SUNFAR C300 SERIES MANUAL

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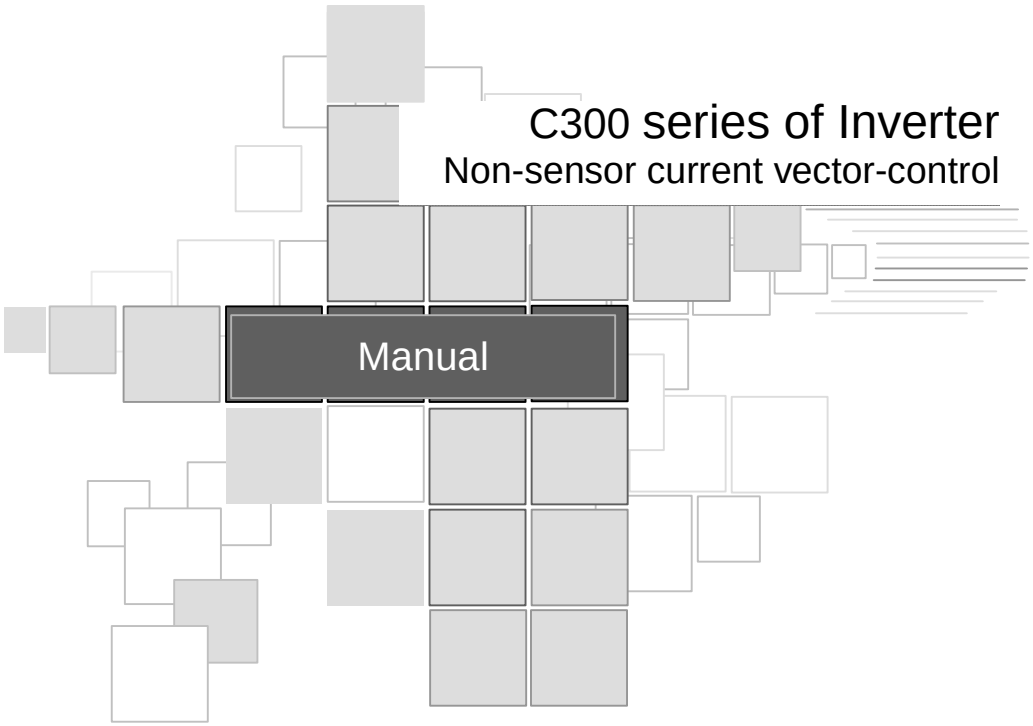

C300 series of Inverter

Non-sensor current vector-control

Manual

SHENZHEN SUNFAR ELECTRIC TECHNOLOGIES CO.,LTD

PREFACE

Thank you very much for choosing C300 series of sensorless vector low-power inverter.

This manual provides guidance of using the inverter safely and carefully, containing introduction of installation, wiring, parameters list, routine maintenance, operating rules and cautions, etc.

In order to make good use of the inverter properly and safely, please read this manual thoroughly before using. It may lead to abnormal operation and failure, reduce using life, even damage the equipment and cause personal injury if you use it wrongly.

This manual is attachment together with the inverter. Please keep it well and it would be available to engineering and installation personnel, repairing and maintaining during the product functioning period. SUNFAR has the right to modify and ameliorate products, data and dimensions without notice, so this manual is updated and all the contents in this manual are subject to change without any notice.

Notice of Using:

C300 is Sensorless vector low-power inverter. Under the operation mode of vector controlling, the inverter carry out the semi-closed-loop control of electricity, while if you use the motor that its capacity is lower than the inverter itself, please input the motor Nameplate parameter [F1.15]~[F1.18] again.

SHENZHEN SUNFAR ELECTRIC TECHNOLOGIES CO., Ltd.

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✧ PRECAUTIONS

In order to use the inverter properly and safely, please read this manual carefully before using. And you should follow the requirements of this manual to move, install, run, operate and repair the inverter.

1. Opening

Ⅰ Please check any damage that may have occurred during transportation.

Ⅱ Please check whether the nameplate data of inverter is in accordance with your order, if anything wrong, please contact supplier immediately.

Our product is manufactured, packed and transported in the strict quality system. But in case there is any error, please contact with our company or local agent, we will solve the problem as quickly as possible.

- Inverter's nameplate data

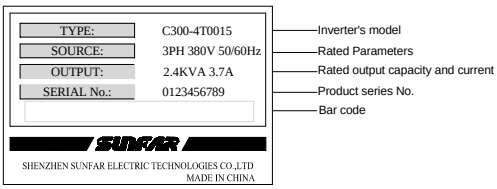


Fig-1 Nameplate

2. Safety regulations

There are four kinds of symbols being related with cautions as follows:

Danger: If user does not operate according to requirements, it will lead to death, grievous bodily harm or severe property loss.

Warning: If user does not operate according to requirements, it will lead to injury or damage of inverter.

This symbol will hint some useful information.

This symbol will hint some items that need to be noticed in operation.

2.1 Installing

2.1.1. Do not put the inverter on the combustible material.
2.1.2. C300 series inverter can't install in the explosive ambient.
2.1.3. Do not drop other material into the inverter.

It is forbidden to disassemble and refit the inverter.

2.2 Wiring

2.2.1. It must be operated by professional worker when wiring.
2.2.2. Please be sure to turn off the power supply at least 10 min before wiring.
2.2.3. Inverter and motor must be grounded correctly.
2.2.4. Be sure to wire or inspect the inverter after power-off at least10 minutes.
2.2.5. Electron components are sensitive about static electricity, so do not drop other material in inverter or touch the main circuit.

It is forbidden to connect an AC power supply with the U, V and W output terminals directly

2.3 Maintenance

1. Do not touch the radiator after power-off at least 10 minutes.
2. The earth terminal of inverter must be connected to ground reliably.

3. Attention Notes:

3.1. Be sure to install the inverter in a well-ventilated ambient.

3.2. The temperature at variable-frequency will be higher than at line-frequency, which is normal phenomenon.

3.3. The ordinary motor cannot run in the low speed for a long time, so user should select the special motor for inverter or reduce the motor load under the low speed.

3.4. When the altitude is over 1000m, the inverter will be valid to decrease the rated current, and the rated current will decrease 10% when the attitude is increased 1500m.

Be sure not to connect the output terminals of inverter with the filter capacitors and other surge absorbers.

4 Dispose:

When you dispose inverter and its parts, please pay attention to:

Capacitor: The capacitors in inverter may explode when they are burned.

Plastic: Poisonous gas may be generated when the front panel is burned, please pay attention to the waste gas when the plastic parts are burned.

Method: Please dispose inverter as industry rubbish.

1. INTRODUCTION

1.1 Model Explanation

C300 - 4 T 0015

Product	
C300	Sensorless Vector Low-power Drive

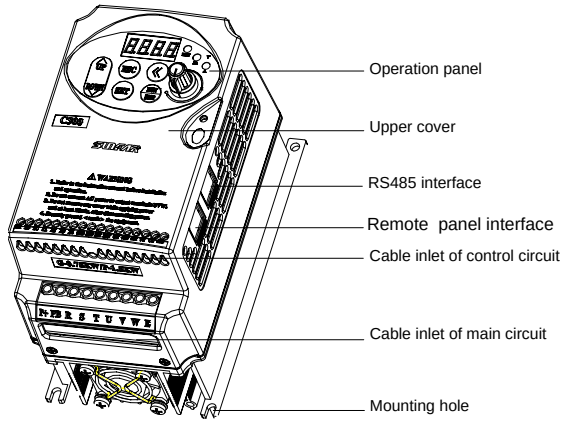
Applied Motor capacity (KW)	
0002	0.2
0004	0.4
0007	0.75
:	:
:	:
0450	45
0550	55

Voltage class	
2	220V
4	380V

Power supply	
T	3-phase
S	1-phase

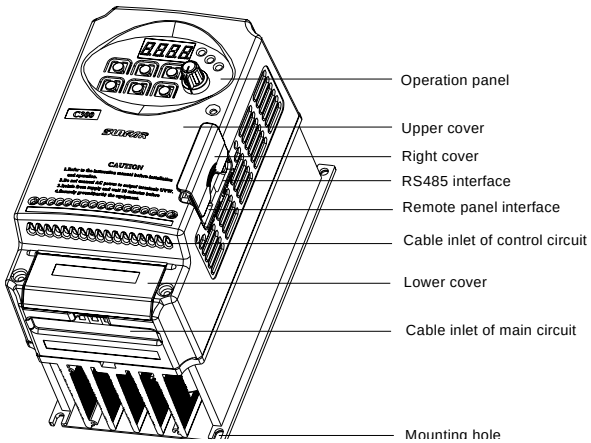
1.2 Appearance description

1.2.1 Appearance of model I



It is fit for：C300-2S0002～C300-2S0007/C300-4T0004～C300-4T0007

1.2.2 Appearance of model II



It is fit for：C300-2S0015～C300-2S0022/C300-4T0015～C300-4T0037

1.3 Model Of Inverter

Model	Rated capacity （KVA）	Rated output current （A）	Applied motor power （KW）
C300-2S0002	0.69	1.8	0.25
C300-2S0004	1.1	3.0	0.4
C300-2S0007	1.9	5.0	0.75
C300-2S0015	2.9	7.5	1.5
C300-2S0022	3.8	10.0	2.2
C300-4T0004	1.3	2.0	0.4
C300-4T0007	1.5	2.3	0.75
C300-4T0015	2.4	3.7	1.5
C300-4T0022	3.6	5.5	2.2
C300-4T0037	5.6	8.5	3.7

1.4 Specifications

Input	Rated voltage and freq.		Three-phase （ 4T**** ） 380V；50/60Hz	Single-phase（2S****）220V；50/60Hz
	Permissible voltage fluctuation		Three-phase（4T****） 320V ~ 460V	Single-phase（2S****） 170V ~ 270V
Output	Voltage		Three-phase （4T****） 0 ~ 380V	Single-phase （ 2S**** ） 0~220V
	Frequency		0~600Hz	
	Over-loading Endurance		110% rated current for long-term； 150% rated current for 1min； 180% rated current for 2s	
Control System			V/F control、Sensorless current vector control	
Control Charac-teristics	Freq. Control Resolution	Analog Input	0.1% of maximum output freq.	
		Digital Input	0.01Hz	
	Freq. Precision	Analog Input	Within 0.2% of maximum output freq.	
		Digital Input	Within 0.01% of setting freq.	
	V/F control	V/F curve	Reference freq. can be discretionally set between 5 and 600Hz. And V/F curve with multi-mode can be discretionally set. There are also three curves provided, Constant torque curve, Dec torque curve 1 and Dec torque curve 2.	
		Torque boost	Manual torque boost can be set between 0 and 20 percent； Automatic torque boost can be set according to output current.	
		Automatic current/voltage limiting	It will determine automatically the current and voltage of stator of motor, which will be controlled within the allowable range.	
	Sensorless Current vector control	Volt/Freq characteristics	Automatically adjust the ration of voltage to frequency according to the parameter of motor and unique arithmetic.	
		Torque characteristics	While freq equals 1, the torque is 150% rated torque. The lasting accuracy is 0.1%	
		Motor’s parameter self-detection	The motor’s parameter self-detection can finish in static state mode.	
		Current / voltage Restraint	Current close-circuit control can avoid the current attack.	

	Under voltage inhibit feature In running		It is special for the users with lower power supply and voltage fluctuate frequently, even the voltage is lower than Permissible voltage, and the system will maintain the longer running time.
Typical Functions	Multi-speed selection and wobble freq. running		Up to 8 stages of programmable multi-speed control, 6 kinds of running mode Wobble freq. function is composed of preset freq., center freq. adjusted and saving state and restart when inverter just had power off.
	PID control RS485 communication		Embedded PID controller can preset freq. Standard positioning RS485 Manifoldcommunication protocols can be selected, having synchronous linkage function.
	Freq. Setting	Analog input	DC voltage 0～10V，DC current 0～20mA
		Digital input	It can be set by Operation panel, RS485, UP/DW terminal and combination setting.
	Output Signal	OC output	One OC output and one faults electric delay out（TA，TB，TC），16 options can be selected.
		Analog output	One output 0～10V voltage and upper/lower limit can be set by user
	Voltage stabilizing running Automatically		To get the most stable running effect, user can select static stabilizing voltage, dynamics stabilizing voltage and non-stabilizing voltage.
	Acceleration/deceleration Time setting		0.1 to 6000 seconds, S-curve or linear
	Brake	Regenerative braking	75% above
		DC braking	Start and stop can be selected respectively, action freq. is form 0 to 50.0Hz, and action time is form 1 to 20.0s. Continuous action is also optional.
	Determine speed and restart		To use the function of Smooth restarting and stop restarting during motor works.
	Counter		Embedded one counter, which will help the integration of system
	Operation functions		Setting of upper limit freq. and lower limit freq., freq hopping running, Reversal running limit, slip freq. compensate, RS485 communication, frequency Acc/Dec control, self-recovery running, ect.

Display	Operation Status	Out freq., Out current, Out voltage, Motor speed, Setting freq., Temperature of Module, PID setting, Feedback value, Analog O/I, ect.
	Fault details	Recently six faults recorded, output freq., setting freq., output current, output voltage, DC voltage and module temperature
Protection/Warning Functions		Over current, over voltage, under current, under voltage, thermal relay, overheating, short circuit, out voltage would be short of the phase, The parameters of motor is abnormal, Main contactor can't attract, Internal memory faults, ect.
Environmental Conditions		Ambient temperature: -10℃~+50℃
		Ambient humidity: under 90%
		Ambient atmosphere: indoors (non-corrosive, non-inflammable, non-oil, non-fog etc.)
		Altitude is lower than 1000m
Configuration		Enclosure rating is IP20
		Cooling system is in the cooling mode.
Installation		Hanging

2. INSTALLATION GUIDELINES

2.1 Environmental Requirements

1. Be sure to install the inverter in a well-ventilated room.
2. Ambient temperature is from -10℃ to 40℃.
3. Please avoid putting the inverter in a high temperature and moist location. The humidity is less than 90% and non-condensing.
4. Keep away from combustible, explosive materials and caustic gas or liquid.
5. No dust, floating fiber and metal particles.
6. The inverter must be installed in a firm and no vibration location.
7. The installation plane should be solid and not vibrant.

If users demand any special requirements of installation, please contact us firstly.

C300 series of inverter is in hanging model, so it should be installed in vertical way. In order to ensure the air circulation around the inverter to be cool, there should be enough space around the inverter (Fig. 2-1-A). Add the air deflector when apply the up-down installation (Fig. 2-1-B).

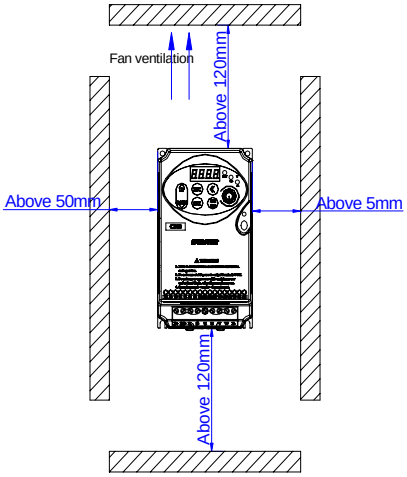


Fig2-1-A Interval distance

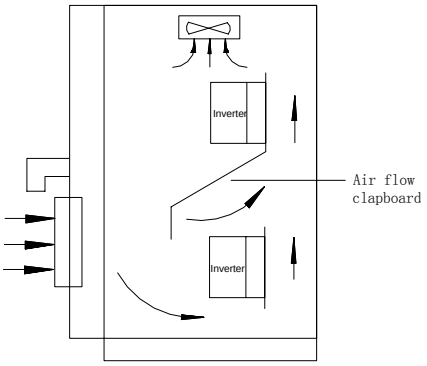
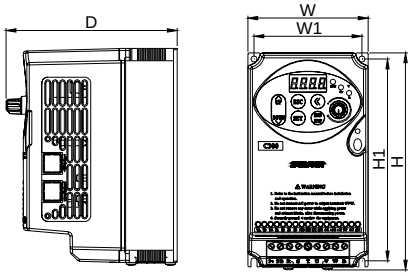


Fig2-1-B Multi-inverter Installation

2.2 Installation Dimension of Inverter



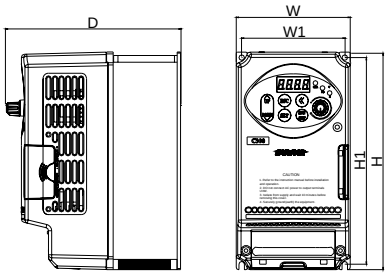
It is fit for：

C300-2S0002～C300-2S0007

C300-4T0004～C300-4T0007

Shown as Fig. 2-2-A。

Fig2-2-A Dimension of model Ⅰ



It is fit for：

C300-2S0015～C300-2S0022

C300-4T0015～C300-4T0037

Shown as Fig. 2-2-B。

Fig2-2-B Dimension of model Ⅱ

The following table shows the Installation Dimension of C300.

Inverter model （3-phase 400V）	Inverter model （1-phase 220V）	W1 (mm)	W (mm)	H1 (mm)	H (mm)	D (mm)	Screw spec
--	C300-2S0002	88	98	165	178	140	M4
C300-4T0004	C300-2S0004						
C300-4T0007	C300-2S0007						
C300-4T0015	C300-2S0015	95	105	190	200	160	M4
C300-4T0022	C300-2S0022						
C300-4T0037	--						

3. WIRING PROCEDURE

3.1 Precautions:

3.1.1. Installing a middle breaker between inverter and power supply in order to avoid enlarging the accident.

3.1.2. Reducing the electromagnetic interference (EMI), please connect surge absorber to the coils of electromagnetic contactors, relays, etc.

3.1.3. Frequency setting terminals VC、CC，Instrument circuit（AVO）, etc., these analog signal wires should be over 0.3mm^2 shield wire. Shield layer is connected with earth terminal GND and the length of wire should be less than 30m.

3.1.4. Wire of relay input and output circuit (X1 ~ X4、OC、RST) must be selected over 0.75mm^2 shield wire. Shield layer should be connected to earth terminal GND and the length of wire should be shorter than 50m.

3.1.5. Separating the main circuit wire from the signal/process circuit wiring， paralleled wiring should be at a distance of over 10cm and crossed wiring should be vertical with each other.

3.1.6. The wire must be less than 30m between motor and inverter. When the length of wire is over 30m, the carrier frequency of inverter should be reduced properly.

3.1.7. All of leading wires should be tightened with the terminal adequately to ensure well-contact.

3.1.8. Compressive resistance of all the wire should match with the voltage grade of inverter.

It is not allowed that U、V、W of inverter connect with the surge absorber capacitor or other surge absorber equipment and shown as following Fig..

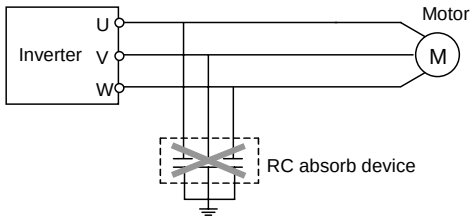


Fig.3-1 It is prohibited to connect RC absorb apparatus

3.2 Wiring of External Components

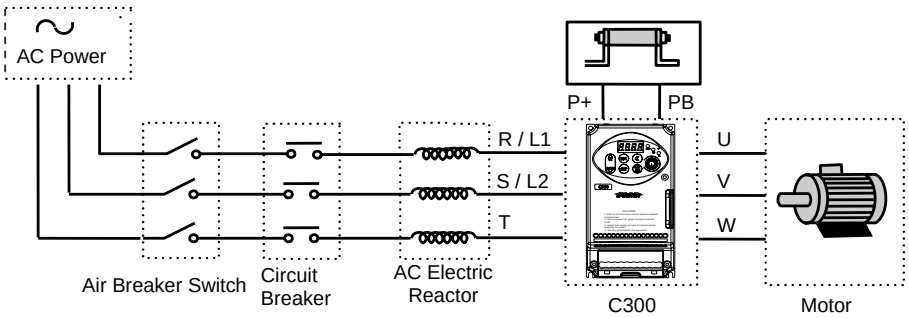


Fig.3-2 wiring

- Power Supply

It is according to the rated input power specifications in manual.

- Air-break switch

1. When the inverter is in maintenance or leave-unused, the air-break switch should isolate the inverter from power supply.
2. Input side of inverter takes place the fault of short-circuits or low-voltage, the air-break would take the protection.

- Contactor

Control the power-on or power-off of inverter expediently.

- AC electric reactor

1. Improve the power factor.
2. Reduce the harmonic wave input for the electric network.
3. Weaken the imbalance effect on 3-phase power voltage.

- Brake resistor

In situation of the regenerative braking, avoiding bringing voltage too highly.

Recommending specification of commanded equipment is shown as following table.

