached	0: No action 1: Stop		0

If setting length reached, one of the selections in this parameter will be operated.

Par. No.	Name	Range	Unit	Default
C30.38	Wobble Restore Mode	0: Dcentre stage 1: Dwell stage		0

When Auto is selected as Wobble cycle start mode (C30.00=0), if option [0] is selected, drive will ramp to centre frequency according to active ramp time if wobble restore command is active; If option [1] is selected, drive will ramp to dwell frequency according to active ramp time if wobble restore command is active; When Manual is selected as wobble cycle start mode (C30.00=1), if wobble restore command is active, drive will ramp to centre frequency according to active ramp time.

Par. No.	Name	Range	Unit	Default
C30.39	Wobble Stage Store	0: Disable 1: Power down and stop save 2: Power down save 3: Stop save		0

This parameter is used to select in which way the wobble function saves the information.

6.15 Group 39: Communication User-Defined Par.

Par. No.	Name	Range	Unit	Default
C39.00	Communication User-Defined Par. 0	0~9999		310
C39.01	Communication User-Defined Par. 1	0~9999		310
C39.02	Communication User-Defined Par. 2	0~9999		310
C39.03	Communication User-Defined Par. 3	0~9999		310
C39.04	Communication User-Defined Par. 4	0~9999		310
C39.05	Communication User-Defined Par. 5	0~9999		310
C39.06	Communication User-Defined Par. 6	0~9999		310
C39.07	Communication User-Defined Par. 7	0~9999		310

Par. No.	Name	Range	Unit	Default
C39.08	Communication User-Defined Par. 8	0~9999		310
C39.09	Communication User-Defined Par. 9	0~9999		310
C39.10	Communication User-Defined Par. 10	0~9999		310
C39.11	Communication User-Defined Par. 11	0~9999		310
C39.12	Communication User-Defined Par. 12	0~9999		310
C39.13	Communication User-Defined Par. 13	0~9999		310
C39.14	Communication User-Defined Par. 14	0~9999		310
C39.15	Communication User-Defined Par. 15	0~9999		310
C39.16	Communication User-Defined Par. 16	0~9999		0
C39.17	Communication User-Defined Par. 17	0~9999		0
C39.18	Communication User-Defined Par. 18	0~9999		0
C39.19	Communication User-Defined Par. 19	0~9999		0
C39.20	Communication User-Defined Par. 20	0~9999		0
C39.21	Communication User-Defined Par. 21	0~9999		0
C39.22	Communication User-Defined Par. 22	0~9999		0
C39.23	Communication User-Defined Par. 23	0~9999		0
C39.24	Communication User-Defined Par. 24	0~9999		0

Par. No.	Name	Range	Unit	Default
C39.25	Communication User-Defined Par. 25	0~9999		0
C39.26	Communication User-Defined Par. 26	0~9999		0
C39.27	Communication User-Defined Par. 27	0~9999		0
C39.28	Communication User-Defined Par. 28	0~9999		0
C39.29	Communication User-Defined Par. 29	0~9999		0
C39.30	Communication User-Defined Par. 30	0~9999		0
C39.31	Communication User-Defined Par. 31	0~9999		0
C39.32	Communication User-Defined Par. 32	0~9999		0
C39.33	Communication User-Defined Par. 33	0~9999		0
C39.34	Communication User-Defined Par. 34	0~9999		0
C39.35	Communication User-Defined Par. 35	0~9999		0
C39.50	Communication User-Defined Par. 0 index	0~9999		0
C39.51	Communication User-Defined Par. 1 index	0~9999		1
C39.52	Communication User-Defined Par. 2 index	0~9999		2
C39.53	Communication User-Defined Par. 3 index	0~9999		3
C39.54	Communication User-Defined Par. 4 index	0~9999		4
C39.55	Communication User-Defined Par. 5 index	0~9999		5

Par. No.	Name	Range	Unit	Default
C39.56	Communication User-Defined Par. 6 index	0~9999		6
C39.57	Communication User-Defined Par. 7 index	0~9999		7
C39.58	Communication User-Defined Par. 8 index	0~9999		8
C39.59	Communication User-Defined Par. 9 index	0~9999		9
C39.60	Communication User-Defined Par. 10 index	0~9999		10
C39.61	Communication User-Defined Par. 11 index	0~9999		11
C39.62	Communication User-Defined Par. 12 index	0~9999		12
C39.63	Communication User-Defined Par. 13 index	0~9999		13
C39.64	Communication User-Defined Par. 14 index	0~9999		14
C39.65	Communication User-Defined Par. 15 index	0~9999		15
C39.66	Communication User-Defined Par. 16 index	0~9999		0
C39.67	Communication User-Defined Par. 17 index	0~9999		0
C39.68	Communication User-Defined Par. 18 index	0~9999		0
C39.69	Communication User-Defined Par. 19 index	0~9999		0
C39.70	Communication User-Defined Par. 20 index	0~9999		0
C39.71	Communication User-Defined Par. 21 index	0~9999		0
C39.72	Communication User-Defined Par. 22 index	0~9999		0

