MC200 Series Inverter User Manual

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.

⚠ 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.

Fist, be sure to confirm that if it is match between the ranges of running speed of mortor shaft and mechanical equipment and the speed of the motor when the invertor runs at frequency above 50Hz except the increment of vibration and noise.

●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.

●Negative torque load

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.

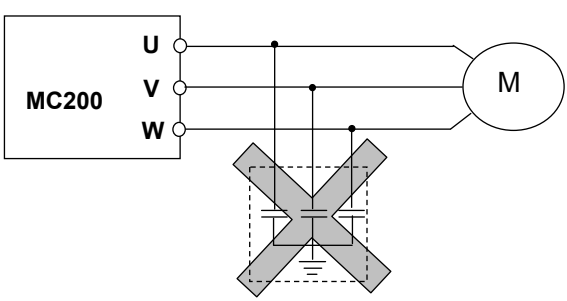


Figure 1-1

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

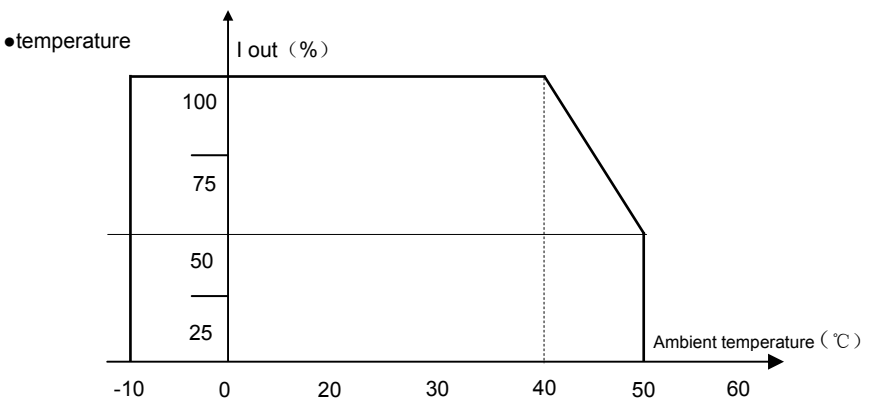


Figure 1-2

●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.

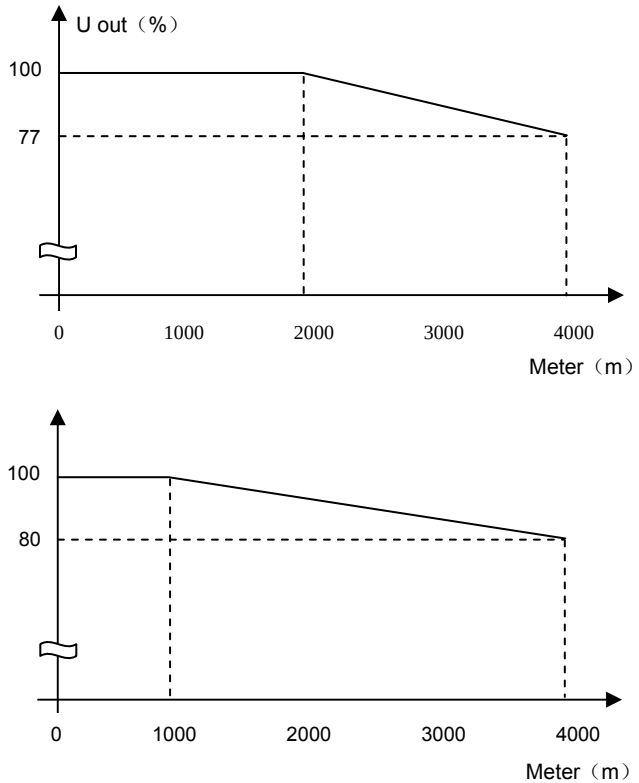


Figure 1-3

●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.

●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:

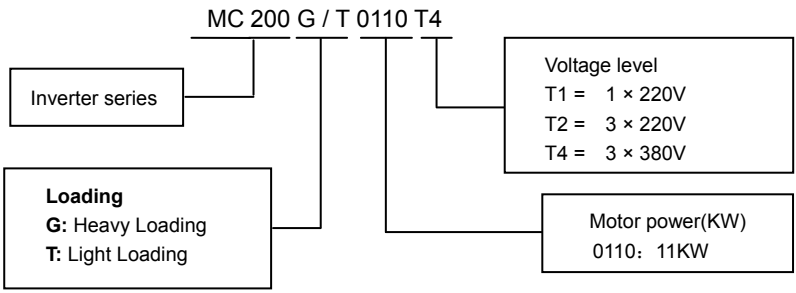
Explosion risk of capacitor: The capacitors in the main circuits may explode when they are burned.

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

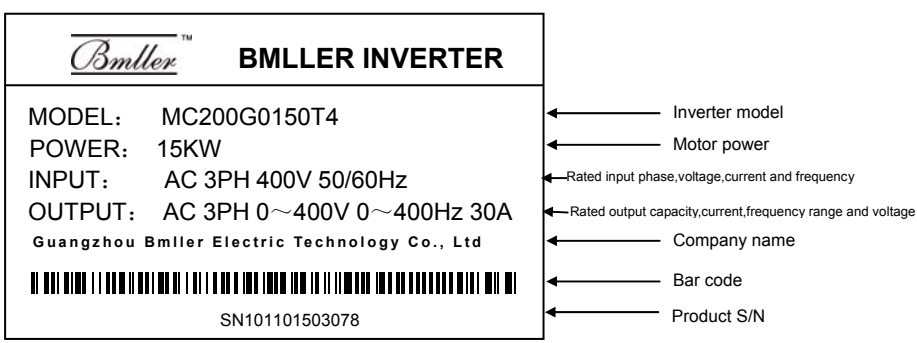
2.1 Model Description



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 capacity (KVA)	Rated output current (A)	Motor power (KW)
MC200G0007T4	1.6	2.5	0.75
MC200G0015T4	2.4	3.7	1.5
MC200G0022T4	3.6	5.5	2.2
MC200G0040T4	6.4	9.7	3.7
MC200G0055T4	8.5	13	5.5
MC200G0075T4	11	18	7.5
MC200G0110T4	17	24	11
MC200G0150T4	21	30	15
MC200G0185T4	24	38	18.5
MC200G0220T4	30	45	22
MC200G0300T4	40	60	30
MC200G0370T4	49	75	37
MC200G0450T4	50	91	45
MC200G0550T4	72	112	55
MC200G0750T4	100	150	75
MC200G0900T4	116	176	90
MC200G1100T4	138	210	110
MC200G1320T4	167	253	132
MC200G1600T4	200	304	160
MC200G1850T4	224	340	185
MC200G2000T4	250	377	200
MC200G2200T4	280	426	220
MC200G2500T4	310	475	250
MC200G2800T4	390	530	280
MC200G3150T4	445	590	315
MC200G3550T4	500	705	355
MC200G4000T4	575	752	400

Models	Rated capacity (KVA)	Rated output current (A)	Motor power (KW)
MC200T0015T4	2.4	3.7	1.5
MC200T0022T4	3.6	5.5	2.2
MC200T0040T4	6.4	9.7	4.0
MC200T0055T4	8.5	13	5.5
MC200T0075T4	11	18	7.5
MC200T0110T4	17	24	11
MC200T0150T4	21	30	15
MC200T0185T4	24	38	18.5
MC200T0220T4	30	45	22
MC200T0300T4	40	60	30
MC200T0370T4	49	75	37
MC200T0450T4	50	91	45
MC200T0550T4	72	112	55
MC200T0750T4	100	150	75
MC200T0900T4	116	176	90
MC200T1100T4	138	210	110
MC200T1320T4	167	253	132
MC200T1600T4	200	304	160
MC200T1850T4	224	340	185
MC200T2000T4	250	377	200
MC200T2200T4	280	426	220
MC200T2500T4	310	475	250
MC200T2800T4	390	530	280
MC200T3150T4	445	590	315
MC200T3550T4	500	705	355
MC200T4000T4	575	752	400
MC200T4500T4	647	843	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: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	branches, 1 of +10V, 5mA output
	Control voltage output	24 V/100mA, or external power supply through PLC terminal
	Analog input	2 of -10V~+10 V DC iuputs,and selected by the jumpers' position at VI or CI on main board.
	Analog output	2,of 0~20mA, output programmable and kinds of output selectable
	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 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

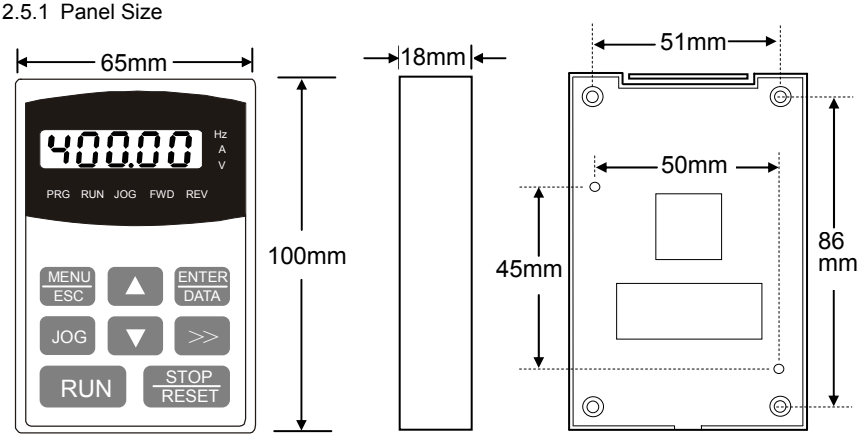


Figure 2-3 Panel Size

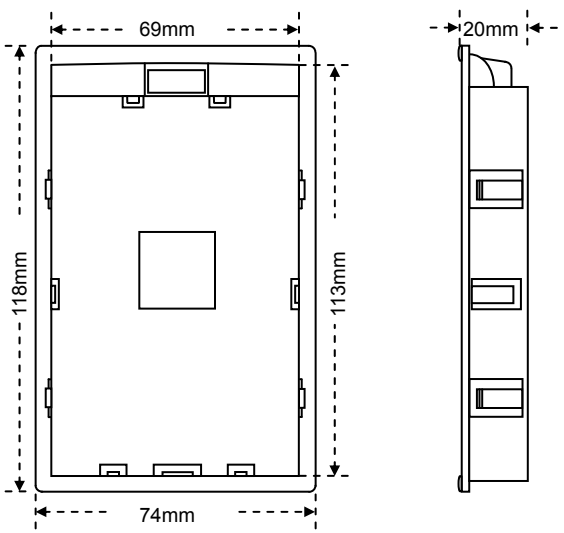


Figure 2-4 Keypad box size (unit: mm)

2.5.2 MC200G Series Outline Size
The Demention of Series MC200G Inverter

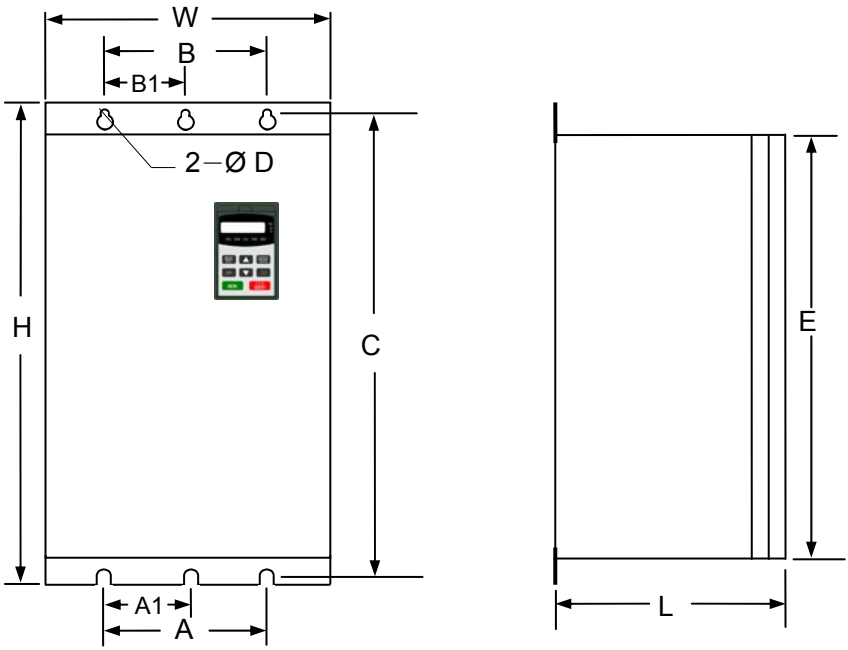


Table 2-1 Dimensions of MC200G series inverters:

Inverter power	Size(mm)									Installation Hole diameter
	A	A1	B	B1	C	H	E	W	L	D(mm)
0.75-4.0kw	100		100		180	195	185	130	151	ø5
5.5-7.5kw	142		142		287	302	265	170	165	ø6
11-15kw	200		200		342	357	320	225	189	ø6
18.5-30kw	200		200		447	463	423	298	196	ø6.2
37-55kw	200		200		572	588	548	352	272	ø 7
75-90kw	200		220		618	635	592	388	279	ø8.2
110-132kw	330	165	330	165	809	835	762	493	346	ø9
160-185kw	330	165	330	165	880	902	829	533	346	ø11

200-315kw	440	220	440	220	1038	1060	987	643	346	ø11
355-400kw	560	280	560	280	1214	1236	1163	763	349	ø11

2.5.3 MC200T Series Outline Size

The Dimensions of MC200T series inverters:

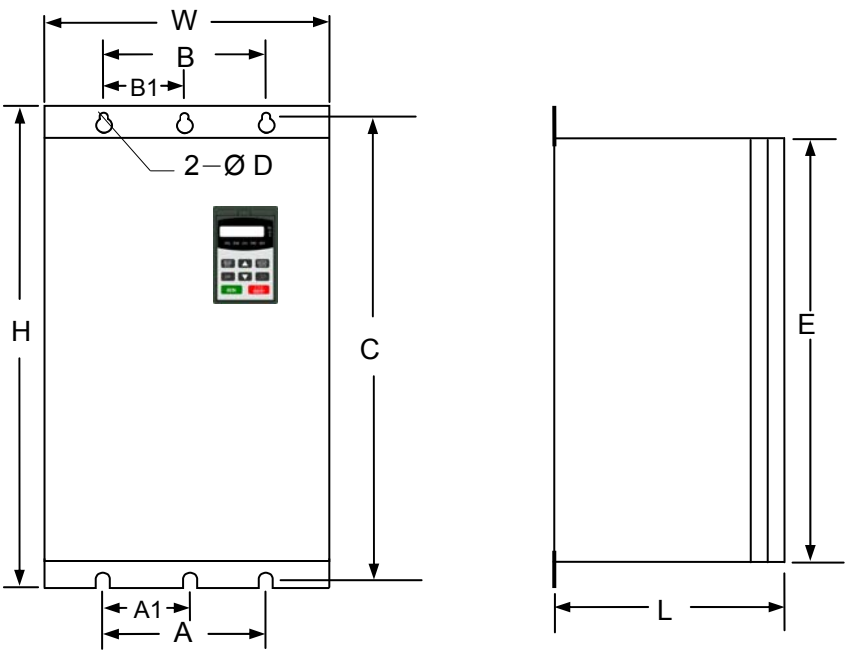


Table 2-1 Dimensions of MC200T series inverters:

Inverter power	Size(mm)									Installation Hole diameter
	A	A1	B	B1	C	H	E	W	L	D(mm)
1.5-5.5kw	100		100		180	195	185	130	151	ø5
7.5-11kw	142		142		287	302	265	170	165	ø6
15-18.5kw	200		200		342	357	320	225	189	ø6
22-37kw	200		200		447	463	423	298	196	ø6.2

45-75kw	200		200		572	588	548	352	272	ø 7
90-110kw	200		220		618	635	592	388	279	ø8.2
132-160kw	330	165	330	165	809	835	762	493	346	ø9
185-200kw	330	165	330	165	880	902	829	533	346	ø11
220-355kw	440	220	440	220	1038	1060	987	643	346	ø11
400-450kw	560	280	560	280	1214	1236	1163	763	349	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.

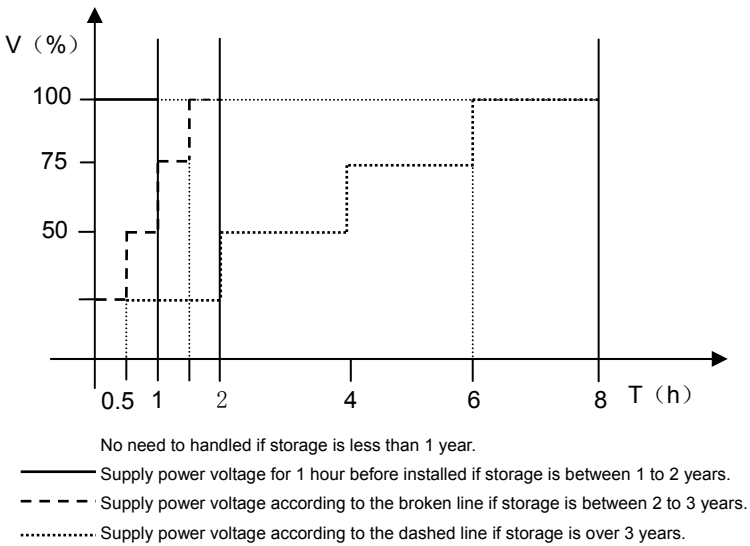


Figure3-1, process of re-handle the capacitor

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.

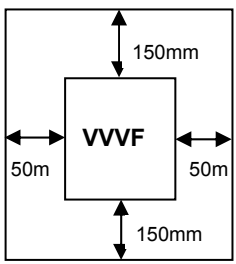


Figure 3-2.

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

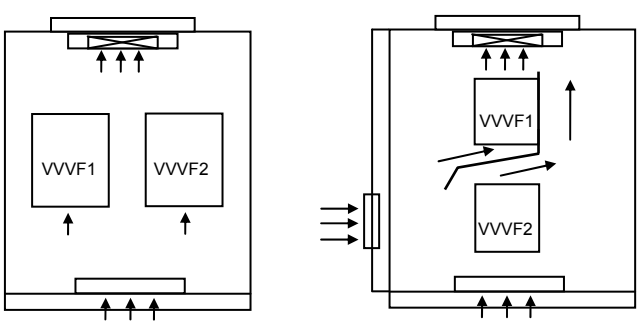


Figure 3-3

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	Input breaker	Input/output cables (mm^2)		Control cables (mm^2)
	MCCB(A)	Input	Output	Control terminals cable
0.75kw	10	2.5	2.5	1
1.5kw	16	4	4	1
2.2kw	16	4	4	1
4.0kw	25	6	6	1
5.5kw	25	6	6	1
7.5kw	40	6	6	1
11kw	63	8	8	1
15kw	63	8	8	1
18.5kw	100	14	14	1
22kw	100	16	16	1
30kw	125	25	25	1
37kw	160	25	25	1
45kw	200	35	35	1
55kw	200	45	45	1
75kw	250	70	70	1
90kw	315	70	70	1
110kw	400	100	100	1
132kw	400	150	150	1
160kw	630	150	150	1
185kw	630	250	250	1
200kw	630	250	250	1
220kw	800	150×2	150×2	1
250kw	800	185×2	185×2	1
280kw	1000	185×2	185×2	1
315kw	1200	240×2	240×2	1
355kw	1280	240×2	240×2	1
400kw	1500	185×3	185×3	1
450kw	1500	185×3	185×3	1

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.

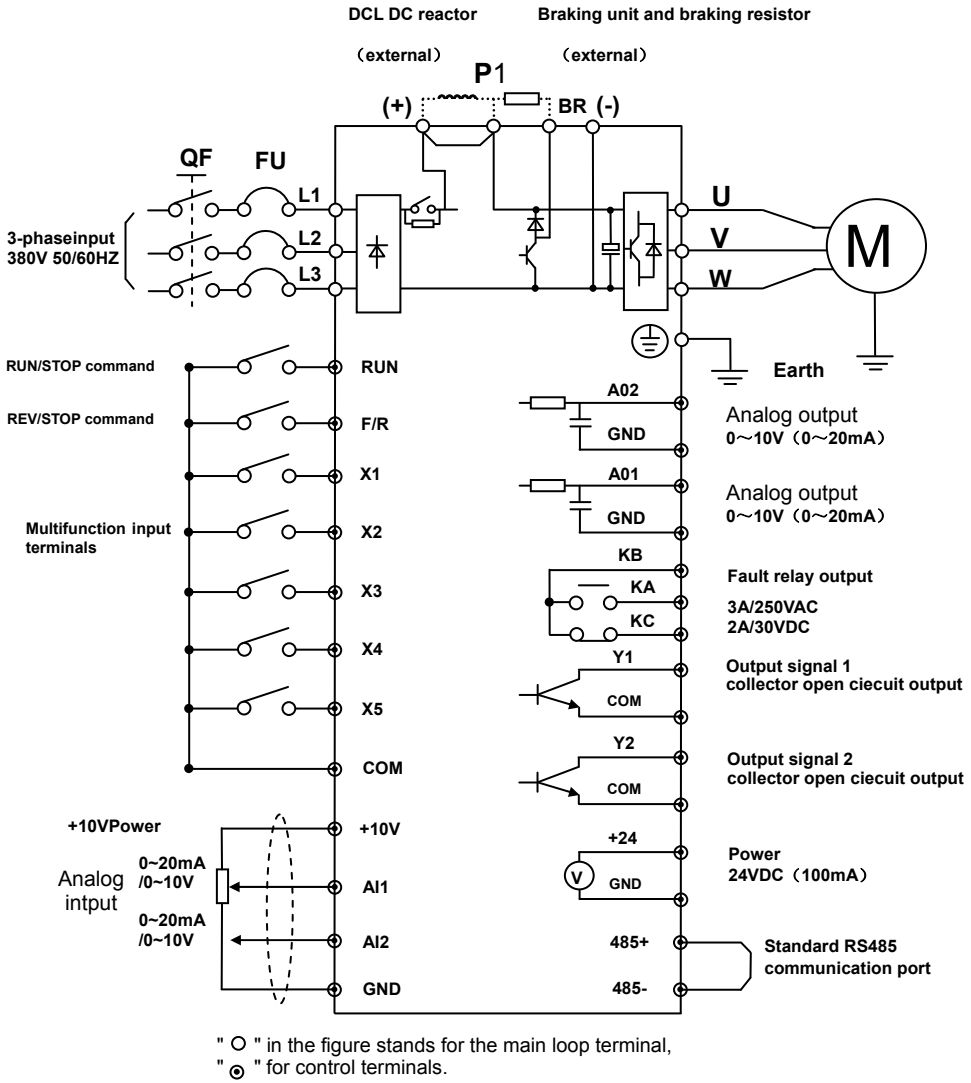
You may use EMI filter to suppress the interference noise and leakage current at the inverter output side.

