User Manual
MC200 Series Inverter

Guangzhou Bmller Electric Technology Co.,Ltd

Chapter 1 Safety Consideration

1.1 Unpacking

Upon unpacking, please confirm the following:

● Any damage occurred during transportation;

● Check whether the model and specifications on the nameplate of inverter are in accordance with your order.

If there is any error, please contact your supplier.

1.2 Safety Rules

⚠ Danger

Operations which are not performed according to requirements may cause serious equipment loss or personnel injury.

⚠ Attention

Operations which are not performed according to requirements may cause medium hurt or light hurt or material loss.

Installation

⚠ Danger
●Don't install the inverter on metal or other nonflammable materialie, otherwise there is a danger of accident ●Don't install the inverter in the site with explosive gases, otherwise there is a danger of explosion. ●Keep away from combustible material, otherwise there is a danger of fire.

⚠ Attention
●Hold the bottom of the Inverter in moving, for danger of droping. ●Be sure the place installing inverter is solide, for danger of falling. ●Keep away from water and wet, for danger of short circuit ●Get rid of all conductive material such as screw, cable pieces and so on and flammable material inside the machine. ●Sheld for the sunshine, or shorten the usage.

Wiring

Cable Connection And Distribution

⚠ Danger
●Only qualified personnel can perform wire-connection job otherwise there is a danger of shocking. ●Wire-connection job can only be done when the mains are cut off, otherwise there is a danger of shocking. ●The earth terminal of frequency converter must be connected to earth reliably, otherwise there is a danger of shocking. ●Install the cover plate properly before power up, otherwise there is a danger of shock or explosion. ●Don't mix input terminals and output terminals, otherwise there is a danger of explosion or material loss. ●The inverters on shelf over 2 years should be ramped up by voltage regulator before power up, otherwise there is a danger of shock or explosion. ●Do not touch the control terminals when it is live, otherwise there is a danger of shock. ●Do not operate on inverter with wet hand, otherwise there is a danger of shock.

⚠ Attention
●No capacitor,noise filter, surge absorptor at the output side of invetor ●Be sure correctly connect the U, V, and W of the cable between output side and electronic motor, this affects the direction of electronic motor moving. ●Don't short circuit (+)P/P1/PB and (-), otherwise there is a danger of fire. ●Be sure to connect the main loop terminal with cable lug firmly, otherwise there is a danger of short circuit. ●No connect terminals(except for KA, KB, KC) on control the bord directly with 220V power supply , otherwise there is a danger of the inverter damage. ●Exposed parts of connecting cable lugs in main circuit must be bound with insulation ape, otherwise there is a danger of short circuit.

Maintenance

⚠ Attention
●Maintenace can not be done until 10 minutes after power off, when the charge indicator is out or the voltage of positive/negative busbar is confirmed below 36V. ●Only qualified personnel replacing the components. Do not leave any leads or metal inside the inverter, otherwise there is a danger of fire . ●After replacement of control panel, the parameters must be changed before power up, otherwise there is a danger of material damage.

Other

⚠ Award
●Never privately alter the invetor, otherwise there is danger of getting shock. ●Operate as industrial waste when the invetor rejected, don't burn it, otherwise there is a danger of explosion.

Caution

⚠ CAUTION
1.Connect the ground cable. Failure to observe this warning may result in an electric shock or fire. 2.Do not connect AC power to an output terminal(U V W). Failure to observe this warning may result in injury or fire. 3.Turn off the power for maintenance or inspection .check that the voltage between DC terminals P and N is less than 30 VDC. Failure to observe this warning may result in an electric shock.

1.3 Notes On Usage

●Electronic motor heating, noising and vibration

Series MC200 is voltage model inverter, which output voltage is PWM wave with some harmonic component . Therefore the heat, noise and vibration will slightly increase.

●The electro-thermal protective value of motor

If the ratings of applied motor are not in compliance with the inverte especial when that of invertor is mor than that of motor, be sure to adjust the protective value to guarantee the safe

running of motor.

●3-phase input modified into 2-phase input

The modification from 3-phase input to 2-phase input is not allowed to MC200, or fault may occur. If there are only two phases available in the field, the phase-loss protection function should be disabled before the inverter is derated for operation.

●Long term runing whith mormal motor at low speed is not suitable because the radiating condition becomes worse and the temperature of the motor is rising higher in this case. If it is necessary to run long term at low speed and constant torque , the special electric motor must be selected.

●The mechanical resonance point of load

Running in some output frequency range, the inverter may encounter the mechanical resonance point of load eguipment. Jump frequencies can be adjusted to avoid it.

●Running at frequency above 50Hz

If running at frequency above 50Hz, besides the increment of vibration and noise, the ranges of running speed of motor shaft and mechanical device have to be guaranteed. Be sure to make an enquiry first.

●Lubrication of mechanical devices

Be sure to make an enquiry first.when the mechanical devices such as deceleration box and gear as well as motor, etc. run at low speed for a long term, because damages may occur due to the worsening lubricating effect.

●Usage outside the range of rated voltage

MC200 is not available beyond specified range of operation voltage, for easy to damage the inner components. If have to, please use corresponding voltage regulation device.

●Petencial load

The motor runs in 4 quadrants with petencial load, negative torque may occur in this condition. Braking units should be equipped with the inverter, or circuit break fault may occur due to over current and over voltage. For 0.75kw ~15kw, only braking resistor is needed because the inverter has built-in braking unit. For 18.5kw ~ 450kw, external braking unit and braking resistors should be equiped.

●Capacitor and varistors

Because the inverter outputs PWM pulse wave, capacitor and varistors should not be connected with the output terminals of the inverter, or the inverter may trip or components may be damaged; as shown in Figure 1-1.

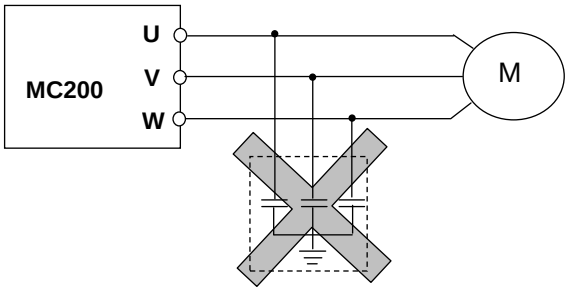


Figure 1-1

Be sur to bachout the capacitor for increase power factor or pressure-sensitive resistor for lightning protection connected with the output terminals as shown in Figure 1-1, or the inverter may trip or components may be damaged,because the inverter outputs PWM pulse wave.

●Lightning strike protection

There are lightning overcurrent devices inside the inverter which has auto-protection function.

●spetial usage

Please inquiry our technological consultants for advise when any method different from the wiring diagram in this handbook is necessry.

1.4 Environmental conditions of inverter application

●temperature

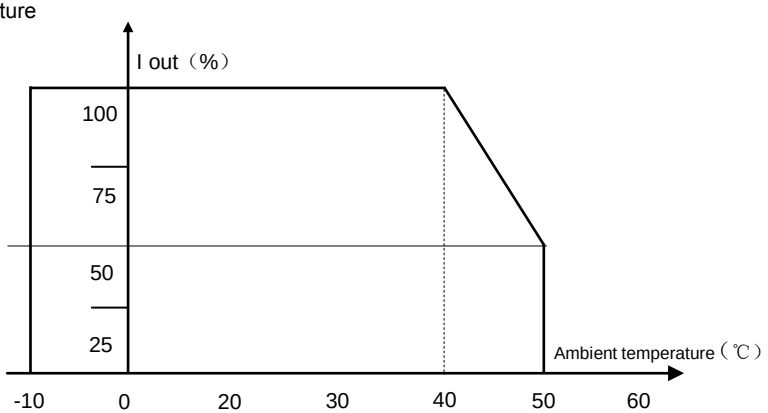


Figure 1-2

●Humidity level

Humidity level in air not higher than 95%, without frost.

●Altitude and deration

When the altitude is higher than 1000m, the cooling effect of inverter is deteriorated because of the rareness of air, derating must be considered. Figure 1-3 indicates the relationship between the altitude and rated current of inverter.

If the altitude is higher than 3000m, please contact the manufacturer.

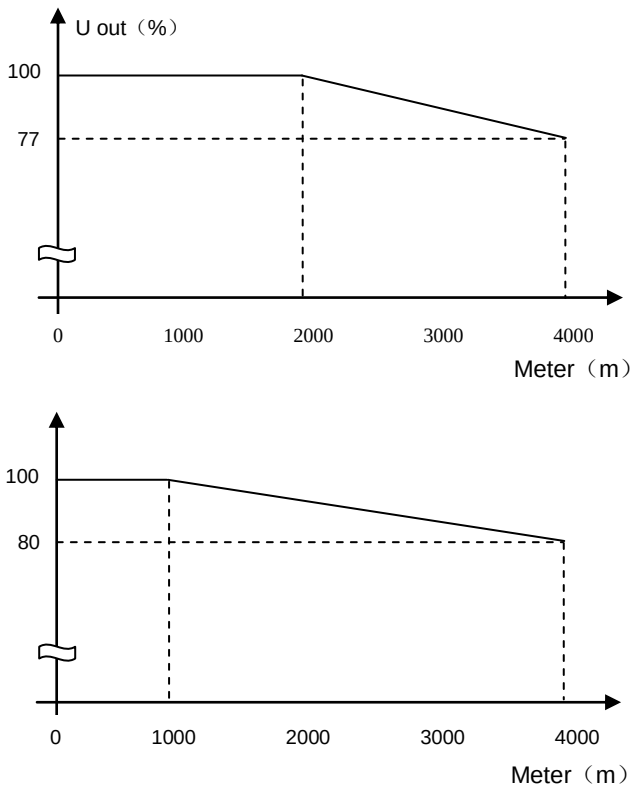


Figure 1-3

●Vibration and attacking

No falling down the flore. Don't apply the invetor at the place where often vibrating. mechanical strength ratings as:

tolerance： 0.075mm（10…58Hz）

acceleration: 9.8m/s2（＞58…Hz）

●electromagnetic radiation

Don't apply the invetor near the source of electromagnetic radiation

●Air polution

Don't apply the invetor under environment of air pollution, for instance, the place where has dusts, aggressive gass and so on.

●Water

Apply the invetor away from place where could be trickled. For instance, don't apply the invetor underneath the water pipe, for the pipe will get frost. Don't apply invetor in somewhere humidity is too high or could get frost.

●Cool down

Don't apply other equipment which will have nagetive effects to cool air circulating surrounding the invetor. Confirm the cooling wind port of invetor is at the correct place without affecting the air sirculating.

●Notes of Regarding Disposal

When disposing the inverter, pay attention to the following:

Explosion risk of capacitor: The capacitors in the main circuits may explode when they are burned.

Waste gas when plastic parts are burned: Poisonous gas may be generated when front panel is burned.

Dispose method: Please dispose the inverter as industrial rubbish.

Chapter 2 Models And Specifications

2.1 Model Description

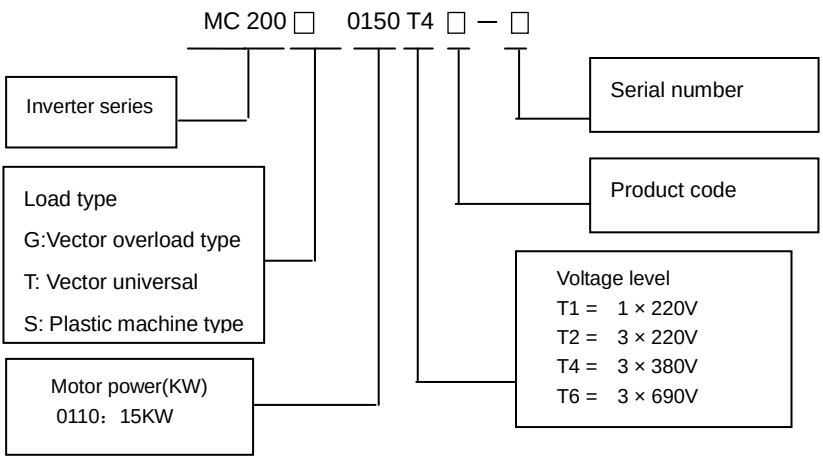
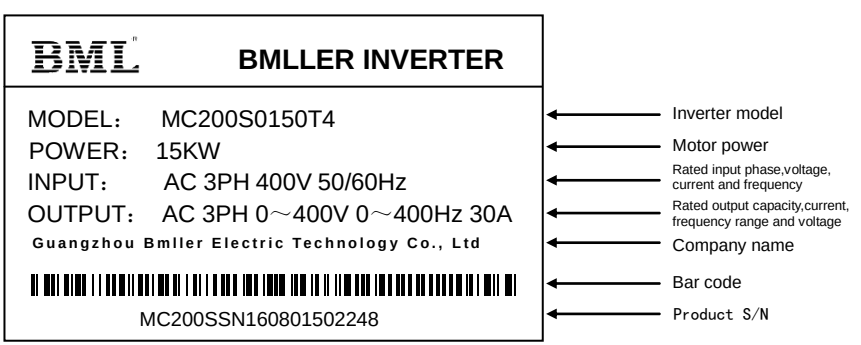


Figure 2-1

2.2 Nameplate

The nameplate is at the upward side of the right lateral plate of the case of the inverter. The contents are shown in Figure 2-2



2.3 Models and types

Models	Rated voltage (V)	Rated output current (A)	Motor power (KW)
MC200G0007T4-3	380	2.5	0.75
MC200G0015T4-3	380	3.7	1.5
MC200G0022T4-3	380	5.5	2.2
MC200G0040T4-3	380	9.7	4.0
MC200G0055T4-3	380	13	5.5
MC200G0075T4-3	380	18	7.5
MC200G0110T4-3	380	24	11
MC200G0150T4-3	380	30	15
MC200G0185T4-3	380	38	18.5
MC200G0220T4-3	380	45	22
MC200G0300T4-3	380	60	30
MC200G0370T4-3	380	75	37
MC200G0450T4-3	380	91	45
MC200G0550T4-3	380	112	55
MC200G0750T4-3	380	150	75
MC200G0900T4-3	380	176	90
MC200G1100T4-3	380	210	110
MC200G1320T4-3	380	253	132
MC200G1600T4-3	380	304	160
MC200G1850T4-3	380	340	185
MC200G2000T4-3	380	377	200
MC200G2200T4-3	380	415	220
MC200G2500T4-3	380	475	250
MC200G2800T4-3	380	520	280
MC200G3150T4-3	380	585	315
MC200G3550T4-3	380	650	355
MC200G4000T4-3	380	740	400
MC200G4500T4-3	380	840	450

Models	Rated voltage (V)	Rated output current (A)	Motor power (KW)
MC200T/S0015T4-3	380	3.7	1.5
MC200T/S0022T4-3	380	5.5	2.2
MC200T/S0040T4-3	380	9.7	4.0
MC200T/S0055T4-3	380	13	5.5
MC200T/S0075T4-3	380	18	7.5
MC200T/S0110T4-3	380	24	11
MC200T/S0150T4-3	380	30	15
MC200T/S0185T4-3	380	38	18.5
MC200T/S0220T4-3	380	45	22
MC200T/S0300T4-3	380	60	30
MC200T/S0370T4-3	380	75	37
MC200T/S0450T4-3	380	91	45
MC200T/S0550T4-3	380	112	55
MC200T/S0750T4-3	380	150	75
MC200T/S0900T4-3	380	176	90
MC200T/S1100T4-3	380	210	110
MC200T/S1320T4-3	380	253	132
MC200T/S1600T4-3	380	304	160
MC200T/S1850T4-3	380	340	185
MC200T/S2000T4-3	380	377	200
MC200T/S2200T4-3	380	415	220
MC200T/S2500T4-3	380	475	250
MC200T/S2800T4-3	380	520	280
MC200T/S3150T4-3	380	585	315
MC200T/S3550T4-3	380	650	355
MC200T/S4000T4-3	380	740	400
MC200T/S4500T4-3	380	840	450

2.4 Specifications

Items		Specifications
Input	Rated voltage, frequency	Three-phase, 380V; 50Hz/60Hz
	Rated	Voltage: 320V~460V, Voltage unbalance rate<3%; frequency: ±5%
Output	Output voltage	Three-phase, 0~380V
	Output frequency	0.1Hz～400Hz
	Overload capability	G:150% rated current for 1 minutes; T/S:130% rated current for 1 minutes;
Control function	Modulation modes	SVPWM
	Control mode	without PG feedback vector control、Torque control、Optimized V/F Control
	Running command input modes	Panel control;outer terminal control; control by serial port of host computer
	Speed setting mode	Operating panel seting: Up/Down terminal seting, analog AI1/AI2 seting, and host host computer communication seting.
	Speed setup definition	Digital setting: ±0.01% (-10°C~+40°C); analog seting: ±0.05% (25°C±10°C)
	Speed setup accuracy	Digital setting: 0.01Hz; analog setup: 1/2000 highest frequency
	Speed control accuracy	Without PG feedback vector control: ±0.5%; (25°C±10°C)
	Speed control range	without PG feedback vector control: 1: 100
	Torque control response	without PG feedback vector control: < 200ms
	Start torque	without PG feedback vector control: 150%/0.5Hz
	Torque control accuracy	±5%

Control I/O signal	Reference voltage output	1 of +10V, 5mA output
	Control voltage output	24 V/100mA, or external power supply through PLC terminal
	Analog input	3 of , 2 of (AI1/AI2)0～10V or 0～20mA，capability F4-35 and F4-36 select；1 of (AI3)-10V～10V
	Analog output	2 of (AI1/AI2)0～10V or 0～20mA，capability F5-12 and F5-15 select.
	Running order input	FWD/STOP and REV/STOP insutruction input contactor terminals
	Programmable relay output	7 of multipal function input terminals ,where 5 are programmable and the other 2 is special fou operating and transmitting.
	FAM output	1 of frequency signal (the signal's frequency is the intimultiple of the inverter's output frequency)
	Open collector output	14 kinds optional running states selectable, the maximum output current is 50mA
	Programmable relay output	14 optional running states selectable, contact capacity: 250V AC /3A or 30V DC /1A
	Alarm relay output	contact capacity: 250V AC /3A or 30V DC /1A
	Serial port	RS-485 port, standard Modbus communication protocol
Display	5-digit display (LED)	setting frequency , output frequency ,output voltage ,output current ,motor speed, load line vilocity
	External meter display	Setting frequency, output frequency, output current(all 0～10VDC or 0～20mA output)
Protection functions		Overcurrent protection, overvoltage protection, undervoltage protection, overload protection, phase-break protection, etc.