Par. No.	Name	Range	Unit	Default
C39.73	Communication User-Defined Par. 23 index	0~9999		0
C39.74	Communication User-Defined Par. 24 index	0~9999		0
C39.75	Communication User-Defined Par. 25 index	0~9999		0
C39.76	Communication User-Defined Par. 26 index	0~9999		0
C39.77	Communication User-Defined Par. 27 index	0~9999		0
C39.78	Communication User-Defined Par. 28 index	0~9999		0
C39.79	Communication User-Defined Par. 29 index	0~9999		0
C39.80	Communication User-Defined Par. 30 index	0~9999		0
C39.81	Communication User-Defined Par. 31 index	0~9999		0
C39.82	Communication User-Defined Par. 32 index	0~9999		0
C39.83	Communication User-Defined Par. 33 index	0~9999		0
C39.84	Communication User-Defined Par. 34 index	0~9999		0
C39.85	Communication User-Defined Par. 35 index	0~9999		0

Chapter 7 Quick Application Guide

7.1 Using LCP to Start/Stop the Drive

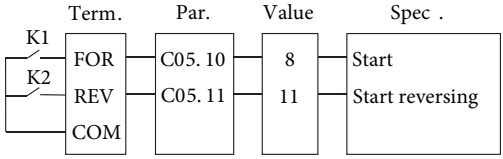
1. Press "HAND" key on LCP to start the drive;
2. Turn the potentiometer to change output frequency;
3. Press "OFF" key on LCP to stop the drive;

7.2 Using Digital Input Terminals to Start/Stop the Drive

Usually there are four mode for using digital input terminals to start/stop the drive. No matter what mode, press "AUTO" key on LCP first.

7.2.1 Two-line Mode 1

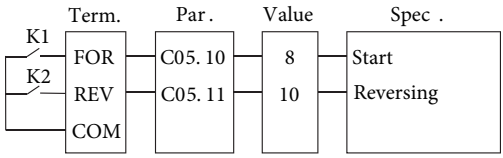
It is the most commonly used two-line mode, in which the forward/reverse rotation of the motor is decided by FOR and REV. Wiring and parameters are set as below:



K1	K2	Command
OFF	OFF	Stop
ON	OFF	Run forward
OFF	ON	Run reverse
ON	ON	Stop

7.2.2 Two-line Mode 2

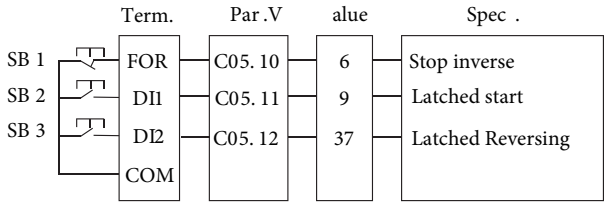
In this mode, FOR is run enabled terminal, and REV determines the running direction. Wiring and parameters are set as below:



K1	K2	Command
OFF	OFF	Stop
ON	OFF	Run forward
OFF	ON	Stop
ON	ON	Run reverse

7.2.3 Three-line Mode 1

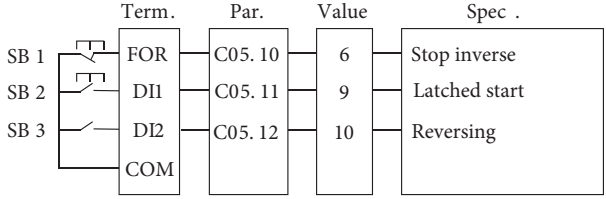
In this mode, FOR is run enabled terminal, and the direction is decided by DI1 and DI2. Wiring and parameters are set as below:



SB1	SB2	SB3	Command
OFF	×	×	Stop
ON	⎍	×	Run forward
ON	×	⎍	Run reverse

7.2.4 Three-line Mode 2

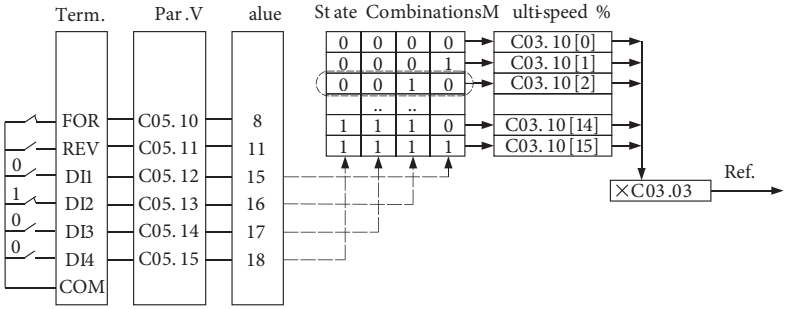
In this mode, FOR is run enabled terminal. The RUN command is given by DI1 and the direction is decided by DI2. Wiring and parameters are set as below:



SB1	SB2	SB3	Command
OFF	×	×	Stop
ON	⎍	OFF	Run forward
ON	⎍	ON	Run reverse

7.3 Multi-speed

In scenarios where the running frequency of the drive need not be adjusted continuously and only several frequencies are required, the multi-speed control can be used. The drive supports a maximum of 16 running frequencies in each set-up, which are implemented by state combinations of four DI terminals. Set the parameter number corresponding to DI terminals to a value among 15 to 18 (Preset ref. bit 0~3), and then the DI terminals are specified as the multi-frequency input terminals. The multiple frequencies are set based on the multi-frequency table in group FC. In addition, you need to set C03.03 (Maximum Reference). The following figure shows how to set the multi-speed function.