☆ 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



" ○ " in the figure stands for the main loop terminal,
" ⊙ " for control terminals.

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.

☆ 0.75KW～15KW 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（3AC380V　0.75KW～450KW）

⚠ 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	⏚
		POWER			MOTOR			

Applicable model:MC200G(0.75kw~4.0kw)/MC200T(1.5kw~5.5kw)

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

Applicable model:MC200G(5.5kw~15kw)/MC200T(7.5kw~18.5kw)

(+)	(-)	P1	L1	L2	L3
			POWER		

⏚	U	V	W
	MOTOR		

Applicable model:MC200G(18.5kw~400kw)/MC200T(22kw~450kw)

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~MC200G0150T4, MC200T0015T4~MC200T0185T4 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 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 shorterless 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.

3.3.4Connecting of control Terminals

☆ control board terminal description

layout

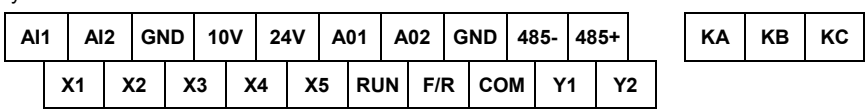


Table 3-2 The list of Control board terminals and it's description

Type	Symbol	Name	Terminal function description
Digital Output	Y1-COM	Open collector output 1	The range of power voltage: 0～24V 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 terminal	RUN inverter per short to digital ground(COM)
	F/R-COM	(F/R) terminal	Control the output of the inverter to change the derection of the motor rotary

Communication	485+	Communication port	Positive terminal of 485 special terminals
	485-		Negative terminal of 485 special terminals
Analog input	AI1-GND	Analog input 1	Common terminal for outer voltage and current seting of inverter. Use VI/CI jumper of J1、J2 socket 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
	KB-KC	Noramlly closed	Contact rating: 250Vac/3A 30Vdc/1A
Analog output	AO1-GND	Analog input 1	Multipal stimilative output terminal on 0～10V 和 0～20mA. AO1and AO2 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.Individual 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.

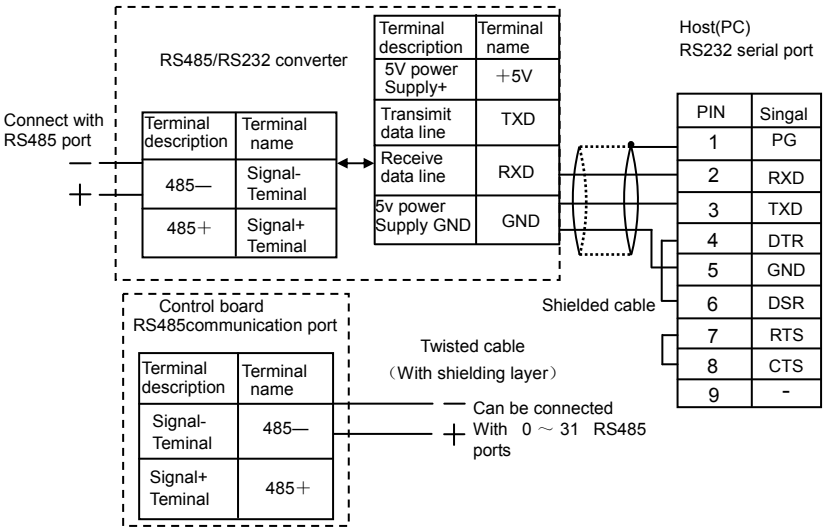


Figure 3-3 Connection of serial communication *port*

☆ 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

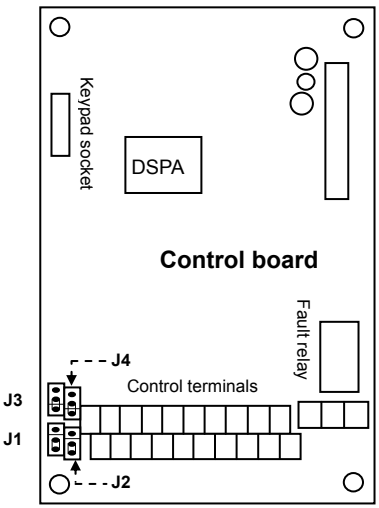
***** Any thrum or bolt left inside the equipment

***** Whether the bolt not hard up

***** Whether the bare conductor of terminal connecting with other ternimal

3.3.5 Setting jumpers and switch on the control board

Before usage, all the jumpers on the control board must be set up in right mode. Position of jumpers and switches on the control board is shown in Figure 3-4.



Note：

AI1、AI2 input modes selection:

If short circuit bar is in 1VI、2VI side, select voltage input: 0~+10V; If short circuit bar is in 1CI、2CI side, select current input:0~20mA

Default setting: short circuit bar is in 1CI、2CI side

AO1、AO2 input modes selection:

If short circuit bar is in 1VO、2VO side, select voltage input: 0~+10V; If short circuit bar is in 1CO、2CO side, select current input:0~20mA

Default setting: short circuit bar is in 1CO、2CO side

Figure 3-4 Jumpers and switch on the control board

Chapter 4 Display and operate Of Inverte

4.1 Panel Description

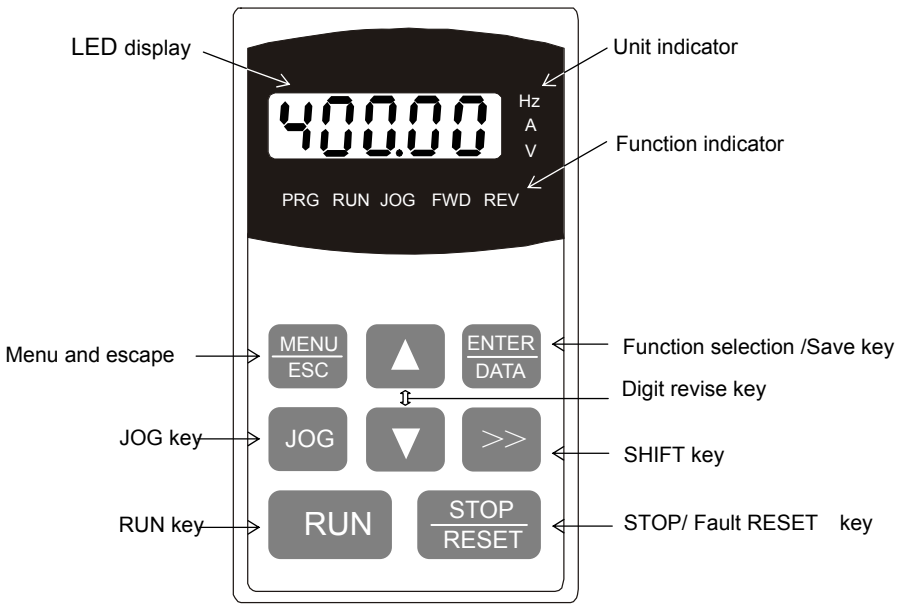


Figure 4-1 Panel and keys

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 function code, menus, or data setup, accomplish special operation with >>. Increase of data or code
▼	Down	decrease function code, manu, or data setup, accomplish special operation with >>. 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 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 Swift of LED display

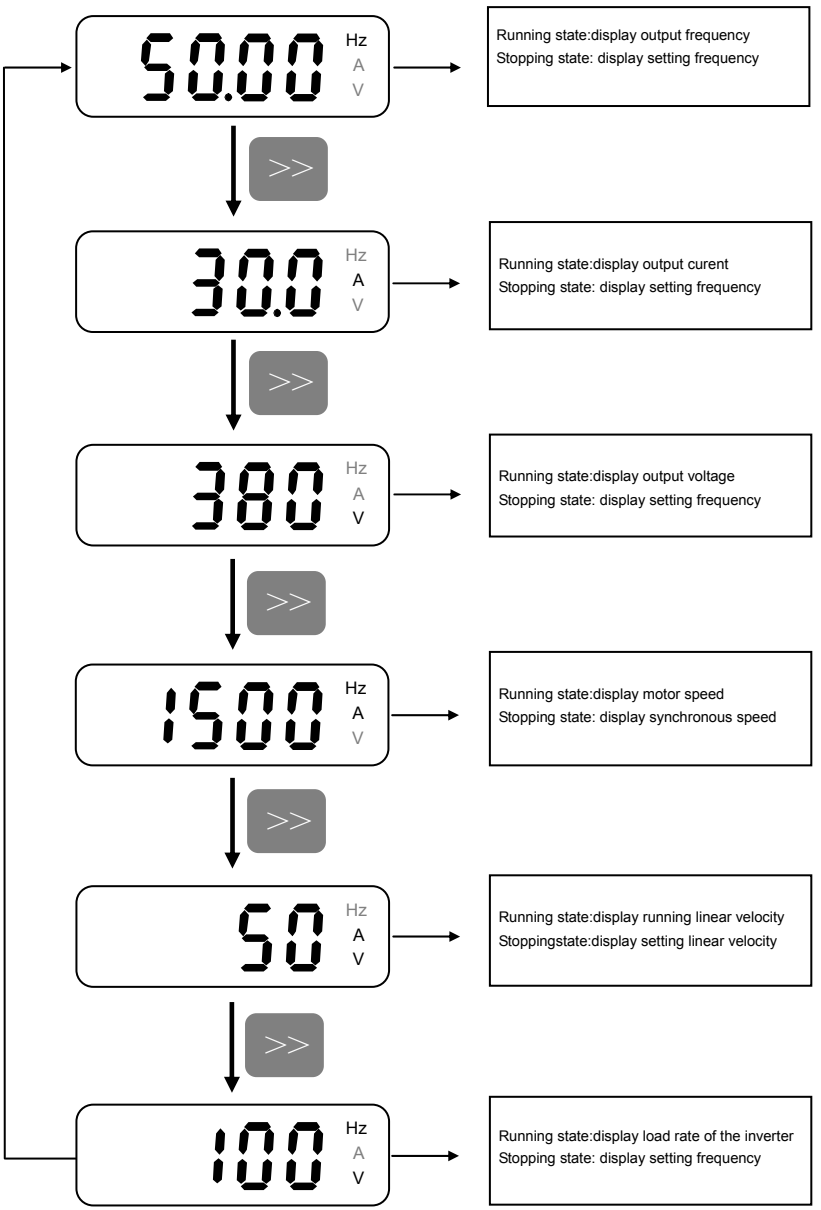


Figure 4-2 Swift of LED display

4.5 function data alter and check

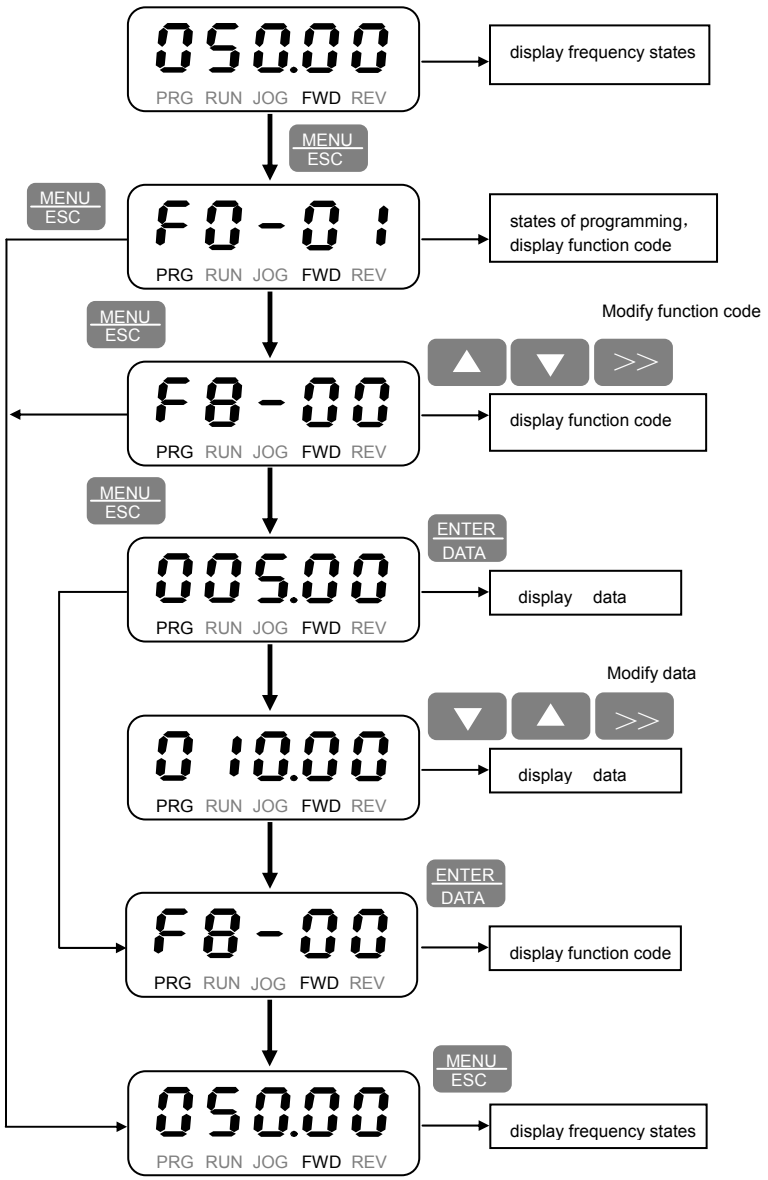


Figure 4-3 Function data alter and check

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 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	choose auxiliary equipment and lines which suitable for the capacity, and connect correctly. Connect the power and auxiliary equipment according to the requirments .
	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;

△ 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 user.

3.Function LIST

Func. code	Name	Setting range	Factory setting	Change	Profibus code
F0 ： Basic Function Groupe					
F0-00	G/T option Models indicator	0: G option 1: T option	Depend on model	*	1
F0-01	Control mode	0：open loop V/F Control mode 1：Torque control mode 2：Open loop vector	0	×	2

		mode1 3 ：Open loop vector mode 2			
F0-02	Running mode	0：Normal running 1：Simple PLC running 2：Wobble running 3：Proccess PID running 4: Multi-Step speed running	0	×	3
F0-03	Running setup mode	0: Keypad control 1: Outer Terminal control 2: Host communication control	0	×	4
F0-04	Main frequency source A	0: Digital setting 1:AI1 setting 2:AI2 setting 3: Host setting mode	0	×	5
F0-05	Auxiliary frequency source B	0: Digital setting 1:AI1 setting 2:AI2 setting 3: communication setting	0	×	6
F0-06	Frequency scale 1 of auxiliary frequency source	0: Main frequency source 1: Maximum operation frequency	0	×	7
F0-07	Frequency scale 2 of auxiliary frequency source	0—100%	000	×	8
F0-08	Frequency source selection	0:A Main frequency source setting 1:B auxiliary frequency source setting 2: A+B main plus auxiliary frequency source setting 3: Max frequency source setting among A and B（A,	0	×	9

		B）			
F0-09	Keypad reference frequency	0.10—400.00Hz	50.00	△	10
F0-10	Highest output frequency	50.00—400.00Hz	50.00	×	11
F0-11	High frequency limit	0.50—400.00Hz	50.00	△	12
F0-12	Low frequency limit	0.1—400.00Hz	1.00	△	13
F0-13	Carrier frequency Regulation	0—8	1	×	14
F0-14	Acc time1	0.1—3600s	20.0	△	15
F0-15	Dec time1	0.1—3600s	20.0	△	16
F1 Motor Parameters					
F1-00	Motor rated power	0.75—450KW	Depend on model	×	17
F1-01	Motor rated voltage	220—440V	380	×	18
F1-02	Motor rated current	1.0—1000.0A	Depend on model	×	19
F1-03	Motor rated frequency	20—400.00Hz	50.00Hz	×	20
F1-04	Motor rated speed	500—24000rpm	Depend on model	×	21
F1-05	Stator resistance	0.001—65.535Ω	Depend on model	×	22
F1-06	Rotor resistance	0.001—65.535Ω	Depend on model	×	23
F1-07	Motor leakage inductance	0.01—655.35mH	Depend on model	×	24
F1-08	Motor mutual inductance	0.01—655.35mH	Depend on model	×	25
F1-09	Excitation current with no load	0.5—1000A	Depend on model	×	26
F1-10	Motor auto-tuning process	0: In vain 1: parameter measure and test	0	×	27
F2: Vector Control					
F2-00	ASR proportional gain 1	0—100	30	△	28

F2-01	ASR integration time 1	0.00—10.00s	0.50	△	29
F2-02	ASR switching frequency 1	0.00—400.00Hz	5.00	△	30
F2-03	ASR proportional gain 2	0—100	20	△	31
F2-04	ASR integration time 2	0.00—10.00s	1.00	△	32
F2-05	ASR switching frequency 2	0.00—400.00Hz	10.00	△	33
F2-06	ACR proportional gain	0.0—1000.0	100.0	△	34
F2-07	ACR integral gain	0.0—1000.0	100.0	△	35
F2-08	Speed detection filter time	0.001—0.1s	0.005s	△	36
F2-09	Slip compensation rate of VC	0—200	100%	△	37
F2-10	Motor torque limit	20-200	150%	△	38
F2-11	Braking torque limit	0-150	80%	△	39
F3:V/F Control Group					
F3-00	V/F curve mode	0: linear voltage and frequency 1: arbitrarily voltage and frequency	0	×	40
F3-01	Torque boost	0—50	5	×	41
F3-02	VF1 frequency	1.00—400.00Hz	6.00	×	42
F3-03	VF1 voltage	0—380V	6	×	43
F3-04	VF2 frequency	1.00—400.00Hz	15.00	×	44
F3-05	VF2 voltage	0—380V	34	×	45
F3-06	VF3 frequency	1.00—400.00Hz	25.00	×	46
F3-07	VF3 voltage	0—380V	95	×	47
F3-08	VF4 frequency	1.00—400.00Hz	35.00	×	48
F3-09	VF4 voltage	0—380V	186	×	49
F3-10	VF5 frequency	1.00—400.00Hz	45.00	×	50
F3-11	VF5 voltage	0—380V	307	×	51
F3-12	Auto slip compensation	0.00—10.00Hz	0.00	△	52
F3-13	AVR function	0: Disable automatic voltage regulation 1: allowable automatic	0	△	53

		voltage regulation			
F3-14	Auto energy saving selection	0：Disable save energy mode 1: allowable automatic save energy mode	0	△	54
F3-15	Maximum output voltage	220V—440V	380	×	55
F3-16	Voltage limited frequency start point	10.00—400.00Hz	50.00	×	56
F4: linput terminal group					
F4-00	X1 terminal function	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 terminal 4 5:Multi-speed up/down time terminal1 6:Multi-speed up/down time terminal2 7:Corotation&JOG input (JOGF) 8:Reverse &JOG input (JOGF) 9:OuterReset(RESET) input 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	0	△	57
F4-01	X2 terminal function		0	△	58
F4-02	X3 terminal function		0	△	59
F4-03	X4 terminal function		7	△	60
F4-04	X5 terminal function		9	△	61

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	limit				
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FC-08	Multi-frequency 9	0.00-400.00HZ	45.00	△	218
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FC-11	Multi-frequency 12	0.00-400.00HZ	40.00	△	221
FC-12	Multi-frequency 13	0.00-400.00HZ	35.00	△	222

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FC-15	Multi-frequency 16	0.00-400.00HZ	8.00	△	225
FC-16	Program operation mode	0:proramm run N cycles After the stop 1:Last section program running after program run N cyclical 2:Program circle running	0	×	226
FC-17	Segment of Proram running	1-16	1	△	227
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FC-20	Phase 1 runing direction and speed up/down time	(1-4)(0-1)	1-0	△	230
FC-21	Phase 2 running time	0.1-3600.0s	4.0	△	231
FC-22	Phase 2 runing direction and speed up/down time	(1-4)(0-1)	1-0	△	232
FC-23	Phase 3 running time	0.1-3600.0s	4.0	△	233
FC-24	Phase 3 runing direction and speed up/down time	(1-4)(0-1)	1-0	△	234
FC-25	Phase 4 running time	0.1-3600.0s	4.0	△	235
FC-26	Phase 4 runing direction and speed up/down time	(1-4)(0-1)	1-0	△	236
FC-27	Phase 5 running time	0.1-3600.0s	4.0	△	237
FC-28	Phase 5b runing direction and speed up/down time	(1-4)(0-1)	1-0	△	238
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FC-32	Phase 7 runing direction and speed up/down time	(1-4)(0-1)	1-0	△	242
FC-33	Phase 8 running time	0.1-3600.0s	4.0	△	243
FC-34	Phase 8 runing direction and speed up/down time	(1-4)(0-1)	1-0	△	244

FC-35	Phase 9 running time	0.1-3600.0s	4.0	△	245
FC-36	Phase 9 runing direction and speed up/down time	(1-4)(0-1)	1-0	△	246
FC-37	Phase 10 running time	0.1-3600.0s	4.0	△	247
FC-38	Phase 10 runing direction and speed up/down time	(1-4)(0-1)	1-0	△	248
FC-39	Phase 11 running time	0.1-3600.0s	4.0	△	249
FC-40	Phase 11 runing direction and speed up/down time	(1-4)(0-1)	1-0	△	250
FC-41	Phase 12 running time	0.1-3600.0s	4.0	△	251
FC-42	Phase 12 runing direction and speed up/down time	(1-4)(0-1)	1-0	△	252
FC-43	Phase 13 running time	0.1-3600.0s	4.0	△	253
FC-44	Phase 13 runing direction and speed up/down time	(1-4)(0-1)	1-0	△	254
FC-45	Phase 14 running time	0.1-3600.0s	4.0	△	255
FC-46	Phase 14 runing direction and speed up/down time	(1-4)(0-1)	1-0	△	256
FC-47	Phase 15 running time	0.1-3600.0s	4.0	△	257
FC-48	Phase 15 runing direction and speed up/down time	(1-4)(0-1)	1-0	△	258
FC-49	Phase 16 running time	0.1-3600.0s	4.0	△	259
FC-50	Phase 16 runing direction and speed up/down time	(1-4)(0-1)	1-1	△	260
FC-51	PLC running time unit Timing unit	0: 1(sec) 1: 1(min)	0	×	261
FD: Serial Communication function group					
FD-00	Local address	0-31	1	△	262
FD-01	Baud rate selection	0: 1200 1: 2400 2: 4800 3: 9600 4: 19200	3	△	263

FD-02	Data format	0：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	△	264
FD-03	Communication failure predication time	0.2—10.0s	2.0	△	265
FD-04	Communication error handling	0： No action 1： Alarm and continue to run 2： Stop	0	△	266
FE: Reserved function					
FF: Factory population of parameter					
FF-00	Manufacturer password setup	0-65535	0	0	267
FH: User Password					
FH-00	User password setting	0-9999	0	△	268
FH-01	Parameter lockedup	0: Disable 1: Enable	0	△	269
FH-02	Parameter initialization	0：No operation 1：Recover factory setting	0	×	270
FH-03	Fault record clear	0: Disable 1: Enable	0	△	271

Chapter 6 Detailed Function Introduction

△ 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.