Model	Applied Motor（KW）	Wire spec (Main circuit) （mm^2）	Air-break （A）	Magnetic contactor （A）
C300-2S0002	0.25	2.5	10	6
C300-2S0004	0.4	2.5	10	6
C300-2S0007	0.75	4	16	12
C300-2S0015	1.5	4	20	18
C300-2S0022	2.2	6	32	18
C300-4T0004	0.4	2.5	10	6
C300-4T0007	0.75	2.5	10	6
C300-4T0015	1.5	2.5	16	12
C300-4T0022	2.2	4	16	12
C300-4T0037	3.7	4	20	18

3.3 Basic wiring

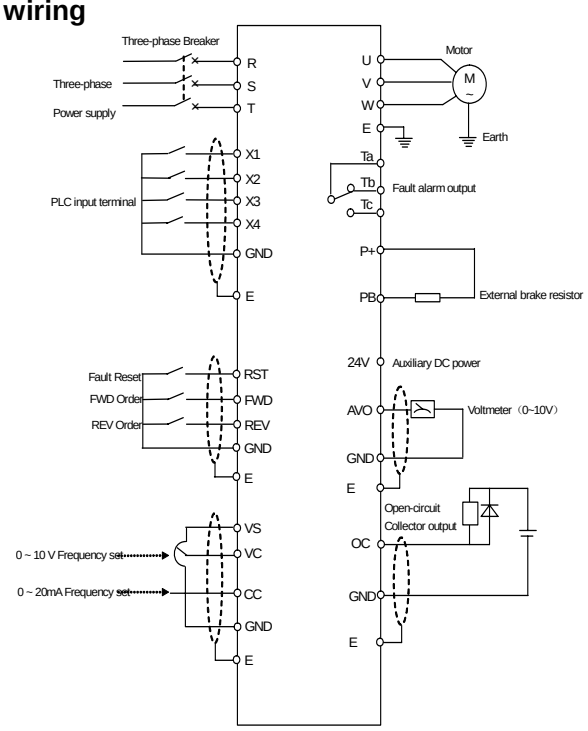
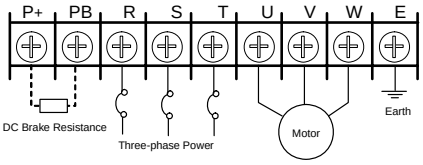


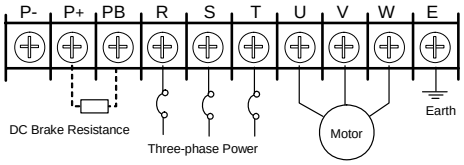
Fig.3-3 C300 series of inverter basic wiring

3.4 Terminal of main circuit

（1）**Ⅰ** model（It is fit for C300-4T0004～C300-4T0037）



It is fit for 0.4KW~0.75KW

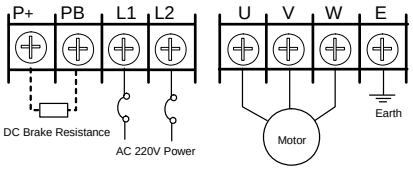


It is fit for 1.5KW~3.7KW

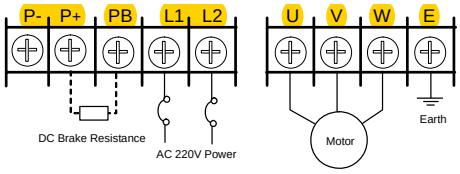
Description of terminal:

Terminal	Function	Terminal	Function
P-	Negative Terminal of DC	P+	Positive Terminal of DC
PB	DC brake resistance can be connected between P and PB.	R、S、T	Connecting three-phase AC power supply
U、V、W	Connecting three-phase AC motor	E	Earth Terminal

（2）**Ⅱ** model（It is fit for C300-2S0002～C300-2S0022）



It is fit for 0.25KW~0.75KW



It is fit for 1.5KW~2.2KW

Description of terminal:

Terminal	Function	Terminal	Function
P-	Negative Terminal of DC	P+	Positive Terminal of DC Negative
PB	DC brake resistance can be connected between P and PB.	L1、L2	Connecting 1-phase 220V AC Power
U、V、W	Connecting 220V AC motor	E	Earth Terminal

3.5 Terminal of Control circuit

(1) Terminal of Control circuit fig:

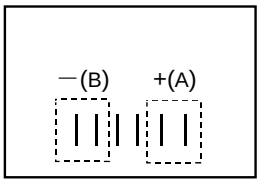
(2) Description of control-circuit terminal:

Type	Terminal	Function	Notes
Analog Input	VS	It provides +10V/10mA	
	VC	Frequency setting voltage signal input terminal	0~10V
	CC	Frequency setting current signal input terminal	0~20mA
	GND	Common terminal of analog input signal	
Control Terminal	X1	Multi-function input terminal 1	The detailed function of multi-function Input terminal is by setting parameter F3.0~F3.5, The terminal is valid while being closed with GND terminal.
	X2	Multi-function input terminal 2	
	X3	Multi-function input terminal 3	
	X4	Multi-function input terminal 4	
	RST	Fault reset input terminal	Those terminals are valid when being connected with GND.And running direction is controlled by FWD-GND state
	FWD	FWD control command terminal	
	REV	REV control command terminal	
	GND	Common terminal of control	
	24V	It provides +24V/50mA power and is grounded by GND.	
Analog Output	AVO	PLC voltage signal input terminal. It is set by F2.9 and allowed to connect with external voltmeter.	voltage signal output 0~10V/1mA
	GND	Common terminal of AVO	
OC Output	OC	PLC open-circuit collector output is set by F3.4	The maximum load-current is50mA .And the maximum withstand voltage is 24V.
PLC output	TA TB TC	General , TA-TB is connected，TA-TC is unconnected when TA-TB is unconnected and TA-TC is connected，F3.8 is valid	Capacity：AC 250V 1A Resistive load

3.6 Wiring of RS485 interface and remote panel interface

（1） RS485 interface wiring model，as fig on the right：

（2）External keypad interface and RS485 interface are connected by 6P crystal pin line.



3.6.1 Model **I**

It is fit for:C300-2S0002～C300-2S0007/C300-4T0004～C300-4T0007

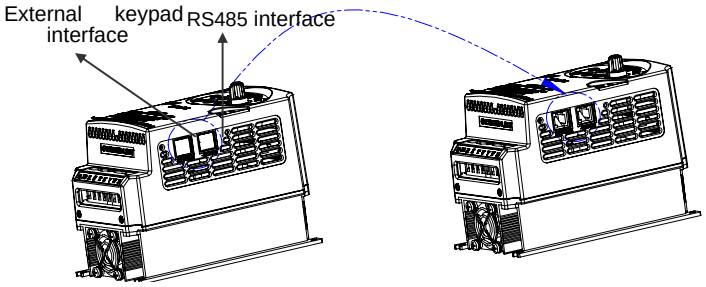


Fig. 3-4-A model Ⅰ

3.6.2Model **II**

It is fit for:C300-2S0015～C300-2S0022/C300-4T0015～C300-4T0037

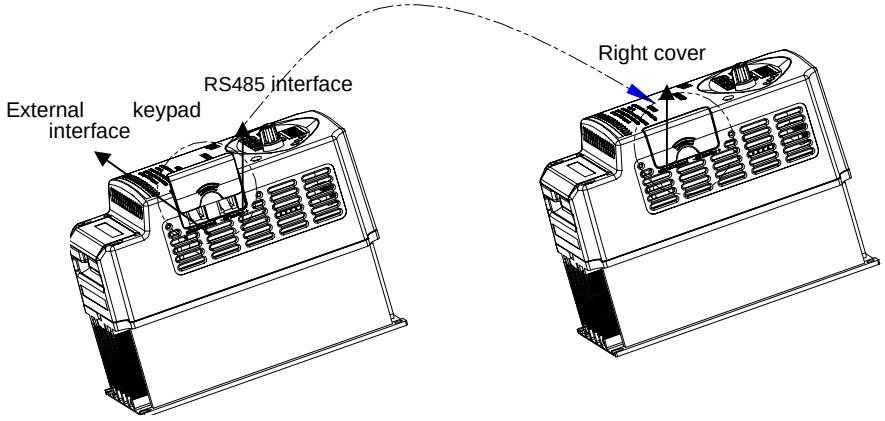
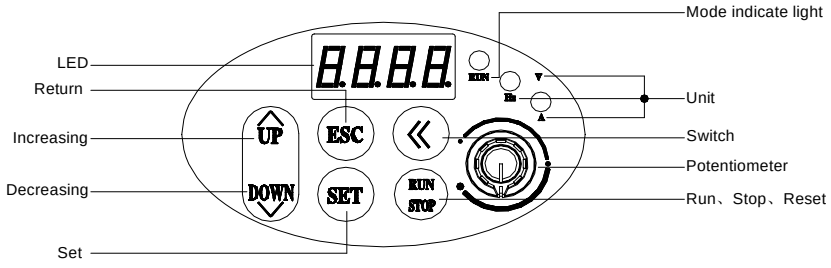


Fig.3-4-B model Ⅱ

4. PANEL OPERATIONS



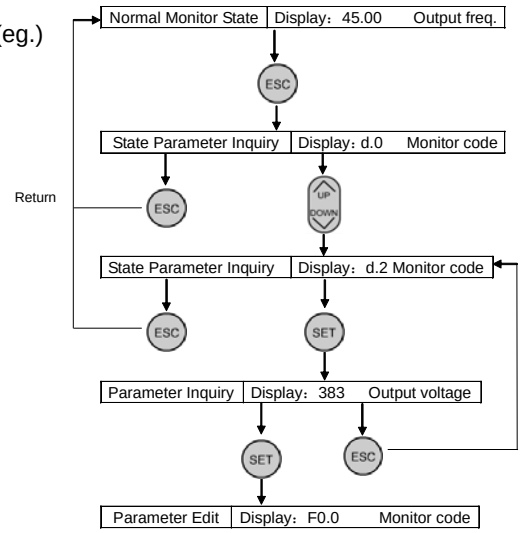
4.1. Keypad functions

Item	Function
LED	It displays current state and setting parameter.
A、Hz、V	The corresponding unit of current display.
RUN	Operation indicator light. The inverter is running and U, V and W output voltage.
UP DOWN	Data modify key. It is used for modifying the function code and parameter. In state monitor mode, if F0.1 is 0, press this key will modify the frequency instruction.
ESC	Return key. Press this key in normal monitor state to enter query mode of not normal monitor state /monitor parameters to check running state. In any state, press this key to return the upper state.
SET	Set key. It affirms current state and parameter, and goes to the next function list.
RUN STOP	Run/Stop key. When F0.4 is 000#, this key is valid for panel control. When the inverter is stop and press this key, the inverter will run. When the inverter is stop and press this key, the inverter will stop. If inverter occur fault, press this key to reset it.
<<	Shift key. When modify data，Press the key to modify the digital bit, the modification bit will be displayed blink.
	Panel potentiometer. Running frequency is set by potentiometer on the panel Potentiometer turning left will reduce running frequency, potentiometer turning right will increase running frequency.

4.2. Panel operation

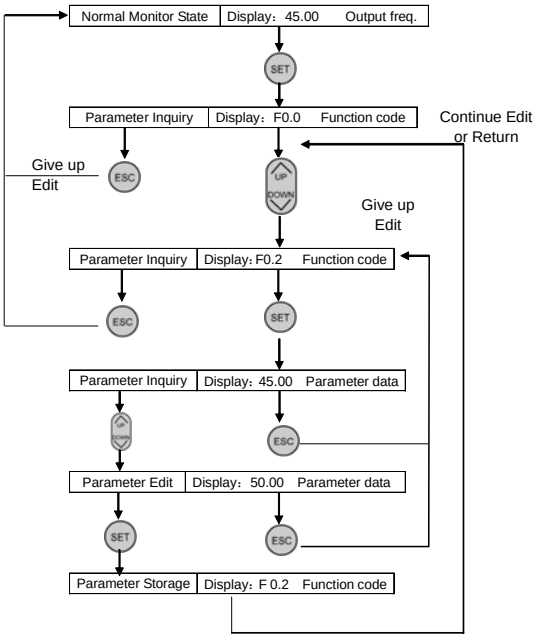
(1)State parameters enquiries (eg.)

Return



(2)Parameter enquiries

and edits (eg.)



4.3 List of State monitor parameter

Monitor Code	Content	Unit
d-0	Current output frequent	Hz
d-1	Current output current (Valid)	A
d-2	Current output voltage (Valid)	V
d-3	Rotational speed of motor	Rpm
d-4	DC bus voltage	V
d-5	Input voltage of inverter	V
d-6	Setting freq.	Hz
d-7	Count value of Internal counter	
d-8	PID setting value	
d-9	PID feedback value	
d-10	Running linear speed	m/s
d-11	Setting linear speed	m/s
d-12	Analog input voltage VC	V
d-13	Reserved	
d-14	Analog input current CC	mA
d-15	Reserved	
d-16	State of input terminal	
d-17	Temperature of module	ºC
d-18	Analog output AVO	
d-19	Reserved	
d-20	Magnetization current	A
d-21	Magnetization current setting	A
d-22	Torque current	A
d-23	Torque current setting	A
d-24	Operation frequency	Hz
d-25	Reserved	
d-26	First fault record	
d-27	Second fault record	
d-28	Third fault record	
d-29	Fourth fault record	
d-30	Fifth fault record	

d-31	Sixth fault record	
d-32	Output frequency of last fault	Hz
d-33	Setting frequency of last fault	Hz
d-34	Output current of last fault	A
d-35	Output voltage of last fault	V
d-36	DC voltage of last fault	V
d-37	Temperature of module of last fault	ºC

4.4 Operations

4.4.1. Initialization

(1)Frequency input channel / mode selection（[F0.1]）

Initialization of inverter is different according to different model. If [F0.0] is 0, the frequency of inverter is set by keypad.

(2)Operation channel selection（[F0.4]）

Initialization of inverter is different according to different model. If F0.4 is 00#0, start and stop of inverter is controlled by RUN STOP key.

4.4.2. Simply operation

It is forbidden to connect Three-phase power to output terminal U, V and W directly.

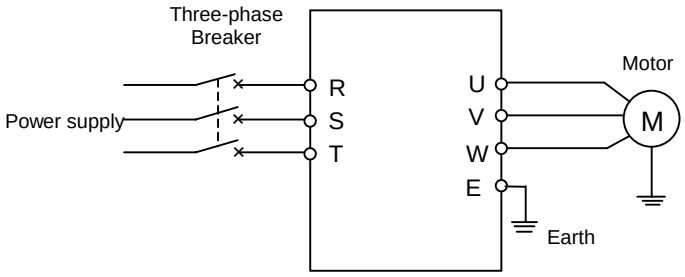


Fig.4-1 simply running

① Please follow fig 4-1 to connect.

② Be sure that the wiring is correctly, then turn the power on, the inverter will display “P.oFF” and”0” step by step.

③ Select inverter’s control mode（[F0.0]＝0，V/F method;[F0.0]＝1，Vector control）;

④ Be sure that F0.1 is 0.

⑤ Please set parameters [F1.3] and [F1.4], according to the nameplate parameters of applied motor..If it is controlled by vector, using parameters[F1.15]～[F1.18] to set.

⑥ Please press RUN STOP key to start inverter, then the inverter will display 0.0Hz.

⑦ Please press upper key on the UP DOWN key to increase input frequency and motor will run.

⑧ Please observe the motor whether it runs normally or not. If abnormal, please stop running at once and turn off the power, and find out the reason, then restart.;

⑨ Press the key on the UP DOWN key to decrease the setting frequency.

⑩Press the key RUN STOP to stop running and turn the power supply off.

Carrier wave frequency is fixed value between 1.5 and 12 KHz. If motor does not take any load, it will be a slight oscillate. So please decrease setting value of F0.16.

5. PARAMETERS LIST

★ means that this parameter can not be changed during operation.

▲ means that this parameter is related to the inverter's model.

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Basic operation parameter unit	F0. 0	Control methods	0：V/F method； 1：Vector control	1	1	★
	F0. 1	Frequency input channel / mode selection	0：Frequency setting by operation panel 1：UP/DW Acc and Dec control 2：RS485 interface 3：Panel potentiometer 4：External voltage signal VC（0V~10V） 5：External current signal CC（0~20mA） 6：Combination setting 7：External terminals	1	0	
	F0. 2	Frequency digital setting	0.00 ~ the upper limit frequency	0.01	0	
	F0. 3	Auxiliary control of freq. digital setting	The first part of LED(form right to left)： 0：Setting freq. will save after power down 1：Setting freq. will not save after power down The second part of LED： 0：Setting freq. is keep when stopping 1：Setting freq. will save in F0.2 when stopping 2：Setting freq. isclear when stopping The third and fourth part of LED(form right to left)：Reserved	1	0000	
	F0. 4	Operation Channel selection	The first part of LED (form right to left): 0：Panel control 1：External terminals 2：RS485 interface The second part ofLED：Function of key STOP 0：It is valid for panel control. 1：It is valid for all kinds of control method. The third and fourth part of LED(form right to left)：Reserved	1	0000	

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Basic operation parameter unit	F0.5	Combination methods of running the command of terminals	0：Two-line mode 1 1：Two-line mode 2 2：Three-line mode	1	0	★
	F0.6	Steering control	The first part of LED (form right to left): 0：Running direction is consistent with setting direction 1：Running direction is opposite to setting direction The second part of LED： 0：Prevention REV is valid 1：Prevention REV is invalid The third and fourth part of LED(form right to left)：Reserved	1	0000	
	F0.7	The lower limit frequency	0.0 Hz~ [F0.8]	0.01	0.0	
	F0.8	The upper limit frequency	[F0.7] ~ 400.00Hz	0.01	50.00	
	F0.9	Reserved				
	F0.10	Acc time 1	0.1 ~ 6000 Sec/Min	0.1	▲	
	F0. 11	Dec time 1	0.1 ~ 6000 Sec/Min	0.1	▲	
	F0. 12	Characteristics parameters of Acc and Dec	The first part of LED (form right to left): 0：Beeline 1：Scurve The second part of LED： 0：Output freq. will be modified according to Acc/Dec time. 1：Output freq. will be automatically modified according to lode. The third part ofLED：Unit of Acc/Dec time 0：Sec 1：Min The third and fourth part of LED: Reserved	1	0000	

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Basic operation parameter unit	F0. 13	Acc/Dec initial section of S curve	10 .0~ 50.0 （%）	0.1	20.0	★
	F0. 14	Acc/Dec ascend/decline section of S curve	10.0 ~ 80.0 （%）	0.01	60.0	★
	F0. 15	Reserved				
	F0. 16	Carrier wave frequency	1.5~ 12.0 KHz	0.1	6.0*	
	F0. 17	Carrier wave characteristics	The first part of LED (form right to left): Reserved The second part of LED (form right to left): 0：The relation between out current and Carrier wave is off. 1：The relation between out current and Carrier wave is on. The third part of LED (form right to left): 0：The relation between module temp and Carrier wave is off. 1：The relation between module temp and Carrier wave is on. The third part of LED (form right to left): 0：The relation between out frequent and Carrier wave is off. 1：The relation between out frequent and Carrier wave is on.	1	1110	
	F0. 18	Parameter write-protect	1：Forbid to modify all parameter, except F0.2 and F0.18 2：Forbid to modify all parameter, except F0.18	1	0	
Primary applied paramete r unit	F1. 0	Type of V/F Curve (Parameters [F1.0]～ [F1.13] is only under the control mode that is [F0.0]＝0,valid.)	0：Constant torque curve 1：Low-freq. torque curve 1 2：Low-freq. torque curve 2 3：V/F user-defined curve	1	0	★

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Primary applied parameter unit	F1. 1	Torque Boosting	0.0~20.0（%）	0.1	6.0	
	F1. 2	Torque boosting pattern	0：Manual 1：Automatic	1	0	★
	F1. 3	Base running frequency	5.00～the upper limit frequency	0.01	50.00	
	F1. 4	Max outputvoltage	200～500V; 100～250V	1	380V 220V	
	F1. 5	V/F freq. 3	[F1.7] ~ [F1.3]	0.01	0.0	★
	F1. 6	V/F voltage 3	[F1.8] ~ 100.0(%)	0.1	0.0	★
	F1. 7	V/F freq. 2	[F1.9] ~ [F1.5]	0.01	0.0	★
	F1. 8	V/F voltage 2	[F1.10] ~ [F1.6]	0.1	0.0	★
	F1. 9	V/F freq.1	0.0 ~ [F1.7]	0.01	0.0	★
	F1. 10	V/F voltage 1	[F1.1] ~ [F1.8]	0.1	0.0	★
	F1. 11	DC braking current when starting	0.0 ～ 100.0（%）	0.1	50.0	
	F1. 12	DC braking time when starting	0.0 ～ 20.0 S	0.1	0	★
	F1.13	Reserved				
	F1.14	Compensate for slip freq.	0～150（%）	1	0	
	F1.15	Rated voltage of applied motor	200～500V; 100~250V	1	380V 220V	
	F1.16	Rated freq. of applied motor	5.00～600.00Hz	0.01	50.00	★
	F1.17	Rated current of applied motor	0.01～300.0A	0.01	▲	★
	F1.18	Rated rev of applied motor	300～6000RPM	1	▲	★
	F1.19	Exciting current of applied motor	[F0.17]/4~[F1.17]×3/4	0.01	▲	★

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Primary applied parameter unit	F1.20	Parameters self-determination	0：Invalid 1：Determine parameters when motor is static 2：Determine parameters when motor runs 3：Both 1 and 2.	1	0	★
	F1.21	Selection of starting pre-excitation	The first part of LED (form right to left): 0：Starting pre-excitation is Valid 1：Starting pre-excitation is Invalid The second part of LED: 0：Prepare pre-excitation is valid when zero frequency 1：Prepare pre-excitation is invalid when zero frequency The third and fourth part of LED：Reserved	1	0001	
	F1.22	Pre-excitation of starting time	0.10～2.00Sec	0.01	0.30	★
	F1.23	Self-adapting rectify of motor parameters	The first part of LED (form right to left): 0：Self-adapting rectify of stator resistance will invalid. 1：Self-adapting rectify of stator resistance will valid. The second part of LED 0：Self-adapting rectify of excitation current will invalid 1：Self-adapting rectify of excitation current will valid. The third part of LED： 0：Self-adapting ectify of rotor resistance will invalid. 1：Self-adapting ectify of rotor resistance will valid. The fourth part of LED：Reserved	1	0010	

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Primary applied parameter unit	F1.24	Stator resistance	0.000～20.000	0.0011	▲	★
	F1.25	Rotor resistance	0.000～20.000	0.0011	▲	★
	F1.26	Rotor inductance	0.00～600.00（mH）	0.01	▲	★
	F1.27	Inductance of excitation	0.00～600.00（mH）	0.01	▲	★
	F1.28	Leakage inductance (coefficient)	0.00～100.00（mH）	0.01	▲	★
	F1.29	Gain of compensation for speed drop	0.50～1.50	0.01	1.00	
	F1.30	Reserved				
Analog I/O parameter unit	F2.0	Input lower limit voltage VC	0.0 ~ [F2.1]	0.1	0.0V	
	F2.1	Input upper limit voltage VC	[F2.0] ~ 10.0V	0.1	5.0 V	
	F2.2	Input lower limit current CC	0.0mA~ [F2.3]	0.1	4.0	
	F2.3	Input upper limit current CC	[F2.2] ~ 20.0mA	0.1	20.0	
	F2.4	Frequency with the min setting	0.0~[F2.5]	0.01	0.00	
	F2.5	Frequency with the max setting	[F2.4]~550.0Hz	0.01	50.00	
	F2.6	Characteristics selection of input channel	The first part of LED (form right to left)：(VC channel) 0: positive characteristics 1：Negative characteristics The second part of LED：Reserved The third part of LED：(CC channel) 0: positive characteristics 1：Negative characteristics The fourth part of LED：Reserved	1	0000	★