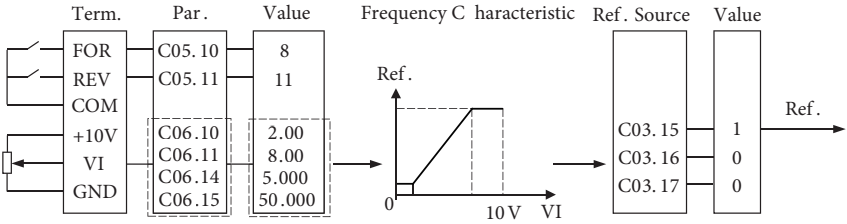


In the preceding figure, FOR, REV are set as two-line mode 1, DI1, DI2, DI3 and DI4 are used as the multi-frequency input terminals, each of which has a bit value. The state combinations of these terminals correspond to multiple frequencies, When (DI4, DI3, DI2, DI1) = (0, 0, 1, 0), the state combination value is 2, corresponding to the value set in C03.10[2]. The target running frequency is automatically calculated by C03.10[2] x C03.03.

The drive supports a maximum of four DI terminals to be used as the multi-frequency input terminals. You can also use less than four DI terminals, and the empty bit is considered to be 0.

7.4 Analog Input as the Frequency Source

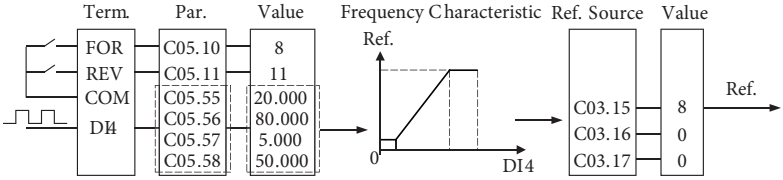
The VI/AI terminals can be used as the frequency source. The following figure shows how to use the VI as the frequency source.



Attention: Parameters and theirs value in dash box should be set according to the application.

7.5 Pulse Input as the Frequency Source

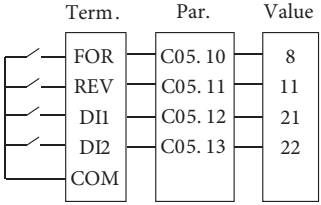
The DI4 terminal can be used as pulse input. The following figure shows how to use the pulse input as the frequency source.

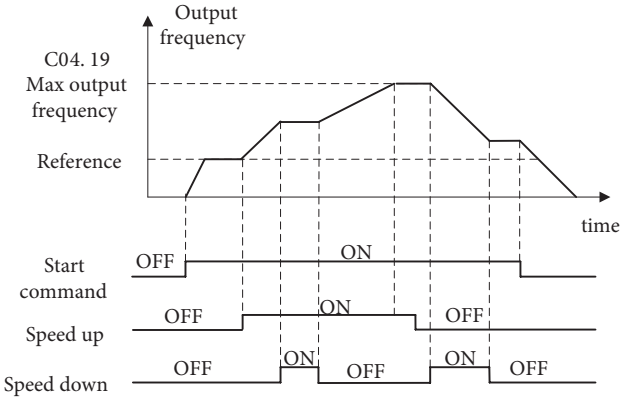


Attention: Parameters and theirs value in dash box should be set according to the application.

7.6 Speed up/down

When you need speed fine tuning at a fixed value, you can use the speed up/down via terminals. The following figures show how to use the function:





7.7 Parameter Initialization

1. Set C14.22 = 2;
2. Cut off the main power and Re-power on, LCP displays “E.80”;
3. Press “OFF” key on LCP;

7.8 Automatic Motor Adaption (AMA)

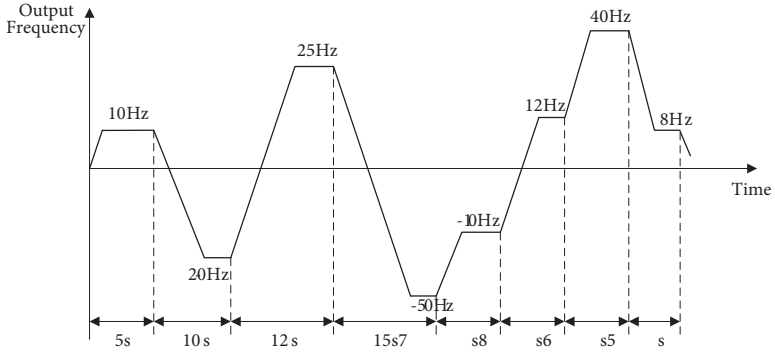
1. Reboot the drive;
2. Enter motor nameplate data to C01.20 to C01.25;
3. Choose option [2] in C01.29 to enable AMA;
4. LCP displays "PUSH", "HAND", press "HAND" key on LCP, "-AT-" will be displayed;
5. Wait for the LCP displays "PUSH", "ENT", press " ◎ " key, AMA complet.