Options		Braking unit, AC input reactor, DC reactor, romote cable, keypad mounting box, EMI filter, etc.
Environment	Environment	Indoors, free from direct sunlight, dust, corrosive gas, combustible gas, oil mist, steam,water drop or salt
	Altitude	Lower than 1000m (deration is needed above 1000m)
	Ambient temperature	-10℃～+40℃
	Humidity	20%~90%RH, noncondensing
	Vibration	Lower than 5.9m/s2 (0.6g)
	Storgae temperature	-20℃～+60℃
Structure	Protection level	IP20
	Coooling	Forced air cooling
Installation		Wall mounted

2.5 Inverter Size（mm）

2.5.1 Panel Size

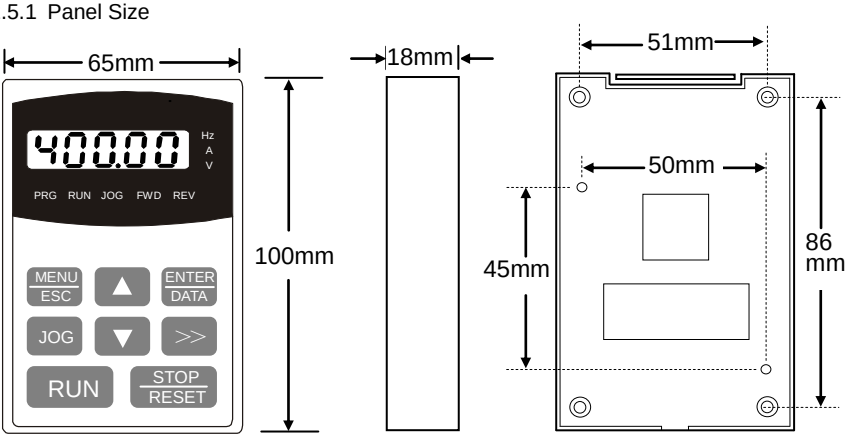


Figure 2-3 Panel Size

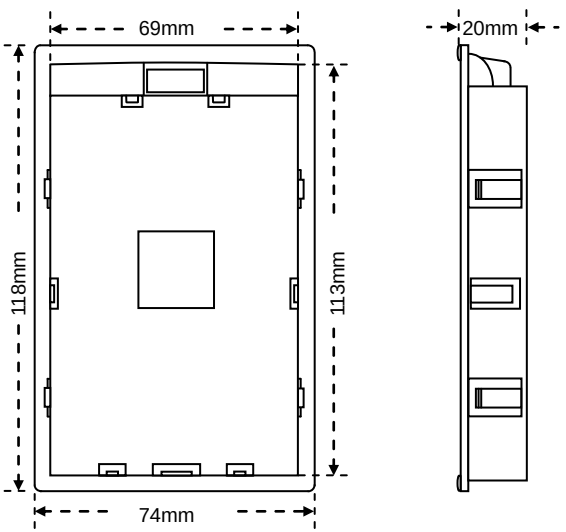


Figure 2-4 Keypad box size (unit: mm)

2.5.2 Demention of MC200G Series Inverters

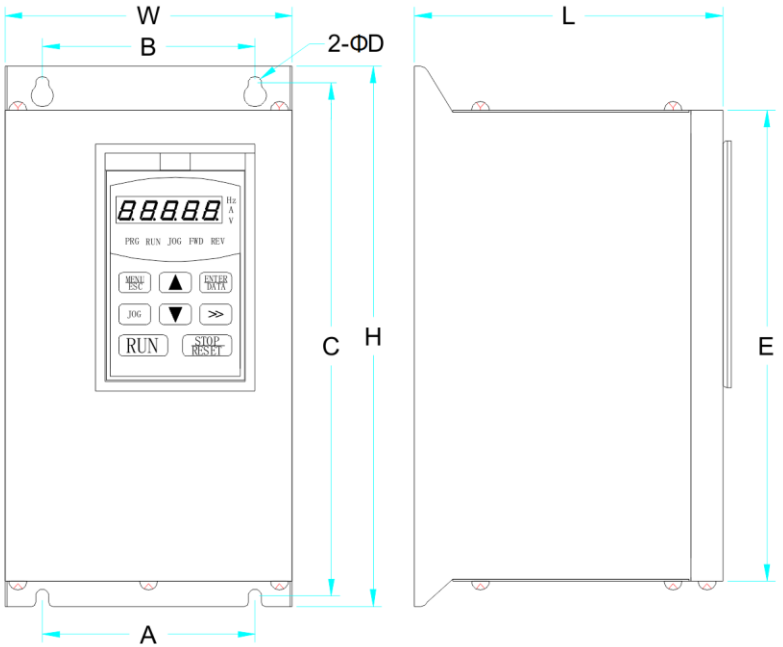


Table 2-1 Dimensions of MC200G series inverters:

Inverter power	Size(mm)									Installation Hole diameter
	A	A1	B	B1	C	H	E	W	L	D(mm)
0.75-4kw	85		85		209	221	192	125	150	ø5.2
5.5kw	100		100		242	254	225	135	165	Ø5.2
7.5kw	100		100		285	297	268	170	165	Ø5.2
11-18.5kw	100		100		340	352	323	215	180	Ø5.2
22-37kw	200		200		438	451	420	306	213	ø 6.2
45kw	200		220		535	550	505	335	262	Ø9
55-75kw	200		200		630	650	593	390	295	ø9
90-110kw	300		300		697	717	660	450	325	Ø9
132-220kw	400	200	400	200	893	913	847	533	359	ø11
250-355kw	500	250	500	250	1080	110	1034	689	359	ø11
400-450kw	560	280	560	280	1218	1240	1165	768	359	ø11

2.5.3 Dimensions of MC200T/S series inverters:

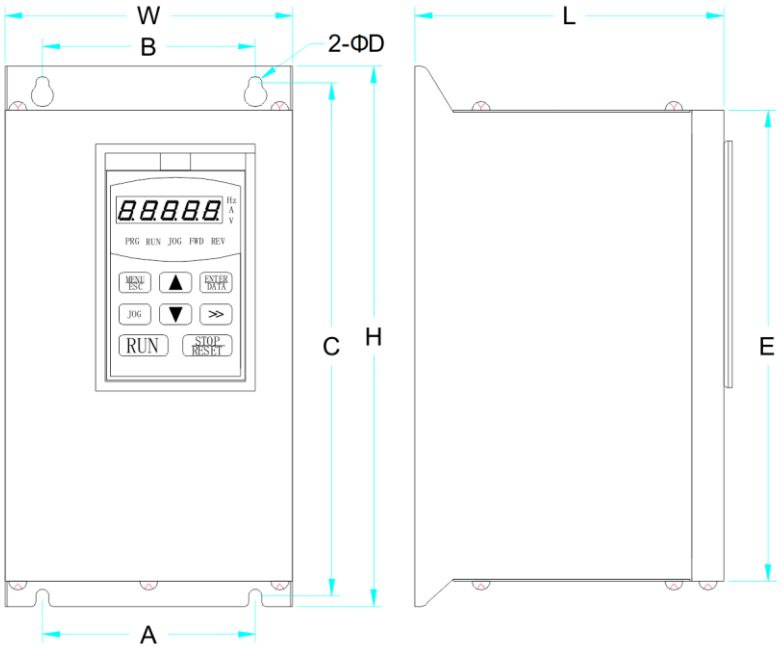


Table 2-1 Dimensions of MC200T/S series inverters:

Inverter power	Size(mm)									Installation Hole diameter
	A	A1	B	B1	C	H	E	W	L	D(mm)
1.5-5.5kw	85		85		209	221	192	125	150	ø5.2
7.5kw	100		100		242	254	225	135	165	Ø5.2
11kw	100		100		285	297	268	170	165	Ø5.2
15-22kw	100		100		340	352	323	215	180	Ø5.2
30-45kw	200		200		438	451	420	306	213	ø 6.2
55kw	200		220		535	550	505	335	262	Ø9
70-90kw	200		200		630	650	593	390	295	ø9
110-132kw	300		300		697	717	660	450	325	Ø9
160-250kw	400	200	400	200	893	913	847	533	359	ø11
280-400kw	500	250	500	250	1080	1100	1034	689	359	ø11
450-500kw	560	280	560	280	1218	1240	1165	768	359	ø11

Chapter 3 Installation And wiring

3.1 Installation after long-term storage

Capacitor must be handled if the inveter has been stored over 2 years.

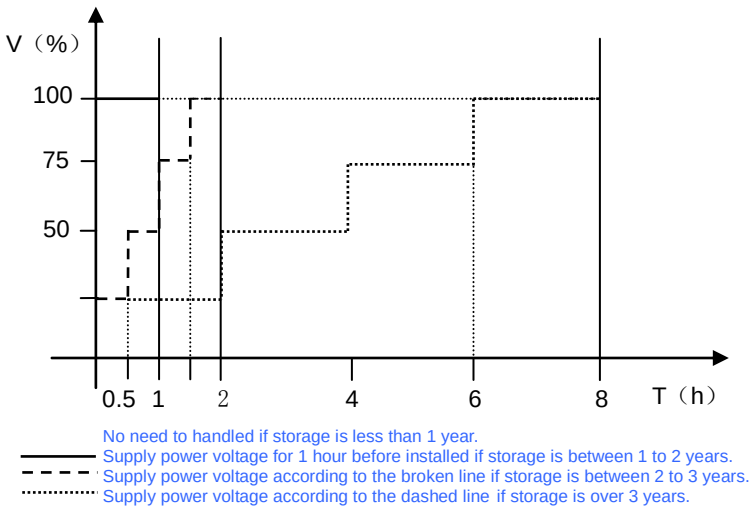


Figure3-1, process of re-handle the capacitor

3.2 Installation

Please mount the inverter inside a well-ventilated location, generally in vertical way.

The selection of mounting environment should take the following items into account:

1. Ambient temperature: It is required to be within the range of -10°C~40°C. If the temperature is higher than 40°C, the inverter should be derated by 30% when the temperature rises by every 5°C, at the same time the ventilation and heat dissipation should be enhanced.
2. Humidity should be lower than 90% with no dew condensation.
3. Be away from the location full of dust or metal powder.
4. Mount in the location free of corrosive gas or combustible gas.
5. Mount in the location where vibration is less than 5.9m/ s2 (0.6G).
6. Mount in the location free of direct sunlight.
7. The inverter should be installed in a metal cabinet, which can prevent unauthorized person from touching.

If there are any special requirements on mounting, please contact us in advance.

In order to have good radiating, the inverter must be mounting vertically.

For the requirements enforce wind cooling ,the mounting space and the distance far from others is no less than the refenrence shown in Figure 3-2.

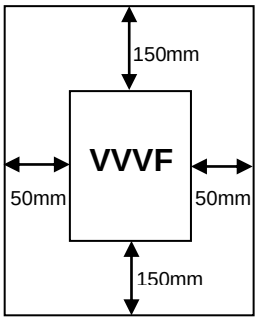


Figure 3-2.

When several inverters are in one cabinet, they should be side-to-side setup so as to decrease the infruence of heat each other .When top-and-bottom setup has to be mounted , clapboard must be set in order to resisit the bottom heat infruence the top. If there is a draught fan on the top of the cabinet, the air volume of the draught fan air should no less than the volume of the total outputs of inverters. If there is no draught fan on the top of the cabinet, the top of the cabinet shoul be open as possible. When the top of the cabinet cannot be open, the out port of the air in the top of the cabinet and in port of the air in the bottom of the cabinet must be reserved and the total area must be no less than the total area of inverters head faces.The input wind risistans of input pord should as small as possible. If the invert is mounted on the wall of the console, the draftiness should be keep and console must not be closed shown in Fig 3-3

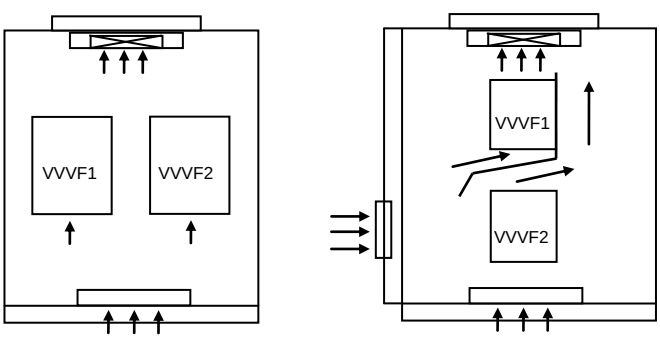


Figure 3-3

3.3 Wiring

⚠ Danger
●After the power is switched off, all the LEDs on the panel are off at least for 10 minutes, then the cover can be removed only. ●Wiring work can be performed only when the Charge light is off and the voltage between the (+) and (-) terminals is lower than 36V. ●Wiring in the inverter can only be done by professional person certified. ●Wire connections must be checked before operate when emergency stopping or protection circuit occured.

⚠ Attention
●Before usage, check whether the mains voltage meets the requirement of inverter input voltage; ●The inverter has gone through voltage withstand test in factory. ●Users shall not conduct voltage withstand test again. ●Refer to *Chapter 9 Options* if brake unit or resistor is needed.

☆ Fuse or MCCB must be connected between mains and inverter input terminals (L1, L2, L3). Refer to Table 3-1 for the types of breakers and MCCB.

☆ The PE terminal must be reliably connected to the protective earthing terminal of the supply. The cross section of earthing cable must be at least the same as the input cables, and the grounding resistance should not be higher than 0.2Ω.

☆ Check that the inverter power cables are connected to the inverter properly.

☆ After finishing the cable connection, please check:

1) Whether all the connections are right?

2)Whether there is any connection missed or forgotten?

3)Whether there is any short circuit in the cable connection?

Table 3-1 MCCB, circuit breaker and cable specifications

Inverter power （MC200 □T4-3）	Incoming switch		Input/output cables (mm^2)	Imput/output terminal screw	
	Air circuit-breaker (A)	Electromagnetic contactor （A）	Cables BV(mm^2)	specification	number
G0007	10	10	1.5	M4*12	6
G0015	16	10	1.5	M4*12	6
G0022	16	10	1.5	M4*12	6
G0040	25	16	1.5	M4*12	6
G0055	32	25	2.5	M4*12	6
G0075	40	32	2.5	M5*12	6
G0110	63	40	4	M5*12	6
G0150	63	40	4	M5*12	6
G0185	100	63	6	M5*12	6
G0220	100	63	10	M6*16	6
G0300	125	100	10	M6*16	6
G0370	160	100	16	M6*16	6
G0450	200	125	25	M6*16	6
G0550	200	125	35	M10*25	6
G0750	250	160	50	M10*25	6
G0900	250	160	70	M12*25	6
G1100	350	350	95	M12*25	6
G1320	400	400	120	M12*25	6
G1600	500	400	120	M12*25	6
G1850	500	400	150	M12*25	6
G2000	630	600	185	M12*25	6
G2200	630	600	240	M12*25	6
G2500	800	600	120×2	M12*25*2	12
G2800	800	800	150×2	M12*25*2	12
G3150	800	800	150×2	M12*25*2	12
G3550	800	800	185×2	M12*25*2	12
G4000	1250	1250	240×2	M12*25*2	12

Inverter power （MC200 □T4-3）	Incoming switch		Input/output cables (mm^2)	Imput/output terminal screw	
	Air circuit-breaker (A)	Electromagnetic contactor （A）	Cables BV(mm^2)	specification	number
T/S0015	10	10	1.5	M4*12	6
T/S0022	16	10	1.5	M4*12	6
T/S0040	16	10	1.5	M4*12	6
T/S0055	25	16	2.5	M4*12	6
T/S0075	32	25	2.5	M4*12	6
T/S0110	40	32	2.5	M5*12	6
T/S0150	63	40	4	M5*12	6
T/S0185	63	40	6	M5*12	6
T/S0220	100	63	6	M5*12	6
T/S0300	100	63	10	M6*16	6
T/S0370	125	100	16	M6*16	6
T/S0450	160	100	16	M6*16	6
T/S0550	200	125	25	M6*16	6
T/S0750	200	125	35	M10*25	6
T/S0900	250	160	50	M10*25	6
T/S1100	250	160	70	M12*25	6
T/S1320	350	350	95	M12*25	6
T/S1600	400	400	120	M12*25	6
T/S1850	500	400	150	M12*25	6
T/S2000	500	400	185	M12*25	6
T/S2200	630	600	240	M12*25	6
T/S2500	630	600	240	M12*25	6
T/S2800	800	600	150×2	M12*25*2	12
T/S3150	800	800	150×2	M12*25*2	12
T/S3550	800	800	185×2	M12*25*2	12
T/S4000	1250	1250	240×2	M12*25*2	12
T/S4500	1250	1250	240×2	M12*25*2	12

3.3.1 Connecting Optional Parts

☆ AC input reactor

You may choose AC input reactor to improve input power factor and reduce high harmonic current.

☆ EMI filter at input side

You may choose EMI filter to suppress high frequency noiseinterference from the drive power lines.

☆ Contactor

The contactor can be used to cut off power supply in case of fault. But do not use contactor to control the start or stop of the motor.

☆ DC reactor

In order to protect the inverter against power supply interference and reduce high harmonic current, a DC reactor should be used in the following cases:

1.When a switch controlled reactive power compensation capacitor or a phase-controlled thyristor load shares the same power source with the inverter, the inverter input rectifier circuit may be damaged as the capacitor switch to cut over causing reactive power transient leading sharp voltage change, or the phase-controlled thyristor load causes harmonic and wave nick.

2. When the imbalance among the 3 AC input phases exceeds 3%.

3. When it is required to raise the power factor at inverter input side to 0.93.

4. When the inverter is in connection with a large capacity transformer, the current on the inverter power source may damage the rectification circuit. Generally a DC reactor should be used when the transformer capacity is larger than 550kVA.

☆ EMI filter at output side.

You may use EMI filter to suppress the interference noise and leakage current at the inverter output side.

☆ AC output reactor

When the cable between inverter and motor is longer than 20m, you can use a reactor at AC output side to suppress the overcurrent caused by cable capacitance. The reactor can also suppress inverter's EMI.

☆ See Chapter 9 Options for the technical parameters of optional parts.

3.3.2 Basic Wiring Diagram

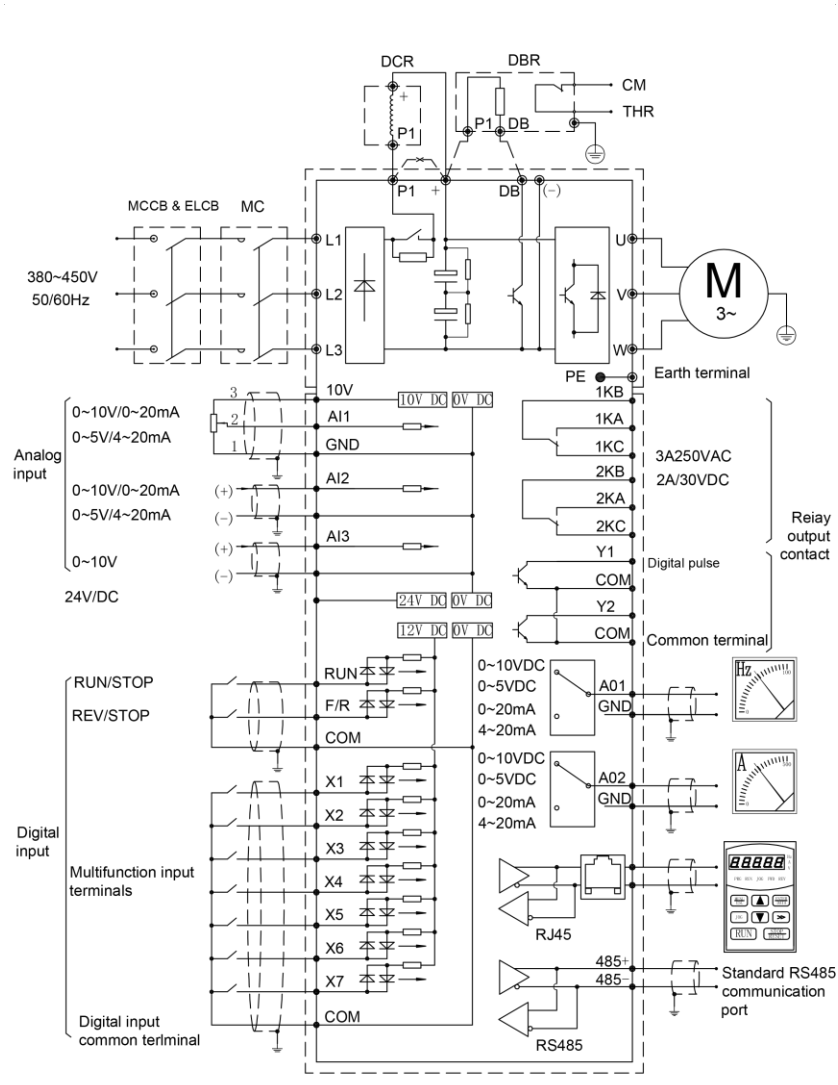


Figure 3-2 Basic wiring diagram

☆ AI1、AI2 :selectable input voltage or current signal,per jumping J1、J2 on the control board selectet V side or I side.