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Analog I/O parameter unit	F2.7	External freq. set time constant offiltering	0.01～1.00Sec	0.01	0.10	
	F2.8	Combination setting mode	Refer to the explanations about（0～19）	1	0	
	F2.9	Analog output selection（AVO）	The first part of LED (form right to left)：AO1output 0：Output freq. 1：Output current 2：Output voltage 3：Rotational speed Of applied motor 4：PID setting 5：PID feedback The second and third and fourth part of LED：Reserved	1	0000	
	F2.10	The lower limit of analog output AVO	0.0～[F2.11]	0.1	0.0 V	
	F2.11	The upper limit of analog output AVO	[F2.10]～12.0	0.1	10.0V	
	F2.12	Reserved				
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Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Auxiliary running parameter unit	F3.0	Function selection of input terminal 1 (0~25)	0：Control terminal is idle 1：Multi-speed control terminal 1 2：Multi-speed control terminal 2 3：Multi-speed control terminal 3 4：Wobble freq. is valid 5：State of wobble freq. reset 6：FWD jog control 7：REV jog control 8：Acc& Dec time selection terminal 1 9：Acc& Dec time selection terminal 2 10：Freq. setting channel selection 1 11：Freq. setting channel selection 2 12：Freq. setting channel selection 3 13：Freq. is controlled gradually increase（UP） 14：Freq. is controlled gradually increase（DW） 15：UP-DW freq. clear 16：Uncontrolled stop control 17：Fault signal of peripheral equipment input 18：Three-line mode running control 19：DC braking control 20：Inner counter clear 21：Inner counter timer 22：PLC running valid 23：PID running valid 24：Reserved 25：PLC state reset after stopping	1	1	★
	F3.1	Function selection of input terminal 2 (0~25)		1	2	★
	F3.2	Function selection of input terminal 3 (0~25)		1	3	★
	F3.3	Function selection of input terminal 4 (0~25)		1	6	★

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Auxiliary running parameter unit	F3.4	Output terminal（OC）	0：In the running； 1：Frequency reaching； 2：Freq. level detection signal FDT； 3：Over-loading alarm； 4：External fault halt； 5：Output frequency reaches the upper-limit； 6：Output frequency reaches the lower-limit； 7：Running in zero speed； 8：Inverter will stop when under voltage； 9：PLC stage is end of run； 10：PLC periodic is end of run； 11：Reserved； 12：Setting value of counter arrives； 13：Designated value of counter arrives； 14：Reserved； 15：Reserved； 16：Inverter fault； 17：Restrictions on wobble freq. of the upper and lower limit freq. 18：Reserved；	1	0	
	F3.5	TA, TB and TC of relay contacts（TA、TB、TC）		1	16	
	F3.6	Frequency reach the checkout amplitude	0.0~20. 00Hz	0. 01	5.00	
	F3.7	FDT setting	0.0~ the upper limit freq.	0.01	10.00	
	F3.8	delay time of FDT output	0.0~200.0s	0.1	2.0	★
	F3.9	level of over-loading alarm	50~200（%）	1	110	
	F3.10	delay time of over-loading alarm	0.0~20.0s	0.1	2.0	★
	F3.11	Reserved				

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Auxiliary running parameter unit	F4.0	Start mode	0：Routine mode 1：Detect speed and restart	1	0	★
	F4.1	Start frequency	0.0～10.00Hz	0.01	0.5	
	F4.2	Start frequency duration	0.0～20.0 S	0.1	0.0	★
	F4.3	Stop mode	0：Decelerate mode 1：Uncontrolled stop	1	0	
	F4.4	Initial freq. of DC braking when stopping	0.0～50.00Hz	0.01	3.00	
	F4.5	Waiting time of DC braking when stopping	0.0～5.0 S	0.1	0.1	
	F4.6	Action time of DC braking whenstopping	0.0～20.0 S	0.1	0	★
	F4.7	DC braking current when stopping	0.0～100（%）	0.1	50.0	
	F4.8	Running threshold of zero freq.	0.0～100.0Hz	0.01	0.0	
	F4.9	Return different of zero freq.	0.0～50.00Hz	0.01	1.00	
	F4.10	Jog frequency	0.0～the upper limit freq.	0.01	10.00	
	F4.11	Acc torque level	110～200（%）	1	160	
	F4.12	Braking torque lever	10～150（%）	1	80	
	F4.13	Motor over-loading protection coefficient	50～110（%）	1	100	

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Auxiliary running parame	F4.14	Automatic voltage regulation（AVR）	0：Invalid 1： Dynamic valid 2：Static valid	1	2	
	F4.15	Reserved				
	F4.16	Dead time of FWD&REV	0.0～5.0 S	0.1	0.0	★
	F4.17	Acceleration time 2	0.1～6000 s/min	0.1	▲	
	F4.18	Deceleration time 2	0.1～6000 s/min	0.1	▲	
	F4.19	Acceleration time 3	0.1～6000 s/min	0.1	▲	
	F4.20	Deceleration time 3	0.1～6000 s/min	0.1	▲	
	F4.21	Acc time 4/Jog Acc time	0.1～6000 s/min	0.1	▲	
	F4.22	Dec time 4/Jog Dec time	0.1～6000 s/min	0.1	▲	
	F4.23	Modified rated of UP/DW terminals	0.01～100.0Hz/Sec	0.01	10.00	
	F4.24	Start voltage of dynamic braking	600~750V	1	700V	
	F4.25	Action ratio of dynamic braking	10~100（%）	1	60%	
	F4.26	Restart after power down setting	The first part of LED： 0：Invalid 1： Valid The second part of LED： 0：Routine mode 1：Detect speed and restart mode The third and fourth part of LED：Reserved	1	0010	★
	F4.27	Waiting time of restart after power down	0.0～10.0 s	0.1	0.5	★
	F4.28	Reserved				

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Multi-speed running parameter unit	F5. 0	Multi-speed running mode	The first part of LED(form right to left)：PLC setting 0：PLC is invalid. 1：PLC is valid. 2：PLC is conditional invalid. The second part of LED：Simple PLC running mode selection 0：Single loop mode 1：Single loop and stop mode 2：Continuous loop mode 3：Continuous loop and stop mode 4：Keep the end value 5：Keep the end value and stop mode The third part of LED 0：Restart from the first stage freq. 1：Restart from running freq. which is saved before running is break 2：Restart from setting freq. when running is break. The fourth part of LED：PLC save state 0：Non-save after power off 1：Save after power off	1	0000	★
	F5. 1	Multi-speed frequency 1	0.0 ~ the upper limit freq.	0.01	35.00	
	F5. 2	Multi-speed frequency 2	0.0 ~ the upper limit freq.	0.01	15.00	
	F5. 3	Multi-speed frequency 3	0.0 ~ the upper limit freq.	0.01	3.00	
	F5. 4	Multi-speed frequency 4	0.0 ~ the upper limit freq.	0.01	20.00	
	F5. 5	Multi-speed frequency 5	0.0 ~ the upper limit freq.	0.01	25.00	
	F5. 6	Multi-speed frequency 6	0.0 ~ the upper limit freq.	0.01	30.00	
	F5. 7	Multi-speed frequency 7	0.0 ~ the upper limit freq.	0.01	35.00	
	F5.8	Multi-speed frequency 8	0.0 ~ the upper limit freq.	0.01	40.00	

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Multi-speed running parameter unit	F5. 9	Running time of Multi-speed 1	0.0～6000 s	0.1	10.0	
	F5. 10	Running time of Multi-speed 2	0.0～6000 s	0.1	10.0	
	F5. 11	Running time of Multi-speed 3	0.0～6000 s	0.1	10.0	
	F5. 12	Running time of Multi-speed 4	0.0～6000 s	0.1	10.0	
	F5. 13	Running time of Multi-speed 5	0.0～6000 s	0.1	10.0	
	F5. 14	Running time of Multi-speed 6	0.0～6000 s	0.1	10.0	
	F5.15	Running time of Multi-speed 7	0.0～6000 s	0.1	10.0	
	F5.16	Running time of Multi-speed 8	0.0～6000 s	0.1	10.0	
	F5.17	Running direction of PLC multi-speed	The first part of LED(form right to left): 0：Stage 1 FWD 1：Stage 1 REV The second part of LED: 0：Stage 2 FWD 1：Stage 2 REV The third part of LED: 0：Stage 3 FWD 1：Stage 3 REV The fourth part of LED: 0：Stage 4 FWD 1：Stage 4 REV	1	0000	
	F5.18	Running direction of PLC multi-speed	The first part of LED(form right to left): 0：Stage 5 FWD 1：Stage 5 REV The second part of LED: 0：Stage 6 FWD 1：Stage 6 REV The third part of LED: 0：Stage 7 FWD 1：Stage 7 REV The fourth part of LED: 0：Stage 8 FWD 1：Stage 8 REV	1	0000	
	F5.19	Reserved				

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Advanced running parameter unit	F6.0	Reserved				
	F6.1	Fault self-recovery time	0，1，2	1	0	★
	F6.2	Interval time of fault self-recovery	0.2～20 S	0.1	2.0	★
	F6.3	Final value set up of internal counter	1～60000	1	1	★
	F6.4	Internal timer setup	1～60000	1	1	★
	F6.5	Skip freq. 1	0.0～the upper limit freq.	0.01	0	
	F6.6	Amplitude accumulation of Skip freq. 1	0.0～5.00Hz	0.01	0	
	F6.7	Skip freq. 2	0.0～the upper limit freq.	0.01	0	
	F6.8	Amplitude accumulation of Skip freq. 2	0.0～5.00Hz	0.01	0	
	F6.9	Linear speed coefficient setting	0.01～100.0	0.01	1	
	F6.10	Close-loop analog coefficient setting	0.01～100.00	0.01	1.00	
	F6.11	Rotator speed coefficient setting	0.01～10.00	0.01	1.00	
	F6.12	Monitor item selection 1	0～11	1	0	
	F6.13	Monitor item selection 2	0～11	1	1	
	F6.14	Query or modify parameters	0 ~ 9999	1	1700	
	F6.15	Parameter initialization	0：Parameter initialization is off. 1：Parameterinitialization is on. 2：Clean fault records	1	0	★

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Advanced running parameter unit	F6.16	Copy parameter function	0：Forbid 1：Allow	1	1	
	F6.17	Manufactory password	0～9999	1	1000	
	F6.18	User password	0～9999	1	0	
	F6.19	Reference password	0 ~ 9999	1	▲	
Wobble freq. running parameter unit	F7.0	Wobble freq. running mode	The first part of LED (form right to left) 0:Function of wobble freq. is invalid. 1:Function of wobble freq. is valid. 2:Function of wobble freq. is conditional valid. The second part of LED: restart mode 0:Restart according to parameters saved before stop 1:Restart The third part of LED: 0:The wobble freq. is fixed 1:The wobble freq. is changeable. The fourth part of LED: Storage characteristics of wobble freq. 0:It will not save the running state of wobble freq. after power off 1:It will save the running state of wobble freq. after power off	1	1000	★
	F7.1	Preset freq. of wobble freq.	0.0～the upper limit freq.	0.01	10.00	
	F7.2	Waiting time of preset freq.	0.0～6000.0Sec	0.1	0.0	★
	F7.3	Amplitude of wobble freq.	0.0～50.0（%）	0.1	10.0	
	F7.4	Jumping freq.	0.0～80.0（%）	0.1	10.0	
	F7.5	Triangular rise time	0.1～1000.0Sec	0.1	10.0	
	F7.6	Triangular fall time	0.1～1000.0Sec	0.1	10.0	
	F7.7	Preset center freq. of wobble freq.	0.0～the upper limit freq.	0.01	10.0	
	F7.8	Reserved				

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
PID control parameter unit	F8.0	Inner PID control	The first part of LED(form right to left): Inner PID control 0：Inner PID control is invalid 1：Inner PID control is valid 2：Inner PID control is conditional valid. The second part ofLED： PID controller selection 0：proportion 1：Integral 2：Proportion and integral The third part of LED： Regulating property of PID controller 0：positive interaction 1：Reactor The fourth part of LED: 0： PID with unidirectional control 1： PID with two directions control	1	0020	★
	F8.1	Inner PID setting and channel selection	The first part of LED(form right to left): 0：Digital setting. 1：Serials interfacesetting 2：Panel potentiometer setting, it is on the operationpanel. 3：External voltage signal VC（0～10V） 4：External current signal CC The second part of LED： Reserved. The third part of LED： It is used for setting PID feedback channel. 0：External voltage input VC（0 ~ 10V） 1：External current input CC 2：VC + CC； 3：VC – CC； 4：Min{VC， CC}； 5：Max{VC， CC} The fourth part of LED: Reserved	1	0000	★

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
PID control parameter unit	F8.2	Inner PID close-loop digital setting	0.00～10.00V	0.01	0.00	
	F8.3	Minimum fixed value	0.0～[F8.4]	0.01	0.0	
	F8.4	Maximum fixed value	[F8.3]～10.00	0.01	10.00	
	F8.5	Feedback of minimum fixed value	0.0～10.00	0.01	0.0	
	F8.6	Feedback of maximum fixed value	0.0～10.00	0.1	10.00	
	F8.7	Proportion gain	0.0～5.00	0.01	1.00	
	F8.8	Integral time constant	1.0～100.0 s	0.1	10.0	
	F8.9	Allowable deviation limit	0～20.0（%）	0.1	0.0	
	F8.10	Preset freq. for close-loop	0.0～the upper limit freq.	0.01	0.0	
	F8.11	Holding time of preset freq. for close-loop	0.0～6000.0Sec	0.1	0.0	★
	F8.12	Sleeping threshold	0.0～10.00	0.01	10.00	
	F8.13	Awakening threshold	0.0～10.00	0.01	0.0	
	F8.14	Reserved				
Serials communication parameters	F9.0	Communication setting	The first part of LED(form right to left)： It is used for setting baud rate of serials communication. 0：Reserved 1：1200bps 2：2400bps 3：4800bps 4：9600bps 5：19200bps The second part of LED： To set data format of serials communication. 0：Close 1： Even 2：Odd The third and fourthpart of LED: Reserved.	1	0014	★

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Serials communication parameters	F9.1	Local address	0～30	1	0	
	F9.2	Response delay of local	0～1000ms	1	5ms	
	F9.3	Function setting of communication auxiliary function	The first part of LED(form right to left)： 0: The inverter is guest 1: The inverter is host The second part of LED： Act selection after communication is lost 0：Stop 1：Keep The third part of LED: Reserved. The fourth part of LED: Communication protocol setting, from 0 to 2	1	0000	
	F9.4	Checkout time of communication overtime	0.0～100.0s	0.1	10.0	
	F9.5	Linkage setting proportion	0.01～10.00	0.01	1.00	
	F9.6	Rectify channel of linkage setting proportion	0：Close 1：Panel potentiometer 2：External voltage signal VC（0 ~ 10V） 3：External current signal CC（0 ~ 20mA）	1	0	
	F9.7	Reserved				
Special function parameter unit	FC.0	Under voltage protection level	360～460V	1	380	
	FC.1	Over voltage limit level	660～760V	1	700	
	FC.2	Current amplitude limiting level	150～200（%）	1	180	
	FC.3	Reserved				

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Special function parameter unit	FC.4	Function Protection in operation	The first part of LED(form right to left): Under voltage compensation intensity The second part ofLED: Over voltage inhibit intensity The third part of LED: Over current inhibit intensity The fourth part ofLED: Self-adaptingbraking torque adjust intensity	1	3333	
	FC.5	Function Action selection	the first part of LED(form right to left): Cooling fan control 0: Cooling fan run after inverter run. 1: Cooling fan will automatic run when inverter is power on. The second part ofLED: Variable speed control of cooling fan 0：Invalid 1：Valid Cooling fan always keep the max speed. The third part of LED: Voltage over modulation 0：Invalid 1：Valid The fourth part of LED：Reserved.	1	0010	
	FC.6	Reserved				
	FC.7	Reserved				
	FC.8	Agency password	0 ~ 9999	1	100	
	FC.9	Rotational speed coefficient	0.10～5.00	0.01	1.00	
	FC.10	Gain of closed loop of rotating speed	0.50～1.20	0.01	1.00	

Parameters' Types	Function Code	Name	Setting range	Minimum Setting	Manufacture Setting	Modify Limit
Special function parameter unit	FC.11	Integral time constants of closing loop of rotational speed	0.10～10.00	0.01	1.00	
	FC.12	Compensation rectify of death zone	0～25	1	0	
	FC.13	Program version	2000～2099	1	▲	

6. DESCRIPTION OF SPECIFIC FUNCTIONS

6.1 Basic operation parameter unit

F0.0 Control methods	Setting range：0 ~ 1

Please select control method when inverter is working.
0：V/F method
It is used for variable speed inverter occasions where don't demand high perf ormance of speed control and low-frequency torque.
1：Sensorless Vector control
It used for the variable speed inverter occasions with high performance.

It will get prime performance when inverter matches the same capacity motor under the method of vector control.

Notes：

1. It needs use some basic parameters of load motor when inverter takes vector control. C300 serial inverter provides those basic parameters of motor, and those parameters were set already.
2. When basic parameters of applied motor are different from parameters provided by inverter, those parameters must be set again (code [F1.15] ~ [F1.18]). User can get those parameters by setting code F1.20 (Parameters self-determination).
3. When you can't gain nameplate parameters of applied motor or you need inverter to inverter several motors, please take V/F method.

F0.1 Frequency input channel / mode selection	Setting range：*0 ~ 7*

It is used for selecting input channel of frequency instruction.

0： Frequency digital setting by operation panel

Setting frequency of inverter can be set by parameter F0.2 as well as by the key on the operation panel in normal monitor mode.

1： UP/DW Acc and Dec control

Running frequency is set by terminals UP and DW. And controlled terminals UP and DW can be selected by parameters [F3.0]~[F3.3]. When UP is on, the running frequency will increase. When DW is on, the running frequency will decrease. When UP and DW is on or off at the same time, running frequency will be fixed. The rate of modified frequency of terminals UP and DW is set by parameter F4.23.

2： RS485 interface

It receives instructions of setting frequency from the PC or Master by Serial Communication RS485 interface.

3： Panel potentiometer

Running frequency can be set by potentiometer on the operation panel.

4： External voltage signal VC

Running frequency is set by external voltage signal VC（0.0~10.0V）Please set the VC1 following the parameters F2.0 and F2.1.

5： External current signal CC

Running frequency is set by external current signal CC. (CC is form 0.0 to 20.0mA) Please set the CC following the parameters F2.2 and F2.3.

6： Combination setting

Running frequency is set by linear combination of each channel, and combination mode is decided by parameter F2.8.

7： External terminals

External terminals set input channel of frequency. And it can be set by parameters F3.0～F3.3.

F0.2 Frequency digital setting	Setting range：0.0 ~ the upper limit frequency

When F0.1 is 0, frequency digital setting controls output frequency of inverter which has been decided by this data. In normal monitor state, you can use the key 

to modify this parameter.

As to the methods of setting frequency, F0.1 is 1 or methods of interfacing, F0.1 is 2, the frequency will save in parameter F0.3 after power off, if F0.3 is 00#0.

F0.3 Auxiliary control of freq. digital setting	Setting range：0000 ~ 0021

When F0.1 is 0, 1 or 2, set parameter F0.3 to ensure that setting freq. is or not be saved in F0.2.

The first part of LED(form right to left)：

0： Inverter will run in setting freq. that is storage in F0.2 after stopping

1： Setting freq. will lost after stopping. And inverter will run in 0.0Hz when restart

The second part of LED(form right to left)：

0：Setting freq. is keep when stop

1：Setting freq. will save in F0.2 when stop

2：Setting freq. is clear when stop

The third and fourth part of LED(form right to left)：Reserved.

F0.4 Operation channel selection	Setting range： 0000 ~ 0012

It is used for selecting operation channel of inverter and function of key RUN/STOP

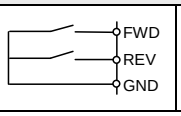
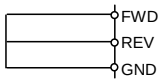
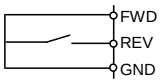
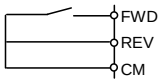
The first part of LED (form right to left): to select operation channel of inverter.

0： Panel control

The inverter is controlled by key RUN/STOP on the panel. And external control terminal, FWD state will affect output phase sequence of inverter. When FWD is on, connecting with GND, output phase sequence will reverse with setting sequence, on the contrary, output phase sequence will go the same way with setting sequence.

1： External terminals control

The inverter receives running instruction form the situation of being on or off of external terminals FWD、REV and GND, while the mode is decided by parameter [F0.5]. The manufacture setting is shown as follows:

Instruction	Stop instruction		FWD instruction	REV instruction
Terminals State				

2：Serial Communication RS485 interface

The inverter will receive running instruction from the PC or Master.

The second part of LED (form right to left): to select function of the key RUN/STOP

0： It is valid for panel.

When F0.4 is 0000, RUN/STOP key on the operation panel is available.

1： It is valid for all kinds of control method.

When F0.4 is not 0 and pressing RUN/STOP key, inverter will stop urgently and twinkle display Fu.16.

The third and fourth part of LED(form right to left)：Reserved.

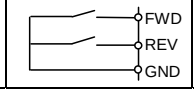
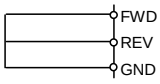
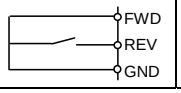
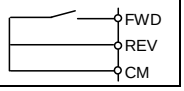
F0.5	Combination methods of instruction terminals	Setting range：0 ~ 2

It is used for setting control modes of external terminals.

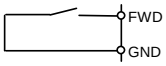
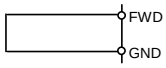
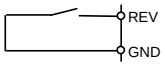
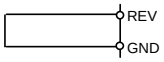
HINT

This parameter will valid only when F0.4 is set as ＃＃＃1

0：Two-line mode 1（Manufacture Setting）

Instruction	Stop instruction		FWD instruction	REV instruction
Terminals State				

1： Two-line mode 2

Instruction	Stop instruction	Run instruction	FWD instruction	REV instruction
Terminals State				

2：Three-line mode

Please select a three-line mode terminal to set three-line mode. (Refer to description of parameters F3.0 ~ F3.3) X？is three-line mode terminals，and it is any one among terminals X1 ~ X4.