Note: AMA doesn't fit for rotate motor. Measurements are stored in C01.30, C01.33, and C01.35

7.9 Simple PLC

7.9.1 Order Execution

Use order execution to achieve Eight-speed Internal Control Function. For example, to achieve the function of 10Hz runs for 5s, -20Hz runs for 10s, 25Hz runs for 12s, -50Hz runs for 15s, -10Hz runs for 7s, 12Hz runs for 8s, 40Hz runs for 6s, 8Hz runs for 5s, the following figure is the frequency curve:



Parameters setting:

Parameter	Value	Function	Parameter	Value	Function
C03.10[0]	20	Preset reference 0	C13.20[0]	5	Timer 0
C03.10[1]	-40	Preset reference 1	C13.20[1]	10	Timer 1
C03.10[2]	50	Preset reference 2	C13.20[2]	12	Timer 2
C03.10[3]	-100	Preset reference 3	C13.20[3]	12	Timer 3
C03.10[4]	-20	Preset reference 4	C13.20[4]	15	Timer 4
C03.10[5]	24	Preset reference 5	C13.20[5]	7	Timer 5
C03.10[6]	80	Preset reference 6	C13.20[6]	6	Timer 6
C03.10[7]	16	Preset reference 7	C13.20[7]	5	Timer 7

Parameter	Value	Function	Parameter	Value	Function
C13.00	1	Order Execution	C03.00	1	-max~+max
C13.51[0]	39	Start Command	C13.52[0]	29	Start timer 0
C13.51[1]			C13.52[1]	10	Select preset ref. 0
C13.51[2]	30	Simple PLC Time-out 0	C13.52[2]	30	Start timer 1
C13.51[3]			C13.52[3]	11	Select preset ref. 1
C13.51[4]	31	Simple PLC Time-out 1	C13.52[4]	31	Start timer 2
C13.51[5]			C13.52[5]	12	Select preset ref. 2
C13.51[6]	32	Simple PLC Time-out 2	C13.52[6]	65	Start timer 3
C13.51[7]			C13.52[7]	13	Select preset ref. 3
C13.51[8]	50	Simple PLC Time-out 3	C13.52[8]	66	Select Ramp 4
C13.51[9]			C13.52[9]	14	Start timer 4
C13.51[10]	51	Simple PLC Time-out 4	C13.52[10]	67	Select preset ref. 4
C13.51[11]			C13.52[11]	15	Start timer 5
C13.51[12]	52	Simple PLC Time-out 5	C13.52[12]	68	Select preset ref. 5
C13.51[13]			C13.52[13]	16	Start timer 6
C13.51[14]	53	Simple PLC Time-out 6	C13.52[14]	69	Select preset ref. 6
C13.51[15]			C13.52[15]	17	Start timer 7
C13.51[16]	54	Simple PLC Time-out 7	C13.52[16]	1	No Action
If C13.52[16] is set to [24] stop, the internal control eight-speed will perform only one time, not cycles.					

Chapter 8 Faults and Solutions

8.1 Fault List

The drive has three different fault types: warning, alarm and error. When a fault happens, the drive shows a specific code to indicate it.

When a warning happens, it means that the drive is close to its design limits for some reason, but the drive still works. If the drive fault disappear, the warning will also disappear. When a warning happens, LCP displays "A.XX" (XX is warning code).

An alarm means that the drive has exceeded its design limits for some reason. When this happens, the drive will trip. The driver must be reset in order to re-run. When an alarm happens, LCP displays "E.XX" (XX is alarm code).

When some alarms happen, the drive will lock itself. These alarms are called trip-lock alarm. The Trip-lock alarm offers additional protection, the default setting is that the main power should be cut off before resetting the alarm. But by setting parameter C14.23 = 0, the trip-lock alarm can be reset without cutting the main power off. But there is a risk of accident when choosing this function. Before using this function, it is important to be familiar with the drive and the whole system in order to be safe when dealing with the drive.

Error means the drive is in a state and unable to carry out an operation. When an error happens, LCP display "Er.XX" (XX is error code).

Warning	Alarm	Error	Fault Description	Reason analysis
A.02	E.02		Live Zero Error	Please refer to C06.0 Live Zero Timeout Time.
A.03	E.03		Motor Loss	1. Motor cable connection problems; 2. The drive power is greater than the motor power;
A.04	E.04*		Mains Phase Loss	1. Missing phase on supply side; 2. Too high voltage imbalance.
A.07	E.07		Over Voltage	1. The input voltage is too high; 2. An external force drives the motor during acceleration or deceleration; 3. The deceleration time is too short; 4. The braking unit and braking resistor are not installed.
A.08	E.08		Under Voltage	1. Instantaneous power failure occurs on the input power supply; 2. The drive's input voltage is not within the allowable range; 3. The rectifier bridge and buffer resistor are faulty.

Warning	Alarm	Error	Fault Description	Reason analysis
A.09	E.09		Drive Overload	1. The load is too heavy or lockedrotor occurs on the motor; 2. The drive model is of too small power class; 3. C01.** is set improperly.
A.10	E.10		Motor Overload	1. C01.24 is set improperly; 2. The load is too heavy or lockedrotor occurs on the motor; 3. The drive model is of too small power class; 4. C01.** is set improperly.
	E.11		Motor Over Temperature	Thermistor damage, uncorrectly installed or motor cooling equipment failure.
A.12	E.12*		Torque Limit	Torque exceeds the max. torque limit.
A.13	E.13*		Over Current	1. The acceleration time is too short; 2. Manual torque boost or V/F curve is not appropriate; 3. The input voltage is too low; 4. The startup operation is performed on the rotating motor; 5. A sudden load is added during acceleration/deceleration; 6. The drive model is of too small power class.
A.14	E.14*		Earth fault	Discharge from output phases to ground (22kW and below)
	E.16*		Short Circuit	Short circuit in motor or on motor terminals.
A.17	E.17		Control Word Timeout	Drive communication timeout, this alarm occurrs when C08.04 is set to 1 or 5.
A.24	E.24		Fan Fault	Too much dust on the fan or the fan is aging.
	E.25*		Brake resistor short-circuit	Brake resistor is short circuit, leading the brake function invalid.
	E.27		Brake transisitor short-circuit	Brake transistor is short circuit leading brake function invalid.
	E.28		Brake Detect	Brake resistor is not connected or working.
	E.30*		Motor phase U missing	Check the phase and motor.

