FREQUENCY INVERTER

E 2000Q

0.75 kW - 180 kW

- Full torque at zero speed (with closed loop VECTOR option)
- High overload capability: 200% for 2 sec.
- Smart brake control algorithm, for crane and hoist applications.
- Multiple motor control (open loop).
- Positioning function.
- Intelligent “no trip” functions, to guarantee reliable operation.
- Fault-memory and troubleshooting functions.

CONTENTS

I. Safety

Read this manual carefully so that you have a thorough understanding. Installation, commissioning or maintenance may be performed in conjunction with this chapter. EURA will assume no liability or responsibility for any injury or loss caused by improper operation.

1.1 Safety information

1.1.1 Application Area

The equipment described is intended for industrial motor speed control utilising AC induction motors.

1.1.2 Safety definition

Danger: series physical injury or even death may occur if not follow relevant requirements.

Warning: Physical injury or damage to the devices may occur if not follow relevant requirements.

Note: Physical hurt may occur if not follow relevant requirements.

Qualified electricians: People working on the device should take part in professional electrical and safety training, receive the certification and be familiar with all steps and requirements of installing, commissioning, operating and maintaining the device to avoid any emergency.

1.1.3 Warning symbols

Warning caution you about conditions which can result in serious injury or death and/or damage to the equipment, and advice on how to avoid the danger. Following warning symbols are used in this manual.

Symbols	Name	Instruction	Abbreviation
Danger	Electrical danger	Serious physical injury or even may occur if not follow the relative requirements.	
Hot sides	Hot sides	Sides of the device may become hot. Do not touch.	
Warning	Warning	Physical injury or damage to the devices may occur if not follow the relative requirements.	
Do not	Electrostatic discharge	Damage to the PCB board may occur if not follow the relative requirements.	
Note	Note	Physical hurt may occur if not follow the relative requirements.	**Note**

1.1.4 Safety guidelines

<table>
<tr><td>  </td><td>◇ Only qualified electricians are allowed to operate on the inverter.

◇ Do not carry out any wiring and inspection or changing components when the power supply is applied. Ensure all input power supply is disconnected before wiring and checking and always wait for at least the time designated on the inverter or until the DC bus voltage is less than 36V. Below is the table of the waiting time:
<table>
<tr><td>inverter model</td><td>Min waiting time</td></tr>
<tr><td>400V 1.5kW – 110kW</td><td>5 minutes</td></tr>
<tr><td>400V 132kW – 250kW</td><td>15minutes</td></tr>
</table></td></tr>
<tr><td>  </td><td>◇ The base of the radiator may become hot during running. Do not touch to avoid hurt.</td></tr>
<tr><td>  </td><td>◇ Do not refit the inverter unauthorizedly; otherwise fire, electric shock or other injury may occur.

◇ Never touch power terminals internal inverter to avoid any electric shock.

◇ Do not connect input power supply onto U, V. W or ⏚/PE/E terminals.

◇ Do not install inverter directly under sunshine, do not block up the cooling hole.

◇ All safety covers should be well fixed before inverter is power connected, to avoid any electric shock.</td></tr>
<tr><td>  </td><td>◇ The electrical parts and components inside the inverter are electrostatic. Take measurements to avoid electrostatic discharge relevant operation.</td></tr>
</table>

1.1.5 Delivery and installation

◇ Please install the inverter on fire-retardant material and keep the inverter away from combustible materials.

◇ Connect the braking optional parts (braking resistors, braking units or feedback units) according to the wiring diagram.

◇ Do not operate on the inverter if there is any damage or components loss to the inverter.

◇ Do not touch the inverter with wet items or body, otherwise electric shock may occur.

◇ Select appropriate moving and installing tools to ensure a safe and normal running of the inverter and avoid physical injury or death. For physical safety, the erector should take some mechanical protective measurements, such as wearing exposure shoes and working uniforms.

◇ Ensure to avoid physical shock or vibration during delivery and installation.

◇ Do not carry the inverter by its cover to avoid cover falling off.

◇ Install away from children and other public placers.

◇ Derating must be considered when the drive is installed at high altitude, greater than 1000m. This is because the cooling effect of drive is deteriorated due to the thin air, as shown in Fig1-1 that indicates the relationship between the elevation and rated current of the drive.

◇ Forbidden screws, cables and other conductive items to fall inside the inverter.

◇Proper grounding should be ensured with grounding resistance not exceeding 4Ω; separate grounding is required for motor and inverter. Grounding with series connection is forbidden.

◇R，S and T are the input terminals of the power supply, while U, V and

	W are the motor terminals. Please connect the input power cables and motor cables with proper techniques; otherwise the damage to the inverter may occur. ◇If inverter is installed in a control cabinet, smooth ventilation should be ensured and inverter should be installed vertically (as shown in Fig1-2). If there are several inverters in one cabinet, in order to ensure ventilation, please install inverters side by side. If it is necessary to install several inverters up and down, please add heat-insulation plate (as shown in Fig1-3). ◇ Signal line should not be too long to avoid any increase with common mode interference. ◇Before using the drive, the insulation of the motors must be checked, especially, if it is used for the first time or if it has been stored for a long time. This is to reduce the risk of the drive from being damaged by the poor insulation of the motor. ◇Do not connect any varistor or capacitor to the output terminals of the drive, because the drive's output voltage waveform is pulse wave, otherwise tripping or damaging of components may occur; in addition, do not install circuit breaker or contactor at the output side of the drive as shown in Fig 1-4.

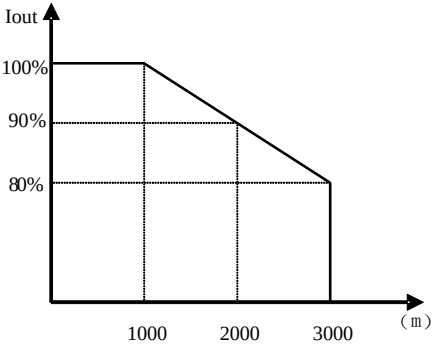


Fig 1-1 Derating drive's output current with altitude

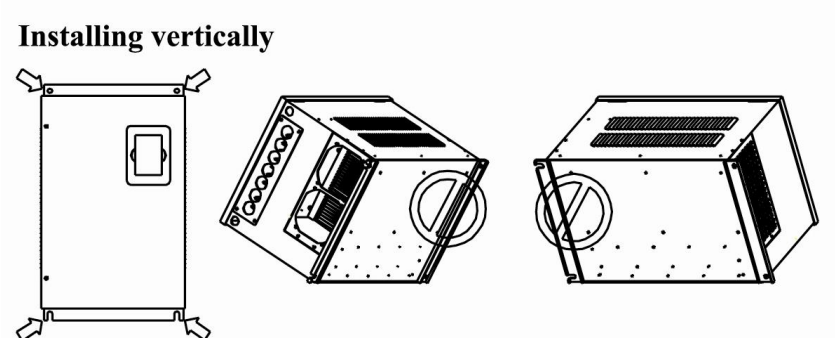


Fig 1-2 Installing vertically

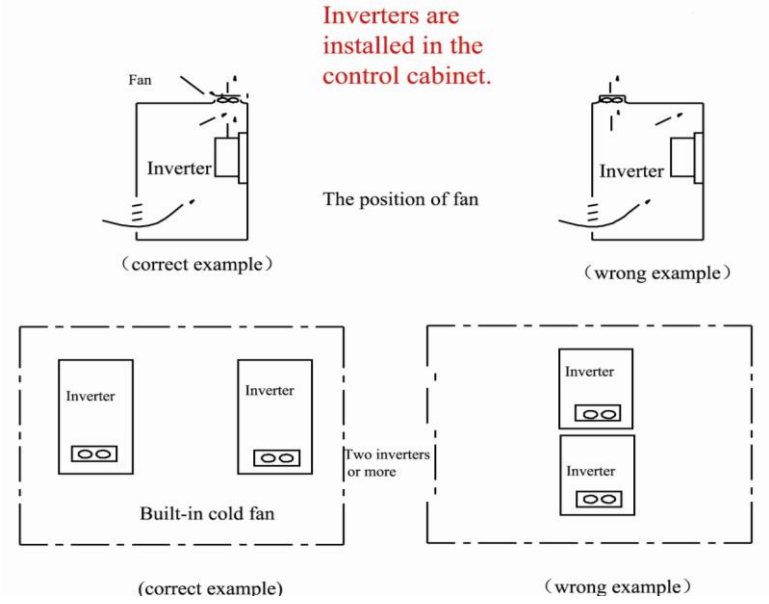


Fig 1-3 Installed in the cabinet

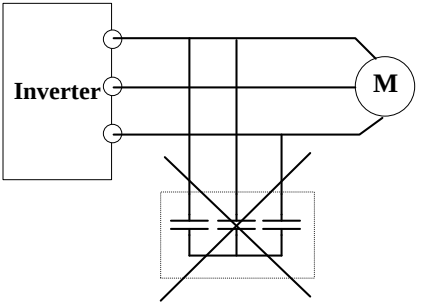


Fig 1-4 Capacitors are prohibited to be used.

1.2 Before using

1.2.1 Unpacking inspection

Check as followings after receiving products:

1. Check that there are no damage and humidification to the package. If not, please contact with local agents or company offices.
2. Check the information on the type designation label on the outside of the package to verify that the drive is of the correct type. If not, please contact with local dealers or company offices.
3. Check that there are no signs of water in the package and no signs of damage or breach to the inverter. If not, please contact with local dealers or company offices.
4. Check the information on the type designation label on the outside of the package to verify that the nameplate is of the correct type. If not, please contact with local dealers or company offices.
5. Check to ensure the accessories (including user manual, control keypad and extension card) inside the device is complete. If not, please contact with local dealers or company offices.

1.2.2 Application confirmation

Check the machine before beginning to use the inverter:

1. Check the load type to verify that there is no overload of the inverter during work and check that whether the drive needs to modify the power degree.
2. Check that the actual current of the motor is less than the rated current of the

inverter.
3. Check that the control accuracy of the load is the same of the inverter.
4. Check that the incoming supply voltage is correspondent to the rated voltage of the inverter.
5. Check that the communication needs option card or not.

1.2.3 Environment

Check as followings before the actual installation and usage:

1. Check that the ambient temperature of the inverter is below 50℃. If exceeds, derate 3% for every additional 1℃. Additionally, the inverter can not be used if the ambient temperature is above 60℃. Note: for the cabinet inverter, the ambient temperature means the air temperature inside the cabinet.
2. Check that the ambient temperature of the inverter in actual usage is above -10℃. If not, add heating facilities. Note: for the cabinet inverter, the ambient temperature means the air temperature inside the cabinet.
3. Check that the altitude of the actual usage site is below 1000m. If exceeds, derate 1% for every additional 100m.
4. Check that the humidity of the actual usage site is below 90% and condensation is not allowed. If not, add additional protection inverters.
5. Check that the actual usage site is away from direct sunlight and foreign objects cannot enter the inverter. If not, add additional protective measures.
6. Check that there is no conductive dust or flammable gas in the actual usage site. If not, add additional protection to inverters.

1.2.4 Installation confirmation

Check as followings after the installation:

1. Check that the load range of the input and output cables meet the need of actual load.
2. Check that the accessories of the inverter are correctly and properly installed. The installation cables should meet the needs of every component (including input chokes, input filters, output chokes, output filters, DC choke, braking unit and braking resistor.)

3. Check that the inverter is installed on non-flammable materials and the calorific accessories (chokes and braking resistors) are away from flammable materials.
4. Check that all control cables and power cables are run separately and the rotation complies with EMC requirement.
5. Check that all grounding systems are properly grounded according to the requirements of the inverters.
6. Check that the free space during installation is sufficient according to the instructions in user manual.
7. Check that the installation conforms to the instructions in user manual. The drive must be installed in a vertical position.
8. Check that the external connection terminals are tightly fastened and the torque is appropriate.
9. Check that there are no screws, cables and other conductive items left in the inverter. If not, get them out.

1.2.5 Basic commission

 Complete the basic commissioning as followings before actual utilization:

1. Select the motor type, set correct motor parameters and select control mode of the inverter according to the actual motor parameters.
2. Auto-tune. If possible, disconnected from the motor load to start dynamic auto-tune. Or if not, static auto-tune is available.
3. Adjust acceleration/deceleration time according to actual running of load.
4. Commission the device via jogging and check that the rotation direction is as required. If not, change the rotation direction by changing the wiring of motor.
5. Set all control parameters and then operate.

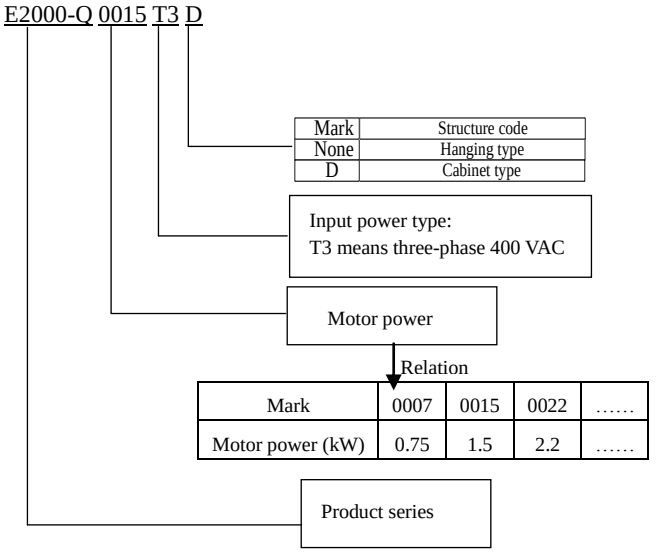
1.3 Designed Standards for Implementation

- IEC/EN 61800-5-1: 2007 Adjustable speed electrical power drive systems safety requirements.
- IEC/EN 61800-3: 2004 / +A1： 2012 Adjustable speed electrical power drive systems-Part 3: EMC product standard including specific test methods.

II. Product

This manual offers a brief introduction of the installation connection for E2000-Q series inverters, parameters setting and operations, and should therefore be properly kept. Please contact manufacturer or dealer in case of any malfunction during application.

2.1 Product model naming rule



2.2 Optional function naming rule

F2 C9 Y K B R

Mark	Built-in EMI filter
None	None
R	Including built-in EMI filter

Mark	Built-in braking unit
None	None
B	Including built-in braking unit

Mark	Operation panel with potentiometer
None	Local operation panel without potentiometer
K	Local operation panel with potentiometer

Mark	Operation panel type
None	Operation panel is not removable.
Y	Operation pane is removable, to be controlled remotely.

Mark	I/O expand card, PG card
None	None
C8	I/O expand card 2
C9	Differential input PG card
C10	Non-differential input PG card
C11	I/O expand card 2 and differential input PG card
C12	I/O expand card 2 and non-differential input PG card

Mark	Scene bus type
None	No communication function
F2	MODBUS is connected by terminals.

2.3 Nameplate

Taking for instance the E2000-Q series 1.5kW inverter with 3-phase input, its nameplate is illustrated as Fig 1-1.

3Ph: 3-phase output; 4.5A, 0.75kW: rated output current and power;

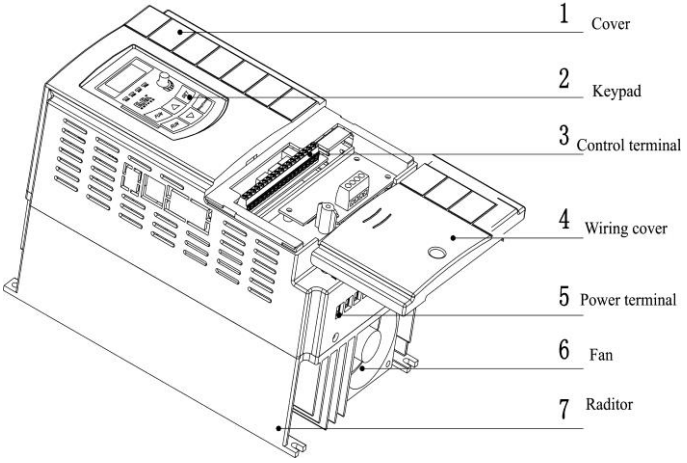
0.50～150.0Hz: output frequency range.

EURA DRIVES	EURA DRIVES ELECTRIC CO., LTD		
MODEL	E2000-Q0015T3	Function Symbol	F2KBR
INPUT	AC 3PH 400V 50/60Hz		
OUTPUT	3PH 1.5KW 4A 0～380V		
	0.50～150.0Hz		
BAR CODE			

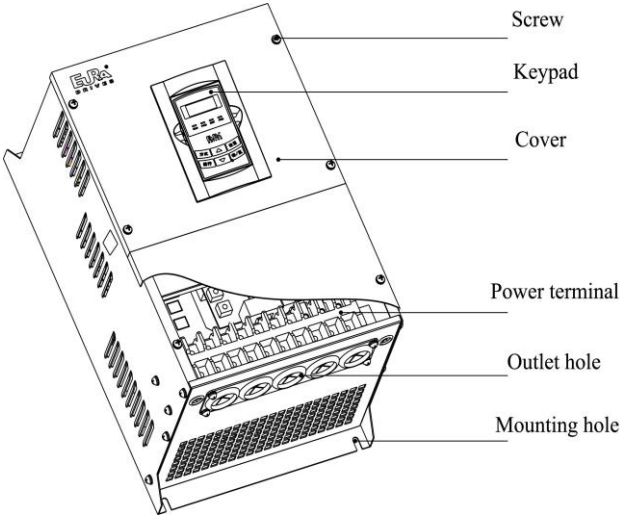
2.4 Appearance

The external structure of E2000-Q series inverter is classified into plastic and metal housings. Wall hanging type and cabinet type are adopted. Good poly-carbon materials are adopted through die-stamping for plastic housing with nice form, good strength and toughness.

Taking E2000-Q0015T3 for instance, the external appearance and structure are shown as in below Fig.



Metal housing uses advanced exterior plastic- spraying and powder-spraying process on the surface with elegant color and with detachable one-side door hinge structure adopted for front cover, convenient for wiring and maintenance. Taking E2000-Q0300T3 for instance, its appearance and structure are shown as in right Fig.



2.5 Technical Specifications

Table2-1 **Technical Specifications for E2000-Q Series Inverters**

	Items	Contents
Input	Rated Voltage Range	3-phase 380-480V (+10%, -15%)
	Rated Frequency	50/60Hz
Output	Rated Voltage Range	3-phase 0-INPUT (V)
	Frequency Range	0.00～150.0Hz
Control Mode	Carrier Frequency	800~16000Hz; Fixed carrier-wave and random carrier-wave can be selected by F159.
	Input Frequency Resolution	Digital setting: 0.01Hz, analog setting: max frequency X 0.1%
	Control Mode	For induction motor: SVC (open-loop vector control) control, V/F control, VC (Closed-loop vector control) control
	Start Torque	0.5 Hz/150% (SVC) 0. 0Hz/200% (VC)
	Speed-control Scope	1:100 (SVC), 1:1000 (VC)
	Steady Speed Precision	±0.5% (SVC) , ±0.02% (VC)
	Toque response	<20ms (SVC) ; <10ms (VC)
	Torque Control Precision	±5%
	Overload Capacity	150% rated current, 60 seconds.
	Torque Elevating	Auto torque promotion, Manual Torque Promotion includes 1-20 curves.
	V/F Curve	3 kinds of modes: beeline type, square type and under-defined V/F curve.
	Startup mode	Direct startup, DC braking startup
	DC Braking	DC braking frequency: 0.20-50.00 Hz, braking time: 0.00~30.00s
	Auto voltage regulation	When source voltage changes, the modulation rate can be adjusted automatically, so that the output voltage is unchanged.
	Torque regulation and control	Auto torque regulation can avoid over current protection.
	Multi-stage speed running	Terminals control can realize 15-stage speed running.
Function for Crane application	Brake logic control	Built-in brake sequence control.
	Acceleration under light load	Maximum output frequency will be calculate automatically according to load.
	Overload protection	Automatic recognition of load situation. Under overload condition, load can't be lifted and only can be laid down.
	Frequency adjustments with bus voltage	When bus voltage is consistently low, decreasing given frequency will keep inverter normal output and avoiding 'LU' in running process.

	Parameters switchover between several motors	Motor parameter switchover between two motors.
	Impact stop	Impact stop realizes safety stop
	Frequency abnormal detection	Inverter will send an alarm signal automatically when the difference between feedback speed and given speed is higher than the limit value.
	Brake failure detection in stopped status	Brake failure can be detected in stopped status to avoid load sliding down.
Operation Function	Frequency Setting	Potentiometer or external analog signal (0～5V, 0～10V, 0～20mA); keypad (terminal)▲ / ▼ keys, external control logic and automatic circulation setting.
	Start/Stop Control	Terminal control, keypad control or communication control.
	Running Command Channels	3 kinds of channels from keypad panel, control terminal and MODBUS.
	Frequency Source	Frequency sources: given digit, given analog voltage, given analog current and given MODBUS
	Accessorial frequency Source	7 kinds of accessorial frequency
Optional	Built-in EMI filter, built-in braking unit, Modbus, tele-control panel	
Protection Function	Input phase loss, Output phase loss, input under-voltage, DC over-voltage, over-current, inverter over-load, motor over-load, current stall, over-heat, external disturbance, brake feedback protection, off load protection, analog line disconnected.	
Display	LED nixie tube showing present output frequency, present rotate-speed (rpm), present output current, present output voltage, present linear-velocity, types of faults, and parameters for the system and operation; LED indicators showing the current working status of inverter.	
Environment Conditions	Equipment Location	In an indoor location, Prevent exposure from direct sunlight, Free from dust, tangy caustic gases, flammable gases, steam or the salt-contented, etc.
	Environment Temperature	-10℃～+50℃
	Environment Humidity	Below 90% (no water-bead coagulation)
	Vibration Strength	Below 0.5g (acceleration)
	Height above sea level	1000m or below
Protection level	IP20	
Applicable Motor	0.75～250kW	

2.6 Optional accessories

If users need the following optional accessories, please make it clear in order. Refer to user manual for installation dimension and exteral dimention.

Table 2-2 E2000-Q optional accessories

Name	Model	Function	Remark
Input and output expand cards 2	EDR02	Four digital input terminals, two relay output terminals	Refer to FF00～FF09
Differential input PG card	EPG01	Rotary encoder expand card with division output	For induction motor, closed-loop vector control
Non-differential input PG card	EPG02	Rotary encoder expand card with division output	The adaptor power is 15V, push-pull or open-collector output encoder
I/O expand cards 2 and Differential input PG card	EPGDR01	Four digital input terminals, two relay output terminals, rotary encoder expand card with division output	For induction motor, closed-loop vector control，digital input and relay output expand is required.
I/O expand cards 2 and non-differential input PG card	EPGDR02	Four digital input terminals, two relay output terminals, rotary encoder expand card with division output	The adaptor power is 15V, push-pull or open-collector output encoder, digital input and relay output expand is required.

III Keypad panel

Keypad panel and monitor screen are both fixed on keypad controller. Two kinds of controllers (with and without potentiometer) are available for E2000-Q series inverters. Refer to note for Fig3-1.

3.1 Panel Illustration

The panel covers three sections: data display section, status indicating section and keypad operating section, as shown in Fig. 3-1.

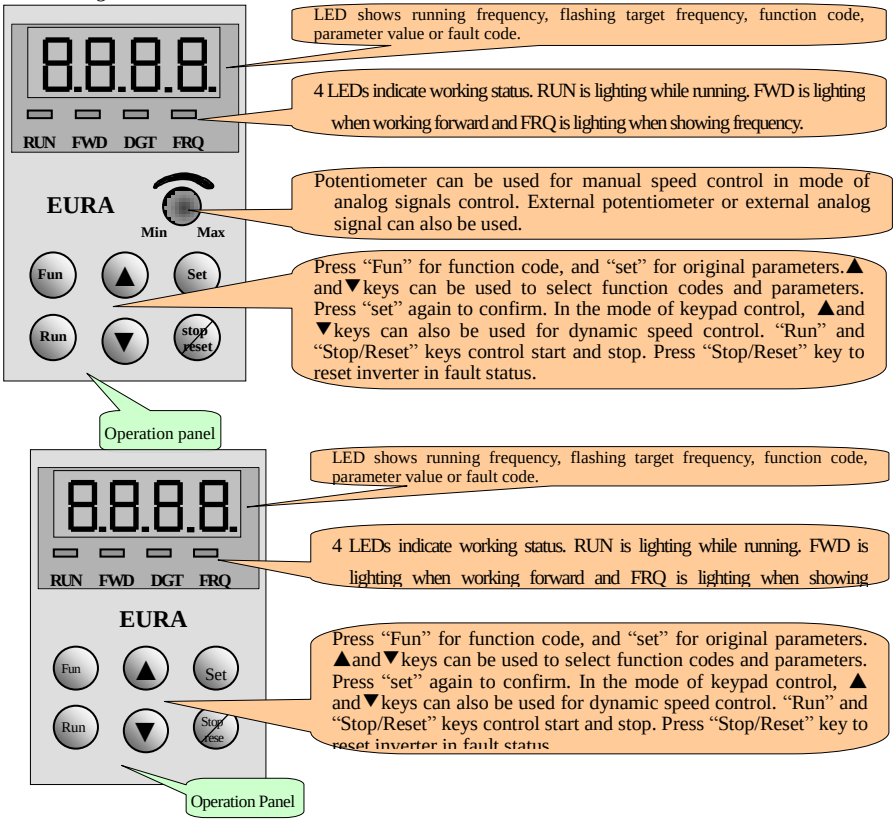


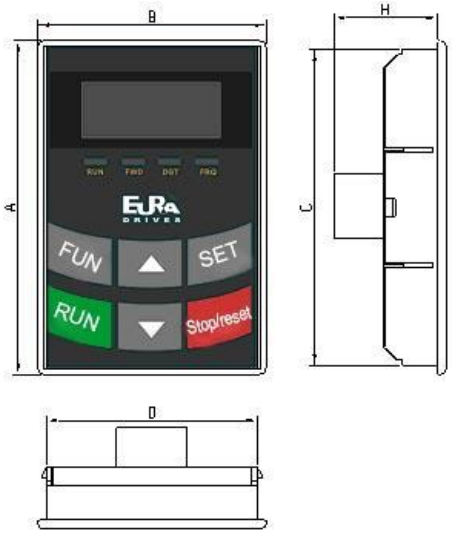
Fig.3-1 Operation Panels

Instructions for operation panel:

1. Operation panels of 18.5kW and below 18.5kW can not be pulled out. Please select AA-A or A6-1-A control panel to realize remote control, which is connected by 8-core telephone cable.
2. Operation panels of 22kW and above 22kW can be pulled out. Please select A6-1-A control panel to realize remote control, which is connected by 8 core net cable.

