HLP-C100 Series Operating Manual

Introduction

Thank you for purchasing and using the minidrive of HLP-C100 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 driveof a kind of powerelectronics 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 inverter 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.
- 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 toN-line. Otherwise it will easily cause the protection or errors of thedrive.
- 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 drivefrom the reach of children or persons not concerned.

1.2 During the Power-up

⚠ Danger

- Do not plug the connectors of the drive duringthe power upto avoid any surge into the main control board due to plugging, which might cause the damage of thedrive.

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 thedrive is in running. Otherwise it will cause over-current trip and even burn up the main circuit of the drive.
- Do not come close to the machine when the ResetFunction 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. 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-C1000D3721P20XXX1CX0AXXVXXX

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

1-8	HLP-C100	Indicate Product Series
9-12	0D37	Indicate0.37KW
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	A	Without RS485
	B	With RS485
26-27	XX	Reserved
28-31	VXXX	Indicate software version number, such as V235 means the version number is 2.35.

Note: Without RS485 is standard configuration, With RS485 is optional, please specify when ordering.

2.2 Particular Specifications

Model	Input voltage	Input current/A	Output current/A	Rated power/KW	Suitable motor/KW	Net weight/KG
HLP-C1000D3721	1×200-240V50/60Hz	6.1	2.2	0.37	0.37	0.84
HLP-C1000D7521	1×200-240V50/60Hz	11.6	4.2	0.75	0.75	0.84
HLP-C1000ID521	1×200-240V50/60Hz	18.7	6.8	1.5	1.5	0.84
HLP-C1000D3723	3×200-240V50/60Hz	3.5	2.2	0.37	0.37	0.84
HLP-C1000D7523	3×200-240V50/60Hz	6.7	4.2	0.75	0.75	0.84
HLP-C1000ID523	3×200-240V50/60Hz	10.9	6.8	1.5	1.5	0.84
HLP-C1000D7543	3×380-440V50/60Hz	3.5	2.2	0.75	0.75	0.84
	3×440-480V50/60Hz	3.0	2.1			
HLP-C1000ID543	3×380-440V50/60Hz	5.9	3.7	1.5	1.5	0.84
	3×440-480V50/60Hz	5.1	3.4			
HLP-C10002D243	3×380-440V50/60Hz	8.5	5.3	2.2	2.2	0.84
	3×440-480V50/60Hz	7.3	4.8			

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	0-400Hz;
Main control functions	Control mode	V/F, VVC+;
	Start torque	0.5Hz 150%;
	Overload capacity	150% 60s;
	PWM switch frequency	2~16kHz;
	Speed setting resolution	Digital: 0.001Hz; Analogy: 0.5‰ of the max. operating frequency ;
	Speedopen-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 8-speed steps ramp up and down times 0.05-3600.0s;

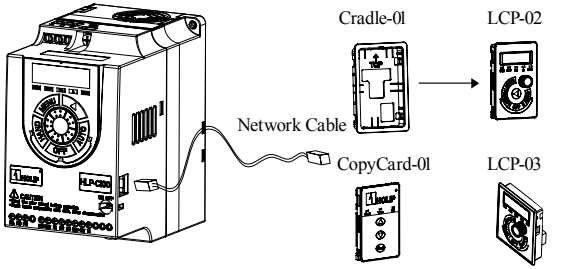
Item		Specification
Basic Functions	Speed Open-loop Control; Process Closed-loop Control; Slip Compensation;Torque compensation;Automatic Voltage Regulation; V/F Control, DC Brake; Speed Limit; Current Limit; FlyingStart; Reset Function;	
Application Functions	Jogging; Multi-speed Control via Digital input; Mechanical Braking; UP/DOWN; Catch up/Slow down; Counter.	
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;Live Zero Timeout Function;ButtonFreeze; Duplicate Fails; LCP Invalid; LCP Incompatible; Parameter Read-only; Reference Out of Range; Invalid While Running etc.	
Control terminals	Input	5 digital inputs; lanalog input, both can receive voltage or current signals.
	Output	1 relay output;
	Power supply	1 +l0V, max current output l0mA;
	Communication*	RS+, RS-, max baud rate 38400bit/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, l-l0 fault records and accumulated working time etc.;
Environment	Enclosure	IP20;
	Ambient temperature	-l0C~50C, derating use when over 40C;
	Humidity	5%-85% (95% without condensation);
	Vibration test	1l4g;
	Max. altitude above sea level	l000m, derating use when more than l000 meters;
	Motor cable length	Shield cable: 5 meters, unshield cable: 50 meters;
others	DC choke	None;
	Braking unit	≥220/380V 1.5kWBuilt-in

2.4 Derating Specifications

Derating for ambient temperature: If the drive is operated over 40C ambient temperature, the continuous output current should be decreased.The drive has been designed for operation at max 50C ambient temperationwith one motor size smaller than normal.Continuous operation at full load at 50C 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	Specification	Remark
LCP-02	The standard length of extension cable is 15 meters when mounting LCP on control cabinet.	Optional, please specify when ordering
LCP-03	LCP-03 has the same installation dimensions with HLP-A control panel (OP-AB01).	Optional, please specify when ordering
Cradle-01	For LCP-02 installation.	Optional, please specify when ordering
CopyCard-01	Copy Card can copy parameters from one drive to another.	Optional, please specify when ordering
Network Cable	Connect LCP to the drive when mounting LCP on control cabinet.	Do not offer, self procurement

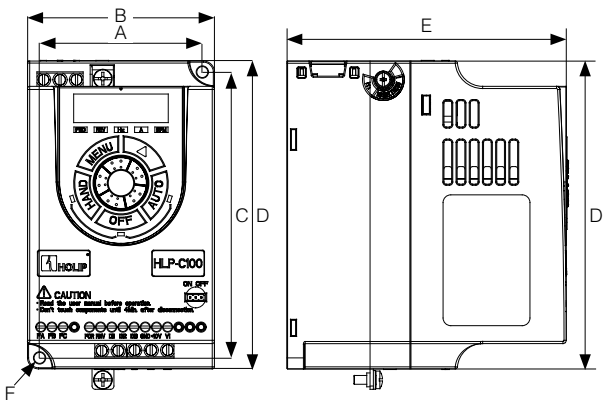
Chapter 3 Mechanical and Electrical Installation

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 surroundingspace for heat dissipation;
3 Installation should be performed where vibration is less than 1.14g;
4 Avoid from moisture and direct sunlight;
5 Do not expose to an atmosphere with flammable gases, corrosive gases, explosive gasesor 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



Single/three phase 220V 0.37~1.5kW and three phase 380V 0.75~2.2kW

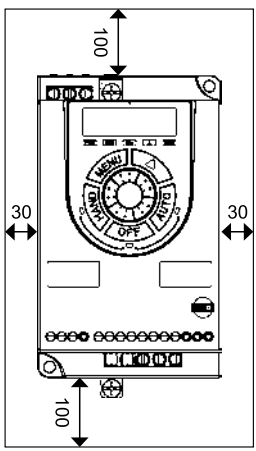
External and installation dimensions(unit: mm)

Model	A	B	C	D	E	F
HLP-C1000D3721	74	85	130	140	127	5
HLP-C1000D7521						
HLP-C10001D521						
HLP-C1000D3723						
HLP-C1000D7523						
HLP-C10001D523						
HLP-C1000D7543						
HLP-C10001D543						
HLP-C10002D243						

3.1.3 Installation and Direction

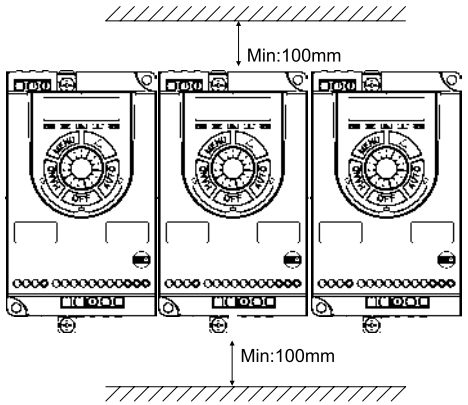
1. Single Installation

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



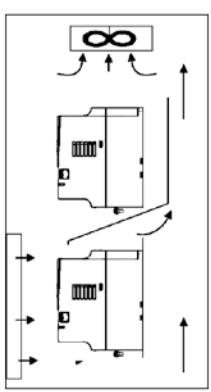
2. Side by Side Installation

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

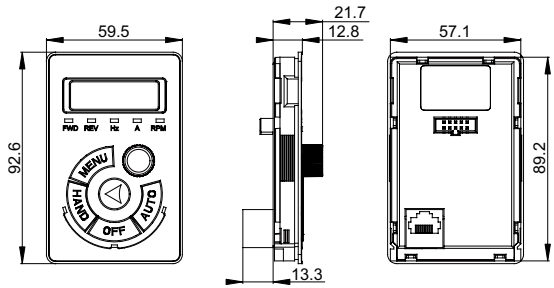
If several drives need to be installed together in one cabinet, upper and lower installation can be adopted. Enough space must be reserved to ensure effective cooling, as shown below:



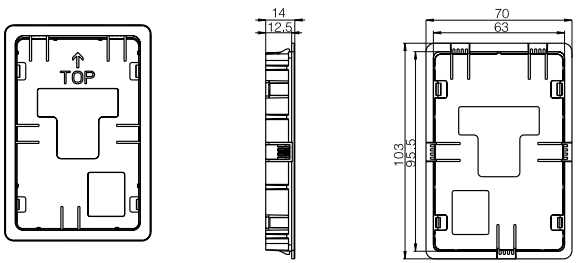
3.1.4 Accessories Installation

1. LCP-02 Installation

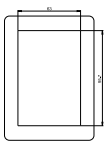
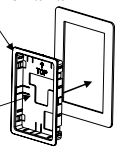
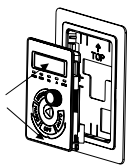
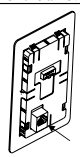
The external dimensions of LCP-02 are shown below (unit: mm):



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

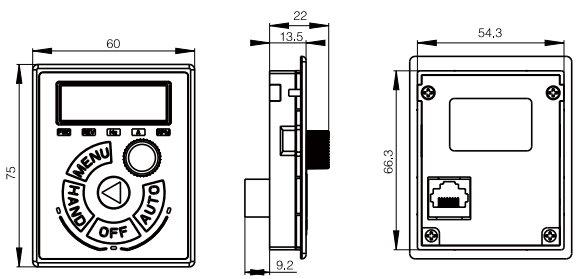


The installation steps of LCP-02 are shown below:

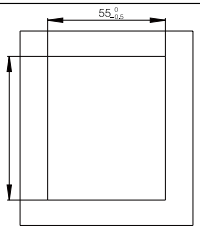
<table>
<tr>
<td> 
Step1: Open a hole in line with the size of the control panel in the position need to install the LCP, hole size, as shown:</td>
<td>This cradle is suitable for 1.0-2.0mm thickness sheet metal parts
Press and hold the snap roots when installation, using buckle deformation install sheet metal.
 
Step2: Install the LCP according to the direction of the arrow.</td>
</tr>
<tr>
<td>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.</td>
<td> 
Step 4: Install the external LCP communication cable, insert into RJ45 terminal from thebottom of hole.</td>
</tr>
</table>

2. LCP-03 Installation

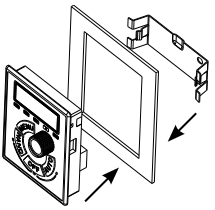
The external dimensions of LCP-03 are shown below (unit: mm):

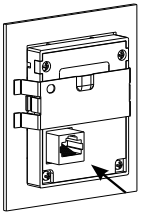


The installation steps of LCP-03 are shown below:



Step 1: Open a hole in the control panel where it is needed to install LCP-01 or LCP-02, the hole size is as shown.

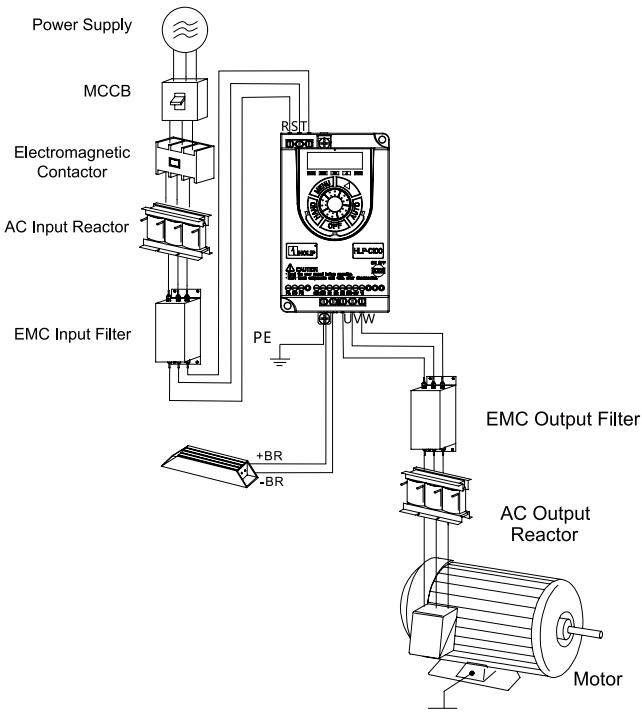




Step 3: Install the LCP commun-ication cable, insert into RJ45 terminal from the bottom hole.

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 ondownstream devices.
Contactor	Between MCCB and drive input side	Do not start and stop the drive frequently by switchingthe contactor on and off (less than twice per minute) noruse it to directly start the drive.

Part	Mounting Location	Function Description
AC input reactor	Drive input side	Improve the power factor of the input side; Eliminate the input current unbalance due to unbalancebetween the power phases; Eliminate the higher harmonics of the input sideeffectively; prevent other devices from beingdamaged 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	≥1.5kW 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 ACdrive protection trips; If the distance between the drive and the motor isgreater than 100 m, install an AC output reactor;

3.2.1 Selection of MCCB/Fuse/Contactor

Model	MCCB (A)	Fuse (A)	Contactor (A)
HLP-C1000D3721	10	10	10
HLP-C1000D7521	25	25	16
HLP-C10001D521	32	32	25
HLP-C1000D3723	10	10	10

HLP-C1000D7523	16	16	10
HLP-C10001D523	25	25	16
HLP-C1000D7543	10	10	10
HLP-C10001D543	10	10	10
HLP-C10002D243	16	16	10

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: $R = U_{DH} \times U_{DH} \div (K_B \times P_{MN})$
   U_{DH} is the limit of the DC bus, generally it is 700V for 400V model , 400V for 200V model.
   P_{MN} is rated motor power;
   K_B is braking torque coefficient, it is between 0.8 to 2.0. For general machine, it is 1.0, for greaterinertia machine, it is 1.5 to 2.

2. Selection of the Braking resistor power
   Braking power: $Pb = U_{DH} \times U_{DH} \div R$
   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
   $Pr = a\ Pb$
   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
HLP-C10001D521	300W	≧50Ω
HLP-C10001D523	300W	≧50Ω
HLP-C10001D543	250W	≧200Ω
HLP-C10002D243	500W	≧100Ω

For the power less than 0.75kW (including) models, 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	Ratedcurrent (A)	Maximum continuous current(A)	Inductance (mH) & 3% Impedance
HLP-C1000D3721	6	9	11.64
HLP-C1000D7521	12	18	5.74
HLP-C10001D521	19	28.5	2.87
HLP-C1000D3723	3.5	5.2	11.64
HLP-C1000D7523	7	10.5	5.74
HLP-C10001D523	11	16.5	2.87
HLP-C1000D7543	3.5	5.2	16
HLP-C10001D543	6	9	8
HLP-C10002D243	8.5	13	5.5

2. the guide of AC output reactor selection

Model	Rated current (A)	Saturation current (A)	Inductance (mH) & 3% Impedance
HLP-C1000D3721	2.5	5.3	9.78
HLP-C1000D7521	5	10.6	4.82
HLP-C10001D521	7.5	15.9	2.41
HLP-C1000D3723	2.5	5.3	9.78
HLP-C1000D7523	5	10.6	4.82
HLP-C10001D523	7.5	15.9	2.41
HLP-C1000D7543	2.3	4.8	14.39
HLP-C10001D543	4	8.5	7.19
HLP-C10002D243	5.6	11.9	4.9

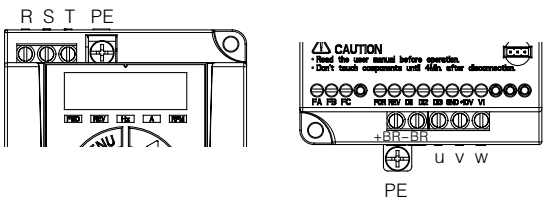
3.2.4 Selection of EMC Filter

Model	EMC Input Filter		EMC Output Filter	
	Rated Current (A)	Recommended Model*	Rated Current (A)	Recommended Model*
HLP-C1000D3721	10	NFI-010	5	NFO-005
HLP-C1000D7521	20	NFI-020	5	NFO-005
HLP-C10001D521	20	NFI-020	10	NFO-010
HLP-C1000D3723	5	NFI-005	5	NFO-005
HLP-C1000D7523	10	NFI-010	5	NFO-005
HLP-C10001D523	10	NFI-010	10	NFO-010
HLP-C1000D7543	5	NFI-005	5	NFO-005
HLP-C10001D543	5	NFI-005	5	NFO-005
HLP-C10002D243	10	NFI-010	10	NFO-010

* 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



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.
PE	Ground terminal

3.3.2 Main Circuit Terminal Screws and Wiring Recommended Specifications

Model	Input Cable (mm^2)	Output Cable (mm^2)	Input and Output Terminals' Screws	Input and Output Terminals' Torque	Ground Terminal Screw	Ground Terminal Torque
HLP-C1000D3721	1	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-C1000D7521	1.5	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-C10001D521	1.5	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-C1000D3723	1	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-C1000D7523	1	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-C10001D523	1.5	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-C1000D7543	1	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-C10001D543	1	1	M3.5	0.8-1.0	M4	1.0-1.2
HLP-C10002D243	1	1	M3.5	0.8-1.0	M4	1.0-1.2

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.