Warning	Alarm	Error	Fault Description	Reason analysis
	E.31*		Motor phase V missing	Check the phase and motor.
	E.32*		Motor phase W missing	Check the phase and motor.
	E.38*		Internal Fault	Contact the local distributor or Holip Company.
	E.44*		Earth Fault	Discharge from output phases to ground (22KW or more).
	E.47*		24V Power Card Fault	24V voltage power card failure
	E.51		AMA check Unom and Inom	Motor voltage and motor current error setting.
	E.52		AMA Low Inom	Motor current is too low,check the settings.
	E.53		AMA Motor is too large	Motor configuration is too large to perform AMA.
	E.54		AMA Motor is too small	Motor configuration is too small , unable to perform AMA.
	E.55		AMA Paremeter Error	Motor parameter is out of the range
	E.56		AMA Interrupt	Interrupted by the user when running AMA.
	E.57		AMA Time-out	AMA takes too long to run.
A.58	E.58		AMA Internal Error	Contact Local distributor or Holip Company.
A.59			Current Limit	Current exceeds value set in C04.18.
	E.63		Mechenical Brake Current Low	Actual motor current can not exceeds release brake current set in C02.20 within start delay time.
A.69	E.69*		IGBT Over Temperature	1. The ambient temperature is too high; 2. The air filter is blocked; 3. The fan is damaged; 4. The thermally sensitive resistor of the IGBT is damaged; 5. The drive IGBT is damaged.
A.74	E.74		Rectifier Temperature Sensor Error	Rectifier Temperature Sensor Error

Warning	Alarm	Error	Fault Description	Reason analysis
A.75	E.75		Rectifier Temperature High	1. The ambient temperature is too high; 2. The air filter is blocked; 3. The fan is damaged.
A.76	E.76		IGBT Temperature Sensor Error U	IGBT Temperature Sensor Error U
A.77	E.77		IGBT Temperature Sensor Error V	IGBT Temperature Sensor Error V
A.78	E.78		IGBT Temperature Sensor Error W	IGBT Temperature Sensor Error W
	E.80		Parameter Initialization	Make parameter initialized.
	E.83		Power Board Over Temperature	1. The ambient temperature is too high; 2. The air filter is blocked; 3. The fan is damaged.
	E.88*		24V Power Card Fault	24V Power Card Fault
		Er.84	LCP Connection with the drive failed	No communication between LCP and the drive.
		Er.85	Button is disabled	Refer to parameter group C00.4*.
		Er.89	Parameter read-only	Try to write read-only parameter.
		Er.91	Parameter value is invalid in this mode	Invalid parameter value to write.
		Err	Unchangbale	Parameter is freezed or can't be changed during running.

Note: Trip-lock alarm is with *.

Chapter 9 Maintenance

9.1 Note

Confirm the main circuit power supply has been turned off, and the display has disappeared before carry out inspection and maintenance. Make sure the system is in dynamic state, please pay attention to the following:

- Check whether the power supply voltage matches to the rated voltage of the drive;
- Check whether the motor makes unexpected noises or abnormal vibration when running;
- Check whether there are abnormal heating;
- Check whether the drive output voltage, output current, output frequency, and monitor display is greater than the value commonly used.
- Check whether the cooling fan installed at the lower part of the drive runs normally;
- Check whether the ambient temperature is too high and whether there is dust, iron filings, corrosive fluid in the drive;
- Check whether the ambient temperature of the drive is between -10℃ ~40℃ , and whether the humidity is between 5%-85% (95% is without condensation), phenomenon of water droplets is not allowed;
- The drive should be discarded as industrial waste. It is forbidden to burn it;

9.2 Storage and Transport

The drive must be kept in its original package box before installation. Pay attention to the followings when keeping it in storage if the drive is not used for the time being:

- It must be stored in a dry place without rubbish or dust;
- The suitable temperature for storage is between -25℃ ~65℃ ;
- The relative humidity required is 5%~95% without condensation;
- There is no corrosive gas or liquid in the storage ambience;
- It is better to lay the drive on a rack and keep it in a proper package;
- The ambient temperature for transport is between -25℃ ~70℃ ;
- The relative humidity of transport ambience must be less than 95% (Ambient temperature is 40℃).

Attention: It is better not to store the drive for long time. Long time storage of the drive will lead to the deterioration of electrolytic capacity. If it needs to be stored for a long time make sure to power it up one time within a year and the power-up time should be at least above five hours. When powering up, supply voltage must be increased slowly with a voltage regulator to the rated voltage value.

Appendix A Modbus Communication Specification

The drive provide RS485 communication interface. It adopts international standard Modbus communication protocol to perform master-slave communication. The user can realize centralized control through PC/PLC to adapt specific application requirements.