F0 Basic Function

Func. code	Name	Setting range	Change	Factory setting
F0-00	G/T option	0：G 1：T	*	Depend on mode

●This parameter only for user to check the factory type, unavailable to change.

●0： For type G series ,applicable to constant torque load，Overload capability：150% rated current for 1 minutes。

●1：For type T series ,applicable to constant torque load，Overload capability：130% rated current for 1 minutes。

Func. code	Name	Setting range	Change	Factory setting
F0-01	Control mode	0：open loop V/F Control mode 1：Torque control mode 2：Open loop vector mode 1 3 ：Open loop vector mode 2	×	0

This parameter is for control model of invertor, can be seted in different circumstances.

●0：V/F Control:It is suitable for general purpose application，Can be used in the case when one inverter drives more than one motor。

●1：F0-01 setup as 1 means torque control mode

It is suitable for the application with low accuracy torque control, the speed of motor is determined by load in this mode。And one triver can qrive one motor only.

●2：F0-01 setup as 2 means vector control mode 1

It is suitable for no pulse encoder (generator) PG equipped and is used for the application which requires high performance such as higher torque at low speed, higher speed accuracy, large range of ajustabel speed and quicker dynamic response。And one triver can qrive one motor only.

3：F0-01 setup as 3 means vector control mode 2

It is suitable for no pulse encoder (generator) PG equipped is used for the application which requires high performance with, higher start torque and larger range of ajustabel speed than NO PG vector control mode 1。

Attention：

Ajusting vecter control parameter(group 2) can optimize the performance of inverter, but the high performance can be get when the accurate motor parameter is known.So nameplate parameter must be right set and motor measure and test must be done for getting accurate motor parameter befor selecting the vector control mode.

Func. code	Name	Setting range	Change	Factory setting
F0-02	Running mode	0: Normal running	×	0
		1: Simple PLC running		
		2: Wobble running		
		3: Proccess PID running		
		4: Multi-Step speed running		

●0: general, setup frequency by Keypad or outer terminal. Initial frequency are prereference for F0-09. it can be adjusted by operate the key ▲、▼.

●1: Simple PLC running

User can set reference frequency, hold time, running direction and acceleration/deceleration time for relative segment by setting FC parameters in “Simple PLC and multi-segment function group”.

●2: Wobble running

Wobble,canbe name as frequency also, it can preset acceleration/deceleration time and frequency, periodic variable running ,especially in textile industry where machine speed varias as wound roll diameter varias, the setup mode and frequency can be set by wobble.

●3: Proccess PID running

Right setup must be done befor running. PID control is widely used in the feld of proccss

variable exist such as constant pressure ,constant temperature and so on. The running frequency of inverter is PID effected frequency.

●4: Multi-Segments speed running

In this function,the inverter runs as multi-segments speed. The running segment speed can be selected by F4 terminals and running frequency can be selected by FC parameters.

Func. code	Name	Setting range	Change	Factory setting
F0-03	Running command Setup mode	0: Keypad control	×	0
		1: outer Terminal control		
		2: Host communication control		

● Select inverter's running control command, control commands of the inverter include: Start, Stop, FWD, REV andJOG.

● 0: running command issued by keypad Running command is issued by pressing the keys of RUN, STOP/RESETand JOG on the Keypad. Normer-reverse commands is controlled by setting parameter F8-19.

● 1：Running command is issued by external terminals such as RUN, F/R, JOG and X1～X5 (terminal function must be defined). The details function definition of External terminals, refers to F4: input terminal group.

● 2：Running command can be issued through internal RS485 serial communication port by host.The inverter with RS485 port which use international standard Modbus communication protocol,for details refer to APPENDIX 3 parameter group and relevant description.

Func. code	Name	Setting range	Change	Factory setting
F0-04	Main reference-input-channel selection A	0: Digital setting	×	0
		1:AI1 setting		
		2:AI2 setting		
		3:Host setting mode		

●The parameter is the path to selecte inverter main frequency reference A.

0: Digital reference (memory), the initial are “presetup frequency”. The setting frequency canbe changed by operating the key ▲、▼(or UP、DOWN in mult-function input terminals).The word “memory”mentioned here means that setting frequency is the same as the setting frequency befor electric power off.

1: Refrenced by AI1,and 2: Refrenced by AI2, those means the reference is setup by analog input signal terminals. AI1 and AI2 may be voltage signal in 0～10V and current signal in

0～20mA which determined jumper wire J1 and J2 in the main control panel.

2: Select “AI2” as main input

3: communication setup which means that the main frequency input is communication setup by Host.

Func. code	Name	Setting range	Change	Factory setting
F0-05	Auxiliary frequency source	0: Digital setting	×	0
		1:AI1 setting		
		2:AI2 setting		
		3: communication setting		

●The parameter is the path to selecte inverter auxiliary frequency reference B

●When take auxiliary frequency source as independent frequency reference path, the select mothed is the same as main frequency source A, Details refer to description F0-04

There is following special when auxiliary frequency source is take as overprinting reference:

* Taking auxiliary frequency source as digital reference, presetup frequency does not effect, and the setting frequency can be adjusted based on the main reference frequency by operating the key ▲、▼(or UP、DOWN in mult-function input terminals).

* Taking auxiliary frequency source as analog input reference（AI1、AI2） or pulse input reference (“input terminal group” F4), refers to description F0-06 and F0-07.

Func. code	Name	Setting range	Change	Factory setting
F0-06	Frequency scale 1 of auxiliary frequency source	0：Main frequency source	×	0
		1: Maximum operation frequency		

Func. code	Name	Setting range	Change	Factory setting
F0-07	Frequency scale 2 of auxiliary frequency source	0-100%	×	000

● It is used to determine the range of auxiliary frequency source ajuste when auxiliary frequency source is take as overprinting reference (F0-08 are setup as 2):

In Analog setting mode, auxiliary input is adjusted based on main input.

If auxiliary reference-input-channel is selected, then the Analog input will be added to main input with the form of auxiliary adjusting value to form total input; for example the frequency input in analog mode, or the analog close loop input.

Func. code	Name	Setting range	Change	Factory setting
F0-08	Frequency command selection	0:A	×	0
		1:B		
		2: A+B		
		3: Max（A, B）		

This parameter can be used to select the reference frequency command.

0: Only frequency command source A is active.

1: Only Frequency command source B is active.

2: Both Frequency command source A and B are active.

Reference frequency = reference frequency A + reference frequency B.

3: Either Frequency command source A or B is active.

Reference frequency = Max (reference frequency A, reference frequency B).

Func. code	Name	Setting range	Change	Factory setting
F0-09	Keypad reference frequency	0.10-400.00Hz	△	50.00

●When F02 is set to be 0, this parameter is the initial value of inverter reference frequency.

Func. code	Name	Setting range	Change	Factory setting
F0-10	Highest output frequency	50.00-400.00Hz	×	50.00

●The user shoul pay attention to that hightest output frequency is base of frequency setting and velocity.The anology input signals are source of the hightest output frequency.when the setting of anology input signals is 100%, it is the hightest input frequency.

Func. code	Name	Setting range	Change	Factory setting
F0-11	High frequency limit	0.50-400.00Hz	△	50.00

●High frequency limit setting: High frequency limit≤Highest output frequency.

Func. code	Name	Setting range	Change	Factory setting
F0-12	Low frequency limit	0.1-400.00Hz	△	1.00

●Low frequency limit is the minimum frequency which the customer is allowed to set. Inverter begins to run from “starting frequency”(F6-03). If the setting frequency is smaller then the low frequency limit, the inverter will run in the low frequency limit till the inverter stops or the setting frequency bigger than the low frequency limit.

Func. code	Name	Setting range	Change	Factory setting
F0-13	Carrier frequency Regulation	0-8	×	1

● The carrier frequency is the PWM wave of inverter's output, which impacts motor operation noise and hot effect. When the condition temperature is high or the load of motor is rather big, the carrier frequency need be decreased. While the carrier frequency is increased, electromagnetism noise and current harmonic wave are decreased as well as leakage current is enlarged. Inverter is suggested to used in lower carrier frequency.

Func. code	Name	Setting range	Change	Factory setting
F0-14	Acc time1	0.1-3600s	△	20.0
F0-15	Dec time1	0.1-3600s	△	20.0

● Acc time means the inverter outputs from zero frequency to the highest output frequency shown in Figure 6-1 as t1.

Dec time means the inverter outputs from the lowest output frequency to zero frequency shown in Figure 6-1 as t2.

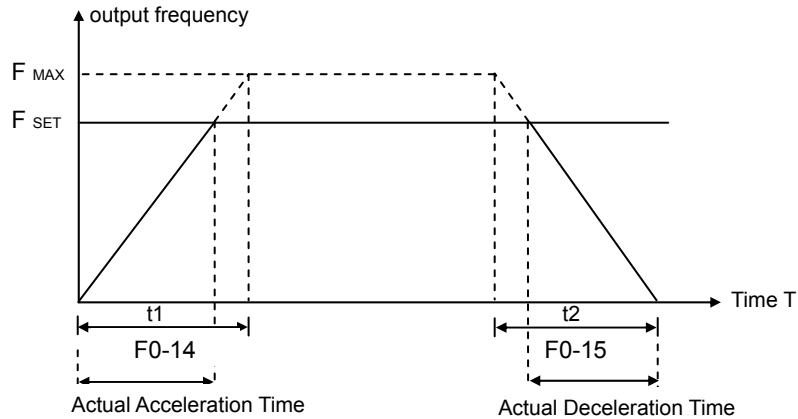


Figure 6-1 Definition of Acc/Dec time

●MC200G/T series inverter has 4 groups of acceleration and deceleration time.

1st group: F0-14、F0-15

2nd group: F8-03、F8-04

3rd group: F8-05、F8-06

4td group: F8-07、F8-08

The acceleration and deceleration time can be selected by combination of multifunctional ON-OFF input terminals determined by F4 Group.

F1 :Motor Parameters

Func. code	Name	Setting range	Change	Factory setting
F1-00	Motor rated power	0.75-450KW	×	Depend on model
F1-01	Motor rated voltage	220-440V	×	380
F1-02	Motor rated current	1.0-1000.0A	×	Depend on model
F1-03	Motor rated frequency	20-400.00Hz	×	50.00Hz
F1-04	Motor rated speed	500-24000rpm	×	Depend on model

● To ensure normal motor tuning, set the motor nameplate parameters correctly.

To ensure the control performance, the motor's power should fit the inverter power, generally within 2 grades below or 1 grade above.

Func. code	Name	Setting range	Change	Factory setting
F1-05	Stator resistance	0.001-65.535Ω	×	Depend on model
F1-06	Rotor resistance	0.001-65.535Ω	×	Depend on model
F1-07	Motor leakage inductance	0.01-655.35mH	×	Depend on model
F1-08	Motor mutual inductance	0.01-655.35mH	×	Depend on model
F1-09	Excitation current with no load	0.5-1000A	×	Depend on model
F1-10	Motor auto-tuning process	0:No operation 1:Start tuning	×	0

● Before tuning, the parameters on the nameplate of the motor must be input correctly (F1-00~F1-04).

First set F1-10 to 1, after confirmation, inverter will perform auto-tuning functions.

After tuning, value of F1-10 will be set to 0 automatically.

The high control performance is based on these parameters.Please don't change these parameters casually.

F2: Vector Control Function

F2-00~F2-13 are only valid for vector control mode, and invalid for V/F control.

Func. code	Name	Setting range	Change	Factory setting
F2-00	ASR proportional gain 1	0—100	△	30
F2-01	ASR integration time 1	0.00—10.00s	△	0.50
F2-02	ASR switching frequency 1	0.0—400.00Hz	△	5.00
F2-03	ASR proportional gain 2	0—100	△	20
F2-04	ASR integration time 2	0.00—10.00s	△	1.00
F2-05	ASR switching frequency 2	0.0—400.00Hz	△	10.00

●F2-00 and F2-01 are the parameters, when the running frequency is lower than the PID frequency. F2-03 and F2-04 are the parameters, when the running frequency is higher than the PID frequency.the band of the PI switching frequency1 and PI switching frequency2 is obtained by the change of these two group PI patameters.

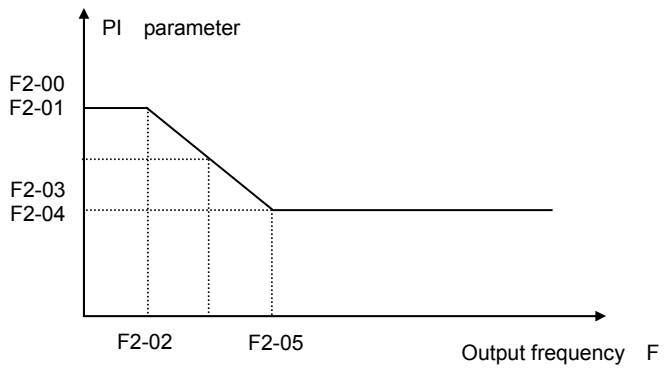


Figure 6-2 PI parameter diagram

● The system dynamic response can be faster if the proportion gain P is increased. However, if P is too large, the system tends to oscillate.

The system dynamic response can be faster if the integration time I is decreased. However, if I is too small, the system becomes over adjusted and tends to oscillate.

Speed loop PI parameters and system inertial have close relations. In view of the different load characteristics need, in default on the basis of PI parameters ,be adjusted to meet the needs of various occasions

Func. code	Name	Setting range	Change	Factory setting
F2-06	ACR proportional gain	0.0-1000.0	△	100.0
F2-07	ACR integral gain	0.0-1000.0	△	100.0

● The bigger of the proportional gain P, the faster of the response, but oscillation may easily occur. If only proportional gain P is applied in regulation, the bias cannot be eliminated.

In order to eliminate the bias, apply the integral gain I to achieve PI regulator.

Func. code	Name	Setting range	Change	Factory setting
F2-08	Speed detection filter time	0.001-0.1s	△	0.005s

●When the inverter is run in vector control mode, this parameter is used to filter of moment.when the perturbation is rather big, it can boost the time parameter;when the motor chatter, it can decrease the parameter.

●The output torque of the inverter may vary widely and the response may be quickly when the filte time small.

Func. code	Name	Setting range	Change	Factory setting
F2-09	Slip compensation rate of VC	0-200	△	100%

●The parameter is used to adjust the slip frequency of vector control and improve the precision of speed control for sensorless vector control . Properly adjusting this parameter can effectively restrain the static speed bias.Vice versa.

Func. code	Name	Setting range	Change	Factory setting
F2-10	Motor torque limit	20-200	△	150%
F2-11	Braking torque limit	0-150	△	80%

Torque limit is used to limit the torque current output by speed regulator.

Torque limit value 0.0~200% is the inverter's rated current percentage: If the torque limit value is 100%, then the torque current limit is the inverter's rated current.

In the regenerative braking state, the braking toque limit (F2-11) should be adjusted properly. When large braking torque is required, an external brake resistor or brake unit should be used, otherwise overvoltage fault may occur.

F3:V/F Control

Func. code	Name	Setting range	Change	Factory setting
F3-00	V/F curve Control mode	0: linear	×	0
		1: self define		

These parameters are used to set the type of V/F curve.

0: Linear voltage/frequency mode (constant torque load)，as curve 0 in Figure 6-3a.

1: User-defined curve. It can be defined through setting (F3-02~F3-11)，as curve 0 in Figure 6-3b.

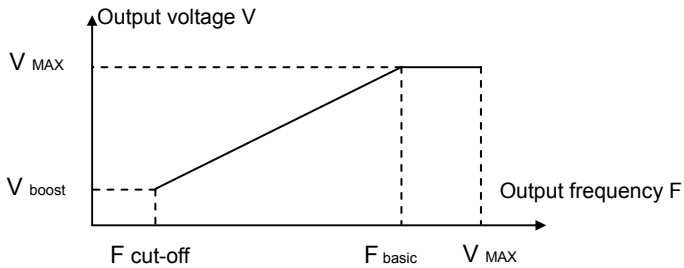


Figure 6-3a

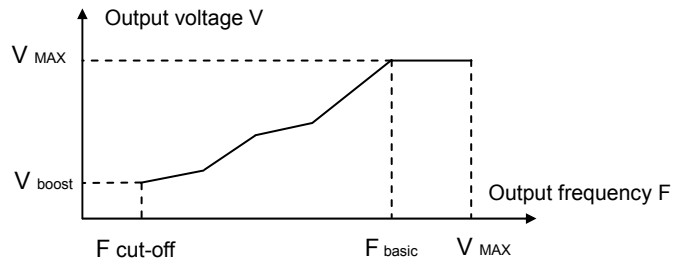


Figure 6-3b

Func. code	Name	Setting range	Change	Factory setting
F3-01	Torque boost	0-50	×	5

●In order to compensate the low frequency torque, boost the output voltage in the low frequency 。

The value of torque boost should be determined by the load. The heavier the load, the larger the value.

Notice: This value should not be too large, otherwise the motor would be over-heat or the inverter would be tripped by over-current or over-load.

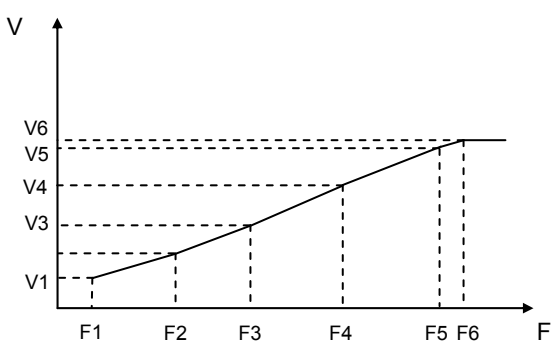
If F3-01 is set to 0, the inverter will boost the output torque according to the load automatically.

Func. code	Name	Setting range	Change	Factory setting
F3-02	VF1 frequency	1.00-400.0 Hz	×	6.00
F3-03	VF1 voltage	0-380V	×	6
F3-04	VF2 frequency	1.00-400.0 Hz	×	15.00
F3-05	VF2 voltage	0-380V	×	34
F3-06	VF3 frequency	1.00-400.0 Hz	×	25.00
F3-07	VF3 voltage	0-380V	×	95
F3-08	VF4 frequency	1.00-400.0 Hz	×	35.00
F3-09	VF4 voltage	0-380V	×	186
F3-10	VF5 frequency	1.00-400.0 Hz	×	45.00
F3-11	VF5 voltage	0-380V	×	307

● There are ten parameters in F3-02～F3-11 to set the self-define V/F curve, shown in figure 6-4.

The setting of V/F curve is defined by load of motor.