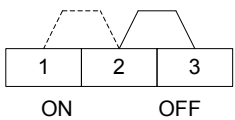
3.4 Description of Control Circuit

3.4.1 Schematic of ControlCircuit Terminals

FA	FB	FC	FOR	FEV	D11	D12	D13	GND	+10V	VI	RS+	RS-	COM

Terminals' specification:

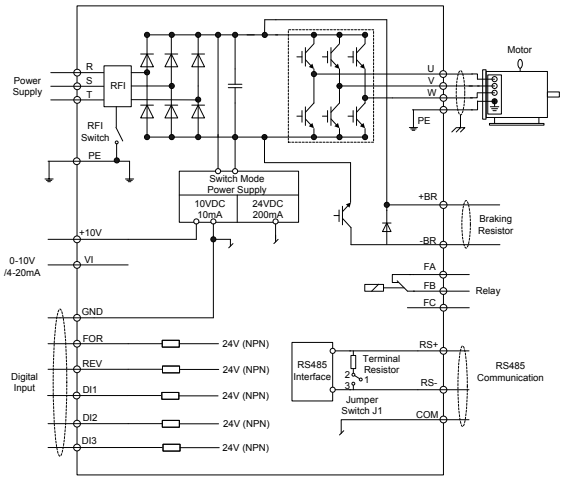
Symbol	Description	Specification
FA-FB-FC	Relay output	1. Resistive Load: 250VAC 3A/30VDC 3A; 2. Inductive Load: 250VAC 0.2A/24VDC 0.1A (cosφ=0.4); FA-FB: NC, FB-FC: NO
FOR, REV, DI1, DI2, DI3	Digital input	1. Logic: >DC 19V Logic:0; <DC 14V Logic: 1; 2. Voltage: DC0~24v; 3. Input resistance: 5kΩ; 4. Input voltage Rang:Max ±30v;

GND	Digital/Analog	Isolated from internal COM.
+10V	10V power supply	Max load 10mA, with over load and short circuit protection functions.
VI	Analog input	VI can be configurated to 0-20mA or 0-10V by paramters: 1. Input Impedance: about 10kΩ; 2. Input Impedence: ≤500Ω;
RS+, RS-	RS485 communication	Max baud rate: 38400bit/s;
COM	Digital ground	Isolated from internal GND;
J1	RS485 termination resistor jumper switch	 Jumper switch 1-2 connected: ON, termination resistor connected; Jumper switch 2-3 connected: OFF, termination resistor not connected, default state;

3.4.2 Control Terminals' Screws and Wiring Recommended Specifications

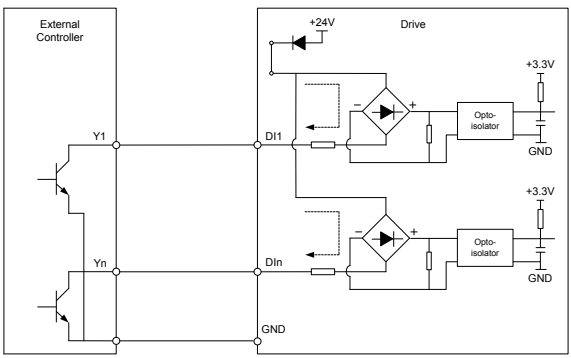
Cable types	Cable specifications (mm^2)	Torque (n·m)
Shielded cables	0.4	0.4

3.4.3 ControlCurcuit Wiring



3.4.4 Digital Input Terminals UsageSpecification

Open collector NPN mode wiring



HLP-C100 only supports this mode.

3.5 EMC instructions

3.5.1 Introduction to EMC Standard

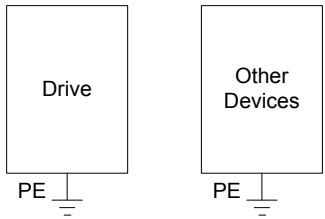
The HLP-C100 series satisfies the requirements of standard IEC/EN61800-3: 2004 (Adjustable speed electrical power drive systems part 3: EMC requirements and specific test methods).

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-C100 serials, it can remove RFI screw to cut RFI filter to reduce the leakage current;

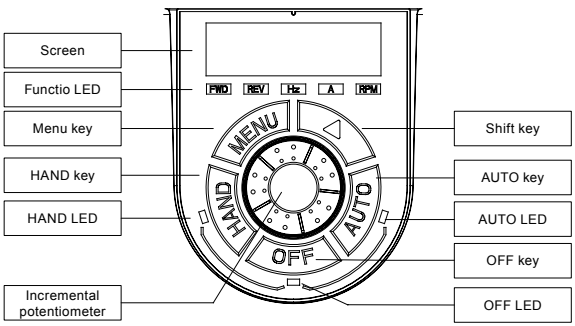
3.5.5 Induction VoltageSuppression

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 .

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. StateLED

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.

AUTOLED: 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. FunctionLed

FWD, REVLed: 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 thereset 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 ParameterSetting

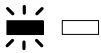
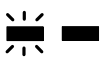
Example:Set C03.10 [0] to 20.5:

Key-press	LCP Display	Action Description
	C00.03	Presskey (MENU) to display the first basic C00.03
	C03.00	Turn clockwise to select parameter groupC03

	C03.00	Press ◀ key to shift to fractional part
	C03.10	Turn clockwise to select parameterC03.10
	[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	
<0	STOP	
≥0	FWD	
≥0	REV	
<0	FWD	
<0	REV	

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

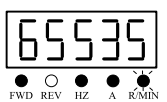
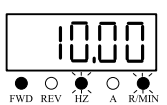
Example 1: The first line of the table indicates the drive is stop and the reference is greater than or equal to 0, means the dirve at some time in the future will run forward.

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 C16.13is50.0Hz, 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 C16.30is 540V,display accuracy: 1
Drive temperature	◀		Show the drivetemperature C16.34 is45℃, display accuracy:1

Feedback Value			Show the feedback value C16.52 is28.000, 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 is10.00V, display accuracy: 0.01

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
	C00.04	Press (MENU) key to display the first basic C00.04.
	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
	C00.04	Press to display the first basic parameterC00.04.
	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
	C00.04	Operating State at Power-up	0: Resume 1: Forced stop, ref=old 2: Forced stop, ref=0		0
	C00.31	Custom Readout Min. Value	0.00~9999.00		0.00
	C00.32	Custom Readout Max. Value	0.00~9999.00		0.00
	C00.33	LCP Display Option	0~4095		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
	C00.60	Set-up Locked	0: Disabled 1: Enabled		0

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group01: Load / Motor	C01.00	Configuration Mode	0: Speed open loop 3: Process closed loop 4: Torque open loop		0
	*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	0.1~1000.0	N·m	*
	*C01.42	Motor Cable Length	0~150	m	*
	C01.55	V/F Characteristic-V	0.0~999.9	V	*
	C01.56	V/F Characteristic-F	0.0~400.0	Hz	*
	C01.62	Slip Compensation	-400~399	%	0
	C01.63	Slip Compensation Time Constant	0.05~5.00	s	0.10
	C01.67	Torque Compensation	0~200	%	0
	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	0.00~10.00	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
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
	C02.10	Brake Function	0: Off 1: Resistor brake		0
	C02.11	Brake Resistor	5~65535	Ω	*
	C02.17	Over-voltage Control	0: Disabled 2: Mode 1 3: Mode 2		0