Switch function is shown as follows：

1. SW1 ——Stop trigger switch of inverter
2. SW2 ——FWD trigger switch
3. SW3 ——REV trigger switch

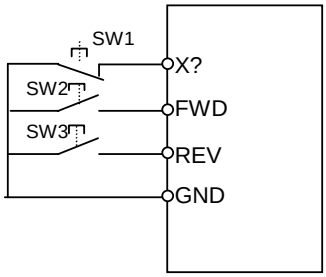


Fig.6-1 three-line mode wiring

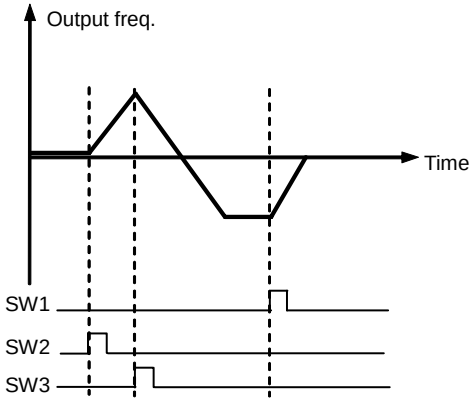


Fig.6-2 Output freq. when three-line

F0. 6 Steering control	Setting range：0000 ~ 0011

This parameter is used for modifying the present output phase sequence of inverter, which modifies the running motor direction. Control effect of panel control method is shown as the following table.

Parameter F0.4 is valid together with direction control of external terminals.

FWD-GND	[F0.6]	Direction
OFF	# # 1 #	FWD
ON	# # 1 #	FWD
OFF	# # 0 0	FWD
OFF	# # 0 1	REV
ON	# # 0 0	REV
ON	# # 0 1	FWD

F0.7	The lower limit frequency	Setting range：0.0 ~ [F0.8] Hz
F0.8	The upper limit frequency	Setting range：[F0.7] ~ 400.00Hz

When setting freq. is lower than lower limit freq., the inverter will run in lower limit freq. But the parameters F4.8 and F4.9 are priority over F0.7 and F0.8.

F0.9	Reserved

F0.10	Acc time 1	Setting range：0.1 ~ 6000 Sec/Min
F0.11	Dec time 1	Setting range：0.1 ~ 6000 Sec/Min

Acc time 1 is the time of output frequency accelerating from 0.0 Hz to 50.00Hz.
Dec time 1 is the time of output frequency decelerating from 50.00 Hz to 0.00Hz.
Units of Acc and Dec are set by parameter F0.12.

F0.12	character parameter of Acc and Dec	Setting range：0000 ~ 0111

The first part of LED(form right to left)：It is used for setting curve type when inverter is accelerating or decelerating, shown as fig6-3.
0： Beeline
Output freq. of inverter will increase or decrease according to fixed rate.
1： S curve
Output freq. of inverter will increase or decrease according to graded rate. Characteristics of S curve are set by parameter F0.13 and F0.14.
The second part of LED：To set Acc/Dec method
0： Output freq. will be modified according to Acc/Dec time.
1： Output freq. will be automatically modified according to lode.
The third part of LED： It is used for setting unit of Acc/Dec time, namely unit of parameters F0.10, F0.11, F4.17, F4.18, F4.19, F4.20, F4.21 and F4.22.
0： Sec. 1： Minute
The fourth part of LED：Reserved.

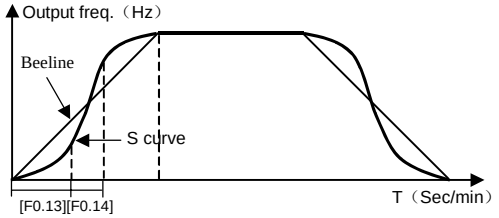


Fig.6-3 Acc/Dec curve

F0.13 Acc/Dec initial section proportion of S curve	Setting range：10.0 ~ 50.0(%)
F0.14 Acc/Dec ascending/decline section proportion of S curve	Setting range：10.0 ~ 80.0(%)

Parameters F0.13 and F0.14 define characteristics of S curve. It is totally divided into three sections, shown as fig6-3.

Acc/Dec initial section is the process that slope of output freq. is increase form 0 gradually. The slope will fix in Acc/Dec ascending/decline section. And the slope will decrease to 0 gradually in end section.

F0.15 Reserved

F0.16 Carrier wave frequency	Setting range： 1.5 ~ 12.0 KHz

The parameter has decided the switch frequency of the inner frequency of inverter. As to the different power of inverter, there are differences between the highest carrier wave frequency and the lowest carrier wave frequency under permission.

Carrier wave frequency mainly influences audio-frequency noise and calorific effect in running. If you need the running situation that you can heighten the carrier wave frequency a little, while the load capacity of inverter would decrease a little, and the interference rates of inverter would increase little.

When environmental temperature is too high and motor's load is too heavy, carrier frequency should be decreased properly to improve the heat thermal performance.

F0.17 Carrier wave characteristics	Setting range：0000 ~ 1110

It used for setting correlative characteristics about carrier wave.

F0.18 Parameter write-protection	Setting range：1，2

It is used for preventing error modify about data.

1：Forbid to modify all parameter, except F0.2 and F0.18

2：Forbid to modify all parameter, except F0.18

In running, some parameters cannot be modified. At this time , if try to modify these parameters, the inverter will display "— —", please turn off the inverter before modify those parameters.

6.2 Primary application of parameter unit

F1.0 Type of V/F Curve	Setting range ： 0 ~ 3

0：Constant torque curve

The output voltage of inverter is in direct ratio to the output frequency, and most load take this mode.

1: low-freq. torque curve 1

The output voltage of inverter is conic with the output frequency, which is suited to the fan and pump load.

2: low-freq. torque curve 2

The output voltage of inverter is conic with the output frequency, which is suited to the constant power load, such as fan, pump, etc. If there is some unstable phenomenon in light-load running, please switch to run in the decreasing torque curve 1.

3: V/F user-defined curve

It is used for setting user-defined curve which you need.

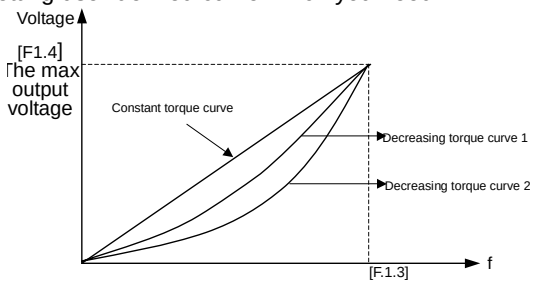
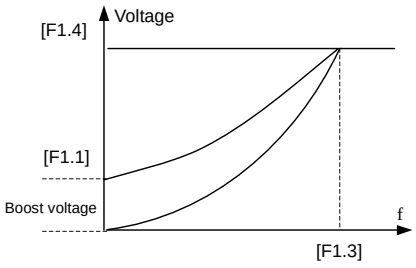


Fig. 6-4 V/F curve

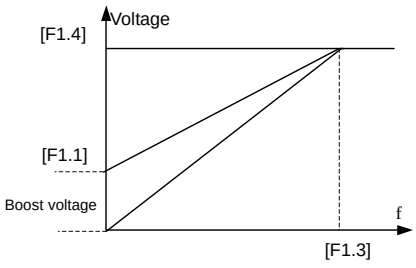
F1.1 Torque Boost(output voltage at 0 Hz)	Setting range：0 ~ 20（%）

It is used for improving the low-frequency torque character. In low-frequency running, it will make boost compensation for the output voltage of inverter, as shown in Fig.6-5.

$$\text{Boost voltage} = \frac{[F1.1]}{100} \times [F1.4]$$



（1）Decreasing torque curve



（2）Constant torque curve

F1.2 Torque boost patterns	Setting range：0 ， 1

0：Manual

Torque boost voltage is completely set by F1.1. There are two features: voltage will steady boost. And motor will easily magnetic saturation when light-load.

1：Automatic

Torque boost voltage is changed with the stator current of motor. The boost voltage is higher with the stator current higher.

$$\text{Boost voltage} = \frac{[F1.1]}{200} \times [F1.4] \times \frac{\text{Inverter's output Current}}{\text{Inverter's rated current}}$$

Auto torque boost can prevent the magnetic saturation, as the boost voltage is too high with light load, which can avoid the over-heat phenomenon of motor in low frequency running.

F1.3	Base running frequency	Setting range： 5.00 ~ the upper frequency
F1.4	Maximal output voltage	Setting range： 200 ~ 500V/100~250V

Basic running frequency is corresponding to minimum frequency when output voltage of inverter is highest. Usually, it is rated frequency of motor.

Maximal output voltage is corresponding to output voltage when inverter outputs the base running frequency. Usually, it is rated voltage of motor.

F1.5 V/F freq. 3	Setting range： [F1.7] ~ [F1.3]
F1.6 V/F voltage 3	Setting range：[F1.8] ~ 100%
F1.7 V/F freq. 2	Setting range： [F1.9] ~ [F1.5]
F1.8 V/F voltage 2	Setting range：[F1.10] ~ [F1.6]
F1.9 V/F freq. 1	Setting range：0.0 ~ [F1.7]
F1.10 V/F voltage 1	Setting range：[F1.1] ~ [F1.8]

Those parameters are used for setting user-defined curve which you need. Shown

as Fig.6-6:

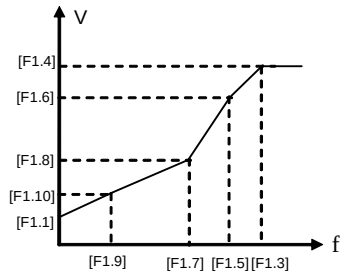


Fig.6-6 V/Fuser-defined curve

F1.11	DC braking current when start	Setting range：0.0 ~ 100.0 （%）
F1.12	DC braking time when start	Setting range：0.0 ~ 20.0 S

Those parameters are fit for the occasion that inverter need brake before start.

$$F1.11=\frac{\text{DC braking current when starting}}{\text{Rated current of inverter}}\times 100\%$$

When rated current of motor is lower than rated current of inverter, please pay attention to set F1.11.Make sure that DC braking current is lower than rated current of motor.

Parameter F1.12 defines duration time that inverter output DC braking current. When F1.12 is 0, DC braking is invalid when start. Shown as Fig.6-7.

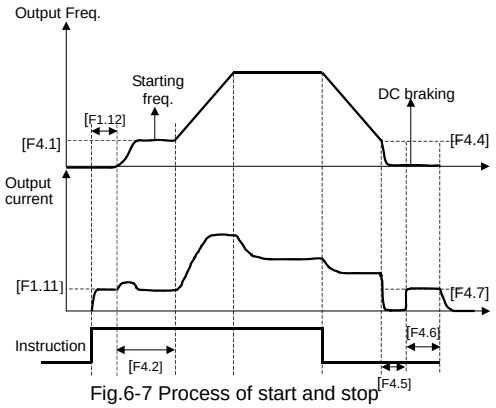


Fig.6-7 Process of start and stop

F1.13	Reserved

F1.14	Compensation for slipping freq.	Setting range： 0.0 ~ 150（%）

The inverter will modify output freq. automatically to offset effects that is acting on rotational speed of motor form

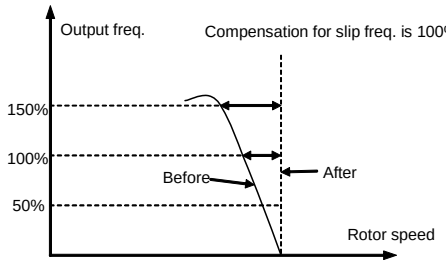


Fig.6-8 Compensate for slip freq.

F1.15	Rated voltage of applied motor	Setting range： 200 ~ 500/100 ~ 250 V
F1.16	Rated freq. of applied motor	Setting range： 5.00 ~ 300.00 Hz
F1.17	Rated current of applied motor	Setting range： 0.01 ~ 300.0 A
F1.18	Rated rev of applied motor	Setting range： 300 ~ 6000 RPM
F1.19	Exciting current of applied motor	Setting range： [F1.17]/4 ~ [F1.17]×3/4

Those parameters are nameplate data of applied motor. And they need input one by one according to capacity of applied motor, when inverter takes vector method.
Generally, exciting current of applied motor needn't modify. Because it will automatically update when rated current of applied motor is modified.

F1.20	Parameters self-determination	Setting range： 0 ~ 3

0： It will be invalid.
1： Determine parameters when motor stops
2： Determine parameters when motor runs（Reserved）

Both vector control method（[F0.0] = 1）and panel control method（[F0.4] = 00#0）are valid.

When parameter F1.20 is valid, inverter will determine parameters by press RUN STOP. Parameters will save automatically in inverter's memory and Parameter F1.20 will clear automatically.

Before start function of Parameters self-determination, please make sure that nameplate parameters of motor（[F1.15] ~ [F1.18]）are input correctly and the motor has stopped.

Self-determination function of static parameter: motor would always keep silent when parameter is self-determining.

Self-determination function of dynamic parameter: motor runs to rated speed for a while then stop automatically in the process of self-determining. Make sure that

motor is always below rated load, if not, you can't implement the process. (Reserved)
Self-determination function of synthesis: firstly, inverter implements motor's static self-determination, then, it runs the process of starting the dynamic self-determination and then stop automatically.
(Reserved)
Attention: If motor, with inverter not connecting correctly, the process of self-determination will stop, while display the signal Fu.30～Fu.33.
(Refer to the seventh chapter: Fault Diagnosis and Countermeasures)

When capacity of applied motor is equally match inverters, user start function of Parameters self-determination is not necessary.
If motor isn't connect with inverter correctly, self-determination will stop and LED of inverter will show fault Fu.30 ~ Fu.33.

F1.21	Selection of starting pre-excitation	Setting range： 0000 ~ 0011
F1.22	Pre-excitation of starting time	Setting range： 0.10 ~ 2.00 Sec

Those parameters are used for defining pre-excitation of motor startup.
It need some time to set motor air-gas flux (approximate rotor time). In order to get enough start torque, it must set air-gas flux beforehand when motor is stop but it will start.
Those parameters will valid while inverter takes vector control method only.
parameters[F1.21] （set by binary system）
The first part of LED (form right to left): To start Pre-excitation
0：To start Pre-excitation is invalid.
It isn't needed to set air-gas flux beforehand when motor is from stopping to starting.

In order to achieve vector control, inverter will forcibly give motor an excitation current, even parameter F1.21 is set 0.

1： To start pre-excitation is valid
To give motor a pre-excitation before it startup, Pre-excitation of starting time is set by parameter [F1.22].
The second part of LED (form right to left): zero-freq. excitation preparation
0： Prepare pre-excitation is invalid when zero frequency
When inverter's Instruction is running, but the output freq. is 0, inverter will close off output power and the stator current of motor is 0.
1：Prepare pre-excitation is valid when zero frequency

When inverter is running, it will output excitation current even the freq. output is 0. So there is no pre-excitation of starting time when start-up motor.
The second and third part of LED (form right to left) reserved.

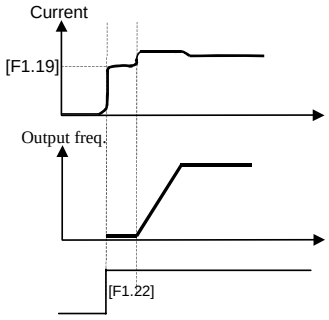


Fig. 6-9 TO start pre-excitation

F1.23	Self-adapting rectify of motor parameters	Setting range： 0000 ~ 0111

It is used for selecting self-adapting rectify of motor parameters function（set by binary system）.

The first part of LED (form right to left): to select self-adapting rectify of stator resistance function
0:Self-adapting rectify of stator resistance is invalid
1:Self-adapting rectify of stator resistance is valid
The second part of LED (form right to left): to select self-adapting rectify of excitation function
0:Self-adapting rectify of excitation is invalid
1:Self-adapting rectify of excitation is valid
The third part of LED (form right to left): to select self-adapting rectify of rotor resistance function
0:Self-adapting rectify of rotor resistance is invalid
1:Self-adapting rectify of rotor resistance is valid
The fourth part of LED (form right to left): reserved.
Some parameters of motor have influenced by temperature change, and control performance is affected if setting value isn't precision. When motor have selected corresponding function, inverter will optimize parameters automatically in running, which can improve the performance and stability of motor.

F1.24	stator resistance	Setting range： 0.000 ~ 20.000 （Ω）
F1.25	rotor resistance	Setting range： 0.000 ~ 20.000 （Ω）
F1.26	rotor inductance	Setting range： 0.00 ~ 600.00 （**mH**）
F1.27	excitation inductance	Setting range： 0.00 ~ 600.00 （**mH**）
F1.28	Leakage inductance (coefficient)	Setting range： 0.00 ~ 100.00 （**mH**）

Those parameters are used for setting motor's basic parameter. They are necessary for completing vector control arithmetic. Clients can use inverter's interior parameters when capacity of inverter matches motor's. When the performance of inverter can't satisfy the users' demand, you can use function of parameters self-determination to renew some parameters. If user can get these parameters precisely beforehand, parameters also can be input one by one. When parameters are initializing, inverter will renew interior acquiescence parameter according to type.
Before start function of parameters self-determination, user must make sure the input nameplate parameter of motor.

F1.29	Gain of compensation for speed dropping	Setting range： 0.50 ~ 1.50

Parameter F1.29 is valid when inverter takes vector control method. It is used for offsetting error of setting motor rotor parameter. The parameter is read only.

6.3 Analog I/O parameter unit

F2.0	VC input lower limit voltage	Setting range： 0 .0 V ~ [F2.1]
F2.1	VC input upper limit voltage	Setting range： [F2.0] ~ 10.0 V

F2.2	CC input lower limit voltage	Setting range： 0.0 mA ~ [F2.3]
F2.3	CC input upper limit voltage	Setting range： [F2.2] ~ 20.0 mA

[F2.0] and [F2.1] define the range of analog input voltage channel VC1, and it should be set according to the actual input signal.
[F2.2] and [F2.3] define the range of analog input current channel CC, and it should be set according to the actual input signal.

F2.4	frequency with the min setting	Setting range： 0.0Hz ~ [F2.5]
F2.5	frequency with the max setting	Setting range： [F2.4] ~ 550.0Hz

They define the Corresponding relation between analog input (pulse input) and setting frequency. Shown as fig.6-10.

F2.6	Character selection of input channel	Setting channel： 0000 ~ 0101

It is used for selecting input character of external analog value or pulse value.
The first part of LED (form right to left):It defines character of voltage signal analog input VC.
0： positive character 1：Negative character
The second part of LED (form right to left): Reserved..
The third part of LED (form right to left): It defines character of current signal analog input CC.

0： positive character 1：Negative character

The fourth part of LED (form right to left): Reserved..

The corresponding relation is shown as fig.6-10 between input signal and setting freq.

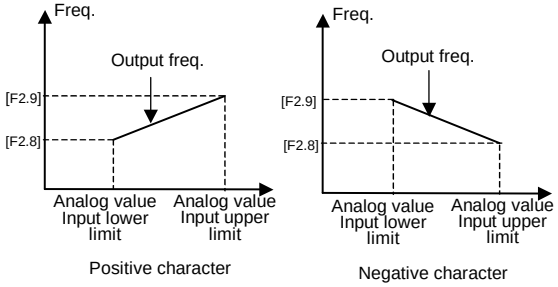


Fig.6-10 corresponding relation between analog input and setting freq.

F2.7 External freq. set time constant of filtering	Setting range： 0.01 ~ 1.00s

Setting freq. set by external analog input will be filtered to eliminate fluctuate. Time constant of filtering have to appropriate set according to fluctuate of external input signal.

F2.8 Combination setting mode	Setting range：0 ~ 19

The parameter is valid only when the frequency input channel F0.1 is set 6.

Setting Value	Combination setting mode	Setting Value	Combination setting mode
0	External voltage VC + External current CC	1	External voltage VC - External current CC
2	External voltage VC + panel setting	3	External voltage VC - panel setting
4	External current + panel setting	5	External current - panel setting
6	External voltage VC + panel setting + digital setting	7	External voltage VC - panel setting + digital setting
8	External current + panel setting + digital setting	9	External current - panel setting + digital setting
10	Serials interface setting + External voltage VC	11	Serials interface setting – External voltage VC
12	Serials interface setting + External current CC	13	Serials interface setting - External current CC
14	Serials interface setting + External voltage VC +panel setting	15	Serials interface setting + External voltage VC - panel setting

16	External voltage VC + External current+ panel setting	17	External voltage VC + External Current – panel setting + digital setting
18	The max between External voltage1, and External current	19	Nonzero valid External voltage VC and External current CC

F2.9	Analog output selection	Setting range： 0000 ~ 0005

It defines meanings of AVO.

The first part of LED: it defines the meanings of analog output terminal AVO.

0：Output freq.

Amplitude accumulation of AVO is in direct ratio to the output frequency. F2.11 is corresponding to the upper limit freq.

1：Output current

Amplitude accumulation of AVO is in direct ratio to the output current. F2.11 is twice rated current of inverter.

2：Output voltage

Amplitude accumulation of AVO is in direct ratio to the output voltage. F2.11 is corresponding to [F1.4] and [F1.15].

3：Rotational speed of applied motor

Amplitude accumulation of AVO is in direct ratio to the motor rotational speed of inverter. F2.11 is corresponding to rotational speed that is corresponded with the upper limit freq.

4：PID setting

Amplitude accumulation of AVO is in direct ratio to the setting value of PID. F2.11 is corresponding to feedback of 10.00.

5：PID feedback

Amplitude accumulation of AVO is in direct ratio to the PID feedback. F2.11 is corresponding to feedback of 10.00.

The second, third and fourth part of LED: Reserved.

F2.10	the lower limit of analog output AVO	Setting range： 0.0 V ~ [F2.11]
F2.11	the upper limit of analog output AVO	Setting range： [F2.10] ~ 12.0 V

AO1and AO2, shown as fig 6-11.