3.2 Panel structure

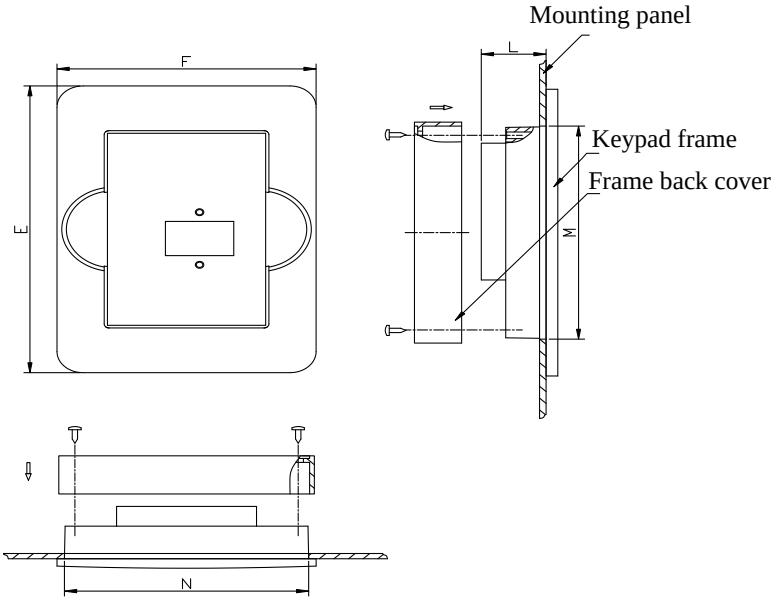
1. structure diagram



2. Structure size (Unit: mm)

Code	A	B	C	D	H	Opening size
AA	76	52	72	48	24	73*49
A6-1	124	74	120	70	26	121*71

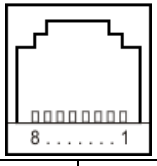
3. Panel mounting structure diagram



4. Panel mounting size (Unit: mm)

Code	Keypad panel size			Opening size	
	E	F	L	N	M
AA	109	80	20	75	81
A6-1	170	110	22	102	142

5. Port of control panel



Pins	1	2	3	4	5	6	7	8
8 core	Potentiometer	5V	Grounding	Grounding	Signal 1	Signal 2	Signal 3	Signal 4

3.3 Panel Operating

All keys on the panel are available for user. Refer to Table 3-1 for their functions.

Table 3-1 **Uses of Keys**

Keys	Names	Remarks
Fun	Fun	To call function code and switch over display mode.
Set	Set	To call and save data.
▲	Up	To increase data (speed control or setting parameters)
▼	Down	To decrease data (speed control or setting parameters)
Run	Run	To start inverter;
Stop/reset	Stop or reset	To stop inverter; to reset in fault status; to change function codes in a code group or between two code groups.

3.4 Parameters Setting

This inverter has numerous function parameters, which the user can modify to effect different modes of operation control. User needs to realize that if user sets password valid (F107=1), user's password must be entered first if parameters are to be set after power off or protection is effected, i.e., to call F100 as per the mode in Table 2-2 and enter the correct code. User's password is invalid before delivery, and user could set corresponding parameters without entering password.

Table 3-2 Steps for Parameters Setting

Steps	Keys	Operation	Display
1	Fun	Press "Fun" key to display function code	F100
2	▲ or ▼	Press "Up" or "Down" to select required function code	F114
3	Set	To read data set in the function code	5.0
4	▲ or ▼	To modify data	9.0
5	Set	To show corresponding target frequency by flashing after saving the set data	
	Fun	To display the current function code	F114

The above-mentioned step should be operated when inverter is in stop status.

3.5 Function Codes Switchover in/between Code-Groups

It has more than 300 parameters (function codes) available to user, divided into 14 sections as indicated in Table 3-3.

Table 3-3 Function Code Partition

Group Name	Function Code Range	Group Name	Function Code Range
Basic Parameters	F1	Parameters of the motor	F8
Run Control Mode	F2	Communication function	F9
Multi-functional input/output terminal	F3	Torque control	FC
Analog signals and pulse of input/output	F4	Parameters for crane application	FD
Multi-stage speed parameters	F5	The second motor parameters	FE
Subsidiary function	F6	Parameters of expansion terminal	FF
Timing control and protection function	F7	Parameters display	H0

As parameters setting costs time due to numerous function codes, such function is specially designed as "Function Code Switchover in a Code Group or between Two Code-Groups" so that parameters setting become convenient and simple.

Press "Fun" key so that the keypad controller will display function code. If press "▲" or "▼" key then, function code will circularly keep increasing or decreasing by degrees within the group; if press the "stop/reset" key again, function code will change circularly between two code groups when operating the "▲" or "▼" key.

e.g. when function code shows F111 and DGT indicator is on, press "▲"/ "▼" key, function code will keep increasing or decreasing by degrees within F100～F160; press "stop/reset" key again, DGT indicator will be off. When pressing "▲"/ "▼" key, function codes will change circularly among the 10 code-groups, like F211, F311…FA11, F111…, Refer to Fig 2-2 (The sparkling "50.00" is indicated the corresponding target frequency values).

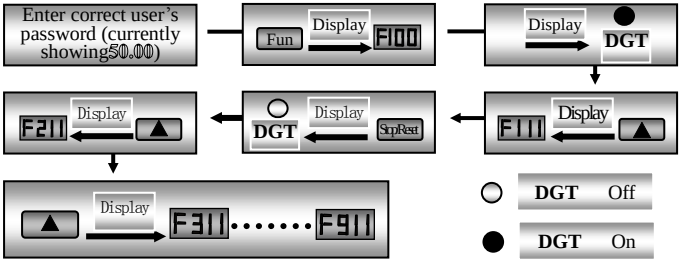


Fig 3-5 Switchover in a Code Group or between Different Code-Groups

3.6 Panel Display

Table 3-4 Items and Remarks Displayed on the Panel

Items	Remarks
HF-0	This Item will be displayed when you press "Fun" in stopping status, which indicates jogging operation is valid. But HF-0 will be displayed only after you change the value of F132.
-HF-	It stands for resetting process and will display target frequency after reset.
OC, OC1, OC2, OE, OL1, OL2, OH, LU, PF0, PF1,CE	Fault code, indicating "over-current OC", "over-current OC1", "over-current OC2", "over-voltage", "inverter over-load", "motor over-load" "over-heat", "under-voltage for input", "phase loss for output", "phase loss for input", "communication error " respectively.
AErr	Analog line disconnected
ESP	During two-line/three line running mode, "stop/reset" key is pressed or external emergency stop terminal is closed, ESP will be displayed.
F152	Function code (parameter code).
10.00	Indicating inverter's current running frequency (or rotate speed) and parameter
50.00	Sparkling in stopping status to display target frequency.
A100、U100	Output current (100A) and output voltage (100V). Keep one digit of decimal when current is below 100A.
H ***	Radiator temperature is displayed.

IV. Installation & Connection

4.1 Installation

Inverter should be installed vertically, as shown in Fig 3-1. Sufficient ventilation space should be ensured in its surrounding. Clearance dimensions (recommended) are available from Table 3-1 for installing the inverter.

Table 4-1 Clearance Dimensions

Model	Clearance Dimensions	
Hanging (＜22kW)	A≥150mm	B≥100mm
Hanging (≥22kW)	A≥200mm	B≥100mm

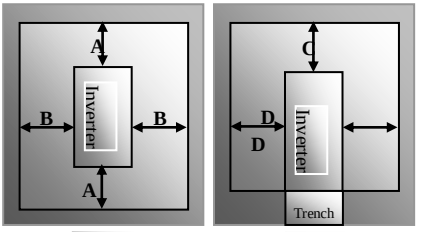
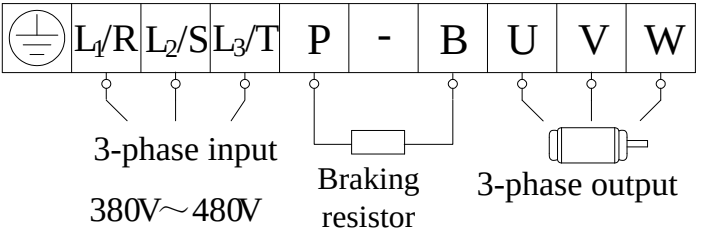


Fig 3-1 Installation Sketch

4.2 Connection

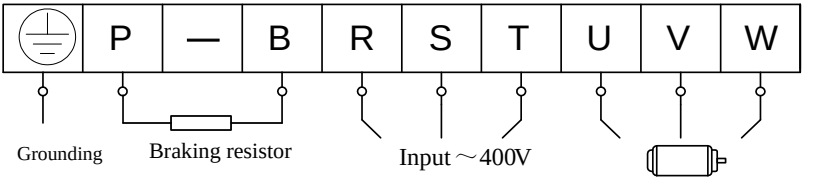
- In case of 3-phase input, connect R/L1, S/L2 and T/L3 terminals (L1/R and L2/S terminals for single-phase) with power source from network and ⏚/PE/E to earthing, U, V and W terminals to motor.
- Motor shall have to be ground connected. Or else electrified motor causes interference.
- For 18.5kw and below 18.5kW, braking unit is built-in. For 18.5kW~180kw, "-B" stands for built-in braking unit, and it is optional. For inverter above 180kW, braking unit is external.

Power terminals sketch of inverter with three-phase 400V 0.75kW~18.5kW.



Note: No "-" terminal for 11kW inverters and below 11kW inverters.

Power terminals sketch of inverter with three-phase 400V above 22kW.



(The figure is only sketch, terminals order of practical products may be different from the above-mentioned figure.)

Introduction of terminals of power loop

Terminals	Terminal Marking	**Terminal Function Description**
Power Input Terminal	R/L1, S/L2, T/L3	Input terminals of three-phase 400V AC voltage
Output Terminal	U, V, W	Inverter power output terminal, connected to motor.
Grounding Terminal	⏚/PE/E/⏚	Inverter grounding terminal.
Rest Terminal	P, B	External braking resistor (Note: no Terminals P or B for inverter without built-in braking unit).
	P, -	DC bus-line output
		Externally connected to braking unit P connected to input terminal “P” or “DC+”of braking unit, - connected to input terminal of braking unit “N” or “DC-”.

Wiring for control loop as follows:

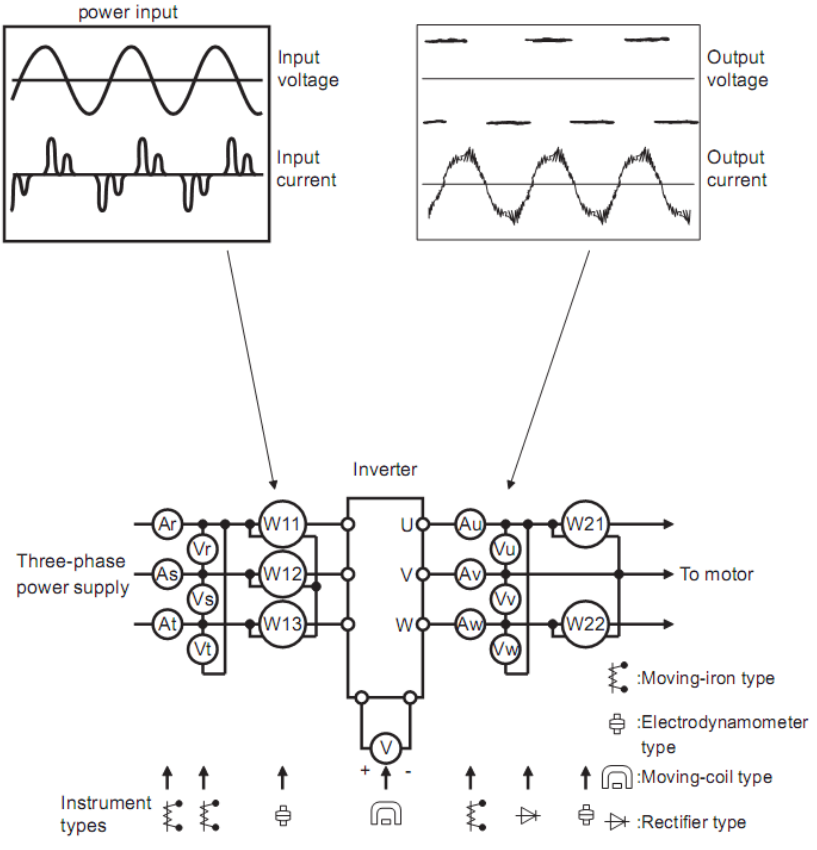
TA	TB	TC	DO1	DO2	24V	CM	DI1	DI2	DI3	DI4	DI5	DI6	DI7	DI8	10V	AI1	AI2	GND	AO1	AO2
GND	VCC	A+	B-																	

Note:

18.5kW and below 18.5kW inverters have no DO2 and DI7, DI8 control terminals.

4.3 Measurement of main circuit voltages, currents and powers

Since the voltages and currents on the inverter power supply and output sides include harmonics, measurement data depends on the instruments used and circuits measured. When instruments for commercial frequency are used for measurement, measure the following circuits with the recommended instruments.



Examples of Measuring Points and Instruments

Item	Measuring Point	Measuring Instrument	Remarks (Reference Measurement Value)
Power supply voltage V1	Across R-S,S-T, T-R	Moving-iron type AC voltmeter	400V±15%, 230V±15%
Power supply side current I1	R, S, and T line currents	Moving-iron type AC voltmeter	
Power supply side power P1	At R, S and T, and across R-S, S-T and T-R	Electrodynamic type single-phase wattmeter	P1=W11+W12+W13 (3-wattmeter method)
Power supply side power factor Pf1	Calculate after measuring power supply voltage, power supply side current and power supply side power.[Three phase power supply] $Pf1=\frac{P1}{\sqrt{3}V1\times I1}\times 100\%$		
Output side voltage V2	Across U-V, V-W and W-U	Rectifier type AC voltmeter (Moving-iron type cannot measure)	Difference between the phases is within ±1% of the maximum output voltage.
Output side current I2	U, V and W line currents	Moving-iron type AC Ammeter	Current should be equal to or less than rated inverter current. Difference between the phases is 10% or lower of the rated inverter current.
Output side power P2	U, V, W and U-V, V-W,W-U	Electrodynamic type single-phase wattmeter	P2 = W21 + W22 2-wattmeter method
Output side power factor Pf2	Calculate in similar manner to power supply side power factor: $Pf2=\frac{P2}{\sqrt{3}V2\times I2}\times 100\%$		
Converter output	Across P+（P）and -(N)	Moving-coil type (such as multi-meter)	DC voltage, the value is $\sqrt{2}\times V1$
Power supply of control PCB	Across 10V-GND	Moving-coil type (such as multi-meter)	DC10V±0.2V
	Across 24V-CM	Moving-coil type (such as multi-meter)	DC24V±1.5V
Analog output AO1	Across AO1-GND	Moving-coil type (such as multi-meter)	Approx. DC10V at max frequency.
	Across AO2-GND	Moving-coil type (such as multi-meter)	Approx. DC 4～20mA at max frequency
Alarm signal	Across TA/TC Across TB/TC	Moving-coil type (such as multi-meter)	<Normal> <Abnormal> Across TA/TC: Discontinuity Continuity Across TB/TC: Continuity Discontinuity

4.4 Functions of control terminals

The key to operate the inverter is to operate the control terminals correctly and flexibly. Certainly, the control terminals are not operated separately, and they should match corresponding settings of parameters. This chapter describes basic functions of the control terminals. The users may operate the control terminals by combining relevant contents hereafter about "Defined Functions of the Terminals".

Table 4-3 **Functions of Control Terminals**

Terminal	Type	Description	Function	
DO1	Output signal	Multifunctional output terminal 1	When the token function is valid, the value between this terminal and CM is 0V; when the inverter is stopped, the value is 24V. When DO1 is as high-frequency output terminal, the max output frequency is 100KHz and please do not connect to intermediate relay.	The functions of output terminals shall be defined per manufacturer's value. Their initial state may be changed through changing function codes.
DO2[Note]		Multifunctional output terminal 2	When the token function is valid, the value between this terminal and CM is 0V; when the inverter is stopped, the value is 24V.	
TA		Relay contact	TC is a common point, TB-TC are normally closed contacts, TA-TC are normally open contacts. The contact capacity is 10A/125VAC, NO/NC 3A 250VAC/30VDC.	
TB				
TC				
AO1		Voltage/current output	It is connected with frequency meter, speedometer or ammeter externally, and its minus pole is connected with GND. See F423～F426 for details,.	
AO2		Current output	It is connected with ammeter externally, and its minus pole is connected with GND. See F427～F430 for details	
10V	Analog power supply	Self contained power supply	Internal 10V self-contained power supply of the inverter provides power to the inverter. When used externally, it can only be used as the power supply for voltage control signal, with current restricted below 20mA.	
AI1	Input Signal	Voltage analog input port	When analog speed control is adopted, the voltage signal is inputted through this terminal. The range of voltage input is 0～10V, grounding: GND. When potentiometer speed control is adopted, this terminal is connected with center tap, earth wire to be connected to GND.	
AI2		Voltage / Current analog input port	When analog speed control is adopted, the voltage or current signal is input through this terminal. The range of voltage input is 0~5V or 0~10V or -10V-10V, and the current input is 0～20mA, the input resistor is 500Ohm, and grounding: GND. If the input is 4～20mA, it can be realized by setting F406=2. The voltage or current signal can be chosen by coding switch. See table 5-2, 5-3 for details, the default setting of AI1 is 0~10V, and the default setting of AI2 is 0~20mA.	
GND		Self-contained Power supply Ground	Ground terminal of external control signal (voltage control signal or current source control signal) is also the ground of 10V power supply of this inverter.	
24V	Power supply	Control power supply	Power: 24±1.5V, grounding is CM; current is restricted below 200mA for external use.	
DI1	Digital input control terminal	Jogging terminal	When this terminal is valid, the inverter will have jogging running. The jogging function of this terminal is valid under both at stopped and running status. This terminal can also be used as high-speed pulse input port. The max frequency is 100K Hz.	The functions of input terminals shall be defined per manufacturer's value. Other functions can also be defined by changing function codes.

DI2		External Emergency Stop	When this terminal is valid, “ESP” malfunction signal will be displayed.	
DI3		“FWD” Terminal	When this terminal is valid, inverter will run forward.	
DI4		“REV” Terminal	When this terminal is valid, inverter will run reversely.	
DI5		Reset terminal	Make this terminal valid under fault status to reset the inverter.	
DI6		Free-stop	Make this terminal valid during running can realize free stop.	
DI7		Running terminal	When this terminal is in the valid state, inverter will run by the acceleration time.	
DI8		Stop terminal	Make this terminal valid during running can realize stop by the deceleration time.	
CM	Common port	Grounding of control power supply	The grounding of 24V power supply and other control signals.	
GND	485 communication terminals	Grounding of differential signal	Grounding of differential signal	
5V		Power of differential signal	Power of differential signal	
A+		Positive polarity of differential signal	Standard: TIA/EIA-485(RS-485) Communication protocol: Modbus Communication rate: 1200/2400/4800/9600/19200/38400/57600bps	
B-		Negative polarity of Differential signal		

Note:

1. 18.5kW and below 18.5kW inverters have no DO2, DI7 and DI8 control terminals.
2. AI1 terminal of 18.5kW and below 18.5kW inverters can only accept 0~10V voltage signal.

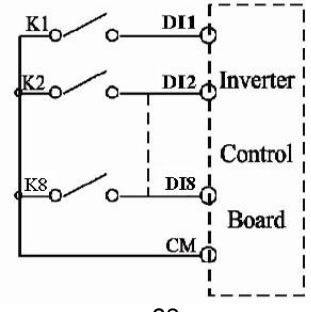
Wiring for digital input terminals:

Generally, shield cable is adopted and wiring distance should be as short as possible. When active signal is adopted, it is necessary to take filter measures to prevent power supply interference. Mode of contact control is recommended.

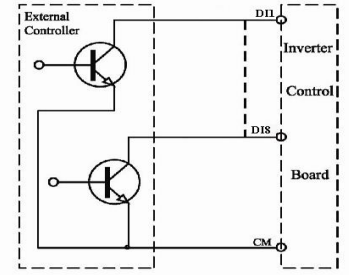
Digital input terminals are only connected by source electrode (NPN mode) or by drain electrode (PNP mode). If NPN mode is adopted, please turn the toggle switch to the end of “NPN”.

Wiring for control terminals as follows:

1. Wiring for positive source electrode (NPN mode).

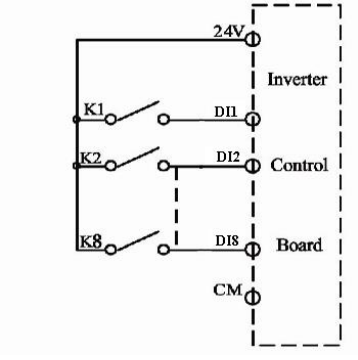


2. Wiring for active source electrode

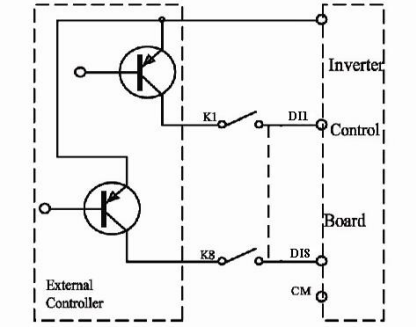


If digital input control terminals are connected by drain electrode, please turn the toggle switch to the end of "PNP". Wiring for control terminals as follows:

3. Wiring for positive drain electrode (PNP mode)



4. Wiring for active drain electrode (PNP mode)



Wiring by source electrode is a mode most in use at present. Wiring for control terminal is connected by source electrode, user should choose wiring mode according to requirement.

Instructions of choosing NPN mode or PNP mode:

1. There is a toggle switch J7 near to control terminals. Please refer to Fig 4-2.
2. When turning J7 to “NPN”, DI terminal is connected to CM.
When turning J7 to “PNP”, DI terminal is connected to 24V.

Fig 4-2 Toggle Switch J7

4.5 Wiring Recommended

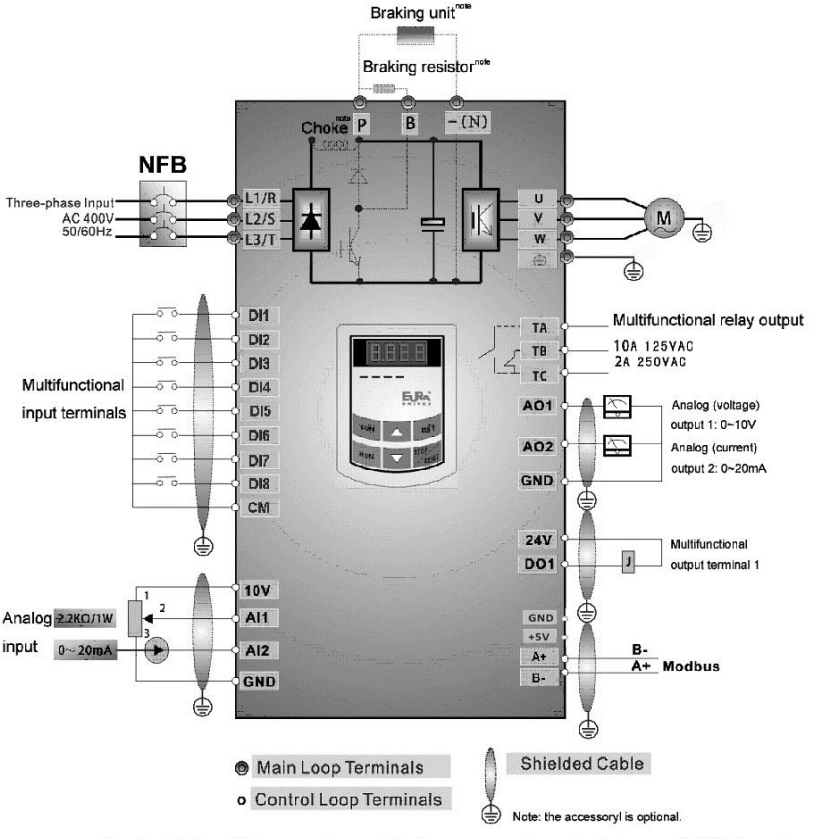
Inverter Model	Lead Section Area(mm^2)	Inverter Model	Lead Section Area(mm^2)
E2000-Q0007T3	1.5	E2000-Q0370T3	25
E2000-Q0015T3	2.5	E2000-Q0450T3	35
E2000-Q0022T3	2.5	E2000-Q0550T3	35
E2000-Q0030T3	2.5	E2000-Q0750T3	50
E2000-Q0040T3	2.5	E2000-Q0900T3	70
E2000-Q0055T3	4.0	E2000-Q1100T3	70
E2000-Q0075T3	4.0	E2000-Q1320T3	95
E2000-Q0110T3	6.0	E2000-Q1600T3	120
E2000-Q0150T3	10	E2000-Q1800T3	120
E2000-Q0185T3	16	E2000-Q2000T3	150
E2000-Q0220T3	16	E2000-Q2200T3	185
E2000-Q0300T3	25	E2000-Q2500T3	240

4.6 Lead section area of protect conductor (grounding wire)

Lead section area S of U,V,W (mm^2)	Minimum lead section area S of E (mm^2)
S≤16	S
16<S≤35	16
35<S	S/2

4.7 Overall Connection and "Three- Line" Connection

* Refer to next figure for overall connection sketch for E2000-Q series inverters. Wiring mode is available for various terminals whereas not every terminal needs connection when applied.



Basic Wiring Diagram for multi-stage speed control macro (NPN type)

Note:

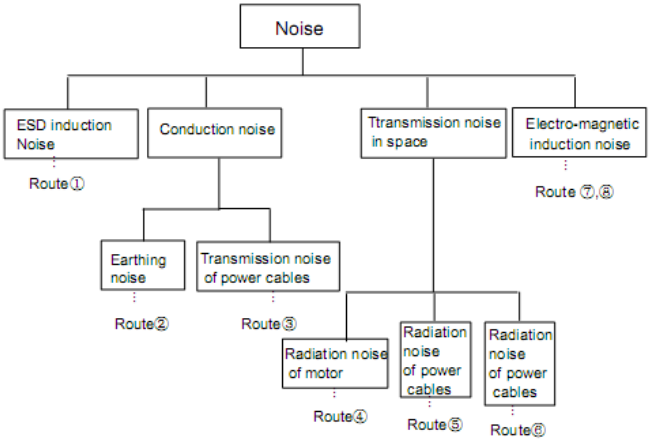
1. 485 communication has standard MODBUS communication protocol. Communication port is on the left side of inverter. The sequence for 18.5kw and below 18.5kw inverter from top to down is B-, A+, 5V power, and GND. The sequence for 22kw and above 22kw inverter from top to down is GND, 5V, A+ and B-.
2. Inverter 22kw and above 22kW has 8 multifunctional input terminals DI1~DI8, inverter below 22kW has 6 multifunctional input terminals DI1~DI6.
3. The contact capacity is 10A/125VAC. NO/NC: 3A 250VAC/30VDC.