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 03: Reference / Ramps	C03.03	Maximum Reference	0.000~4999.000		50.000
	C03.07	Main Reference Calculation	0: Preset reference + Reference sourcel, 2 1: Preset reference priority		
	C03.10	Preset Reference	-100.00~100.00	%	0.00
	C03.11	Jog speed	0.0~400.0	Hz	0.0
	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
	C03.15	Reference Sourcel	0: No function 1: Terminal VI II: Local bus 21: LCP potentiometer		1
	C03.16	Reference Source2			2
	C03.18	Relative Reference Source			0
	C03.19	Speed Up/Down Value Store	0: No function 1: Stop save 2: Power down save		0
	C03.41	Ramp 1 Ramp Up Time	0.05~300.00	s	*
	C03.42	Ramp 1 Ramp Down Time	0.05~300.00	s	*
	C03.51	Ramp 2 Ramp Up Time	0.05~300.00	s	*
	C03.52	Ramp 2 Ramp Down Time	0.05~300.00	s	*
	C03.61	Ramp 3 Ramp Up Time	0.05~300.00	s	*
	C03.62	Ramp 3 Ramp Down Time	0.05~300.00	s	*
	C03.71	Ramp 4 Ramp Up Time	0.05~300.00	s	*
	C03.72	Ramp 4 Ramp Down Time	0.05~300.00	s	*
	C03.80	Jog Ramp Time	0.05~300.00	s	*
	C03.85	Ramp 5 Ramp Up Time	0.05~300.00	s	*
	C03.86	Ramp 5 Ramp Down Time	0.05~300.00	s	*
	C03.88	Ramp 6 Ramp Up Time	0.05~300.00	s	*

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 03: Reference / Ramps	C03.89	Ramp 6 Ramp Down Time	0.05~300.00	s	*
	C03.91	Ramp 7 Ramp Up Time	0.05~300.00	s	*
	C03.92	Ramp 7 Ramp Down Time	0.05~300.00	s	*
	C03.94	Ramp 8 Ramp Up Time	0.05~300.00	s	*
	C03.95	Ramp 8 Ramp Down Time	0.05~300.00	s	*
	C03.96	Link preset reference and ramp time	0: No link 1: Link		0
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
	C04.18	Current Limit	0~300	%	150
	*C04.19	Max Output Frequency	0.0~400.0	Hz	65.0
	C04.40	Counting Value of Counter A	0~0x7FFFFFFFUL		0
	C04.41	Counting Value of Counter B	0~0x7FFFFFFFUL		0
	C04.52	Warning Frequency Low	0.0~400.0	Hz	0.0
	C04.53	Warning FrequencyHigh	0.1~400.0	Hz	65.0
	*C04.58	Missing Motor Phase Function	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
Par. Group 05: Digital In / Out	C05.04	DI Filter Time	2~16	ms	4
	C05.09	Function at External Alarm	0: Off 2: Stop and warning 3: Jogging and warning 4: Max. speedand warning 5: Stop and trip		0

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 05: Digital In / Out	C05.10	Terminal FOR	0: No operation 1: Reset 2: Coast inverse 6: Stop inverse 8: Start 9: Latched start 10: Reversing 11: Start reversing 14: Jog 15: Preset ref. bit0 16: Preset ref. bit1 17: Preset ref. bit2 21: Speed up 22: Speed down 28: Catch up 29: Slow down 34: Ramp bit0 35: Ramp bit1 36: Ramp bit2 37: Latched Reversing 38: JogReversing 42: Coast 43: External Alarm Input 46: Stop 60: Counter A 62: Reset counter A 63: Counter B 65: Reset counter B		8
	C05.11	Terminal REV			10
	C05.12	Terminal DI1			15
	C05.13	Terminal DI2			16
	C05.14	Terminal DI3			17

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 05: Digital In / Out	C05.40	Relay Function	0: No operation 5: Drive running 8: Run on reference/ No warning 9: Alarm 10: Alarm or warning 15: Out of frequency range 16: Below frequency low 17: Above frequency high 18: Out of feedback range 21: Thermal warning 24: Ready, voltage OK 25: Reverse signal 26: Bus OK 38: Counter A reach 39: Counter B reach 43: External alarm 55: Reverse		5
Par. Group 06: Analog In/ Out	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	-4999.000~4999.000		0.000
	C06.15	Terminal VI High Ref./ Feedb. Value	-4999.000~4999.000		50.000
	C06.16	Terminal VI Filter Time	0.01~10.00	s	0.01

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 06: Analog In/ Out	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
	C06.81	LCP Pot.Min. Ref.	-4999.000~4999.000		0.000
	C06.82	LCP Pot.Max. Ref.	-4999.000~4999.000		50.000
Par. Group 07: Controllers	C07.20	Process PID Feedback Source	0: No function 1: Terminal VI 11: Local bus		0
	C07.31	Process PID Anti Windup	0: Disable 1: Enable		0
	C07.33	Process PID Proportional Gain	0.00~10.00		0.01
	C07.34	Process PID Integral Time	0.10~9999.00	s	9999.00
	C07.38	Process PID Feed Forward Factor	0~400	%	0
	C07.39	On Reference Bandwidth	0~200	%	0
	C07.41	Process PID Output Low	-100~100	%	0
	C07.42	Process PID Output High	-100~100	%	100
Par. Group 08: Communication	C08.01	Control Site	0: Digital and control word 1: Digital only 2: Control word only		0
	C08.02	Control Word Selection	0: Disable 1: Enable		1
	C08.03	Control Word Timeout Time	0.1~6500.0	s	1.0
	C08.04	Control Word Timeout Function	0: Off 2: Stop 3: Jogging 4: Max. speed 5: Stop and trip		0
	C08.06	Reset Control Word Timeout	0: Do not reset 1: Do reset		0

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 08: Communication	C08.29	Communication Alarm Mode	0: Bit mode 1: Code mode		0
	C08.31	Address	0~247		1
	C08.32	Baud Rate	0: 2400 1: 4800 2: 9600 3: 19200 4: 38400	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	0.001~0.500	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
Par. Group 14: Special Functions	C14.01	Switching Frequency	2~6: 2~6kHz 7: 8kHz 8: 10kHz 9: 12kHz 10: 16kHz	kHz	*
	*C14.03	Overmodulation	0: Off 1: On		1
	C14.08	Damping Gain Factor	0~200	%	96

Par. Group	Par. No.	Name	Range	Unit	Default
Par. Group 14: Special Functions	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
	C14.17	Automatic Voltage Regulation	0: Disable 1: Enable		1
	C14.18	Delay Time of Auto RestartWhen 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
	C14.30	Current Controller 1 Proportional Gain	0~300	%	100
	C14.31	Current Controller 1Integration Time	0.005~2.000	s	0.020
	C14.32	Current Controller Filter Time	2.0~100.0	ms	10.0
	C14.33	Current Controller 2 Proportional Gain	0~300	%	0

Par. Group	Par. No.	Name	Range	Unit	Default
	C14.34	Current Controller 2Integration Time	0.001~2.000	s	0.020
	*C14.51	DC Link Compensation	0: Off 1: On		0
Par.Group 15: Drive Information	C15.00	Operating Days	0~9999	d	
	C15.02	kWh Counter	0~65535	kWh	
	C15.03	Power Up's	0~2147483647		
	C15.06	Reset kWh 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		
	C16.05	Motor Speed	0~9999	rpm	
	C16.09	Custom Readout	0.00~9999.00		
	C16.10	Output Power	0.000~1000.000	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	
	C16.30	DC Link Voltage	0~65535	V	
	C16.34	IGBT Temperature	0~65535	℃	
	C16.52	Feedback	-4999.000~4999.000		
	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	
	C16.71	Relay Output	0~65535		
	C16.72	Counter A	0~2147483647		
	C16.73	Counter B	0~2147483647		
	C16.86	Communication Reference	-32768~32767		

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
C00.04	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 reappearsand 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.

C00.3*LCP Custom Readout

Par. No.	Name	Range	Unit	Default
C00.31	Custom Readout Min. Value	0.00~9999.00		0.00
C00.32	Custom Readout Max. Value	0.00~9999.00		0.00

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:

$$C16.09 = (C00.32 - C00.31) \times C16.13 \div C04.14 + C00.31$$

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,

$$C00.33=1\times23+1\times27=136.$$

Bit 11	Bit 10	Bit9	Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Custom Readout	Reserved	Reserved	Reserved	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

C00.4*LCP Keypad

Enable, disable individual keys on theLCP.

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

0: Disabled, No effect when HANDkey 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 AUTOoperation 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.

C00.6*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: Thisfunction is only valid to LCP, not active to local bus.

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		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*.

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

C01.2* Motor Date

Par. No.	Name	Range	Unit	Default
*C01.20	Motor Power	Motordependant	kW	*
*C01.22	Motor Voltage	50~1000	V	*
*C01.23	Motor Frequency	20~400	Hz	*
*C01.24	Motor Current	Motordependant	A	*
*C01.25	Motor Speed	100~9999	rpm	*
*C01.26	Motor Torque	0.1~10000.0	N·m	*

Set the above parameters according to the motor nameplate.