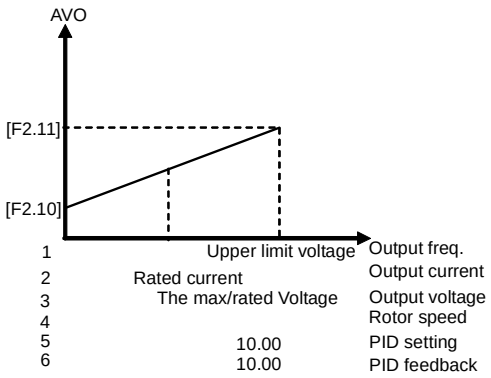


Fig.6-11 output of analog terminals

F2.12	Reserved

6.4 Digital O/I parameter unit

F3.0	Function selection of input ternimal1	Setting range：0 ~ 25
F3.1	Function selection of input ternimal2	Setting range：0 ~ 25
F3.2	Function selection of input ternimal3	Setting range：0 ~ 25
F3.3	Function selection of input ternimal4	Setting range：0 ~ 25

0：Control ter

1：Multi-speed control terminal 1

2：Multi-speed control terminal 2

3：Multi-speed control terminal 3

Combination of multi-speed control terminals is used for selecting output freq. of multi-speed.

4：Wobble freq. is valid

When F7.0 is ###2 and any of those parameters are set 4, wobble freq. is valid.

5：State of wobble freq. reset

When inverter stop and F7.0 is ##0#, forcible reset will work by setting those parameters.

6：FWD jog control

7：REV jog control

When F0.4 is ###1 and any of those parameters is set 6 or 7, external jog signal is valid.

8：Acc& Dec time selection terminal 1

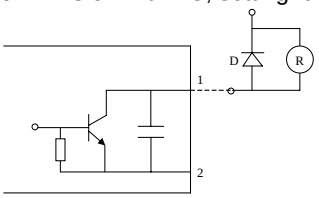
9：Acc& Dec time selection terminal 2

They are used for selecting external terminals Acc/Dec time 1~4.
10：Freq. setting channel selection 1
11：Freq. setting channel selection 2
12：Freq. setting channel selection 3
When F0.1 is 7, Frequency input channel is set by terminals state of 10, 11 and 12. Refer to the explanation about parameter F0.1.
13：Freq. gradually increase to control (UP)
14：Freq. gradually decrease to control (DW)
15：UP-DW freq. clear
When F0.3 is##0#, one of terminal X1~X6 defined by this parameter have function of forcible clear.
16：Uncontrolled stop control
If one of terminal X1~X6 defined by this parameter is connected with CM, the inverter will lock output signal and applied motor will stop uncontrolled. Then inverter will detect speed and restart after terminal is disconnected with CM.
17：Fault signal of peripheral equipment input
When one of terminal X1~X6 defined by this parameter, it is connected with CM, and peripheral equipment is fault. The inverter will lock output signal and display FU.16.
18：Three-line mode running control
When F0.5 is 2, one of external terminal X1~X6 defined by this parameter, it would stop trigger switch of inverter. Refer to explanation about F0.5.
19：DC braking control
When inverter is stop and one of external terminals X1~X6 defined by this parameter is connected with CM and output freq. is lower than Initial freq. of DC braking, function of DC braking is valid until terminal is disconnected with CM. Refer to explanation about F4.4~F4.7.
20：Inner counter clear
21：Inner counter timer
Only terminal X6 is used for Inner timer, namely parameter F3.3 is 21.
22：PLC running valid
When F5.0 is ###2 and any of those parameters is set 22, PLC running is valid.
23：PID running valid
When F8.0 is ###2 and any of those parameters is set 23, PID running is valid.。
24：Reserved
25：PLC state reset after stopping
If F5.0 is set as #1##, the PLC state will keep fix. But external terminals will force reset, which is set by this function.

F3.4	Output terminal OC	Setting range：0 ~ 18
F3.5	A, TB and TC of relay contacts	Setting range：0 ~ 18

It defines expression content of relay contact and terminals OC1 and OC 2 when

collector is open-circuit. Shown as fig.6-12.。
When TA is on with TC, setting functions will available.



HINT

While connecting the external inductance cell (For example, Relay coil), it must connect the parallel fly-wheel diode D.

Fig.6-12 Inner wiring diagram of output terminals

0：In the running

When the inverter is in the running state, it will output the valid signal. While the inverter is in stop mode, it will output the invalid signal.

1：Frequency reaching

When the output frequency of inverter approaches the certain range of the setting frequency. (The range is decided by parameter F3.6), it outputs valid signal, otherwise, outputs the invalid signal (High-resistance).

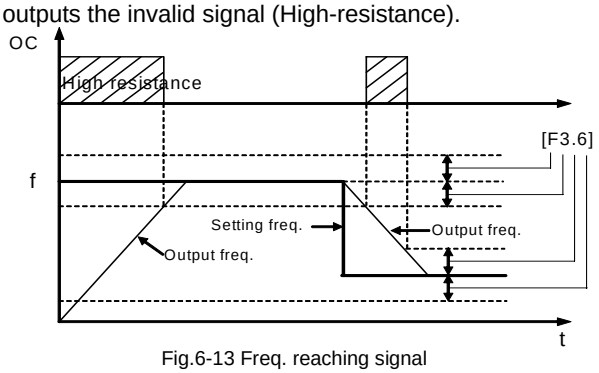


Fig.6-13 Freq. reaching signal

2：Freq. level detection signal（FDT）

When the output frequency of inverter is over FDT Frequency level, the inverter will output the valid signal (Low electrical level) after the setting delay time. When the output frequency of inverter is lower than FDT frequency level, after the same delay time, it will output the invalid signal (High resistance).

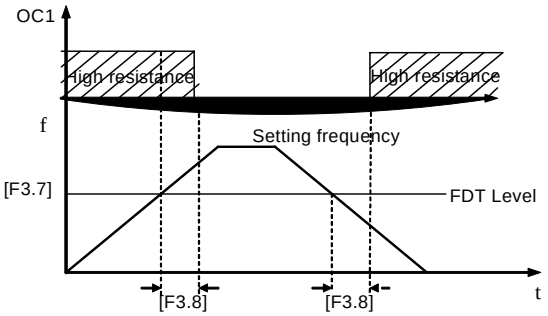


Fig. 6-14 Freq. level detection signal（FDT）

3. Over-loading alarm

When the output current of inverter is over the over-loading alarm level, it will output the valid signal (Low level) after the setting alarm delay time. When the output current is lower than the over-loading alarm level, it will output the invalid signal (High resistance) after the same delay time.

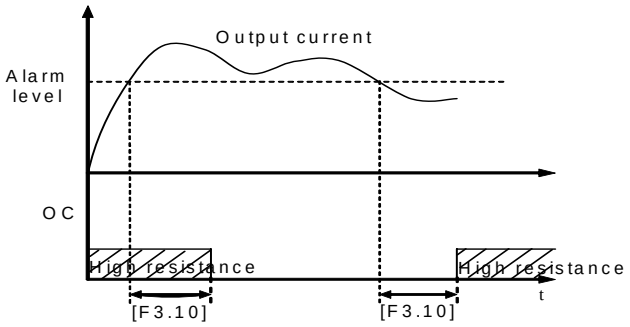


Fig.6-15 Over-loading alarm

4：External fault halt

When the external fault input signal is valid and it will lead to stop-machine, the terminal will output the valid signal (Low level), otherwise it will output the invalid signal (High resistance).

5：Output frequency reaches the upper-limit

When the output frequency reaches the upper-limit frequency, the terminal will output the valid signal (Low level). Otherwise, it will output the invalid signal (High resistance).

6：Output frequency reaches the lower-limit

When the output frequency reaches the lower-limit frequency, the terminal will output the valid signal (Low level). Otherwise, it will output the invalid signal (High resistance)

7：Running in zero speed

Running instruction is valid and output freq. is 0, if inverter is input freq., the terminal will output the valid signal (Low electrical level). If inverter is not input freq., the terminal will output the invalid signal (High resistance).

8：Internal timer reaches the setting time

When the internal timer reaches the setting time, the terminal will output the valid pulse signal of 0.5 Sec pulse widths. (Low electrical level)

9：PLC stage is end of run

When simple PLC is valid and current stage is end, this port will output pulse signal with 0.5s pulse width. 10：PLC periodic is the end of running.

When simple PLC is valid and current period is end, this port will output pulse signal with 0.5s pulse width.

11：Reserved

12：Setting value of counter arrives

Refer to the explanation about parameter F6.3.

13：Designated value of counter arrives

Refer to the explanation about parameter F6.4.

14：Reserved

15：Reserved

16：Inverter faults

When inverter is running with faults, it will output available signal (low level).

17：Restrictions on wobble freq. of the upper and lower limit freq.

When parameters setting about wobble freq. result in that running freq. is beyond the upper and lower limit freq., this port will output available signal (lower lever). Generally, this port output high resistance.

18：Reserved

F3. 6	Frequency reach the checkout amplitude	Setting range：0.0 ~ 20.00Hz

If output freq. of inverter is within setting value that is set in F3.9, selected terminal will output valid signal. Shown as fig.6-13.

F3.7	FDT setting	Setting range：0.0 ~ upper limit freq.
F3.8	FDT output delay time	Setting range：0.0 ~ 200.0 s

The parameter is used for setting the frequency detection level. When output frequency is higher than the setting value of FDT, after the setting delay time, terminals will output the valid signal, shown as fig.6-14.

F3.9	Overload alarm level	Setting range：50 ~ 200（%）
F3.10	Overload alarm delay time	Setting range：0.0 ~ 20.0s

If output freq. beyond the setting value set by parameter F3.9, after the setting delay time set by parameter F3.10, terminals output valid signal, shown as fig.6-15.

F3.11	Reserved

6.5 Auxiliary running parameter unit

F4.0	Start mode	Setting range：0～1
F4.1	Start frequency	Setting range：0.0～10.00Hz
F4.2	Start frequency duration	Setting range：0.0～20.0s

Those parameters are used for defining characteristics with relation to start mode, shown as fig6-16.

The explanation of F4.0 is shown as follows:

0： Routine mode

It is fit for mostly lodes, which have not special demand.

1：Detect speed and restart

It is fit for fault reset and restart occasion, or, power off and restart occasion. Inverter will judge automatically running speed and direction of motor. Motor, which

have not stop, will start up directly according to detect result.

Start frequency ： It is fit for system, which is big inertia, heavy load and high start torque.

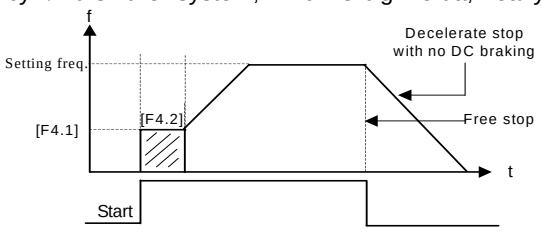


Fig6-16 Start and stop freq. output curve

F4.3 Stop mode	Setting range：0 ~ 1

0： Decelerate mode

Inverter will gradually decrease output freq. to 0 according to Dec time when stopping.

1： Uncontrolled stop

Inverter will output zero freq. and lock output signal when stop, so motor will stop uncontrolled.

If user needs restart motor before motor stop completely, function of detection speed and restart must be valid when inverter stops uncontrolled.

Start mode and stop mode is shown as fig6-16.

F4.4 Initial freq. of DC braking when stopping	Setting range：0.00 ~ 50.00 Hz
F4.5 Waiting time of DC braking when stopping	Setting range：0.0 ~ 5.0 S
F4.6 Action time of DC braking when stopping	Setting range：0.0 ~ 20.0 S
F4.7 DC braking current when stopping	Setting range：0.0 ~ 100 (%)

It is used for setting DC braking parameters when stopping, shown as fig6-7.

When output freq. is lower than setting freq. of Parameter F4.4, inverter will lock output and start DC braking function after waiting setting time of parameter F4.5. DC braking when stopping is invalid while F4.6 is 0.

DC braking current when stopping is the percentage of rated current of inverter. When capability of applied motor is lower than inverter capability, please be sure to set F4.7.

F4.8 Running threshold of zero freq.	Setting range：0.00 ~ 100.00（Hz）
F4.9 Return different of zero freq.	Setting range：0.00 ~ 50.00（Hz）

When inverter takes analog input freq. to set freq., analog signal will fluctuate around zero to cause sluggish input. Those parameters have lagging function to avoid fluctuating around zero. Appropriate set

Function of sleeping and awakening will work, if those parameters are appropriate set. For example analog input channel VC is shown as fig6-17.

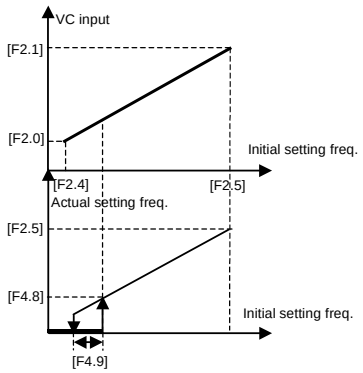


Fig6-17 freq. zero-crossing curve

F4.10 Jog frequency	Setting range：0.0 ~ Upper limit frequency

Jog running is special running method of inverter.

Whatever the initial state of inverter stop or run, the jog signals will be received. The transition form initial running freq. to jog freq. is act according to parameters F4.21 and F4.22.

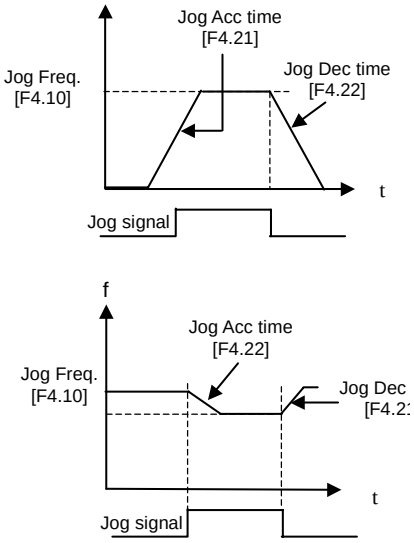


Fig6-18 Jog running

F4.11	Acc torque level	Setting range：110 ~ 200 （%）
F4.12	Braking torque lever	Setting range：10 ~ 150 （%）

It is used for setting permissible output level of torque current under motor acceleration state.

The restriction on torque level is set by F4.11. It is percentage of rated current of inverter. For example, F4.11 set 150% that means the max output current is 150 percentage of rated current.

When output current of inverter is beyond setting value of F4.11, inverter will prolong Acc/Dec time to inhibit output current in setting value of F4.11. Shown as fig6-19.

It fits for occasions that demand high performance with braking torque. If setting value of parameter F4.12 is big, the Braking effect will obvious. But inverter will alarm about over voltage if inverter is not connect braking resistance.

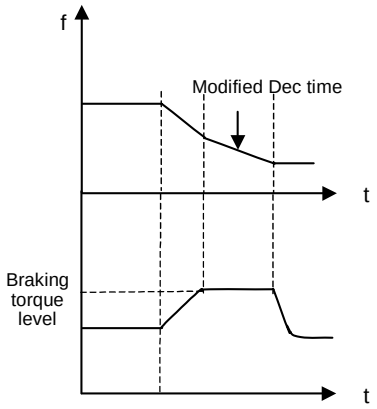


Fig6-19 Acc torque level

F4.13	Motor over-lode protection coefficient	Setting range：50 ~ 110（%）

The parameter is used for setting the sensitivity of thermal relay protection for applied motor. When the rated current of applied motor doesn't match with the rated current of inverter, it can accomplish the correct heat protection for the motor to set this parameter.

The setting value of this parameter can be set by the following formula:

$$[F4.13]=\frac{\text{Rated current of motor}}{\text{Inverter's rated output current}}\times 100\%$$

While one inverter parallel running with multi-motors, the thermal relay protection of inverter will be invalid, in order to protect the motor, please install the thermal relay on inlet terminals the motor.

F4.14 Automatic voltage regulation（AVR）	Setting range：0 ~ 2

The function of Automatic voltage regulation is to ensure the output voltage of inverter not to fluctuate with the input voltage. When the range of fluctuation of power supply voltage is too large, and expect to motor have the stabilized stator voltage and current, this function should be open.

0：Invalid 1： Dynamic valid 2： Static valid

When user selects dynamic voltage regulation, fast dynamic voltage regulation can inhibit form increasing current cause by DC voltage in motor deceleration. But it easy brings current resonance.

For getting good performances in vector mode, please set AVR available (F4.14 is 1 or2).

F4.15 Reserved

F4.16 Dead time of FWD&REV	Setting time：0.0 ~ 5.0 Sec

The parameter means that the duration at zero frequency when the inverter changes its running direction, and it is shown as the following fig.6-20. FWD and REV dead time is set for the big inertia load which has the mechanical dead zone.

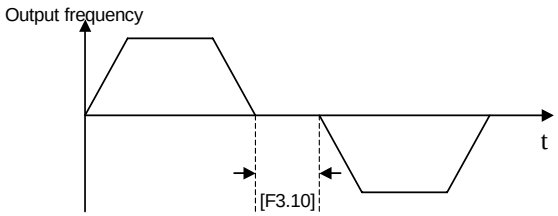


Fig.6-20 Dead zone between FWD and REV

F4.17	Acceleration time 2	Setting range：0.1 ~ 6000 Sec
F4.18	Deceleration time 2	Setting range：0.1 ~ 6000 Sec
F4.19	Acceleration time 3	Setting range：0.1 ~ 6000 Sec
F4.20	Deceleration time 3	Setting range：0.1 ~ 6000 Sec
F4.21	Acc time 4/Jog Acc time	Setting range：0.1 ~ 6000Sec
F4.22	Dec time 5/Jog Dec time	Setting range：0.1 ~ 6000Sec

Jog frequency has the highest priority. In any state, as long as Jog instruction is input, the inverter will transit to run at Jog frequency according to the setting Acc and Dec time.

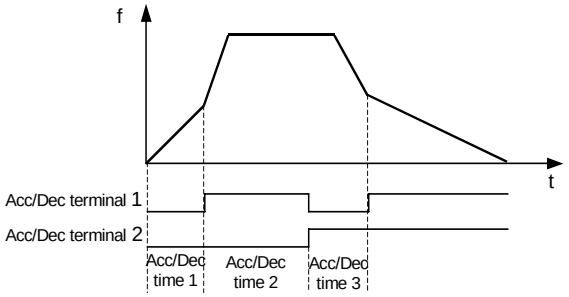


Fig.6-21 Acc/Dec time selection

F4.23 Modified rated of UP/DW terminals	Setting range：0.01 ~ 100.00 (Hz/Sec)

It defines rate that terminals UP/DW modify setting freq. Speed of F4.23 isn't controlled by Acc/Dec time.

F4.24	Start voltage of dynamic braking	Setting range：600 ~ 720 V
F4.25	Action ratio of dynamic braking	Setting range：10 ~ 100（%）

Those parameters are valid for inverter with the inner brake unit. And they define the action parameter of inner brake unit. When inner DC voltage of inverter is higher than the start voltage of dynamic braking, the inner brake unit will act. If inverter connects external brake resistance, DC energy of inverter will be release by it to decline DC voltage. When DC voltage declines to the certain value ([F3.19]-50V), inner brake unit of inverter will be off, shown as Fig.6-22.

Braking unit action ratio is used for defining the voltage on brake resistor, and the voltage on brake unit is Voltage PWP. Duty cycle equals brake action ratio. The ratio is larger, and the energy is consumed more quickly, at the same time, the power of brake resistor is bigger. User can set parameter according to the resistance and power of resistor and actual braking effect.

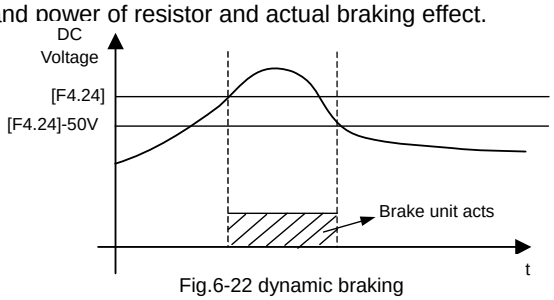


Fig.6-22 dynamic braking

F4.26	Restart after power down setting	Setting range：0000 ~ 0011
F4.27	waiting time of restart after power down	Setting range：0.0 ~ 10.0s

The first part of LED：

0：Invalid 1： Valid

When restart after setting power off is invalid, the inverter will clear automatically all running command and run according to new command after power on.

When restart after setting power off is valid, the inverter will save all running command and run according to the save command after power on.

Please make sure that other equipments in system are ready before using function of restart after power down.

The second part of LED：

Applied motor is still running when user select restarting. Here, you have to select function of detected speed and restart.

The third and fourth part of LED: reserved.

F4.28 Reserved

6.6 Multi-speed running parameter unit

F5.1	Multi-speed frequency 1	Setting range：0.0 ~ the upper limit freq.
F5.2	Multi-speed frequency 2	Setting range：0.0 ~ the upper limit freq.
F5.3	Multi-speed frequency 3	Setting range：0.0 ~ the upper limit freq.
F5.4	Multi-speed frequency 4	Setting range：0.0 ~ the upper limit freq.
F5.5	Multi-speed frequency 5	Setting range：0.0 ~ the upper limit freq.
F5.6	Multi-speed frequency 6	Setting range：0.0 ~ the upper limit freq.
F5.7	Multi-speed frequency 7	Setting range：0.0 ~ the upper limit freq.
F5.8	Multi-speed frequency 8	Setting range：0.0 ~ the upper limit freq.

F5.9	Running time of Multi-speed1	Setting range：0.0 ~ 6000s
F5.10	Running time of Multi-speed2	Setting range：0.0 ~ 6000s
F5.11	Running time of Multi-speed3	Setting range：0.0 ~ 6000s
F5.12	Running time of Multi-speed4	Setting range：0.0 ~ 6000s
F5.13	Running time of Multi-speed5	Setting range：0.0 ~ 6000s
F5.14	Running time of Multi-speed6	Setting range：0.0 ~ 6000s
F5.16	Running time of Multi-speed8	Setting range：0.0 ~ 6000s

F5.17	Running direction of PLC multi-speed	Setting range：0000 ~ 1111
F5.18	Running direction of PLC multi-speed	Setting range：0000 ~ 1111

Parameter F5.0 is multi-speed running mode. It is used for setting basic characteristics of multi-speed running.

The first part of LED(form right to left)：Simple PLC selection

0:Simple PLC is invalid.
1:Simple PLC is valid. If priority of freq. channel is permit after starting, inverter will run in a simple PLC state.
2:Simple PLC is conditional valid. If external X1~X6 terminals is valid (F3.0~F3.3 is set as 22), inverter will run at simple PLC state.