4.8 Basic methods of suppressing the noise

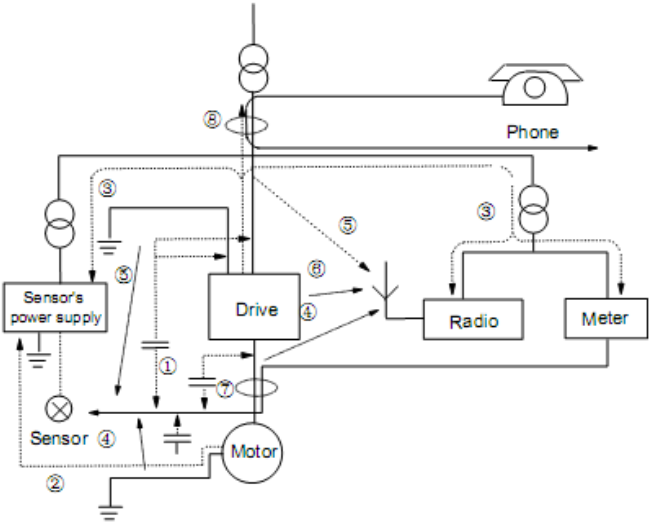
The noise generated by the drive may disturb the equipment nearby. The degree of disturbance is dependent on the drive system, immunity of the equipment, wiring, installation clearance and earthing methods.

4.8.1 Noise propagation paths and suppressing methods

① Noise categories



② Noise propagation paths

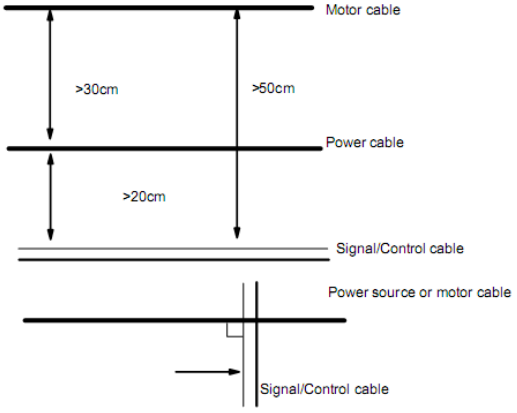


③Basic methods of suppressing the noise

Noise emission paths	Actions to reduce the noise
②	When the external equipment forms a loop with the drive, the equipment may suffer nuisance tripping due to the drive's earth leakage current. The problem can be solved if the equipment is not grounded.
③	If the external equipment shares the same AC supply with the drive, the drive's noise may be transmitted along its input power supply cables, which may cause nuisance tripping to other external equipment. Take the following actions to solve this problem: Install noise filter at the input side of the drive, and use an isolation transformer or line filter to prevent the noise from disturbing the external equipment.
④⑤⑥	If the signal cables of measuring meters, radio equipment and sensors are installed in a cabinet together with the drive, these equipment cables will be easily disturbed. Take the actions below to solve the problem: (1) The equipment and the signal cables should be as far away as possible from the drive. The signal cables should be shielded and the shielding layer should be grounded. The signal cables should be placed inside a metal tube and should be located as far away as possible from the input/output cables of the drive. If the signal cables must cross over the power cables, they should be placed at right angle to one another. (2) Install radio noise filter and linear noise filter (ferrite common-mode choke) at the input and output of the drive to suppress the emission noise of power lines. (3) Motor cables should be placed in a tube thicker than 2mm or buried in a cement conduit. Power cables should be placed inside a metal tube and be grounded by shielding layer
①⑦⑧	Don't route the signal cables in parallel with the power cables or bundle these cables together because the induced electro-magnetic noise and induced ESD noise may disturb the signal cables. Other equipment should also be located as far away as possible from the drive. The signal cables should be placed inside a metal tube and should be placed as far away as possible from the input/output cables of the drive. The signal cables and power cables should be shielded cables. EMC interference will be further reduced if they could be placed inside metal tubes. The clearance between the metal tubes should be at least 20cm.

4.8.2 Field Wire Connections

Control cables, input power cables and motor cables should be installed separately, and enough clearance should be left among the cables, especially when the cables are laid in parallel and the cable length is big. If the signal cables must go through the power cables, they should be vertical to each other.

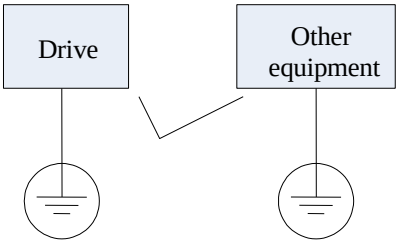


Generally, the control cables should be shielded cables and the shielding metal net must be connected to the metal

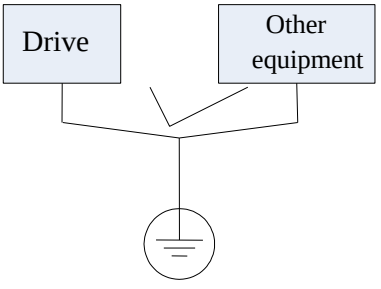
enclosure of the drive by cable clamps.

4.8.3 Earthing

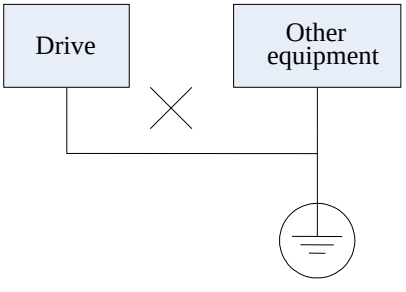
Independent earthing poles (best)

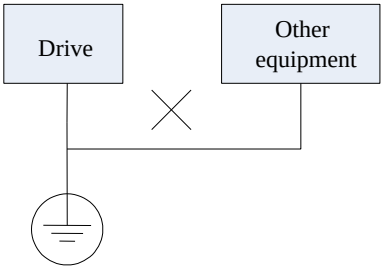


Shared earthing pole (good)



Shared earthing cable (not good)





Note:

1. In order to reduce the earthing resistance, flat cable should be used because the high frequency impedance of flat cable is smaller than that of round cable with the same CSA.
2. If the earthing poles of different equipment in one system are connected together, then the leakage current will be a noise source that may disturb the whole system. Therefore, the drive's earthing pole should be separated with the earthing pole of other equipment such as audio equipment, sensors and PC, etc.
3. Earthing cables should be as far away from the I/O cables of the equipment that is sensitive to noise, and also should be as short as possible.

4.8.4 Leakage current

Leakage current may flow through the drive's input and output capacitors and the motor's capacitor. The leakage current value is dependent on the distributed capacitance and carrier wave frequency. The leakage current includes ground leakage current and the leakage current between lines.

Ground leakage current

The ground leakage current can not only flow into the drive system, but also other equipment via earthing cables. It may cause the leakage current circuit breaker and relays falsely activated. The higher the drive's carrier wave frequency, the bigger the leakage current, also, the longer the motor cable, the greater the leakage current,

Suppressing methods:

Reduce the carrier wave frequency, but the motor noise may be louder;

Motor cables should be as short as possible;

The drive and other equipment should use leakage current circuit breaker designed for protecting the product against high-order harmonics/surge leakage current;

Leakage current between lines

The line leakage current flowing through the distribution capacitors of the drive out side may cause the thermal relay falsely activated, especially for the drive whose power is lower than 7.5kW. When the cable is longer than 50m, the ratio of leakage current to motor rated current may be increased that can cause the wrong action of external thermal relay very easily.

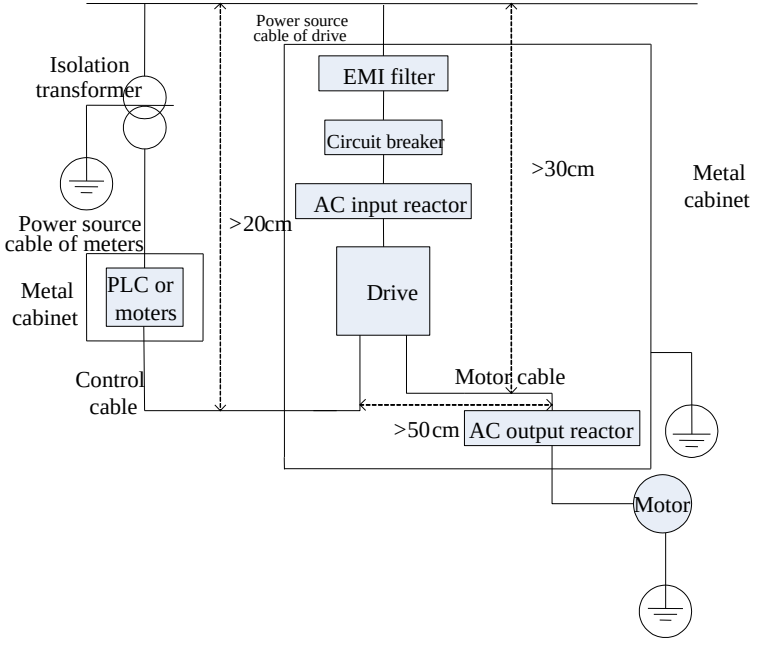
Suppressing methods:

Reduce the carrier wave frequency, but the motor noise may become louder;

Install reactor at the output side of the drive.

In order to protect the motor reliably, it is recommended to use a temperature sensor to detect the motor's temperature, and use the drive's over-load protection device (electronic thermal relay) instead of an external thermal relay.

4.8.5 Electrical installation of the drive



Note:

·Motor cable should be earthed at the drive side, if possible, the motor and drive should be earthed separately;

·Motor cable and control cable should be shielded . The shield must be earthed and avoid entangling at cable end to improve high frequency noise immunity.

·Assure good conductivity among plates, screw and metal case of the drive; use tooth-shape washer and conductive installation plate;

4.8.6 Application of Power Line Filter

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

the external EMI. The power source filter should be a two-way low pass filter through which only 50Hz current can flow and high frequency current should be rejected.

Function of power line filter

The power line filter ensures the equipment can satisfy the conducting emission and conducting sensitivity in EMC standard. It can also suppress the radiation of the equipment.

Common mistakes in using power cable filter

1. Too long power cable

The filter inside the cabinet should be located near to the input power source. The length of the power cables should be as short as possible.

2. The input and output cables of the AC supply filter are too close

The distance between input and output cables of the filter should be as far apart as possible, otherwise the high frequency noise may be coupled between the cables and bypass the filter. Thus, the filter will become ineffective.

3. Bad earthing of filter

The filter's enclosure must be earthed properly to the metal case of the drive. In order to be earthed well, make use of a special earthing terminal on the filter's enclosure. If you use one cable to connect the filter to the case, the earthing is useless for high frequency interference. When the frequency is high, so is the impedance of cable, hence there is little bypass effect. The filter should be mounted on the enclosure of equipment. Ensure to clear away the insulation paint between the filter case and the enclosure for good earthing contact.

V. Operation and Simple Running

This chapter defines and interprets the terms and nouns describing the control, running and status of the inverter. Please read it carefully. It will be helpful to your correct operation.

5.1 Basic conception

5.1.1 Control mode

E2000-Q inverter has four control modes: sensorless vector control (F106=0), closed-loop vector control (F106=1), V/F control (F106=2) and vector control 1 (F106=3)

5.1.2 Mode of torque compensation

Under V/F control mode, E2000-Q inverter has four kinds of torque compensation modes: Linear compensation (F137=0); Square compensation (F137=1); User-defined multipoint compensation (F137=2); Auto torque compensation (F137=3)

5.1.3 Mode of frequency setting

Please refer to F203~F207 for the method for setting the running frequency of the E2000-Q inverter.

5.1.4 Mode of controlling for running command

The channel for inverter to receive control commands (including start, stop and jogging, etc) contains three modes: 1. Keypad (keypad panel) control; 2. External terminal control; 3. Communication control.
The modes of control command can be selected through the function codes F200 and F201.

5.1.5 Operating status of inverter

When the inverter is powered on, it may have four kinds of operating status: stopped status, programming status, running status, and fault alarm status. They are described in the following:

Stopped status

If re-energize the inverter (if "auto-startup after being powered on" is not set) or decelerate the inverter to stop, the inverter is at the stopping status until receiving control command. At this moment, the running status indicator on the keypad goes off, and the display shows the display status before power down.

Programming status

Through keypad panel, the inverter can be switched to the status that can read or change the function code parameters. Such a status is the programming status.

There are numbers of function parameters in the inverter. By changing these parameters, the user can realize different control modes.

Running status

The inverter at the stopped status or fault-free status will enter running status after having received operation command.

The running indicator on keypad panel lights up under normal running status.

Fault alarm status

The status under which the inverter has a fault and the fault code is displayed.

Fault codes mainly include: OC, OE, OL1, OL2, OH, LU, PF1 and PF0 representing "over current", "over voltage", "inverter overload", "motor overload", "overheat", "input under-voltage", "input phase loss", and "output phase loss" respectively.

For trouble shooting, please refer to Appendix I to this manual, "Trouble Shooting".

5.2 Keypad panel and operation method

Keypad panel (keypad) is a standard part for configuration of E2000-Q inverter. Through keypad panel, the user may carry out parameter setting, status monitoring and operation control over the inverter. Both keypad panel and display screen are arranged on the keypad controller, which mainly consists of three sections: data display section, status indicating section, and keypad operating section. There are two types of keypad controller (with potentiometer or without potentiometer) for inverter. For details, please refer to Chapter II of this manual, "Keypad panel".

It is necessary to know the functions and how to use the keypad panel. Please read this manual carefully before operation.

5.2.1 Method of operating the keypad panel

(1) Operation process of setting the parameters through keypad panel

A three-level menu structure is adopted for setting the parameters through keypad panel of inverter, which enables convenient and quick searching and changing of function code parameters.

Three-level menu: Function code group (first-level menu) → Function code (second-level menu) → Set value of each function code (third-level menu).

(2) Setting the parameters

Setting the parameters correctly is a precondition to give full play of inverter performance. The following is the introduction on how to set the parameters through keypad panel.

Operating procedures:

①Press the "Fun" key, to enter programming menu.

②Press the key "Stop/Reset", the DGT lamp goes out. Press ▲ and ▼, the function code will change within the function code group. The first number behind F displayed on the panel is 1, in other words, it displays F1××at this moment.

③ Press the key "Stop/Reset" again, the DGT lamp lights up, and the function code will change within the code group. Press ▲ and ▼ to change the function code to F113; press the "Set" key to display 50.00; while press ▲ and ▼ to change to the need frequency.

④ Press the "Set" key to complete the change.

5.2.2 Switching and displaying of status parameters

Under stopped status or running status, the LED digitron of inverter can display status parameters of the inverter. Actual parameters displayed can be selected and set through function codes F131 and F132. Through the "Fun" key, it can switch over repeatedly and display the parameters of stopped status or running status. The followings are the description of operation method of displaying the parameters under stopped status and running status.

(1) Switching of the parameters displayed under stopped status

Under stopped status, inverter has several parameters of stopped status, which can be switched over repeatedly and displayed with the keys "Fun" and "Stop/Reset". These parameters are displayed: keypad jogging, target rotary speed, PN voltage, PID feedback value, temperature, PID given value and count value. Please refer to the description of function code F132.

(2) Switching of the parameters displayed under running status

Under running status, several parameters of running status can be switched over repeatedly and displayed with the keys "Fun". These parameters are displayed: output rotary speed, output current, output voltage, PN voltage, PID feedback value, temperature, count value, linear speed and PID given value. Please refer to the description of function code F131.

5.2.3 Operation process of measuring motor parameters

The user shall input the parameters accurately as indicated on the nameplate of the motor prior to selecting

operation mode of vector control and auto torque compensation (F137=3) of V/F control mode. Inverter will match standard motor stator resistance parameters according to these parameters indicated on the nameplate. To achieve better control performance, the user may start the inverter to measure the motor stator resistance parameters, so as to obtain accurate parameters of the motor controlled.
The motor parameters can be tuned through function code F800.
For example: If the parameters indicated on the nameplate of the motor controlled are as follows: numbers of motor poles are 4; rated power is 7.5kW; rated voltage is 400V; rated current is 15.4A; rated frequency is 50.00HZ; and rated rotary speed is 1440rpm, operation process of measuring the parameters shall be done as described in the following:

In accordance with the above motor parameters, set the values of F801 to F805 correctly: set the value of F801 = 7.5, F802 = 400, F803 = 15.4, F804 = 4 and F805 = 1440 respectively.

2. In order to ensure dynamic control performance of the inverter, set F800=1, i.e. select rotating tuning. Make sure that the motor is disconnected from the load. Press the "Run" key on the keypad, and the inverter will display "TEST", and it will tune the motor's parameters of two stages. After that, the motor will accelerate according to the acceleration time set at F114 and maintain for a certain period. The speed of motor will then decelerate to 0 according to the time set at F115. After auto-checking is completed, relevant parameters of the motor will be stored in function codes F806~F809, and F800 will turn to 0 automatically.

3. If it is impossible to disconnect the motor from the load, select F800＝2, i.e. stationary tuning. Press the "Run" key, the inverter will display "TEST", and it will tune the motor's parameters of two stages. The motor's stator resistance, rotor resistance and leakage inductance will be stored in F806-F808 automatically, and F800 will turn to 0 automatically. The user may also calculate and input the motor's mutual inductance value manually according to actual conditions of the motor.

5.2.4 Operation process of simple running

Table 5-1 Brief Introduction to Inverter Operation Process

Process	Operation	Reference
Installation and operation environment	Install the inverter at a location meeting the technical specifications and requirements of the product. Mainly take into consideration the environment conditions (temperature, humidity, etc) and heat radiation of the inverter, to check whether they can satisfy the requirements.	See Chapters I, II, III, IV.
Wiring of the inverter	Wiring of input and output terminals of the main circuit; wiring of grounding; wiring of switching value control terminal, analog terminal and communication interface, etc.	See Chapter IV.
Checking before getting energized	Make sure that the voltage of input power supply is correct; the input power supply loop is connected with a breaker; the inverter has been grounded correctly and reliably; the power cable is connected to the power supply input terminals of inverter correctly (R/L1, S/L2 terminals for single-phase power grid, and R/L1, S/L2, and T/L3 for three-phase power grid); the output terminals U, V, and W of the inverter are connected to the motor correctly; the wiring of control terminals is correct; all the external switches are preset correctly; and the motor is under no load (the mechanical load is disconnected from the motor).	See Chapters I～IV

Checking immediately after energized	Check if there is any abnormal sound, fuming or foreign flavor with the inverter. Make sure that the display of keypad panel is normal, without any fault alarm message. In case of any abnormality, switch off the power supply immediately.	See Appendix 1 and Appendix 2.
Inputting the parameters indicated on the motor's nameplate correctly, and measuring the motor's parameters.	Make sure to input the parameters indicated on the motor nameplate correctly, and study the parameters of the motor. The users shall check carefully, otherwise, serious problems may arise during running. Before initial running with vector control mode, carry out tuning of motor parameters, to obtain accurate electric parameters of the motor controlled. Before carrying out tuning of the parameters, make sure to disconnect the motor from mechanical load, to make the motor under entirely no load status. It is prohibited to measure the parameters when the motor is at a running status.	See description of parameter group F800~F830
Setting running control parameters	Set the parameters of the inverter and the motor correctly, which mainly include target frequency, upper and lower frequency limits, acceleration/deceleration time, and direction control command, etc. The user can select corresponding running control mode according to actual applications.	See description of parameter group.
Checking under no load	With the motor under no load, start the inverter with the keypad or control terminal. Check and confirm running status of the drive system. Motor's status: stable running, normal running, correct rotary direction, normal acceleration/deceleration process, free from abnormal vibration, abnormal noise and foreign flavor. Inverter' status: normal display of the data on keypad panel, normal running of the fan, normal acting sequence of the relay, free from the abnormalities like vibration or noise. In case of any abnormality, stop and check the inverter immediately.	See Chapter V.
Checking under with load	After successful test run under no load, connect the load of drive system properly. Start the inverter with the keypad or control terminal, and increase the load gradually. When the load is increased to 50% and 100%, keep the inverter run for a period respectively, to check if the system is running normally. Carry out overall inspection over the inverter during running, to check if there is any abnormality. In case of any abnormality, stop and check the inverter immediately.	
Checking during running	Check if the motor is running stably, if the rotary direction of the motor is correct, if there is any abnormal vibration or noise when the motor is running, if the acceleration/deceleration process of the motor is stable, if the output status of the inverter and the display of keypad panel is correct, if the blower fan is run normally, and if there is any abnormal vibration or noise. In case of any abnormality, stop the inverter immediately, and check it after switching off the power supply.	

5.3 Illustration of basic operation

Illustration of inverter basic operation: we hereafter show various basic control operation processes by taking a 7.5kW inverter that drives a 7.5kW three-phase asynchronous AC motor as an example.

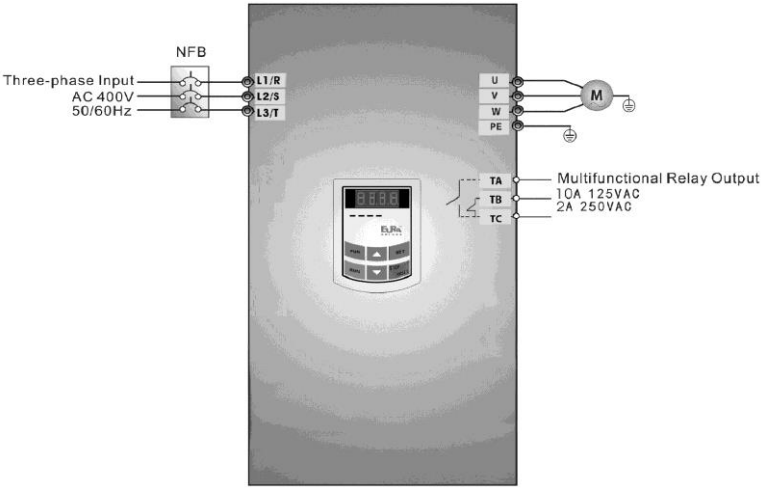


Figure 5-1 Wiring Diagram 1

The parameters indicated on the nameplate of the motor are as follows: 4 poles; rated power, 7.5kW; rated voltage, 400V; rated current, 15.4A; rated frequency 50.00HZ; and rated rotary speed, 1440rpm.

5.3.1 Operation process of frequency setting, start, forward running and stop with keypad panel

(1) Connect the wires in accordance with Figure 5-1. After having checked the wiring successfully, switch on the air switch, and power on the inverter.

(2) Press the "Fun" key, to enter the programming menu.

(3) Measure the parameters of the motor

Function	Values
F800	1(2)
F801	7.5
F802	400
F803	15.4
F805	1440

Press the "Run" key, to measure the parameters of the motor. After completion of the tuning, the motor will stop running, and relevant parameters will be stored in F806～F809. For the details of tuning of motor parameters, please refer to "Operation process of measuring the motor parameters" in this manual and Chapter XII of this manual. (Note: F800=1 is rotating tuning, F800=2 is stationary tuning. In the mode of rotating tuning, make sure to disconnect the motor from the load).

(4) Set functional parameters of the inverter:

Function code	Values
F111	50.00
F200	0
F201	0
F202	0
F203	0

(5) Press the “Run” key, to start the inverter;

(6) During running, current frequency of the inverter can be changed by pressing ▲ or ▼;

(7) Press the “Stop/Reset” key once, the motor will decelerate until it stops running;

(8) Switch off the air switch, and power off the inverter.

5.3.2 Operation process of setting the frequency with keypad panel, and starting, forward and reverse running, and stopping inverter through control terminals

(1) Connect the wires in accordance with Figure 5-2. After having checked the wiring successfully, switch on the air switch, and power on the inverter;

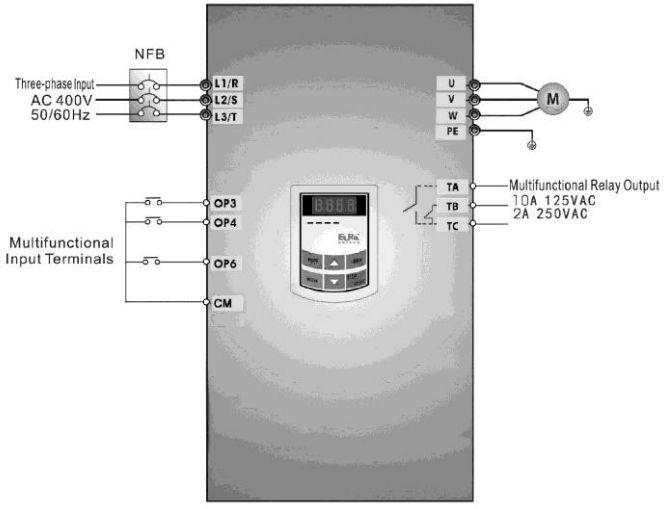


Figure 5-2 Wiring Diagram 2

(2) Press the “Fun” key, to enter the programming menu.

(3) Study the parameters of the motor: the operation process is the same as that of example 1.

(4) Set functional parameters of the inverter:

Function code	Values
F111	50.00
F203	0
F208	1

(5) Close the switch DI3, the inverter starts forward running;

(6) During running, current frequency of the inverter can be changed by pressing ▲ or ▼;

(7) During running, switch off the switch DI3, then close the switch DI4, the running direction of the motor will be changed (Note: The user should set the dead time of forward and reverse running F120 on the basis of the load. If it was too short, OC protection of the inverter may occur.)

(8) Switch off the switches DI3 and DI4, the motor will decelerate until it stops running;

(9) Switch off the air switch, and power off the inverter.

5.3.3 Operation process of jogging operation with keypad panel

(1) Connect the wires in accordance with Figure 5-1. After having checked the wiring successfully, switch on the air switch, and power on the inverter;

(2) Press the "Fun" key, to enter the programming menu.

(3) Study the parameters of the motor: the operation process is the same as that of example 1.

(4) Set functional parameters of the inverter:

Function code	Values
F124	5.00
F125	30
F126	30
F132	1
F202	0

(5) Press and hold the "Run" key until the motor is accelerated to the jogging frequency, and maintain the status of jogging operation.

(6) Release the "Run" key. The motor will decelerate until jogging operation is stopped;

(7) Switch off the air switch, and power off the inverter.

5.3.4 Operation process of setting the frequency with analog terminal and controlling the operation with control terminals

(1) Connect the wires in accordance with Figure 5-3. After having checked the wiring successfully, switch on the air switch, and power on the inverter. Note: 2K～5K potentiometer may be adopted for setting external analog signals. For the cases with higher requirements for precision, please adopt precise multiturn potentiometer, and adopt shielded wire for the wire connection, with near end of the shielding layer grounded reliably.