C01.4*Motor Cable Length

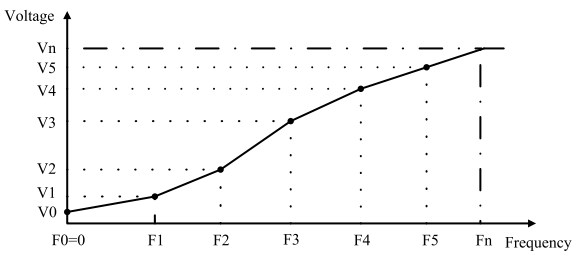
Par. No.	Name	Range	Unit	Default
*C01.42	Motor Cable Length	0~150	m	*

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

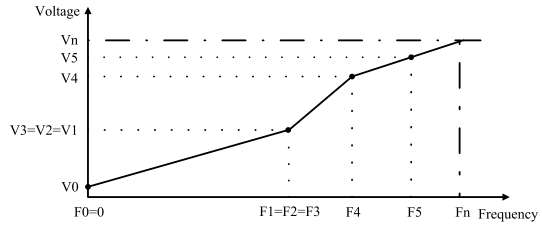
C01.5*Load Indep.Setting

Par. No.	Name	Range	Unit	Default
C01.55	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 onlyaccessible 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 characteristicby 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:

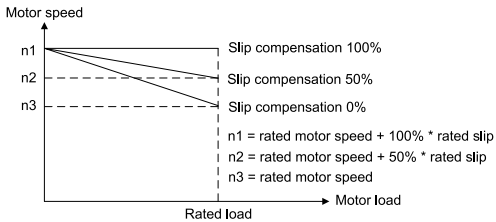
	[0]	[1]	[2]	[3]	[4]	[5]
C01.55	0.0	12.0	400.0	400.0	400.0	400.0
C01.56	0.0	0.5	50.0	50.0	50.0	50.0

C01.6*Load Depen.Setting

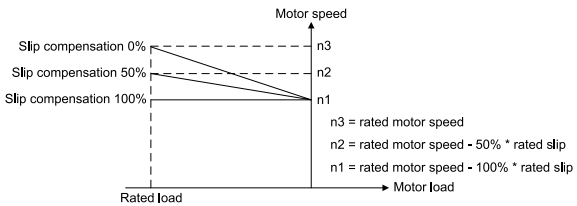
Par. No.	Name	Range	Unit	Default
C01.62	Slip Compensation	-400~399	%	100

When the motor is driving an electric-driven load, motor speed dropswith 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.

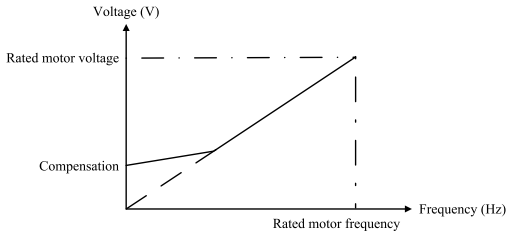
Par. No.	Name	Range	Unit	Default
C01.63	Slip Compensation Time Constant	0.05~5.00	s	0.10

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
C01.67	Torque Compensation	0~200	%	0

Enter the % value to compensate voltage in relation to load when the motor is running at low speed. 100% corresponds to completely

compensate for the voltage drop caused by the stator resistance.
Diagram of torque compensation is shown below:



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 functionwhen 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
C01.75	Min. Start Frequency	0.00~10.00	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 C01.76Jump 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

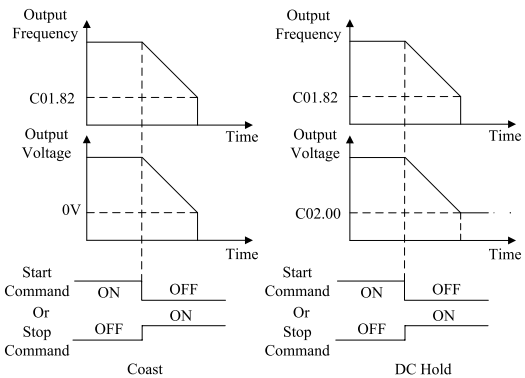
Par. No.	Name	Range	Unit	Default
C01.80	Function at Stop	0: Coast 1: DC Hold		0

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.

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.

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
C02.17	Over-voltage Control	0: Disabled 2: Mode 1 3: Mode 2		0

Over-voltage control (OVC) reduces the risk of the drive tripping due toan 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.

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 [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
C03.03	Maximum Reference	0.000~4999.000		50.000

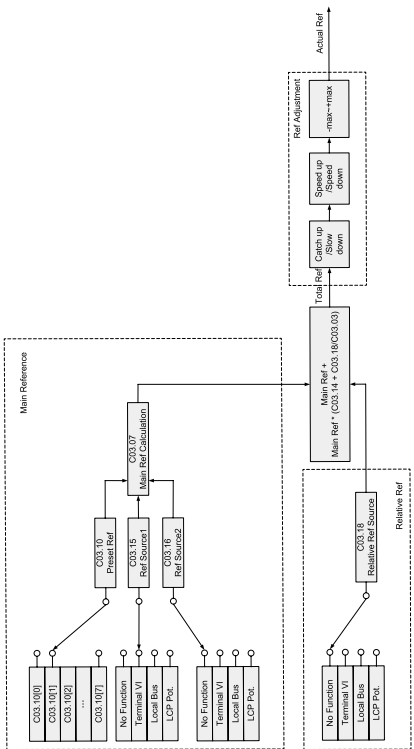
Enter value for Maximum Reference. The Maximum Reference is the highest value obtainable by summing all references.

Par. No.	Name	Range	Unit	Default
C03.07	Main Reference Calculation	0: Preset reference + Reference source1, 2, 3 1: Preset reference priority		0

Select main reference calculation method.
0: Preset reference + reference source1, 2
1: Preset reference priority
For option [1],
Preset reference[1-N] when use preset reference 1-N
Main reference =
Preset reference [0] + Reference source1, 2when use preset reference 0

C03.1*References

Diagram of Reference Calculation is shown below:



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 selectedconfiguration, thisparameter 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
C03.15	Reference Source1	0: No function 1: Terminal VI 11: Local bus 21: LCP potentiometer		1
C03.16	Reference Source2			0

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

0: No function;

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

C03.4*Ramp1

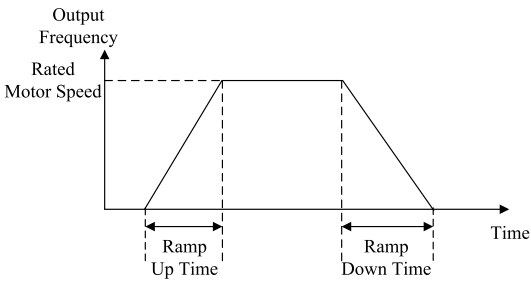
There are 4 ramps built in the drive. For each of four ramps (C03.4*, C03.5*, C03.6* and C03.7*), configure the ramp parameters: ramp type, ramp up time and ramp down time.

Par. No.	Name	Range	Unit	Default
C03.41	Ramp 1 Ramp Up Time	0.05~300.00	s	*
C03.42	Ramp 1 Ramp Down Time	0.05~300.00	s	*
C03.51	Ramp 2 Ramp Up Time	0.05~300.00	s	*
C03.52	Ramp 2 Ramp Down Time	0.05~300.00	s	*
C03.61	Ramp 3 Ramp Up Time	0.05~300.00	s	*
C03.62	Ramp 3 Ramp Down Time	0.05~300.00	s	*

C03.71	Ramp 4 Ramp Up Time	0.05~300.00	s	*
C03.72	Ramp 4 Ramp Down Time	0.05~300.00	s	*

Ramp UpTime 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.



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	0.05~3600.00	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.

Par. No.	Name	Range	Unit	Default
C03.85	Ramp 5 Ramp Up Time	0.05~300.00	s	*
C03.86	Ramp 5 Ramp Down Time	0.05~300.00	s	*
C03.88	Ramp 6 Ramp Up Time	0.05~300.00	s	*
C03.89	Ramp 6 Ramp Down Time	0.05~300.00	s	*
C03.91	Ramp 7 Ramp Up Time	0.05~300.00	s	*
C03.92	Ramp 7 Ramp Down Time	0.05~300.00	s	*
C03.94	Ramp 8 Ramp Up Time	0.05~300.00	s	*
C03.95	Ramp 8 Ramp Down Time	0.05~300.00	s	*

Par. No.	Name	Range	Unit	Default
C03.96	Link preset reference and ramp time	0: No link 1: Link		

If choose [1] link preset reference and ramp time, preset reference 0-7 are corresponding to ramp time 1-8. For example, choose preset reference 2 by using terminals control, the ramp time is 3.