Priority of freq. channel is shown as following table.

Priority		Setting freq.
High ↓ Low	1	JOG freq.
	2	Wobble freq. running
	3	PID output
	4	PLC multi-speed freq.
	5	External terminals select multi-speed freq.
	6	Freq. setting channel selection（Parameter [F0.1] ）

The second part of LED：Simple PLC running mode selection

0：Single loop mode
The inverter will run in setting freq of the first stage and in turn output freq. of each stage according to setting running time. If setting running time of a certain stage is 0, the inverter will skip this stage. When a cycle operation is end of running, inverter will stop input until user input available running instrument to restart the next cycle.

1：Single loop and stop mode
Its function has an analogy with single loop mode. The difference is that output freq. is reduced to 0 within the given decelerate time after a certain stage is in the end of running and inverter will run at next stage.

2：Continuous loop mode
Inverter will run eight stages in turn. If the eighth stage is at the end of running, the inverter will run in the next cycle from the first stage.

3：Continuous loop and stop mode
Its function has an analogy with Continuous loop mode. The difference is that output freq. is reduced to 0 within the given decelerate time after a certain stage at the end of running and inverter will run at next stage.

4：Keep the final value
Its function has an analogy with single loop mode. The difference is that inverter will run in the last stage with non-zero speed.

5：Keep the final value and stop mode
Its function has an analogy with keep the end value. The difference is that inverter will reduce the output freq. to 0 after arriving setting value of Acc time after a certain stage at the end of running and, then inverter will run the next stage.

The third part of LED

0：Restart from the first stage freq.
When inverter stops, caused by fault or receiving stop instrument in PLC running, it will clear current running state and restart from the first stage freq.

1：Restart from running freq., which is saved before running is break
When inverter is stop caused by fault or receiving stop instrument in PLC running, inverter will restart from running time and freq. that is saved before running is break.
2：Restart from setting freq. when running is break.
When inverter stops, caused by fault or receiving stop instrument in PLC running, setting of running time and freq. of a certain stage will be save. And inverter will restart form setting of running time and freq. the different between mode 1 and mode 2 is initial freq. Shown as fig6-24.

The fourth part of LED：PLC save state
0：Non-save after power off
It will not save PLC running state after power off. Inverter will run form the stage 1 when power on.
1：Save after power off
It will save PLC running state after power off. Inverter will run form the stage 1 when power on.

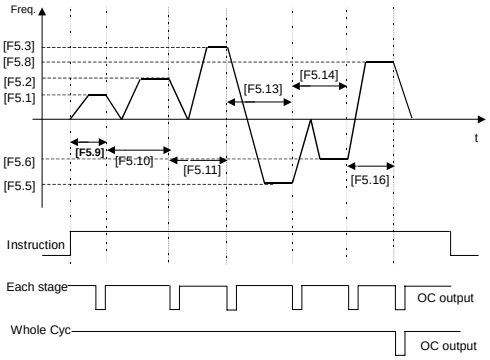


Fig.6-23 Single loop and stop mode

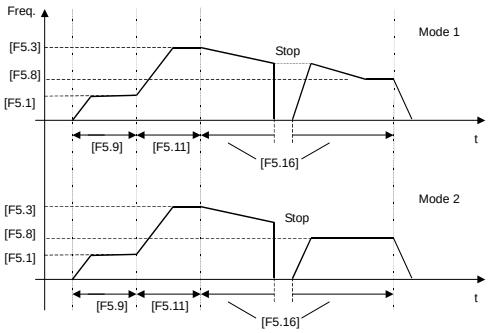


Fig.6-24 PLC recover running after restart

[F5.1]～[F5.8]　Multi-speed freq.1～8
Those parameters are used for setting output freq. of multi-speed.
[F5.9]～[F5.16]　Running time of Multi-speed 1~8
Those parameters are used for confirming running time of each stage.
[F5.17]～[F5.18]　Running direction of PLC multi-speed
Those parameters are used for defining running direction of PLC multi-speed.
[F5. 17]
The first part of LED(form right to left)：
0：Stage 1 FWD　　1：Stage 1 REV
The second part of LED：
0：Stage 2 FWD　　1：Stages 2 REV
The third part of LED：
0：Stage 3 FWD　　1：Stages 3 REV
The fourth part of LED：
0：Stage 4 FWD　　1：Stages 4 REV
[F5. 18] ：
The first part of LED(form right to left)：
0：Stage 5 FWD　　1：Stages 5 REV
The second part of LED：
0：Stage 6 FWD　　1：Stages 6 REV
The third part of LED：
0：Stage 7 FWD　　1：Stages 7 REV
The fourth part of LED：
0：Stage 8 FWD　　1：Stages 8 REV

F5.19　Reserved

6.7 Advanced running parameter unit

F6.0　Reserved

F6.1　Fault self-recovery time	Setting range：0 ~ 2
F6.2　Interval time of fault self-recovery	Setting range：0.2 ~ 20.0s

F6.1 is used for resetting some faults and run again.
F6.2 defines interval time between fault starting and fault recovery. If inverter can't recover in setting value of F6.1, it will output fault signal. Inverter will check speed and restart.

Inverter can't self-recovery about overheat or overload protect.

F6.3	Final value setup of internal counter	Setting range：1 ~ 60000
F6.4	Internal timer setup	Setting range：1 ~ 60000

The parameter defines the counting action of internal counter, and the clock terminals of counter are selected by parameter F1.6.

The counting value of counter for the external clock reaches the value appointed by parameter F3.3, and the corresponding Terminal OC outputs a valid signal of same width with the external clock cycle.

When the counting value of counter for external clock reached the value appointed by Parameter F6.3, the corresponding Terminal OC will output the valid signal, Go on counting to the value provided by parameter F6.4, which will lead to reset and the output valid signal will be withdrawn.

The clock cycle of counter should be over 5ms and the min width should be 2ms.

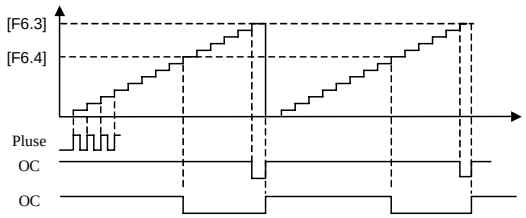


Fig.6-25 Internal counter function

F6.5	Skip freq. 1	Setting range:：0.0 ~ upper frequency
F6.6	Amplitude accumulation of Skip freq. 1	Setting range：0.0 ~ 5.00Hz
F6.7	Skip freq.2	Setting range：0.0 ~ upper frequency
F6.8	Amplitude accumulation of Skip freq. 2	Setting range：0.0 ~ 5.00Hz

It is used for avoiding resonance point of mechanical lode. Shown as fig. 6-26.

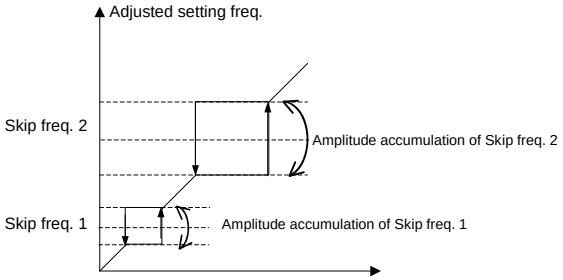


Fig.6-26 Skip freq.

F6.9	Coefficient of linear speed settings	Setting range：0.01 ~ 100.0

This parameter is used for confirming the diapaly value of running linear speed and

setting linear speed, and displaying other value being positive ratio with the output frequency.

Running linear velocity（d-10）= F6.9 × output frequency (d-0)
Setting linear velocity（d-11）= F6.9 × Setting frequency (d-6)

F6.10	Close-loop analog coefficient setting	Setting range：0.01 ~ 100.0

PID feedback value（d.9）= F6.10 × actual feedback value
PID setting value（d.8）= F6.10 × setting value

F6.11	Rotator speed coefficient setting	Setting range： 0.01 ~ 10.00

It is used for rectifying the display value of rotator speed.

rotator speed（d.3）= F6.11 × actual output rotator speed

F6.12	Monitor item selection 1 / Main display	Setting range：0 ~ 11
F6.13	Monitor item selection 2 / Auxiliary display	Setting range：0 ~ 11

This parameter is used for confirming display content of operation panel under state monitor mode.

F6.14	Query or modify parameters	Setting range : 0 ~ 9999

It is used for getting check code to query or modify parameters.

F6.15	Parameter initialization	Setting range：0 ~ 2

It is used for modifying inverter's parameters to manufacture setting.
0：Parameter initialization is off.
1：When parameter initialization is on, please come back parameter unit F0 ~ F9 to manufacture setting.
2：Clean fault records

F6.16	Copy function of parameter	Setting range：0 ~ 1

0：Forbid
It is forbidden to copy the backup data from operation panel to inverter, but this function doesn't affect the copy and read parameter function.
1：Allow

F6.17 Manufactory password	Setting range：0 ~ 9999

Don't modify this parameter without our permission.

F6.18 User password	Setting range：0 ~ 9999

It is used for getting some special power for user.

F6.19 Reference password	Setting range：0 ~ 9999

It is always random number.

6.8 wobble freq. running parameter unit

F7.0 Wobbles freq. running mode	Setting range： 0000～1112

It is used for setting basic characteristics of wobble freq. running.
The first part of LED (form right to left) ：
0： Function of wobble freq. is invalid.
1： Function of wobble freq. is valid.
When inverter receives running instruction, inverter will run in setting freq. of F7.1. Then inverter will in wobble freq. running mode after arriving setting time of F7.2.
2： Function of wobble freq. is conditional valid.
When external input terminals are valid (namely one of F3.0~F3.3 is 4), the inverter will run in wobble freq. running mode. When external input terminals are invalid, the inverter will run in preset freq. of wobble freq. (F7.1)。
The second part of LED: restart mode
0： Restart according to parameters saved before stop
1： Restart
The third part of LED: wobble freq. characteristics（Refer to explanation about parameter F7.3）
0：The wobble freq. is fixed 1：The wobble freq. is changeable.
The fourth part of LED: Storage characteristic of wobble freq.
0：It will not save the running state of wobble freq. after power off
1：It will save the running state of wobble freq. after power off

F7.1 Preset freq. of wobble freq.	Setting range：0.0 ~ the upper limit freq.
F7.2 Waiting time of preset freq.	Setting range：0.0 ~ 6000.0s

Preset freq. of wobble freq. is running freq. before inverter is in or out wobble freq. mode.
When [F7.0]＝###1，inverter will start and run in preset freq. of wobble freq., then run in wobble freq. mode after the setting time of F7.2.
When [F7.0]＝###2 and the terminals of wobble freq. is valid (F3.0~F3.5 is 4)，the inverter will run in wobble freq. mode. When [F7.0]＝###2 and the terminals of wobble freq. is invalid, inverter will output preset freq. [F7.1].

F7.3 Amplitude of wobble freq.	Setting range：0 ~ 50.0 %

F7.3 is rate of amplitude of wobble freq.
When F7.0 is [F7.0]＝#0##，
Amplitude of wobble freq.＝ [F7.3]×the upper limit freq. [F0.8]
When F7.0]＝#1##，
Amplitude of wobble freq.＝ [F7.3]×（Preset center freq. of wobble freq. [F7.7] + External setting freq.）

F7.4 Jumping freq.	Setting range：0.0 ~ 80.0 %

When freq. arrives the upper limit freq. the freq. will fast decline. Or when freq. arrives the lower limit freq., the freq. will fast ascend. Jumping freq. is amplitude, which freq. ascends or declines. Shown as fig6-27.
Actual jumping freq. = [F7.4]×Amplitude of wobble freq. [F7.3]

F7.5 Triangular rise time	Setting range：0.1 ~ 1000.0 s
F7.6 Triangular fall time	Setting range：0.1 ~ 1000.0 s

F7.5 defines the running time from lower limit freq. to upper limit freq. of wobble freq., namely Acc time.
F7.5 defines the running time from upper limit freq. to lower limit freq. of wobble freq., namely Dec time.
The sum of F7.5 and F7.6 is running cycle of wobble freq.

F7.5 and F7.6 define slope of Acc and Dec in wobble freq.

F7.7 Preset center freq. of wobble freq.	Setting range: 0.0 ~ upper limit freq.

Center freq. of wobble freq. is central value of output freq. when inverter is in wobble freq. mode. The sum of setting value of F7.7 and F0.1 is actual center freq.
Running process of wobble freq. is shown as fig6-27.

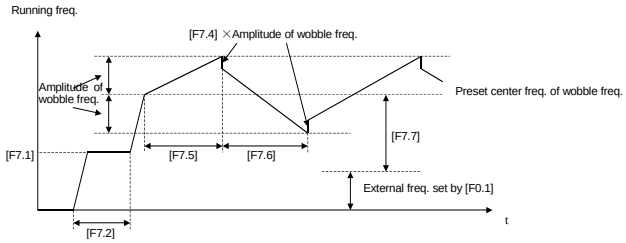
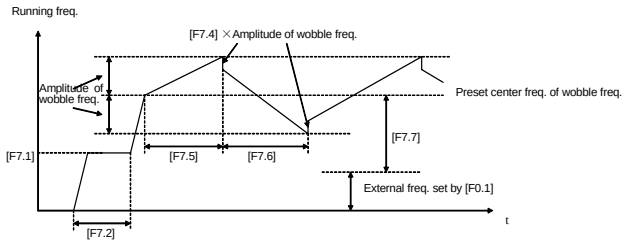


Fig.6-27 running process of wobble freq.



6-28 Running process of wobble freq.

F7.8 Reserved

6.9 PID control parameter unit

F8.0 Inner PID control	Setting range：0000 ~ 1122

The first part of LED(form right to left)： Inner PID control

0：Inner PID control is invalid 1：Inner PID control is valid

2：Inner PID control is conditional valid. Inner PID is set by external terminals X1～X4 (Parameters F3.0~F3.3) .

The second part of LED： PID controller selection

0： proportion 1：Integral 2：Proportion and integral

The third part of LED： Regulating property of PID controller

0： positive interaction 1：Reactor

The fourth part of LED: The pole choosing of PID controller

0: Monopole PID control 1: ambipolar PID control

Under the monopole PID control mode, the output phase sequence of inverter is mono-direction; and the external terminal decides the direction of output that it has no relation with the output of PID controller. The adjusting effect of PID controller

only affect the output frequency of inverter. Please refer to fig 6-29.
Monopole PID control applies in water and voltage supply which do not need the setting of motor's reversion.
Under the ambipolar PID control mode, when the adjusting effect of PID controller makes the output frequency as 0, and it has margin between PID setting and feedback, the output phase sequence and motor's reversion would change. That is to say, the external terminal and PID controller decide the motor's reversion together under this control mode. Please refer to fig 6-30.

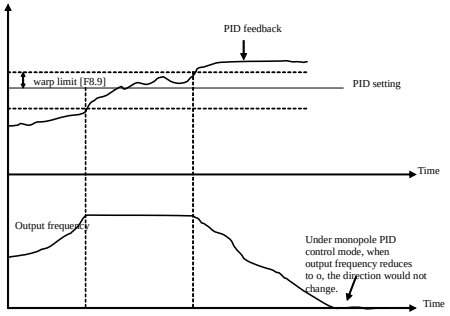


Fig 6-29 Monopole PID control mode

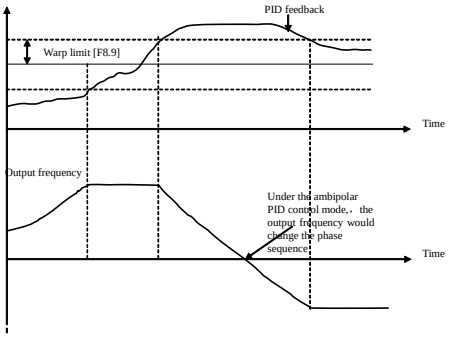


Fig 6-30 Ambipolar PID control mode

F8.1 Inner PID setting and channel selection	Setting range：0000 ~ 0504

It is used for setting inner PID and feedback channel.

The first part of LED(form right to left)：It is used for setting PID channel .

0：Digital setting. It is set by parameter F8.2.

1：Serials interface setting

2：Panel potentiometer setting, it is on the operation panel.

3：External voltage signal VC（0V~10V）。

4：External current signal CC（0~20mA）。

The second part of LED： Reserved.

The third part of LED： It is used for setting PID feedback channel.

0：External voltage input VC is as feedback channel, which is in the range of 0~10V.

1：External current input CC is as feedback channel, which is in the range of 0~20mA.

2：VC+CC Feedback value is composed of VC1 and CC.

3：VC-CC Feedback value is that VC1 minus CC.

4：Min (VC, CC) Feedback value is min value between VC and CC.

5：Max (VC, CC) Feedback value is max value between VC and CC.

The fourth part of LED: Reserved.

F8.2	Inner PID close-loop digital setting	Setting range：0.0 ~ 10.00V

If F8.1 is 0#00, setting value will be set by F8.2.

F8.3	Minimum fixed value	Setting range：0.0 ~ [F8.4]
F8.4	Maximum fixed value	Setting range：[F8.3] ~ 10.00
F8.5	Feedback of minimum fixed value	Setting range：0.0 ~ 10.00
F8.6	Feedback of maximum fixed value	Setting range：0.0 ~ 10.00

Parameters F8.3 and F8.4 define the upper and lower limit value of PID setting. Parameters F8.5 and F8.6 define corresponding relation with PID feedback value. Shown as fig.6-31.

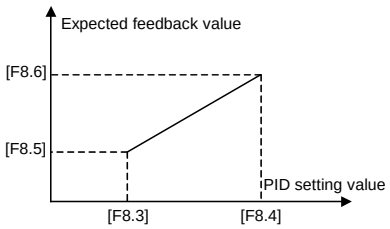


Fig.6-31 Relation between PID fixed value and expected feedback value

F8.7	Proportion gain	Setting range：0.0 ~ 5.00
F8.8	Integral time constant	Setting range：1.0 ~ 100 Sec

Those parameters are inner parameter of PID.

F8.9 Allowable deviation limit	Setting range：0.0 ~ 20.0(%)

The parameter is the allowable deviation value relative to the setting max value. When the difference between feedback value and the setting value is lower than this setting value, PID controller will stop. Shown as fig.6-32.

This function is mainly suited to the system that has lower control precision and needs to avoid adjusting frequently, for example, water-supply with constant pressure system.

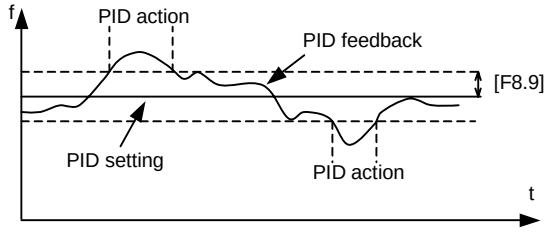


Fig.6-32 PID Control allowable deviation limit

F8.10 Preset freq. for close-loop	Setting range：0.00 ~ the upper limit freq.
F8.11 Holding time of preset freq. for close-loop	Setting range：0.0 ~ 6000.0s

Those parameters define freq. and running time of inverter before actual PID control is valid. In some control systems, inverters will forcible output a certain freq. (F8.10) and keep it in setting time (F8.11) for controlled object arrives fast targeted value. When controlled object almost arrives targeted value, PID controller will be valid to improve response speed.

F8.12 Sleeping threshold	Setting range： 0.0 ~ 10.0

It defines feedback value while inverter goes to sleep state. When actual feedback value is bigger than setting value and inverter arrives lower limit value, the inverter will go sleep. Shown as fig.6-33

F8.13 Awakening threshold	Setting range：0.00 ~ 10.00

It defines feedback value while inverter goes to work state from sleep state.

When actual feedback value is lower than setting value, the inverter will start to work. Shown as fig.6-33

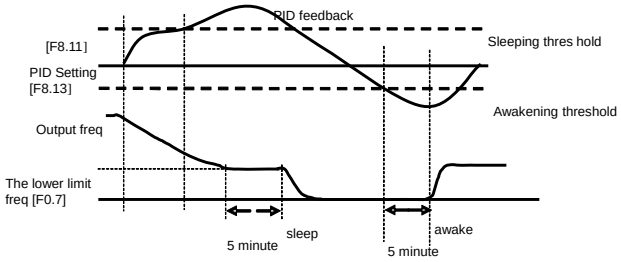


Fig.6-33 PID contro sleeping and awakening function

F8.14 Reserved

6.10 Communication function parameter units

F9.0 Communication setting	Setting range: 0000 ~ 0025

The first part of LED(form right to left): It is used for setting characteristics of relating to communication.

0: Reserved 1: 1200bps 2: 2400bps

3: 4800bps 4: 9600bps 5: 19200bps

To make sure both sides have the same baud rate, when client use serials communication.

The second part of LED: To set data format of serials communication.

0: Close 1: Even 2: Odd

To make sure both sides have the same data format, when client use serials communication.

The third and fourth part of LED: Reserved.

F9.1 Local address	Setting range: 0 ~ 30

F9.2 Response time of machine itself	Setting range: 0 ~ 1000 ms

It defines waiting time, which is the time from local receives correctly code to send response data frames.

F9.3 Setting of communication Auxiliary function	Setting range: 0000 ~ 2011

The first part of LED(form right to left):

0: The inverter is slave 1: The inverter is master

The second part of LED: Act selection after communication is lost

0: Stop 1: Keep

The third part of LED: Reserved.

The fourth part of LED: communication protocol selection.

F9.4	Checkout time of communication overtime	Setting range: 0.0 ~ 100.0 Sec

communication is fault. Inverter will keep on running or stopping according to setting of parameter F9.3.

F9.5	Linkage setting proportion	Setting range: 0.01 ~ 10.00
F9.6	Rectify channel of linkage setting proportion	Setting range: 0 ~ 4

It is used for setting proportion of output freq. between Master and Slave, when takes linkage setting control.
When F9.6 is 0, rectify channel of linkage setting proportion is invalid.
Slave freq. = Master freq.× [F9.5]
When F9.6 is 1, 2,3 or 4, rectify channel of linkage setting proportion is valid.
Slave freq. = Master freq.× [F9.5]×value of rectify channel or the max value of rectify channel
F9.6 is used for selecting rectify channel.
Rectify channel 1：Panel potentiometer
Rectify channel 2：External voltage signal VC（0 ~ 10V）
Rectify channel 3：External current signal CC（0 ~ 20mA）

F9.7	Reserved

6.11 Special function parameter unit

FC.0	Under voltage protection level	Setting range: 360V ~ 460V

It defines lower limit voltage which terminals P+ and P- are allow while inverter is working normally. For some low voltage conditions, user can decrease under voltage protection level to ensure that inverter is running normally.