☆ MC200G(0.75KW～15KW)/MC200T/S(1.5KW-22KW) inverter braking device inside. Conneting braking resisitor between BR and (+) is needed when using

☆For using of the control terminals Refer to Chapter 5 and Chapter 6.

3.3.3 The power Input, Output and Earth Terminals

Danger
Be sure of the erthing terminal of the inverter is erthing reliable,otherwise electric shock Or fire accident may occur.

(+)	(-)	BR	L1	L2	L3	U	V	W	
DC			POWER			MOTOR			

Applicable model: MC200G(0.75kw~18.5kw)/MC200T/S(1.5kw~22kw)

L1	L2	L3	(-)	P1	(+)	U	V	W	
POWER			DC			MOTOR			

Applicable model:MC200G(22kw~45kw)/MC200T/S(30kw~55kw)

(-)	(+)	P1	L1	L2	L3
DC			POWER		

	U	V	W
	MOTOR		

Applicable model:MC200G(55kw~450kw)/MC200T/S(75kw~500kw)

Inverter power terminal description

Terminal	Description
L1、L2、L3	Three phase power input terminal, 380V,50/60Hz
（+）、BR	Reserved terminals for braking resistor
P1、（+）	Reserved terminals for DC reactor.
（+）、(-)	Output terminal for negative DC bus, the braking resistor is connencted between this and （+）terminal.
U、V、W	AC output terminals
⏚	Earth terminal for power supply protection

☆Power input terminals (L1, L2, L3)

1.Power input terminals L1, L2 and TL3must be connected with three-phase power supply via MCCB or ELCB. Generally, the phase sequence need not be considered.

2.Electro-magnetic contactor is recommended to be installed at the input side and the contactor must be interlock with output fault relay, so the fault part can be isolated and the safety is ensured.

3.In order to reduce the coupled noise per power line , suitable noise filter can be installed at the input side of Inverter.

☆ Inverter power put terminals (U, V, W)

1.It is strictly prohibited to connect the power input terminals to the U, V, W power output terminals, or connect the power input terminals to the P1, (+), (-), PR terminals.

2.The U, V, W output terminals should be connected to three-phase AC motor correctly.
If the motor rotary direction is wrong, exchange the connections of any two phases.

3.Capacitors and surge suppressors are forbidden to be installed at the output side of the inverter.

4.It is strictly prohibited to short or earth the output terminals of the inverter.

5.To suppress the EMI of the inverter, users may install the dedicated optional noise filter at the output side of the inverter, or lead the power output cables through erthing metal tubes and separate them from the control cables.

6.When the cable between the inverter and motor is too long, the high frequency current caused by distributed capacitors may make the inverter in protection tripping operation because of the over current, at the same time the current displaying accuracy falls because

of the rising of leakage current; so the cable length should not be longer than 100m in normal, if the cable is longer than 100m, then filter should be used or lower the carrier frequency.

☆ Terminals for DC reactors (P1, (+))

1. DC reactor is going to be used for improving the power factor. When doing this the short circuit bar should be removed first because the bar is connected between P1 and (+) in the factory befor delivery .

2. Do not remove the short circuit bar between P1 and (+) and do tighten the screws,otherwise the inverter can not work in normal.

☆ Terminals for braking resistor ((+), BR)

1.A braking unit has been built-in the inverter for MC200G0007T4~MC200G0185T4, MC200T/S0015T4~MC200T/S0220T4 because them need braking resistor only.normaly ,in order to consume the energy during braking process, braking resistor should be connected between (+) and PBh when the consumption torque is no enough for use, details see *Chapter 9* for caiculetion and selection of the braking resistor.

2.The cable of braking resistor should be less than 5m,and twisted pair line should be used in the cable.

3.The temperature of the braking resistor will rise due to energy release. So in installation, ensure safety protection, good ventilation and heat dissipation.

☆ Terminals for external braking unit (+), (-)

1. Because the inverters include 18.5KW and above in model MC200G, 22KW and above in model MC200T/S do not equip an innerbraking unit, a braking unit can be connected between (+) and (-) of the inverter, and the braking resistor can be connected between (+)and PB of the braking unit. See *Chapter 9* for the specifications of braking resistor and braking unit.

2.The cable between the inverter and braking unit should be less than 5m, so does the cable between braking resistor and braking unit.

3.Note: Do not mistaken the (+) and (-) poles of inverter and braking unit. The braking resistor cannot be connected between the terminals of P and N directly, or there may be fire accident.

☆Earth terminal

1.Earth terminal must be grounded well and the grounding resistor should not be higher than 4Ω so as to avoid electric shock and fire accident. The area of section of the line of erthing cable is no less than the area of section of the line of L1、L2、L3 power cable.

2.The inverter must have its own outer earth point. The earth cable should be as short as possible. It is recommended to use dedicated green-yellow earth cable.

3.3.4 Connecting of control Terminals

☆ control board terminal description

layout

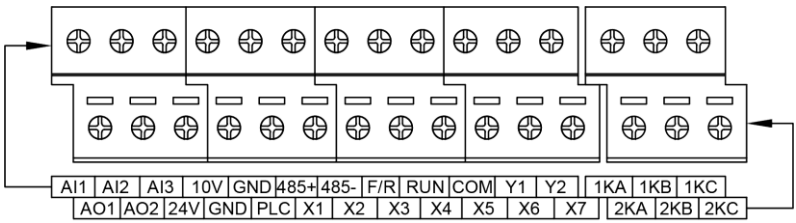


Table 3-2 The list of Control terminals and it's description

Type	Symbol	Name	Terminal function description
Digital Output	Y1-COM	Open collector output 1	The range of power voltage: 50mA The range of output current: 50mA The range of 24V pull up resistor: 2k~10kΩ
	Y2-COM	Open collector output 2	
Digital Input	X1-COM	Multifunction input terminal1	Optical isolation,compati ble bipolar input. The range of input voltage: 9～30Vdc Input impedance: 3.3kΩ
	X2-COM	Multifunction input terminal 2	
	X3-COM	Multifunction input terminal 3	
	X4-COM	Multifunction input terminal 4	
	X5-COM	Multifunction input terminal 5	
Running Control	RUN-COM	RUN/Stop terminal	RUN inverter per short to digital ground(COM)
	F/R-COM	(F/R)/Stop terminal	Control the output of the inverter to change the derection of the motor rotary

Communication	485+	Communication port	Positive terminal of 485 terminals
	485-		Negative terminal of 485 terminals
Analog input	AI1-GND	Analog input 1	Common terminal for outer voltage and current seting of inverter. F4-35 and F4-36 to select voltage（0～10VDC） or current（0～20mA） input .
	AI2-GND	Analog input 2	
Fault relay output	KB-KA	Noramlly open	Relay output for fault alarm of inverterg Contact rating: 250Vac/3A 30Vdc/1A
	KB-KC	Noramlly closed	
Analog output	AO1-GND	Analog input 1	Multipal stimilative output terminal on 0～10V 和 0～20mA. F5-12and F5-15 have same function.
	AO2-GND	Analog input 2	
Power supply	+10V	+10V power supply	potentiometer power supply,Max output current: 10mA
	24V-GND	+24V power supply	Sensor power supply Max output current: 100mA
Shield	COM	Digital earthing terminal	Digital terminals common earthing , isolate from GND
	GND	Analoge earthing terminal	Analoge terminal common earthing , isolate from the COM

☆Cables for the control ternimials

1.Because analog input signal is easily interfered by external disturbance, so phase shielded twisted-pair cable must be used, the cable length must be as shorter as possible and the shield layer must be grounded well。This kind of cable is recommended for the transmite the pulse coded signal. Individual routing should be made for different analoge signal and a common line for back is not to take too.

2.It's beeter to use Phase shielded cale, multiple-twin twisted-pair single screened cable may be used also.

3.screened cables should be used for analoge signal and digital signal.

4.For relay's control signal, if the voltage is not over 48V, Same kind of calbes can be used as for digital input signal. twisted-pair line is recommendated for relay's control signal.

5. For keep off the control signal from noise, keep the cable less than 30cm, and isolated with power line.

*Twisted-pair single screened line should be used for input frequency order from outside

☆The connection of terminals of control loop

The connecting of control cable must 360 degree earthing. Isolate the lining of duct pilot and main pilot with other power line. Cover every cable when lining, to have enough IP and EMC protection.

1.list out the cables which will be connected.

2. Divided cables into left and right according signals in and out avoiding cables cross in the cabinet

3.seperate the cabel of each group according to the size.

4.If more than one cable go through one cover, the cover must be sealed by sealat.

Monolayer shielded cable: connect shield layer to the shortst erthing point.

two-layer shielded cable: connect shield layer to the shortst erthing point.

Don't connect the shielding layer of the same kind cable to one earthing point.

Don't' connect the other side of shielding layer to the earth, or indirective earthing withservral nFof high frequency and high voltage capacitor（such as 3.3nF/3000V）. The shielding layer also can direct earthing the both sides if there is no obvious potential difference in the two sides of same erth line.

if there is no obvious potential difference in the two sides of the erth line, twisted-pair shoud be keep and as short as possible to the terminal. Twist signal line and back line to reduce the electric-mangnitic disturbance by inductive coupling.

☆ Connetion

1.Connect the shield cable to the RS485 port on the control terminal board, the shield layer should be grounded well.

2.The inverter communicates with PC and PLC through standard RS485 port, thus the modification of function codes and direct monitoring can be realized by host computer.

3.Connection of serial communication port is shown in Figure 3-3.

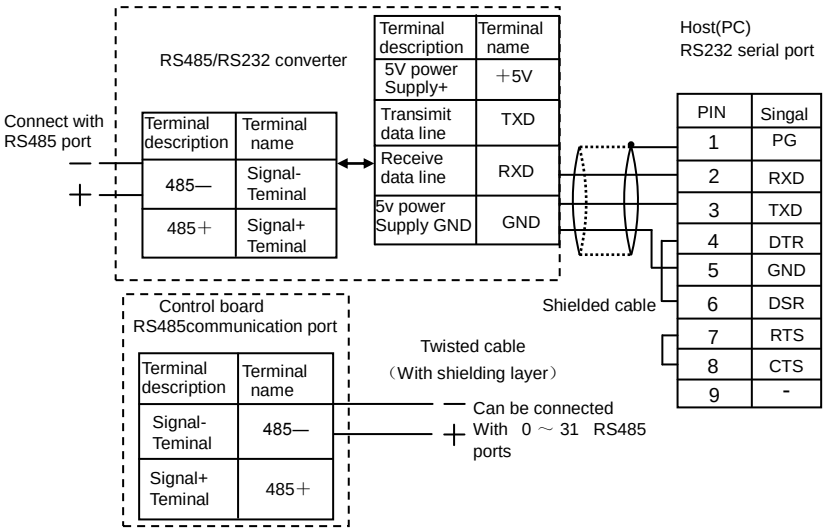


Figure 3-3 Connection of serial communication *port*

☆ Notes on relay cable connection

* Please refer Table 3-1 for the selection of relay cable.

* Surge suppressing circuit should be added for the inductive load (such as relay, contactor), for example: RC circuit (be careful that the leakage current should be lower than the relay maintenance current), voltage sensitive resistor, or diode (used in DC circuit, but the polarity must be paid attention).

* The components of suppressing circuits must be as close to the relays as possible.

☆ Checking connetion

*Check following after connection

* Any mistatke of connecion

* Any thrum or bolt left inside the equipment

* Whether the bolt not hard up

* Whether the bare conductor of terminal connecting with other ternimal

3.3.5 Schematic Diagram of Control Board

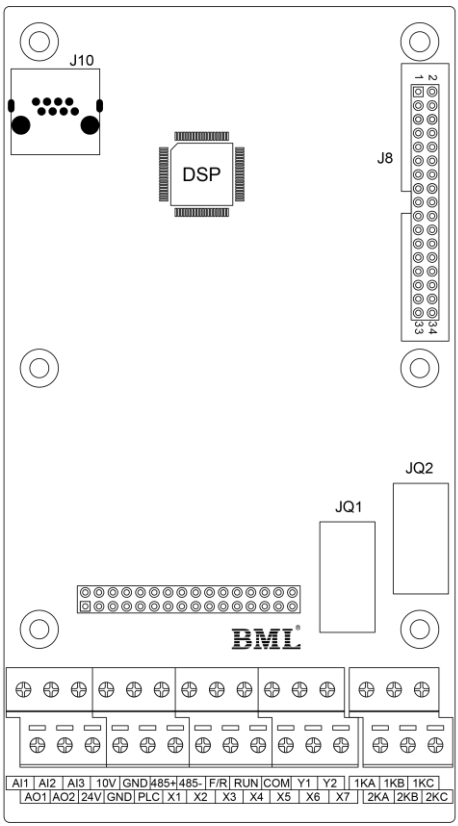


Figure 3-4 Schematic diagram of control board

一.AI1、AI2 Analog Input terminal：

1. Analog input terminal，Refer to the description of parameters F4-35 and F4-36.

二.AO1、AO2 Analog output terminal:

1. AO1 and AO2 analog output terminals，Refer to the description of parameters F5-12 and F5-25.

2. Analog output terminal Refer to the description of parameters F5-08 and F5-09.

Chapter 4 Display and operate Of Inverte

4.1 Panel Description

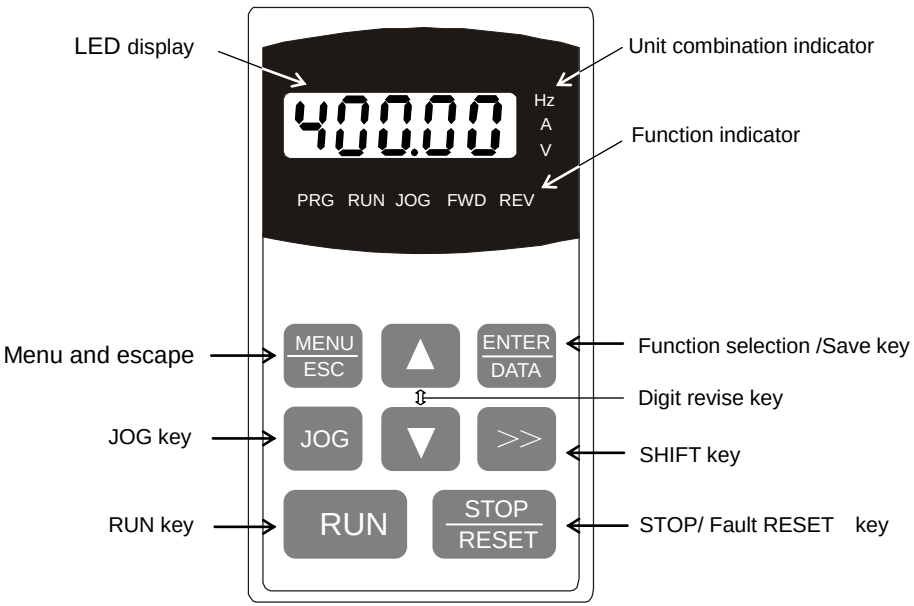


Figure 4-1 Panel and keys

4.2 Function description of panel key's function

Function description of the is shown in Table 4-1.

Key	Name	Function
MENU / ESC	Menu selection and switchover	Switchover of states of programming and others,displaying parameter and Switchover of the menus In programming state, pressing this key returns to the previous menu
ENTER / DATA	Function data	In program state, press this key to enter the next menu and finish saving the parameters in third level menu state

▲	Up	Increase of data or code
▼	Down	Decrease of data or code
>>	Shift	In the state of RUN and STOP, press this key to display parameters; when setting data, it can change the data's revising bit. accomplish special operation with ▲and ▼
JOG	JOG	In the panel control mode, press this key for JOG operation, the inverter stops after you release the key
RUN	Running direction shift	Press this key to reverse the inverter's running direction
STOP/RESET	Stop Reset	The key is for stoping the running of the inverter in running state, and for resetting in fault state. Press this key double times for emergent stop.