6.4 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 settingin 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
C04.18	Current Limit	0~300	%	150

This parameter is used to set drive output current limit, 100% equals motor current set in C01.24. If the output current exceeds the C04.18 motor current limit, the drive will report A.59 warning and current limit controllers (see C14.3*) start.

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 isfinal in all configurations (independent of the setting in C01.00 Configuration Mode).

Par. No.	Name	Range	Unit	Default
C04.40	Counting Value of Counter A	0~0x7FFFFFFUL		0
C04.41	Counting Value of Counter B	0~0x7FFFFFFUL		0

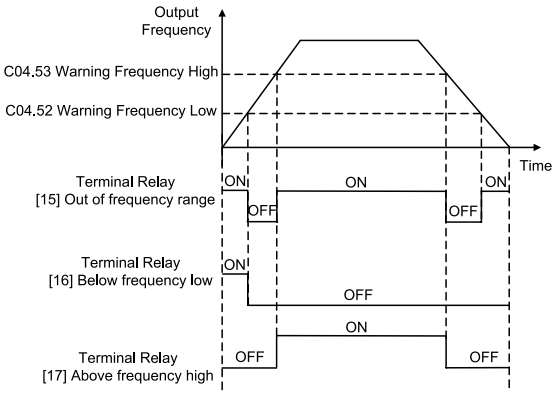
These parameters are used to set Counter A/B counting value. When Counter A/B reaches the set value, if the parameter C05.40 relay output function sets to [38]/[39] Counter A/B reach, the relay acts.

C04.5*Adjustable Warnings

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

Enter the flow /fhigh value. When the motor frequency falls below flow or exceeds fhigh, a signal can be produced on relay. See [15] Out of frequency range, [16] Below frequency low and [17] Above frequency high in C05.40.

Diagram of Warning FrequencyLow and Warning FrequencyHigh are shown below:



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 isstrongly recommended to make an active setting to avoid motordamage.

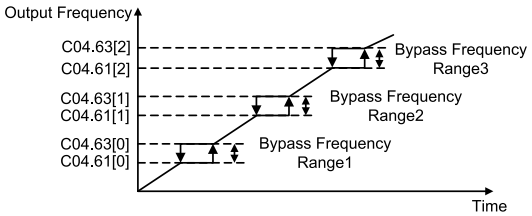
C04.6*Speed Bypass

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 parametersare 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:



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
C05.09	Function at External Alarm	0: Off 2: Stop and warning 3: Jogging and warning 4: Max. speedand warning 5: Stop and trip		0

The function activates when the digital input terminal function [43] external alarm inputis 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: Joggingand 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	0~65		8
C05.11	Terminal REV			10
C05.12	Terminal DI1			15
C05.13	Terminal DI2			16
C05.14	Terminal DI3			17

The digital inputs are used for selecting various functions inthe drive. All digital inputs can be set to thefollowing 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;

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;

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

15: Preset ref. bit0, Preset ref.bit0, bit1, bit2, bit3 enables a choicebetween 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];

Terminal of Preset ref. bit2	Terminal of Preset ref. bit1	Preset ref. bit0	Parameter
OFF	OFF	OFF	C03.10[0]
OFF	OFF	ON	C03.10[1]
OFF	ON	OFF	C03.10[2]
OFF	ON	ON	C03.10[3]
ON	OFF	OFF	C03.10[4]
ON	OFF	ON	C03.10[5]
ON	ON	OFF	C03.10[6]
ON	ON	ON	C03.10[7]

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;

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

29: Slow down, similar to [28]Catch up;
34: Ramp bit0, ramp bit0, bit1, bit2 are used for select one of the eight ramps;
35: Ramp bit1, same as [34];
35: Ramp bit2, same as [34];

Terminal of Ramp bit1	Terminal of Ramp bit1	Terminal of Ramp bit0	Parameters
OFF	OFF	OFF	Ramp1 (C03.41, C03.42)
OFF	OFF	ON	Ramp2 (C03.51, C03.52)
OFF	ON	OFF	Ramp3 (C03.61, C03.62)
OFF	ON	ON	Ramp4 (C03.71, C03.72)
ON	OFF	OFF	Ramp5 (C03.85, C03.86)
ON	OFF	ON	Ramp6 (C03.88, C03.89)
ON	ON	OFF	Ramp7 (C03.91, C03.92)
ON	ON	ON	Ramp7 (C03.94, C03.95)

37: Latched Reversing, motor starts counter-clockwiseif a pulseis applied for min. 4ms.The motor stops when [6]Stop inverse/[46] Stop is activated;
38: JogReversing, similar to [14] jog, but reversing.
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;
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";

C05.4*Relay

Par. No.	Name	Range	Unit	Default
C05.40	Relay Function	0~55		5

0: No operation;
5: Drive running, the drive is running;
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;
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;
21: Thermal warning, a thermal warning occurs;
24: Ready, voltage OK, the drive is ready for operation, no over-voltage or under-voltage is present;
25: Reverse signal, the drive has reverse signal;
26: Bus OK, local bus communication is normal;
38: Counter A reach, counter A reaches the C04.40 setting value;
39: Counter B reach, counter B reaches the C04.41 setting value;
43: External alarm, the digital input terminal function [43] external alarm inputis active;
51: Drive in HANDstate;
52: Drive in AUTOstate;
53: No alarm;
55: Reverse, the drive runs in counter clockwise;

6.7 Group 06: Analog In/Out

C06.1*Analoge Input VI

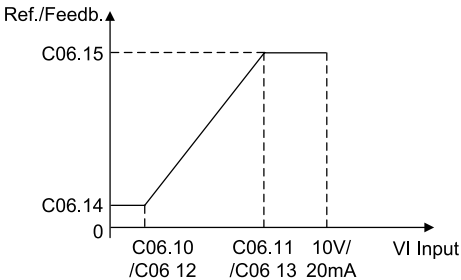
Parameters for configuring the scaling and limits for analoginput VI.

Par. No.	Name	Range	Unit	Default
C06.10	Terminal VI Low Voltage	0.00~C06.11	V	0.07
C06.11	Terminal VIHigh Voltage	C06.10~10.00	V	10.00
C06.12	Terminal VILow Current	0.00~C06.13	mA	0.14
C06.13	Terminal VIHigh Current	C06.12~20.00	mA	20.00
C06.14	Terminal VILow Ref./ Feedb. Value	-4999.000~4999.000		0.000
C06.15	Terminal VIHighRef./ Feedb. Value	-4999.000~4999.000		50.000

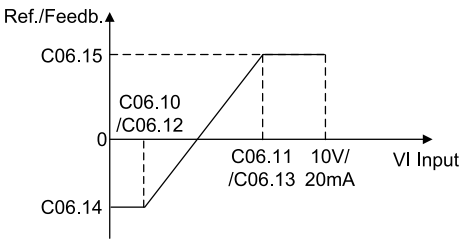
C06.10is used to set low voltage input;C06.12is used to set low current input; The low voltage and current analog input scaling value corresponds to the lowref./feedb. value, set in C06.14.

C06.11is used to set high voltage input;C06.12is 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.

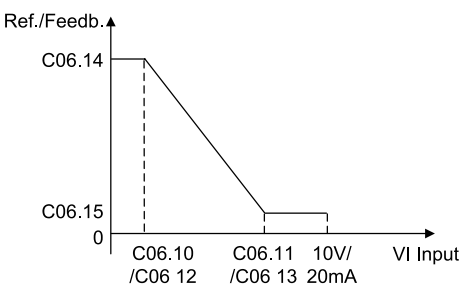
There are 4 kind of curves between terminal VI input voltage/current and its scale value:



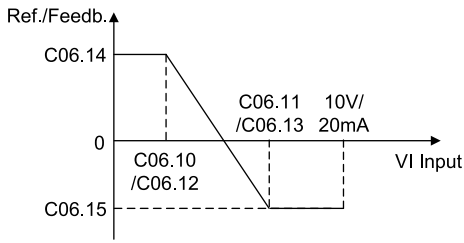
C06.14 < C06.15 and C06.14 >= 0



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



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



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

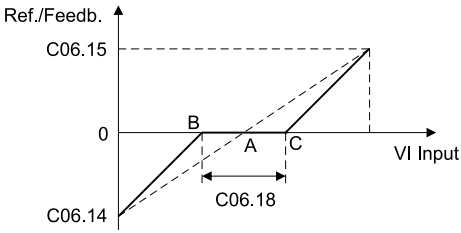
Terminal VI reference/feedback value calculated as follows:
If C06.10 <= VI Input<= C06.11,
VI Ref./Feedb.Value = (C06.15 - C06.14) ÷ (C06.11 - C06.10) × (VI input - C06.10) + C06.14;
If VI Input< C06.10,
VI Ref./Feedb.Value = C06.14;
If VIInput> C06.11,
VI Ref./Feedb.Value = C06.15;
Note: Above formulasare 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 setterminal 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 inputto be present on analog input VI.