FC.1	Over voltage limit level	Setting range: 660V ~ 760V

It defines threshold of voltage stall protection while motor is decelerating. If DC voltage caused by decelerating is beyond setting value of FC.1, deceleration time will automatic prolong. Shown as fig6-34.

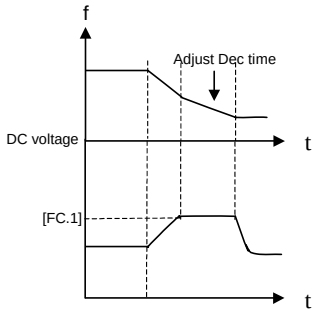


Fig.6-34 voltage stall protection in Dec speed

FC.2 Current amplitude limiting level	Setting range： 150 ~ 200%

It defines the maximum output current which is permitted by inverter. Whatever the operation mode is, inverter will adjust output freq. to inhibit current within the range of regulation, when output current of inverter is beyond setting value of FC.2.

FC.3 Reserved

FC.4 Running protection function setting	Setting range： 0000 ~ 9999

It is used for setting some coefficients with special function in running process. Generally, user needn't set.
The first part of LED(form right to left)： Under voltage compensation intensity
The second part of LED： Over voltage inhibit intensity
The third part of LED： Over current inhibit intensity
The fourth part of LED：Self-adapting braking torque adjust intensity

FC.5 Action function selection	Setting range： 0000 ~ 0111

The first part of LED(form right to left)： Cooling fan control
0：Cooling fan run after inverter run.
Cooling fan will stop after inverter stop. When temperature is above 40℃，the cooling fan also will also run.
1：Cooling fan will automatic run when inverter is power on.
The second part of LED： Variable speed control of cooling fan
0：Invalid
1：Valid
Cooling fan always keep the max speed.
The third part of LED： Voltage over modulation
0：Invalid 1：Valid

FC.6 Reserved

FC.7	Reserved

FC.8	Agency password	Setting range： 0~ 9999

They are closed loop control parameters about rotational speed and used to set.

FC.9	Rotational speed coefficient	Setting range： 0.10 ~ 5.00
FC.10	Gain of closed loop of rotational speed	Setting range： 0.50 ~ 1.20
FC.11	Integral time constants of closed loop of rotational speed	Setting range：0.10 ~ 10.00

Arithmetic of vector control. Generally, they need modify by professional person.

FC.12	Compensation rectify of dead zone	Setting range： 0 ~ 25

It is read-only parameter for user. Rectify coefficient of dead zone can be modify by parameter F1.20 only.

FC.13	Program version	Range: 2000 ~ 2099

It is read-only parameter.

7. FAULT DIAGNOSIS AND COUNTERMEASURES

7.1 Protective functions and Countermeasures

Code	Faults	Probable Causes	Solutions
Fu.1	over-current during Acc	1. Acceleration time is too short. 2. V/F curve is not suitable. 3. You hasn't set the right motor parameters 4. User start rotating motor directly, but doesn't set function of detecting speed and restart. 5. Value of torque boost set too high. 6. Power grid voltage is too low	1.Prolong the acceleration time 2. Descend the torque boost or adjust the V/F curve 3.Input motor's parameter once again and do self-determination to parameter. 4.To set function of detecting speed and restart. 5.To decrease voltage of torque boost 6. Check power gird voltage, and reduce power then use
Fu.2	over-current during Dec	Deceleration time is too short.	Prolong the deceleration time
Fu.3	Over-current during Running or stopping	1.Load occurs mutation 2.Power grid voltage is too low	1. Decrease power supply load fluctuation 2.Check voltage.
Fu.4	over-voltage during Acc	1.Input voltage is too high 2. Power supply is switched on or off frequently.	1.Check power supply voltage 2.Decrease setting value of F4.11 3.Control the on-off of inverter by the control terminal
Fu.5	over-voltage during Dec	1.Deceleration time is too short. 2.Input-voltage is abnormal	1.Extend the deceleration time 2.Check power supply voltage 3.Install or select the brake resistance
Fu.6	over-voltage during running	1.Power supply is abnormal 2.There are energy feedback load	1.Check power supply 2.Install or select brake resistor
Fu.7	over-voltage during stop	Power supply is abnormal	Check power supply voltage
Fu.8	Under-voltage during running	1. Power supply is abnormal2. There is great fluctuation of load in electric network.	1.Check power supply voltage 2.Provide the power supply separately
Fu.9	protective action of inverterr	1. Output is short-circuit or ground 2. Load is too heavy	1. Check wiring 2. Reduce the load 3. Check whether brake resistor is short-circuit

Fu.10	Output grounding (Reserved)	1.The output terminal of inverter grounds 2. The wire is too long between inverter and motor and the carrier frequency is too high.	1. Check the connecting wire 2. Shorten the connection wire or reduce the carrier frequency.
Fu.11	Interfere of inverter	Fault action caused by disturbance of electromagnetism	Add absorb circuit around inverter
Fu.12	Inverter over-loading	1. Load is too heavy. 2. Acceleration time is too short. 3. Torque boost is too high or V/F curve is not suitable. 4. Voltage of Power supply is too low 5. User starts rotating motor but doesn't set function of detecting speed and restart.	1.Reduce the load or replace with higher capacity inverter. 2. Prolong Acc time. 3. Decrease the torque boost or adjusting V/F curve. 4. Check Voltage of Power supply 5. To set function of detect speed and restart
Fu.13	Motor over-loading	1. Load is too heavy. 2. Acceleration time is too short. 3. The setting of protection factor is too small 4.Torque boost is too high or V/F curve is not suitable.	1. Reduce the load 2. Prolong Acc time 3. Increase the over-loading protection factor of motor [F4.13]） 4. Decrease torque boost voltage and adjust V/F curve.
Fu.14	Inverter overheat	1. Wind hole is blocked 2. Environmental temperature is too high 3. Fan is damaged	1. Clear air duct or improve the air condition. 2. Improve ventilation condition or decrease carrier frequency. 3. Replace fan.
Fu.15	Reserved		
Fu.16	External equipment failure	There is signal input on the peripheral. Equipment fault input terminal of Inverter	Check the signal source and the pertinent equipments.
Fu.17	Inverter output lack phase	Inverter output lack phase	Check the wire of applied motor.
Fu.18	Reserved		
Fu.19	Main contactor of inverter is poor contact	1. Power supply is too low 2. Contactor is damaged. 3. Starting resistance is damaged. 4. Control circuit is damaged.	1. Check power supply 2. Replace contactor 3. Replace starting resistance. 4. Contract Us
Fu.20	Current checking error	1.The current detecting equipment or circuit is damaged 2.Auxiliary power supply has problem	Contract Us

Fu.21	Temperature sensor ococcur faults	1. Signal line of temperature is poor contact 2. Temperature sensor is damage.	1. Check jack 2. Contract Us
Fu.22-Fu.29	Reserved		
Fu.30	Inverter can not check the motor parameter normally.	1. The nameplate parameter what you have input is wrong. 2. Doing self-detection before stopping. 3. The connection of motor and inverter is wrong.	1. Checking the motor nameplate, and input the right parameter.（ [F1.15]~ [F1.18] ） 2. Make sure to do self-detection before stopping the motor. 3. Check the connection cable of motor.
Fu.31	U phase motor parameters are abnormal.	1. The motor parameter is abnormal. 2. The self-detection of motor parameter is failed.	1. Check the motor lines. 2. Doing the self-detection of otor parameter once again.
Fu.32	V phase motor parameters are abnormal. Phase motor parameters are abnormal. phase motor parameters is abnormal.	1. The motor parameter is abnormal. 2. The self-detection of motor parameter is failed.	1. Check the motor lines. 2. Doing the self-detection of motor parameter once again.
Fu.33	W phase motor parameters are abnormal.	1. The motor parameter is abnormal. 2. The self-detection of motor parameter is failed.	1. Check the motor lines. 2.Doing the self-detection of motor parameter once again.
Fu.34-Fu.39	Reserved		
Fu.40	Inner data of storage is wrong.	Read and write errors of the control parameter	Contract Us

7.2 Fault record inquiry

C300 series inverter records the last six fault codes and the output parameters of last fault. This information is aid in looking up the fault causes. Fault information and State monitor parameters are stored uniformly, so please refer to the operation way to look up the information.

Monitor Item	Contents	Monitor Item	Contents
d-26	First fault record	d-32	Output frequency of last fault
d-27	Second fault record	d-33	Setting frequency of last fault
d-28	Third fault record	d-34	Output current of last fault
d-29	Fourth fault record	d-35	Output voltage of last fault
d-30	Fifth fault record	d-36	DC voltage of last fault
d-31	Sixth fault record	d-37	Module temperature of last fault

7.3 Reset

(1) Be sure to check the fault cause and exclude it before reset, otherwise, which may lead to the permanent damage for the inverter
(2) If the inverter can not be reset or occur the fault again after reset, please find out the reason. Continuous reset will damage the inverter
(3) Over-load or over-heat protective action should delay 5 minutes to reset.

I. When the inverter happens to the fault, you can reset the inverter to resume the normal running by any way as follows:
II. External reset input-terminal RST and GND terminal are closed, and then off.
III. While the fault code is displayed, press 

key.
IV. It will send fault reset instrument by RS485 interface.
V. Turn the power source off.

8. MAINTENANCE

As a result of ambient temperature, humidity, dust, vibration and aging of internal components of inverter, the inverter will probably appear the potential problem during running. In order to ensure the inverter to run steadily for a long time, the inverter should be checked up once at 3 to 6 months.

- First of all, turn the inverter's power off. And professional worker performs maintenance.

8.1 Daily Maintenance

maintenance points：

Inspection items	Time		Inspection contents	Criterion
	Daily	Periodic		
Running Environment	√		1.Temperature, Humidity 2.Dust, gases	1.When temperature is over 40℃, the panel should be open. Humidity is less than 90%, and no condensation 2. No peculiar smell，no flammable and explosive gases.
Cooling system		√	1.Installation Environment 2. Fan in inverter	1.Installation environment is well ventilated, and the duct is not blocked. 2.Fan is normal and no abnormal voice.
Inverter	√		1.Vibration, Temperature raise 2. Noises 3. Wire、Terminal	1. Vibration smooth, the temperature of air outlet is normal. 2.Not abnormal voice and no peculiar smell 3. Fastening screw is not loosed.
Motor	√		1.Vibration, Temperature raise 2. Noises	1. Running smooth, and temperature is normal
Input/output Parameters	√		1. Input voltage 2. Output current	1. Input-voltage is in the setup range 2. Output-current is under the rated value

input voltage	Moving-coil voltmeter
Output voltage	Rectifier-type voltmeter
O/I current	Tong-type ammeter

(1) Inverter has done the electric insulating experiment before leave-factory, so user don't need to do the withstand voltage test.
(2) Do the insulation test to the inverter if necessary, all of I/O terminals must be connected in short-circuit (R, S, T,L1,L2, U, V, W, P, P-, PB). Strictly prohibited from doing the insulation test for the single terminal. Please use 500V Meg-ohmmeter to perform this test.
(3) Control circuit can not be used the Meg-ohmmeter to test.
(4) For insulation test to motor, the connection wire between motor and inverter should be disassembled.

8.2 Damageable parts maintenance

Some cells in inverter are worn out or the performance descends in the process of usage process, in order to ensure the stable running of inverter, so the inverter needs to do the preventative maintenance or replace the part if necessary

(1) Filter capacitor

Pulse current in main circuit will take effect on the performance of aluminum electrolytic filter capacitor, and the degree of effect has relation with the ambient temperature and usage condition. In normal condition, the electrolytic capacitor of inverter should be replaced at 4 to 5 years.

When the electrolytic capacitor leaks out, safety valve falls out or main block of capacitor expands, the corresponding parts should be replaced immediately.

(2) Cooling fan

The lifetime of all the cooling fans in the inverter is about 15000 hours (that inverter is used continuously about two years). If the fan occurs the abnormal noise or vibration, it should be replaced immediately.

8.3 Storage

If the inverter don't used for a long time, please notice the following items:

(1) To avoid storing the inverter at the environment with high-temperature，humidity, vibration or metal dust, and ensure the well ventilation.

(2) If the inverter is not used for a long time, it should be energized to resume the capability of electrolyte capacitor once at 2 years，at the same time, check the

functions of inverter. When the inverter is electrified, its voltage should be increased by an autotransformer step by step and the time should not be less than 5 hours.

- If inverter is not used for a long time, the performance of internal filter capacitor will descend.

8.4 After sale services

Guarantee time of this inverter is 18 months (From the day of purchase).
In guarantee Time, if the inverter occurs fault or be damaged in normal usage, our company will provide the free repair service or replacement.

Guarantee scale is just the master of inverter.

In guarantee time, if the faults are caused by the following cases, certain service cost would be charged.

① Malfunction is caused by not following the operation manual or over using the standard specification;
② Malfunction is caused by repairing without admision.
③ Malfunction is caused by the bad-storage.
④ Malfunction is due to application of inverter for abnormal functional needs.
⑤ Damage is caused by fire, salt-corrode, gas-corrode, earthquake, storm, flood, lightning strike, voltage abnormal or other force majored.

Even if over guarantee time, our company will provide the paid service forever.

9. USAGE EXAMPLE

9.1 Panel on-off control, Panel potentiometer setting frequency and V/F control methods

9.1.1 Initial settings

1. When F0.0 is 0, V/F method is valid.
2. When F0.4 is 00#0, panel control is valid.
3. When F0.1 is 3, panel potentiometer is valid.

9.1.2 Basic wiring

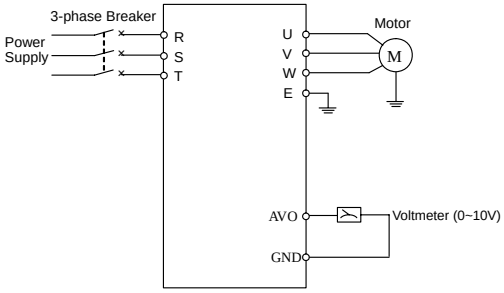


Fig9-1 Basic wiring

9.1.3 Operation Notes:

Press RUN/STOP key to start the inverter, and then rotate the button of panel potentiometer in clockwise to increase setting frequency step by step. Contrarily, rotate in anti-clockwise to decrease setting frequency step by step.

Press RUN/STOP key to stop the inverter.

HINT

External control terminal FWD decides the running direction of motor.

9.2 External control mode, external voltage setting frequency and V/F control

9.2.1 Initial settings

1. When F0.0 is 0, V/F method is valid.
2. When F0.4 is 00#1, external terminals control is valid.
3. Setting X1-X3 are Multi-speed control terminals ([F3.0]~[F3.2])。
4. Setting each speed running frequency（[F5.1]~[F5.7]）。

9.2.2 Basic wiring

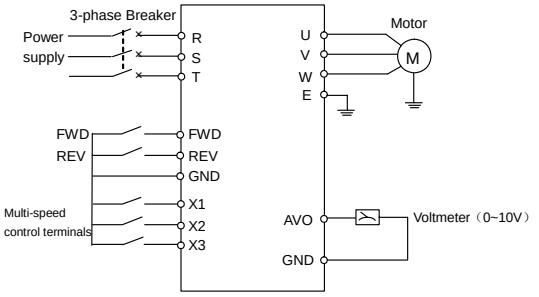


Fig9-2 Basic wiring

9.2.3 Operation Notes:

FWD-GND is off，the motor will running forward. REV- GND is off, the motor will running backward. FWD-GND and REV-GND are off or on at the same time, the inverter will stop.

If X1, X2 and X3 are all opened with CM, the multi-speed running is invalid. The inverter will run as the setting instruction speed. (The setting frequency channel is selected by parameter F0.1)

If one terminal or all of X1, X2 and X3are connected with GND terminal, the inverter will run as the multi-speed frequency selected by X1, X2 and X3.

HINT

Control method of terminals FWD and REV is set by parameter F0.5.（See the explanation about parameter F0.5.）

9.3 Multi-speed running, external control mode and V/F control

9.3.1 Initial settings

1. When F0.0 is 1, Sensorless current vector-control is valid.
2. Setting parameters F1.15]~[F1.18] according to match motor's rate nameplate data
3. When set [F0.1] =1，and UP/DW Acc and Dec control.
4. Setting start and stop control is panel control（[F0.4]=00#0）.
5. Using Parameters self-determination to determine motor's parameters.
6. Setting UP/DW terminal：select X1、X2 for UP/DW terminal. corresponding to parameters settings are ：
   [F3.0]=13（X1 is UP terminal）
   [F3.1]=14（X2 is DW terminal）

9.3.2 Basic wiring

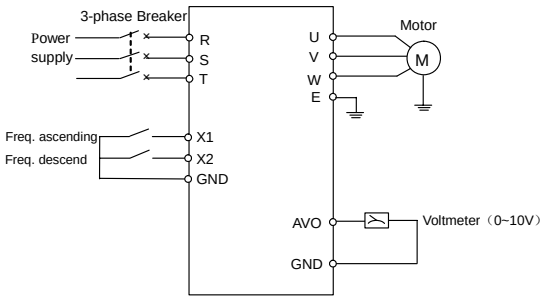


Fig9-3 Basic wiring

9.3.3 Operation Notes:

1. Motor's nameplate parameters must be set before inverter run, sometime parameters self-determination is necessary.
2. Press RUN/STOP key start inverter, press RUN/STOP key next time stop inverter.
3. When X1 terminal is connected, output freq. will ascend; when X2 terminal is connected, output freq. will descend.

9.4 Panel on-off control，Panel potentiometer setting frequency and linkage control with inverters

9.4.1 Initial settings

Console setting：

1. Freq. setting channel is panel potentiometer mode. Namely F0.1 is 3.
2. Operation channel selection is panel control, namely F0.4 is 00#0.
3. Communication setting (Parameter F9.0) is default.
4. If F9.3 is 0001, the inverter is console.

Slave setting：

1. Freq. setting channel is RS485 interface. Namely F0.1 is 2.
2. Operation channel selection isRS485 interface. Namely F0.4 is 00#2.
3. Communication setting (Parameter F9.0) is default.
4. If F9.3 is 0000, the inverter is slave.
5. Linkage setting proportion (Parameter F9.5) will be set by user needs.
6. Rectify channel of linkage setting proportion is external voltage signal VC. Namely F9.6 is 2

9.4.2 Basic wiring

9.4.3 Operation Notes:

Running freq. of slave has a certain proportion with console. Linkage setting proportion is set by parameter F9.5.

In this example, freq. proportion of console and slaves can get across by VC channel.

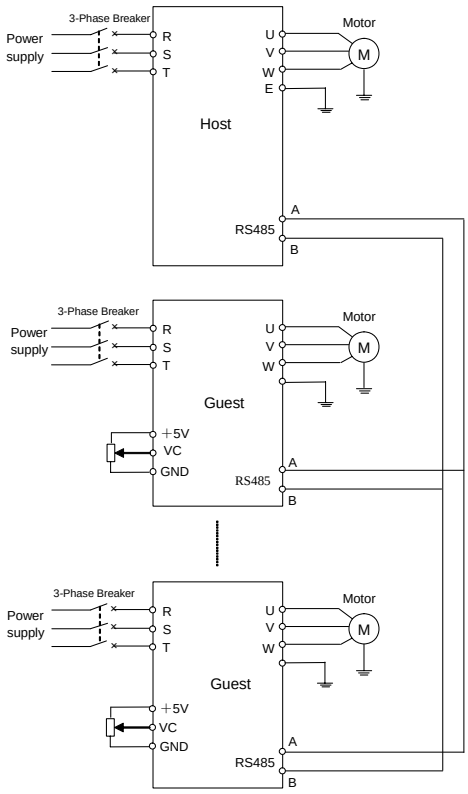


Fig9-4 Basic wiring

9.5 PLC controls the startup and stop of inverter and 3-speed operation

9.5.1 The brief introduction of example control function:

Through a simple example of PLC control inverter, the inverter achieves the aim of integration with system under providing a typical control method. The control approaches are as follows: 1, through terminal X0 to startup the running of inverter, 2, through terminal X5 to stop the running of inverter, 3, through the switching on terminal X1, X2 and X3 which respectively correspond to 10Hz, 20Hz, 50Hz, and

the output frequency is invalid (the output frequency is 0) if these terminals switch on simultaneously.

9.5.2 The system configuration:

Main site: MITSUBISHI PLC Model: FX2N-16MR-001

Subordinative site: C300－2S0022 series of inverter

9.5.3 The connection of master and slave hardware:

SUNFAR inverter uses crystal pin telephone line to connect PLC, using RS485. Please refer to the following fig9-5.

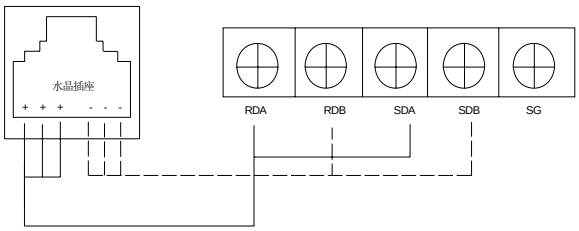


Fig 9-5 Wiring method

9.5.4 The master control wiring diagram of SUNFAR inverter and PLC:

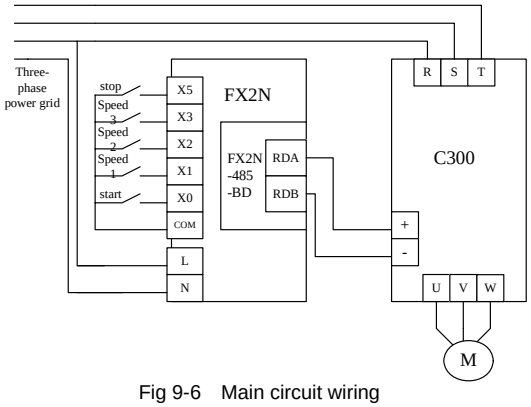


Fig 9-6 Main circuit wiring

9.5.5 The slave setting:

1, The channels of output frequency: communication interface（F0.1=2）

2, The channels of running command: communication interface（F0.4=00#2）

3, Communication setting F9.0 is default

4, Communication auxiliary function configuration F9.3=000: the inverter is slave.