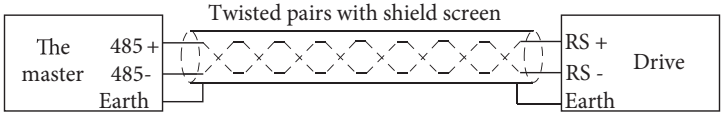
1. Application Mode

1.1 Interface Mode

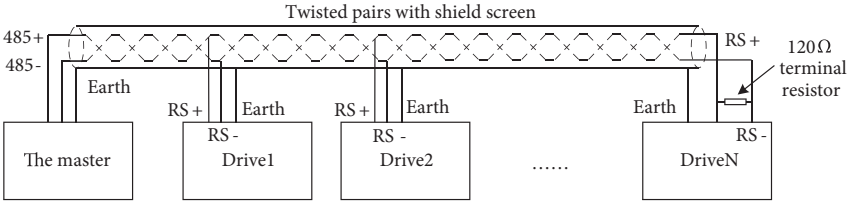
The communication interface is RS485. RS485 works on semiduplex and its data signal applies differential transmission which is called balance transmission too.

1.2 Networking Mode

The drive has two networking modes: single master/multiple slaves networking and single master/single slave networking.



Single master/single slave networking diagram



Single master/multiple slaves networking diagram

Specification:

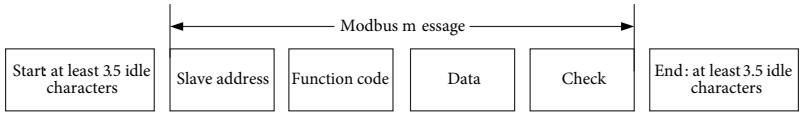
1. No matter which mode, the drive is used as a slave in communication. When master sends commands using broadcast address, the slave does not respond;
2. It is recommended to use shield cables in multiple connection. The basic parameter of the devices, such as baud rate and digital check bit in RS485 should be the same as slave device's and there should be no repeated addresses in slave devices.

2. Protocol Format

Modbus protocol supports both RTU and ASCII mode.

2.1 RTU Mode

RTU data frame format is shown as the figure below:

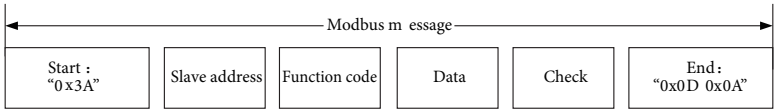


Specification:

Start	at least 3.5 idle characters
Slave address	Address: 0-247 (0 is broadcast address)
Function code	Modbus function code
Data (N-1)	2 * N data
Data (N-2)	
…	
Data 0	
CRC CHK high-8-bit	CRC check
CRC CHK low-8-bit	
End	at least 3.5 idle characters

2.2 ASCII Mode

ASCII data frame format is shown as the figure below:



Specification:

1. Frame header is "0x3A" while the default frame end is "0x0D" "0x0A";
2. In ASCII mode, all data bytes other than frame header and end are sent in the form of ASCII code; high-4-bit byte and low-4-bit byte are sent successively;
3. In ASCII mode, the data is 7-bit long. For 'A'~'F', their uppercase ASCII codes are used;
4. Data is subjected to LRC check which covers the information portion from slave address to data;

3. Function Code

Function code supported by the drive Modbus protocol are as shown in the table below:

Function code	Description	Meaning
0x03	Read Holding Registers	Read drive functional parameters and running status parameters
0x06	Preset Single Register	Over-write individual drive functional parameters
0x10	Preset Multiple Regs	Over-write multiple drive functional parameters

4. Register Address Definition

All the following register addresses are started from 0.

4.1 The Rules of Register Address of the Parameter Number

The parameters can be mapping to register address. The rules of register address of the parameter number are shown below:

$$\text{Register address} = \text{PNU} \times 10 - 1$$

For example:

The register address of C03.03 is 303 × 10 - 1 = 3029 (0x0BD5)

The register address of C16.13 is 1613 × 10 - 1 = 16129 (0x3F01)

4.2 Other Register Addresses Specification

In addition to parameter number is mapped to Modbus registers, there are some additional registers within the drive which can be used to control the drive, monitor the drive's status.

Register address	Specification	R/W
6	The internal error code of last communication error	R
7	Register address of last occurred communication error	R
8*	Parameter index	R,W
51000*	Control command	W
51001*	Frequency command	W
51002*	Communication reference	W
51100*	State	R
51101*	Warning/Alarm code	R
51102	Output frequency (0~Fmax, unit: 0.1Hz)	R
51103	Output current (unit: 0.01A)	R
51104	Output voltage (unit: 1V)	R
51105	Output power (unit: 0.01kW)	R
51106	Motor speed (unit: 1rpm)	R
51107	DC bus voltage (unit: 1V)	R
51108	Reference	R
51109	Feedback	R

* Reg. 8 specification

Reg 8 is parameter index register. The drive has some array type parameters. When accessing these parameters, it should be set index first.

For example, write value into C03.10[2]. It should write 2 into Reg 8 first, then write value into 3099 (the register address of C03.10 is 310 × 10-1=3099, hexadecimal is 0x0C1B).

* Reg. 51000 specification

Bit	Explain
Bit 0	0B: None 1B: Warning
Bit 1	0B: None 1B: Alarm
Bit 3~2	00B: Stop 01B: Run forward 10B: Reverse 11B: Reserved
Bit 7~4	Reserved
Bit 11~8	0000B: Using master speed 0001B: Using 1st step speed 0010B: Using 2nd step speed 0011B: Using 3rd step speed … 1111B: Using 15th step speed
Bit 15~12	Reserved

* Reg. 51101 specification

Register 51101 is used to store the drive fault information, it has two warning/alarm modes (selected by C08.29).