C06.8*LCP Potentiometer

The LCPPotentiometercan be select either as reference resource or relative reference source.

Par. No.	Name	Range	Unit	Default
C06.81	LCP Pot.Min. Ref.	-4999.000~4999.000		0.000
C06.82	LCP Pot.Max. Ref.	-4999.000~4999.000		50.000

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

6.8 Group 07: Controllers

C07.2*Process PID Feedback

Par. No.	Name	Range	Unit	Default
C07.20	Process PID Feedback Source	0: No function 1: Terminal VI 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 C01.00Configuration Mode).

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
C07.33	Process PID Proportional Gain	0.00~10.00		0.01

Enter the PID proportional gain. The proportional gain multiplies the errorbetween 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	0.10~9999.00	s	9999.00

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

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	-100~100	%	0
C07.42	Process PID Output High	-100~100	%	100

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
C08.02	Control Word Selection	0: Disable 1: Enable		1

This parameter is used to select whether the control word is active or not.

Par. No.	Name	Range	Unit	Default
C08.03	Control Word Timeout Time	0.1~6500.0	s	1.0

Enter the maximum time expected to pass between the reception of two consecutivetelegrams. If this time is exceeded, it indicates that the serial communicationhas stopped. The function selected in C08.04 Control Word Timeout Function willthen be carried out. The time-out counter is triggered by a valid control word.

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

Select the time-out function. The time-out function activates when the control word fails to be updated within the time period specified in C08.03 Control Word Timeout Time.

0: Off, resumes control via serial bus using the most recent control word;
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 Control Word Timeout	0: Do not reset 1: Do reset		0

Resetting control word timeout will remove any timeout function. After control word timeout occurs, a control word 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 control word timeout.

0: Do not reset, control word timeout is not reset;
1: Do reset, control word 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
C08.31	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	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	0.001~0.500	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.

6.10 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 asignificant 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
C14.12	Function at Mains Imbanlance	0: Trip 1: Warning 2: Disabled		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, the drive trips (reports "E.04") when a mains imbalance is detected;

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

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

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.

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
C14.17	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 RestartWhen 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 1-10times, 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 remaina tripstate. It needs power off and on to reset the trip after shootingfault.

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 C14.20Reset 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;

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 controller1 controls current by reducing the output frequency, and current controller2 controls current by reducing the output voltage. Typically only recommended to use current controller1, if it is still unable to control the current in some occasions (such as fast acceleration and deceleration), you can use the current controller2.

Par. No.	Name	Range	Unit	Default
C14.30	Current Controller 1 Proportional Gain	0~500	%	100
C14.31	Current Controller 1Integration Time	0.000~2.000	s	0.020
C14.32	Current Controller Filter Time	0~100	ms	1
C14.33	Current Controller 2 Proportional Gain	0~300	%	0
C14.34	Current Controller 2Integration Time	0.001~2.000	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 lowerintegration time causes the controller response more quickly, but too highvalue 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 le vel 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
*C14.51	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.

6.11 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
C15.02	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	0~2147483647		

View the number of times the drive has been powered up. 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 C15.01Running 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.

6.12 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 Modbus Communication Specification.

Par. No.	Name	Range	Unit	Default
C16.01	Reference	-4999.000~4999.000		

View the actual reference.

Par. No.	Name	Range	Unit	Default
C16.05	Motor Speed	0~9999	rpm	

View motor speed.

Par. No.	Name	Range	Unit	Default
C16.09	Custom Readout	0.00~9999.00		

View the value of user-defined readoutcorrected from C00.31, C00.32 and C04.14.

C16.1*Motor Status

Par. No.	Name	Range	Unit	Default
C16.10	Output Power	0.000~1000.000	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.

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
C16.34	IGBT Temperature	0~65535	℃	

View the temperature of drive's IGBT Temperature.

C16.5*Ref./Feedb.

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	Reserved	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
C16.62	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
C16.71	Relay Output	0~65535		

View the output status of the relay, the corresponding bit is set to "1"whenthe relay output is active, otherwise it will be set to "0".

Binary	bit0
Item. No.	Relay 1

Par. No.	Name	Range	Unit	Default
C16.72	Counter A	0~2147483647		

View present value of counter A.

Par. No.	Name	Range	Unit	Default
C16.73	Counter B	0~2147483647		

View present value of counter B.

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.

Chapter 7 Quick Application Guide

7.1 Using LCP to Start/Stopthe Drive

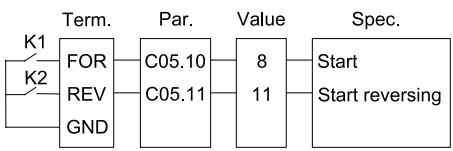
1. Press “HAND” key on LCP to start the drive;
2. Turn the potentiometer to change output frequency;
3. Press“OFF”key on LCP to stop the drive;

7.2 Using Digital InputTerminals to Start/Stopthe 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

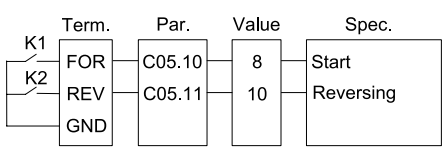
It is the most commonly used two-line mode, in which the forward/ reverse rotation of the motor is decided by FOR and REV. Wiring and parameters are set as below:



K1	K2	Command
OFF	OFF	Stop
ON	OFF	Run forward
OFF	ON	Stop
ON	ON	Run reverse

7.2.2 Three-line Mode 1

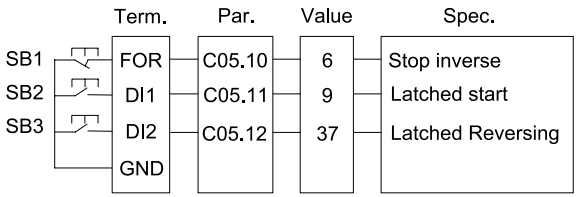
In this mode, FOR is run enabled terminal, and the direction is decided by DI1 and DI2. Wiring and parameters are set as below:



K1	K2	Command
OFF	OFF	Stop
ON	OFF	Run forward
OFF	ON	Stop
ON	ON	Run reverse

7.2.3 Three-line Mode 1

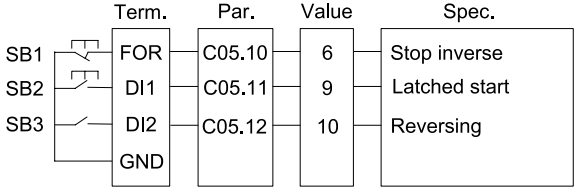
In this mode, FOR is run enabled terminal, and the direction is decided by DI1 and DI2. Wiring and parameters are set as below:



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:

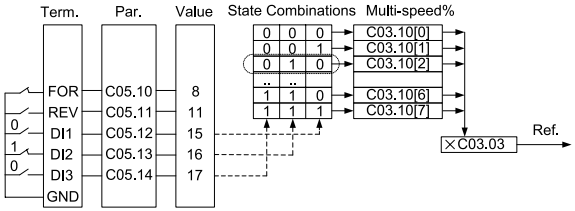


SB1	SB2	SB3	Command
OFF	×	×	Stop

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.

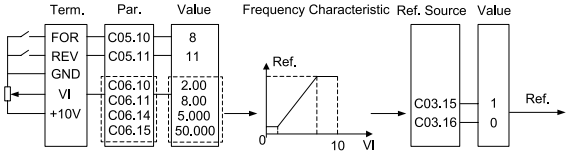


In the preceding figure, FOR, REV are set as two-line mode 1, DI1, DI2, DI3 and DI4 are used as the multi-frequency input terminals, each of which has a bit value. The state combinations of these terminals correspond to multiple frequencies, When (DI4, DI3, DI2, DI1) = (0, 0, 1, 0), the state combination value is 2, corresponding to the value set in C03.10[2]. The target runningfrequency 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

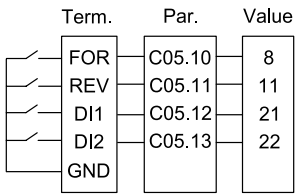
The VI/AI terminals can be used as the frequency source. The following figure shows how to use the VI as the frequency source.

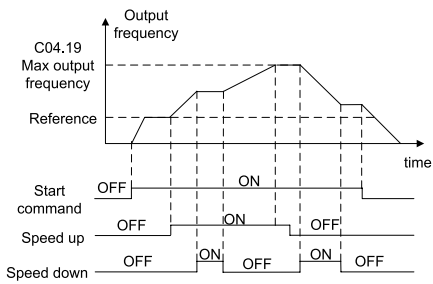


Attention: Parameters and theirs value in dash box should be set according to the application.