Notice: VF1frequency ＜ VF2 frequency ＜ VF3 frequency ＜ VF4 frequency ＜ VF5 frequency，VF1voltage＜VF2 voltage＜VF3 voltage＜VF4 voltage＜VF5 voltage.Overtop lower voltage reference may lead overheat of the moter even burn down, the inverter may stallout or protection due to overcurent.



V1~V5:VF1~VF5 voltage point
F1~F5:VF1~VF5 frequency point
V6: rated voltage
F6: rated frequency
Figure 6-4 seft-define V/F curve

Func. code	Name	Setting range	Change	Factory setting
F3-12	Auto slip compensation	0.00—10.00Hz	△	0.00

● The motor's slip changes with the load torque, which results in the variance of motor speed. The inverter's output frequency can be adjusted automatically through slip compensation according to the load torque. Therefore the change of speed due to the load change can be reduced. The value of compensated slip is dependent on the motor's rated slip which can be calculated as: *P*4.09 = *fb* - *n***P* / 60. f is motor rated frequency , n is motor rated speed , and P is pole pairs of motor.

Func. code	Name	Setting range	Change	Factory setting
F3-13	AVR function	0: No action 1: Action	△	0

●AVR (Auto Voltage Regulation) function ensures the output voltage of inverter is stable no matter how the DC bus voltage changes. During deceleration, if AVR function is disabled, the deceleration time will become short but the current will become long. If AVR function is enabled all the time, the deceleration time will be long but the current will be small.

Func. code	Name	Setting range	Change	Factory setting
F3-14	Auto energy saving selection	0：Disabled 1：Enabled	△	0

Auto energy saving selection: the inverter will automatically tune the output voltage according to the load current for saving energy.

0: Disable saving energy.

1: Enable saving energy.

Func. code	Name	Setting range	Change	Factory setting
F3-15	Maximum output voltage	220V～440V	×	380
F3-16	Voltage limited frequency start point	10.00—400.00Hz	×	50.00

Maximum output voltage is set as the rated operation voltage indicated on the motor

nameplate.

Base frequency is the rated frequency of the motor(indicated on the motor nameplate). It is also the maximum output voltage of the inverter. The base frequency must match the motor rated frequency, otherwise the motor may be damaged.

F4: Group--Input Terminals

MC200G/T standard unit has 5 multi-funcation data input terminal(which X4 and X5 can be used as pulse signal terminal), and 2 stimulative input terminals.

Func. code	Name	Setting range	Change	Factory setting
F4-00	X1 terminal function	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 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 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	△	0
F4-01	X2 terminal function		△	0
F4-02	X3 terminal function		△	0
F4-03	X4 terminal function		△	7
F4-04	X5 terminal function		△	9

		16:Swift between main frequency A and B 17:UP/DOWN terminal clear command 18：PID option 19:Coast to Stop input 20:X1—X3 Reserved X4:Frequency increase command (UP) X5:Frequency decrease command (DOWN)		

Set the multiple function terminal（X1-X5） as the input signal of speed, Refer table 6-02.

Set the multiple function terminal （X1-X5）as the input signal of process PID.

Set the multiple function terminal （X1-X5）as the time of acceleration or deceleration. Refer table 6-01.

Set the change of panel and external multiply function terminal, this setting is used with F0-03.

Main frequency source A and auxiliary frequency source B are the choise of real requency.

Table 6-01 Acc/Dec time selection

Xi6	Xi5	Acc or Dec time selection
OFF	OFF	Acc time1/Dec time1 （F0-14，F0-15）
OFF	ON	Acc time2/Dec time2（F8-03，F8-04）
ON	OFF	Acc time3/Dec time3（F8-05，F8-06）
ON	ON	Acc time4/Dec time4（F8-07，F8-08）

Notice:ON indicates that this terminal is close with COM,Off indicates that it is cut off.

Xi indicates a terminal of X1～X5, for example Xi6 means a terminal to be defined as 6.

Table 6-02 MS (multi-section) speed running selection

Xi4	Xi3	Xi2	Xi1	setting multi-frequency
OFF	OFF	OFF	OFF	1.Selection multi-frequency 1（FC-00）
OFF	OFF	OFF	ON	2.Selection multi-frequency 2（FC-01）
OFF	OFF	ON	OFF	3.Selection multi-frequency 3（FC-02）
OFF	OFF	ON	ON	4.Selection multi-frequency 4（FC-03）

OFF	ON	OFF	OFF	5.Selection multi-frequency 5（FC-04）
OFF	ON	OFF	ON	6.Selection multi-frequency 6（FC-5）
OFF	ON	ON	OFF	7.Selection multi-frequency 7（FC-06）
OFF	ON	ON	ON	8.Selection multi-frequency 8（FC-07）
ON	OFF	OFF	OFF	9.Selection multi-frequency 9（FC-08）
ON	OFF	OFF	ON	10.Selection multi-frequency 10（FC-09）
ON	OFF	ON	OFF	11.Selection multi-frequency 11（FC-10）
ON	OFF	ON	ON	12.Selection multi-frequency 12（FC-11）
ON	ON	OFF	OFF	13.Selection multi-frequency 13（FC-12）
ON	ON	OFF	ON	13.Selection multi-frequency 14（FC-13）
ON	ON	ON	OFF	15.Selection multi-frequency 15（FC-14）
ON	ON	ON	ON	16.Selection multi-frequency 16（FC-15）

- Terminal for external FWD/FWD Jog running control:JOGF/JOGR.

In esternal terminal control mode (F0-03=1), JOGF is Jog forward running (setup as 7), JOGR is Jog reverse running (setup as 8).

- Terminal for inputting external reset signal (RESET)

When fault alarm occurs, reset the inverter. The function is the same with STOP/RESET key on the Panel.

- Three-line control mode TLC

In terminals control mode (F4-05=2), this function is used toset the input of FWD/REV running command when three-line running control mode is selected. Refer to F4-05 for the introduction of three-line running control mode.

- Normally close contacts for inputting external interrupt command
- Normally open contacts for inputting external interrupt command

When the inverter is in running process, after external interrupt signal is received, the inverter will decrease its output frequency to zero according to the Acc/Dec mode and continues running at zero frequency; Once the external interrupt signal disappears, the inverter will continues to run at the frequency before interruption according to the preset Acc/Dec mode.

Two kinds of input modes for external interruption: Terminal 14 uses normally open input mode, and terminal 13 uses normally closed input mode.

- Switch between panel control mode and external terminal control mode

Notice: terminal function is defined by F8-20, F8-20=0,this function is disable. When F8-20=1, the running command can not be set by F0-03.

This function is used for selecting the physics channel that inputs inverter's running control command: Selecting between keypad and external terminal to input control commands.

- Swift between main frequency A and B

Condition : F8-21=1

When selecting relative terminal Xi connect with terminal COM,mian ferequency source A is to be exchanged with auxiliary ferequency source B.

When selecting relative terminal Xi disconnect with terminal COM,mian ferequency source A and with auxiliary ferequency source B are both to recover to that original.

- UP/DOWN clear command

This terminal is used to clear the frequency set via external terminals (set the frequency by frequency increase command UP/decrease command DOWN).

- Emergent stop input

When this terminal is close, inverter will be power off and give alarm signal.

- Frequency increase command UP

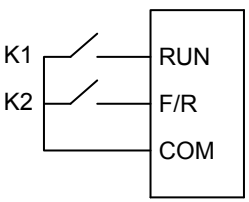
When X4 is seclected, this terminal ia used as increasing input signal.

- Frequency decrease command DOWN

When X5 is seclected, this terminal ia used as decreasing input signal.

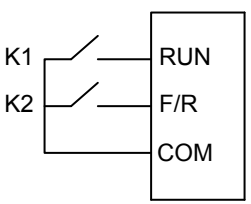
Func. code	Name	Setting range	Change	Factory setting
F4-05	Outer running mode selection	0: Two line mode 1 1: Two line mode 2 2: Three line mode	×	0

- This function define three ways of control invetor with outside terminal, as figure 6-5,6-6 and 6-7 showing.



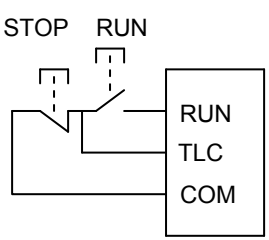
K1	K2	Run command
OFF	OFF	STOP
OFF	ON	F/R
ON	OFF	RUN
ON	ON	STOP

Figure 6-5 Two-line control mode 1



K1	K2	Run command
OFF	OFF	STOP
OFF	ON	STOP
ON	OFF	RUN
ON	ON	F/R

Figure 6-6 Two-line control mode 2



K	Run command
STOP	STOP
RUN	RUN

Figure 6-7 Three-line control mode

Func. code	Name	Setting range	Change	Factory setting
F4-06	AI1 lower limit	0.00—10.00V	△	0.01
F4-07	AI1 lower limit corresponding setting	0.0—100.0%	△	0.0
F4-08	AI1 upper limit	0.00—10.00V	△	10.00
F4-09	AI1 upper limit corresponding setting	0.0—100.0%	△	100.0
F4-10	AI1 filter time for input signal	0.00—10.00s	△	1.00

● These parameters determine the relationship between analog input voltage and the corresponding setting value. When the analog input voltage exceeds the range between lower limit and upper limit, it will be regarded as the upper limit or lower limit.

The analog input AI1 can only provide voltage input, and the range is 0V~10V.

For different applications, the corresponding value of 100.0% analog setting is different.

For details, please refer to description of each application.

● AI1 is the parameter of filtering time.Increasing the filtering time slows down the response, but strengthens the immunity to the disturbance.Reducing the filtering time speed up the response, but weakens the immunity.

Func. code	Name	Setting range	Change	Factory setting
F4-11	AI2 lower limit	0.00—10.00V	△	0.01
F4-12	AI2 lower limit corresponding setting	0.0—100.0%	△	0.0
F4-13	AI2 upper limit	0.00—10.00V	△	10.00
F4-14	AI2 upper limit corresponding setting	0.0—100.0%	△	100.0
F4-15	AI2 filter time for input signal	0.00—10.00s	△	1.00

● Please refer to description of AI1.

Notice: When AI1 and AI2 are set as 0～10V and 0~20mA respectively, the corresponding voltage range is 0~5V. MC200 provide 2 input analog signal.

Func. code	Name	Setting range	Change	Factory setting
F4-16	Action selection at external analog frequency/speed command missing	0：No detect 1：Stop 2：run as 80% of previous frequency 3：Running set by F4-7	×	0
F4-17	External running frequency	0.10—400.00Hz	△	40.00
F4-18	AI1 checking analog signal off-line	0.00—10.00	△	0.00
F4-19	AI2 checking analog signal at off-line	0.00—10.00	△	0.00

● Signal lost handle means input analog signal is smaller than setting checking analog signal. When inverter is running, one should check the external terminal input signal.

0:Disable checking

1:if signal is lost, the inverter stops.

2:if signal is lost, the inverter runs as 80%frequency.

3:if signal is lost, the inverter runs as the setting of F4-17.

Func. code	Name	Setting range	Change	Factory setting
F4-20	**Input frequency control**	**0: saving △F** **1: Do not saving △F** **2:reset when stop or cut off**	△	**0**

● When set the frequency with X4、X5,chose as follow:

0:saving△F, save the frequency, which is adjusted by X4、X5.

1: Do not saving △F，do not save the frequency, which is adjusted by X4、X5.

2: when stop or power off, △F is reseted.

Func. code	Name	Setting range	Change	Factory setting
F4-21	Type of input signals	0: switch signal 1: pulse signal	△	0

● There are two type of signals(0 or1), when the external terminal X4、X5 is used to defined the input signal.when the input signal is pulse, it should satisfy T1>2ms、T2>2ms shown as figure 6-8.

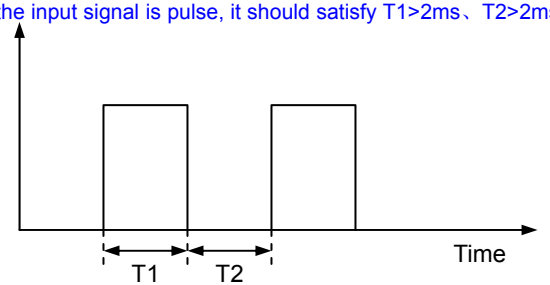


Figure 6-8 pulse signal input

Func. code	Name	Setting range	Change	Factory setting
F4-22	Input pulse frequency unit	0.01—2.00Hz	△	0.01

F4-22 sets the unit of the input signals from X4 & X5 terminals.

Func. code	Name	Setting range	Change	Factory setting
F4-23	I/O pulse ratio	0.01—10.00	△	1.00

● F4-23 sets the ratio of the output pulse(from Y1 & Y2 terminals) to the input pulse(from X4 & X5 terminals).

When you want multiple inverters to run synchronously, you may connect Y1 & Y2 of No.1 inverter to X4 & X5 terminals of No.2 inverter respectively and set F513 & F514 properly. Then by adjusting No.1 inverter's X4 & X5 terminals, No.1 and No.2 inverters can be made running synchronously. In this case, Y2 need to be set "Frequency up"(F5-01=18) and Y3 be set "Frequency down"(F5-02=18).

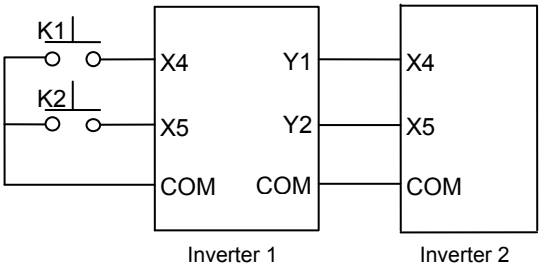


Figure 6-9 synchronization control

F5: Group--output terminal

There are two mutiply function digital output terminals, one mutiply function relay output terminal,two mutiply function analog output terminal.

Func. code	Name	Setting range	Change	Factory setting
F5-00	Relay output selection	0：Running 1： Stopping 2: Frequency reached 3：Specified Frequency 1 reached 4：Specified Frequency 2 reached 5：Inverter over load 6：External alarm 7: Keypad operation 8:Lower voltage stopping 9：PLC running 10：PLC cycle finished 11：PLC a cycle finished 12：One stage of PLC operation finished 13：Feedback overhigh 14：Feedback overlow 15：Fault alarm 16: Output when external setting signal lose 17：Y1 pulse output 18: Relay output Y1: Frequency up output Y2: Frequency down output	△	15
F5-01	Y1 function selection		△	0
F5-02	Y2 function selection		△	1

0：Running

A signal is output when the inverter is running.

1：Stopping

A signal is output when the inverter has stopped.

2：Frequency reached

A signal is output when the output frequency reaches the reference frequency.

3：Specified Frequency 1 reached

A signal is output when the output Specified frequency 1 reaches the reference frequency.

4：Specified Frequency 2 reached

A signal is output when the output Specified frequency 2 reaches the reference frequency.

5：Inverter over load pre-alarm

A signal is output when the output current exceeds F9-00=1.

6：External alarm

When this terminal is disconnected from COM, a signal is output.

7：Keypad operation

When F0-04=0，a signal is output.

8：Under voltage stopping

When undervoltage causes the inverter to stop，a signal is output.

9：PLC running

When F02=1 and the inverter is in PLC operation, a signal is output.

10：PLC cycle finished

When F02=1 and after cycle of the PLC operation is finished, a signal is output.

11：PLC a cycle finished

When F02=1 and after a cycle of the PLC operation is finished, a 0.5s signal is output.

12：PLC stage finished

When F02=1 and after any stage of PLC operation is finished, a 0.5s signal is output.

13：Feedback overhigh

When feedback signal is higher than upper feedback, this terminal close.

14：Feedback overlow

When feedback signal is lower than lower limit feedback, this terminal close.

15：Fault alarm

When the inverter alarms, this terminal close.

16：output of external setting signal losting

When the external analog input signal lost, this terminal close.

17：Y1 pulse output，Refer to F5-16 & F5-17.

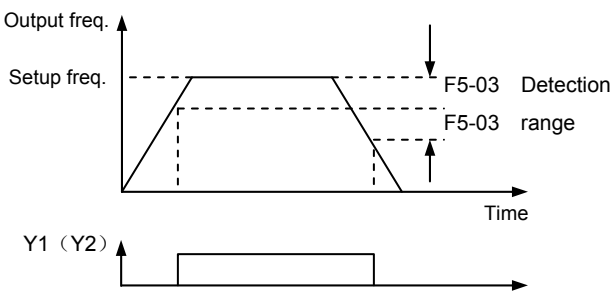
18: Relay output

Y1: Frequency up output

Y2: Frequency down output

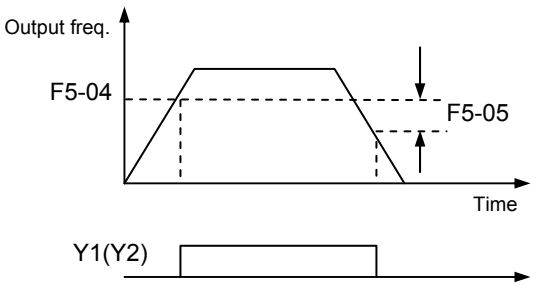
Func. code	Name	Setting range	Change	Factory setting
F5-03	Frequency reach detection band	0.00—10.00Hz	△	1.00

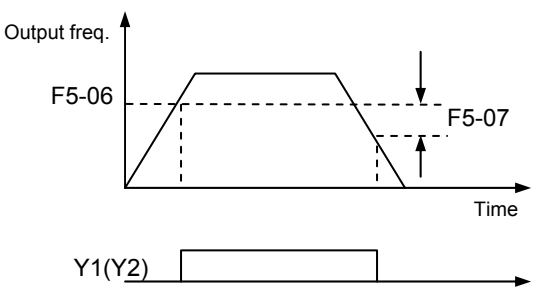
Set the Frequency reach detection band. When some input terminal frequency reach,this terminal will output signals at acceleration and constant speed. If there are no output signals, this terminal keeps states at deceleration.if there are some output signals, the output signal of this terminal disappears shown in figure 6-10.



Func. code	Name	Setting range	Change	Factory setting
F5-04	Specified detection frequency 1	0.10—400.00Hz	△	30.00
F5-05	Specified detection frequency 1 width	0.00—10.00Hz	△	1.00
F5-06	Specified detection frequency 2	0.1.—400.00Hz	△	40.00
F5-07	Specified detection frequency 2 width	0.00—10.00Hz	△	1.00

Set the arbitrary Frequency. When some input terminal frequency reach,this terminal will output signals at acceleration and constant speed. If there are no output signals, this terminal keeps states at deceleration.if there are some output signals, the output signal of this terminal disappears shown in figure 6-11 and 6-12.





Func. code	Name	Setting range	Change	Factory setting
F5-08	AO1 output selection	0：Setup frequency 1：Output frequency 2：Output current	△	1
F5-09	AO2 output selection		△	2

0:output signals pro rata setting frequency,according to the hightest output frequency.

1: output signals pro rata output frequency,according to the hightest output frequency.

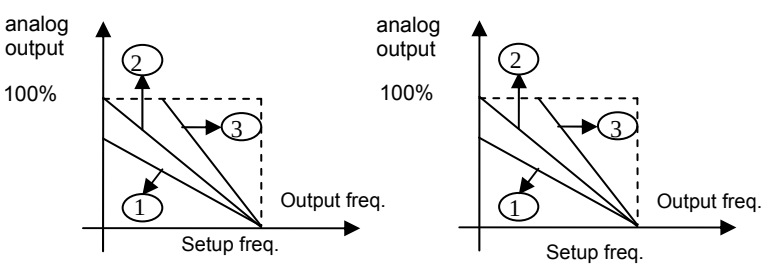
2: output signals pro rata motor current,according to the rated current.

Current or voltage is decided by switch of panel,shown in figure 6-13.

Figure 6-13 analog output select

Func. code	Name	Setting range	Change	Factory setting
F5-10	AO1 zero offset adjustment	0—200	△	100
F5-11	AO1 gain setup	0—200	△	100
F5-12	AO1 polarity	0. Positive polarity	△	0
		1. Negative polarity		
F5-13	AO2 zero offset adjustment	0—200	△	100
F5-14	AO2 gain setup	0—200	△	100
F5-15	AO1 output signal polarity	0. Positive polarity	△	0
		1. Negative polarity		

Adjust some parameters to revise the output.



B Negative polarity

① positive bias ② 0 zero bias ③ negative bias

Figure 6-14 analog output

Func. code	Name	Setting range	Change	Factory setting
F5-16	PO Output selection	0:Setting frequency	△	1
		1：Output frequency		
		2：Speed		
		3：Motor speed		
F5-17	PO pulse gain	1—200	△	10

This function define the output.

- 0:the output frequency pro rata setting frequency.

  output frequency=setting frequency（Hz）×PO pulse rate

- 1:the output frequency pro rata output frequency.

output frequency=output frequency（Hz）×PO pulse rate

- 2:the output frequency pro rata synchronize speed.

output frequency= synchronize speed（r/min）×PO pulse rate

- 3:the output frequency pro rata motor speed.

output frequency= motor speed（r/min）×PO pulse rate

When P0 output frequency =0Hz, electrical level is low, shown in figure 6-15.