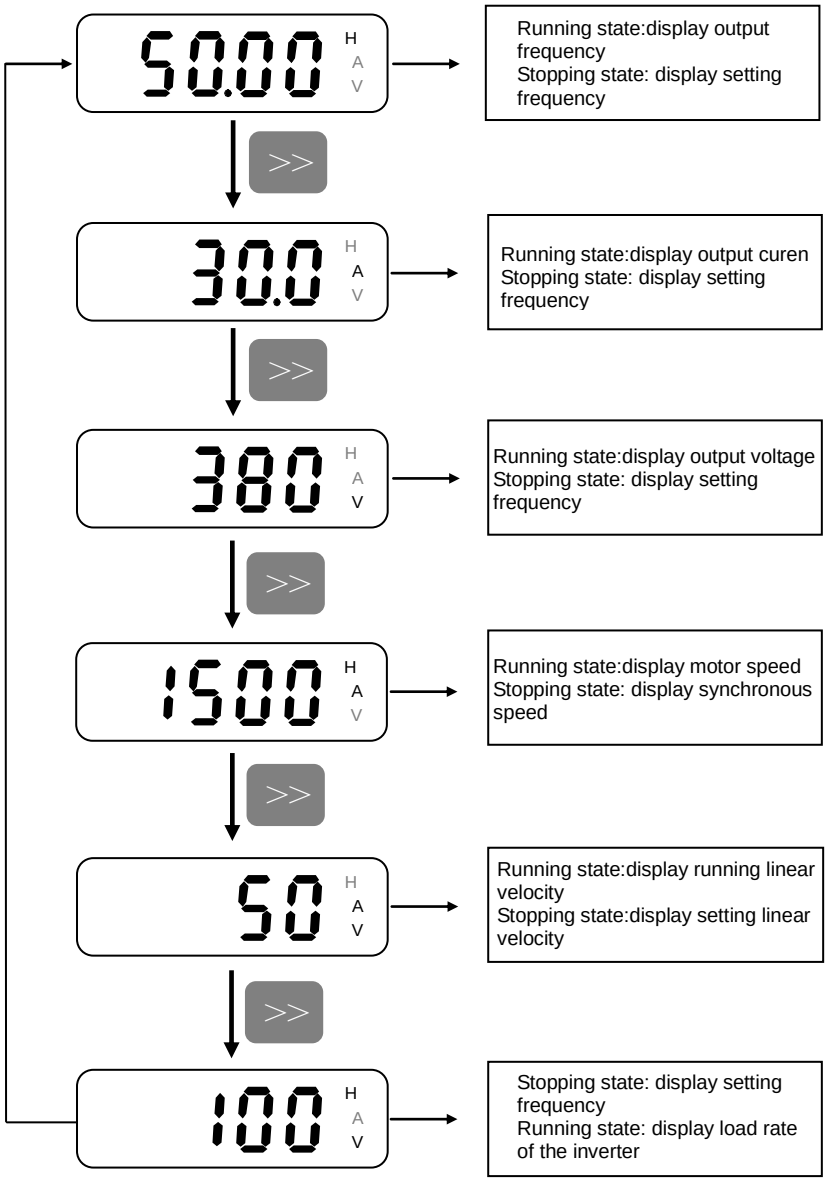
4.3 LED description of LED display and indicator

display and indicator

Name	description
LED display	5 digital LED display, which can display the output frequency, output electric current, output voltage, transmit, synchronous speed, load factor, line speed, and error
PRG	Programming status lamp: lamp on when invetor is in status of grogramming

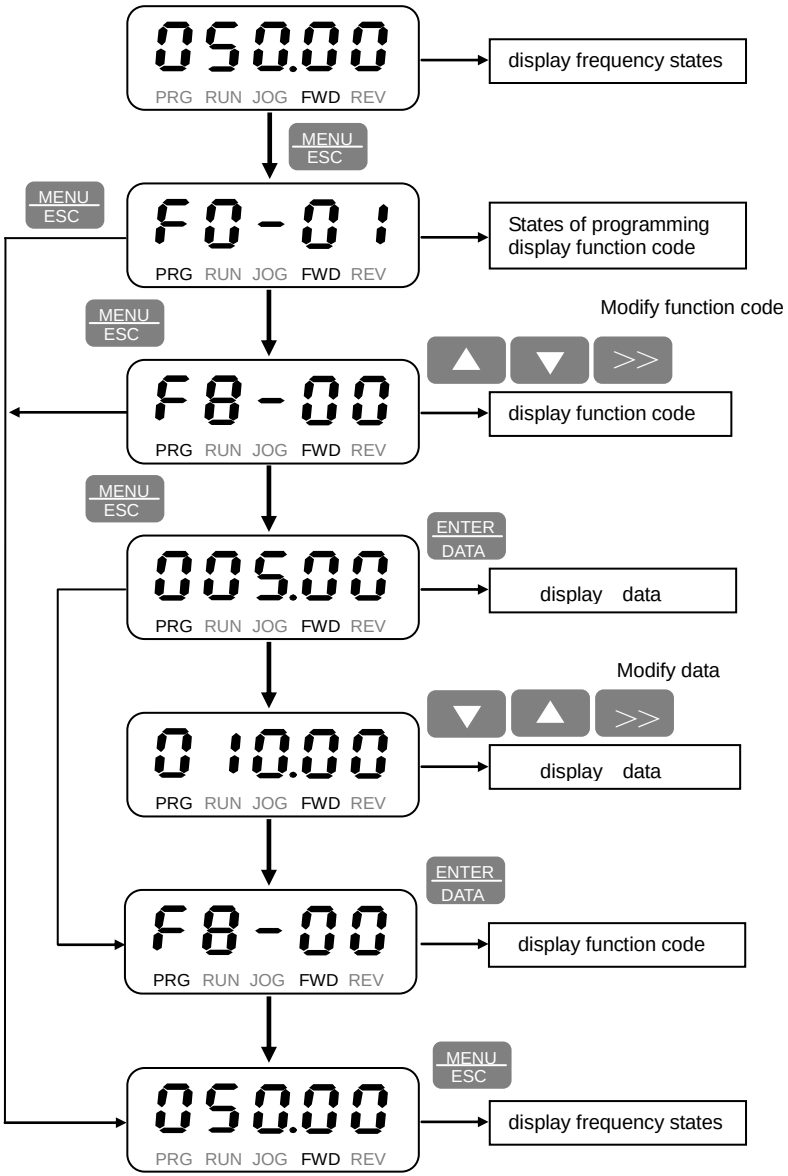
RUN	Operation status lamp: lamp on when invetor is in operation, lamp off when invetor is power off, lamp is twinkling when the setup frequency is lower than the starting frequency and the invetor is operating without output.
JOG	JOG running indicator: indicator on when invertor in JOG running.
FWD	Corotating moving indicator: indicator on when the invertor is corotational
REV	Reverse running indicator: indicator on when invertor is reversing.
Hz	Frequency indicator: indicator on when LED display shows the number of frequency
A	Electric current indicator: indicator on when LED display shows the number of electric current
V	Voltage indicator: indicator on when LED display shows the number of voltage
Hz+A	synchronous speed indicator: Hz and A indicators on simoutanously when LED display whows the number of synchronous speed under the setup frequency
Hz+V	load factor indicator: A and V indicator on simoutanously when LED displays the number of load factor of invertor
A+V	Line speed lmap: Hz and V lamps on simoutanously when LED displays the nuber of the line speed of invertor

4.4 LED swift of LED display



Swift of LED display

4.5 Function data alter and check



Function data alter and check

4.6 Trial run of invetor

4.6.1 Checking before trial run

☆ Machine installation

1.environment available for running, freely flowing of the cooled air

2.invertor correctly installed on flour and vertical untindery wall

☆ Electrical installation

1.main power suplly(input power) voltage should fit with the setup input voltage

2.main electric cable link to L1, L2, and L3, tightening torque meet the needs.

3.install appropriate mian power fuse and breaker.

4.Connect the cable of invetor to U, V and W terminal, tightening torque meet the needs.

5.Avoid others cable from the invertor cable.

6.Setup of voltage of brake resistor、fan、and invertor.

7.No power factor correction capacitor beside the cable.

8.Outside control of invetor has been connected.

9.No tools, outside materials and dusts for drilling left inside the invetor.

10.Don't connect main power supply(input power) voltage at the output terminal.

11.Sheld covered for the invetor, terminai box of the motor, and other equipment.

4.6.2 Sequency of trial operation

Follow the Table 4-3 in MC200G,MC200T/S trial operation when try running the inverter.

Table 4-3 Sequency of trial operation

operation	content
installation	Install the invertor following the installation setup. * confirm whether satisify the installation requirement.
connection	Connect the power and auxiliary equipment according to the requirments . *choose auxiliary equipment and lines which suitable for the capacity, and connect correctly.

Power on	Confirm following before switch on power supply, *whether input power cable connecting at input terminal of L1,L2 and L3. *output terminal U, V and W connect with input terminal of machine. *Control terminals connect with control equipment correctly, and terminal status is OFF. * Load Motor is idle load.
Power status	Confirm whether invetor is normal when power on: LED digital tube twinkling 50.00 and Hz indicator light on when invetor is normal. LED showing code for error when erroring, check the error code and treadment.
Idle load	Operate the invetor keyboard for idle loading Press RUU key on key board to start the invetor motor should smoothly spped up to setup frequency in speed up time 1.
Load running	After indle load normal, connect machine to load running *Press RUN key on the key board to start the invertor. *motor should smoothly spped up to setup frequency in speed up time 1.

4.6.3 Inverter operation of trial running

☆ switch on the power supply

1.Confirm the following before switch on the power supply:

Whether voltage of power is correct?

380V,3-phase,and 50/60 HZ

2.Whether power line connect the input terminal L1,L2,and L3.

3.Output terminal U, V and W connect with input terminal of machine.

4.Control terminal connect with control equipment correctly, and terminal status is OFF.

5.Moter is idle load.

6.If above are positive, the power supply may be switched on.

7.（+）、（-）are terminals for connecting outer brake unit.

8.The post-purchase services is not cover the damages caused by connetion error mentioned above.

☆Idle load running

When motor is idle loading, operate the invertor with key board, trial running the motor.

Operate following in trial running.

1.setup the reference frequency

The factory-set reference frequency is 50.OHz.

Before trial running, confirm the frequency F0-09 value is not over the factory-set frequency.

2.Start the invertor

Press the RUN key and release, the motor start to rotary, until reach the setup frequency.

Set the function data F8-19 which can change the direction of motor rotary.

Press STOP then motor rotary slowing down till stop.

3.Observation of running status

When change the command of invertor or rotary direction, observe whether the motor vibration and noising.

Confirm whether unexpected things happen when running the invertor

☆loading running

After indle load normal, connect machine to load running

1.Connect the machine loading

After the motor stop, connect loading machine

Fastening screw and fix the machine load to the axis of the motor

2.Start the invertor

Press the RUNN key on key board as in idle loading

Press STOP to shut off the motor

3.Observation the running status

Confirme the direction of loading mahine.

When change the command of invertor or rotary direction, observe whether the motor vibration and noising.

When running, swift the ‘>>’to observe whether the electricity is too large.

Chapter 5 Function Parameter list

1. Function parameter groups

MC200 Series inverter function parameters are divided into 17 groups according to their functions, each group contains several function codes that can be set to different values. When use keypad operation, the parameter group corresponds to first level menu, function code corresponds to second level menu, function code's setting value corresponds to third level menu.

2.Contents of function table:

Column 1 "function code": serial number of function parameters; Column 2"Name": complete name of function parameters; Column 3 "Setting range": function parameters' valid setting range, displayed on the LCD of keypad; Column 4 "Factory setting": function parameters' primary setting value before delivery; Column 5 "revise": function parameters' revise characteristic (that is whether the function parameter can be revised): Column 6 "type": name and serial number of function parameters;

"Δ"means that the parameter can be revised during inverter's running and stopping state;
"×" means that the parameter can not be revised during running;
" * "means that the actually measured or fixed parameters can not be revised;
"O" means that the parameter is set by the manufacturer and can not be changed by the user.

3.Function

Func code	Name	Setting range	Factory setting	Change	Profibus code
F0 ： Basic Function					
F0-00	G/T option Models indicator	1: G option 2: T option 3: S option	Depend on model	*	0
F0-01	Control mode	0： V/F control 1：Torque control 2：No PG vector control	2	×	1

		mode 1 3 ： No PG vector control mode 2			
F0-02	Running mode	0:Normal running 1：Simple PLC 2: Swing 3: Proccess PID 4:Multi-Step speed	0	×	2
F0-03	Running setup mode	0: Keypad 1: outer terminal 2: Host computrer	0	×	3
F0-04	Main **f**requency source A	0: Digital setting 1:AI1 setting 2:AI2 setting 3:Communication setting mode 4：AI3 setting	0	×	4
F0-05	Auxiliary frequency source B	0: Digital setting 1:AI1 setting 2:AI2 setting 3:Communicating setting mode 4：AI3 setting	0	×	5
F0-06	Reference of auxiliary frequency source B	0: Main **f**requency source A 1: Maximum frequency	1	×	6
F0-07	Frequency gaie of auxiliary frequency source B	0—100%	000	×	7
F0-08	requency source selection	0: Main **f**requency source A 1: Auxiliary frequency source B	0	×	8

		2: A+B superimposed 3: Max frequency source setting among A and B 4:A±B/2			
F0-09	Reference frequency	0.10—400.00Hz	50.00	∆	9
F0-10	Highest output frequency	50.00—400.00Hz	50.00	×	10
F0-11	High frequency limit	0.50—400.00Hz	50.00	∆	11
F0-12	Low frequency limit	0.1—400.00Hz	0.50	∆	12
F0-13	Carrier frequency	0—8	3	×	13
F0-14	Speed up time1	0.1—3600s	20.0	∆	14
F0-15	Speed down time1	0.1—3600s	20.0	∆	15
F1 Motor Parameters					
F1-00	Motor rated power	MC200G：0.75—450KW MC200T/S：1.5—450KW	Depend on model	×	256
F1-01	Motor rated voltage	220—440V	380	×	257
F1-02	Motor rated current	1.0—1000.0A	Depend on model	×	258
F1-03	Motor rated frequency	20—400.00Hz	50.00Hz	×	259
F1-04	Motor rated speed	500—24000rpm	Depend on model	×	260
F1-05	Stator resistance	0.001—65.535Ω	Depend on model	×	261
F1-06	Rotor resistance	0.001—65.535Ω	Depend on model	×	262
F1-07	Motor leakage inductance	0.01—655.35mH	Depend on model	×	263
F1-08	Motor mutual inductance	0.01—655.35mH	Depend on model	×	264
F1-09	Excitation current with no load	0.5—1000A	Depend on model	×	265
F1-10	Motor auto-tuning process	0:No operation 1:Start tuning	0	×	266

F1-11	Motor type selectino	0：Asynchronous motor 1：Synchronous motor	0	×	267
F2: Vector Control					
F2-00	ARS proportional gain 1	0—100	50	▵	512
F2-01	ARS integration time 1	0.00—10.00s	1.00	▵	513
F2-02	ASR switching frequency 1	0.00—400.00Hz	5.00	▵	514
F2-03	ASR proportional gain 2	0—100	80	▵	515
F2-04	ASR integration time 2	0.00—10.00s	1.00	▵	516
F2-05	ASR switching frequency 2	0.00—400.00Hz	10.00	▵	517
F2-06	ACR proportional gain	0.0—1000.0	200.0	▵	518
F2-07	ACR integral gain	0.0—1000.0	100.0	▵	519
F2-08	Filter time	0.001—0.200s	0.020s	▵	520
F2-09	Slip compensation rate of VC	0—200	100%	▵	521
F2-10	Motor torque limit	MC200G：0-200 MC200T/S：0-150	G：150 T：130	▵	522
F2-11	Brak torque limit	MC200G：0-150 MC200T/S：0-130	G：150 T：110	▵	523
F2-12	Drive torque setting mode	0：F2-10 setting	0	▵	524
F2-13	Brake torque setting mode	0：F2-11 setting	0	▵	525
F2-14	Starting torque setting mode	0.00-10.00	0	▵	526
F2-15	Excitation time	0.0008-8.000S	0	▵	527
F2-16	Excitation current	0-100%	10	▵	528
F2-17	Overvoltage control	MC200G：0-150% MC200T/S：0-130%	100	▵	529
F3:V/F Control Group					
F3-00	V/F curve mode	0: linear 1: self define 2: VF voltage proportional separation 3: VF voltage is completely separated	0	×	768

		4: Voltag superposition			
F3-01	Torque boost	0—50	0	×	769
F3-02	VF1 frequency	1.00—400.00Hz	6.00	×	770
F3-03	VF1 voltage	0—380V	6	×	771
F3-04	VF2 frequency	1.00—400.00Hz	15.00	×	772
F3-05	VF2 voltage	0—380V	34	×	773
F3-06	VF3 frequency	1.00—400.00Hz	25.00	×	774
F3-07	VF3 voltage	0—380V	95	×	775
F3-08	VF4 frequency	1.00—400.00Hz	35.00	×	776
F3-09	VF4 voltage	0—380V	186	×	777
F3-10	VF5 frequency	1.00—400.00Hz	45.00	×	778
F3-11	VF5 voltage	0—380V	307	×	779
F3-12	Auto slip compensation	0.00—10.00Hz	0.00	△	780
F3-13	AVR function	0: No action 1: Action	0	△	781
F3-14	Auto energy saving selection	0：Disable 1：Enabled	0	△	782
F3-15	Maximum output voltage	220V—440V	380	×	783
F3-16	Base frequency	10.00—400.00Hz	50.00	×	784
F3-17	VF separation voltage signal input selection	0:Analog input channel 1 1:Analog input channel 2	0	×	785
F4: Iinput terminal group					
F4-00	Input X1 terminal	0: No function 1: MS (multi-section) speed terminal 1 2: MS (multi-section) speed terminal 2 3: MS (multi-section) speed terminal 3 4: MS (multi-section) speed	0	△	1024
F4-01	Input X2 terminal		0	△	1025
F4-02	Input X3 terminal		0	△	1026
F4-03	Input X4 terminal		7	△	1027
F4-04	Input X5 terminal		0	△	1048
F4-24	Input X6 terminal		0	△	1049
F4-25	Input X7 terminal		9	△	1028

		terminal 4 5:Multi-Acc/Dec time terminal1 6:Multi-Acc/Dec time terminal2 7:RUN&JOG control input (JOGF) 8: F/R&JOG control input (JOGF) 9:External Reset(RESET) input 10: 3-wire running control input 11:Reserved 12:Reserved 13:External interrupt normally closed contact input 14:External interrupt normally open contact input 15:Switcht between panel operation and external terminal command 16:Exchange sets between main frequency source A and auxiliary frequency source B 17:UP/DOWN terminal clear command 18: Selection of PID 19: Emergency shutdown input 20:X1—X3 Reserved X4:Frequency increas command (UP)			

		X5:Frequency decreas command (DOWN) 21：Reserved 22：22：Terminal control DC braking 23：Broken line detection is invalid 24：Fixed stop 25：Emergency stop mode 2 26：Forced PO pulse output			
F4-05	RUN/F/R running mode Control selection	0: Two line mode 1 1: Two line mode 2 2: Three line mode1 3: Three line mode2 4: Three line mode3 5: Three line mode4	0	×	1029
F4-06	AI1 lower limit	0.00—10.20V	0.01	▵	1030
F4-07	AI1 lower limit corresponding setting	0.0—100.0%	0.0	▵	1031
F4-08	AI1 upper limit	0.00—10.20V	10.00	▵	1032
F4-09	AI1 upper limit corresponding setting	0.0—100.0%	100.0	▵	1033
F4-10	AI1 filter time	0.00—10.00s	1.00	▵	1034
F4-11	AI2 lower limit	0.00—10.20V	0.01	▵	1035
F4-12	AI2 lower limit corresponding setting	0.0—100.0%	0.0	▵	1036
F4-13	AI2 upper limit	0.00—10.20V	10.00	▵	1037
F4-14	AI2 upper limit corresponding setting	0.0—100.0%	100.0	▵	1038
F4-15	AI2 filter time	0.00—10.00s	1.00	▵	1039
F4-16	Action selection at external analog frequency/speed	0：No detect 1：Stop 2：operate with 80% of original	0	×	1040

	command missing	frequency 3：Running set by F4-7			
F4-17	F4-16 running frequency	0.10—400.00Hz	40.00	▵	1041
F4-18	AI1 measure analogy signal when connection fails	0.00—10.00	0.00	▵	1042
F4-19	AI2 measure analogy signal when connection fails	0.00—10.00	0.00	▵	1043
F4-20	Input terminal frequency control	0:storage of ▵F 1:no storage of ▵F 2:clear ▵F when stopping or disconnecting	0	▵	1440
F4-21	Types of input signal	0:switching signal 1:Pulse signal	0	▵	1045
F4-22	Input pulse frequency unit	0.01—2.00Hz	0.01	▵	1046
F4-23	I/O pulse multiplying power	0.01—10.00	1.00	▵	1047
F4-26	AI3 lower limit	0.00-10.20V	0.02	▵	1050
F4-27	AI3 lower limit corresponding setting	0.0-100.0%	0.0	▵	1051
F4-28	AI3 upper limit	0.00-10.20V	10.00	▵	1052
F4-29	AI3 upper limit corresponding setting	0.0-100.0%	100.0	▵	1053
F4-30	AI3 filter time constant	0.00-10.00S	1.00	▵	1054
F4-31	AI3 input zero	0.00-10.20V	0.02	▵	1055
F4-32	AI3 input zero hysteresis band width	0.00-10.20V	0.10	▵	1056
F4-33	Analog input filter hysteresis band width	0.00-100.00	0.00	▵	1057
F4-34	X4, X5 terminal input frequency increment rate setting mode	0：F4-22 setting 1：AI1 setting 2：AI2 setting	0	▵	1058