9.5.6 Operation Notes:

PLC controls the running of inverter when terminal X0 is on.

The running speed of inverter is 10Hz when terminal X1 is on.

The running speed of inverter is 20Hz when terminal X2 is on.

The running speed of inverter is 500Hz when terminal X3 is on.

The inverter would stop when terminal X5 is on.

9.5.7 Master PLC trapezoidal chart:

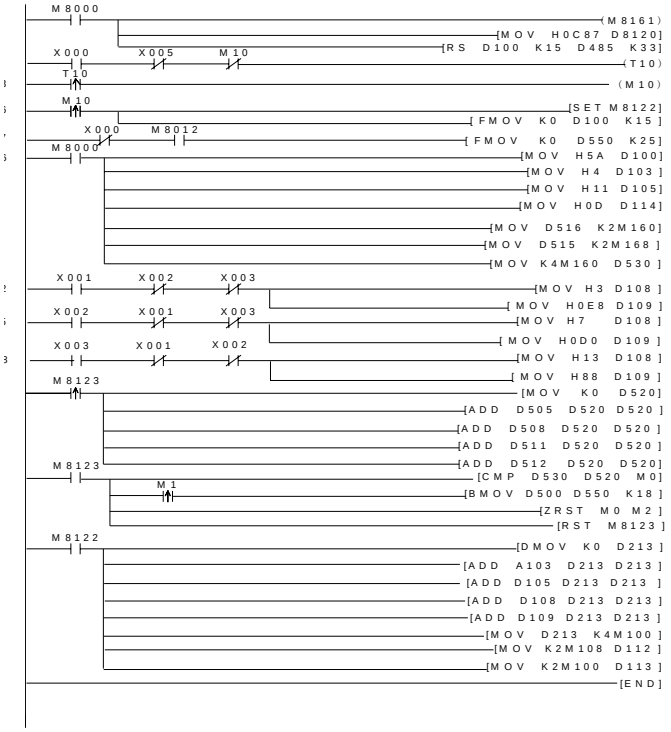


Fig 9-7 Master PLC trapezoidal chart

Appendix Ⅰ RS485 COMMUNICATION PROTOCOL

1. Summary

C300 series of inverter provides RS485 interface, users can carry out centralized monitoring through PC/PLC to get operating requirements. The protocol in this appendix is designed for the above functions.

1.1. About protocol

This serial communication protocol defines the transmission information and use format in the series communication and it includes master-polling (or broadcasting) format, master coding method and the content includes function code of action, transferring data and error checking. The response of slave is the same structure, and it includes action confirmation, returning the data and error checking etc. If slave takes place the error while it is receiving the information or cannot finish the action demanded by master, it will send one fault signal to master as a response.

1.2. Application scope

1.2.1. Application products

The protocol is fit for all sunfar series of inverters, for example C300, C320, E380 series of inverter, and some other inverters.

1.2.2. Application methods

（1） The inverter will be connected into a “Single-master Multi-slave ” PC/PLC control net with RS485 bus.

（2）The inverter will be connected into a “Point to Point” PC/PLC monitor background.

2. BUS structure and protocol description

2.1. BUS structure

（1）Interface mode

There provide RS485 interface and RS232 interface, but RS232 interface need the level translation accessories.

（2）Transmission mode

There provide asynchronous series and half-duplex transmission mode. At the same time, just one can send the data and the other only receives the data between master and slave. In the series asynchronous communication, the data is sent out frame by frame in the form of message.

（3）Topological mode

In Single-master system, there are 32 sites at most. There are one master site and 31 slave sites among these sites. The address range of slave is 0~30, 31 (1FH) is broadcast communication address. The address of slave must is exclusive in the network. Point to point mode is a special application of single master and multi-slaves mode. That is one condition of one slave machine.

2.2. Protocol description

C300 series inverter communication protocol is a kind of serial master-slave communication protocol, in the network, only one equipment, and master can build a protocol, (Named as “Inquire/Command”). Other equipments, slaves response “Inquire/Command” of master only by providing the data or doing the action according to the master’s “Inquiry/Command”. Here, master is Personnel Computer, Industrial Machine or Programmable logical controller, and the slave is inverter**.** Master not only visits some slave, but also sends the broadcast information to all the slaves. For the single master “Inquiry/Command”, all of slaves will return a signal that is a response; for the broadcast information provided by master, slave needs not feedback a response to master machine.

2.2.1 Data format

3 kinds of data transmission format are optional:

⑴ 1 bit start-bit, 8-bit data bits, 1 bit stop-bit and no check bit.

⑵ 1 bit start-bit , 8-bit data bits, 1 bit stop-bit and odd check.

⑶ 1 bit start-bit , 8-bit data bits, 1 bit stop bit and even check. It is also manufacture setting.

2.2.2Baud rate

There are five kinds of baud rate, 1200bps, 2400 bps, 4800 bps, 9600 bps and 19200 bps.

2.2.3Communication mode

（1） Point to point communication mode, which is master “Polling” and slave “Responding”.

（2） Setting the serial interface communication parameters by the keypad of inverter. These parameters include local address, baud rate and data format.

Master must set the same baud rate and data format of inverter

2.2.4Communication rule

（1） There are at least 5-byte startup interval time between data frames, only the

message with the stated startup internal time is valid.

(2) The waiting time of master, with the longest responding time of inverter is 8-byte input time. If not, determined as a failure.

（3） If inverter doesn't receive any message during setting time of F9.4, it will be occurred the wire-break fault. Running state of slaves is decided by setting value of F9.3.

2.3 Message structure

The length of each message is between 11 and 18 bytes. The type of character are ASCⅡ code and hex.

（1） 3800H is shown as ASCⅡ code.

Data list	9	10	11	12
	Setting Data	Setting Data	Setting Data	Setting Data
Data（ASCⅡ）	33	38	30	30

（2） 3800H is shown as hex.

Data list	9	10	11	12
	Setting Data	Setting Data	Setting Data	Setting Data
Data（Hex）	0	0	38	00

2.3.1 Master command frame

Sending Sequence		Definition	Sending Sequence		Definition
0	Header		9	Setting data	Data area
1	Slave addr.	Slave addr.	10	Setting data	
2	Slave addr		11	Setting data	
3	Type of order	Order area	12	Setting data	
4	Operation order		13	Check sum	Check area
5	Operation order		14	Check sum	
6	Type of data	Addr. area	15	Check sum	
7	Data addr.		16	Check sum	
8	Data addr.		17	Tail	0DH

2.4 Slave responding frame

Sending Sequence		Definition	Sending Sequence		Definition
0	Header		9	Running data	Data area
1	Slave addr.	Slave addr.	10	Running data	
2	Slave addr		11	Running data	
3	Slave	Responding area	12	Running data	
4	Operation order		13	Check sum	Check area
5	Operation order		14	Check sum	
6	Type of data	Address area	15	Check sum	
7	Data addr.		16	Check sum	
8	Data addr.		17	Tail	0DH

2.4.1 Header

This communication protocol defines that both 2AH (ASCⅡ code of character and 5AH are available. When header is 2AH, all of data behind header is ASCⅡ code. When header is 5AH, all of data behind header is hex code and invalid byte fill 0. Unaided headers of 2AH and 5AH aren't rightful header. There need waiting time above five bytes before sending header.

2.4.2 Slave address

Slave address is inverter address. The address range of slave machine is 0~30, 31 (1FH) is broadcast communication address.

2.4.3 Type of order

Type of order is only in master command frame and defines task of the data in this frame. Length of each frame is different according to different order. Type of order is shown as following table.

Data	Operation
0	Read the state and information of slaves
1	Read the running parameter of slaves
2	Read code parameter
3	Modify code parameter in RAM, it will not save after power down
4	Send control order
5	Modify code parameter in EPROM, it will save after power down
6～F	Reserved

2.4.4 Operation order

Master gives a control order to slaves. It exists in all messages and is shown as

following table.

Data	Operation	Data	Operation
00H	Invalid instrument	10H	To set running freq. of slave
01H	Start with FWD	11H	Start with FWD and setting freq.
02H	Start with REV	12H	Start with REV and setting freq.
03H	Stop	13H	Stop with Start setting freq.
04H	Slave will FWD running when jog	14H	Slave will FWD running with setting freq. when jog
05H	Slave will REV running when jog	15H	Slave will REV running with setting freq. when jog
06H	Jog running is stop	16H	Slave will JOG running with setting freq.
…	…	…	…
20H	Slave will fault reset	30H	Reserved
21H	Slave will emergency stop	31H	Reserved

When user need not send operation order, please send invalid order 00H.

2.4.5 Slave responding

Slave responding exists in all messages and is shown as following table.

Data	Definition	Data	Definition
0	Slave receive data and works well	1	Data received form master is beyond the permission range
2	When slave is running, data can't be modified	3	If modify the data, please input password
4	To try read and write parameter	5	Reserved
6	Appointed code or addr. Is invalid	7	It exist invalid ASCⅡ code in message
8	Type of order or operation order is invalid	9～F	Reserved

- When data of slave responding is 6, 7 or 8, length of responding frame is 11 bytes.

Its frame format is shown as following.

Slave responding	0	1	2	3	4	5	6	7	8	9	10
	Header	Slave address	Slave address	Slave responding	0	0	Check Sum	Check Sum	Check Sum	Check sum	Tail
Definition		Slave address		Order/responding area			Check area				0DH

2.4.6 State feedback

Slave gives a running state about slave to master, and state feedback exists in all messages. It is shown as following table.

Data	Operation	Data	Operation
00H	DC voltage of slave is not ready	10H	Reserved
01H	Slave is FWD running	11H	Accelerating with FWD
02H	Slave is REV running	12H	Accelerating with REV
03H	Slave is stop	13H	Abruptly stop and restart
04H	Slave will FWD running when jog	14H	Decelerating with FED
05H	Slave will REV running when jog	15H	Decelerating with REV
06H	Reserved	16H	Slave is in DC braking state.
…	…	…	…
20H	Slave is in fault state	21H	Slave is emergency

When slave occurs fault (data of state feedback is 20H), the seventh and eighth of feedback rata frame is fault code.

2.4.7 Check sum

The sum of ASCⅡor hex form slave address to setting data (running data) is check sum.

2.4.8 Frame Tail

0DH is hex, namely ASCⅡof CR is 0DH.

3. Description about frame format

When header, tail and check sum in message occur fault form master, slave may

(1) Order Ⅰ is read state and information about slaves

Master Sending	0	1	2	3	4	5	6	7	8	9	10	11	12	13
	Header	Slave addr.	Slave addr.	0	Operation order	Operation order	Data Type	0	0	Check Sum	Check Sum	Check Sum	Check Sum	Tail

Slave responding		Sending Sequence	
0	Header	9	Character information
1	Slave addr.	10	Character information
2	Slave addr	11	Character information
3	Slave responding	12	Character information
4	State feedback	13	Check sum
5	State feedback	14	Check sum
6	Data type	15	Check sum
7	Character information	16	Check sum
8	Character information.	17	Tail

Slave will give different characters information to master according to different data type in master message.

Data Type (master sending)		Character information (slave responding)					
6		7	8	9	10	11	12
0	Read slave inf. about inverter model	Voltage level	0	Power	Power	Power	Power
1	Read slave inf. about inverter series	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
2	Read slave inf. about program version	Reserved	Reserved	#	#	#	#
3	Read slave inf. about control information	Master control	Setting freq. of master	Reserved	Reserved	Reserved	Reserved
4～F	Reserved	#	#	#	#	#	#

For example, if data type is 0, slave return 400185. 4 mean voltage level. 0 means Character information. 0185 means power, 18.5Kw.

(2) Order Ⅱ is used for reading running parameter of slave

	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Master Sending	Header	Slave addr.	Slave addr.	1	Operation order	Operation order	0	Data subentry	Data subentry	Check Sum	Check Sum	Check Sum	Check Sum	Tail

Slave responding		Sending Sequence	
0	Header	9	Running data
1	Slave addr.	10	Running data
2	Slave addr.	11	Running data
3	Slave responding	12	Running data
4	State feedback	13	Check sum
5	State feedback	14	Check sum
6	0	15	Check sum
7	Data subentry	16	Check sum
8	Data subentry	17	Tail

Data subentry is state monitor parameters, shown as following table.

Monitor item	Data subentry	Returning data form slave
d-0	00	Output frequent
d-1	01	Output current
. . .	. . .	. . .
d-15	15	External pulse input
. . .	. . .	. . .
d-37	37	Temperature of module of last fault

HINT

➢ Refer to the explanation about state monitor parameter in the fourth chapter.

（3）Order Ⅲ is read parameters of code.

Master Sending	0	1	2	3	4	5	**6**	**7**	**8**	9	10	11	12	13
	Header	Subordination addr.	Subordination addr.	2	Operation order	Operation order	Data type	Data Addr.	Data Addr.	Check sum	Check sum	Check sum	Check sum	Tail

Slave responding		Sending Sequence	
0	Header	9	Parameter data
1	Slave addr.	10	Parameter data
2	Slave addr	11	Parameter data
3	Slave responding	12	Parameter data
4	State feedback	13	Check sum
5	State feedback	14	Check sum
6	Data type	15	Check sum

7	Data addr.	16	Check sum
8	Data addr.	17	Tail

➢ Data type and data address are defined in order Ⅳ and Ⅵ.

（4）order Ⅳ is used for modifying parameter of code in RAM.

order Ⅵis used for modifying parameter of code in EPROM.

Master Sending		Sending Sequence	
0	Header	9	Setting data
1	Slave addr.	10	Setting data
2	Slave addr	11	Setting data
3	3 or 5	12	Setting data
4	Operation order	13	Check sum
5	Operation order	14	Check sum
6	Data type	15	Check sum
7	Data addr.	16	Check sum
8	Data addr.	17	Tail
Slave responding		Sending Sequence	
0	Header	9	Setting data
1	Slave addr.	10	Setting data
2	Slave addr	11	Setting data
3	Slave responding	12	Setting data
4	State feedback	13	Check sum
5	State feedback	14	Check sum
6	Data type	15	Check sum
7	Data addr.	16	Check sum
8	Data addr.	17	Tail

Data type is shown as following table.

Parameter unit	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	FC	FE	FF	FH	FL	FP
Data type	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

For example, data address of F0.8, F1.8 and F#.8 are 8. But data type of them is different.

Attention：When slaves don't accomplish order form master, setting data is 0000.

（5）Order Ⅴ is used for sending control order.

It is fit for routine operation for inverter.

Master Sending		Sending Sequence	
0	Header	8	Setting data
1	Slave addr.	9	Setting data
2	Slave addr	10	Check sum
3	4	11	Check sum
4	Operation order	12	Check sum
5	Operation order	13	Check sum
6		14	Tail
7	Setting data		
Slave responding		Sending Sequence	
0	Header	9	Running data
1	Slave addr.	10	Running data
2	Slave addr	11	Running data
3	Slave responding	12	Running data
4	State feedback	13	Check sum
5	State feedback	14	Check sum
6	0	15	Check sum
7	Monitor item	16	Check sum
8	Monitor item	17	Tail

Setting data in master sending is setting freq., which is send form master to slave. Setting data in slave responding is running parameter, which is send form master. It is set by parameter F6.12.

➢ See the explanation about list of parameter in chapter five.

4. Usage example

4.1. Order Ⅰ

To read slave model of 0#.

master will send：

2A 30 30 30 30 31 30 30 30 30 31 38 31 0D

5A 00 00 00 00 01 00 00 00 00 00 00 01 0D

Slave will respond：（Inverter with 220V and 0.4KW）

2A 30 30 30 30 33 30 32 30 30 30 30 34 30 32 34 39 0D

5A 00 00 00 00 03 00 02 00 00 00 00 04 00 00 00 09 0D

4.2. Order Ⅱ

To read running parameter of 0# slave（namely read d.4, output freq.）

master will send：

2A 30 30 31 30 30 30 30 34 30 31 38 35 0D

5A 00 00 01 00 00 00 00 04 00 00 00 05 0D

Slave will respond：（Return current DC voltage of generatrix is 285V）

2A 30 30 30 30 33 30 30 34 30 31 31 44 30 32 35 44 0D

5A 00 00 00 00 03 00 00 04 00 00 01 1D 00 00 00 25 0D

4.3.Order Ⅲ

To read code parameter of 0# slave（namely parameter F0.16）

master will send：

2A 30 30 32 30 30 30 31 30 30 31 38 33 0D

5A 00 00 02 00 00 00 00 10 00 00 00 12 0D

Slave will respond：（Carrier wave freq. is 8KHZ）

2A 30 30 30 30 33 30 31 30 30 30 35 30 30 32 34 39 0D

5A 00 00 00 00 03 00 00 10 00 00 00 50 00 00 00 63 0D

4.4. Order Ⅳ

To modify digit setting freq of 0# slave (modify parameter F0.2 as 60.02)

master will send：(To set detect and restart mode)

2A 30 30 33 30 30 30 30 32 31 37 37 32 30 32 35 36 0D

5A 00 00 03 00 00 00 00 02 00 00 17 72 00 00 00 8E 0D

Slave will respond：(Parameter is modified)

2A 30 30 30 30 33 30 30 32 31 37 37 32 30 32 35 36 0D

5A 00 00 00 00 03 00 00 02 00 00 17 72 00 00 00 8E 0D

4.5. Order Ⅵ

To send control order of $0^{\#}$ slave（running freq. is 9.99HZ）

master will send：

2A 30 30 34 31 31 30 33 45 37 30 31 44 35 0D

5A 00 00 04 00 11 00 00 03 E7 00 00 00 FF 0D

Slave will respond：

2A 30 30 30 30 31 30 30 30 30 33 45 37 30 32 36 30 0D

5A 00 00 00 00 01 00 00 00 00 00 03 E7 00 00 00 EB 0D

4.6. Order Ⅴ

To modify Torque Boost F1.1 of slave as 6.0

master will send：

2A 30 30 35 30 30 31 30 31 30 30 33 43 30 32 35 44 0D

5A 00 00 05 00 00 01 00 01 00 00 00 3C 00 00 00 43 0D

Slave will respond：

2A 30 30 30 30 31 31 30 31 30 30 33 43 30 32 35 39 0D

5A 00 00 00 00 01 01 00 01 00 00 00 3C 00 00 00 3F 0D

Appendix Ⅱ OPTIONS

1. Operation panel

Sometimes users need to take operation panel out of the inverter or control cabinet, if users purchase panel base and wire, it is convenient to install and debug. Wire between operation panel and inverter should be less than 15m. If the length is above 15m, long-distance control line is needed.

1.1 Appearance of panel base

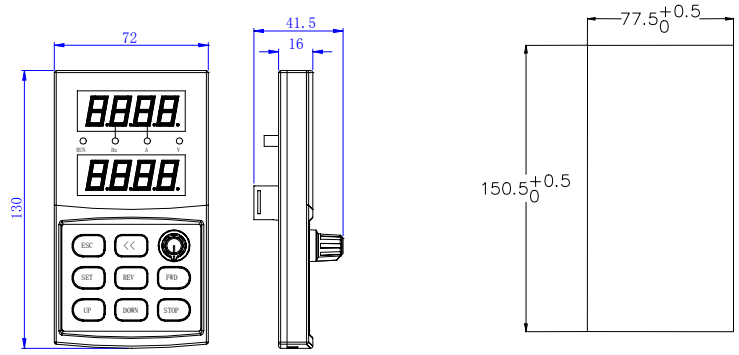
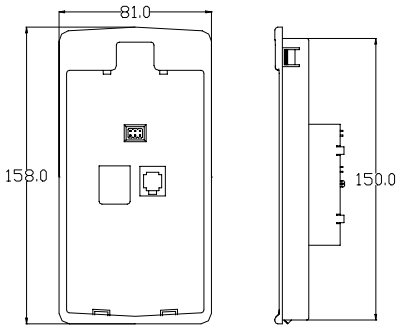


Fig-A Dimension of panel



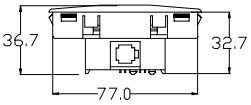


Fig-B Dimension of panel base

HINT

It is recommended that user takes Fig-B Hole dimension of panel base.

a) Appearance of small panel base

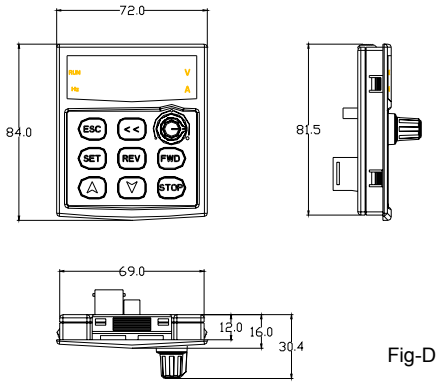


Fig-C Dimension of small panel base

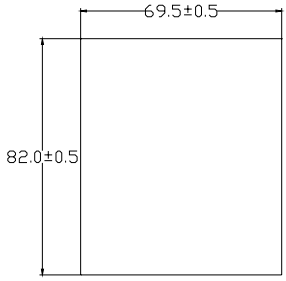


Fig-D Hole dimension of small panel base。

HINT

It is recommended that users take Fig-D Hole dimension of panel base.

1.3 Installation of panel base

Open a hole on the control cabinet according to dimension of panel base. And put the panel horizontally into the hole. Then four locks in panel base will lock. There is an interface on the bottom of base, please insert the long-distance control wire into it.

2. Brake resistance

The brake resistance is shown following table.

Model	Applied motor （Kw）	Power of brake resistance（Kw）	Brake resistance（Ω）	Brake torque （%）
C300-2S0002	0.2	0.1	250	100
C300-2S0004	0.4	0.18	150	100
C300-2S0007	0.75	0.25	100	100
C300-2S0015	1.5	0.4	70	100
C300-2S0022	2.2	0.6	50	100
C300-4T0004	0.4	0.25	500	100
C300-4T0007	0.75	0.3	400	100

C300-4T0015	1.5	0.5	300	100
C300-4T0022	2.2	0.65	200	100
C300-4T0037	3.7	1.0	125	100

If the braking effect is not obvious, please decrease brake resistance and increase power of brake resistance according to proportion.

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