Bit	Explain
Bit mode Bit 15~0	Warning bit: Bit0: Mains Phase Loss (A.04) Bit1: Over Voltage (A.07) Bit2: Under Voltage (A.08) Bit3: Drive Overload (A.09) Bit4: Over Current (A.13) Bit5: Fan Fault (A.24) Bit6: Current Limit (A.59) Bit7~15: Reserved Alarm bit: Bit0: Internal Fault (E.38) Bit1: Over Current (E.13) Bit2: Earth fault (E.14) Bit3: Short Circuit (E.16) Bit4: Mains Phase Loss (E.04) Bit5: Drive Overload (E.09) Bit6: Drive Over Temperature (E.69/E.75/E.83) Bit7: Motor Phase Missing (E.30/E.31/E.32) Bit8~15: Reserved
Code mode Bit 15~0	Warning/Alarm code For example: When the drive occurs E.13 alarm, the value of register 51101 is 13.

5. Communication ratio values

The Communication data is expressed by hexadecimal in actual application and there is no radix point in hexadecimal. For example, If you want to set C03.10[0] = 60.34, 60.34 can be magnified by 100 times into 6034. So hex 0x1792 (6034) can be used to express 60.34.

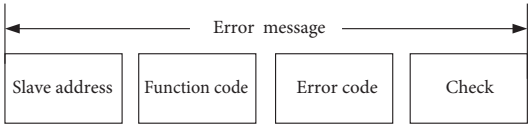
A non-integer can be timed by a multiple to get an integer and the integer can be called communication ratio values.

The communication ratio values are refered to the radix point of the setting range of default value in the functional parameter list. If there are radix point n, then the communication ratio value m is 10^n.

6. Error message

There may be errors in the communication process, for example, some parameters are read-only, but the PC/PLC sends a written directive, the drive will return an error message.

Error message data frame format is shown as the figure below:



Error message function code = requirements function code + 0x80

Error code	Specification
0x01	Function code error, the drive does not support this kind of function code.
0x02	Defined parameters can not be written.
0x03	The value exceeds the upper limit of the parameter
0x04	Operation error.

7. Examples

7.1 Read Holding Registers (0x03)

7.1.1 Read Output Frequency

Read the Reg. 51102 to get the output frequency.

Transmit: 01 03 C7 9E 00 01 D8 90 (Hexadecimal)

Receive: 01 03 02 01 F4 B8 53 (Hexadecimal)

Transmit data specification:

Field	Description
01	Address
03	Function
C7 9E	Register address: 51102 (0xC79E)
00 01	The number of read registers is 1
D8 90	CRC check

Receive data specification:

Field	Description
Field	Description
01	Address
03	Function
02	The byte number of received data
01 F4	0x01F4 converts to decimal number is 500. So the value of Reg. 51102 is 500 / 10= 50.0
B8 53	CRC check

Read the value of C16.13 to get the output frequency.

Transmit: 01 03 3F 01 00 02 99 DF (Hexadecimal)

Receive: 01 03 04 00 00 01 F4 FA 24 (Hexadecimal)

Transmit data specification:

Field	Description
01	Address
03	Function
3F 01	Register address (ADDRH ADDRL). The register address of C16.13 is 1613*10-1=16129 (0x3F01)
00 02	The number of read registers is 2
99 DF	CRC check

Receive data specification:

Field	Description
01	Address
03	Function
04	The byte number of received data
00 00 01 F4	0x000001F4 converts to decimal number is 500. So the value of C16.13 is 500 / 10 = 50.0
FA 24	CRC check

Note: The data type of C16.13 is UINT32, so it needs read 2 registers.

7.1.2 Read Drive Status

Read the Reg. 51100 and 51101 to get the drive status.

Transmit: 01 03 C7 9C 00 02 39 51 (Hexadecimal)

Receive: 01 03 00 02 00 0D 25 CF (Hexadecimal)

Transmit data specification:

Field	Description
01	Address
03	Function
C7 9C	Register address: 51100 (0xC79C)
00 02	The number of read registers is 2
39 51	CRC check

Receive data specification:

Field	Description
01	Address
03	Function
04	The byte number of received data
00 02 00 0D	The value of Reg. 51100 is 0x0002. Note: Bit 0 is 0B, that is No warning; Bit 1 is 1B, that is Alarm; Bit 3~2 is 00B, that is Stop; Bit 11~8 is 0000B, that is Using master speed; The value of Reg. 51101 is 0x000D (13). The drive has E.13 over current alarm.
25 CF	CRC check

7.2 Write Single Register (0x06)

7.2.1 Control the drive running at 1st step speed.

Write 51000 to control the drive.