		3：Reserved			
F4-35	AI1 analog input	Tens place：0~1；0: Voltage mode，1：Current mode Ones place：0～3；output range setting Ones place =0:0~10V（0~20mA） Ones place =1：0～5V（0～10mA） Ones place =2：2～10V（4～20mA） Ones place =3：1～5V（2～10mA）	00	Δ	1059
F4-36	AI2 analog input	Refer to the description of parameters F4-35	12	Δ	1060
F5: Output terminal					
F5-00	Relay output selection1	0：Running 1： Stopping 2: Frequency reached 3：Specified Frequency 1 reached 4:Specified Frequency 2 reached 5：Inverter over load pre-alarm 6：External alarm 7: Keypad operation 8:Lower voltage stopping 9：PLC running 10：PLC cycle finished 11：PLC running cycle finished 12：One stage of PLC operation finished	15	Δ	1280
F5-18	Relay output selection2		15	Δ	1298
F5-01	Y1 function selection		0	Δ	1281
F5-02	Y2 function selection		1	Δ	1282

		13：Feedback hogh output 14：Feedback overlow output 15：Fault alarm 16 ： External analog frequency/speed missing output 17：Y1 pulse output 18: Relay: Reserved Y1: Frequency speed up output Y2: Frequency speed down output 19: Internal counter reaches output 20: The frequency converter is ready 21: Reserved 22: Running 23：Stop the pause frequency arrival			
F5-03	Frequency reach detection band	0.00—10.00Hz	1.00	▵	1283
F5-04	Specified detection frequency 1	0.10—400.00Hz	30.00	▵	1284
F5-05	Specified detection frequency 1 width	0.00—10.00Hz	2.00	▵	1285
F5-06	Specified detection frequency 2	0.1.—400.00Hz	40.00	▵	1286
F5-07	Specified detection frequency 1 width	0.00—10.00Hz	2.00	▵	1287
F5-08	AO1 output selection	0：Setup frequency 1：Output frequency	1	▵	1288
F5-09	AO2 output selection		2	▵	1289

		2：Motor current Output			
F5-10	AO1 zero offset adjustment	0—200	100	▵	1290
F5-11	AO1 gain setup	0—200	100	▵	1291
F5-12	AO1 polarity	Hundreds place：0~1；0：Positive，1：Negative Tens place：0～1；0：Voltage mode，1：Current mode Ones place：0～3；output range setting Ones place =0：0～10V（0～20mA） Ones plac =1：0～5V（0～10mA） Ones plac =2：2～10V（4～20mA） Ones plac =3：1～5V（2～10mA）	000	▵	1292
F5-13	AO2 zero offset adjustment	0—200	100.0	▵	1293
F5-14	AO2 gain setup	0—200	100.0	▵	1294
F5-15	AO2 polarity	Refer to the description of parameters F5-12	012	▵	1295
F5-16	PO Output selection	0：Setting ferquency 1：Output ferquency 3：Speed 4：Motor speed	1	▵	1296
F5-17	PO pulse multiplying power	1—200	10	▵	1297
F5-19	PO pulse rate reference source setting	0：F5-17 1：AI1 2：AI2	0	▵	1299

		3：AI3			
F5-20	Programmable Output 1 Source Selection	0~65535	8451	Δ	1300
F5-21	Programmable Output 2 Source Selection	0~65535	8452	Δ	1301
F6:Start and Stop Control					
F6-00	Speed search mode	0：restart inactive when power recover 1：Restart from 0Hz 2: Voltage alarm when over overcompensated in Speed search mode starting 3: flying restart tracking	0	×	1536
F6-01	Speed search waiting time	0.2—5.0s	0.5	Δ	1537
F6-02	momentary power failure	0.1—5.0s	2.0	Δ	1538
F6-03	Start frequency	0.10—10.00Hz	1.00	×	1539
F6-04	Start frequency holding time	0.0—20.0s	0.1	Δ	1540
F6-05	Acc/Dec selection	0: Line Acc/Dec 1: S Curve rule Acc/Dec	0	×	1541
F6-06	S-curve accel start-stage time	0.0—5.0s	1.0	Δ	1542
F6-07	S-curve accel end-stage time	0.0—5.0s	1.0	Δ	1543
F6-08	S-curve decel start-stage time	0.0—5.0s	1.0	Δ	1544
F6-09	S-curve decel end-stage time	0.0—5.0s	1.0	Δ	1545
F6-10	Stopping mode	0: Dec-to-stop 1: Coast to stop 2: Dec-to-stop+ DC braking	0	Δ	1546
F6-11	Initial frequency of DC injection braking	0.00—60.00Hz	5.00	×	1574

F6-12	DC braking	0—100	20	×	1548
F6-13	DC braking time	0.1—20.0s	5.0	×	1549
F6-14	Start delay time	0.0—6000.0s	0.0	×	1550
F6-15	Start cutoff frequency	0.00-400.00Hz	0.00	×	1551
F6-17	Power outage self-sustaining	0： Disabled 1： Enabled	0.0	×	1553
F7:Panel Display					
F7-00	Display on LED	0—6	0	△	1792
F7-01	Speed coefficient	0.01—100.00	1.00	△	1793
F7-02	Input terminal status				1794
F7-03	Output terminal status				1795
F7-04	Preset frequency				1796
F7-05	Output frequency				1797
F7-06	Output current				1798
F7-07	Output voltage				1799
F7-08	Output power				1800
F7-09	Preset speed				1801
F7-10	Output speed				1802
F7-11	Preset line speed				1803
F7-12	Output line speed				1804
F7-13	Load rate				1805
F7-14	PID reference				1806
F7-15	PID feedback				1807
F7-16	DC bus voltage				1808
F7-17	IGBT module temperature				1809
F7-18	Total quantity of electricity	0-60000			1810
F7-19	Total operated time	0.0-6000.0h			1811
F7-20	Total quantity of electricity	0;Clear of verboten 1: Clear	0	△	1812
F7-21	Total running time	0: Clear of verboten 1; Clear	0	△	1813
F7-22	Software version				1814

F7-23	AI1 input signal ratio				1815
F7-24	AI2 input signal ratio				1816
F7-25	AI3 input signal ratio				1817
F7-26	Keyboard multi-function shortcut（QUICK/JOG）	0: No function 1: Forward jog key 2: Reverse jog key 3: Forward and reverse switch 4:UP/DOWN Setting clear 5: Reserved			1818
F7-27	Software version				1819
F7-28	Programmable display settings	0~65535	1796	Δ	1820
F8: Auxiliary Parameters					
F8-00	Jog frequency	0.10—400.00Hz	5.0	Δ	2048
F8-01	Jog Acc time	0.1—600.0s	5.0	Δ	2049
F8-02	Jog Dce time	0.1—600.0s	5.0	Δ	2050
F8-03	Acc time 2	0.1—3600.0s	20.0	Δ	2051
F8-04	Dec time 2	0.1—3600.0s	20.0	Δ	2052
F8-05	Acc time 3	0.1—3600.0s	20.0	Δ	2053
F8-06	Dec time 3	0.1—3600.0s	20.0	Δ	2054
F8-07	Acc time 4	0.1—3600.0s	20.0	Δ	2055
F8-08	Dec time 4	0.1—3600.0s	20.0	Δ	2056
F8-09	Low jump frequency 1 limit	0.00—400.00Hz	0.00	Δ	2057
F8-10	High jump frequency 1 limit	0.00—400.00Hz	0.00	Δ	2058
F8-11	Low jump frequency 2 limit	0.00—400.00Hz	0.00	Δ	2059
F8-12	High jump frequency 2 limit	0.00—400.00Hz	0.00	Δ	2060
F8-13	Low jump frequency 3 limit	0.00—400.00Hz	0.00	Δ	2061
F8-14	High jump frequency 3 limit	0.00—400.00Hz	0.00	Δ	2062

F8-15	Suspend frequency when startting	0.00—400.00Hz	5.00	Δ	2063
F8-16	Suspend time when startting	0.0—10.0s	0.0	Δ	2064
F8-17	Suspend frequency when stopping	0.00—400.00Hz	2.00	Δ	2065
F8-18	Suspend time when stopping	0.0—6000.0s	0.0	Δ	2066
F8-19	Spinning direction	0: RUN 1: F/R 2: F/R inhibit 3：AI3 input control	0	×	2067
F8-20	Run command switching	0: disable 1:Enable	0	×	2068
F8-21	Frequency command switching	0: Disable 1: Enable	0	×	2069
F8-22	Switching selection	0: Disable 1: Enable	0	×	2070
F8-23	Switching frequency	0.00—400.00Hz	20.00	×	2071
F8-24	Cooling fan control	0: Auto running mode 1: Run all the time	0	Δ	2072
F8-25	RUN/F/R dead time	0.0—3000.0s	0.0	Δ	2073
F8-26	Power supply function selection	0: For inverter 1: For power inverter	0	×	2074
F8-27	Run command external limit selection	0：not limited 1：External terminal limit 2：Frequency zero limit 3：Power-on operation terminal turn-on limit	0	×	2075
F8-28	Input grid rated frequency	0~100.00Hz	50.00	×	2076
F9: Protection and Fault Group					
F9-00	Motor overload protection mode	0: Disable	0	Δ	2304

	selection	1: Enable			
F9-01	Motor overload protection factor selection	MC200G：020—150% MC200T/S：020-120%	105	▵	2305
F9-02	Inverter over load pre-alarm	0: Disable 1: Enable	1	▵	2306
F9-03	Over-voltage stall function selection	0: Disable 1: Enable	2	▵	2307
F9-04	Over-current function selection	0: Disable 1: Enable	1	▵	2308
F9-05	Stall over current point	MC200G:20—150% MC200T/S:20—130%	130	▵	2309
F9-06	Iner brake unit	0: Disable 1: Enable	1	▵	2310
F9-07	Fault auto-reset times	0—7	0	▵	2311
F9-08	Auto-reset time interval	1.0—20.0s	5.0	▵	2312
F9-09	Protection of brake resistor over heat	0: No Remind of resistor over heat 1:Remind of resistor over heat	0	▵	2313
F9-10	Inverter output phase failure protection	0: Protection disabled 1: Protection enabled	1	▵	2314
F9-11	Latest fault type				2315
F9-12	2nd last fault type				2316
F9-13	3rd fanlt type				2317
F9-14	Running frequency at last fault				2318
F9-15	Output current at last fault				2319
F9-16	Bus voltage at last fault				2320
F9-17	IGBT module temperature at last fault				2321
F9-18	Over-voltage protection times				2322
F9-19	Over-current protection times				2323
F9-20	Over-heat protection times				2324

F9-21	Built-in energy consumption brake setting	10-100%	50	Δ	2325
F9-22	Input phase loss protection detection level	0-1000.0	100.0	Δ	2326
F9-23	Output current warning threshold	10~200.0%	100.0	Δ	2327
F9-24	Output current warning delay time	0.0~60.0S	1.0	Δ	2328
FA: PID Pocess					
FA-00	PID running mode	0: PID running 1:Open-loop reference+PID running 2. Single PID operation lower limit shutdown 3. Open loop given + PID run 2	0	×	2560
FA-01	Open-loop reference source selection	0: AI1 1: AI2 2: AI1+AI2 3: Communication setting 4: FA—03 setting 5：F0-09 setting	1	×	2561
FA-02	Close-loop reference source selection		4		2562
FA-03	Reference digital setting	0.0—100.0	50.0	Δ	2563
FA-04	Higher limit	20.0—100.0	100.0	Δ	2564
FA-05	Lower limit	0.0—50.0	0.0	Δ	2565
FA-06	Close-loop feedback signal selection	0: AI1 1: AI2 2: AI1+AI2 3: Communication setting	0	×	2666
FA-07	Proportional gain P	0.0—200.00	70.00	Δ	2567
FA-08	Integration time Ti	0.01—100.00s	2.00	Δ	2568
FA-09	Differential time Td	0.0—100.0s	0.50	Δ	2569

FA-10	Sample cycle T	0.01—10.00s	0.5	∆	2570
FA-11	Error limit	0.0—99.9	0.5	∆	2571
FA-12	PID control polarity	0：Positive 1：Negative	0	×	2572
FA-13	PID lower limit	0.0—100.0	20.0	∆	2573
FA-14	PID upper limit	0.0—100.0	80.0	∆	2574
FA-15	feedback over-low limit protection value	0.0—100.0	20.0	∆	2575
FA-16	feedback overtop limit protection value	0.0—100.0	80.0	∆	2576
FA-17	Protection time	0.1—3000.0s	1800.0	∆	2577
FA-18	Sleeping Latency Time	0.1-600.0S	10.0	∆	2578
FA-19	Wakeup Time Delay	0.1-600.0S	5.0	∆	2579
FA-20	PID output reference	0：maximum value 1：AI1 2：AI2 3：Open loop given source 4: 485 communication setting	0	×	2580
FA-21	PID output limit range	0.0-900.0	100.0	∆	2581
FA-22	PID ratio correction frequency	0.00-400.00Hz	25.00	∆	2582
FA-23	PID ratio correction factor	0.000-2.000	0.000	∆	2583
FA-24	Sleeping Frequency	0.00-400.00Hz	0.00	∆	2584
FB: extension card function					
FB-00	Expansion card port control	0: Stop 1: Only allowed to send 2: Allow only to receive 3:Both sending and receiving are allowed	0	×	2816
FB-01~19	Reserved				
FB-02~99	Expansion card dynamic control				

FC: Simple PLC					
FC-00	Multi-frequency 1	0.00-400.00HZ	5.00	Δ	3072
FC-01	Multi-frequency 2	0.00-400.00HZ	10.00	Δ	3073
FC-02	Multi-frequency 3	0.00-400.00HZ	15.00	Δ	3074
FC-03	Multi-frequency 4	0.00-400.00HZ	20.00	Δ	3075
FC-04	Multi-frequency 5	0.00-400.00HZ	25.00	Δ	3076
FC-05	Multi-frequency 6	0.00-400.00HZ	30.00	Δ	3077
FC-06	Multi-frequency 7	0.00-400.00HZ	35.00	Δ	3078
FC-07	Multi-frequency 8	0.00-400.00HZ	40.00	Δ	3079
FC-08	Multi-frequency 9	0.00-400.00HZ	45.00	Δ	3080
FC-09	Multi-frequency 10	0.00-400.00HZ	50.00	Δ	3081
FC-10	Multi-frequency 11	0.00-400.00HZ	45.00	Δ	3082
FC-11	Multi-frequency 12	0.00-400.00HZ	40.00	Δ	3083
FC-12	Multi-frequency 13	0.00-400.00HZ	35.00	Δ	3084
FC-13	Multi-frequency 14	0.00-400.00HZ	25.00	Δ	3085
FC-14	Multi-frequency 15	0.00-400.00HZ	15.00	Δ	3086
FC-15	Multi-frequency 16	0.00-400.00HZ	8.00	Δ	3087
FC-16	PLC operation mode	0：proramm run N cycles After the stop 1: Last section program running after program run N cyclical 2：Continuous cycle	0	×	3088
FC-17	Segment of PLC running	1-16	1	Δ	3089
FC-18	PLC operation cycle number	1-5000	1	×	3090
FC-19	Phase 1 running time	0.1—3600.0s	4.0	Δ	3091
FC-20	Phase 1 direction and Acc/Dec time	(1-4)(0-1)	1-0	Δ	3092
FC-21	Phase 2 running time	0.1-3600.0s	4.0	Δ	3093
FC-22	Phase 2 direction and Acc/Dec	(1-4)(0-1)	1-0	Δ	3094

	time				
FC-23	Phase 3 running time	0.1-3600.0s	4.0	▵	3095
FC-24	Phase 3 direction and Acc/Dec time	(1-4)(0-1)	1-0	▵	3096
FC-25	Phase 4 running time	0.1-3600.0s	4.0	▵	3097
FC-26	Phase 4 direction and Acc/Dec time	(1-4)(0-1)	1-0	▵	3098
FC-27	Phase 5 running time	0.1-3600.0s	4.0	▵	3099
FC-28	Phase 5 direction and Acc/Dec time	(1-4)(0-1)	1-0	▵	3100
FC-29	Phase 6 running time	0.1-3600.0s	4.0	▵	3101
FC-30	Phase 6 direction and Acc/Dec time	(1-4)(0-1)	1-0	▵	3102
FC-31	Phase 7 running time	0.1-3600.0s	4.0	▵	3103
FC-32	Phase 7 direction and Acc/Dec time	(1-4)(0-1)	1-0	▵	3104
FC-33	Phase 8 running time	0.1-3600.0s	4.0	▵	3105
FC-34	Phase 8 direction and Acc/Dec time	(1-4)(0-1)	1-0	▵	3106
FC-35	Phase 9 running time	0.1-3600.0s	4.0	▵	3107
FC-36	Phase 9 direction and Acc/Dec time	(1-4)(0-1)	1-0	▵	3108
FC-37	Phase 10 running time	0.1-3600.0s	4.0	▵	3109
FC-38	Phase 10 direction and Acc/Dec time	(1-4)(0-1)	1-0	▵	3110
FC-39	Phase 11 running time	0.1-3600.0s	4.0	▵	3111
FC-40	Phase 11 direction and Acc/Dec time	(1-4)(0-1)	1-0	▵	3112
FC-41	Phase 12 running time	0.1-3600.0s	4.0	▵	3113
FC-42	Phase 12 direction and Acc/Dec time	(1-4)(0-1)	1-0	▵	3114
FC-43	Phase 13 running time	0.1-3600.0s	4.0	▵	3115

FC-44	Phase 13 direction and Acc/Dec time	(1-4)(0-1)	1-0	Δ	3116
FC-45	Phase 14 running time	0.1-3600.0s	4.0	Δ	3117
FC-46	Phase 14 direction and Acc/Dec time	(1-4)(0-1)	1-0	Δ	3118
FC-47	Phase 15 running time	0.1-3600.0s	4.0	Δ	3119
FC-48	Phase 15 direction and Acc/Dec time	(1-4)(0-1)	1-0	Δ	3120
FC-49	Phase 16 running time	0.1-3600.0s	4.0	Δ	3121
FC-50	Phase 16 direction and Acc/Dec time	(1-4)(0-1)	1-1	Δ	3122
FC-51	PLC Timing unit	0: 1(sec) 1: 1(min)	0	×	3123
FC-52	Program running data storage selection	0：No storage，stop clearing 1：No storage，Power outage clear 2：storage，terminal clear only	0	×	3124
FD: Serial Communication					
FD-00	Local address	0-31	1	Δ	3328
FD-01	Baud rate selection	0: 1200 1: 2400 2: 4800 3: 9600 4: 19200 5:38400 6:56000 7:857600	3	Δ	3329

FD-02	Data format	00：no parity(N.8.1) 1:even parity(E.8.1) 2:odd parity(O.8.1) 3:no parity(N.8.2) 4: even parity(E.8.2) 5: odd parity(O.8.2)	3	▵	3330
FD-03	Communication failure predication time	0.2—10.0s	2.0	▵	3331
FD-04	Communication error handling	0： No action 1： Alarm and continue to run 2： Stop	0	▵	3332
FD-05	Transmission response selection	0 ： Allow communication response 1 ： Prohibit communication response 2 ： Disable dedicated communication function	0	▵	3333
FE: Reserved function					
FF: Factory Reserved					
FF-00	Manufacturer password setup	0-65535	0	O	3840
FH: User Password					
FH-00	User password setting	0-9999	0	▵	4096
FH-01	Data protection	0: Disable 1: Enable	0	▵	4097
FH-02	Parameter initialization	0：No operation 1：Recover factory setting	0	×	4098
FH-03	Fault record clear	0: Disable 1: Enable	0	▵	4099

Chapter 7 Troubleshooting

7.1 Fault Alarm And Troubleshooting

When the inverter is abnormal, protection function acts: LED displays fault code, the inverter stops output and the motor coasts to stop.