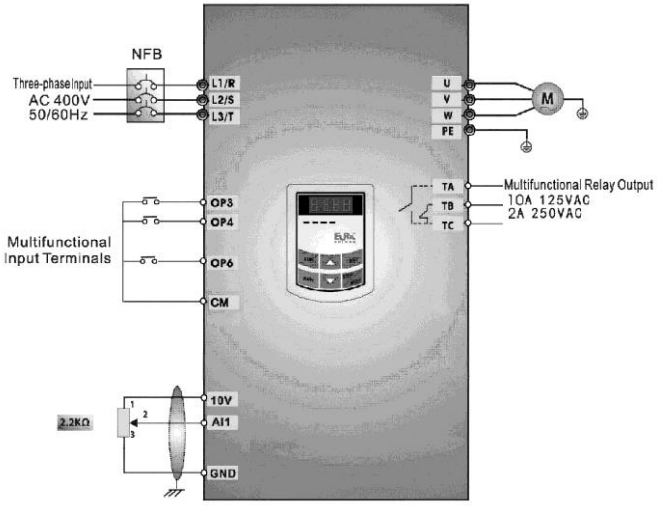


Figure 5-3 Wiring Diagram 3

(2) Press the "Fun" key, to enter the programming menu.

(3) Study the parameters of the motor: the operation process is the same as that of example 1.

(4) Set functional parameters of the inverter:

Function code	Values
F203	1
F208	1

(5) There is a red two-digit coding switch SW1 near the control terminal block of 18.5 kW inverter and below 18.5 kW, as shown in Figure 5-4. The function of coding switch is to select the voltage signal (0～5V/0～10V) or current signal of analog input terminal AI2, current channel is default. In actual application, select the analog input channel through F203. Turn switches 1 to ON and 2 to ON as illustrated in the figure, and select 0～20mA current speed control. Another switches states and mode of control speed are as table 5-2.

(6) There is a red four-digit coding switch SW1 near the control terminal block of above 30 kW inverter, as shown in Figure 5-5. The function of coding switch is to select the input range (0～5V/0～10V/0~20mA) of analog input terminal AI1 and AI2. In actual application, select the analog input channel through F203. AI1 channel default value is 0~10V, AI2 channel default value is 0~20mA. Another switches states and mode of control speed are as table 5-3.

(7) There is a toggle switch S1 at the side of control terminals, please refer to Fig 5-6. S1 is used to select the voltage input range of AI1 channel. When turning S1 to "+", the input range is 0~10V, when turning S1 to "-", the input range is -10~10V.

(8) Close the switch DI3, the motor starts forward running;

(9) The potentiometer can be adjusted and set during running, and the current setting frequency of the inverter can be changed;

(10) During running process, switch off the switch DI3, then, close DI4, the running direction of the motor will be changed;

(11) Switch off the switches DI3 and DI4, the motor will decelerate until it stops running;

(12) Switch off the air switch, and power off the inverter.

(13) Analog output terminal AO2 can only output current signal, AO1 terminal can output voltage and current signal, the selecting switch is J5, please refer to Fig 5-7, the output relation is shown in table 5-4.

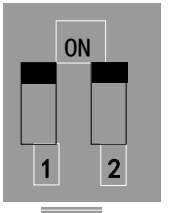


Fig 5-4

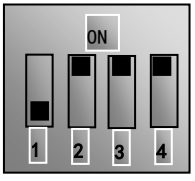


Fig 5-5

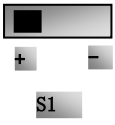


Fig 5-6

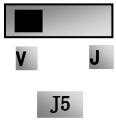


Fig 5-7

Table 5-2 **The Setting of Coding Switch and Parameters in the Mode of Analog Speed Control**

F203=2, channel AI2 is selected			F203=1, channel AI1 is selected	
SW1 coding switch			S1 toggle switch	
Coding Switch 1	Coding Switch 2	Mode of Speed Control	+	-
OFF	OFF	0~5V voltage	0~10V voltage	-10~10V voltage
OFF	ON	0~10V voltage		
ON	ON	0～20mA current		

Table 5-3 The Setting of Coding Switch and Parameters in the Mode of Analog Speed Control

Set F203 to 1, to select channel AI1				Set F203 to 2, to select channel AI2		
Coding Switch SW1		Toggle switch S1	Analog signal range	Coding Switch SW1		
Switch 1	Switch 3			Switch 2	Switch 4	Analog signal range
OFF	OFF	+	0～5V voltage	OFF	OFF	0～5V voltage
OFF	ON	+	0～10V voltage	OFF	ON	0～10V voltage
ON	ON	+	0～20mA current	ON	ON	0～20mA current
OFF	OFF	-	Reserved			
OFF	ON	-	-10~10V voltage			
ON	ON	-	Reserved			
ON refers to switching the coding switch to the top, OFF refers to switching the coding switch to the bottom						

Table 5-4 The relationship between AO1 and J5 and F423

AO1 output		Setting of F423		
		0	1	2
J5	V	0～5V	0～10V	Reserved
	I	Reserved	0～20mA	4～20mA

VI. Function Parameters

6.1 Basic parameters

F100 User's Password	Setting range: 0～9999	Mfr's value: 0

·When F107=1 with valid password, the user must enter correct user's password after power on or fault reset if you intend to change parameters. Otherwise, parameter setting will not be possible, and a prompt "Err0" will be displayed.

Relating function code: F107 Password valid or not F108 Setting user's password

F102 Inverter's Rated Current (A)		Mfr's value: Subject to inverter model
F103 Inverter Power (kW)		Mfr's value: Subject to inverter model

· Rated current and rated power can only be checked but cannot be modified.

F105 Software Edition No.	Setting range: 1.00～10.00	Mfr's value: Subject to inverter model

Software Edition No. can only be checked but cannot be modified.

F106 Control mode	Setting range: 0:Sensorless vector control (SVC); 1: Closed-loop vector control (VC); 2: V/F; 3: Vector control 1	Mfr's value: 2

·0: Sensorless vector control is suitable for the application of high-performance requirement. One inverter can only drive one motor.

1: Closed-loop vector control is suitable for the application of high-precision speed control and torque control. One inverter can only drive one motor, and the motor must install encoder.

·2: V/F control is suitable for common requirement of control precision or one inverter drives several motors.

·3: Vector control 1 is auto torque promotion, which has the same function of F137=3. While studying motor parameters, motor does not need to be disconnected with load. One inverter can only drive one motor.

Note:

1. It is necessary to study the parameters of motor before inverter runs in the vector control mode (F106=0, 1 and 3).

2. Under vector control mode (F106=0, 1 and 3), one inverter can only drive one motor and the power of motor should be similar to the power of inverter. Otherwise, control performance will be increased or system can not work properly.

3. The operator may input motor parameters manually according to the motor parameters given by motor manufactures.

4. Usually, the motor will work normally by inverter's default parameters, but the inverter's best control performance will not be acquired. Therefore, in order to get the best control performance, please study the parameters of motor before inverter runs in the vector control mode.

F107 Password Valid or Not	Setting range: 0: invalid; 1: valid	Mfr's value: 0
F108 Setting User's Password	Setting range: 0～9999	Mfr's value: 8

·When F107 is set to 0, the function codes can be changed without inputting the password. When F107 is set to 1, the function codes can be changed only after inputting the user's password by F100.

·The user can change “User’s Password”. The operation process is the same as those of changing other parameters.

· Input the value of F108 into F100, and the user’s password can be unlocked.

Note: When password protection is valid, and if the user’s password is not entered, F108 will display 0.

F109 Starting Frequency (Hz)	Setting range: 0.00～10.00	Mfr’s value: 0.00
F110 Holding Time of Starting Frequency (S)	Setting range: 0.0～999.9	Mfr’s value: 0.0

·The inverter begins to run from the starting frequency. If the target frequency is lower than starting frequency, F109 is invalid.

·The inverter begins to run from the starting frequency. After it keeps running at the starting frequency for the time as set in F110, it will accelerate to target frequency. The holding time is not included in acceleration/deceleration time.

·Starting frequency is not limited by the Min frequency set by F112. If the starting frequency set by F109 is lower than Min frequency set by F112, inverter will start according to the setting parameters set by F109 and F110. After inverter starts and runs normally, the frequency will be limited by frequency set by F111 and F112.

·Starting frequency should be lower than Max frequency set by F111.

Note: when speed track is adopted, F109 and F110 are invalid.

F111 Max Frequency (Hz)	Setting range: F113～650.0	Mfr’s value: 50.00
F112 Min Frequency (Hz)	Setting range: 0.00～F113	Mfr’s value: 0.50

· Max frequency is set by F111.

Note: in vector control mode (F106=0,1), the max frequency should be lower than 500Hz.

· Min frequency is set by F112.

· The setting value of min frequency should be lower than target frequency set by F113.

· The inverter begins to run from the starting frequency. During running process, if the given frequency is lower than min frequency, then inverter will stop.

Max/Min frequency should be set according to the nameplate parameters and running situations of motor. The motor is forbidden running at low frequency for a long time, or else motor will be damaged because of overheat.

F113 Target Frequency (Hz)	Setting range: F112～F111	Mfr’s value: 50.00

·It shows the preset frequency. Under keypad speed control or terminal speed control mode, the inverter will run to this frequency automatically after startup.

F114 First Acceleration Time (S) F115 First Deceleration Time (S) F116 Second Acceleration Time (S) F117 Second Deceleration Time (S)	Setting range: 0.1～3000	Mfr’s value: subject to inverter model

F119 is used to set the reference of setting accel/decel time.

· The Acceleration/Deceleration time can be chosen by multifunction digital input terminals F316~F323 and connecting DI terminal with CM terminal. Please refer to the instructions of multi-functional input terminals.

Note: when speed track is working, acceleration/deceleration time, min frequency and target frequency are invalid. After speed track is finished, inverter will run to target frequency according to acceleration/deceleration time.

F118 Turnover Frequency (Hz)	Setting range: 15.00～650.0	Mfr’s value: 50.00Hz

· Turnover frequency is the final frequency of V/F curve, and also is the least frequency according to the highest output voltage.

·When running frequency is lower than this value, inverter has constant-power output. When running frequency exceeds this value, inverter has constant-power output.

Note: during the process of speed track, turnover frequency is invalid. After speed track is finished, this function code is valid.

F119 The reference of setting accel/decel time	Setting range: 0: 0~50.00Hz	Mfr’s value: 0

	1: 0~max frequency	

When F119=0, acceleration/ deceleration time means the time for inverter to accelerate/ decelerate from 0Hz (50Hz) to 50Hz (0Hz).
When F119=1, acceleration/ deceleration time means the time for inverter to accelerate/ decelerate from 0Hz (max frequency) to max frequency (0Hz).

F120 Forward / Reverse Switchover dead-Time (S)	Setting range: 0.0～3000	Mfr's value: 0.0

· Within "forward/ reverse switchover dead-time", this latency time will be cancelled upon receiving "stop" signal. This function is suitable for all the speed control modes except automatic cycle operation.
· This function can ease the current impact in the process of direction switchover.
Note: during the process of speed track, F120 is invalid. After speed track is finished, this function code is valid.

F122 Reverse Running Forbidden	Setting range: 0: invalid; 1: valid	Mfr's value: 0

When F122=1, inverter will only run forward no matter the state of terminals and the parameters set by F202.
Inverter will not run reverse and forward / reverse switchover is forbidden. If reverse signal is given, inverter will stop.
If reverse running locking is valid (F202=1), whatever speed track is valid or not, inverter has no output.
When F122=1，F613=1 and inverter gets forward running command and motor is sliding reverse, if inverter can detect the sliding direction and track to motor speed, then inverter will run to 0.0Hz reverse, then run forward according to the setting value of parameters.

F123 Minus frequency is valid in the mode of combined speed control.	0：Invalid；1：valid	0

·In the mode of combined speed control, if running frequency is minus and F123=0, inverter will stop; if F123=1, inverter will run reverse at this frequency. (This function is controlled by F122.)

F124 Jogging Frequency (Hz)	Setting range: F112～F111	Mfr's value: 5.00
F125 Jogging Acceleration Time (S)	Setting range: 0.1～3000	Mfr's value: subject to inverter model
F126 Jogging Deceleration Time (S)		

·There are two types of jogging: keypad jogging and terminal jogging. Keypad jogging is valid only under stopped status (F132 including of displaying items of keypad jogging should be set). Terminal jogging is valid under both running status and stopped status.

·Carry out jogging operation through the keypad (under stopped status):

a. Press the "Fun" key, it will display "HF-0";
b. Press the "Run" key, the inverter will run to "jogging frequency" (if pressing "Fun" key again, "keypad jogging" will be cancelled).

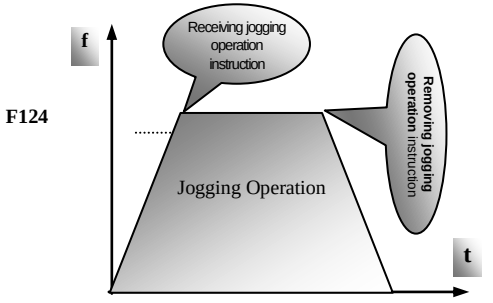


Figure 6-1 Jogging Operation

·In case of terminal jogging, make "jogging" terminal (such as DI1) connected to CM, and inverter will run to jogging frequency. The rated function codes are from F316 to F323.

Note: when jogging function is valid, speed track function is invalid.

F127/F129 Skip Frequency A,B (Hz)	Setting range: 0.00～150.0	Mfr's value:0.00
F128/F130 Skip Width A,B (Hz)	Setting range: 0.00~2.50	Mfr's value: 0.00

· Systematic vibration may occur when the motor is running at a certain frequency. This parameter is set to

skip this frequency.

·The inverter will skip the point automatically when output frequency is equal to the set value of this parameter.

·"Skip Width" is the span from the upper to the lower limits around Skip Frequency. For example, Skip Frequency=20Hz, Skip Width=0.5Hz, inverter will skip automatically when output is between 19.5～20.5Hz.

·Inverter will not skip this frequency span during acceleration/deceleration.

Note: during the process of speed track, skip frequency function is invalid. After speed track is finished, this function is valid.

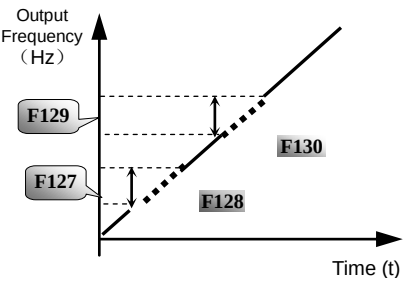


Figure 6-2 Skip Frequency

F131 Running Display Items	0－Current output frequency/function-code 1－Output rotary speed 2－Output current 4－Output voltage 8－PN voltage 16－Reserved 32－Temperature 64－Reserved 128－Reserved 256－Reserved 512－Reserved 1024－Reserved 2048－Output power 4096－ Output torque	Mfr's value: 0+1＋2＋4＋8=15

·Selection of one value from 1, 2, 4, 8, 16, 32, 64 and 128 shows that only one specific display item is selected. Should multiple display items be intended, add the values of the corresponding display items and take the total values as the set value of F131, e.g., just set F131 to be 3 (1+2) if you want to call "current output rotary speed" and "output current". The other display items will be covered.

·As F131＝8191, all display items are visible, of which, "frequency/function-code" will be visible whether or not it is selected.

·Should you intend to check any display item, just press the "Fun" key for switchover.

·Refer to the following table for each specific value unit and its indication:

·Whatever the value of F131 is set to, corresponding target frequency will flash under stopped status.

Target rotary speed is an integral number. If it exceeds 9999, add a decimal point to it.

Current display A *.* Voltage display U*** Temperature H***

Output power *.* Output torque *.*

Note: when count value is displayed and it exceeds 9999, only 4 digits are displayed and add a decimal point to it, i.e. 12345 is displayed in the form of 1234. .

F132 Display items of stop	Setting range: 0: Frequency/function-code 1: Reserved 2: Target rotary speed 4: PN voltage 8: Reserved 16:temperature 32: Reserved 64: Reserved 128: Reserved 256: Reserved 512: Reserved	Mfr's value: 0+2+4=6
F133 Drive ratio of driven system	Setting range: 0.10～200.0	Mfr's value: 1.00
F134 Transmission-wheel radius	0.001～1.000 (m)	Mfr's value: 0.001

·Calculation of rotary speed and linear speed:

For example, If inverter's max frequency F111=50.00Hz, numbers of motor poles F804=4, drive ratio F133=1.00, transmission-shaft radius R=0.05m, then

Transmission shaft perimeter: $2\pi r = 2\times3.14\times0.05=0.314$ (meter)

Transmission shaft rotary speed: 60× operation frequency/ (numbers of poles pairs × drive ratio) =60×50/ (2×1.00) =1500rpm

Endmost linear speed: rotary speed × perimeter=1500×0.314=471(meters/second)

F136 Slip compensation	Setting range: 0～10%	Mfr's value: 0

· Under V/F controlling, rotary speed of motor rotor will decrease as load increases. Be assured that rotor rotate speed is near to synchronization rotary speed while motor with rated load, slip compensation should be adopted according to the setting value of frequency compensation.

Note: during the process of speed track, slip compensation function is invalid. After speed track is finished, this function is valid.

F137 Modes of torque compensation	Setting range: 0: Linear compensation; 1: Square compensation; 2: User-defined multipoint compensation 3: Auto torque compensation	Mfr's value: 0
F138 Linear compensation	Setting range: 1～16	Mfr's value: subject to inverter model
F139 Square compensation	Setting range: 1: 1.5 2: 1.8 3: 1.9 4: 2.0 5~6: Reserved	Mfr's value: 1

When F106=2, the function of F137 is valid.

To compensate low-frequency torque controlled by V/F, output voltage of inverter while low-frequency should be compensated.

When F137=0, linear compensation is chosen and it is applied on universal constant-torque load;

When F137=1, square compensation is chose and it is applied on the loads of fan or water pump;

When F137=2, user-defined multipoint compensation is chosen and it is applied on the special loads of spin-drier or centrifuge;

This parameter should be increased when the load is heavier, and this parameter should be decreased when the load is lighter.

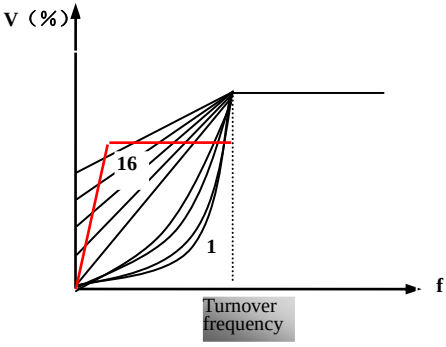


Fig 6-3 Torque Promotion

If the torque is elevated too much, motor is easy to overheat, and the current of inverter will be too high. Please check the motor while elevating the torque.

When F137=3, auto torque compensation is chose and it can compensate low-frequency torque automatically, to diminish motor slip, to make rotor rotary speed close to synchro rotary speed and to restrain motor vibration. Customers should set correctly motor power, rotary speed, numbers of motor poles, motor rated current and stator resistance. Please refer to the chapter "Operation process of measuring motor parameters".

F140 Voltage compensation point frequency (Hz)	Setting range: 0.00～F142	Mfr's value: 1.00
F141 Voltage compensation point 1 (%)	Setting range: 0～100	Mfr's value: 4
F142 User-defined frequency point F2	Setting range: F140～F144	Mfr's value: 5.00
F143 User-defined voltage point V2	Setting range: 0～100%	Mfr's value: 13
F144 User-defined frequency point F3	Setting range: F142～F146	Mfr's value: 10.00
F145 User-defined voltage point V3	Setting range: 0～100%	Mfr's value: 24
F146 User-defined frequency point F4	Setting range: F144～F148	Mfr's value: 20.00
F147 User-defined voltage point V4	Setting range: 0～100%	Mfr's value: 45
F148 User-defined frequency point F5	Setting range: F146～F150	Mfr's value: 30.00
F149 User-defined voltage point V5	Setting range: 0～100%	Mfr's value: 63
F150 User-defined frequency point F6	Setting range: F148～F118	Mfr's value: 40.00
F151 User-defined voltage point V6	Setting range: 0～100%	Mfr's value: 81

AS shown in Fig6-3, when F137=0, VF curve compensation =Max (F138, F141)

When F137=1, VF curve compensation =Max (F139, F141)

When F137=2, VF curve compensation =Max (auto compensation, F141)

When F137=3, auto compensation.

F141 can not be set too high, otherwise, inverter will easily trip into OH and OC.

Multi-stage V/F curves are defined by 12 parameters from F140 to F151.

The setting value of V/F curve is set by motor load characteristic.

Note: V1<V2<V3<V4<V5<V6，F1<F2<F3<F4<F5<F6.As low-frequency, if the setting voltage is too high, motor will overheat or be damaged. Inverter will be stalling or occur over-current protection.

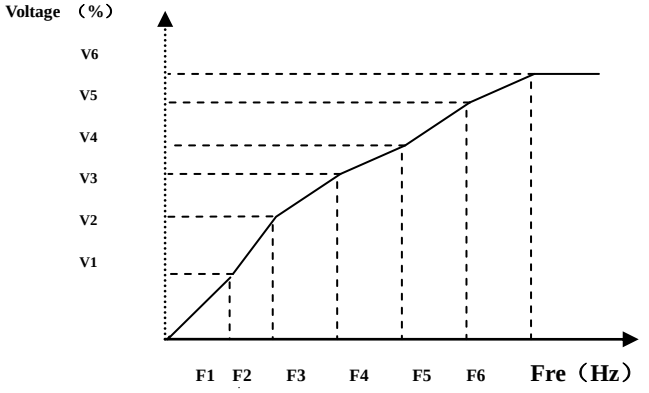


Fig 6-4 Polygonal-Line Type V/F

Note: during the process of speed track, polygonal-line V/F curve function is invalid. After speed track is finished, this function is valid.

F152 Output voltage corresponding to turnover frequency	Setting range: 10～100	Mfr's value: 100

This function can meet the needs of some special loads, for example, when the frequency outputs 300Hz and corresponding voltage outputs 200V (supposed voltage of inverter power supply is 400V), turnover frequency F118 should be set to 300Hz and F152 is set to（200÷400）×100=50. And F152 should be equal to 50.

Please pay attention to nameplate parameters of motor. If the working voltage is higher than rated voltage or the frequency is higher than rated frequency, motor would be damaged.

Note: during the process of speed track, slip compensation function is invalid. After speed track is finished, this function is valid.

F153 Carrier frequency setting	Setting range: subject to model	Mfr's value: subject to model

Carrier-wave frequency of inverter is adjusted by setting this code function. Adjusting carrier-wave may reduce motor noise, avoid point of resonance of mechanical system, decrease leakage current of wire to earth and the interference of inverter.

When carrier-wave frequency is low, although carrier-wave noise from motor will increase, the current leaked to the earth will decrease. The wastage of motor and the temperature of motor will increase, but the temperature of inverter will decrease.

When carrier-wave frequency is high, the situations are opposite, and the interference will raise.

When output frequency of inverter is adjusted to high frequency, the setting value of carrier-wave should be increased. Performance is influenced by adjusting carrier-wave frequency as below table:

Carrier-wave frequency	Low	→	High
Motor noise	Loud	→	Low
Waveform of output current	Bad	→	Good
Motor temperature	High	→	Low
Inverter temperature	Low	→	High
Leakage current	Low	→	High
Interference	Low	→	High

F154 Automatic voltage rectification	Setting range: 0: Invalid 1: Valid 2:Invalid during deceleration process	Mfr's value: 0

This function is enable to keep output voltage constant automatically in the case of fluctuation of input voltage, but the deceleration time will be affected by internal PI adjust. If deceleration time is forbidden being changed, please select F154=2.

F155 Digital accessorial frequency setting	Setting range: 0.00～F111	Mfr's value: 0.00
F156 Digital accessorial frequency polarity setting	Setting range: 0 or 1	Mfr's value: 0
F157 Reading accessorial frequency		
F158 Reading accessorial frequency polarity		

Under combined speed control mode, when accessorial frequency source is digital setting memory (F204=0), F155 and F156 are considered as initial set values of accessorial frequency and polarity (direction).

In the mode of combined speed control, F157 and F158 are used for reading the value and direction of accessorial frequency.

For example, when F203=1, F204=0. F207=1, the given analog frequency is 15Hz, inverter is required to run to 20Hz. In case of this requirement, user can push "UP" button to raise the frequency from 15Hz to 20Hz. User can also set F155=5Hz and F160=0 (0 means forward, 1 means reverse). In this way, inverter can be run to 20Hz directly.

F159 Random carrier-wave selection	Setting range: 0: Invalid 1: Valid	Mfr's value: 0

When F159=0, inverter will modulate as per the carrier-wave set by F153. When F159=1, inverter will operate in mode of random carrier-wave modulating.

Note: when random carrier-wave is selected, output torque will increase but noise will be loud. When the carrier-wave set by F153 is selected, noise will be reduced, but output torque will decrease. Please set the value according to the situation.

F160 Reverting to manufacturer values	Setting range: 0: Invalid 1: Valid	Mfr's value: 0

·When there is disorder with inverter's parameters and manufacturer values need to be restored, set F160=1. After "Reverting to manufacturer values" is done, F160 values will be automatically changed to 0.

· "Reverting to manufacturer values" will not work for the function-codes marked "○"in the "change" column of the parameters table. These function codes have been adjusted properly before delivery. And it is recommended not to change them.

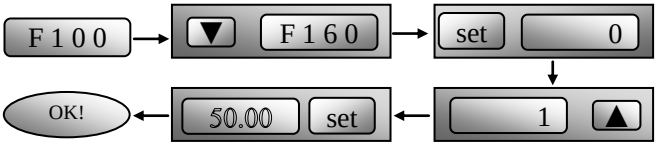


Figure 6-5 Reverting to manufacturer values

6.2 Operation Control

F200 Source of start command	Setting range: 0: Keypad command; 1: Terminal command; 2: Keypad＋Terminal; 3: MODBUS; 4: Keypad＋Terminal＋MODBUS	Mfr's value: 4
F201 Source of stop command	Setting range: 0: Keypad command; 1: Terminal command; 2: Keypad＋Terminal; 3: MODBUS; 4: Keypad＋Terminal＋MODBUS	Mfr's value: 4

· F200 and F201 are the resource of selecting inverter control commands.

· Inverter control commands include: starting, stopping, forward running, reverse running, jogging, etc.

·"Keypad command" refers to the start/stop commands given by the "Run" or "stop/reset" key on the keypad.

·"Terminal command" refers to the start/stop command given by the "Run" terminal defined by F316-F323.