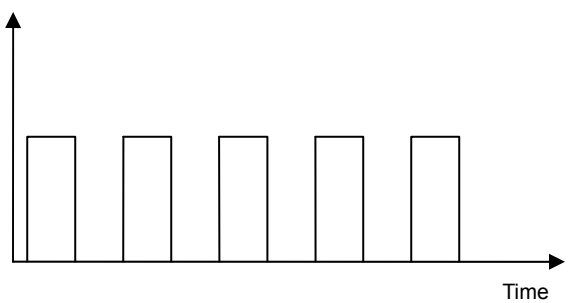


Figure 6-14

F6:Start and Stop Control

Func. code	Name	Setting range	Change	Factory setting
F6-00	Revolution tracking start control	0:Restart inactive when power recover 1：Restart from 0Hz 2: lower voltage alarm when over overcompensated in revolution tracking starting 3:flying restart	×	0
F6-01	Speed search waiting time	0.2—2.0s	△	0.2
F6-02	Allowable time for momentary power failure	0.1—5.0s	△	0.2

0：After power recovery, the LED displays the fault code Lu, inverter does not start。

1：after power recovery, when the inverter detects that the DC voltage is greater than the undervoltage protection level, it restarts from 0Hz after the period of F6-01(Fig.6-16).

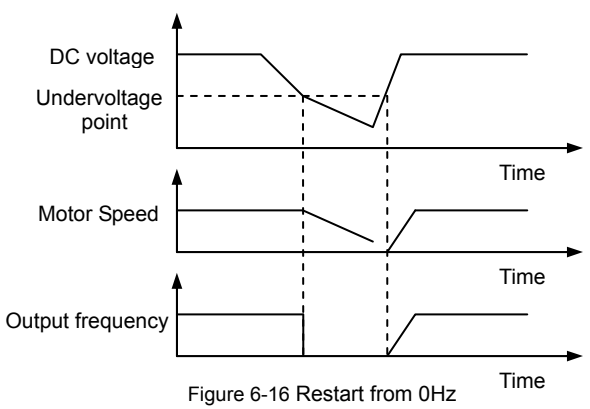


Figure 6-16 Restart from 0Hz

2：If the time of power failure exceeds F6-02, the inverter won't start the motor automatically after the power recovery even if F6-00=1，2(or 3) and the DC voltage is greater than the undervoltage protection level. The inverter will start the motor after receiving the start command.

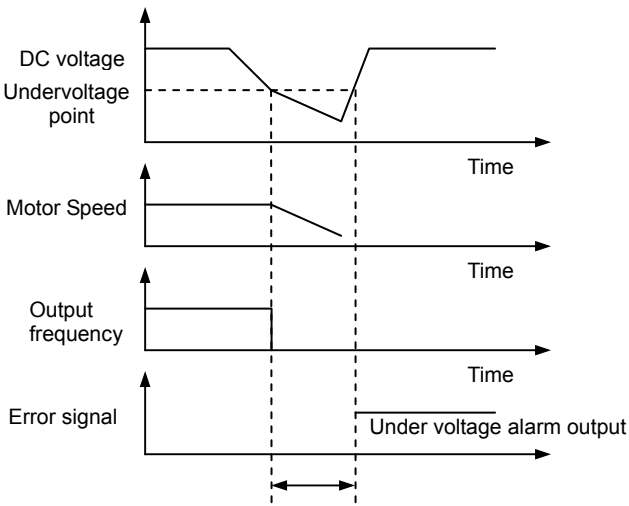


Figure 6-17 Undervoltage Protection T>F6-02

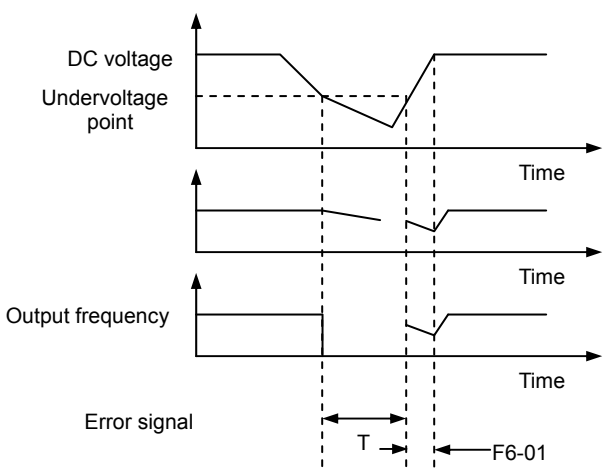


Figure 6-18 flying restart T<F6-02

3：After power recovery, when the DC voltage is greater than the undervoltage protection

level, after the period of F6-01, the inverter searches the motor speed based on its output frequency before power failure, then restarts from the frequency corresponding to the searched motor speed .

Func. code	Name	Setting range	Change	Factory setting
F6-03	Start frequency	0.10—10.00Hz	×	1.00
F6-04	Start frequency holding time	0.0—20.0s	△	0.5

Start frequency: It is the initial frequency when the inverter starts from zero frequency.

In the Acc and Start process, if the preset frequency is lower than the start frequency, inverter's output frequency becomes zero.

Start frequency is effective in each Acc process in RUN and F/R running process.

Start frequency holding time: the running time at start frequency in Acc/Start process.

Start frequency holding time is effective in each Start process and FWD/REV running switching process.

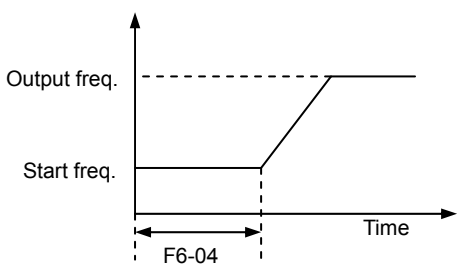


Figure 6-19 Start mode (RUN, F/R and Stop)diagram

Func. code	Name	Setting range	Change	Factory setting
F6-05	Acc/Dec selection	0: Line Acc/Dec	×	0
		1: S curve Acc/Dec		

Acc/Dec modes 0 and 1 are valid in Start, Stop, FWD/REV, Acc and Dec process.

0: Straight line mode

In Acc/Dec process, the relationship between output frequency and Acc/Dec time is linear. The output frequency increases or decreases at the constant slope as shown in Figure 6-20.

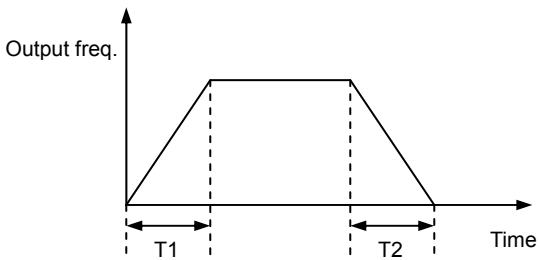


Figure 6-20 Linear Acc/Dec

1: S curve mode

In Acc/Dec process, the relationship between output frequency and Acc/Dec time is nonlinear. The output frequency increases or decreases according to the S curve shown in Figure 6-21.

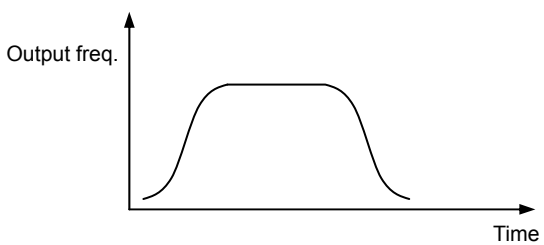


Figure 6-21 S Curve Acc/Dec

Func. code	Name	Setting range	Change	Factory setting
F6-06	S-curve accel start-stage time	0.0—5.0s	△	1.0
F6-07	S-curve accel end-stage time	0.0—5.0s	△	1.0
F6-08	S-curve decel start-stage time	0.0—5.0s	△	1.0
F6-09	S-curve decel end-stage	0.0—5.0s	△	1.0

	time			

This function is widely used in applications which require smooth start and stop, such as elevators, belt conveyor etc.

The curvature of S curve is codetermined by ACC/DEC time, start section time and end section time.

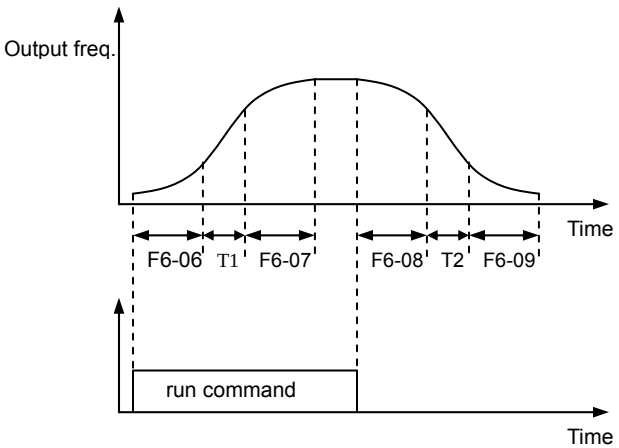


Figure 6-22 **S curve acc/dec**

Func. code	Name	Setting range	Change	Factory setting
F6-10	Stopping mode	0: Dec-to-stop	△	0
		1: Coast to stop		
		2: Dec-to-stop+ DC braking		

0: Dec-to-stop mode

When the inverter receives stop command, it lowers its output frequency and decelerates to stop according to the preset Dec time and Acc/Dec mode

1: Coast to stop mode

After the inverter receives the stop command, it stops its output immediately; the motor will stop according to its inertia.

2: Dec-to-stop+ DC braking mode

The inverter slows down and blocks the output when its operating frequency drops to F6-11. the inverter applies the DC current(F6-12) to the motor, which stops following another period of time(F6-13).

Func. code	Name	Setting range	Change	Factory setting
F6-11	Initial frequency of DC injection braking	0.00—60.00	×	5.00
F6-12	DC braking weight	0—100	×	20
F6-13	DC braking time	0.1—20.0s	×	5.0

Initial frequency of DC injection braking: It is the frequency when the inverter's output frequency is decreased to zero along the Dec curve in Dec-to-stop process。

When the inverter is in Dec-to-stop process, if the preset frequency is lower than the initial frequency of DC injection braking, then the output frequency become zero.

Initial frequency of DC injection braking is valid in the Dec process when the inverter is switching between RUN and F/R states.

If the user selects DC injection braking function, this frequency is also the initial frequency of DC injection braking in stopping process.

DC injection braking current: percentage of braking current when the inverter stops in DC injection braking mode.

DC injection braking time: the time for maintaining output DC injection braking current in inverter's stopping process.

When the DC injection braking time is set to 0.0, the DC injection braking function is disabled.

F7:Panel Display

Func. code	Name	Setting range	Change	Factory setting
F7-00	Display on LED	0—5	△	0

●F7-00：Display on LED

This function selects which information is displayed on the LED monitor when the power of the inverter is turned on.

Table6-03 LED display

F7-00 Setting	Display in stop	Display in running
0	Preset frequency	Output frequency
1		Output current
2		Output voltage
3	Synchronous speed	Motor Synchronous speed
4	Preset Line speed	Line speed
5	Preset frequency	Load rate

Func. code	Name	Setting range	Change	Factory setting
F7-01	Speed coefficient	0.01—100.00	△	1.00

● This function sets the speed coefficient when the line speed or load speed is required to display on the LED monitor.

Displayed line speed or load speed = Frequency × Speed coefficient

Func. code	Name	Setting range	Change	Factory setting
F7-02	Input terminal status			
F7-03	Output terminal status			

Showing the connection and disconnection status of invetor input terminal, as figure 6-23 and 6-24.

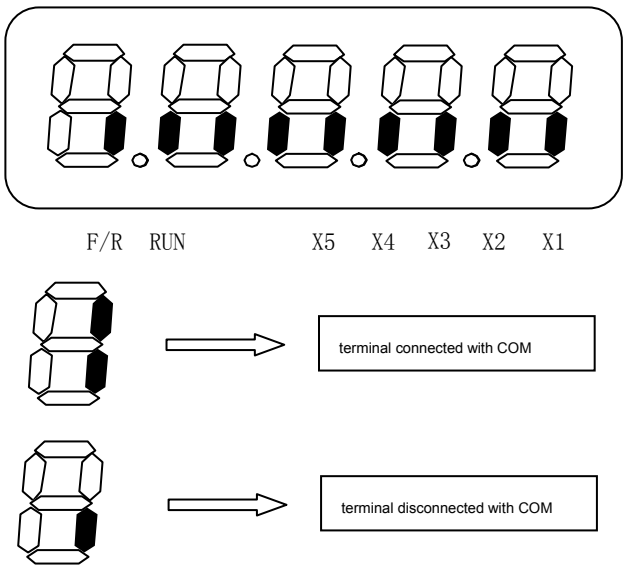


Figure6-23 input terminal states

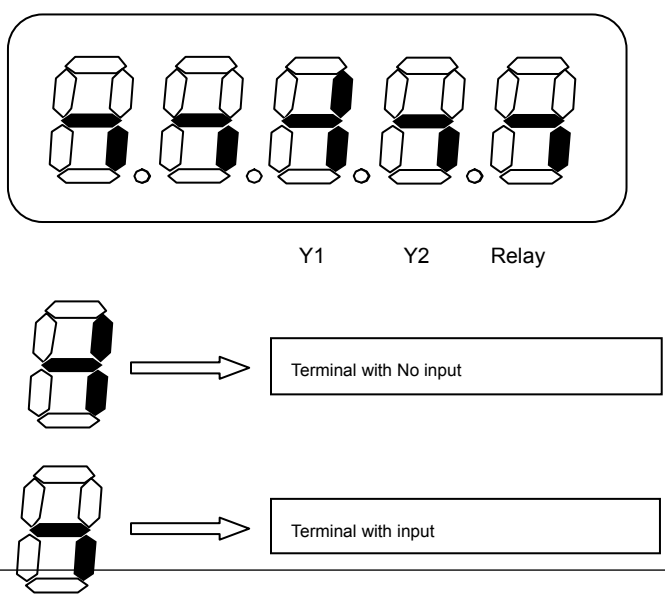


Figure6-23 output terminal states

Func. code	Name	Setting range	Change	Factory setting
F7-04	Preset frequency			
F7-05	Output frequency			
F7-06	Output current			
F7-07	Output voltage			
F7-08	Output power			
F7-09	Preset speed			
F7-10	Output speed			
F7-11	Preset line speed			
F7-12	Output line speed			
F7-13	Load rate			
F7-14	PID reference			
F7-15	PID feedback			
F7-16	DC bus voltage			
F7-17	IGBT module temperature			

● Inverter's basic running state parameters can be selected to be displayed through this function code.

Func. code	Name	Setting range	Change	Factory setting
F7-18	Total quantity of electricity	0-60000		
F7-19	Total operated time	0.0-6000.0h		
F7-20	Clear of total quantity of electricity	0. Disabled 1. Enabled	△	0
F7-21	Clear of total running	0. Disabled	△	0

	time	1. Enabled		

●F7-18 indicate the summary of electric quantity. electric quantity =(F7-18* power) /1000.(unit: KW/h)

●F7-19 indicate the running time(unit:h)

●F7-20 and F7-21 is used to clear F7-18 and F7-19 respectively.

Func. code	Name	Setting range	Change	Factory setting
F7-22	Software version			

●F7-22 showing the software version of invetor.

F8: Auxiliary Parameters

Func. code	Name	Setting range	Change	Factory setting
F8-00	Jog frequency setting	0.10—400.00Hz	△	5.0
F8-01	Jog Acc time setting	0.1—600.0s	△	5.0
F8-02	Jog Dec time setting	0.1—600.0s	△	5.0

● The meaning and factory setting of F8-01 and F8-02 is the same as F0-14 and F0-15. No matter what the value of F6-00 and F6-10 are, jog will start as start directly mode and stop as deceleration to stop mode.

Func. code	Name	Setting range	Change	Factory setting
F8-03	Acc time 2	0.1—3600.0s	△	20.0
F8-04	Dec time 2	0.1—3600.0s	△	20.0
F8-05	Acc time 3	0.1—3600.0s	△	20.0
F8-06	Dec time 3	0.1—3600.0s	△	20.0
F8-07	Acc time 4	0.1—3600.0s	△	20.0
F8-08	Dec time 4	0.1—3600.0s	△	20.0

● F8-03~F8-08 define Acc/Dec time 2, 3 and 4 respectively, Acc/Dec time 1, 2, 3 and 4 (Acc/Dec time 1 is defined in F0-14 and F0-15) can be selected through control terminals as inverter's Acc/Dec time in running process.

The acceleration and deceleration time can be selected by combination of multifunctional ON-OFF input terminals determined by F4 Group.

Func. code	Name	Setting range	Change	Factory setting
F8-09	Low jump frequency 1 limit	0.00—400.00Hz	△	0.00
F8-10	High jump frequency 1 limit	0.00—400.00Hz	△	0.00
F8-11	Low jump frequency 2 limit	0.00—400.00Hz	△	0.00
F8-12	High jump frequency 2 limit	0.00—400.00Hz	△	0.00
F8-13	Low jump frequency 3 limit	0.00—400.00Hz	△	0.00
F8-14	High jump frequency 3 limit	0.00—400.00Hz	△	0.00

● Jump frequency is set to prevent the output frequency of inverter from meeting the mechanical resonant point of load.

In Jump frequency parameters, set the system's mechanical resonant central frequency, at most three frequency values can be setup, shown in Figure 6-25.

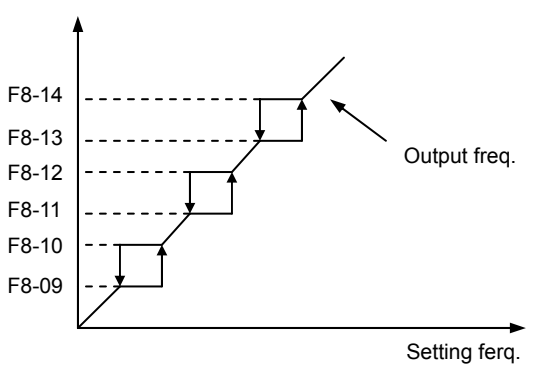


Figure 6-25 jump frequency

Func. code	Name	Setting range	Change	Factory setting
F8-15	Pause frequency at starting	0.00—400.00Hz	△	5.00
F8-16	Pause time at starting	0.0—10.0s	△	0.0
F8-17	Pause frequency at stopping	0.00—400.00Hz	△	5.00
F8-18	Pause time at stopping	0.0—10.0s	△	0.0

● This function is used to keep output frequency at starting or stopping.by setting the pause output frequency, motor will be keep in usual states.

Func. code	Name	Setting range	Change	Factory setting
F8-19	Spinning direction	0: RUN	×	0
		1: F/R		
		2: F/R inhibit		

● Select the relationship between inverter's actual output direction and the direction control command when the inverter is in running state.

0: The same with command direction

1: Contrary to command direction

2: F/R prohibited

Func. code	Name	Setting range	Change	Factory setting
F8-20	Running Odor Swift	0: Disable	×	0
		1: Enable		

● This function parameters used to implement the panel running commands and external terminals switching between instructions

To realize this function also need to install an external input terminals X(1～5)=15，refer F4-00～F4-04.

Func. code	Name	Setting range	Change	Factory setting
F8-21	Frequency odor swift	0: Disable	×	0
		1: Enable		

● 0：to cut over in vain, to cut over function of AI1 and AI2 in vain

1：running with cut over signal, when ferequency reference by outer terminal AI1and AI2,terminal X(1～5)=16 be connected to terminal COM, frequency command AI1 will to exchange with AI2.

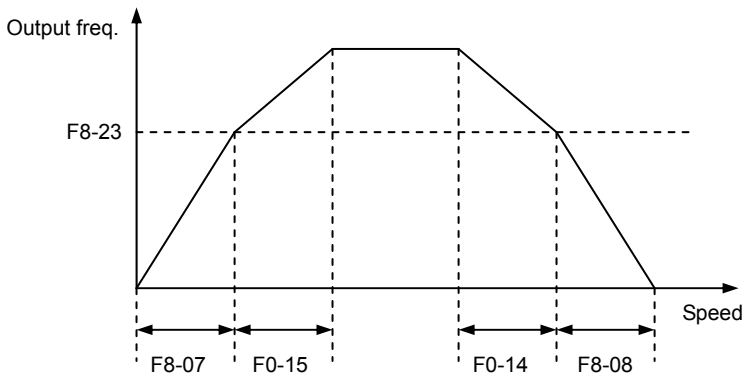
Func. code	Name	Setting range	Change	Factory setting
F8-22	Deceleration switching frequency choice	0: Disable	×	0
		1: Enable		
F8-23	Deceleration switching frequency	0.00—400.00Hz	×	20.00

● F8-22：Select the drive during acceleration and deceleration, whether during deceleration automatically switch addition and subtraction, time, speed

F8-22=0：Accelerating or decelerating process does not automatically switch increases, the deceleration time

F8-22=1：Accelerating or decelerating during acceleration and deceleration the output frequency is lower than the switching frequency，acceleration according to F8-07, deceleration according to F8-08. Accelerating or decelerating during acceleration and deceleration the output frequency is higher than the switching frequency，acceleration according to F8-15, deceleration according to F8-14. If there are some input of acceleration and deceleration command, acceleration and deceleration are Computed with time of the input acceleration and deceleration.

F8-23:set the switch frequency,shown in figure 6-26.



When output frequency> F8-23,run cccording to the time1 of acceleration and deceleration(F0-15，F0-14)

When output frequency< F8-23,run cccording to the time4 of acceleration and deceleration(F8-07，F8-08)

figure 6-26 acceleration and deceleration switch frequency

Func. Code	Name	Setting range	Change	Factory setting
F8-24	Cooling fan control	0: Auto running mode 1: Run all the time	△	0

●This function sets the operation mode of the cooling fan. When the power goes on, the cooling fan first conducts self-test, then runs according to the control mode.