MC200G/T series inverter's fault contents and troubleshooting is shown in Table 7-1.

After fault alarm occurs, fault phenomenon should be recorded in detail, the fault should be processed according to Table 7-1.

When in need of technical assistance, please contact your supplier.

Table 7-1 Alarms and troubleshooting

Fault code	Type of faults	Possible fault reasons	Troubleshooting
OC1	IGBT fault	1. Instantaneous overcurrent inside inverter. 2. Short circuits in output 3 phases or earthing. 3. Blocked air duct or damaged fan. 4. Internal short circuit of bridge in IGBT.	1. Refer to overcurrent solutions. 2. Re-wiring. 3. Clear air duct or replace fan. 4. Ask for service
LU	DC bus Under-voltage	1. Input voltage abnormal 2. Failure inside inverter	1: Check input power 2: Ask for service
OU	Over-voltage	1. Input voltage abnormal 2. Failure inside inverter	1: Check input power 2: Ask for service

OC2	Over-current	1. Low power of inverter. 2. 2. V/F curve or torque boost setup is not suitable. 3. Acc time including the tuning process is too short. 4. Inverter capacity is too low. 5. Too heavy load	1. Check the motor and wiring. 2. Adjust Acc time 3. Adjust V/F curve or torque boost. 4. Select inverter with proper capacity. 5. Check input power supply. 6. Check whether input phase loss occurs.
OC3	Short circuit to ground protection	1. Output short to ground 2. Inverting module failed	1.Check the wire connection. 2. Ask for service.
OH	Inverter overheat	1. Too high ambient temperature. 2. Blocked air duct. 3. Damaged fan. 4. Abnormal temperature detection circuit	1. Lower the ambient temperature. 2. Clear air duct. 3. Replace fan. 4. Ask for service
OL1	Inverter overload	1. Too short Acc time. 2. V/F curve is not suitable. 3. Restart the motor in running after momemtary stop. 4. Very low mains voltage. 5. Heavy load.	1. Prolong Acc time. 2. Adjust V/F curve. 3. Set start mode as speed tracing start. 4. Check mains voltage. 5. Select inverters with bigger ratings.

OL2	Motor overload	1. V/F curve is not suitable. 2. Very low mains voltage. 3. General motor runs with heavy load at low speed for long term. 4. Wrong setting of motor overload protection factor. 5. Motor choked or sudden change of load.	1. Adjust V/F curve. 2. Check mains voltage. 3. Select special motors for long term low speed running. 4. Setup motor overload protection factor right. 5. Check load.
Er0	Parameter saving failed	Fault occurs in the read-write of control parameters.	1. Press STOP/RESET to reset. 2. Ask for service
Er1	Peripheral fault	Close of external fault terminals	Check the reason
Er2	U current detecting circuit fault	1. Damaged Hall component. 2. Abnormal amplifier circuit or current detecting device	Ask for service
Er3	V current detecting circuit fault	Filter capacitor	Ask for service
Er4	W-phase current detecting circuit fault	1. Damaged Hall component. 2. Abnormal amplifier circuit or current detecting device	Ask for service
Er5	Temperature sensor fault	Failure in temperature sensor	Ask for service
Er6	Input phase	1. Input power Phase 2. Damaged Filter capacitor	Ask for service
Er7	X1 Terminal fault	1.Input signal fault 2.Damaged X1 Terminal	1.Inspect Input signal 2.Ask for service

Er8	X2 Terminal fault	1.Input signal fault 2.Damaged X2Terminal	1.Inspect Input signal 2.Ask for service
Er9	X3 Terminal fault	1.Input signal fault 2.Damaged X3 Terminal	1.Inspect Input signal 2.Ask for service
Er10	X4 Terminal fault	1.Input signal fault 2.Damaged X4Terminal	1.Inspect Input signal 2.Ask for service
Er11	X5 Terminal fault	1.Input signal fault 2.Damaged X5 Terminal	1.Inspect Input signal 2.Ask for service
Er12	RUN Terminal fault	Damaged RUN Terminal	1.Inspect RUN Terminal 2.Ask for service
Er13	F/R Terminal fault	Damaged F/R Terminal	1.Inspect F/R Terminal 2.Ask for service
Er14	communication fault	1. Wrong baud rate setup. 2. Communication fault in serial communication channel interference. 3. Communication time is too long	1. Adjust the baud rate. 2. Check the communication cables, whether they are connected well. 3. Retry
Er15	Analog input disconnection	1.Wires broken or peripheral devices failed 2.F04-18 or F04-19 not set properly	1.Check external wires and peripheral devices 2. Check the settings of F04-18 and F04-19
Er16	feedback over-low limit protection	1.Mis-setup of Feedback over-low protection 2. Mis-setup of PID parameters	1.Re-setup of Feedback over-low protection 2.Re-setup of PID
Er17	feedback overtop limit protection	1.Mis-setup of Feedback overtop limit protection 2. Mis-setup of PID parameters	1.Re-setup of Feedback overtop limit protection 2.Re-setup of PID parameters

7.2 Early warning

COde	Type of faults	Possible fault reasons	Troubleshooting
dd	DC braking	Inverter is in directe current brake state	No need to action, no indication after direct
ErA	External analog voltage/current input signal cable broken fault	1. the analog input signal cable is broken. 2.F04-18 or F04-19 not set properly.	1. Check wiring and re-wire again. 2. Adjust the feedback signal input type
OLP1	Inverter overload pre-alarm	Indicat the inverter overlaod and will reach the protection point	The same as OL1
OLP2	Motor overload pre-alarm	Indicat the motor overlaod and will reach the protection point	The same as OL2
dbH	Braking resistor overheating	Indicat overtemprature of brake resistor	Checke and change stranger power of brake resistor
Er485	Communication abnormal	485 communication over-time	The same as Er14

7.3 security code clear

If user forget the security code, input ‘1234’ at FH-00, at the same time press ‘》’and ‘∧’, to clear the security code.

Chapter 8 Preservation And Maintenance

Potential hazards exist due to aging, wear and tear of inverter internal components as well as environmental influences to the inverter, such as temperature, humidity, PH value, particles, vibration etc. Therefore, daily inspection, periodic preservation and maintenance must be performed to the inverter and its driving mechanism during their storage and operation.

If the inverter is transported for a long distance, routine inspections such as integrity of components and tightening of screws must be done before using the inverter.

During normal operation, clean the dust inside the inverter periodically, and check if the screws become loose.

If the inverter has not been used for a long time, it is recommended to energize it once every six months for more than half an hour to prevent the internal electronic elements from becoming unusable.

⚠ Danger
When power is turned on for inverters stored for more than two years, voltage regulator shall be used to increase the voltage slowly to avoid hazards of electric shock and explosion.

⚠ Danger
During inverter operation the voltage is very high. Wrong operation may result in serious personal injuries. Within a certain period of time after the power is cut off, for a higher voltage is still present in the inverter. Maintenance of inverters can shall only be done by qualified professionals after training. Before maintenance operation, maintenance personnel must take off personal metal articles such as: watches, rings. Working uniforms and tools used during the operation must satisfy insulation requirements to avoid electric shock.

Attention
The following must be verified before inspection and maintenance of inverter to avoid electric shock hazards: Before the following four checks are completed, it is forbidden to touch power main circuit terminals and any other parts inside the inverter directly or with metal tools; Switch Cut off power supply source of the inverter, and wait for no less than 10 minutes; Open the inverter cover board after all indicator LED lamps are off; Charge indicator lamp at lower part inside inverter right side is off; Measure the voltage by DC voltmeter between power main circuit terminals P and N is below DC 36V using a DC voltmeter;

8.1 Daily Preservation And Maintenaning

We should do routine maintenance work, to ensure a good operating environment.

Daily operation data, parameter setting data and parameter modifications shall be well recorded to set up complete inverter application logs.

Various abnormal working conditions can be discovered in time through daily preservation and inspection. This can facilitate prompt investigation of the abnormal conditions in order to solve the problems quickly. These routine preservation and maintenance can ensure normal operation of the equipment and can extend the lifetime of inverter.

Daily inspections to be performed are listed in Table 8-1.

Table 8-1 Daily inspections

Items to be checked	Inspections			Criteria
	Inspection content	Frequency	Means/method	
Operation environment	(1) Temperature, humidity	At any time	(1) Point thermometer,hygrometer	(1) Ambient temperature shall be lower than 40°C, otherwise, the rated values should be decreased. Humidity shall meet the requirement
	(2) Dust, vapor, leakage		(2) Observation	(2) No dust accumulation, no traces of water leakage and no condensate
	(3) Gases		(3) Visual examination and smelling	(3) No abnormal color and smell
Inverter	(1) Vibration	At any time	(1) Comprehensive observation	(1) Smooth operation without vibration
	(2) Cooling and heating		(2) Point thermometer, comprehensive observation	(2) Fan is working in good condition. Speed and air flow are normal. No abnormal heat
	(3) Noise		(3) Listening	(3) No abnormal

				noise
Motor	(1) Vibration	At any time	(1) Comprehensive observation, listening	(1) No abnormal vibration and no abnormal noise
	(2) Heat		(2) Point thermometer	(2) No abnormal heat.
	(3) Noise		(3) Listening	(3) No abnormal noise.
Operation status parameters	(1) Power input voltage	At any time	(1) Voltmeter	(1) Satisfying the specification
	(2) Inverter output voltage		(2) Rectifying voltmeter	(2) Satisfying the specification
	(3) Inverter output current		(3) Ammeter	(3) Satisfying the specification
	(4) Internal temperature		(4) Point thermometer	(4) Temperature rise is lower than 40°C

8.2 Periodic Maintenance

Depending on the operation environment and periodic inspection can be made by the user at 3 to 6 months intervals in compliance with the maintenance precautions.

The periodic maintenance can avoid inverter faults and can thus ensure the stable operation with high performance for a long time.

⚠ Attention
1: Maintenance of the inverter can only be performed by qualified professionals. 2: Metal parts such as screws, washers, conductors and tools must not be left inside the inverter to avoid damages to the inverter. 3: Modification of inverter internal structure is strictly forbidden to ensure normal running of the inverter.

Note：

Do not touch directly the static sensitive IC elements on the control board inside the inverter.

General inspections:

1. Check if screws of control terminals are loose. If loose, tighten them with screw driver;

2. Check if the contact of main circuit terminals is good or not, and whether copper bus connections are overheated;

3. Check if there are damages on power cables and control cables, specially check if there are any cuts on the cable skin which is in contact with the metal surface;

4. Check if insulation binding tapes on power cable connection lugs fall off;

5. Clean thoroughly the dust on the printed circuit board and ventilation ducts. Vacuum cleaner is recommended;

6. Before performing insulation tests, all connections between inverter and power source as well as between inverter and motor should be removed, and all main circuit input/output terminals should be short-circuited with conductors.

Then proceed insulation test to the ground. Certified 500V megohmmeter (or corresponding range of insulation tester) must be used. Do not use instruments with defects.

Insulation test of single main circuit terminal to ground is forbidden, otherwise the inverter might be damaged.

Do not perform insulation test to control terminals to avoid inverter damages.

After testing, short circuit conductors of main circuit terminals must be disconnected.

7. Precautions to be taken when the insulation test of motor is performed: Before insulation test of the motor is performed, connections between the motor and the inverter must be dismantled.

After dismantling, perform the insulation test of the motor separately to avoid damage of the inverter.

Note：

Dielectric test of the inverter is already done in the factory. It is not necessary for the user to make dielectric test again in order to avoid potential damage of its internal components.

8.3 Replacement Of Inverter Consumable Parts

Main consumable parts for the inverter are: cooling fan and electrolyte capacitors for filters.

Their lifetimes depend largely on their application environment and preservation.

Their lifetimes in normal conditions are listed below:

Part	Lifetime
Fan	30,000~40,000 hours
Electrolyte capacitors	40,000~50,000 hours
Relay TA/TB/TC	About 100,000 times

The user can determine normal replacement frequency according to the reference lifetime of these consumable parts and according to the inverter working conditions.

However, when abnormal is discovered during inspection, the component must be replaced at once.

During replacement, the types and electrical parameters of the elements should be completely consistent with or very much the same as the original ones.

Note

Replacing original elements using the spare elements of different type and different electrical parameters may damage the inverter!

1. Cooling fans

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

Criteria: After the power is cut off for the inverter, check if abnormal conditions such as crack exists on fan vanes and other parts. When the power is turned on for the inverter, check if inverter running is normal, and check if there is any abnormal vibration.

2. Electrolyte capacitors

Possible cause of damages: high ambient temperature and aging of electrolyte due to large pulse current induced by frequent leaping changes of loads.

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

8.4 Storage Of Inverter

1. Storage conditions shall satisfy storage requirements.

Table 8-2 Storage environment of inverter

<table>
<tr><th>Environmental conditions</th><th>Requirements</th><th colspan="2">Remark</th></tr>
<tr><td>Ambient temperature</td><td>-20℃～60℃</td><td>Ambient temperature shall not exceed 30°C during long term storage of the inverter, in order to prevent deterioration of capacitor properties</td><td>Condensation and freeze resulted by sudden temperature changes should be avoided</td></tr>
<tr><td>Relative humidity</td><td>20～90%</td><td colspan="2" rowspan="2">Inverter can be covered by plastic films, and desiccant can be used</td></tr>
<tr><td>Storage conditions</td><td>No direct sunlight, no dust, no corrosive or explosive gases, no oil fog, no vapor, water drops, and no vibration. Salt content shall also be controlled</td></tr>
</table>

2. Long term storage can result in performance deterioration of electrolyte capacitor.

Electrolyte capacitor shall be periodically energized for the purpose of preservation.

It is recommended to energize the inverter under long term storage once every 6 months for more than thirty minutes.

The inverter can running without load.

8.5 Warranty Of Inverter

Warranty repair services will be provided by our company in case the following situations occur on the inverter (body):

1.Warranty period is 12 months (starting from the product delivery to user date)or 18 months(starting from the product delivery date from factory), will charge reasonable fee for repair and maintenance outside the warranty period.

2. Even within warranty time range , maintenance will also be charged in the following situations:

1） Damages incurred to the drive due to mis-operations, which are not in compliance with the User Manual;

2) Damages incurred to the mis-wiring；

2） Damages incurred to the drive due to fire, flood, abnormal voltage, etc;

3） Damages incurred to the drive due to the improper use of drive functions.

3. The service fee will be charged according to the actual costs. If there is any contract, the contract prevails.

Chapter 9 Options

9.1 Braking Assembly

MC200G0007T4～MC200G0220T4,MC200T/S0015T4～MC200T/S0300T4 have built-in braking units, the user only needs to select external braking resistors.

For MC200G0220T4～MC200G4500T4, MC200T/S0300T4～MC200T/S4500T4 both external braking units and braking resistors should be used.

9.1.1 Braking Unit

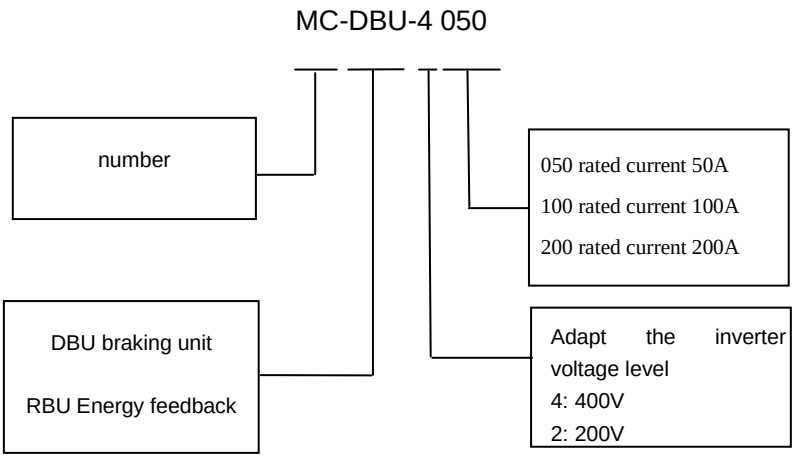


Figure 9-1 brakeing unit

9.1.2 Braking resistor

To meet the requirement on braking torque of 100% and brake unit utility rate of 10% (ED%), the configuration of brake resistor and brake unit is listed below:

Table 9-1 Configuration of braking unit and braking resistor

Voltage（V）	Inverter Power (kw)	Braking resistor（Ω）	Brake resistor power（W）	Braking torque（%）	Braking unit
3AC 400V	0.75	750	80	100	Built-in
	1.5	400	260	100	Built-in
	2.2	150	390	100	Built-in

	4	150	390	100	Built-in
	5.5	100	520	100	Built-in
	7.5	75	1000	100	Built-in
	11	50	1000	100	Built-in
	15	40	1560	100	Built-in
	18.5	32	5000	100	Built-in
	22	28	5000	100	Built-in
	30	20	6000	100	
	37	13.6	9600	100	
	45	13.6	9600	100	
	55	13.6	9600	100	
	75	13.6	9600	100	
	90	13.6	9600	100	
	110	13.6	9600	100	
	132	4	30000	100	External
	160	4	30000	100	
	185	3	40000	100	
	200	3	40000	100	
	220	3	40000	100	
	250	2	60000	100	
	280	2	60000	100	
	315	2	60000	100	

Note:

1.When the needed braking torque is not 100%, Can be adjusted according to actual needs.

2. After brake resistor is chosen, the resistor power (P),take it as long-time duty ,must be adjusted also and can be calculated as in the following methods:

1) Calculation for long- term operation:

$P = I^2 / R$

Where, R is the brake resistor.

2) For weight lifting application, putting the weight down is also part of the work cycle. Besides, the process of putting down is usually intermittent. Therefore the utility rate ED%, should be set according to the actual situation to minimize the brake resistor power. In that way, the braking resistor power “P” can be calculated through the following formula:

$P = a \times (I^2/R) \times ED\%$

3.You can determine the value of according to the proportion that the brake resistor’s work cycle amount to in the total work cycle, as well as the ventilation of the brake resistor.