·When F200=3 and F201=3, the running command is given by MODBUS.

·When F200=2 and F201=2, "keypad command" and "terminal command" are valid at the mean time, F200=4 and F201=4 are the same.

F202 Mode of direction setting	Setting range: 0: Forward running locking; 1: Reverse running locking; 2: Terminal setting	Mfr's value: 0

· The running direction is controlled by this function code together with other speed control mode which can set the running direction of inverter. When auto-circulation speed is selected by F500=2, this function code is not valid.

· When speed control mode without controlling direction is selected, the running direction of inverter is controlled by this function code, for example, keypad controls speed.

Direction given by F202	Direction given by other control mode	Running direction	remarks
0	0	0	0 means forward. 1 means reverse.
0	1	1	
1	0	1	
1	1	0	

F203 Main frequency source X	Setting range: 0: Memory of digital given; 1: External analog AI1; 2: External analog AI2; 3: Pulse input given; 4: Stage speed control; 5: No memory of digital given; 6: Analog AI2; 7: Reserved; 8:Reserved; 9: Reserved; 10: MODBUS	Mfr's value: 0

· Main frequency source is set by this function code.

·0: Memory of digital given

Its initial value is the value of F113. The frequency can be adjusted through the key “up” or “down”, or through the “up”, “down” terminals.

“Memory of digital given” means after inverter stops, the target frequency is the running frequency before stop. If the user would like to save target frequency in memory when the power is disconnected, please set F220=1, i.e. frequency memory after power down is valid.

1: External analog AI1; 2: External analog AI2

The frequency is set by analog input terminal AI1 and AI2. The analog signal may be current signal (0-20mA or 4-20mA) or voltage signal (0-5V or 0-10V), which can be chosen by switch code. Please adjust the switch code according to practical situations, refer to fig 5-4 and table 5-2.

When inverters leave the factory, the analog signal of AI1 channel is DC voltage signal, the range of voltage is 0-10V, and the analog signal of AI2 channel is DC current signal, the range of current is 0-20 mA. If 4-20mA current signal is needed, please set lower limit of analog input F406=2, which input resistor is 500OHM. If some errors exist, please make some adjustments.

3: Pulse input given

When frequency is given by pulse input, the pulse is only inputted by DI1 terminal. The max pulse frequency is 100K. The related parameters are from F440 to F446.

4: Stage speed control

Multi-stage speed control is selected by setting stage speed terminals F316-F323 and function codes of multi-stage speed section. The frequency is set by multi-stage terminal or automatic cycling frequency.

5: No memory of digital given

Its initial value is the value of F113. The frequency can be adjusted through the key “up” or “down”, or through the “up”, “down” terminals.

“No memory of digital given” means that the target frequency will restore to the value of F113 after stop no matter the state of F220.

6: Keypad Potentiometer AI3

The frequency is set by the analog on the control panel.

10: MODBUS

The main frequency is given by MODBUS communication.

F204 Accessorial frequency source Y	Setting range: 0: Memory of digital given; 1: External analog AI1; 2: External analog AI2; 3: Pulse input given; 4: Stage speed control; 5: Reserved 6: Keypad potentiometer AI3	Mfr’s value: 0

· When accessorial frequency Y is given to channel as independent frequency, it has the same function with main frequency source X.

· When F204=0, the initial value of accessorial frequency is set by F155. When accessorial frequency controls speed independently, polarity setting F156 is not valid.

· When F207=1 or 3, and F204=0, the initial value of accessorial frequency is set by F155, the polarity of accessorial frequency is set by F156, the initial value of accessorial frequency and the polarity of accessorial frequency can be checked by F157 and F158.

· When the accessorial frequency is given by analog input (AI1, AI2), the setting range for the accessorial frequency is set by F205 and F206.

· Note: accessorial frequency source Y and main frequency source X can not use the same frequency given channel.

F205 reference for selecting accessorial frequency source Y range	Setting range: 0: Relative to max frequency; 1: Relative to main frequency X	Mfr's value: 0
F206 Accessorial frequency Y range (%)	Setting range: 0～100	Mfr's value: 100

· When combined speed control is adopted for frequency source, F206 is used to confirm the relative object of the setting range for the accessorial frequency.

F205 is to confirm the reference of the accessorial frequency range. If it is relative to main frequency, the range will change according to the change of main frequency X.

F207 Frequency source selecting	Setting range: 0: X; 1: X+Y; 2: X or Y (terminal switchover); 3: X or X+Y (terminal switchover); 4: Combination of stage speed and analog 5: X-Y 6: X+Y-Y_{MAX}*50%	Mfr's value: 0

·Select the channel of setting the frequency. The frequency is given by combination of main frequency X and accessorial frequency Y.

·When F207=0, the frequency is set by main frequency source.

·When F207=1, X+Y, the frequency is set by adding main frequency source to accessorial frequency source. X or Y can be given by PID.

·When F207=2, main frequency source and accessorial frequency source can be switched over by frequency source switching terminal.

·When F207=3, main frequency given and adding frequency given(X+Y) can be switched over by frequency source switching terminal. X or Y can be given by PID.

·When F207=4, stage speed setting of main frequency source has priority over analog setting of accessorial frequency source (only suitable for F203=4 F204=1).

·When F207=5, X-Y, the frequency is set by subtracting accessorial frequency source from main frequency source. If the frequency is set by main frequency or accessorial frequency, PID speed control can be selected.

·When F207=6, X+Y-Y_{MAX}*50%, the frequency is given by both main frequency source and accessorial frequency source. X or Y can be given by PID. When F205=0, Y_{MAX}=F111*F206. When F205=1, Y_{MAX}=X*F206.

Note:

1. When F203=4 and F204=1, the difference between F207=1 and F207=4 is that when F207=1, frequency source selecting is the addition of stage speed and analog, when F207=4, frequency source selecting is stage speed with stage speed and analog given at the same time. If stage speed given is canceled and analog given still exists, inverter will run by analog given.
2. Frequency given mode can be switched over by selecting F207. For example: switching PID adjusting and normal speed control, switching stage speed and analog given, switching PID adjusting and analog given, and so on.
3. The acceleration/deceleration time of stage speed is set by function code of corresponding stage speed time. When combined speed control is adopted for frequency source, the acceleration/deceleration time is set by F114 and F115.

4. The mode of automatic cycle speed control is unable to combine with other modes.
5. When F207=2 (main frequency source and accessorial frequency source can be switched over by terminals), if main frequency is not set to be under stage-speed control, accessorial frequency can be set to be under automatic cycle speed control (F204=5, F500=0). Through the defined switchover terminal, the control mode (defined by X) and automatic cycle speed control (defined by Y) can be freely switched.
6. When F207=6, F205=0 and F206=100, X+Y-Y_{MAX}*50%=X+Y-F111*50%, and if F207=6, F205=1 and F206=100, then X+Y-Y_{MAX}*50%=X+Y-X*50%.

F208 Terminal two-line/three-line operation control	Setting range: 0: No function 1: Two-line operation mode 1;	Mfr's value: 0

· When selecting two-line type or three-line type), F200, F201 and F202 are invalid.

· Five modes are available for terminal operation control. Only two-line operation mode 1 is available for E2000-Q series inverter.

Note: "FWD", "REV" and "X" are three terminals designated in programming DI1～DI8.

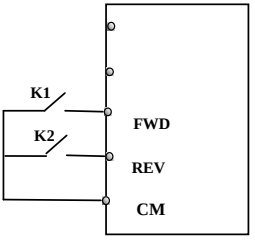
1: Two-line mode 1: this mode is the most popularly used two-line mode. The running direction of mode is controlled by FWD, REV terminals.

For example: "FWD" terminal-----"open": stop, "closed": forward running;

"REV" terminal-----"open": stop, "closed": reverse running;

"CM" terminal-----common port

K1	K2	Running command
0	0	Stop
1	0	Forward running
0	1	Reverse running
1	1	Stop



F209 Selecting the mode of stopping the motor	Setting range: 0: stop by deceleration time; 1: free stop	Mfr's value: 0

When the stop signal is input, stopping mode is set by this function code:

F209=0: stop by deceleration time

Inverter will decrease output frequency according to setting acceleration/deceleration curve and decelerating time, after frequency decreases to 0, inverter will stop. This is often common stopping type. During the process of speed track, this function is invalid. And inverter will be forced to stop during this process.

F209=1: free stop

After stop command is valid, inverter will stop output. Motor will free stop by mechanical inertia.

F210 Frequency display accuracy	Setting range: 0.01～2.00	Mfr's value: 0.01

When inverter is in the running status, under keypad speed control, frequency display accuracy is set by F210 and the range is from 0.01 to 2.00. For example, when F210=0.5, ▲/▼ terminal is pressed at one time,

frequency will increase or decrease by 0.5Hz.

This function is valid when inverter is in the running state.

F211 Speed of digital control (Hz/S)	Setting range: 0.01～100.0	Mfr's value: 5.00

When UP/DOWN terminal is pressed, frequency will change at the setting rate. The Mfr's value is 5.00Hz/s.

In application, if user want to adjust UP/DOWN terminals to keep the accel/decel time for setting frequency consistent with actual running frequency, please refer to formula $F211=\frac{50(Hz)}{F114}$ to get the value for F211. For example, F114=5.0 S, $F211=\frac{50.00(Hz)}{5.0(s)}$ =10(Hz/S).

F224 when target frequency is lower than Min frequency	Setting range: 0: stop 1: run at min frequency	Mfr's value: 0

·F224=0, when target frequency is lower than Min frequency, inverter will stop.

·F224=1, when target frequency is lower than Min frequency, inverter will run at Min frequency.

F229	Crane macro setting	0：invalid 1：lifting motion 2：translation motion 3：rotating motion	Mfr's value: 0

The brake logic control is adjusted by F229.

F229=0, control mode is V/F control, brake logic is valid.

Brake logic is valid in lifting motion, and brake release current is 30% of motor rated current,control mode is sensorless vector control，output phase loss is valid.

Brake logic is invaid in translation motion and rotating motion, control mode is V/F control, and output phase is invalid.

Table 6-1 Combination of Speed Control

F204 / F203	0. Memory of digital setting	1 External analog AI1	2 External analog AI2	3Pulse input given	4 Terminal stage speed control	5 PID adjusting	6 Analog AI3
0 Memory of Digital setting	○	●	●	●	●	●	●
1External analog AI1	●	○	●	●	●	●	●
2External analog AI2	●	●	○	●	●	●	●
3 Pulse input given	●	●	●	○	●	●	●
4Terminal Stage speed control	●	●	●	●	○	●	●
5 Digital setting	○	●	●	●	●	●	●
6 Analog AI3	●	●	●	●	●	●	○
9 PID adjusting	●	●	●	●	●	○	●
10 MODBUS	●	●	●	●	●	●	●

●: Inter-combination is allowable.

〇: Combination is not allowable.

The mode of automatic cycle speed control is unable to combine with other modes. If the combination includes the mode of automatic cycle speed control, only main speed control mode will be valid.

F277	Third Acceleration Time (S)	Setting range: 0.1～3000	Subject to inverter model
F278	Third Deceleration Time (S)		
F279	Fourth Acceleration Time (S)		
F280	Fourth Deceleration Time (S)		

6.3. Multifunctional Input and Output Terminals

6.3.1 Digital multifunctional output terminals

F300	Relay token output	Setting range: 0~43 Refer to table 6-2 for detailed instructions.	Mfr's value: 1
F301	DO1 token output		Mfr's value: 14
F302	DO2 token output		Mfr's value: 5

E2000-Q inverter has one multifunctional relay output terminal. Inverters of 18.5kW and below 18.5 kW have one multifunctional digital output terminals (without DO2 terminal), inverters above 18.5 kW have two multifunctional digital output terminals.

F300- F302 are valid in speed track.

In water supply system, if the fixed mode or timing interchanging mode is selected, relay token output and DO1 token output is invalid.

Table 6-2 Instructions for digital multifunctional output terminal

Value	Function	Instructions
0	no function	Output terminal has no functions.
1	inverter fault protection	When inverter works wrong, ON signal is output.
2	over latent frequency 1	Please refer to instructions from F307 to F309.
3	over latent frequency 2	Please refer to instructions from F307 to F309.
4	free stop	Under free stop status, after stop command is given, ON signal is output until inverter completely stops.
5	In running status 1	Indicating that inverter is running and ON signal is output.
6	Reserved	Reserved
7	acceleration/deceleration time switchover	Indicating that inverter is in the status of acceleration/deceleration time switchover
8	Reserved	
9	Reserved	
10	inverter overload pre-alarm	After inverter overloads, ON signal is output after the half time of protection timed, ON signal stops outputting after overload stops or overload protection occurs.
11	motor overload pre-alarm	After motor overloads, ON signal is output after the half time of protection timed, ON signal stops outputting after overload stops or overload protection occurs.

12	stalling	During accel/decel process, inverter stops accelerating/decelerating because inverter is stalling, and ON signal is output.
13	Inverter is ready to run	When inverter is powered on. Protection function is not in action and inverter is ready to run, then ON signal is output.
14	In running status 2	Indicating that inverter is running and ON signal is output. When inverter is running at 0HZ, it seems as the running status, and ON signal is output.
15	frequency arrival output	Indicating inverter runs to the setting target frequency, and ON signal is output. See F312.
16	overheat pre-alarm	When testing temperature reaches 80% of setting value, ON signal is output. When overheat protection occurs or testing value is lower than 80%of setting value, ON signal stops outputting.
17	over latent current output	When output current of inverter reaches the setting overlatent current, ON signal is output. See F310 and F311.
18	Analog line disconnection protection	Indicating inverter detects analog input lines disconnection, and ON signal is output. Please refer to F741.
19	Reserved	
20	Zero current detecting output	When inverter output current has fallen to zero current detecting value, and after the setting time of F755, ON signal is output. Please refer to F754 and F755.
21	DO1 Output controlled by PC/PLC	1 means output is valid. 0 means output is invalid.
22	DO2 Output controlled by PC/PLC	
23	TA\TC Output controlled by PC/PLC	
24	Watchdog token output	When inverter trips to Err6, output is valid.
25-39	Reserved	Reserved
40	No.1 motor brake command output	When brake release is valid for No.1 motor, inverter ourputs on signal.
41	No.2 motor brake command output	When brake release is valid for No.2 motor, inverter ourputs on signal.
42	Motor switchover	Current motor is No.2 motor.
44	Overload protection	When the load is too heavy, forward running is limited.

F303 DO output types selection	Setting range: 0: level output 1 : pulse output	Mfr's value: 0

· When level output is selected, all terminal functions in table 5-2 can be defined by F301.

· When pulse output is selected, DO1 can be defined as high-speed pulse output terminal. The max pulse frequency is 100KHz. The related function codes are F449、F450、F451、F452、F453.

F304 S curve beginning stage proportion (%)	Setting range: 2.0～50.0	30.0
F305 S curve ending stage proportion (%)	Setting range: 2.0～50.0	30.0
F306 Accel/decel mode	Setting range: 0：Straight-line 1: S curve	0

Please refer to Fig 6-9 about S curve accel/decel:

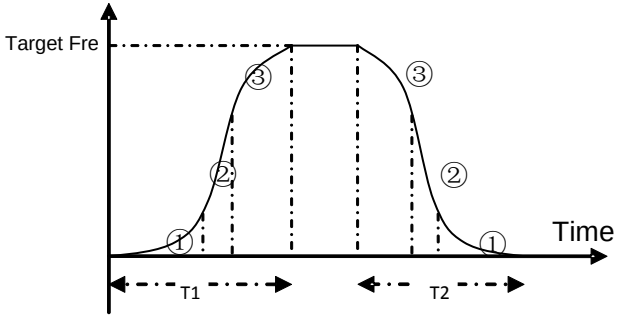


Fig 6-9 S curve acceleration /deceleration

T1 is the acceleration time from present frequency to target frequency.
T2 is the deceleration time from present frequency to target frequency.
During the acceleration process, in the ① stage, the acceleration slope is bigger gradually, in the ② stage, the acceleration slope is constant, in the ③ stage, the acceleration slope is weaker gradually.

F307 Characteristic frequency 1	Setting range: F112～F111Hz	Mfr's value: 10Hz
F308 Characteristic frequency 2		Mfr's value: 50Hz
F309 Characteristic frequency width	Setting range: 0～100%	Mfr's value: 50

When F300=2, 3, F301=2, 3 and F302=2, 3 and token characteristic frequency is selected, this group function codes set characteristic frequency and its width. For example: setting F301=2, F307=10, F309=10, when frequency is higher than F307, DO1 outputs ON signal. When frequency is lower than (10-10*10%) =9Hz, DO1 outputs OFF signal.

F310 Characteristic current (A)	Setting range: 0～1000	Mfr's value: Rated current
F311 Characteristic current width (%)	Setting range: 0～100	Mfr's value: 10

When F300=17 and F301=17 and F302=17 and token characteristic current is selected, this group function codes set characteristic current and its width.
For example: setting F301=17, F310=100, F311=10, when inverter current is higher than F310, DO1 outputs ON signal. When inverter current is lower than (100-100*10%) =90A, DO1 outputs OFF signal.

F312 Frequency arrival threshold (Hz)	Setting range: 0.00～5.00	Mfr's value: 0.00

When F300=15 and F301=15, threshold range is set by F312.
For example: when F301=15, target frequency is 20HZ and F312=2, the running frequency reaches 18Hz (20-2), ON signal is output by DO1 until the running frequency reaches target frequency.

6.3.2 Digital multifunctional input terminals

F316 DI1 terminal function setting	Setting range: 0: no function; 1: running terminal; 2: stop terminal; 3: multi-stage speed terminal 1; 4: multi-stage speed terminal 2; 5: multi-stage speed terminal 3; 6: multi-stage speed terminal 4; 7: reset terminal;	Mfr's value: 11
F317 DI2 terminal function setting		Mfr's value: 9
F318 DI3 terminal function setting		Mfr's value: 15

F319 DI4 terminal function setting	8: free stop terminal; 9: external emergency stop terminal; 10: acceleration/deceleration forbidden terminal; 11: forward run jogging; 12: reverse run jogging; 13: UP frequency increasing terminal; 14: DOWN frequency decreasing terminal; 15: "FWD" terminal; 16: "REV" terminal; 17: reserved 18: acceleration/deceleration time switchover 1; 19: Reserved; 20: switchover between speed and torque 21: frequency source switchover terminal; 47: forward impact stop 49: brake feedback of No.1 motor 50: brake feedback of No.2 motor 51: motor switchover 52:reverse impact stop 62:startup of suspending at zero-speed 63: stop of suspending at zero-speed	Mfr's value: 16
F320 DI5 terminal function setting		Mfr's value: 7
F321 DI6 terminal function setting		Mfr's value: 8
F322 DI7 terminal function setting		Mfr's value: 1
F323 DI8 terminal function setting		Mfr's value: 2

·This parameter is used for setting the corresponding function for multifunctional digital input terminal.
·Both free stop and external emergency stop of the terminal have the highest priority.
·When pulse given is selected, DI1 terminal is set as pulse signal input terminal automatically.
·**Note: 18.5 kW inverter and below 18.5kW has 6 multifunctional digital input terminals DI1~DI6.**

Table 6-3 Instructions for digital multifunctional input terminal

Value	Function	Instructions
0	No function	Even if signal is input, inverter will not work. This function can be set by undefined terminal to prevent mistake action.
1	Running terminal	When running command is given by terminal or terminals combination and this terminal is valid, inverter will run. This terminal has the same function with "run" key in keypad.
2	Stop terminal	When stop command is given by terminal or terminals combination and this terminal is valid, inverter will stop. This terminal has the same function with "stop" key in keypad.
3	Multistage speed terminal 1	15-stage speed is realized by combination of this group of terminals. See table 6-5.
4	Multistage speed terminal 2	
5	Multistage speed terminal 3	
6	Multistage speed terminal 4	
7	Reset terminal	This terminal has the same function with "reset" key in keypad. Long-distance malfunction reset can be realized by this function.
8	Free stop terminal	Inverter closes off output and motor stop process is not controlled by inverter. This mode is often used when load has big inertia or there are no requirements for stop time. This mode has the same function with free stop of F209.
9	External emergency stop terminal	When external malfunction signal is given to inverter, malfunction will occur and inverter will stop.
10	Acceleration/deceleration forbidden terminal	Inverter will not be controlled by external signal (except for stop command), and it will run at the current output frequency.

11	forward run jogging	Forward jogging running and reverse jogging running. Refer to F124, F125 and F126 for jogging running frequency, jogging acceleration/deceleration time.
12	reverse run jogging	
13	UP frequency increasing terminal	When frequency source is set by digital given, the setting frequency can be adjusted which rate is set by F211.
14	DOWN frequency decreasing terminal	
15	"FWD" terminal	When start/stop command is given by terminal or terminals combination, running direction of inverter is controlled by external terminals.
16	"REV" terminal	
17	Reversed	Reserved
18	acceleration/deceleration time switchover 1	Please refer to Table 5-4.
19	Reserved	Reserved
20	Switchover between speed and torque	Switchover between speed and torque
21	frequency source switchover terminal	When F207=2, main frequency source and accessorial frequency source can be switched over by frequency source switching terminal. When F207=3, X and (X + Y) can be switched over by frequency source switching terminal.
47	Forqard impact stop	Impact stop input signal, refer to FF group for details.
49	Brake feedback of No.1 motor	Brake feedback input signal of No.1 motor; refer to Fd15, Fd26, and Fd27 for details.
50	Brake feedback of No.2 motor	Brake feedback input signal of No.2 motor; refer to Fd15, Fd26, and Fd27 for details.
51	switchover between motors	Switch to current motor.
52	reverse impact stop	Impact stop input signal, refer to FF group for details.
62	startup of suspending at zero-speed	In close-loop vector control mode, if brake failure is detected, inverter will run at zero-speed. This terminal can realize the acceleration for inverter.
63	stop of suspending at zero-speed	In close-loop vector control mode, if brake failure is detected, inverter will run at zero-speed. This terminal can realize stop of inverter.

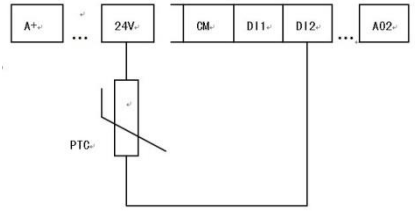


Fig 6-11 PTC heat protection

When the coding switch is in the end of “NPN”, PTC resistor should be connected between CM and DIx terminal. When the coding switch is in the end of “PNP”, PTC resistor should be connected between DIx and 24V. The recommended resistor value is 16.5K.
Because the precision of external PTC has some differences with optocoupler consistency, protection value precision will be bad, heat protection relay is suggested to be used.

Table 6-4 Accel/decel selection

Accel/decel switchover 2 (34)	Accel/decel switchover 1 (18)	Present accel/decel time	Related parameters
0	0	The first accel/decel time	F114, F115
0	1	The second accel/decel time	F116, F117
1	0	The third accel/decel time	F277, F278
1	1	The fourth accel/decel time	F279, F280

Table 6-5 Instructions for multistage speed

K4	K3	K2	K1	Frequency setting	Parameters
0	0	0	0	None	None
0	0	0	1	Multi-stage speed 1	F504/F519/F534/F549/F557/F565
0	0	1	0	Multi-stage speed 2	F505/F520/F535/F550/F558/F566
0	0	1	1	Multi-stage speed 3	F506/F521/F536/F551/F559/F567
0	1	0	0	Multi-stage speed 4	F507/F522/F537/F552/F560/F568
0	1	0	1	Multi-stage speed 5	F508/F523/F538/F553/F561/F569
0	1	1	0	Multi-stage speed 6	F509/F524/F539/F554/F562/F570
0	1	1	1	Multi-stage speed 7	F510/F525/F540/F555/F563/F571
1	0	0	0	Multi-stage speed 8	F511/F526/F541/F556/F564/F572
1	0	0	1	Multi-stage speed 9	F512/F527/F542/F573
1	0	1	0	Multi-stage speed 10	F513/F528/F543/F574
1	0	1	1	Multi-stage speed 11	F514/F529/F544/F575
1	1	0	0	Multi-stage speed 12	F515/F530/F545/F576
1	1	0	1	Multi-stage speed 13	F516/F531/F546/F577
1	1	1	0	Multi-stage speed 14	F517/F532/F547/F578
1	1	1	1	Multi-stage speed 15	F518/F533/F548/F579

Note: 1. K4 is multi-stage speed terminal 4, K3 is multi-stage speed terminal 3, K2 is multi-stage speed terminal 2, K1 is multi-stage speed terminal 1. And 0 stands for OFF, 1 stands for ON.

2. 0=OFF, 1=ON

F324 Free stop terminal logic	Setting range: 0: positive logic (valid for low level); 1: negative logic (valid for high level)	Mfr’s value: 0
F325 External emergency stop terminal logic		Mfr’s value: 0
F326 Watchdog time	Setting range: 0.0: Invalid 0.1~30000	Mfr’s value: 10.0
F327 Stop mode	Setting range: 0: Free to stop 1: Deceleration to stop	Mfr’s value : 0
F328 Terminal filtering times	Setting range: 1~100	Mfr’s value: 10

When multi-stage speed terminal is set to free stop terminal (8) and external emergency stop terminal (9), terminal logic level is set by this group of function codes. When F324=0 and F325=0, positive logic and low level is valid, when F324=1 and F325=1, negative logic and high level is valid.

F326 is interval time of inputting watchdog signal. In running status, F327=0, if there is no rising edge in setting time, inverter will free stop and trip into Err6,watchdog digital token output is valid. When F327=1, if there is no rising edge in setting time, inverter will stop according to setting deleration time and trip into Err6, watchdog digital token output is valid.

Diagnostics and simulation functions

F330 Diagnostics of DIX terminal		Only read

F330 is used to display the diagnostics of DIX terminals.

Please refer to Fig 6-12 about the DIX terminals diagnostics in the first digitron.

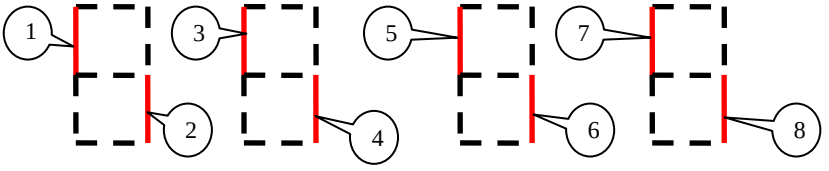


Fig 6-12 Status of digital input terminal

The dotted line means this part of digitron is red.

For example, in the first digitron, the upper part of digitron is red, it means DI1 terminal is invalid. The lower part of digitron is red, it means DI2 is valid. The four digitrons stands for the status of DI1-DI8 terminals

1. Analog input monitoring

F331Monitoring AI1		Only read
F332 Monitoring AI2		Only read
F333 Monitoring AI3		Only read

The value of analog is displayed by 0~4095.