0: If the temperature inside the inverter is higher than the set value assigned by factory, the cooling fan begins to run; and when the temperature is below the assigned value, the cooling fan will stop.

1: The cooling fan always runs at any temperature.

Func. Code	Name	Setting range	Change	Factory setting
F8-25	RUN/F/R dead time	0.0—3000.0s	△	0.0

●RUN F/R dead time: The waiting and holding time before the motor changes its spinning direction after the inverter's output frequency is decreased to zero. It is the time taken by the motor to change its spinning direction when the inverter receives F/R command during its

running process.The time is shown in Figure 6-27.

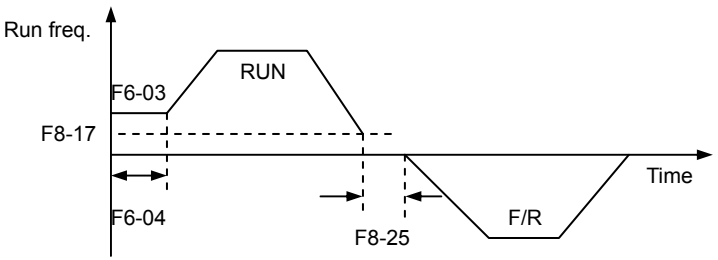


Figure 6-27 FWD/REV dead time

Func. code	Name	Setting range	Change	Factory setting
F8-26	Power supply function selection	0: Disable	×	0
		1: Enable		

●If you use the inverter as a power supply(to drive a transformer), set F8-26=1; if use the inverter to drive a motor, set F8-26=0.

Setting F8-26=1 cancels the dead-time compensation, it may reduce oscillation when the inverter used as power supply.

F9: Protection and Fault

Func. Code	Name	Setting range	Change	Factory setting
F9-00	Motor overload protection mode selection	0: Disable	△	0
		1: Enable		
F9-01	Motor overload protection factor selection	20—105%	△	100

●F9-00=0 No motor overload protection (used when the motor is in short time overload working mode or when selecting external thermal relay). When selecting this mode, inverter

has no over load protection to the motor.

When the inverter drives a motor with matched capacity, the motor overload protection factor can be set to 100%, at this time if the output current is lower than 150% inverter's rated current, motor's overload protection function will be disabled; when the output current is equal to 150% inverter's rated current, motor overload protection will be disabled either, because the inverter overload protection will occur first.

When the inverter's capacity is bigger than that of motor, in order to perform over load protection to motor with different specifications, please set the motor's over load protection factor.

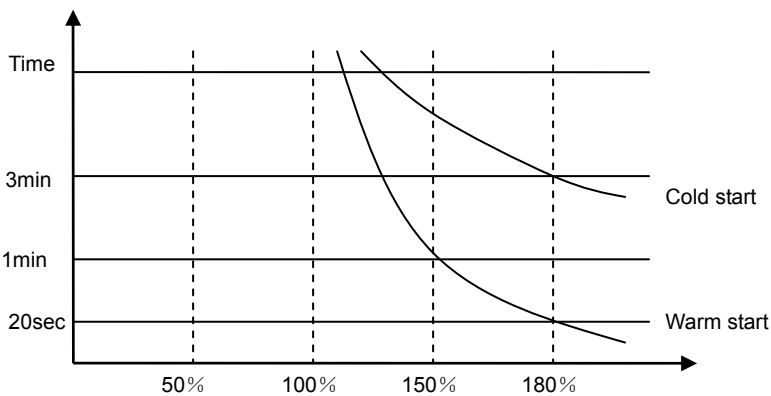


Figure 6-28 motor overload protection

Func. code	Name	Setting range	Change	Factory setting
F9-02	Inverter over load pre-alarm setup	0: Disable 1: Enable	△	0

When output current of inverter exceeds the value of F9-05, inverter will output a pre-warning signal“OLP1”.

Func. code	Name	Setting range	Change	Factory setting
F9-03	Over voltage stall function selection	0: Disable 1: Enable	△	1

Over voltage stall function selection: 0: disabled; 1: enable.

In inverter's Dec process, the actual motor speed may be higher than the output synchronized speed of the inverter due to the load inertia. At this time, the motor will feed the energy back to the inverter, resulting in the voltage rise on the inverter's DC bus. If no measures being taken, tripping will occur due to over voltage.

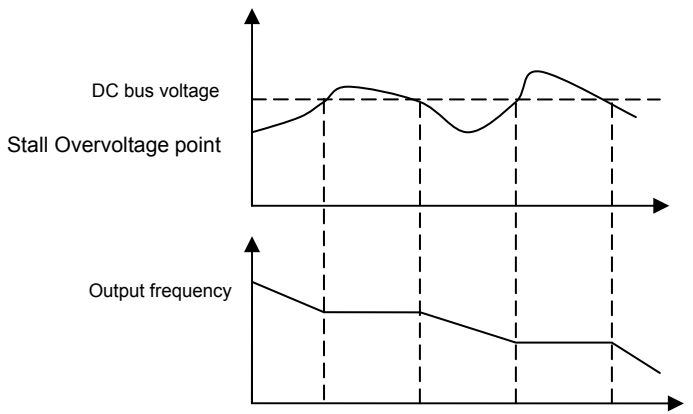


Figure 6-29 Over voltage stall function

Func. Code	Name	Setting range	Change	Factory setting
F9-04	Over current stall function selection	0: Disable 1: Enable	△	1
F9-05	Stall over current point	G:20—150% T:20—130%	△	G:120 T:110

During the Acc/Dec running, surge current occurs due to the mismatch of Dec time and motor inertia or the sudden change of load. Stall overcurrent protection is to detect the output current and compare it with the stall overcurrent point.

When the actual current exceeds the stall overcurrent point, the inverter stops the Acc/Dec process till the current is lower than the point. Then, the inverter continues to accelerate as shown in Figure 6-30.

During inverter steady-state operation, if the output current exceeds the overcurrent stall level, the inverter will lower its output frequency. And when the output current drops to a

certain value below the stall level, the inverter reaccelerates to the set frequency. See Fig. 6-31.

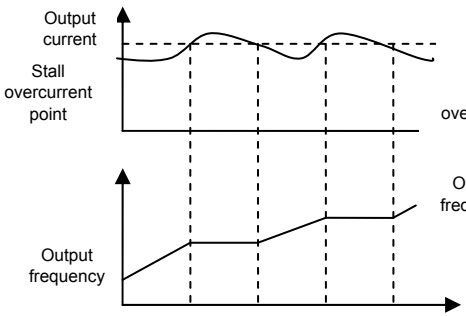


Figure 6-30 Acc Stall overcurrent protection

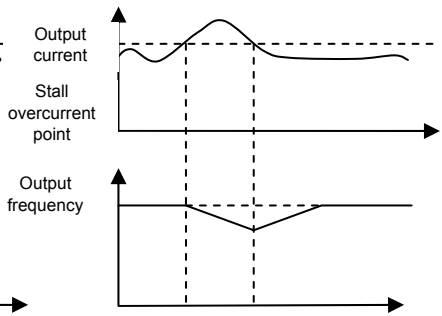


Figure 6-31 Running Stall overcurrent protection

Func. code	Name	Setting range	Change	Factory setting
F9-06	Enable built-in braking	0: Disable 1: Enable	△	1

In the condition of Inertia load and braking frequently,it need install brake resistor and breaking components.Please refer table 9-1.

Func. Code	Name	Setting range	Change	Factory setting
F9-07	Fault auto reset times	0—7	△	0
F9-08	Reset interval	1.0—20.0s	△	5.0

After the inverter fails in running process, the inverter stops its output; then performs auto fault reset and continues running after the reset interval defined in F9-08.

Fault auto reset time is defined by F9-07. When the fault auto reset time is setup to 0, there is no auto-reset function,and only manual reset can be done.

Func. Code	Name	Setting range	Change	Factory setting
F9-09	Thermal protection for braking resistor	0:Do not warm for thermal 1: warn for thermal	△	0

F9-09:this function is used to set the warning of thermal resistor to protect the inverter and braking resistor.

Func. code	Name	Setting range	Change	Factory setting
F9-10	Inverter output phase failure protection	0: Protection disabled	△	0
		1: Protection enabled		

0: Output phase loss protection inhibit.

1: Output phase loss alarm，the inverter stops output, motor coasts to stop and the relay acts.

Func. code	Name	Setting range	Change	Factory setting
F9-11	Last fanlt type			
F9-12	2nd last fanlt type			
F9-13	3rd last fanlt type			
F9-14	Running frequency at last fault			
F9-15	Output current at last fault			
F9-16	Bus voltage at last fault			
F9-17	IGBT module temperature at last fault			
F9-18	Times of excess voltage protection			
F9-19	Times of excess current protection			
F9-20	Times of excess thermal protection			

F9-11~F9-13 are used for memorizing the latest three fault types.

F9-14～F9-17 record the voltage, current, frequency and IGBT module temperature at the last fault for checking.

F9-18～F9-20 record the times of excess voltage /current and thermal respectively.

FA: PID Pocess

PID control is a common used method in process control, such as flow, pressure and temperature control. The principle is firstly detect the bias between preset value and feedback value, then calculate output frequency of inverter according to proportional gain, integral and differential time.

Func. Code	Name	Setting range	Change	Factory setting
FA-00	PID run mode	0:only PID run 1:open-loop + PID	×	0

● This function is used to set PID mode. When F0-02=3,this function is active.

●When FA-00=0,it means only PIN run.

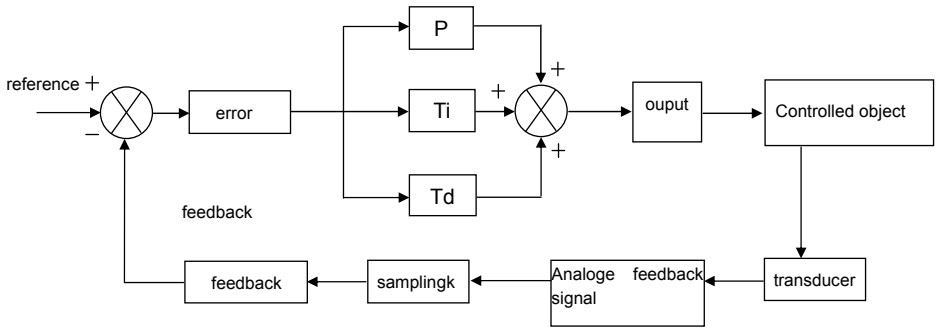


Figure 6-32 only PID

P is proportional gain, Ti is integration time, Td is differential time

When FA-00=1,open-loop + PID run

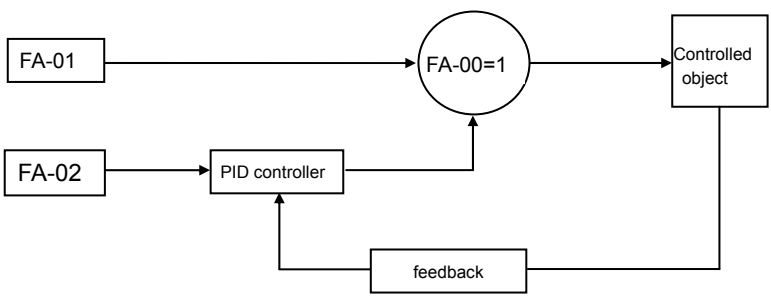


Figure 6-33 open-loop + PID run

Func. code	Name	Setting range	Change	Factory setting
FA-01	Choise of open-loop setting	0: AI1 1: AI2 2: AI1+AI2 3:communication setting 4: FA—03 setting	×	0
FA-02	Choise of close-loop setting			

●This function is used to set the channel of PID running.

●The setting value is pro rata to feed back signals.

Func. code	Name	Setting range	Change	Factory setting
FA-03	Reference digital setting	0.0—100.0	△	50.0

●This function is used to set the parameters of PID.Range from 0.0to 100.0

Func. code	Name	Setting range	Change	Factory setting
FA-04	High limit	20.0—100.0	△	100.0
FA-05	Low limit	0.0—50.0	△	0.0

●when the setting value is lower than the value of FA-05,it will run with the value of FA-05. when the setting value is higher than the value of FA-04,it will run with the value of FA-04,shown in figure 6-34.

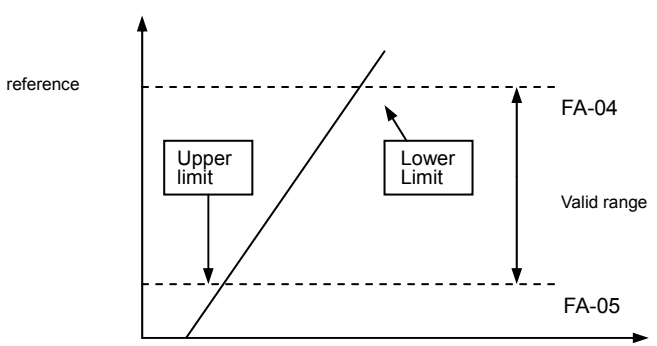


Figure 6-34 setting limit

Func. code	Name	Setting range	Change	Factory setting
FA-06	Chois of close-loop feed back signal	0: AI1	×	0
		1: AI2		
		2: AI1+AI2		
		3:Communication setting		

●These parameters are used to set the channel of PID feedback.

●0: feedback signal is AI1

●1: feedback signal is AI2

●2: feedback signal is the sum of AI1 and AI2

●2: feedback signal is the communication signal.

Func. code	Name	Setting range	Change	Factory setting
FA-07	Proportional gain P	0.0—200.00	△	20.00

These parameters are used to set Kp of PID.the max frequency is Kp=200.

Func. code	Name	Setting range	Change	Factory setting
FA-08	Integration time Ti	0.01—100.00s	△	2.00

●This function parameters used to set inverter internal PID adjustor integral time constant I; Mainly for the elimination of static error. If integral time constant is big, response is slow, vice versa.

Func. code	**Name**	**Setting range**	**Change**	**Factory setting**
FA-09	Differential time Td	0.0—100.0s	△	0.0

● Optimize the responsiveness by adjusting these parameters while driving an actual load.

Adjusting PID control:

Use the following procedure to activate PID control and then adjust it while monitoring the response.

1. Enabled PID control (P0-02=3)

2. Increase the proportional gain (Kp) as far as possible without creating oscillation.

3. Reduce the integral time (Ti) as far as possible without creating oscillation.

4. Increase the differential time (Td) as far as possible without creating oscillation.

Func. code	Name	Setting range	Change	Factory setting
FA-10	Sample cycle T	0.01—10.00s	△	0.5

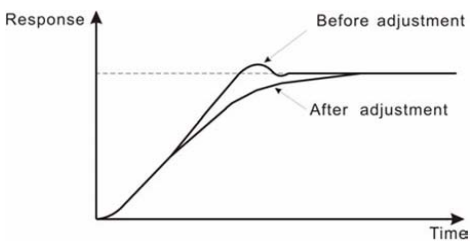
● Sampling cycle T refers to the sampling cycle of feedback value. The PI regulator calculates once in each sampling cycle. The bigger the sampling cycle, the slower the response is.

Making fine adjustments:

First set the individual PID control constants, and then make fine adjustments.

- Reducing overshooting

  If overshooting occurs, shorten the differential time and lengthen the integral time.

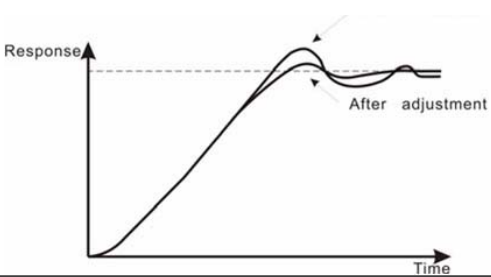


- Rapidly stabilizing control status

To rapidly stabilize the control conditions even when overshooting occurs, shorten the integral time and lengthen the differential time.

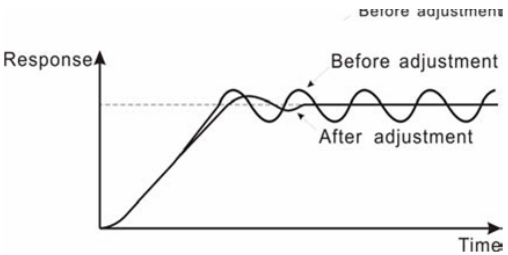
- Reducing long-cycle oscillation

If oscillation occurs with a longer cycle than the integral time setting, it means that integral operation is strong. The oscillation will be reduced as the integral time is lengthened.



- Reducing short-cycle oscillation

If the oscillation cycle is short and oscillation occurs with a cycle approximately the same as the differential time setting, it means that the differential operation is strong.
The oscillation will be reduced as the differential time is shortened.



If oscillation cannot be reduced even by setting the differential time to 0, then either lower the proportional gain or raise the PID primary delay time constant.

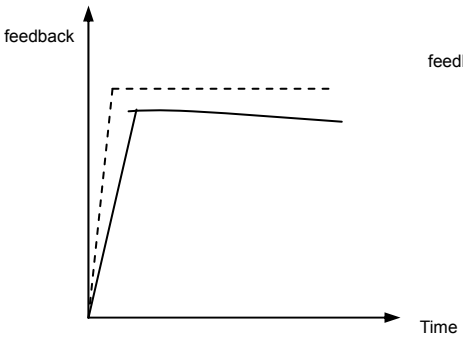


Figure 6-35A

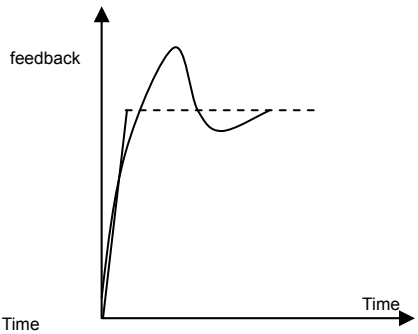
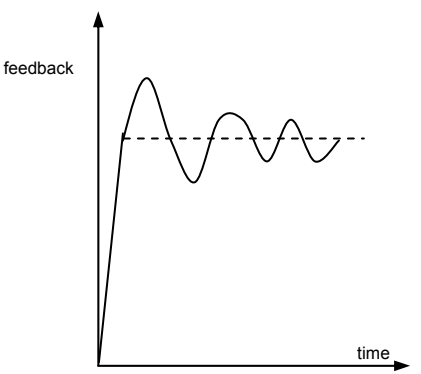
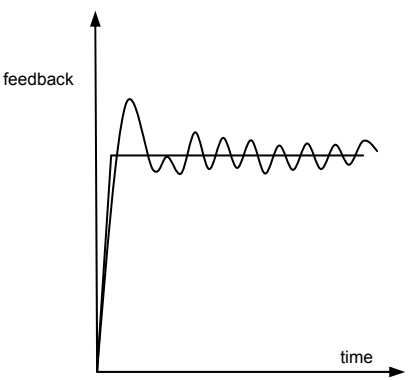


Figure 6-35B



Smaller Kp and longer integral time leads Surge, too long the convergence proccess

Figure 6-35C



smaller both Kp and integral time, continue surge

Figure 6-35D

Func. code	Name	Setting range	Change	Factory setting
FA-11	Error limit	0.0—99.9	△	0.1

Definition: relative error of close loop system＝｜input value−feedback value｜/ input value×100%.

If relative error of close loop system is bigger than the setting value of error limit, then the

PID regulator will adjust the error.

If relative error of close loop system is in the Setting range of error limit, then stop PID regulating, PID regulator's output maintains constant.

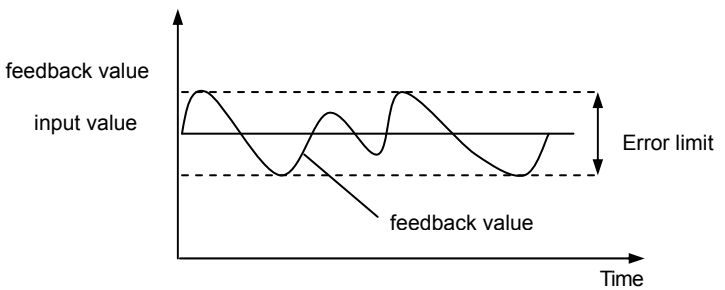


Figure 6-36 Error limit

Func. code	Name	Setting range	Change	Factory setting
FA-12	PID control polarity	0：Positive	×	0
		1：Negative		

FA-12=0: If error(reference - feedback) is positive, this function will increase the output frequency; if error is negative, this function will decrease the output frequency.

FA-12=1: If error(reference - feedback) is positive, this function will decrease the output frequency; if deviation is negative, this function will increase the output frequency.

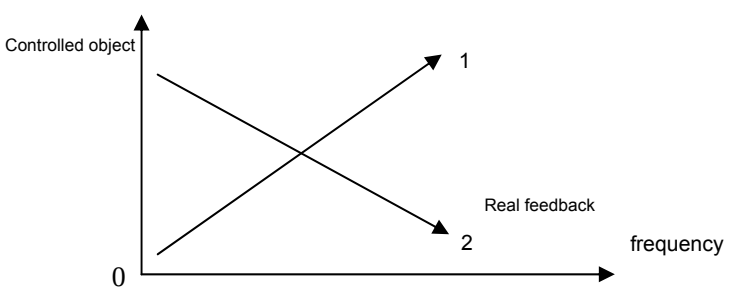


Figure 6-37 PID control polarity

Func. code	Name	Setting range	Change	Factory setting
FA-13	PID lower limit	0.0—100.0	△	20.0
FA-14	PID upper limit	0.0—100.0	△	80.0

These parameters are used to set the min and max value,which are defined by multiply terminal (F5-01-F5-02)

Func. code	Name	Setting range	Change	Factory setting
FA-15	Protection for low feedback	0.0—100.0	△	20.0
FA-16	Protection for high feedback	0.0—100.0	△	80.0
FA-17	Proctection time	0.1—3000.0s	△	1800.0

In the process of PID control, if the output frequency reaches limit frequency, feedback below ultra-low protection value of time more than feedback protect time, frequency converter and downtime alarm

In the process of PID control, if the output frequency reaches limit frequency, feedback above ultra-high protection value of time more than feedback protect time, frequency converter and downtime alarm.