3. The resisitance of brake resistor should ensure that the current through the resistor (Ic) is smaller than brake unit’s output current capacity.

The capacities of various brake units are listed as table 9-2 below for your reference:

Table 9-2 output ability brake units

Brake unit model	Max. transient current (A)
MCL-4-0185	50
MCL-4-0370	75
MCL-4-0550	100

The current of through the brake resistor (Ic) can be calculated as through the following formula: Ic = 800 / R.

9.1.3 Connections And Functions Of External Braking Unit

1. Connection of braking unit and braking resistor is shown in Figure 9-4.

2. Main functions

Adjustable braking voltage

Brake resistor time out protection

Radiator overheat protection

Module abnormal alarm

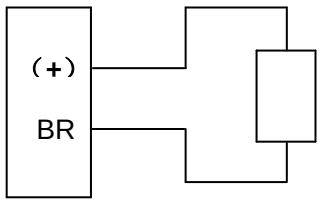
Fault display and fault relay output

Automatic cut-off of braking resistor power and relay alarm output

Cables connecting braking unit with the inverter and cables connecting braking unit with braking resistor should be no longer than 5m. If the cable length exceeds 5m, twisted pair cables should be used .

MC200G0007T4～MC200G0185T4

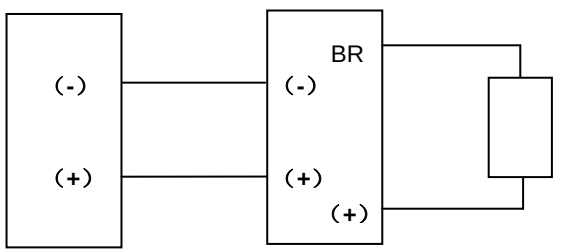
MC200T/S0015T4～MC200T/S0220T4



Inverter braking resistor

MC200G0220T4～MC200G4500T4

MC200T/S0300T4～MC200T/S4500T4



Inverter braking unit braking resistor

Figure 9-2 Connection of braking unit and braking resistor

9.2 AC & DC Reactors

9.2.1 AC Reactors

The input AC reactor can suppress the higher harmonic of the inverter input current and obviously improve the power factor. So it is recommended to use adopt it in following cases:

1.The ratio of the power supply capacity to inverter capacity greater than 10:1.

2.Input voltage unbalance rate of 3-phase power supply more than or equal to 3%.

3.The power factor on the input side is required to improve. It may creased to 0.75~0.85.

4.The effect is very good to use putput AC reactor for keeping down the transmitting

interference and inductive disturbance, and keeping down the vibration of the motor voltage.

9.2.2 DC Reactors

When the power grid capacity is greater than 600 kVA or far more greater than the inverter's capacity, or the needs of improving the power factor is very important, a DC reactor should be used in connecting on direct current bus connected between P1 and P+.

The DC reactor can be used together with the AC reactor. It also effectively decreases the higher harmonics and can raise the power factor up to 0.95.

9.3 EMI Filter

Filter suppresses not only the generated by inverter generated radio interference, but also the external radio interference andthe transient shock & surge interference with the inverter.

The radio noise filter should be adopted in following cases:

1. The requirement of anti-radio interference is highly emphasized.
2. Meets CE, UL and CSA standards is required.
3. There are devices with poor anti-interference ability around the inverter.

The filter should be located as close as possible to the inverter, with the wiring as short as possible.

The filter should be located as close as possible to the inverter, with the wiring as short as possible.

9.4 Keypad Communication Cable

Available cables (length): 1.5m, 2m,5m,10m,15m,20m……500m.

9.5 Specifications of AC input/output and DC reactor

Inverter Power (kw)	AC Input reactor		AC Output reactor		DC reactor	
	Current （A）	Inductance （mH）	Current （A）	Inductance (uH)	Current (A)	Inductance (mH)
1.5	5	3.8	5	1.5	6	11
2.2	7	2.5	7	1	6	11
4.0	10	1.5	10	0.6	12	6.3
5.5	15	1.0	15	0.25	23	3.6
7.5	20	0.75	20	0.13	23	3.6
11	30	0.60	30	0.087	33	2
15	40	0.42	40	0.066	33	2
18.5	50	0.35	50	0.052	40	1.3
22	60	0.28	60	0.045	50	1.08
30	80	0.19	80	0.032	65	0.80
37	90	0.16	90	0.030	78	0.70
45	120	0.13	120	0.023	95	0.54
55	150	0.12	150	0.019	115	0.45
75	200	0.10	200	0.014	160	0.36
90	250	0.06	250	0.011	180	0.33
110	250	0.06	250	0.011	250	0.26
132	290	0.04	290	0.008	250	0.26
160	330	0.04	330	0.008	340	0.18
185	400	0.04	400	0.005	460	0.12
200	490	0.03	490	0.004	460	0.12
220	490	0.03	490	0.004	460	0.12
250	530	0.03	530	0.003	650	0.11
280	600	0.02	600	0.003	650	0.11
315	660	0.02	660	0.002	800	0.06
355	400*2	0.04	400*2	0.005	460*2	0.12

9.6 Specification of input filter and output filter

Inverter Power (kw)	Input Filter	Output Filter
0.75/1.5	NFI-005	NFO-005
2.2	NFI-010	NFO-010
4.0	NFI-010	NFO-010
5.5	NFI-020	NFO-020
7.5	NFI-020	NFO-020
11	NFI-036	NFO-036
15	NFI-036	NFO-036
18.5	NFI-050	NFO-050
22	NFI-050	NFO-050
30	NFI-065	NFO-065
37	NFI-080	NFO-080
45	NFI-100	NFO-100
55	NFI-150	NFO-150
75	NFI-150	NFO-150
90	NFI-200	NFO-200
110	NFI-250	NFO-250
132	NFI-250	NFO-250
160	NFI-300	NFO-300
185	NFI-400	NFO-400
200	NFI-400	NFO-400
220	NFI-600	NFO-600
250	NFI-600	NFO-600
280	NFI-900	NFO-900
315	NFI-900	NFO-900
355	NFI-1200	NFO-1200

Chapter 10 record of user parameter setup

number	parameter	User setup	Factory value	number	parameter	User setup	Factory value

Appendix 1 Requirements In Dusty Environment such as cable industry

In a dusty environment, particularly where metal dust or floc may accumulate, proper dust-proof measures are necessary to ensure inverter normal operation.

A. Installation planning

1. The inverter should be equipped in cabinet.

2. It is recommended to install the inverter at the middle or lower part of the cabinet. the inverter should be located Install it vertically.

Do not mount component parts directly above or below the inverter to avoid blocking the wind path.

3. The clearance around the inverter should be at least 300mm, as shown by H1 & H2 in the following figure

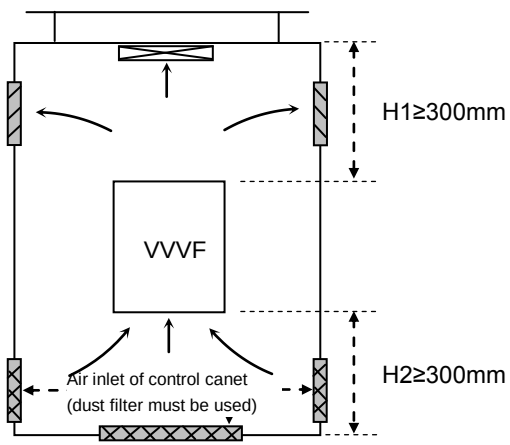


Figure 1 Inverter installation

4. If the keypad has to be removed in use, the holes on inverter front panel must be sealed with adhesive tape to keep the dust out.

If the tape is removed during maintenance, remember to seal the holes again before powering the inverter.

5. Inverters running in dusty environment must be cleaned periodically. The interval should be set to 2~3 months or shorter, for where the more dust there is, the more risky it is to the inverters.

6. Follow the requirements in this manual when other basic stallation and operation requirements in this manual. If Should there is be any questions, please contact the technical supporter personnel in time.

B. Ventilation, dust control and maintenance of control cabinet

1. Overall requirement: The cabinet should be sealed, with specially designed inlet and outlet for ventilation. On top of the cabinet there should be air outlet, protection grid and cover.

   On bottom top of the cabinet there should be bottom plate, cable inlet, air inlet and dust screen.

2. Air duct design should be reasonable so that an effective air duct. Ffree airflow helps prevent dust accumulation.

3. The cabinet top should be mounted with protection grid and protection cover. The height of the protection cover should not block the ventilation.

4. The inlet of the axial flow fan inside the cabinet should be covered with protection grid. Make sure the fan rotation direction is correct, drawing wind from outside the cabinet.

5. Seal the seams on the cabinet to keep the dust out.

6. All the cable/air inlets on the cabinet should be covered with dust screen.

For easy clearing and maintenance, the dust screen should be movable and made of metal. The size of the screen mesh should be small enough to keep the floc out.

7. The control cabinet must be cleaned periodically of dust and floc. In a very dusty environment, the interval for cleaning should be about a month.

Appendix 2 Inverter EMC Design & Installation Instruction

For your reference, this section introduces inverter EMC design and installation instruction.

The covered topics :

1) Noise suppression.

2) Wiring.

3) Grounding.

4) Surge absorption by external equipment.

5) Current leakage.

6) Classification of safety areas and installation planning and attention instructions.

7) Power source filter application.

8) Radiated noise handling.

A. Noise suppression

Noise is unavoidable during inverter operation. Its fluence over peripheral equipment is related to the noise type, transmission means, as well as the design, installation, wiring and grounding of the driving system.

1. Noise type

See the following figure.

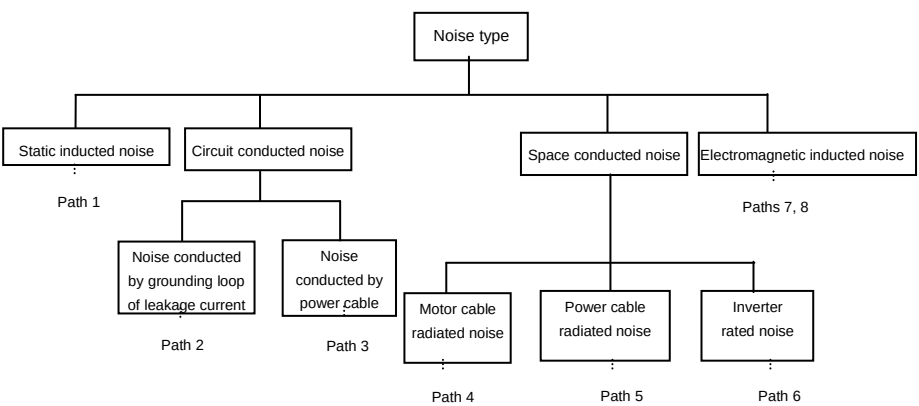


Figure 3 Noise type

2. Noise suppression methods

The methods of noise suppression are listed in the table below:

Means of noise transmission	Noise and its suppression method
③	When peripheral equipment share the same power source with the inverter, the noise transmitted through the power line may misoperate the peripheral equipment. Solution: Mount a noise filter at inverter input side, or isolate the peripheral equipment with an isolated transformer or power filter.
④⑤⑥	Electronic equipment such as computers, measuring meters, radio equipment and sensors, when in the same cabinet with inverter, with their wiring close to the inverter, may misoperate due to radio interference. Solution: 1) The susceptible equipment and its signal lines should be kept away from the inverter. Use shielded cable for the signal line. Ground the shielding coat. Protect the signal cable with a metal pipe and keep it off the inverter input/output cable. When crossing of the signal line and the inverter input/output cables is inevitable, make sure it is orthogonal. 2) Mount radio noise filter or linear noise filter (choke coil) to the input/output side of the inverters to suppress the radio noise. 3) The shielding coat for the cable connecting inverter and the motor should be thick. The wiring can be arranged through thick pipe (2mm or thicker) or cement trench. The cable should be through a metal pipe, and has its shielding coat grounded. You may use the 4-core cable as the motor power cable. Ground one core at inverter side, with the other end of it connected to the motor case.

①⑦⑧	When the signal cables are parallel to, or bound together with the power cables, the static and electromagnetic induction will cause the noise transmit through the signal cable, misoperating the related equipment. Solution: 1) Avoid laying the signal cables parallel to the power cable, or bind them together. 2) Keep the susceptible peripheral equipment away from the inverter. 3) Keep the susceptible signal cables away from the input/output cables of inverter. Shielded cables should be used as the signal or power cable. Lead them through metal pipes respectively would achieve better effect. The metal pipes should be at least 20cm away from each other.
②	If a closed loop is formed between the peripheral equipment and the inverter wiring, the grounding leakage of the inverter will misoperate the equipment. Solution: grounding of the peripheral equipment.

B. Wiring requirement

1. The control signal cables and power/motor cables should be laid separately and kept away as far as possible to avoid interference. This is particularly important when the cables are parallel and extend for a long distance.

When crossing of the control signal cable with power/motor cable is inevitable, the crossing must be orthogonal.

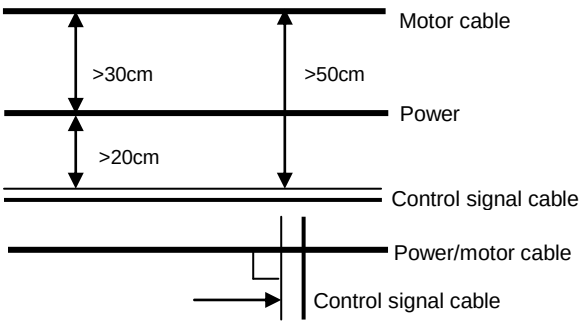


Figure 2-2 Wiring requirement

2. High-frequency low-resistance shielded cables should be used.

3. Use shielded cable as the control cable. Besides, the shielding metal net must be connected to the metal case through cable clamps at both ends.

C. Grounding

1. There are 3 grounding methods as listed below:

（1）Dedicated grounding terminal (the best):

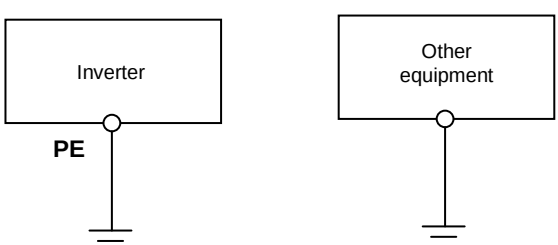


Figure 2-3 Dedicated grounding terminal

（2）Shared grounding terminal (acceptable):

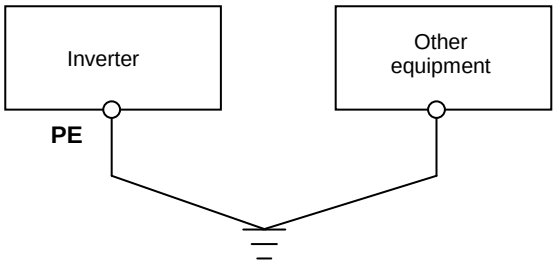


Figure 9 Shared grounding terminal

（3）Shared grounding cable (unacceptable):

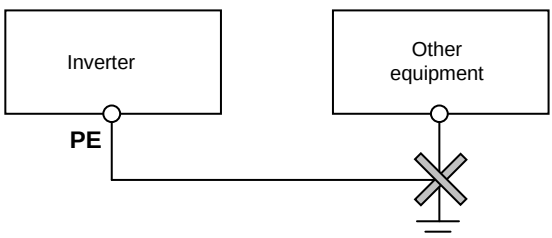


Figure 2-5 Shared grounding cable (a)

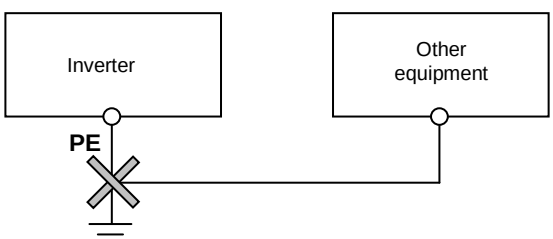


Figure 2-6 Shared grounding cable (b)

2. Grounding cable connection instructions

（1）Reduce the grounding resistance to the minimum by selecting cables as thick as possible. Besides, the flat cable is preferable to the round cable, for the former one has lower high frequency impedance. Because the grounding cable should be the shorter the better,

the grounding point should be near the inverter.

（2）If 4-core cables are used, one of the 4 cores should be grounded at inverter side, with the other end of it grounded at motor side. It is most desirable if both motor and inverter have their own grounding terminals.

（3）If various parts of the control system share the same grounding point, the noise due to grounding leakage current will affect the peripheral equipment. Therefore in a control system, the inverter and other vulnerable electronic equipment such as computer and sensors should be grounded separately.

（4）In order to lower the high-frequency impedance, the fixing bolts of various equipment can be used as the high-frequency terminal that is connected to the cabinet rear panel. Note that the insulation paint must be removed.

（5）The grounding cables should be laid away from the I/O cables of noise-sensitive equipment. Note that the grounding cable should be as short as possible.

D. Surge absorber is necessary when using relay, contactor and magnetic brake

When noise-generating devices such as relay, contactor and magnetic brake are used, wherever the installation position is, surge absorbers must be used.

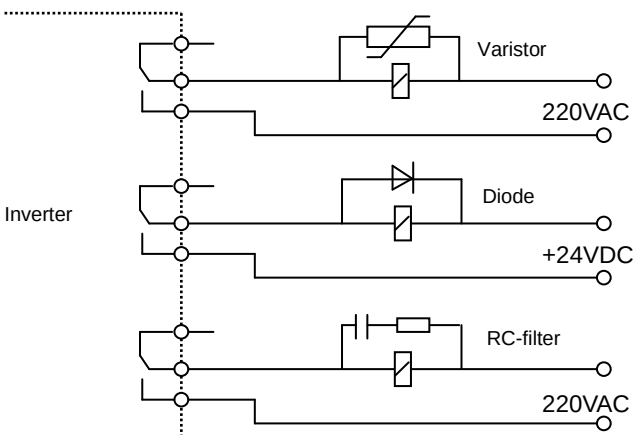


Figure 2-7 Surge absorber for noise-generating device

E. Leakage current and its handling method

The following figure shows the path of leakage current. The leakage can be classified into to-ground leakage and inter-cable leakage. The current strength is related to the carrier frequency and capacitor.

（1）To-ground leakage current

The to-ground leakage current will flow not only into the inverter, but also other equipment through the grounding cable. It may mis-operate equipment such as relays and leakage breakers. The leakage current is proportional to the carrier frequency and the length of motor cable.

Solution:

1) Lower the carrier frequency

2) Shorten the motor cable

3) In the inverter and control system, use the leakage breaker especially designed for high harmonic/surge equipment.

（2）Inter-cable leakage current

The leakage current that flows through the capacitor among inverter output cables may generate high harmonic that can mis-operate the external thermal relay. The small capacity inverters (7.5kW or smaller) that has output cables longer than 50m is particularly easy to mis-operate the external thermal relay.

Solution:

1) Lower the carrier frequency

2) Install an AC output reactor at the output side.

3) It is recommended to use thermal sensor to monitor the motor temperature, or use the inverter's own overload protection function (electronic thermal relay) instead of external thermal relay.

F. Inverter EMC installation area classification and installation instruction

1. Installation area classification

In the inverter-motor drive system, the inverter and peripheral equipment such as control devices and sensors are usually mounted in the same cabinet.