2. Relay/Digital output simulation

F335	Relay output simulation	Setting range:	Mfr's value: 0
F336	DO1 output simulation	0：Output active	Mfr's value: 0
F337	DO2 output simulation	1：Output inactive.	Mfr's value: 0

Take an example of DO1 output simulation, when inverter is in the stop status and enter F336, press the UP key, the DO1 terminal is valid. Relax the UP key, DO1 remains valid status. After quitting F336, DO1 will revert to initial output status.

3. Analog output simulation

F338	AO1 output simulation	Setting range: 0～4095	Mfr's value: 0
F339	AO2 output simulation	Setting range: 0～4095	Mfr's value: 0

When inverter is in the stop status, and enter F338 or F339, press the UP key, the output analog will increase, and when press the DOWN key, the output analog will decrease. If relax the key, analog output remains stable. After quitting the parameters, AO1 and AO2 will revert to initial output status.

F340	Terminal negative logic selection	Setting range： 0:invalid 1：DI1 negative logic 2：DI2 negative logic 4：DI3 negative logic 8：DI4 negative logic 16：DI5 negative logic 32：DI6 negative logic 64：DI7 negative logic 128：DI8 negative logic	Mfr's value: 0

For example, if DI1 is negative logic, F340=1;if DI2 is negative logic, F340=2; if DI1 and DI4 are negative logic, F340=1+8=9,and so on.

6.4 Analog Input and Output

E2000-Q series inverters have 2 analog input channels and 2 analog output channels. AI3 input channel is inside input channel for potentiometer on the keypad panel.

F400 Lower limit of AI1 channel input (V)	Setting range: 0.00～F402	Mfr's value: 0.01
F401 Corresponding setting for lower limit of AI1 input	Setting range: 0～F403	Mfr's value: 1.00
F402 Upper limit of AI1 channel input (V)	Setting range: F400～10.00V	Mfr's value: 10.00
F403 Corresponding setting for upper limit of AI1 input	Setting range: Max (1.00，F401) ～2.00	Mfr's value: 2.00
F404 AI1 channel proportional gain K1	Setting range: 0.0～10.0	Mfr's value: 1.0
F405 AI1 filtering time constant (S)	Setting range: 0.1～10.0	Mfr's value: 0.10

·In the mode of analog speed control, sometimes it requires adjusting coincidence relation among upper limit and lower limit of input analog, analog changes and output frequency, to achieve a satisfactory speed control effect.

· Upper and lower limit of analog input are set by F400 and F402.

For example: when F400=1, F402=8, if analog input voltage is lower than 1V, system judges it as 0. If input voltage is higher than 8V, system judges it as 10V (Suppose analog channel selects 0-10V). If Max frequency F111 is set to 50Hz, the output frequency corresponding to 1-8V is 0-50Hz.

· The filtering time constant is set by F405.

The greater the filtering time constant is, the more stable for the analog testing. However, the precision may decrease to a certain extent. It may require appropriate adjustment according to actual application.

· Channel proportional gain is set by F404.

If 1V corresponds to 10Hz and F404=2, then 1V will correspond to 20Hz.

· Corresponding setting for upper / lower limit of analog input are set by F401 and F403.

If Max frequency F111 is 50Hz, analog input voltage 0-10V can correspond to output frequency from -50Hz to 50Hz by setting this group function codes. Please set F401=0 and F403=2, then 0V corresponds to -50Hz, 5V corresponds to 0Hz and 10V corresponds to 50Hz. The unit of corresponding setting for upper / lower limit of input is in percentage (%). If the value is greater than 1.00, it is positive; if the value is less than 1.00, it is negative. (e.g. F401=0.5 represents –50%).

If the running direction is set to forward running by F202, then 0-5V corresponding to the minus frequency will cause reverse running, or vice versa.

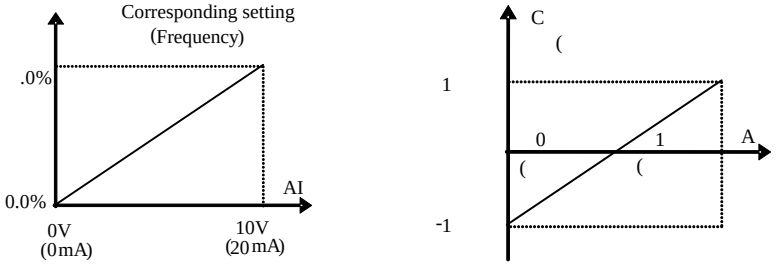
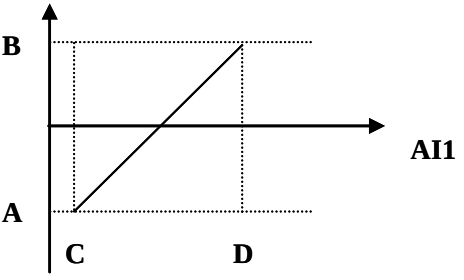


Fig 6-13 correspondence of analog input to setting

The unit of corresponding setting for upper / lower limit of input is in percentage (%). If the value is greater than 1.00, it is positive; if the value is less than 1.00, it is negative. (e.g. F401=0.5 represents –50%).The corresponding setting benchmark: in the mode of combined speed control, analog is the accessorial frequency and the setting benchmark for range of accessorial frequency which relatives to main frequency is "main frequency X"; corresponding setting benchmark for other cases is the "max frequency", as illustrated in the right figure:



A= **(F401-1)* setting value**

B= **(F403-1)* setting value**

C= **F400** D= **F402**

F406 Lower limit of AI2 channel input (V)	Setting range: 0.00～F408	Mfr's value: 0.01
F407 Corresponding setting for lower limit of AI2 input	Setting range: 0～F409	Mfr's value: 1.00
F408 Upper limit of AI2 channel input (V)	Setting range: F406～10.00	Mfr's value: 10.00
F409 Corresponding setting for upper limit of AI2 input	Setting range: Max (1.00，F407) ～2.00	Mfr's value: 2.00
F410 AI2 channel proportional gain K2	Setting range: 0.0～10.0	Mfr's value: 1.0
F411 AI2 filtering time constant (S)	Setting range: 0.1～50.0	Mfr's value: 0.1
F412 Lower limit of AI3 channel input (V)	Setting range: 0.00～F414	Mfr's value: 0.05
F413 Corresponding setting for lower limit of AI3 input	Setting range: 0～F415	Mfr's value: 1.00
F414 Upper limit of AI3 channel input (V)	Setting range: F412～10.0	Mfr's value: 10.0
F415 Corresponding setting for upper limit of AI3 input	Setting range: Max (1.00，F413) ～2.00	Mfr's value: 2.00
F416 AI3 channel proportional gain K1	Setting range: 0.0～10.0	Mfr's value: 1.0
F417 AI3 filtering time constant (S)	Setting range: 0.1～10.0	Mfr's value: 0.10

The function of AI2 and AI3 is the same with AI1.

F418 AI1 channel 0Hz voltage dead zone	Setting range: 0～0.50V (Positive-Negative)	Mfr's value: 0.00
F419 AI2 channel 0Hz voltage dead zone	Setting range: 0～0.50V (Positive-Negative)	Mfr's value: 0.00
F420 AI3 channel 0Hz voltage dead zone	Setting range: 0～0.50V (Positive-Negative)	Mfr's value: 0.00

Analog input voltage 0-5V can correspond to output frequency -50Hz-50Hz (2.5V corresponds to 0Hz) by setting the function of corresponding setting for upper / lower limit of analog input. The group function codes of F418, F419 and F420 set the voltage range corresponding to 0Hz. For example, when F418=0.5, F419=0.5 and F420=0.5, the voltage range from (2.5-0.5=2) to (2.5+0.5=3) corresponds to 0Hz. So if F418=N, F419=N and F420=N, then 2.5±N should correspond to 0Hz. If the voltage is in this range, inverter will output 0Hz.
0HZ voltage dead zone will be valid when corresponding setting for lower limit of input is less than 1.00.
E2000-Q series inverters have two analog output channels.
For the inverters with F2 function, the panel selection and potentiometer selection is as following:

F421 Panel selection	Setting range: 0: Local panel 1: Auto switchover between local panel and remote control panel 2: Local panel + remote control panel	Mfr's value: 1
F422 Potentiometer selection	Setting range: 0: Potentiometer in local panel 1: Potentiometer in remote control panel	Mfr's value: 0

·When F421 is set to 0, local panel is working. When F421 is set to 1, remote control panel is working, and local keypad panel will be invalid for saving energy. When remote control panel is removed, local panel will be valid automatically.
·F422 is used to select potentiometer.
If F422=0, the potentiometer in local panel is valid, if F422=1, the potentiometer in remote control panel is valid.
When F160 is set to 1, the values of F422 can not be reverted to Mfr's values.
The remote control panel is connected by 8-cores net cable.

F423 AO1 output range	Setting range: 0: 0～5V; 1: 0～10V or 0~20mA 2: 4~20mA	Mfr's value: 1
F424 AO1 lowest corresponding frequency (Hz)	Setting range: 0.0～F425	Mfr's value: 0.05
F425 AO1 highest corresponding frequency (Hz)	Setting range: F424～F111	Mfr's value: 50.00
F426 AO1 output compensation (%)	Setting range: 0～120	Mfr's value: 100

· AO1 output range is selected by F423. When F423=0, AO1 output range selects 0-5V, and when F423=1, AO1 output range selects 0-10V or 0-20mA. When F423=2, AO1 output range selects 4-20mA (When AO1 output range selects current signal, please turn the switch J5 to "I" position.
· Correspondence of output voltage range (0-5V or 0-10V) to output frequency is set by F424 and F425. For example, when F423=0, F424=10 and F425=120, analog channel AO1 outputs 0-5V and the output frequency is 10-120Hz.
· AO1 output compensation is set by F426. Analog excursion can be compensated by setting F426.

F427 AO2 output range	Setting range: 0: 0～20mA; 1: 4～20 mA	Mfr's value: 0
F428 AO2 lowest corresponding frequency (Hz)	Setting range: 0.0～F429	Mfr's value: 0.05
F429 AO2 highest corresponding frequency (Hz)	Setting range: F428～F111	Mfr's value: 50.00
F430 AO2 output compensation (%)	Setting range: 0～120	Mfr's value: 100

The function of AO2 is the same as AO1, but AO2 will output current signal, current signal of 0-20mA and 4-20mA could be selected by F427.

F431 AO1 analog output signal selecting	Setting range: 0: Running frequency; 1: Output current; 2: Output voltage; 3: AI1 4: AI2 5: Input pulse 6: Output torque 7: Given by PC/PLC 8: Target frequency 9: Speed 10:Output torque	Mfr's value: 0
F432 AO2 analog output signal selecting		Mfr's value: 1

· Token contents output by analog channel are selected by F431 and F432. Token contents include running frequency, output current and output voltage.

· During the process of speed track, the function of F431 and F432 is still valid.

· When output current is selected, analog output signal is from 0 to twofold rated current.

· When output voltage is selected, analog output signal is from 0V to rated output voltage (230V or 400V).

F433 Corresponding current for full range of external voltmeter	Setting range: 0.01～5.00 times of rated current	Mfr's value: 2.00
F434 Corresponding current for full range of external ammeter		Mfr's value: 2.00

· In case of F431=1 and AO1 channel for token current, F433 is the ratio of measurement range of external voltage type ammeter to rated current of the inverter.

· In case of F432=1 and AO2 channel for token current, F434 is the ratio of measurement range of external current type ammeter to rated current of the inverter.

For example: measurement range of external ammeter is 20A, and rated current of the inverter is 8A, then, F433=20/8=2.50.

F437 Analog filter width	Setting range: 1～100	Mfr's value:10

The greater the setting value of F437 is, the steadier the detecting analog is, but the response speed will decrease. Please set it according to the actual situations.

6.5 Pulse input/output

F440 Min frequency of input pulse FI (KHz)	Setting range: 0.00～F442	Mfr's value: 0.00
F441 Corresponding setting of FI min frequency	Setting range:0.00～2.00	Mfr's value: 1.00
F442 Max frequency of input pulse FI (KHz)	Setting range: F440～100.00	Mfr's value: 10.00
F443 Corresponding setting of FI max frequency	Setting range: Max（1.00，F441）～2.00	Mfr's value: 2.00
F445 Filtering constant of FI input pulse	Setting range: 0～100	Mfr's value: 0
F446 FI channel 0Hz frequency dead zone (KHz)	Setting range: 0～F442 (Positive-Negative)	Mfr's value: 0.00

·Min frequency of input pulse is set by F440 and max frequency of input pulse is set by F442.
For example: when F440=0K and F442=10K, and the max frequency is set to 50Hz, then input pulse frequency 0-10K corresponds to output frequency 0-50Hz.
·Filtering time constant of input pulse is set by F445.
The greater the filtering time constant is, the more steady pulse measurement, but precision will be lower, so please adjust it according to the application situation.
·Corresponding setting of min frequency is set by F441 and corresponding setting of max frequency is set by F443.
When the max frequency is set to 50Hz, pulse input 0-10K can corresponds to output frequency -50Hz-50Hz by setting this group function codes. Please set F441 to 0 and F443 to 2, then 0K corresponds to -50Hz, 5K corresponds to 0Hz, and 10K corresponds to 50Hz. The unit of corresponding setting for max/min pulse frequency is in percentage (%). If the value is greater than 1.00, it is positive; if the value is less than 1.00, it is negative.
If the running direction is set to forward running by F202, 0-5K corresponding to the minus frequency will cause reverse running, or vice versa.
· 0 Hz frequency dead zone is set by F446.
Input pulse 0-10K can correspond to output frequency -50Hz~50Hz (5K corresponds to 0Hz) by setting the function of corresponding setting for max/min input pulse frequency. The function code F446 sets the input pulse range corresponding to 0Hz. For example, when F446=0.5, the pulse range from (5K-0.5K=4.5K) to (5K+0.5K=5.5K) corresponds to 0Hz. So if F446=N, then 5±N should correspond to 0Hz. If the pulse is in this range, inverter will output 0Hz.
0HZ voltage dead zone will be valid when corresponding setting for min pulse frequency is less than 1.00.

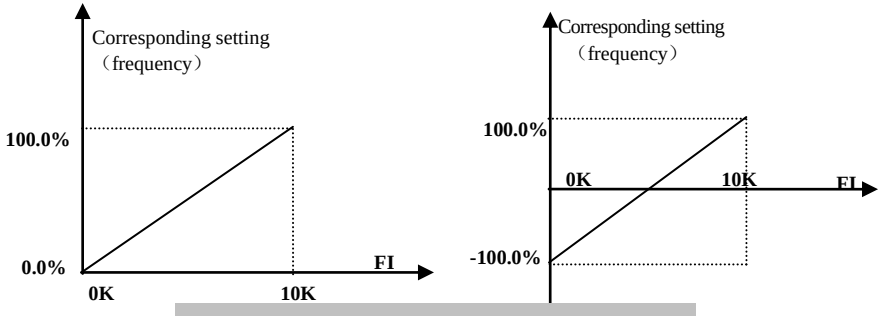


Fig 6-15 correspondence of pulse input and setting

The unit of corresponding setting for max/min input pulse frequency is in percentage (%). If the value is

greater than 1.00, it is positive; if the value is less than 1.00, it is negative. (e.g. F441=0.5 represents –50%).The corresponding setting benchmark: in the mode of combined speed control, pulse input is the accessorial frequency and the setting benchmark for range of accessorial frequency which relatives to main frequency (F205=1) is "main frequency X"; corresponding setting benchmark for other cases is the "max frequency", as illustrated in the right figure:

A= (F441-1)*setting benchmark

B= (F443-1)*setting benchmark

C= F440 F= F442 (E-D)/2=F446

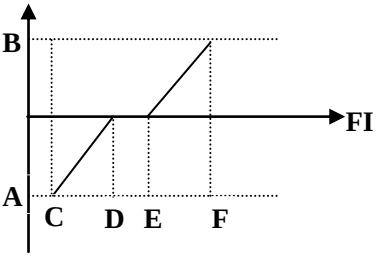


Fig 6-16 relationship between pulse input and setting value

F449 Max frequency of output pulse FO (KHz)	Setting range: 0.00～100.00	Mfr's value: 10.00
F450 Zero bias coefficient of output pulse frequency (%)	Setting range: 0.0～100.0	Mfr's value: 0.0
F451 Frequency gain of output pulse	Setting range: 0.00～10.00	Mfr's value: 1.00
F453 Output pulse signal	Setting range: 0: Running frequency 1: Output current 2: Output voltage 3: AI1 4: AI2 5: Input pulse 6: Output torque 7: Given by PC/PLC 8: Target frequency	Mfr's value: 0

· When DO1 is defined as high-speed pulse output terminal, the max frequency of output pulse is set byF449.

If "b" stands for zero bias coefficient, "k" stands for gain, "Y" stands for actual output of pulse frequency and "X" stands for standard output, then Y=Kx+b.

·Standard output X is the token value corresponding to output pulse min/max frequency, which range is from zero to max value.

·100 percent of zero bias coefficient of output pulse frequency corresponds to the max output pulse frequency (the set value of F449.)

·Frequency gain of output pulse is set by F451. User can set it to compensate the deviation of output pulse.

·Output pulse token object is set by F453. For example: running frequency, output current and output voltage, etc.

·When output current is displayed, the range of token output is 0-2 times of rated current.

·When output voltage is displayed, the range of token output is from 0-1.2 times of rated output voltage.

F460 AI1channel input mode	Setting range: 0: straight line mode 1: folding line mode	Mfr's value: 0
F461 AI2 channel input mode	Setting range: 0: straight line mode 1: folding line mode	Mfr's value: 0
F462 AI1 insertion point A1 voltage value (V)	Setting range: F400～F464	Mfr's value: 2.00
F463 AI1 insertion point A1 setting value	Setting range: F401～F465	Mfr's value: 1.20
F464 AI1 insertion point A2 voltage value (V)	Setting range: F462～F466	Mfr's value: 5.00
F465 AI1 insertion point A2 setting value	Setting range: F463～F467	Mfr's value: 1.50
F466 AI1 insertion point A3 voltage value (V)	Setting range: F464～F402	Mfr's value: 8.00

F467 AI1 insertion point A3 setting value	Setting range: F465～F403	Mfr's value: 1.80
F468 AI2 insertion point B1 voltage value (V)	Setting range: F406～F470	Mfr's value: 2.00
F469 AI2 insertion point B1 setting value	Setting range: F407～F471	Mfr's value: 1.20
F470 AI2 insertion point B2 voltage value (V)	Setting range: F468～F472	Mfr's value: 5.00
F471 AI2 insertion point B2 setting value	Setting range: F469～F473	Mfr's value: 1.50
F472 AI2 insertion point B3 voltage value (V)	Setting range: F470～F412	Mfr's value: 8.00
F473 AI2 insertion point B3 setting value	Setting range: F471～F413	Mfr's value: 1.80

When analog channel input mode selects straight-line, please set it according to the parameters from F400 to F429. When folding line mode is selected, three points A1(B1), A2(B2), A3(B3) are inserted into the straight line, each of which can set the according frequency to input voltage. Please refer to the following figure:

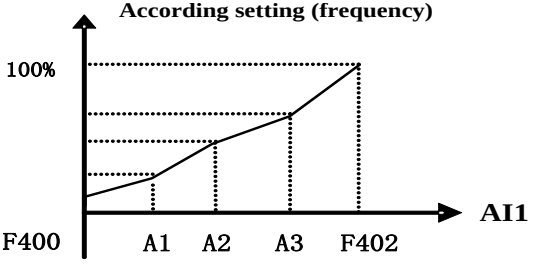


Fig 6-17 Folding analog with setting value

F400 and F402 are lower/upper limit of analog AI1 input. When F460=1，F462=2.00V, F463=1.4, F111=50, F203=1, F207=0, then A1 point corresponding frequency is (F463-1) *F111=20Hz, which means 2.00V corresponding to 20Hz. The other points can be set by the same way.
AI2 channel has the same setting way as AI1.

6.6 Multi-stage Speed Control

The function of multi-stage speed control is equivalent to a built-in PLC in the inverter. This function can set running time, running direction and running frequency.
E2000-Q series inverter can realize 15-stage speed control and 8-stage speed auto circulating.
During the process of speed track, multi-stage speed control is invalid. After speed track is finished, inverter will run to target frequency according to the setting value of parameters.

F500 Stage speed type	Setting range: 0: 3-stage speed; 1: 15-stage speed;	Mfr's value: 1

·In case of multi-stage speed control (F203=4), the user must select a mode by F500. When F500=0, 3-stage speed is selected. When F500=1, 15-stage speed is selected.

Table 6-7 Selection of Stage Speed Running Mode

F203	F500	Mode of Running	Description
4	0	3-stage speed control	The priority in turn is stage-1 speed, stage-2 speed and stage-3 speed. It can be combined with analog speed control. If F207=4, "3-stage speed control" is prior to analog speed control.

4	1	15-stage speed control	It can be combined with analog speed control. If F207=4, "15-stage speed control" is prior to analog speed control.

F504 Frequency setting for stage 1 speed (Hz)	Setting range: F112～F111	Mfr's value: 5.00
F505 Frequency setting for stage 2 speed (Hz)		Mfr's value: 10.00
F506 Frequency setting for stage 3 speed (Hz)		Mfr's value: 15.00
F507 Frequency setting for stage 4 speed (Hz)		Mfr's value: 20.00
F508 Frequency setting for stage 5 speed (Hz)		Mfr's value: 25.00
F509 Frequency setting for stage 6 speed (Hz)		Mfr's value: 30.00
F510 Frequency setting for stage 7 speed (Hz)		Mfr's value: 35.00
F511 Frequency setting for stage 8 speed (Hz)		Mfr's value: 40.00
F512 Frequency setting for stage 9 speed (Hz)		Mfr's value: 5.00
F513 Frequency setting for stage 10 speed (Hz)		Mfr's value: 10.00
F514 Frequency setting for stage 11 speed (Hz)		Mfr's value: 15.00
F515 Frequency setting for stage 12 speed (Hz)		Mfr's value: 20.00
F516 Frequency setting for stage 13 speed (Hz)		Mfr's value: 25.00
F517 Frequency setting for stage 14 speed (Hz)		Mfr's value: 30.00
F518 Frequency setting for stage 15 speed (Hz)		Mfr's value: 35.00
F519～F533 Acceleration time setting for the speeds from Stage 1 to Stage 15 (S)	Setting range: 0.1～3000	Subject to inverter model
F534～F548 Deceleration time setting for the speeds from Stage 1 to Stage 15 (S)	Setting range: 0.1～3000	
F549～F556 Running directions of stage speeds from Stage 1 to Stage 8 (S)	Setting range: 0: forward running; 1: reverse running	Mfr's value: 0
F573~F579 Running directions of stage speeds from stage 9 to stage 15 (S)	Setting range: 0: forward running; 1: reverse running	Mfr's value: 0
F557～564 Running time of stage speeds from Stage 1 to Stage 8 (S)	Setting range: 0.1～3000	Mfr's value: 1.0
F565～F572 Stop time after finishing stages from Stage 1 to Stage 8 (S)	Setting range: 0.0～3000	Mfr's value: 0.0
F580 Stage speed mode	Setting range: 0： Stage speed mode 1 1： Stage speed mode 2	Mfr's value: 0

When F580=0, 0000 means invalid, 0001 means the first speed, 1111 means the 15th speed.

When F580=1, 0000 means the first speed, 0001 means the second speed, and so on. 1111 means invalid.

6.7 Auxiliary Functions

F600 DC Braking Function Selection	Setting range: 0: Invalid; 1: braking before starting; 2: braking during stopping; 3:braking during starting and stopping	Mfr's value: 0
F601 Initial Frequency for DC Braking (Hz)	Setting range: 0.20～5.00	Mfr's value: 1.00
F602 DC Braking efficiency before Starting(%)	Setting range: 0～100	Mfr's value: 10
F603 DC Braking efficiency During Stop(%)		
F604 Braking Lasting Time Before Starting (S)	Setting range: 0.0～30.0	Mfr's value: 0.50
F605 Braking Lasting Time During Stopping (S)		
F656 Time of DC braking when stop	Setting range: 0.00~30.00	Mfr's value: 0

· When F600=0, DC braking function is invalid.

· When F600=1, braking before starting is valid. After the right starting signal is input, inverter starts DC braking. After braking is finished, inverter will run from the initial frequency.

In some application occasion, such as fan, motor is running at a low speed or in a reverse status, if inverter starts immediately, OC malfunction will occur. Adopting "braking before starting" will ensure that the fan stays in a static state before starting to avoid this malfunction.

·During braking before starting, if "stop" signal is given, inverter will stop by deceleration time.

When F600=2, DC braking during stopping is selected. After output frequency is lower than the initial frequency for DC braking (F601), DC braking will stop the motor immediately

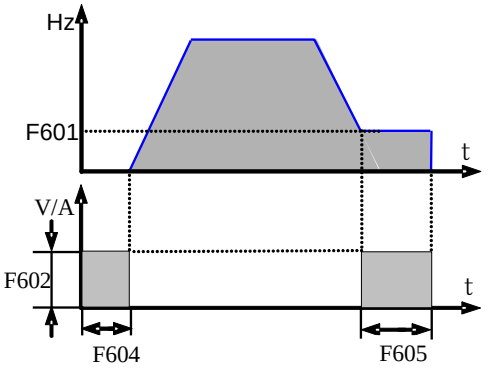


Figure 5-18 DC braking

During the process of braking during stopping, if "start" signal is given, DC braking will be finished and inverter will start.

If "stop" signal is given during the process of braking during stopping, inverter will have no response and DC braking during stopping still goes on.

F656 is the time of DC braking when stop. When running frequency decrease to initial frequency of DC-braking, inverter will stop output for a while, and then start to DC braking, in order to avoid over current fault.

Braking before starting is invalid in speed track.

Parameters related to "DC Braking": F601, F602, F603, F604 and F605 interpreted as follows:

a. F601: Initial frequency of DC-braking. DC braking will start to work as inverter's output frequency is lower than this value.

b. F602/F603: DC braking efficiency. The bigger value will result in a quick braking. However, motor will overheat with too big value.

c. F604: Braking duration before starting. The time lasted for DC braking before inverter starts.
d. F605: Braking duration when stopping. The time lasted for DC braking while inverter stops.

·Note: during DC braking, because motor does not have self-cold effect cause by rotating, it is in the state of easy over-heat. Please do not set DC braking voltage too high and do not set DC braking time to long.