FB: Wobble frequency

Wobble frequency function, which means that the setting frequency flaps around the setting center frequency, are applied in spinning and chemical fiber.

Func. code	Name	Setting range	Change	Factory setting
FB-00	center of running frequency setting	0: FB-01setting 1: AI1setting 2: AI2setting 3: AI1+AI2setting 4:Communication setting	×	0

These parameters are used to set the channel of running frequency center

Func. code	Name	Setting range	Change	Factory setting
FB-01	center of running frequency	0.10—400.00Hz	△	30.00

These parameters are used to set the center of running frequency.

Func. code	Name	Setting range	Change	Factory setting
FB-02	Wobble frequency △F1	0.10—60.00Hz	×	10.00
FB-03	Sudden jump frequency △F2	0.00—60.00Hz	×	2.00
FB-04	Rise time of traverse	0.1—3600.0s	△	5.0
FB-05	摆动频率运行减速时间 Fall time of traverse	0.1—3600.0s	△	5.0
FB-06	Acc time of jitter frequency	0.1—3600.0s	△	0.1
FB-07	Dec time of jitter frequency	0.1—3600.0s	△	0.1

Traverse operation is widely used in textile and chemical fiber industry. The typical

application is shown in following figure.

Center frequency (CF) is reference frequency.

Rise time of traverse: Indicates the time rising from the lowest traverse frequency to the highest traverse frequency.

Fall time of traverse: Indicates the time falling from the highest traverse frequency to the lowest traverse frequency.

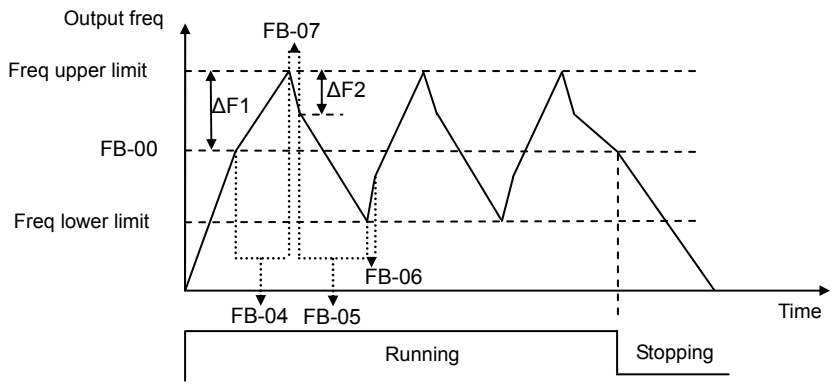


Figure 6-38 Traverse operation diagram

FC: Simple PLC

Simple PLC running function and MS (multi section) speed running are used for realizing the inverter's variable speed running according to certain regulations. For MS (multi section) speed running, the switching of multi-frequency and the change of running direction is realized through external control terminals (such as X1, X2 and X3) and different combination of RUN and F/R. For Simple PLC running function, not only one circulating Multi-frequency can be defined in function codes, but also the Multi-frequency running time, direction and circulation times can also be defined in function codes.

Func. code	Name	Setting range	Change	Factory setting
FC-00	Multi-frequency 1	0.00-400.00HZ	△	5.00
FC-01	Multi-frequency 2	0.00-400.00HZ	△	10.00
FC-02	Multi-frequency 3	0.00-400.00HZ	△	15.00
FC-03	Multi-frequency 4	0.00-400.00HZ	△	20.00

FC-04	Multi-frequency 5	0.00-400.00HZ	△	25.00
FC-05	Multi-frequency 6	0.00-400.00HZ	△	30.00
FC-06	Multi-frequency 7	0.00-400.00HZ	△	35.00
FC-07	Multi-frequency 8	0.00-400.00HZ	△	40.00
FC-08	Multi-frequency 9	0.00-400.00HZ	△	45.00
FC-09	Multi-frequency 10	0.00-400.00HZ	△	50.00
FC-10	Multi-frequency 11	0.00-400.00HZ	△	45.00
FC-11	Multi-frequency 12	0.00-400.00HZ	△	40.00
FC-12	Multi-frequency 13	0.00-400.00HZ	△	35.00
FC-13	Multi-frequency 14	0.00-400.00HZ	△	25.00
FC-14	Multi-frequency 15	0.00-400.00HZ	△	15.00
FC-15	Multi-frequency 16	0.00-400.00HZ	△	8.00

When F0-02 is set multiply segments, it should be set FC-00～FC-15 to ensure the property.

Func. code	Name	Setting range	Change	Factory setting
FC-16	Pattern operation mode	0：Run N cycles After the stop 1：After program run N cyclical , by last section of frequency rate movement 2：Continuous cycle	×	0

- FC-16=0 stop after running for N cycle.
  FC-16=1 run at setup frequency in last phase after running for one cycle.
  FC-16=2 continuous circulation running according to setup phase parameters.

Func. code	Name	Setting range	Change	Factory setting
FC-17	segments of process	1-16	△	1

These parameters are used to set the segments of process.

Func. code	Name	Setting range	Change	Factory setting
FC-18	PLC operation cycle number	1-5000	×	1

hese parameters are used to set the loop times of process.

Func. code	Name	Setting range	Change	Factory setting
FC-19	Phase 1 running time	0.1—3600.0s	△	4.0
FC-20	Phase 1 direction and Acc/Dec time	(1-4)(0-1)	△	1-0
FC-21	Phase 2 running time	0.1-3600.0s	△	4.0
FC-22	Phase 2 direction and Acc/Dec time	(1-4)(0-1)	△	1-0
FC-23	Phase 3 running time	0.1-3600.0s	△	4.0
FC-24	Phase 3 direction and Acc/Dec time	(1-4)(0-1)	△	1-0
FC-25	Phase 4 running time	0.1-3600.0s	△	4.0
FC-26	Phase 4 direction and Acc/Dec time	(1-4)(0-1)	△	1-0
FC-27	Phase 5 running time	0.1-3600.0s	△	4.0
FC-28	Phase 5 direction and Acc/Dec time	(1-4)(0-1)	△	1-0
FC-29	Phase 6 running time	0.1-3600.0s	△	4.0
FC-30	Phase 6 direction and Acc/Dec time	(1-4)(0-1)	△	1-0
FC-31	Phase 7 running time	0.1-3600.0s	△	4.0
FC-32	Phase 7 direction and Acc/Dec time	(1-4)(0-1)	△	1-0
FC-33	Phase 8 running time	0.1-3600.0s	△	4.0
FC-34	Phase 8 direction and Acc/Dec time	(1-4)(0-1)	△	1-0
FC-35	Phase 9 running time	0.1-3600.0s	△	4.0
FC-36	Phase 9 direction and Acc/Dec time	(1-4)(0-1)	△	1-0
FC-37	Phase 10 running time	0.1-3600.0s	△	4.0
FC-38	Phase 10 direction and Acc/Dec time	(1-4)(0-1)	△	1-0
FC-39	Phase 11 running time	0.1-3600.0s	△	4.0

FC-40	Phase 11 direction and Acc/Dec time	(1-4)(0-1)	△	1-0
FC-41	Phase 12 running time	0.1-3600.0s	△	4.0
FC-42	Phase 12 direction and Acc/Dec time	(1-4)(0-1)	△	1-0
FC-43	Phase 13 running time	0.1-3600.0s	△	4.0
FC-44	Phase 13 direction and Acc/Dec time	(1-4)(0-1)	△	1-0
FC-45	Phase 14 running time	0.1-3600.0s	△	4.0
FC-46	Phase 14 direction and Acc/Dec time	(1-4)(0-1)	△	1-0
FC-47	Phase 15 running time	0.1-3600.0s	△	4.0
FC-48	Phase 15 direction and Acc/Dec time	(1-4)(0-1)	△	1-0
FC-49	Phase 16 running time	0.1-3600.0s	△	4.0
FC-50	Phase 16 direction and Acc/Dec time	(1-4)(0-1)	△	1-1

These functions set the run directions、run time and acceleration/ deceleration times。

☆ Simple drawing of PLC

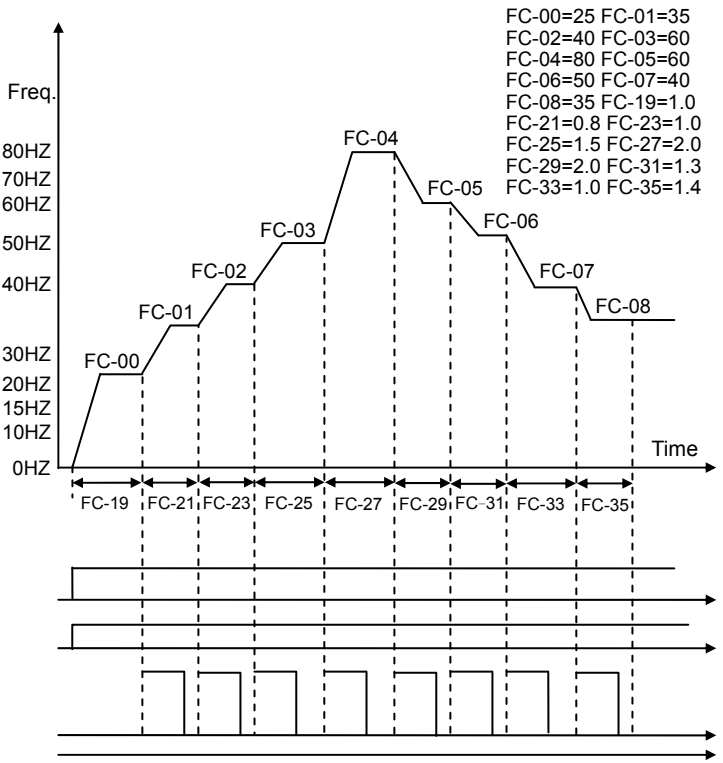


Figure 6-39A

Action specification:

When F0-02=1、FC-16=2、FC-17=9, the inverter start with the frequency(FC-00)till the setting frequency by FC-08.it will not be stop, when STOP is entered, shown in figure 6-39A.

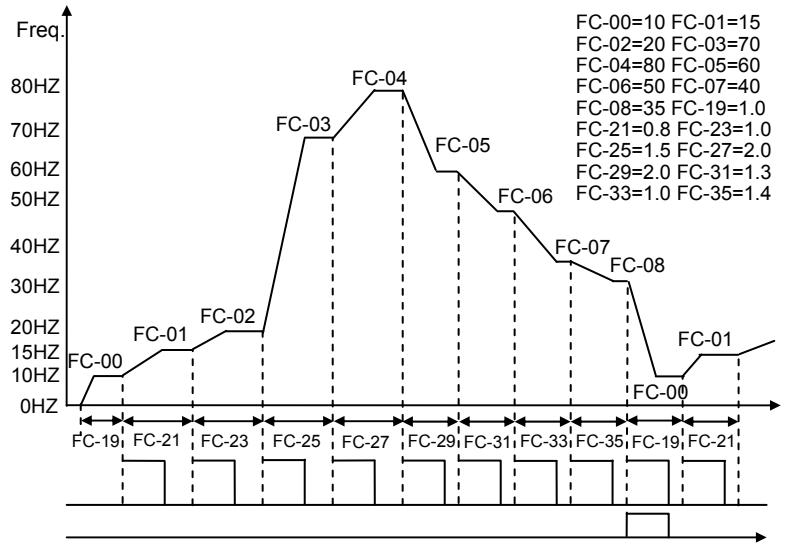


Figure 6-39B

Action specification:

When F0-02=1、FC-16=2、FC-17=9, enter RUN to start the inverter till finish FC-08.it will only be stop, when STOP is entered.

Func. code	Name	Setting range	Change	Factory setting
FC-51	Timing unit	0: 1(sec)	×	0
		1: 1(min)		

0: Second(s) (Each Phase's running time is recorded by second);

1: Minute(m) (Each Phase's running time is recorded by minute).

FD: Serial Communication

☆ **Tips:something about communication, please refer<communication protocol>**

Func. code	Name	Setting range	Change	Factory setting
FD-00	Local address	0-31	△	1

● This parameter determines the slave address used for communication with master.

Func. code	Name	Setting range	Change	Factory setting
FD-01	Baud rate selection	0: 1200	△	3
		1: 2400		
		2: 4800		
		3: 9600		
		4: 19200		

● This parameter can set the data transmission rate during serial communication.

Notice: The baud rate of master and slave must be the same.

Func. code	Name	Setting range	Change	Factory setting
FD-02	Data forma	0：no parity(N.8.1)	△	3
		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)		

●These parameters are used to the data type of RS485, the type of inverter and upper computer must be the same.

Func. code	Name	Setting range	Change	Factory setting
FD-03	Communication overtime	0.2—10.0s	△	2.0

This parameter can be used to set the response delay in communication in order to adapt to the MODBUS master.

Func. code	Name	Setting range	Change	Factory setting
FD-04	Communication error action	0： No action	△	0
		1： Alarm and continue to run		
		2： Stop		

- 0:inverter does not connect with upper computer.
- 1:the time of communication is more than the time set by FD-03, keep current states.
- 2: the time of communication is more than the time set by FD-03,stop.

FE: Reserved function

FF: Factory Reserved

This group is the factory-set parameter group. The user DO NOT try to open these group parameters, otherwise it will cause the inverter abnormal operation or damage.

FH: User Password

Func. code	Name	Setting range	Change	Factory setting
FH-00	User password setting	0-9999	△	0

The password protection function will be valid when set to be any nonzero data. When FH-00 is set to be 00000, user's password set before will be cleared and the password protection function will be disabled.

After the password has been set and becomes valid, the user can not access menu if the user's password is not correct. Only when a correct user's password is input, the user can see and modify the parameters. Please keep user's password in mind.

Func. code	Name	Setting range	Change	Factory setting
FH-01	Data protection	0: Disable	△	0
		1: Enable		

Setting FH-01=0 can only changr some data

Setting FH-01=1 can lock the data preventing illegal change.

When the inverter is installed, Please set FH-01=1.

Func. code	Name	Setting range	Change	Factory setting
FH-02	Parameter initialization	0：No operation	×	0
		1：Recover factory setting		

FH-02=1: Recovery of factory setting value, Setup FH-02=1 and confirm, inverter will recover all the parameters between F0-00~FH-03 to the default factory setting value.

Func. code	Name	Setting range	Change	Factory setting
FH-03	Fault record clear	0: Disable	△	0
		1: Enable		

Setting FH03=1 will clear the fault records of F9-11 ~ F9-20.

Chapter 7 Trouble shooting

7.1 Fault Alarm And Trouble Shooting

When the inverter is abnormal, protection function acts: LED displays fault code,the trouble output relay acts, and the inverter stops output and the motor free glide to stop.The list of trouble and shooting for inverter series MC200G/T 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.

Directions: in order to reset the fault code,there are three method may be used:

1.Switch off the power of the inverter, re-switch on it after the indicators on panel are total black-out.

2.Knob down STOP/RESET on panel.

3.Outer terminals REST and COM onece to be connected.

Table 7-1 Alarms and trouble shootings

Fault code	Type of faults	Possible fault reasons	Troubles diagnosis and hooting
OC1	IGBT fault protection	1. Electric wiring short circuit 2. motor damaged 3. Power switching elements damaged 4. Internal short circuit of bridge in IGBT.	1. Inspection of wiring 2. Inspection of motor 3. Ask for technical service
LU	DC bus Under-voltage	1. Input voltage abnormal 3-phase open phase 2. Failure inside inverter	1. Check input power supply 2. Ask for service
OU	Over-voltage	1.3-phase Input voltage abnormal 2. Failure inside inverter	1: Check 3-phase input power 2: Ask for service

OC2	Over-current	1. Low power of inverter. 2. V/F curve or torque boost setup is not suitable. There are conductor short circuit in inverter. 3. Acc time including the tuning process is too short. Direct erthing. 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	Output erthing	1. Output of the inverter erthing 2. Inverting module failed	1.Check the wire connection of the motor. 2. Ask for service.
OH	Inverter overheat	1. Too high ambient temperature excess. 2. Blockage of air duct. 3. Damaged fan. 4. Abnormal temperature detection circuit	1. Lower the ambient temperature. The fan running in normal when inverter operation 2. Clear air duct. The frequency of the pulse must be seted as default value. 3. Replace fan. Ambient temperature must not be excess admissible value of the inverter. 4. Ask for service

OL1	Inverter overload	1. Too short Acc time. 2. Heavy load. 3. Direct current brake exceed 4. Restart the motor in running after momemtary stop. 5. V/F curve is not suitable.	1. Prolong Acc time. 2. Select more power inverter 5.Adjust V/F curve. 4. Use speed tracing restart function. 3.Fall the direct current brake voltage,and rise the brake time. 4. Check mains voltage. 5. Select inverters with bigger ratings.
OL2	Motor overload	1. Wrong setting of motor overload protection. 2.V/F curve is not suitable. 3. Very low power supply voltage. 4. locked-rotor or overlaod of the motor 5. Motor choked or sudden change of load.	1. Setup motor overload protection factor correctly. 2.Adjust V/F curve. 3. Check power supply voltage. 3. Select special motors for long term low speed running. 4. Check the load of the motor 5. Check load.
Er0	Storage abnormal	Read-write error of parameter storage.	1. Press STOP/RESET to reset. 2. Ask for service
Er1	Peripheral fault	signal valid in outer alarm terminals	Check the reason Peripheral equipments
Er2	U phase sensor abnormal	U phase current sensor damaged	Ask for service
Er3	V phase sensor abnormal	V phase current sensor damaged	Ask for service

Er4	W phase sensor abnormal	W phase current sensor damaged	Ask for service
Er5	Temperature sensor fault	Damage of temperature sensor on power module radiator	Ask for service
Er6	Interfere stop	Ambient electromagnetic interference too strong	1.Check and to remove the interference sources 2. Ask for service
Er7	X1 Terminal fault	1. inquality of the inpu terminal X1 2.damage of the inpu terminal X1	1.Check input signals 2.Ask for service
Er8	X2 Terminal fault	1. inquality of the inpu terminals X2 2.damage of the inpu terminal X2	1.Check input signals 2.Ask for service
Er9	X3 Terminal fault	1. inquality of the inpu terminals X3 2.damage of the inpu terminal X3	1. Check input signals 2.Ask for service
Er10	X4 Terminal fault	1. inquality of the inpu terminals X4 2.damage of the inpu terminal X4	1. Check input signals 2.Ask for service
Er11	X5 Terminal fault	1. inquality of the inpu terminals X5 2.damage of the inpu terminal X5	1. Check input signals 2.Ask for service
Er12	RUN Terminal fault	1. inquality of the inpu terminals RUN 2.damage of the inpu terminal RUN	1. Check input signals 2.Ask for service Check input signals

Er13	F/R Terminal fault	1. inquality of the inpu terminals F/R 2.damage of the inpu terminal F/R	1. Check input signals 2.Ask for service
Er14	communication fault	1. Mis setup of communication parameters 2. Damage of communication cable	1. Re-setup communication parameters 2. Check communication cable
Er15	Analog input disconnection	1. Signal interrupt of analog input terminals 2. Mis setup of line broken measurement analog	1.Check analog inpu signal 2. re-setup of line broken measurement analog
Er16	Feedback ultralow protection	1.Mis-setup of Feedback ultralow protection 2. Mis-setup of PID parameters	1.Re-setup of Feedback ultralow protection 2.Re-setup of PID parameters
Er17	Feedback ultrahigh protection	1.Mis-setup of Feedback ultrahigh protection 2. Mis-setup of PID parameters	1.Re-setup of Feedback ultrahigh protection 2.Re-setup of PID parameters

7.2 Early warning

Type	Type of faults	Possible fault reasons	Troubleshooting
dd	DC braking point out	Inverter is in direct current brake state now	No action, the fault died away after direct current brake finished
ErA	Point out of outer reference broken broken fault	1. the analog input signal broken. 2. Mis setup of line broken measurement analog	1. Check analog input signals 2. Re-setup of line broken measurement analog input type
OLP1	Inverter overload pre-alarm	The inverter has been overlaod and will reche the protection point	The same as OL1
OLP2	Motor overload pre-alarm	The motor has been overlaod and the temprature will reche the protection point	The same as OL2
dbH	Braking resistor overheating	Temperature of brake reristor utrhigh	Check and change greater brake reristor
Er485	Communication abnormal	Communication overtime	The same as Er14

7.3 decryption

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

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
Personal injury may be tended to by mis-operation because during inverter operation the voltage is very high. Within a certain time after the power is cut off,it is dangerous for a higher voltage in the inverter. Maintenance of inverters can only be done by qualified professionals. 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 circuit terminals and any other parts inside the inverter directly or with metal tools; Switch off power supply 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 circuit terminals P and N is below DC 36V using a DC voltmeter;

8.1 Daily Preservation And Maintenaningce

Daily Maintenaning shoul be done well when operation the inverter so as to ensure the operation environment is under good condition. 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	Main 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	(2) No abnormal heat.

			thermometer	
	(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
	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：

withstand test of the inverter is already done in the factory. It is not necessary for the user to make withstand 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 abnomaly 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

Environmental conditions	Requirements	Remark	
Ambient temperature	-20℃～60℃	Ambient temperature shall not exceed 30°C during long term storage of the inverter, in order to prevent deterioration of capacitor properties	Condensation and freeze resulted by sudden temperature changes should be avoided
Relative humidity	20～90%	Inverter can be covered by plastic films, and desiccant can be used	
Storage conditions	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		

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 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. The warranty range is confined to the drive only.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 12 months, 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

MC200G sieries 15Kw inverter and MC200T 18.5 Kw as well as the lowers of power inverter have built-in braking units, the user only needs to select external braking resistors. But when the more power than 18.5 Kw is used, braking units should be selected except that of braking resistors.