7.5 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:





7.6 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;

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 analarm 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 anerror happens, LCP display “Er.XX” (XX is error code).

Warning	Alarm	Error	Fault Description	Reason analysis
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.

Warning	Alarm	Error	Fault Description	Reason analysis
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.
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.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.

Warning	Alarm	Error	Fault Description	Reason analysis
	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.
	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.
A.59			Current Limit	Current exceeds value set in C04.18.
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.
	E.80		Parameter Initialization	Make parameter initialized.
		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 circuitpower 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 driveshould 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 than95% (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.

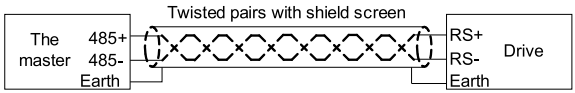
1.Application Mode

1.1 Interface Mode

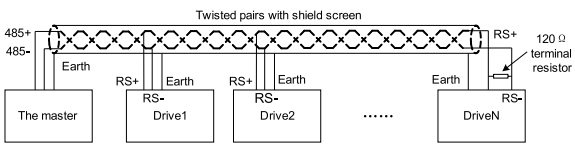
The communication interface is RS485. RS485 works on semiduplex and its data signal applies differential transmission which is called balance transmission too.

1.2 Networking Mode

The drive has two networking modes: single master/multiple slaves networkingand 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;

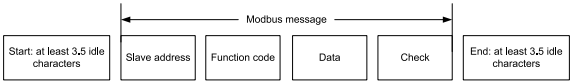
2. It is recommended to use shield cables in multiple connection. The basic parameter of the devices, such as baud rate and digital check bit in RS485 should be the same as slave device's and there should be no repeated addresses in slave devices.

2. Protocol Format

Modbus protocol only supports RTU 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-l)	2 * N data
Data (N-2)	
…	
Data0	
CRC CHK high-8-bit	CRC check
CRC CHK low-8-bit	
End	at least 3.5 idle characters

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. RegisterAddress 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 numberare shown below:

Register address = PNU × 10 – 1

For example:

The register address of C03.03 is 303 × 10 - 1 = 3029 (0x0BD5)

The register address ofC16.13 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. 8specification

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. 51000specification

Bit	说明
Bit 7~0	0x00: No function 0x01: Run forward 0x02: Reverse 0x03: Jog 0x04: Jog reverse 0x05: Stop 0x06: Coast 0x07: Reset
Bit 11~8	0000B: master speed C03.10[0] 0001B: 1st step speed C03.10[1] 0010B: 2nd step speed C03.10[2] 0011B: 3rd step speed C03.10[3] … 0111B: 7th step speed C03.10[7]
Bit 13~12	00B: Ramp 1 01B: Ramp 2 10B: Ramp 3 11B: Ramp 4
Bit 14	Reserved
Bit 15	1B: Enable Bit8~13 function 0B: Disable Bit8~13 function

*Reg. 51001 specification
When using communication to control the drive, you can set the frequency directly by writing register 51001. The register value is in the range of 0.00 ~ C04.19, unit 0.01Hz.

* Reg. 51002 specification
Communication reference is the reference value when C03.15~C03.16 selects [11] local bus.
0.00% corresponds to 0, 100.00% corresponds to C03.03, -100.00% corresponds to -C03.03.

* Reg. 51100 specification

Bit	说明
Bit 0	0B: None 1B: Warning
Bit 1	0B: None 1B: Alarm

Bit3~2	00B: Stop 01B: Run forward 10B: Reverse 11B: Reserved
Bit7~4	Reserved
Bit 11~8	0000B: Using master speed 0001B: Using 1st step speed 0010B: Using 2nd step speed 0011B: Using 3rd step speed … 0111B: Using 7th 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	说明
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.

4.3 Parameter's Data Type

Parameters have different data type decause of they have different range and value. Parameter's data type is shown in the following table.

Par. No.	Data Type	Par. No.	Data Type
C00.04	UINT8	C08.01~C08.02	UINT8
C00.31~C00.32	INT32	C08.03	UINT16
C00.33	UINT16	C08.04~C08.33	UINT8
C00.40~C00.60	UINT8	C08.35~C08.36	UINT16
C01.00~C01.20	UINT8	C08.38~C08.39	UINT8
C01.22~C01.23	UINT16	C14.01~C14.10	UINT8
C01.24	UINT32	C14.12~C14.17	UINT8
C01.25	UINT16	C14.18	UINT16
C01.29~C01.42	UINT8	C14.20	UINT8
C01.50~C01.63	UINT16	C14.21	UINT16
C01.67~ C01.72	UINT8	C14.22~C14.23	UINT8
C01.75~ C01.76	UINT16	C14.30~C14.34	UINT16
C01.80	UINT8	C14.51	UINT8
C01.82	UINT16	C15.00~C15.03	UINT32
C02.00~ C02.04	UINT16	C15.06	UINT8
C02.10	UINT8	C15.19	INT16
C02.11	UINT16	C15.30	UINT8
C02.17	UINT8	C15.31	INT16
C03.03	INT32	C15.38	UINT8
C03.07	UINT8	C15.43	STRING
C03.10	INT16	C16.00	UINT16
C03.11	UINT16	C16.01	INT32
C03.12	INT16	C16.02	INT16
C03.13	UINT16	C16.03	UINT16
C03.15~C03.19	UINT8	C16.05	UINT16
C03.41~C03.95	UINT32	C16.09	INT32
C03.96	UINT8	C16.10~C16.13	UINT32
C04.10	UINT8	C16.14~C16.15	UINT16
C04.12~C04.19	UINT16	C16.30	UINT32

C04.41~C04.42	UINT8	C16.34	INT8
C04.52~C04.53	UINT16	C16.52	INT32
C04.58	UINT8	C16.60	UINT16
C04.61~C04.63	UINT16	C16.62	UINT16
C05.04~C05.40	UINT8	C16.71	UINT16
C06.10~C06.13	UINT16	C16.72~C16.73	INT32
C06.14~C06.15	INT32	C16.86	INT16
C06.16~C06.18	UINT16	C16.90~C16.93	UINT32
C06.19	UINT8		
C06.81~C06.82	INT32		
C07.20~C07.31	UINT8		
C07.32~C07.33	UINT16		
C07.34	UINT32		
C07.38~C07.39	UINT16		
C07.41~C07.42	INT16		

UINT8 represents Unsigned Integer 8 bits;
UINT16 represents Unsigned Integer 16 bits;
UINT32 represents Unsigned Integer 32 bits;
INT8 represents Integer 8 bits;
INT16 represents Integer 16 bits;
INT32 represents Integer 32 bits;
STRING represents text string;

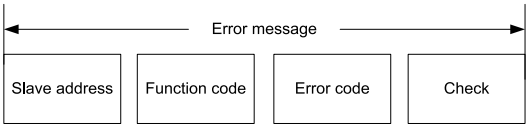
5.Communication ratio values

The Communication data is expressed by hexadecimal in actual application and there is no radix point in hexadecimal. For example, Ifyou 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. 51102to 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
01	Address
03	Function
02	The byte number of received data

01 F4	0x01F4converts to decimal number is500. 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
3F01	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	0x000001F4converts to decimal number is500. 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 dataspecification:

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 WriteSingle Register (0x06)

7.2.1 Control the drive running at 1ststep 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 thedrive and setDrive 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

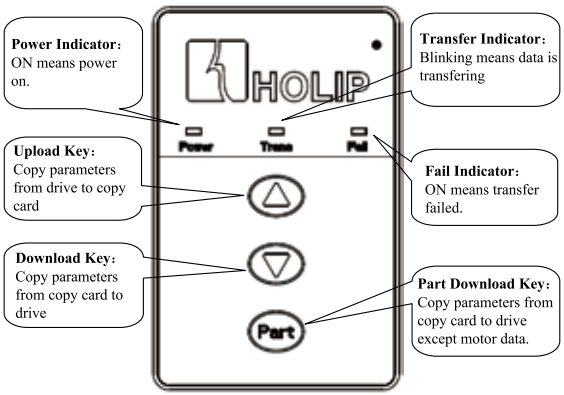
Receive data specification:

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 CardSpecification

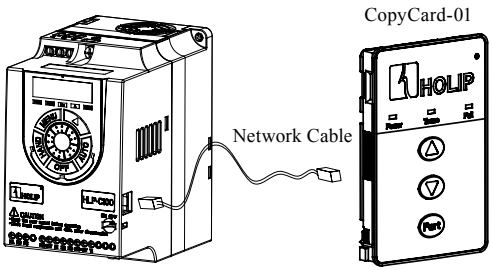
Copy Card can copy parameters from one drive to another.

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.