You can suppress the interference from inside the cabinet by installing radio noise filter and AC reactor at the cabinet input.

It is necessary to consider the EMC of various equipments inside the cabinet as early as the

system design stage.

In the inverter-motor drive system, the inverter, brake unit and contactor are all strong noise sources that can affect the normal operation of sensitive peripheral equipments such as sensors. You can install the peripheral equipments in different EMC areas according to their electrical natures to isolate them from the noise source. This is the best way to reduce interference.

The inverter EMC location installation areas are classified as shown in the following figure.

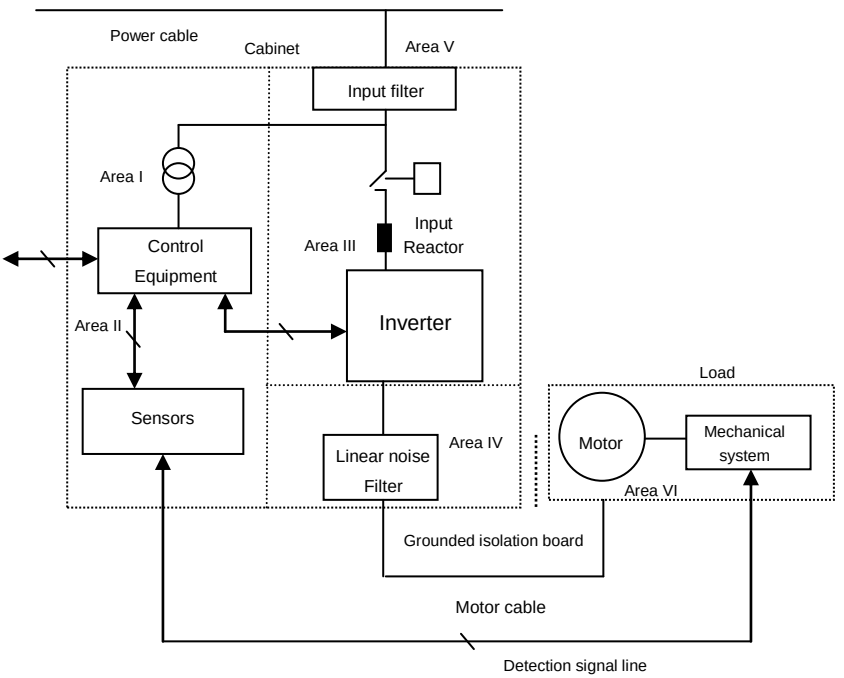


Figure 2-8 Inverter EMC installation area classification

The following is the description of the installation area classification.

1) Area I: transformer for control power supply, control system and sensor

2) Area II: interface for control signal and cables. The devices mounted here should have certain immunity level.

3) Area III: noise-generating devices such as input reactor, inverter, brake unit and contactors.

4) Area IV: output noise filter

5) Area V: Power source (including the cables connecting the radio noise filter)

6) Area VI: Motor and its cables

7) The areas should be all isolated and at least 20cm away from each other to realize electromagnetic decoupling effect.

8) Earthing bars should be used for decoupling among areas. The cables form different areas should be placed in different tubes.

9) Filters, when needed, should be installed at the interfaces between different areas.

10) All bus cables (such as RS485) and signal cables led out from the cabinet must be shielded.

2. Inverter electrical installation instruction

The inverter electrical installation is shown below:

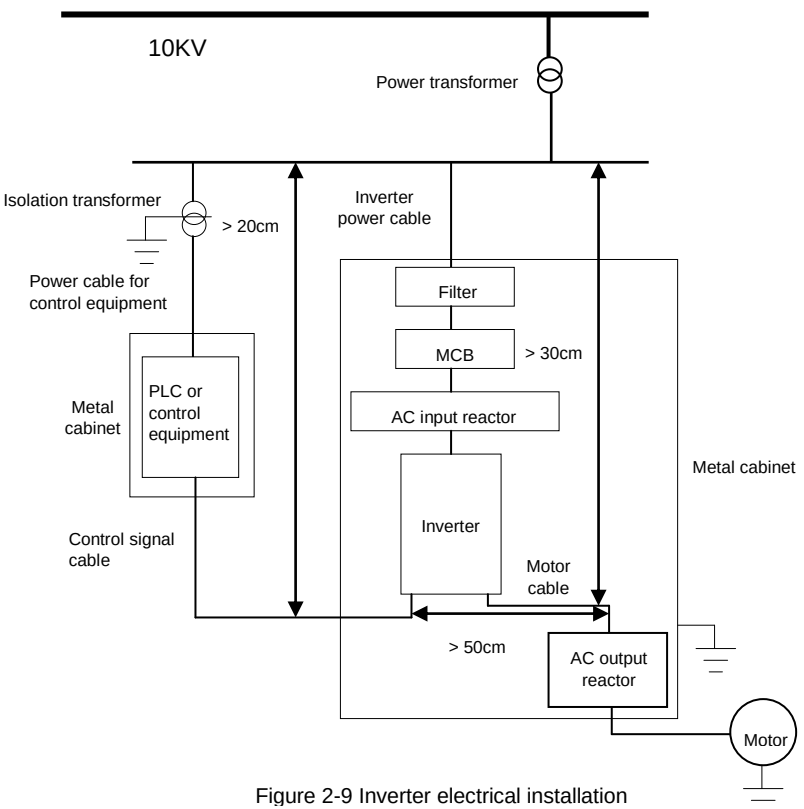


Figure 2-9 Inverter electrical installation

1) The motor cable is grounded at the inverter side, although it is recommended to ground the motor and inverter separately .

2) It is a must in the cabinet to use shielded/armored cables as the motor cable and control cable. Connect the shielding metal net with two ends of the grounding cable. The metal net should not be folded up lest the shielding effect should be reduced. Note that cable clamp must be used here.

3) Ensure good conductivity between the installation board/bolt and the inverter metal case. The serrate washer and conductive installation board are recommended.

4) If there is only one/two sensitive device(s), you can mount power filter directly near the sensitive device. That will be rather cost saving.

G. Power filter application instruction

Power source filter should be used in the equipment that may generate strong EMI, or in the equipment that is sensitive to EMI.

1. The effect of power source filter

1) The power line filter is a bi-directional low-pass filter through which only the DC current and 50Hz mains frequency current can pass. The EMI current with high frequency cannot pass it. Therefore its function is to prevent the EMI, to/from certain equipment, from passing through it.

2) The power line filer helps the equipment meet the EMC requirement on conducted emission and electromagnetic susceptibility. It also suppresses the radiated disturbance of the equipment.

2. Attentions to Power line filter installation instruction

1) Inside the cabinet, the filter should be mounted close to the power cable inlet. The filter's own power cable in the cabinet should be as short as possible.

2) If the filter input and output cables are laid too close to each other, the high-frequency EMI will bypass the filter by coupling directly through the filer input and output cables. The filer will then be useless.

3) Usually there is a dedicated grounding terminal at filter's case. However, if a cable is used to connect the filter to the inverter casing, the filter would be useless in reducing high frequency EMI. That is because the cable's high-frequency impedance is so big that it cannot be used as a bypass. The correct installation method is to stick the filter directly to the conductive metal inverter casing. Note to remove the insulation paint and ensure reliable

connection.

H. Inverter's radiated noise

Inverter's operating principle makes its radiated noise inevitable.

Usually inverters are installed in metal control cabinets. The equipment outside the metal cabinet is little affected by the inverter's radiated emissions. It is the inverter-motor power cable that is the major radiation source.

Operate according to the cable connection requirements listed above, and you can suppress the cable radiated noise effectively.

As for the radiation on other peripheral equipment in the cabinet, you should consider it when designing the cabinet area division. The points to note include inter-area insulation, wiring layout, filtering and connection and application of power line filter.

Appendix 3 COMMUNICATION PROTOCOL

Series MC200G/T inverter, which providing RS485 communicating interface, the international standard of Modbus communication protocol for master and slave communication mode is used in it .With PC/PLC and host computer, users can accomplish integrated control (setting inverter control order, running frequency, parameter alteration, running status and error information), to satisfy applicable demands.

A . Content of protocol

The Modbus Serial Communication Protocol defines frame content and formation in use,which include the formations of host computer polling and broadcasting frame and slave computer response frame;

The frame content organization by host computer include :slave computer address (or broadcasting address),executive command, dada and error checking and so on.

The frame of slave is the same structure as the host computer, the frame content include:action confirmation, dada arrivals and error checking and so no. A fault frame will be as a response by slave computer feedback to the host computer when slave computer receive error or can not complete the action asked by the host.

B. Bus structure

1. Interface mode: RS485 Hardware interface
2. Transmission mode: asynchronous serial, half-duplex

   Default: N-8-2, 9600bps.

Synchronization, only one of the host and the slave can send and the other receive data.In Serial asynchronous communication process, the communication message formation will be taken and one frame by one frame.

3. Topological structure: single host mult-slave system

C. Protocol specification

This inverter series communication protocol is host-slave communication protocol which is a kind of serial asynchronous communication protocol, only one machine (host computer) can establish the protocol(which called as “inquiry/command”).

Other machines (slave computers) only can response through delivering or doing action according to “inquiry/command”given by host. The host may be computer(PC) and industrial

control equipment as well as programmable controller(PLC) and so on, and the slave may be this inverter series or other control equipment with the same communication protocol.

The host may communicate with one of the slaves and also can to release information to all of the slaves.

For alone“inquiry/command”,the slave will give back a information to the host(known as response).

For broadcasting information,the slaves are no need to give response to the host.

D. Communication frame structure

The Modbus protocol communication dada formation of this series inverter is RTU. The formation of every byte is as follows:

Codding system: 8 bit binary system

16 system 0-9.A-F

The bit of byte: include start bit, 8 dada bits, parity bit t and stop bit.

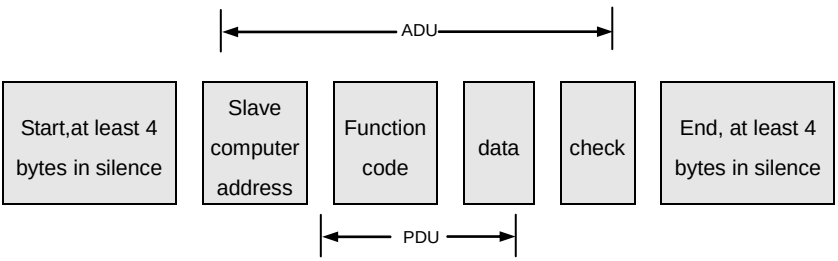
11-bte character frame

Start bit	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7	Bit8	No parity bit even parity bit Odd parity bit	Stop bit

It is always start with 4 bytes mourn in silence in RTU mode. After that the sequence of tobe transmited are address of slave computer, operate command code, dada and CRC check word , every segment is composed by Hexadecimal number 0…9,A…F.

The network equipments are always monitoring the activity of communication bus if in mourn in silence. When fist segment(address information) be Received, the word should be comfirmed by all of the network equipments.

There is a transmission time interval like 4 bytes in order to state the end of the frame. After that ,a new frame is going to be Transmission.



RTU dada frame formation

A information frame must be transmission as a data stream, if the time interval exceed 1.5 bytes, the receiver will clear those imperfect information and known the following bytes as address segment of new frame.

As the same, when time interval of the start of a new frame from last frame is less than 4 time bytes, the receiver will known it as the following of last frame. Because the error of frame, Incorrect CRC check value leads communication fault.

Standard structure of RTU frame

START	Transmission time mor than 4 bytes
Slave computer address or inverter address	Communication address 0～127（decimal system） （0 broadcast address）
Function command	0x03： Read parameters from slaves (setup value 1-16) 0x06： Write slave parameters
Data	Data with 0-16 word,which part is the main content of communication, and the core of data exchange in communication
CRC Check value	Checke value: CRC check value (16BIT)
END	Transmission time mor than 4 bytes

E. Command code and communication data description

1. Command code: 0x03（00000011）. read Word (continous read up to 16 words)

Example : for the slave of inverter which addresss is 0x01, the sart address of EMS memory is 0x0009,read 2 words,the frame structure is described as follows:

RTU host computer cmmand information

Inverter address	Command	Starting address	Numbers of data	CRC checke
0x01	0x03	0x0009	0x0002	0x1409

RTU slave computer reply inforbmation

Inverter address	Command	Numbers of data	Data value	CRC checke
0x01	0x03	0x04	0x1388	0x73CB

2. Command code 0x06（00000110）write a Word

Example : write data 5000(0x1388) to the storage address 0x0009 in slave inverter which addresss is 0x01, the frame strycture is descripted as foolows:

RTU host computer cmmand information

Inverter address	Command	addresss	data	CRC checke
0x01	0x06	0x0009	0x1388	0x549E

RTU slave computer reply inforbmation

Inverter address	Command	addresss	data	CRC checke
0x01	0x06	0x0009	0x1388	0x549E

3. The check mode of communication frame

The check mode of communication frame include 2 parts which are bit check of byte and total data check of the frame(CRC check).

①Bit check of byte

User may select the different mode of the cheche: Odd parity, even parity or no parity mode ,this may influence the checke bit setup of every byte.

The meaning of odd parity bit

A odd parity bit is added before transmission which is used to state the numbers of "1" in the data to be transmited, "1" for even and "0" for odd of the numbers, keeping parity of the data constant

The meaning of even parity bit

A even parity bit is added before transmission which is used to state the numbers of "1" in the data to be transmited, "0" for even and "1" for odd of the numbers.

② CRC check mode--- CRC(Cyclical Redundancy Check)：

Using RTU frame format which include a frame error check segment base on CRC method calculate. CRC segment,consist of 2 bytes include 16 bits binary number, checked the content of the frame and added in the frame after calculating by the transmission equipment. Receiving machine re-calculate the CRC frame received and compare to valu of CRC segment received,if not equal,a transmission error is exist.

CRC logging 0xFFFF fist,then transfer a process which processes more than 6 bytes in a row of the frame and the current value in the storage. Only 8 bits data in every byte in effect to CRC,start bit,end bit and check bit are all in vain.

In CRC producing process, every 8 bit character is exclusive or content whith the content of the storage,the result moves to direction of LSB and 0 is padded in MSB. LSB is extract for checking,if LSB equals 1, the register is exclusive or alone whith the pre-setup value of the storage; if LSB equals 0,then do nothing. The whole process is to repeat 8 times. After last time completed,the next 8 bytes is exclusive or alone whith the current value of the register. The final value in the register is the CRC value after all bytes completed in the frame.

This kind of calculate method is the international standard CRC check method.

When editoring the CRC arithmetic, user may refer to standards and programming computing program to meet the need of check.

In ladder logic, CKSM Calculated CRC according to the content of the frame,look-up table method may be used for calculation, and this method simple for program, fast for Operation

speed and large ROM space taken for the program.

4.The definition of communication data address

This part is the definition of communication data address for running of the inverter and acquiring the state information of the inverter as well as the function parameter setup.

① Presentation rule of the function code parameter address

Take function group as the higher byte of register address: that means the following such as 0x00（F0），0x01（F1），0x02（F2），0x03（F3），0x04（F4），0x05（F5），0x06（F6），0x07（F7），0x08（F8），0x09（F9），0x0A（FA），0x0B（FB），0x0C（FC），0x0D（FD），0x0E（FE），0x0F（FF），0x10（FH）is higher byte, and the number of the function code, converting to hex is necessary , is the lower byte of the register.

Example:the address of function F0-09 is 0x0009（0x00-0x09）and

the address of function FA-11 is 0x0A0B（0x0A-0x0B）

Attention:there are same parameter cannot be changed when the inverter running and same parameter cannot be changed no matter what state of inverter in.Please pay attention to the scope of setup of the parameter,unit and relative reference when change function code parameter.

② Addess description of other function

function description	Definition of address	Data meaning description	R/Wproperty
Communication control command address	0x2000	0x0001： corotation	W/R
		0x0002： inversrotation	
		0x0003： stop	
State address of inverter	0x2001	0x0001： in corotation	R
		0x0002： in inversrotation	
		0x0003： Inverter stand by	
		0x0004： in failure	
Communication ferequency address	0x2100	Communication setup scope（0.00～400.00）	W/R
PID reference address	0x2101	Communication setup scope（0.0～100.0）	W/R
PID feedback address	0x2102	Communication setup scope（0.0～	W/R

		100.0）	
Inverter failure address	0x2F00	Details see note 2 on page 103	R
Inverter pre-alarm information address	0x2F01	Details see note 1 on page 102	
MOdBus communication failure address	0x2F02	0x0001： commad code error 0x0002： Password error 0x0003： Illegal address 0x0004： Illegal data 0x0005： Numbers of data error 0x0006： Can not be changed parameter 0x0007： Can not be changed in running 0x0008： User's password protection 0x0009： Parameter locked 0x000A： Factory's password error	R

5. Communication data address

The pass programming extension addresses 1 (0x2103) and 2 (0x2104) are used to store extended data transmitted from the communication port and can be used for user-defined data storage.

Func code	Name	Setting range	Factory setting	Change
2103	Communication extension data 1	1~1000	0	▵
2104	Communication extension data 2	1~1000	0	▵

6. In response to the communication error

the response when in communication error，the inverter will response error code and send them in a fixed format to host computer when communication fault.

PDU respond them as error code and exception code. In which the error code equals function code plus 0x80 and exception code states detail error cause.

The example of exception code

exception code	Meaning description	exception code	Meaning description
0x01	Command code error	0x06	Parameter cannot be changed
0x02	Password error	0x07	Parameter cannot be changed in running
0x03	Illegal address	0x08	User's password protection
0x04	Illegal data	0x09	Parameter locked
0x05	Data numbers error	0x0A	Factory password error

Nots 1: inverter pre-alarm information code

code	Dispay of inverter	Fault	code	Dispay of inverter	Fault
0x0000		In normal	0x0004	OLP2	Motor overlaod
0x0001	dd	In direct current braking	0x0005	dbH	Brake reristor overheat
0x0002	ErA	Outer reference missed	0x0006	ER485	Communication abnormal
0x0003	OLP1	Inverter overload pre-alarm			

Nots 2:Inverter fault code

code	Dispay of inverter	Fault	code	Dispay of inverter	Fault
0x101	OC1	Power element protection	0x10F	Er6	Interfere stop
0x102	OC2	Over current	0x110	Er7	Reserved
0x103	OU	Over voltage pretection	0x111	Er8	
0x104		Output phase missed	0x112	Er9	
0x105	OH	Inverter over temprature	0x113	Er10	
0x106	OL1	Inverter overlaod pretection	0x114	Er11	
0x107	OC3	Output erthing	0x115	Er12	
0x108	Er0	Storage abnormal	0x116	Er13	
0x109	Er1	Outer alarm	0x117	Er14	Communication abnormal
0x10A	Er2	U phase transducer abnormal	0x118	Er115	Outer reference missed
0x10B	Er3	V phase transducer abnormal	0x119	OL2	Motor overload pretection
0x10C	Er4	W phase transducer abnormal	0x11A	Er16	Feedback utralow protection
0x10D	Er5	Temrature transducer abnormal	0x11B	Er17	Feedback ultrahigh protection
0x10E	LU	Under voltage protection			