DC braking, as shown in Figure 6-19

F607 Selection of Stalling Adjusting Function	Setting range: 0~2:Reserved 3: Voltage/current control 4: Voltage control 5: Current control	Mfr's value: 0
F608 Stalling Current Adjusting (%)	Setting range: 60～200	Mfr's value: 160
F609 Stalling Voltage Adjusting (%)	Setting range: 110～200	Mfr's value: 1-phase: 130 3-phase: 140

F607 is used to set selection of stalling adjusting function.

Voltage control: when motor stops quickly or load changes suddenly, DC bus voltage will be high. Voltage control function can adjust deceleration time and output frequency to avoid OE.

When braking resistor or braking unit is used, please do not use voltage control function.otherwise, the deceleration time will be changed.

Current control: when motor accelerates quickly or load changed suddenly, inverter may trip into OC. Current control function can adjust accel/decel time or decrease output frequency to control proper current value. It is only valid in VF control mode.

Note: (1) Voltage/current control is not suitable for lifting application.
(2) This function will change accel/decel time. Please use this function properly.

Initial value of stalling current adjusting is set by F608, when the present current is higher than rated current *F608, stalling current adjusting function is valid.

During the process of deceleration, stalling current function is invalid.

During the process of acceleration, if output current is higher than initial value of stalling current adjusting and F607=1, then stalling adjusting function is valid. Inverter will not accelerate until the output current is lower than initial value of stalling current adjusting.

In case of stalling during stable speed running, the frequency will drop. If the current returns to normal during dropping, the frequency will return to rise. Otherwise, the frequency will keep dropping to the minimum frequency and the protection OL1 will occur after it lasts for the time as set in F610.

Initial value of stalling voltage adjusting is set by F609, when the present voltage is higher than rated voltage *F609, stalling voltage adjusting function is valid.

Stalling voltage adjusting is valid during the process of deceleration, including the deceleration process caused by stalling current.

F611 Dynamic Braking threshold	Setting range: 200～2000	Subject to inverter model
F612 Dynamic braking duty ratio (%)	Setting range: 0～100	Mfr's value: 100

Initial voltage of dynamic braking threshold is set by F611, which of unit is V. When DC bus voltage is higher than the setting value of this function, dynamic braking starts, braking unit starts working. After DC bus voltage is lower than the setting value, braking unit stops working.

Dynamic braking duty ratio is set by F612, the range is 0~100%. The value is higher, the braking effect is better, but the braking resistor will get hot.

F613 Speed track	Setting range: 0: invalid 1: valid 2: valid at the first time	Mfr's value: 0

When F613=0, the function of speed track is invalid.

When F613=1, the function of speed track is valid.
After inverter tracks motor speed and rotating direction, inverter will begin running according to the tracked frequency, to start the rotating motor smoothly. This function is suitable for the situation of auto-starting after repowered on, auto-starting after reset, auto-starting when running command valid but direction signal lost and auto-starting when running command invalid.
When F613=2, the function is valid at the first time after inverter is repower on.
Note: When F106=0, speed track function is invalid.

F614 Speed track mode	Setting range: 0: Speed track from frequency memory 1: Speed track from zero 2: Speed track from max frequency	Mfr's value: 0

When F614 is set to 0, inverter will track speed down from frequency memory.
When F614 is set to 1, inverter will track speed up from 0Hz.
When F614 is set to 2, inverter will track speed down from max frequency.

F615 Speed track rate	Setting range: 1～100	Mfr's value: 20

It is used to select the rotation velocity speed track when the rotation tracking restart mode is adopted. The larger the parameter is, the faster the speed track is. But if this parameter is too large, it likely results in unreliable tracking.

F641 Inhibition of current oscillation at low frequency	0~100 0: Invalid	Subject to inverter model

When F641=0, inhibition function is invalid.
In the V/F control mode, if inhibition of current oscillation is valid, the following parameters are needed to be set.

(1) F106=2（V/F control mode）and F137≤2;
(2) F613=0, the speed track function is invalid.

Note 1. When the function is valid, one inverter can only drive one motor one time.
2. When the function is valid, please set motor parameters (F801~F805, F844) correctly.
3. When inhibition oscillation function is invalid, and inverter runs without motor, output voltage may be unbalanced. This is normal situation. After inverter runs with motor, output voltage will be balanced.

F657 Instantaneous power failure selection	Setting range: 0: Invalid 1: Valid	Mfr's value: 0
F658 Voltage rally acceleration time	Setting range: 0.0～3000s 0.0: F114	Mfr's value: 0.0
F659 Voltage rally deceleration time	Setting range: 0.0～3000s 0.0: F115	Mfr's value: 0.0
F660 Action judging voltage at instantaneous power failure (V)	Setting range: 200～F661	Subject to inverter model
F661 Action stop voltage at instantaneous power failure (V)	Setting range: F660~1300	Subject to inverter model

· Upon instantaneous power failure or sudden voltage dip, the DC bus voltage of the inverter reduces. The function enables the inverter to compensate the DC bus voltage reduction with the load feedback energy by reducing the output frequency so as to keep the inverter running continuously.
· The function is suitable for big inertia load, such as, fan and centrifugal pump.
·The function is not suitable for the application which frequency is forbidden being decreased.
·When the bus voltage resumes to normal, F658/F659 are used to set the accel/decel time when inverter runs

to target frequency.

· When instantaneous function is valid, if PN voltage is lower than F660, instantaneous function works.

· When inverter is at instantaneous status, if PN voltage is higher than F661, the bus voltage remains to normal, inverter will work normally and run to target frequency.

6.8. Malfunction and Protection

F700 Selection of terminal free stop mode	Setting range: 0: free stop immediately; 1: delayed free stop	Mfr's value: 0
F701 Delay time for free stop and programmable terminal action	Setting range: 0.0～60.0	Mfr's value: 0.0

· "Selection of free stop mode" can be used only for the mode of "free stop" controlled by the terminal. The related parameters setting is F201=1, 2, 4.

When "free stop immediately" is selected, delay time (F701) will be invalid and inverter will free stop immediately.

· "Delayed free stop" means that upon receiving "free stop" signal, the inverter will execute "free stop" command after waiting some time instead of stopping immediately. Delay time is set by F701. During the process of speed track, the function of delayed free stop is invalid.

F702 Fan control mode	0: controlled by temperature 1: Running when inverter is powered on. 2: controlled by running status	Mfr's value: 2

When F702=0, fan will run if radiator's temperature is up to setting temperature 35℃.

When F702=2, fan will run when inverter begins running. When inverter stops, fan will stop until radiator's temperature is lower than 40℃.

F704 Inverter Overloading pre-alarm Coefficient (%)	Setting range: 50～100	Mfr's value: 80
F705 Motor Overloading pre-alarm Coefficient (%)	Setting range: 50～100	Mfr's value: 80
F706 Inverter Overloading Coefficient (%)	Setting range: 120～190	Mfr's value: 150
F707 Motor Overloading Coefficient (%)	Setting range: 20～100	Mfr's value: 100

· Inverter overloading coefficient: the ratio of overload-protection current and rated current, whose value shall be subject to actual load.

· Motor overloading coefficient (F707): when inverter drives lower power motor, please set the value of F707 by below formula in order to protect motor

$$\text{Motor Overloading Coefficient} = \frac{\text{Actual motor power}}{\text{Matching motor power}} \times 100\%。$$

Please set F707 according to actual situation. The lower the setting value of F707 is, the faster the overload protection speed. Please refer to Fig 6-20.

For example: 7.5kW inverter drives 5.5kW motor, $F707 = \frac{5.5}{7.5} \times 100\% \approx 70\%$. When the actual current of motor reaches 140% of inverter rated current, inverter overload protection will display after 1 minute.

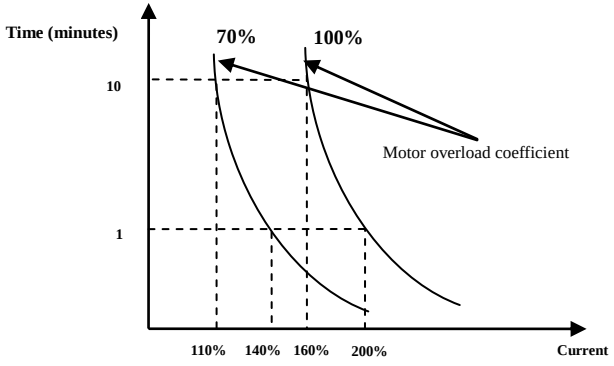


Fig 6-20 Motor overload coefficient

When the output frequency is lower than 10Hz, the heat dissipation effect of common motor will be worse. So when running frequency is lower than 10Hz, the threshold of motor overload value will be reduced. Please refer to Fig 6-21 (F707=100%):

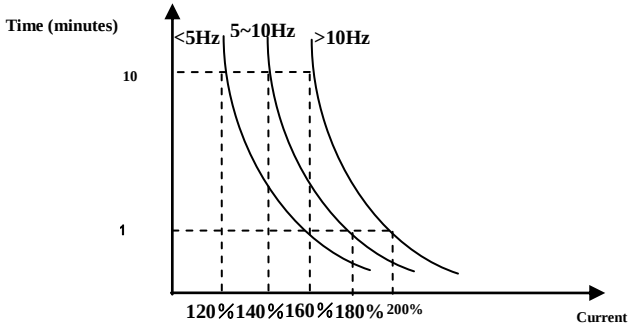


Fig 6-21 Motor overload protection value

F708	Record of The Latest Malfunction Type	Setting range: Please refer to Appendix 1.	
F709	Record of Malfunction Type for Last but One		
F710	Record of Malfunction Type for Last but Two		
F711	Fault Frequency of The Latest Malfunction		
F712	Fault Current of The Latest Malfunction		
F713	Fault PN Voltage of The Latest Malfunction		
F714	Fault Frequency of Last Malfunction but One		
F715	Fault Current of Last Malfunction but One		
F716	Fault PN Voltage of Last Malfunction but One		

F717 Fault Frequency of Last Malfunction but Two		
F718 Fault Current of Last Malfunction but Two		
F719 Fault PN Voltage of Last Malfunction but Two		
F720 Record of overcurrent protection fault times		
F721 Record of overvoltage protection fault times		
F722 Record of overheat protection fault times		
F723 Record of overload protection fault times		
F724 Input phase loss	Setting range: 0: invalid; 1: valid	Mfr's value: 1
F726 Overheat	Setting range: 0: invalid; 1: valid	Mfr's value: 1
F727 Output phase loss	Setting range: 0: invalid; 1: valid	Mfr's value: 1
F728 Input phase loss filtering constant (S)	Setting range: 1～60	Mfr's value: 5
F729 Under-voltage filtering constant (2mS)	Setting range: 1～3000	Mfr's value: 5
F730 Overheat protection filtering constant (S)	Setting range: 0.1～60.0	Mfr's value: 5.0

"Input phase loss" refers to phase loss of three-phase power supply, 4.0kW and below 4.0kW inverters have no this function.

"Output phase loss" refers to phase loss of inverter three-phase wirings or motor wirings.

·"Under-voltage" / "phase loss" signal filtering constant is used for the purpose of eliminating disturbance to avoid mis-protection. The greater the set value is, the longer the filtering time constant is and the better for the filtering effect.

F737 Over-current 1 protection	Setting range: 0:Invalid 1: Valid	Mfr's value: 0
F738 Over-current 1 protection coefficient	Setting range: 0.50～3.00	Mfr's value: 2.50
F739 Over-current 1 protection record		

· F738= OC 1 value/inverter rated current

· In running status, F738 is not allowed to modify. When over-current occurs, OC1 is displayed

F741 Analog disconnected protection	Setting range: 0: Invalid 1: Stop and AErr displays. 2: Stop and AErr is not displayed. 3: Inverter runs at the min frequency. 4: Reserved.	Mfr's value: 0
F742 Threshold of analog disconnected protection (%)	Setting range: 1~100	Mfr's value: 50

When the values of F400 and F406 are lower than 0.10V, analog disconnected protection is invalid. Analog channel AI3 has no disconnected protection.

When F741 is set to 1, 2 or 3, the values of F400 and F406 should be set to 1V-2V, to avoid the error protection by interference.

Analog disconnected protection voltage=analog channel input lower limit * F742. Take the AI1 channel for the example, if F400=1.00, F742=50, then disconnection protection will occur when the AI1 channel voltage is lower than 0.5V.

F745 Threshold of pre-alarm overheat (%)	Setting range: 0~100	Mfr's value: 80
F747 Carrier frequency auto-adjusting	Setting range: 0: Invalid 1: Valid	Mfr's value: 1

When the temperature of radiator reaches the value of 90℃ X F745 and multi-function output terminal is set to 16 (Please refer to F300~F302), it indicates inverter is in the status of overheat.

When F747=1, the temperature of radiator reaches to certain temperature, inverter carrier frequency will adjust automatically, to decrease the temperature of inverter. This function can avoid overheat malfunction.

When F159=1, random carrier frequency is selected, F747 is invalid.

F753 Selection of overload protection	Setting range: 0: Normal motor 1: variable frequency motor	Mfr's value: 1

·When F753=0, because heat dissipation effect of normal motor is bad in low speed, the electronic thermal protection value will be adjusted properly. It means overload protection threshold of motor will be decreased when running frequency is lower than 30Hz.

·When F753=1, because heat dissipation effect of variable frequency motor is not influenced by speed, there is no need to adjust the protection value.

F754 Zero-current threshold (%)	Setting range: 0~200	Mfr's value: 5
F755 Duration time of zero-current (S)	Setting range: 0.0~60.0	Mfr's value: 0.5

When the output current is fallen to zero-current threshold, and after the duration time of zero-current, ON signal is output.

F760 Grounding protection	Setting range: 0: Invalid 1: Valid	Mfr's value: 1

When output terminals (U, V, W) are connected to the earth or the earth impedance is too low, then the leak current is high, inverter will trip into GP. When grounding protection is valid, U, V, W will output voltage for a while after power on.

F761 Switchover mode of FWD/REV	Setting range: 0: At zero 2: at start frequency	Mfr's value: 0

·When F761 = 0, FWD/REV switches at zero frequency, F120 is valid.

·When F761 = 1, FWD/REV switches at start frequency, F120 is invalid, if start frequency is too high, current shock will occur during switchover process.

6.9. Parameters of the Motor

F800 Motor's parameters tuning	Setting range: 0: Invalid; 1: Rotating tuning; 2: stationary tuning	Mfr's value: 0
F801 Rated power (kW)	Setting range: 0.1～1000.0	
F802 Rated voltage (V)	Setting range: 1～1300	
F803 Rated current (A)	Setting range: 0.2～6553.5	
F804 Number of motor poles	Setting range: 2～100	4
F805 Rated rotary speed (rmp/min)	Setting range: 1～30000	
F810 Motor rated frequency (Hz)	Setting range: 1.0~650.0	50.00

·Please set the parameters in accordance with those indicated on the nameplate of the motor.

·Excellent control performance of vector control requires accurate parameters of the motor. Accurate parameter tuning requires correct setting of rated parameters of the motor.

·In order to get the excellent control performance, please configurate the motor in accordance with adaptable motor of the inverter. In case of too large difference between the actual power of the motor

and that of adaptable motor for inverter, the inverter's control performance will decrease remarkably.

·F800＝0, parameter tuning is invalid. But it is still necessary to set the parameters F801~F803，F805 and F810 correctly according to those indicated on the nameplate of the motor.

After being powered on, it will use default parameters of the motor (see the values of F806-F809) according to the motor power set in F801. This value is only a reference value in view of Y series 4-pole asynchronous motor.

·F800＝1, rotating tuning.

In order to ensure dynamic control performance of the inverter, select "rotating tuning" after ensuring that the motor is disconnected from the load. Please set F801-805 and F810 correctly prior to running testing.

Operation process of rotating tuning: Press the "Run" key on the keypad to display "TEST", and it will tune the motor's parameter of two stages. After that, the motor will accelerate according to acceleration time set at F114 and maintain it for a certain period. The motor will then decelerate to 0 according to the time set at F115. After auto-checking is completed, relevant parameters of the motor will be stored in function codes F806~F809 and F844, and F800 will turn to 0 automatically.

·F800＝2, stationary tuning.

It is suitable for the cases where it is impossible to disconnect the motor from the load.

Press the "Run" key, and the inverter will display "TEST", and it will tune the motor's parameter of two stages. The motor's stator resistance, rotor resistance and leakage inductance will be stored in F806-F809 automatically (the motor's mutual inductance uses default value generated according to the power), and F800 will turn to 0 automatically. The user may also calculate and input the motor's mutual inductance value manually according to actual conditions of the motor. With regard to calculation formula and method, please call us for consultation.

When tuning the motor's parameter, motor is not running but it is powered on. Please do not touch motor during this process.

***Note**:

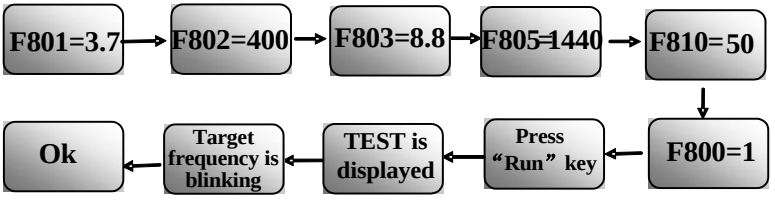
1. No matter which tuning method of motor parameter is adopted, please set the information of the motor (F801-F805) correctly according to the nameplate of the motor. If the operator is quite familiar with the motor, the operator may input all the parameters (F806-F809) of the motor manually.
2. Parameter F804 can only be checked, not be modified.
3. Incorrect parameters of the motor may result in unstable running of the motor or even failure of normal running. Correct tuning of the parameters is a fundamental guarantee of vector control performance.

Each time when F801 rated power of the motor is changed, the parameters of the motor (F806-F809) will be refreshed to default settings automatically. Therefore, please be careful while amending this parameter.

The motor's parameters may change when the motor heats up after running for a long time. If the load can be disconnected, we recommend auto-checking before each running.

F806 Stator resistance (Ω)	Setting range: 0.001～65.53Ω (for 15kw and below 15kw) 0.1~6553mΩ (For above 15kw)	Subject to inverter model
F807 Rotor resistance (Ω)	Setting range: 0.001～65.53Ω (for 15kw and below 15kw) 0.1~6553mΩ (For above 15kw)	
F808 Leakage inductance (mH)	Setting range: 0.01～655.3mH (for 15kw and below 15kw) 0.001~65.53mH (for above 15kw)	
F809 Mutual inductance (mH)	Setting range: 0.01～655.3mH (for 15kw and below 15kw) 0.001~65.53mH (for above 22kw)	
F844 Motor no-load current (A)	Setting range: 0.1~F803	

·The set values of F806～F809 will be updated automatically after normal completion of parameter tuning of the motor.
·The inverter will restore the parameter values of F806～F809 automatically to default standard parameters of the motor each time after changing F801 rated power of the motor;
·If it is impossible to measure the motor at the site, input the parameters manually by referring to the known parameters of a similar motor.
F844 can be got automatically by rotating tuning.
If the no-load current is higher when motor is running, please decrease the value of F844.
If running current or start current is higher when motor is running with load, please increase the value of F844.
Take a 3.7kW inverter for the example: all data are 3.7kW, 400V, 8.8A, 1440rmp/min, 50Hz, and the load is disconnected. When F800=1, the operation steps are as following:



F812 Pre-exciting time	Setting range: 0.00～30.00S	0.30
F813 Rotary speed loop KP1	Setting range: 1~100	30
F814 Rotary speed loop KI1	Setting range: 0.01~10.00	0.50
F815 Rotary speed loop KP2	Setting range:1~100	Subject to inverter model
F816 Rotary speed loop KI2	Setting range:0.01~10.00	1.00
F817 PID switching frequency 1	Setting range: 0~F818	5.00
F818 PID switching frequency 2	Setting range: F817~F111	10.00

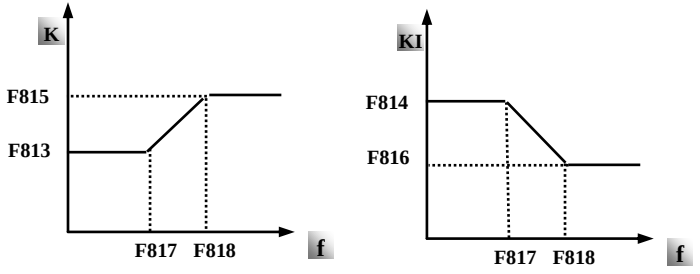


Fig 6-22 PID parameter

Dynamic response of vector control speed can be adjusted through adjusting proportional and storage gains of speed loop. Increasing KP and decreasing KI can speed up dynamic response of speed loop. However, if proportional gain or storage gain is too large, it may give rise to oscillation.
Recommended adjusting procedures:
Make fine adjustment of the value on the basis of manufacturer value if the manufacturer setting value cannot meet the needs of practical application. Be cautious that amplitude of adjustment each time should

not be too large.
In the event of weak loading capacity or slow rising of rotary speed, please decrease the value of KP first under the precondition of ensuring no oscillation. If it is stable, please increase the value of KI properly to speed up response.
In the event of oscillation of current or rotary speed, decrease KP and increase KI properly.
Note: Improper setting of KP and KI may result in violent oscillation of the system, or even failure of normal operation. Please set them carefully.

F820 Filtering coefficient of speed loop	Setting range: 0~100	Mfr's value: 0

In vector control mode, if speed fluctuation is higher or inverter stops instability, please increase the value of F820 properly; it will influence response speed of speed loop.

F851 Encoder resolution	Setting range: 1～9999	Mfr's value: 1000

Note: when F106=1, PG card must be installed, and set encoder resolution correctly

6.10. Communication Parameter

F900 Communication Address	Setting range: 1~255: single inverter address 0: broadcast address	Mfr's value: 1
F901 Communication Mode	Setting range: 1: ASCII 2: RTU	Mfr's value: 2
F902 Stop bits	Setting range: 1~2	Mfr's value: 2
F903 Parity Check	Setting range: 0: Invalid 1: Odd 2: Even	Mfr's value: 0
F904 Baud Rate	Setting range: 0: 1200; 1: 2400; 2: 4800; 3: 9600; 4: 19200 5: 38400 6: 57600	Mfr's value: 3
F905 Communication timeout period (S)	Setting range: 0.0~3000.0	Mfr's value: 0.0
F907 Time 2 of communication timeout (S)	Setting range: 0.0~3000.0	Mfr's value: 0.0

F904=9600 is recommended for baud rate, which makes run steady. Communication parameters refer to Appendix 4.
When F905 is set to 0.0, the function is invalid. When F905 ≠ 0.0, if the inverter has not received effective command from PC/PLC during the time set by F905, inverter will trip into CE.
When F907>0, and receiving the previous data, if after the time set by F907, the next data is not received, inverter will output communication timeout signal. The timeout signal will be cleared by this terminal, and after receiving correct data, inverter will accumulate time again.

6.11 Reserved

6.12 Torque control parameters

FC00 Speed/torque control selection	0：Speed control 1：Torque control 2：Terminal switchover	0

0: speed control. Inverter will run by setting frequency, and output torque will automatically match with the torque of load, and output torque is limited by max torque (set by manufacture.)

1: Torque control. Inverter will run by setting torque, and output speed will automatically match with the speed of load, and output speed is limited by max speed (set by FC23 and FC25). Please set the proper torque and speed limited.

2: Terminal switchover. User can set DIX terminal as torque/speed switchover terminal to realize switchover between torque and speed. When the terminal is valid, torque control is valid. When the terminal is invalid, speed control is valid.

FC02	Torque accel/decel time (S)	0.1～100.0	1.0

The time is for inverter to run from 0% to 100% of rated torque.

FC06	Torque given channel	0: Digital given (FC09) 1: Analog input AI1 2: Analog input AI2 3: Analog input AI3 4: Pulse input channel FI 5: Reserved	0

When FC06=4, only DI1 terminal can be selected because only DI1 terminal has the pulse input function.

FC07	Torque given coefficient	0～3.000	3.000
FC09	Torque given command value (%)	0～300.0	100.0

FC07: when input given torque reaches max value, FC07 is the ratio of inverter output torque and motor rated torque. For example, if FC06=1, F402=10.00, FC07=3.00, when AI1 channel output 10V, the output torque of inverter is 3 times of motor rated torque.

FC14	Offset torque given channel	0: Digital given (FC17) 1: Analog input AI1 2: Analog input AI2 3: Analog input AI3 4: Pulse input channel FI 5: Reserved	0
FC15	Offset torque coefficient	0~0.500	0.500
FC16	Offset torque cut-off frequency (%)	0~100.0	10.00
FC17	Offset torque command value (%)	0~50.0	10.00

· Offset torque is used to output larger start torque which equals to setting torque and offset torque when motor drives big inertia load. When actual speed is lower than the setting frequency by FC16, offset torque is given by FC14. When actual speed is higher than the setting frequency by FC16, offset torque is 0.

· When FC14≠0, and offset torque reaches max value, FC15 is the ratio of offset torque and motor rated torque. For example: if FC14=1, F402=10.00 and FC15=0.500, when AI1 channel outputs 10V, offset torque is 50% of motor rated torque.

FC22	Forward speed limited channel	0: Digital given (FC23) 1: Analog input AI1 2: Analog input AI2 3: Analog input AI3 4: Pulse input channel FI 5: Reserved	0
FC23	Forward speed limited (%)	0～100.0	10.00
FC24	Reverse speed limited channel	0: Digital given (FC25) 1: Analog input AI1 2: Analog input AI2 3: Analog input AI3 4: Pulse input channel FI 5: Reserved	0
FC25	Reverse speed limited (%)	0～100.0	10.00

·Speed limited FC23/FC25: if given speed reaches max value, they are used to set percent of inverter output frequency and max frequency F111.

FC28	Electric torque limit channel	0: Digital given (FC30) 1: Analog input AI1 2: Analog input AI2 3: Analog input AI3 4: Pulse input channel FI 5: Reserved	0

FC29	Electric torque limit coefficient	0～3.000	3.000
FC30	Electric torque limit (%)	0～300.0	200.0
FC33	Braking torque limit channel	0: Digital given (FC35) 1: Analog input AI1 2: Analog input AI2 3: Analog input AI3 4: Pulse input channel FI 5: Reserved	0
FC34	Braking torque limit coefficient	0～3.000	3.000
FC35	Braking torque limit (%)	0～300.0	200.00

·When motor is in the electric status, output torque limit channel is set by FC28. When FC28 does not equal to 0, limit torque is set by FC29. When FC28= 0, limit torque is set by FC30.

·When motor is in the Braking status, Braking torque limit channel is set by FC31. When FC33 does not equal to 0, limit torque is set by FC34. When FC33= 0, limit torque is set by FC35.

6.13 Parameters for crane application

Note: inverter must run forward in lifting status.