Transmit: 01 06 C7 38 81 01 94 E3 (Hexadecimal)

Receive: 01 06 C7 38 81 01 94 E3 (Hexadecimal)

Transmit data specification:

Field	Description
01	Address
06	Function
C7 38	Register address: 51000 (0xC738)
81 01	Control command is 0x8101. Note: Bit 7~0 is 0x01, that is Run forward; Bit 11~8 is 0001B, that is Using 1st step speed C03.10[1]; Bit 13~12 is 00B, that is Using ramp 1; Bit 15 is 1B, that is Enable bit 13~8;
94 E3	CRC check

Receive data specification:

Field	Description
01	Address
06	Function
C7 38	Register address: 51000 (0xC738)
81 01	Control command
94 E3	CRC check

7.2.2 Set parameter C03.10[0]

Set C03.10[0] to 40.00%

Transmit: 01 06 0C 1B 0F A0 FF 15 (Hexadecimal)

Receive: 01 06 0C 1B 0F A0 FF 15 (Hexadecimal)

Transmit data specification:

Field	Description
01	Address
06	Function
0C 1B	The register address of C03.10 is 310 *10-1=3099 (0x0C1B) .
0F A0	The value which will be written into C03.10[0] is 40.00% (Decimal: 4000, Hexadecimal: 0x0FA0).
FF 15	CRC check

Receive data specification:

Field	Description
01	Address
06	Function
0C 1B	Register address
0F A0	The value which has be written into C03.10[0] is 40.00% (Decimal: 4000, Hexadecimal: 0x0FA0).
FF 15	CRC check

7.3 Write Multiple Registers (0x10)

Start the drive and set Drive output frequency.

Write register 51000 to control the drive running and write register 51001 to set the drive output frequency.

Transmit: 01 10 C7 38 00 02 04 00 01 13 88 DB BE (Hexadecimal)

Receive: 01 10 C7 38 00 02 FD 71 (Hexadecimal)

Transmit data specification:

Field	Description
01	Address
10	Function
C7 38	Register address: 51000 (0xC738)
00 02	The number of write registers is 2
04	The byte number of write data is 4
00 01 13 88	Reg. 51000 = 0x0001 Note: Bit 7~0 is 0x01, that is Run forward; Bit 11~8 is 0000B, that is Using master speed C03.10[0]; Bit 13~12 is 00B, that is Using ramp 1; Bit 15 is 0B, that is Disable bit 13~8; Reg. 51001 = 0x1388 (5000, So the output frequency is 5000 / 100 = 50.00Hz)
DB BE	CRC check

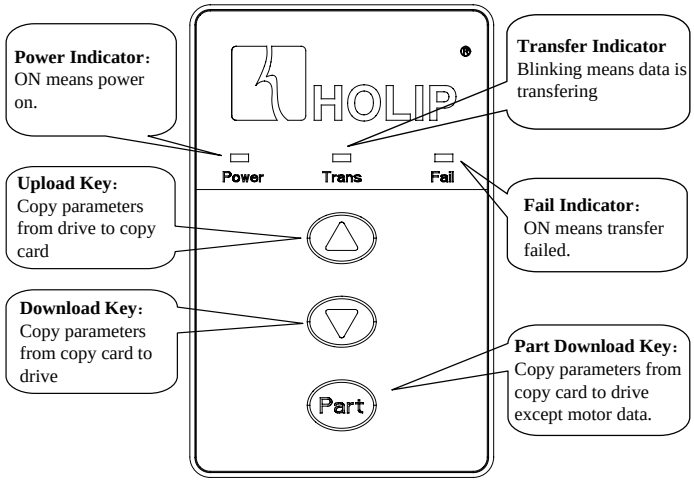
Receive data specification:

Field	Description
01	Address
10	Function
C7 38	Register address: 51000 (0xC738)
00 02	The number of write registers is 2
FD 71	CRC check

Appendix B Copy Card Specification

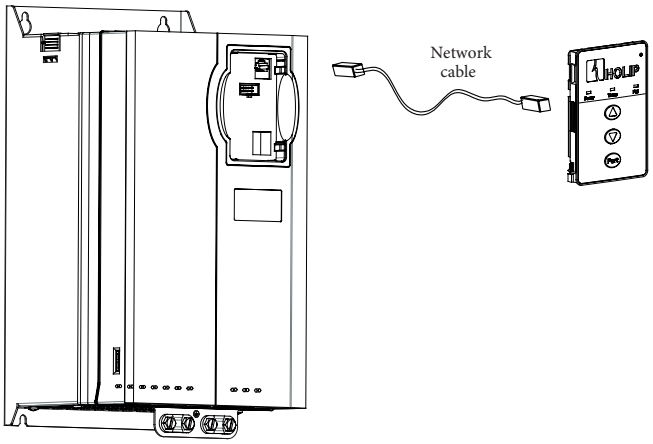
Copy Card can copy parameters from one drive to another.

1. Copy Card Interface



2. Installation

Use netcable to connect the copy card and the drive. Plug one terminal into the copy card RJ45 port which is placed on the back and plug the other terminal into drive RJ45 port. As shown in the following figure:



3. Operation

3.1 Upload

1) Connect copy card and drive according to 2. Installation;
2) After the drive power on, Power indicator on the copy card will be ON. If the connection between copy card and drive is not OK, Fail indicator will be ON;
3) Press Upload key, parameters in drive begin copying to copy card. Trans indicator will be blinking during transfer.
4) If an error occurs during transfer, Fail indicator will be ON; If data upload success, Trans indicator will be OFF;

3.2 Download

1) Connect copy card and drive according to 2. Installation;
2) After the drive power on, Power indicator on the copy card will be ON. If the connection between copy card and drive is not OK, Fail indicator will be ON;
3) Press Download key, parameters in copy card begin copying to drive. Trans indicator will be blinking during transfer.
4) If an error occurs during transfer, Fail indicator will be ON; If data download success, Trans indicator will be OFF;

3.3 Part Download

Part download is similar to download, use Part key instead of Download key. It copies parameters from copy card to drive except motor data.