9.1.1 Braking Unit

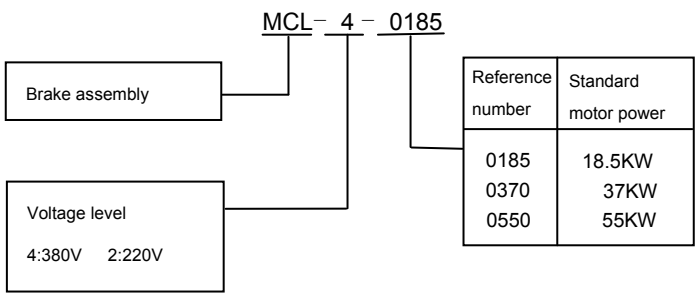


Figure 9-1 Model description of braking unit

9.1.2 Selection of 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

Inverter model	Braking resistor model	Braking torque （%）	Braking unit
MC200G0007T4 MC200T0015T4	900Ω/75W	100	Built-in
MC200G0015T4 MC200T0022T4	460Ω/150W	100	Built-in
MC200G0022T4 MC200T0040T4	315Ω/220W	100	Built-in
MC200G0040T4 MC200T0055T4	175Ω/400W	100	Built-in

MC200G0055T4 MC200T0075T4	120Ω/550W	100	Built-in
MC200G0075T4 MC200T0110T4	100Ω/750W	100	Built-in
MC200G0110T4 MC200T0150T4	70Ω/1100W	100	Built-in
MC200G0150T4 MC200T0185T4	47Ω/1500W	100	Built-in
MC200G0185T4 MC200T0220T4	38Ω/2000W	A	MCL-4-370
MC200G0220T4 MC200T0300T4	32Ω/2200W	100	MCL-4-0370
MC200G0300T4 MC200T0370T4	23Ω/3000W	100	MCL-4-0370
MC200G0370T4 MC200T0450T4	19Ω/3700W	100	MCL-4-0370
MC200G0450T4 MC200T00550T4	16Ω/4500W	100	MCL-4-0550
MC200G0550T4 MC200T0750T4	13Ω/5500W	100	MCL-4-0550
MC200G0750T4 MC200T0900T4	10Ω/8000W	100	MCL-4-0550×2
MC200G0900T4 MC200T1100T4	8Ω/9000W	100	MCL-4-0550×2
MC200G1100T4 MC200T1320T4	7Ω/11000W	100	MCL-4-0550×2
MC200G1320T4 MC200T1600T4	5Ω/15000W	100	MCL-4-1600
MC200G1600T4 MC200T1850T4	3.5Ω/20000W	100	MCL-4-1600
MC200G1850T4 MC200T2000T4	3.5Ω/20000W	100	MCL-4-2200
MC200G2000T4 MC200T2200T4	3Ω/25000W	100	MCL-4-2200
MC200G2200T4 MC200T2500T4	3Ω/25000W	100	MCL-4-2200
MC200G2500T4 MC200T2800T4	2.5Ω/30000W	100	MCL-4-2200×2
MC200G2800T4	2.5Ω/30000W	100	MCL-4-2200×2

MC200T3150T4			
MC200G31500T4 MC200T3550T4	2Ω/35000W	100	MCL-4-2200×2

Note:

1.When the needed braking torque is not 100%, it'is possible to adjust the reristance about value in the table abave according to inverse proportion of real torque needed(it is means that the increasment of the brake torque base on 100% named, the decrement of the brake resistor is ,and vice versa)

Attention:The brake torque is no lesser than the 150% torque named, otherwise enquires to the service.

2. After adjusting the resisitance of the brake resistor, the resistor power (P),take it as long-time duty ,must be adjusted also and can be calculated as following:

P = 700 2/ R

Where, R is the brake resistor.

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

The maximum output current of brake units are listed as table 9-2.

Table 9-2 Maximum output Current of brake units

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

The current of the brake resistor (Ic) can be calculated as: 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

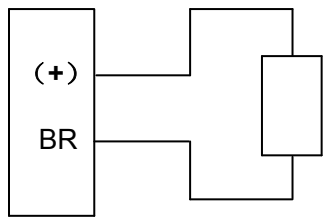
Module abnormal alarm

Fault display and fault relay output

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

Both cables connecting braking unit with the inverter and connecting braking unit with braking resistor should be no longer than 5m. otherwise twisted pair cables should be used there.

MC200G0007T4～MC200G0150T4
MC200T0015T4～MC200T0185T4



MC200G0185T4～MC200G4000T4
MC200T0220T4～MC200T4500T4

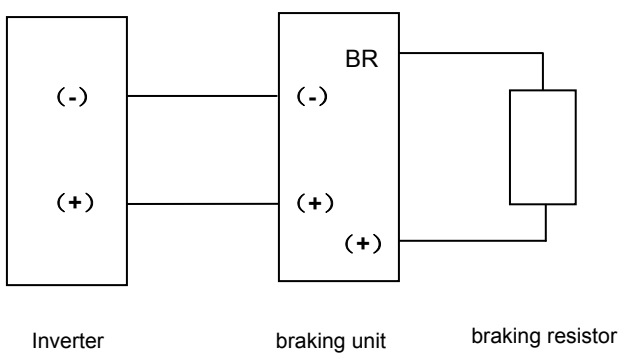


Figure 9-2 Connection of braking unit and braking resistor

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 it in following cases:

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

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

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

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 capacity is greater than 600 kVA or far more greater than the inverter's, or the needs of the power factor is very important, a DC reactor should be used in connecting on direct current bus 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

Radio noise filter suppresses not only the transimit of electromagnetic interference generated by inverter, but also the interference by external radio interference and power supply permanent impact as well as surge interference.

the transient shock & surge interference with the inverter.

The radio noise filter should be adopted in following cases:

◆The requirement of anti-radio interference is highly emphasized.

◆Meeting CE, UL and CSA standards is required.

◆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.

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
400	490*2	0.03	490*2	0.004	460*2	0.12
450	490*2	0.03	490*2	0.004	650*2	0.11
500	530*2	0.03	530*2	0.003	650*2	0.11

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
400	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 Application 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 vertically. Big parts which may keep out the wind are avoid to located in direct over and under of the inverter.

Do not mount ky 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.

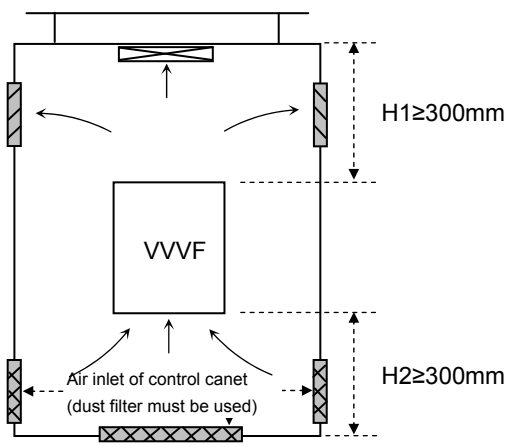


Figure 1 Inverter installation

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

inverter.

6. Follow the requirements in this manual when stallation and operation. If there is any questions, please contact the technical supporter 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 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. free 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 Guides to Inverter EMC Design & Installation

For your reference, this section introduces inverter EMC design and installation. The covered topics clude: 1) Noise suppression. 2) Wiring. 3) Grounding. 4) Surge absorption by external equipment. 5) Current leakage. 6) installation planning and attention. 7) Power source filter application. 8) Radiated noise handling.

A. Noise suppression

The influence to peripheral equipments of noise generated by inverter when it operation is concern to the type of noise of the inverter and noise transit channelas well as the design,installation,wiring,grounding of the driving system

1. Noise type

See the following figure.

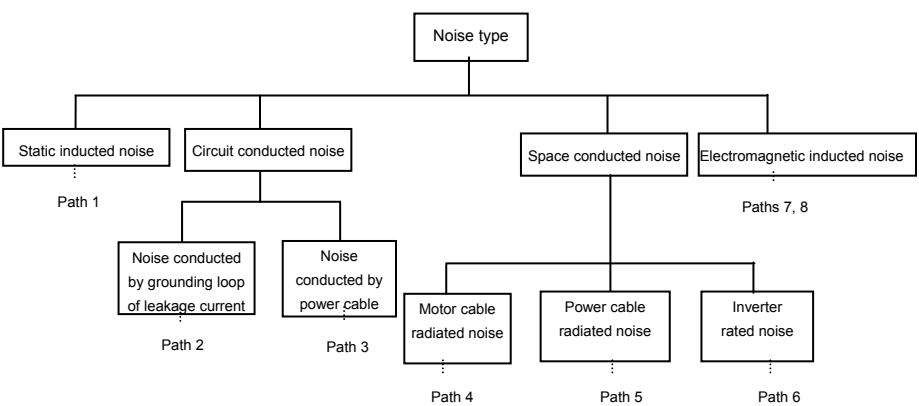


Figure 3 Noise type

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 eqipment. 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 inverter 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 shilding 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: Remove the 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.

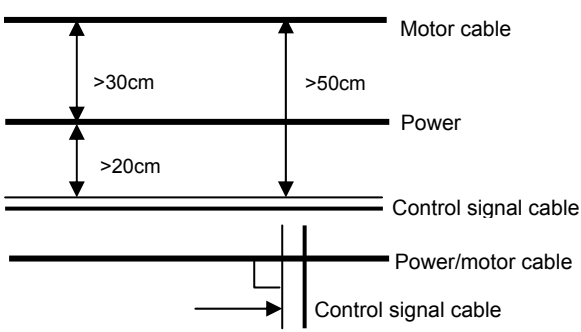


Figure 2-2 Wiring requirement

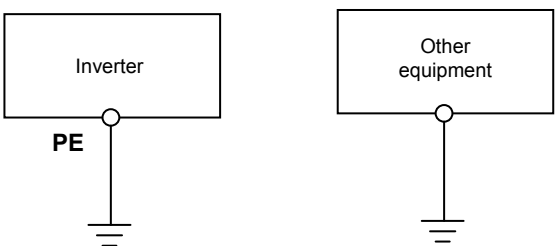
2. High-frequency low-resistance shielded/armored(plaited wire netting) cables should be used.

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):



（2）Shared grounding terminal (acceptable):

Figure 2-3 Dedicated grounding terminal

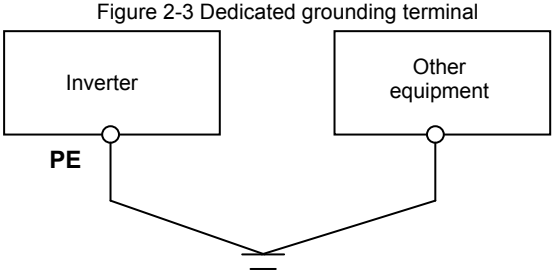


Figure 9 Shared grounding terminal

（3）Shared grounding cable (unacceptable):

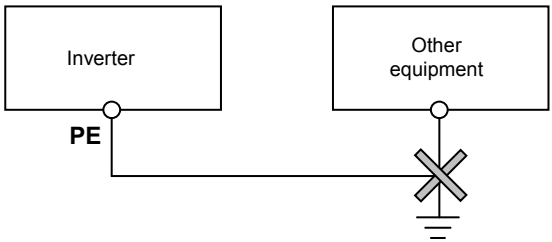


Figure 2-5 Shared grounding cable (a)

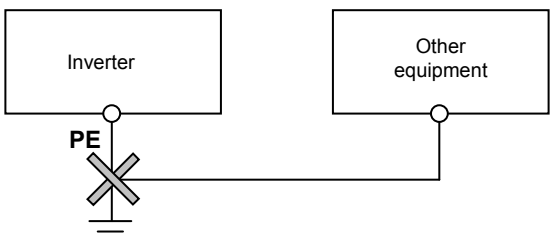


Figure 2-6 Shared grounding cable (b)

2. Grounding cable connection attentions

（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.

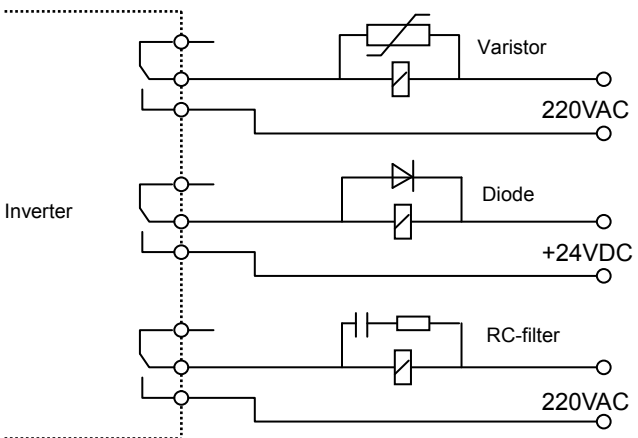


Figure 2-7 Surge absorber for noise-generating device

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 positively 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 capacitye 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 resistor 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 location and installation guide

1. Installation location

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 resistor 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 is shown in the following figure.

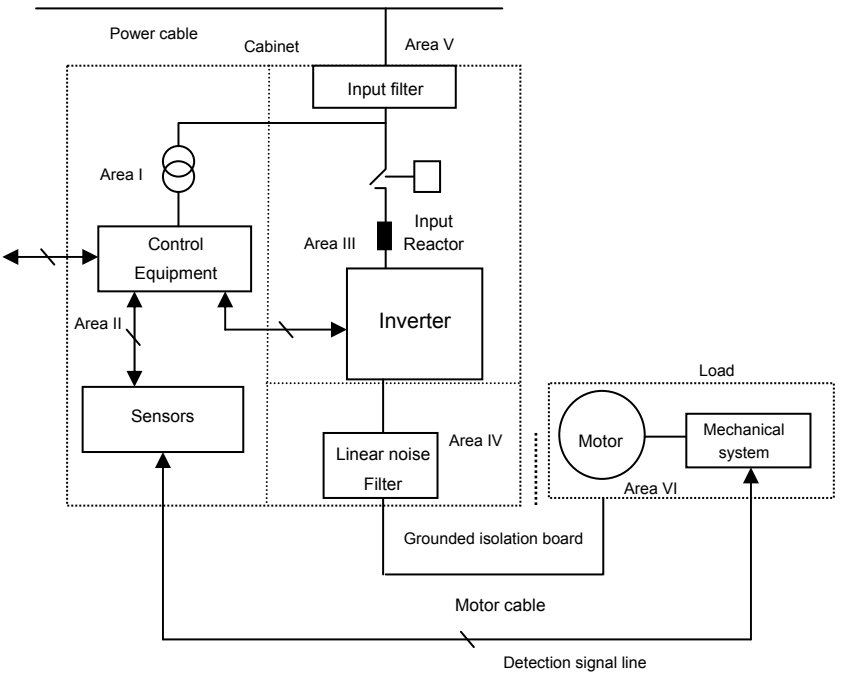


Figure 2-8 Inverter EMC installation area classification

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. Attention to Inverter electrical installation

The inverter electrical installation is shown below:

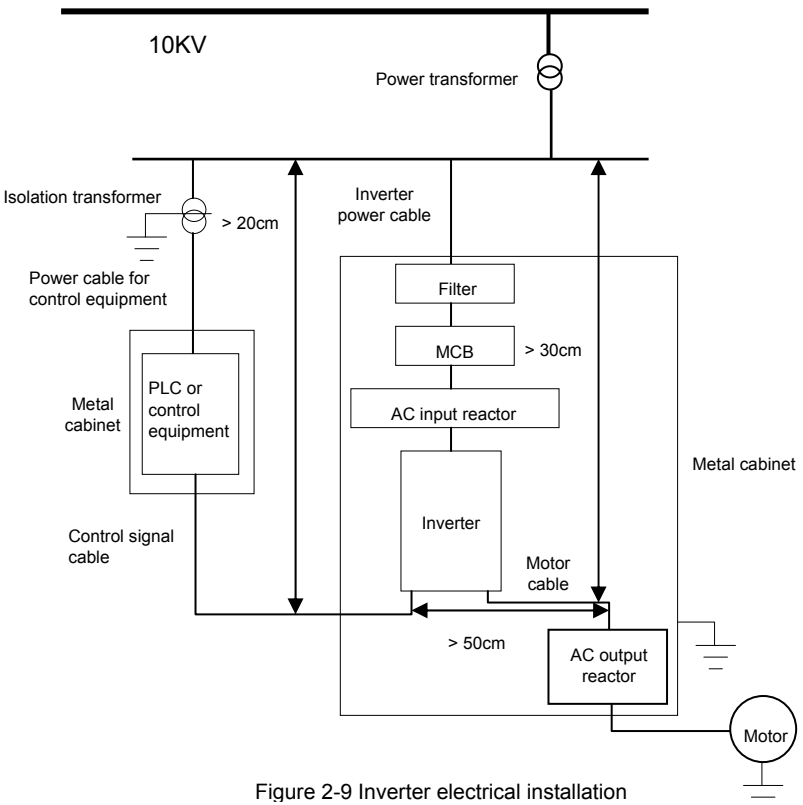


Figure 2-9 Inverter electrical installation

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

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. Guides to Power filter application

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

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 commnunicational protocol for master and slave communication mode is used in it .With PC/PLC and host computer, users can accomplish integrated control (setting inveter control oder, running frequency, parameter alteration, running status and error information obersvation), 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 holling and broadcasting frame and slave computer responsion frame;The frame content orgeniaed 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 baching 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 compelet the action asked by the host.

B. Bus structure

Interface mode: RS485 Hardware interface

RS485: asynchronous Serial, half-duplex transite mode.

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

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 estalishe the protocol(which called as “inquiry/command”). Other machines (slave computers) only can response through delivering dada 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 alonely “inquiry/command”,the slave will give back a information to the host(known as respanse).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

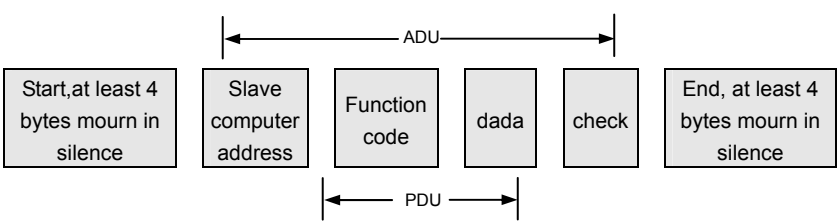
The bit of byte: include start bit, 8 dada bits, parity bit t and stop bit.

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 dada 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 buseven if in mourn in silence. When fist segment(address information) be resieved, 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 thant ,a new frame is going to be teansimited.

RTU dada frame formation



A information frame must be transimited as a dada 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 frome last frame is less than 4 time bytes, the receiver will known it as the following of last frame. Because the error of frame, increct 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） （0broadcast address）
Function command	0x03： Read parameters from slaves (setup value 1-16) 0x06： Write slave parameters
dada	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)
Exsample : for the slave of inverter which addresss is 0x01, the sart address of EMS memory is 0x0009,read 2 words,the frame strycture is descripted as foolows:

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	Data value	CRC checke
0x01	0x03	0x04	0x1388	0x1388	0x73CB

2． Command code 0x06（00000110）write a Word
Exsample : 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 cheche mode of communication frame

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

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 dada 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 dada 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 checke segment base on CRC method calculation.CRC segment,consist of 2 bytes include 16 bits binary number, checked the content of the frame and added in the frame after caculating by the transimission equipment.Reseiving machine re-calculat the CRC frame received and compare to valu of CRC segment received,if not equal,a transimission 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 checke bit are all in vain.

In CRC producing process, evry 8 bit character is exclusive or olone 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 olone 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 olone 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 checke method. When editoring the CRC arithmetic,user may refer to corrlative arithmetic and programming computing program to meet the neede of cheching.

In ladder logic, CKSM calcute 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 yuning 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.

①Presentation 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 nececary , is the lower byte of the register.

Exsample: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 addres	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（0.0～100.0）	W/R
Inverter failure address	0x2F00	Details see note 1 on page 119	R
Inverter pre-alarm information address	0x2F01	Details see note 2 on page 119	

MOdBus communication failure address	0x2F02	commad code error Password error Illegal address Illegal data Numbers of data error Can not be changed parameter Can not be changed in running User's password protection Parameter locked Factory's password error	R

5.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 respons 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			

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	Terminal X1 abnormal
0x103	OU	Over voltage pretection	0x111	Er8	Terminal X2 abnormal
0x104		Output phase missed	0x112	Er9	Terminal X3 abnormal
0x105	OH	Inverter over temprature	0x113	Er10	Terminal X4 abnormal
0x106	OL1	Inverter overlaod pretection	0x114	Er11	Terminal X5 abnormal
0x107	OC3	Output erthing	0x115	Er12	Terminal RUN abnormal
0x108	Er0	Storage abnormal	0x116	Er13	Terminal F/R abnormal
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			