Fd00	Braking function enabled	Bit 1: No. 1 motor braking enabled 0: Disabled 1: Enabled Bit 0: No. 2 motor braking enabled 0: Disabled 1: Enabled	01
Fd05	Brake release Freq (FWD)	1.00~50.00	1.50
Fd06	Brake release Freq (REV)	1.00~50.00	1.50
Fd07	Brake release current (FWD)	0~200	30
Fd08	Brake release current (REV)	0~200	30
Fd09	Brake release delay time (s)	0~60.00	0.50

Braking function selection:

Fd00 is used to set whether braking function of No. 1 and No. 2 motors is enabled. If No. 2 motor is not selected, the default selection is No. 1 motor.

	Bit1	Bit0	Braking logic
Fd00	0	0	Braking logic of both motors are disabled.
	0	1	Braking logic of No. 1 motor is enabled.
	1	0	Braking logic of No. 2 motor is enabled.
	1	1	Braking logic of both motors are enabled.

Brake will release after inverter runs to Fd05/Fd06, and running current is higher than Fd07/ Fd08. After the brake release delay time Fd09, inverter will accelerate to target frequency.

Note: at VVVF mode, because running current is low at low frequency, it will not reach brake release forward current, so please increase Fd05 or decrease Fd07. But if Fd05 is too high, inverter will trip into OC, and if Fd07 is too low, inverter will drop down easily.

Fd10	Brake close Freqency	Fd13-50.00	2.00

When inverter receives stop command, braking will close after running frequency is lower than Fd10.

Fd11	Filtering time of switchover between	0.0-5.0	0.3

	FWD/REV terminal (S)		

Fd11 is used to avoid frequent switchover between forward and reverse running.

Fd13	Slip prevention Frequency(Hz)	1.00-Fd10	2.00
Fd14	Slip prevention Time (S)	0-60.00	0.50

When inverter receives stop command and runs to Fd10, after the time Fd14, inverter will decelerate to stop (During the time of Fd14, running frequency will be higher than Fd13).

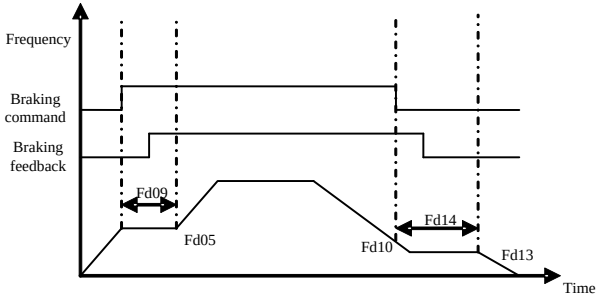


Figure 6-25 Braking diagram

Fd15	Braking feedback enabled	0: invalid 1:valid at two point 2:valid as inverter starts running	0

Motor braking feedback function needs hardware support. Braking feedback logic can be set by Fd17. Braking feedback filtering time can be set through Fd16. If brake feedback gives fault signal for longer than the time set to Fd16, the inverter displays brr1.

When Fd15=0, braking feedback function is invalid.

When Fd15=1, braking feedback signal can be detected only if brake is in releasing or closing process. Refer to figure 6-26 for details

When Fd15=2, braking feedback signal can be detected as long as inverter starts running. Refer to figure 6-27 for details

Fd16	Braking feedback filtering time	0.1～10.0	0.1
Fd17	Braking feedback logic selection	0: Low level 1: High level	0

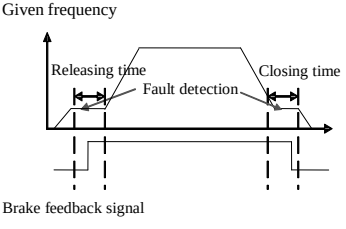


Figure 6-26

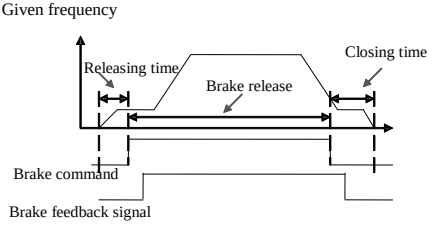


Figure 6-27

Fd28	Load loss protection	0: Invalid 1: Valid	1
Fd29	Load loss detection time(s)	0.0-60.0	0.20

After brake is released, if inverter output current remains zero for longer than the time set to Fd29, inverter will show LOSE for load loss fault.

No. 2 motor braking logic selection:

Fd31	No. 2 motor brake release Freq (FWD)	1.00~50.00	1.50
Fd32	No. 2 motor brake release Freq (REV)	1.00~50.00	1.50
Fd33	No. 2 motor brake release current (FWD)	0~200	30
Fd34	No. 2 motor brake release current (REV)	0~200	30
Fd35	No. 2 motor brake release delay time (s)	0~60.00	0.50

Brake will release after inverter runs to Fd31/Fd32, and running current is higher than Fd33/ Fd34. After the brake release delay time Fd35, inverter will accelerate to target frequency.

Note: at VVVF mode, because running current is low at low frequency, it will not reach brake release forward current, so please increase Fd31 or decrease Fd33. But if Fd31 is too high, inverter will trip into OC, and if Fd33 is too low, inverter will drop down easily.

Fd36	Brake close Frequency of No. 2 motor(Hz)	Fd39-50.00	2.00

When inverter receives stop command, braking will close after running frequency is lower than Fd36.

Fd37	Filtering time of switchover between FWD/REV terminal of No. 2 motor(S)	0.0-5.0	0.3

Fd37 is used to avoid frequent switchover between forward and reverse running.

Fd39	Slip prevention Frequency of No. 2 motor(Hz)	1.00-Fd36	2.00
Fd40	Slip prevention Time of No. 2 motor (s)	0-60.00	0.30

When inverter receives stop command and runs to Fd36, after the time Fd40, inverter will decelerate to stop (During the time of Fd40, running frequency will be higher than Fd39).

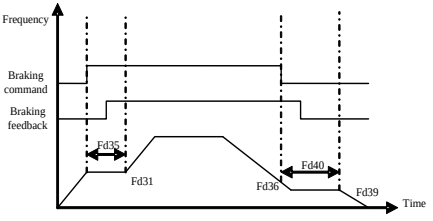


Figure 6-28 Braking diagram

Fd41	Braking feedback function of No. 2 motor	0: invalid 1:valid at two point 2:valid when inverter is running	0
Fd42	Braking feedback filtering time of No. 2 motor	0.1～10.0	0.1
Fd43	Braking feedback logic selection of No. 2 motor	0: Low level 1: High level	0

Motor braking feedback function needs hardware support. Braking feedback logic can be set by Fd43. Braking feedback filtering time can be set through Fd42.

When Fd41=0, braking feedback function is invalid.

When Fd41=1, braking feedback signal can be detected only when brake is releasing or closing. Refer to figure 6-26 for details

When Fd41=2, braking feedback signal can be detected as long as inverter starts running. Refer to figure 6-27 for details

Fd44	Start direction as brake releases	0: inverter runs reversely 1: inverter starts forward and switches to running reversely	0

When Fd44=0, if brake releases, inverter will start to run reversely.

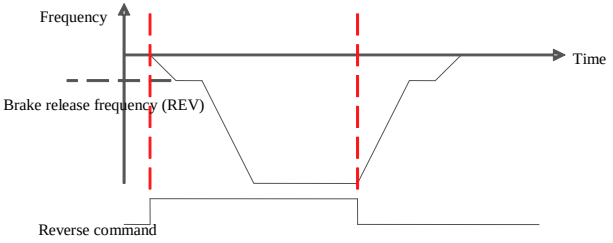


Figure 6-29

When Fd44=1, inverter will run forward to brake release frequency. After the brake release delay time Fd35, inverter will switch to reverse running at brake release frequency.

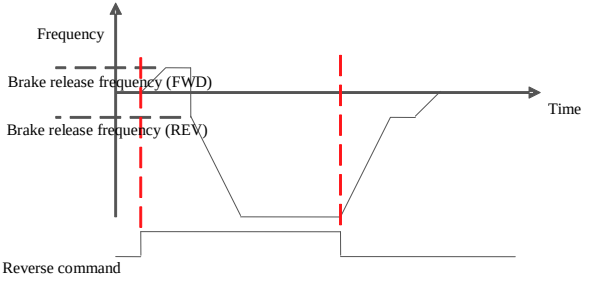


Figure 6-30

Fd45	Restart in the process of braking	0: invalid 1: valid	0

Fd45=0, after giving brake colse command, inverter can not restart in stopping process. Inverter could restart only if inverter has stopped running.

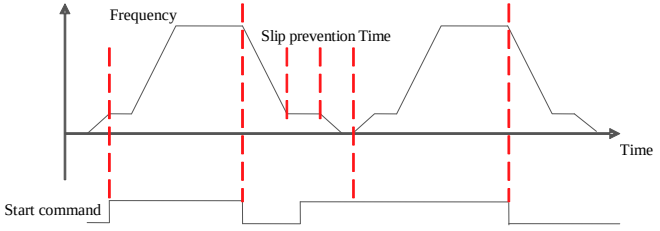


Figure 6-31

When Fd45=1, inverter can restart in stopping process even if brake colse command has been given.

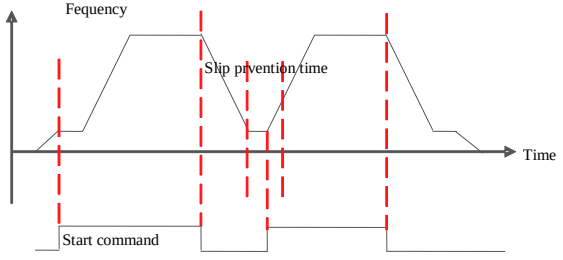


Figure 6-32

Fd46	Brake failure detection in stopped status	0: invalid 1: valid	0

In closed-loop vector control mode, after inverter stops, brake failure can be detected. In stopped status, if inverter detects motor frequency is more than 1Hz and delays 0.3s, brake failure will be confirmed. Then inverter keeps output frequency at zero to ensure the load stays still. Inverter will make the load fall down by setting function of input terminal to 62. Then inverter will stop by setting function of input terminal to 63.

Fd49	Reverse control in running status	0:inverter runs reversely after stops 1:inverter runs reversely directly	0
Fd50	Tripping frequency(Hz)	0.00~20.00	2.00

Fd49=0, inverter will stop after receiving a reverse running signal and then start to run reversely.Brake will work during the process.

Fd49=1, after receiving a reverese running signal,inverter will decelerate to tripping frequency Fd50 and run reversely at tripping frequency. Brake will not work during this process.

Fd51	Stop mode of No.2 motor	0:stop by deceleration time 1: free stop	0

When the stop signal is input, No.2 motor stopping mode is set by this function code.

Fd51=0: stop by deceleration time

Inverter will decrease output frequency according to setting acceleration/deceleration curve and decelerating time, after frequency decreases to 0, inverter will stop. This is normal stopping type.

Fd51=1: free stop

After stop command is valid, inverter will stop output. Motor will free stop by mechanical inertia.

Fd52	Abnormal frequency detection period (S)	0.00~1.00	0.50
Fd53	Frequency following detection period(S)	0.00~1.00	0.50
Fd54	Frequency following difference（%）	0.00~25.00	10.00

Under closed-loop vector control mode, if the difference between feedback frequency and given frequency is more than Fd54*rated frequency and duration time is longer than Fd53, inverter will trip into Er42. If feedback frequency has opposite value to setting frequency for longer than the time set to Fd52, inverter will alarm abnormal frequency fault and show Er43.

Fd57	Frequency adjustment with bus voltage	0:valid 1:invalid	0
Fd58	Action voltage for frequency adjustment with bus voltage（%）	70~95	85

If bus voltage is lower than Fd58*537, inverter will decrease output frequency automatically to output full torque. Target frequency is calculated by actual bus voltage/standard bus voltage*rated frequency. If bus voltage rises and its value is lower than recovery voltage (Fd58+5%）*537), target frequency remains unchanged. If bus voltage rises and its value is higher than recovery voltage, target frequency will return to setting value.

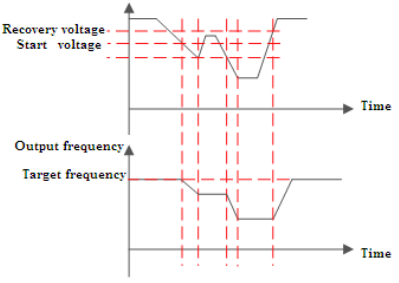


Figure 6-33

Fd59	Acceleration gain for light-load (%)	100.0~300.0	100.0
Fd60	Acceleration torque 1 for light-load (%)	0.00~Fd61	5.0
Fd61	Acceleration torque 2 for light-load (%)	Fd60~Fd62	35.0
Fd62	Acceleration torque 3 for light-load (%)	Fd61~100.0	80.0
Fd63	Detection time（S）	0.0~5.0	0.5
Fd64	Detection frequency（Hz）	5.00~50.00	40.00
Fd65	Positive modification（%）	0.00~100.0	100.0
Fd66	Negative modification（%）	0.00~100.0	100.0

When inverter target frequency is larger than motor rated frequency, acceleration for light-load can be selected to calculate maxmium output frequency on the basis of load to increase productivity.

When inverter output frequency rises to Fd64, after delay time Fd63, inverter will detect output torque T to calculate maximum output frequency.

If target frequency is larger than rated frequency and Fd59 is more than 100%, acceleration under light-load is valid. When T is lower than Fd60 or higher than Fd62, the maximum output frequency is rated frequency. When Fd60 is higher than Fd60 and lower than Fd61, the maximun output frequency is Fd59*rated frequency. When T is higher than Fd61 and lower than Fd62, the maximum frequency will be adjusted according to following curve. The maximum frequency Fmax can be changed by Fd65 or Fd66, Fout = Fmax*Fd65 or Fout = Fmax*Fd66.

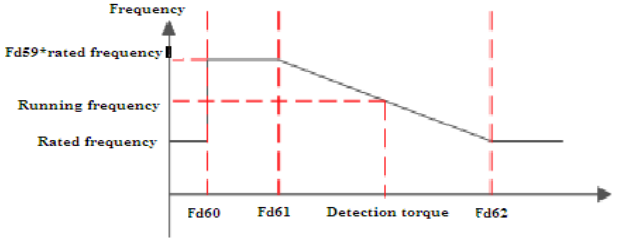


Figure 6-34

Fd67	Torque limit for heavy-load	0.00~150.0	0.0

When inverter runs forward and output frequency is higher than Fd64 or inverter runs at constant speed, if output torque is higher than Fd67, inverter will stop automatically and forward running is forbidden. After inverter runs reversely and brake is released, then forward running is allowed.

Fd68	Impact stop mode	0:invalid 1: impact stop mode 1 2: impact stop mode 2	0
Fd69	Impact stop creep frequency(Hz)	F112~F111	3.00
Fd70	Impact stop creep time(S)	0.0～20.0	10.0
Fd71	Impact stop detection current (%)	80～200	100
Fd72	Impact stop detection time(S)	0.1～1.0	0.5

Impact stop mode 1: when inverter runs to Fd69 and duration time is longer than Fd70, inverter will decelerate to stop. If forward impact stop terminal is valid, forward running will be forbidden untill forward impact stop signal is cancelled.

Impact stop mode 2: when inverter runs to Fd69 and current is higher or equal to Fd71, after duration time is longer than Fd72, inverter will decelerate to stop. If current is always lower than Fd71, inverter works as impact stop mode 1.

6.14 Expansion terminal

Expansion card is I/O extension card for E2000-Q series, which adds four digital input terminals and two relay output terminals.

Terminal	Type	Description	Function	
TA1	Output signal	Relay contact	TC is a common point, TA-TC are normally open contacts. The contact capacity is 12A/125VAC , 7A/250VAC and 7A/30VDC.	The functions of output terminals shall be defined per manufacturer's value. Their initial state may be changed through changing function codes.
TC1				
TA2				
TC2				
DIA	Input signal	No function	Refer to 6.3.2 for details.	
DIB				
DIC				
DID				
CM	Common port	Grounding of control power supply	Power: 24±1.5V, grounding is CM; current is restricted below 50mA for external use.	
+24V	Power supply	Control power supply		

FF00 Expansion relay1 output	Setting range: as same as F300	Mfr's value：0
FF01 Expansion relay2 output		Mfr's value：0
FF05 Expansion input DIA	Setting range: as same as F316	Mfr's value：0
FF06 Expansion input DIB		Mfr's value：0
FF07 Expansion input OPC		Mfr's value：0
FF08 Expansion input OPD		Mfr's value：0
FF09 Positive and negative logic for expansion input terminal	Setting range: as same as F340	Mfr's value：0
FF10 Current weight	Setting range:0-10000	Mfr's value：0
FF11 Real-time weight	Setting range:0-10000	Mfr's value：0
FF12 Current weight percentage (%)	Setting range:0-100.00%	
FF13 Reserved		
FF14 Reserved		
FF15 Type of sensor	Setting range:0-1	Mfr's value：1
FF16 Range of sensor (Kg)	Setting range:0-10000	Mfr's value：5000
FF17 Weight for rated load (Kg)	Setting range:0-10000	Mfr's value：3000
FF18 Weight for empty cage (Kg)	Setting range:0-10000	Mfr's value：2000
FF19 Calibration weight (Kg)	Setting range:0-1000	Mfr's value：65
FF20 Weighing ratio (%)	Setting range:0.00-200.00	Mfr's value：100
FF21 Sensor sensitivity	Setting range:0.0-10.0	Mfr's value：1.6
FF22 Delay time for Overweight (s)	Setting range:0.0-20.0	Mfr's value：0

FF23 Detection time for disconnected sensor	Setting range:0.0-20.0	Mfr's value：0

6.15 Parameters for the second motor

Please refer to appendix 6 for parameters for the second motor. Refer to F800 to F850 for details.

6.16 Parameters display

H000 Running frequency/target frequency(Hz)		

In stopped status, target frequency is displayed. In running status, running frequency is displayed.

H001 Actual speed/target speed (rpm)		

In stopped status, actual speed is displayed. In running status, target speed is displayed.

H002 Output current (A)		

In running status, output current is displayed. In stopped status, H002=0.

H003 Output voltage (V)		

In running status, output voltage is displayed. In stopped status, H003=0.

H004 Bus voltage (V)		

Bus voltage is displayed by H004.

H012 Output power (KW)		

Inverter output power is displayed by H012.

H013 Output torque (%)		
H014 Target torque (%)		

Inverter output torque is displayed by H013 and target torque is displayed by H014.

H017 Current stage speed for multi-stage speed		

In multi-stage speed mode, current stage speed is displayed by H017.

H018 Frequency of input pulse		

Input pulse frequency of DI1 terminal is displayed by H018, the unit is 0.01.

H019 Feedback speed (Hz)		
H020 Feedback speed (rpm)		

Feedback speed is displayed as frequency by H019. Feedback speed is displayed as speed by H020.

H021 AI1 voltage(digital)		
H022 AI2 voltage(digital)		
H023 AI3 voltage(digital)		

Analog input voltage is display by H021, H022 and H023.

H025 Current power-on time (h)		
H026 Current running time (h)		

Current power-on time and running time are displayed by H025 and H026.

H027 Input pulse frequency(Hz)		

Input pulse frequency is displayed by H027, the unit is 1Hz.

H030 Main frequency source X (Hz)		
H031 Accessorial frequency source Y(Hz)		

Main frequency and accessorial frequency are displayed by H030 and H031.

Appendix 1 Trouble Shooting

When malfunction occurs to inverter, don't run by resetting immediately. Check any causes and get it removed if there is any.

Take counter measures by referring to this manual in case of any malfunctions on inverter. Should it still be unsolved, contact the manufacturer. Never attempt any repairing without due authorization.

Table 1-1 **Inverter's Common Cases of Malfunctions**

Fault	Description	Causes	Countermeasures
Err0	Prohibition modify function code	* prohibition modify the function code during running process.	* Please modify the function code in stopped status.
Err1	Wrong password	*Enter wrong password when password is valid * Do not enter password when modifying function code.	* Please enter the correct password.
2: O.C.	Over-current	* too short acceleration time * short circuit at output side * locked rotor with motor * Too heavy load. * parameter tuning is not correct.	*prolong acceleration time; *whether motor cable is broken; *check if motor overloads; *reduce V/F compensation value * measure parameter correctly.
16: OC1	Over-current 1		
67: OC2	Over-current 2		
3: O.E.	DC Over-Voltage	*supply voltage too high; *load inertia too big *deceleration time too short; *motor inertia rise again * bad effect of dynamic braking *parameter of rotary speed loop PID is set abnormally.	*check if rated voltage is input; *add braking resistance(optional); *increase deceleration time * Enhancing the dynamic braking effect *set the parameter of rotary speed loop PID correctly. * Change to VF control for centrifugal fan.
4: P.F1.	Input Phase loss	*phase loss with input power	*check if power input is normal; *check if parameter setting is correct.
5: O.L1	Inverter Overload	* load too heavy	*reduce load; *check drive ratio; *increase inverter's capacity
6: L.U.	Under-Voltage Protection	*input voltage on the low side	*check if supply voltage is normal *check if parameter setting is correct.
7: O.H.	Radiator Overheat	*environment temperature too high; *radiator too dirty *install place not good for ventilation; *fan damaged * Carrier wave frequency or compensation curve is too high.	*improve ventilation; *clean air inlet and outlet and radiator; *install as required; *change fan * Decrease carrier wave frequency or compensation curve.
8: O.L2	Motor Overload	* load too heavy	*reduce load; *check drive ratio; *increase motor's capacity
11: ESP	External fault	*External emergency-stop terminal is valid.	*Check external fault.
12: Err3	Current malfunction before running	*Current alarm signal exists before running.	*check if control board is connected with power board well. *ask for help from manufacture.
13: Err2	Parameters tuning wrong	* Do not connect motor when measuring parameters	*please connect motor correctly.

15: Err4	Current zero excursion malfunction	*Flat cable is loosened. *Current detector is broken.	*check the flat cable. *ask for help from manufacture.
17: PF0	Output Phase loss	* Motor is broken * Motor wire is loose. * Inverter is broken	* check if wire of motor is loose. * check if motor is broken.
18: AErr	Line disconnected	* Analog signal line disconnected * Signal source is broken.	* Change the signal line. * Change the signal source.
26: GP	Grounding protection (1-phase does not have GP protection)	*Motor cable is damaged, short connected to grounding. *Motor isolation is damaged, short connected to grounding. *inverter fault.	*change a new cable. *repair the motor. *contact manufacturer.
32: PCE	PMSM distuning fault	*motor parameters measurement is wrong. *load is too heavy.	* Measure motor parameters correctly. * Decrease the load.
35: OH1	PTC overheat protection	*external relay protection.	*check external heat protection equipment.
45: CE	Communication timeout error	Communication fault	*PC/PLC does not send command at fixed time *Check whether the communication line is connected reliably.
47: EEEP	EEPROM read/write fault	*interference around *EEPROM is damaged.	* remove interferences *contact manufacturer.
49: Err6	Watchdog fault	Watchdog timeout	*please check watchdog signal

Table 1-2 **Motor Malfunction and Counter Measures**

Malfunction	Items to Be Checked	Counter Measures
Motor not Running	Wiring correct? Setting correct? Too big with load? Motor is damaged? Malfunction protection occurs?	Get connected with power; Check wiring; Checking malfunction; Reduce load; Check against Table 1-1
Wrong Direction of Motor Running	U, V, W wiring correct? Parameters setting correct?	To correct wiring Setting the parameters correctly.
Motor Turning but Speed Change not Possible	Wiring correct for lines with given frequency? Correct setting of running mode? Too big with load?	To correct wiring; To correct setting; Reduce load
Motor Speed Too High or Too Low	Motor's rated value correct? Drive ratio correct? Inverter parameters are set in-corrected? Check if inverter output voltage is abnormal?	Check motor nameplate data; Check the setting of drive ratio; Check parameters setting; Check V/F Characteristic value
Motor Running Unstable	Too big load? Too big with load change? Phase loss? Motor malfunction.	Reduce load; reduce load change, increase capacity; Correct wiring.
Power Trip	Wiring current is too high?	Check input wring; Selecting matching air switch; Reduce load; checking inverter malfunction.

Appendix 2 Products & Structures

E2000-Q series inverter has its power range between 0.75～250kW. Refer to Tables 3-1 and 3-2 for main data. There may be two (or more than two) kinds of structures for certain products. Please make a clear indication when placing your order.

Inverter should operate under the rated output current, with overload permitted for a short time. However, it shall not exceed the allowable values at working time.

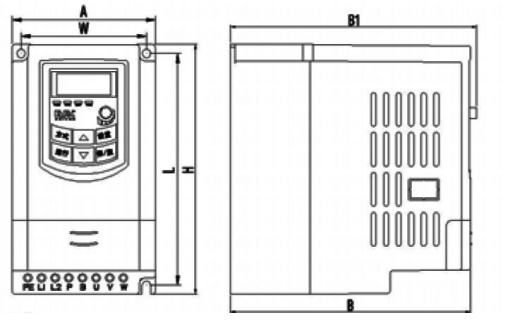
Table 3-1 **Product List of E2000-Q**

Model	Applicable Motor (kW)	Rated Current Output	Structure Code	Weight (kg)	Cooling Mode	Remarks
E2000-Q0007T3	0.75	2	E2	2.0	Air-Cooling	Three-Phase Plastic Hanging
E2000-Q0015T3	1.5	4	E2	2.1	Air- Cooling	
E2000-Q0022T3	2.2	6.5	E2	2.2	Air- Cooling	
E2000-Q0030T3	3.0	7	E3	2.5	Air-Cooling	
E2000-Q0040T3	4.0	9	E4	3.0	Air- Cooling	
E2000-Q0055T3	5.5	12	E4	3.5	Air- Cooling	
E2000-Q0075T3	7.5	17	E5	4.5	Air- Cooling	
E2000-Q0110T3	11	23	E5	4.8	Air- Cooling	
E2000-Q0150T3	15	32	E6	8.0	Air- Cooling	
E2000-Q0185T3	18.5	38	E6	8.5	Air-Cooling	
E2000-Q0220T3	22	44	C3	22	Air- Cooling	Three-phase Metal hanging
E2000-Q0300T3	30	60	C3	22.5	Air- Cooling	
E2000-Q0370T3	37	75	C4	24	Air- Cooling	
E2000-Q0450T3	45	90	C5	40	Air- Cooling	
E2000-Q0550T3	55	110	C5	41.5	Air- Cooling	
E2000-Q0750T3	75	150	C5	42.	Air- Cooling	
E2000-Q0900T3	90	180	C6	56	Air-Cooling	
E2000-Q1100T3	110	220	C6	56.5	Air- Cooling	
E2000-Q1320T3	132	265	C7	87	Air- Cooling	
E2000-Q1600T3	160	320	C8	123	Air- Cooling	
E2000-Q1800T3	180	360	C8	123.5	Air- Cooling	
E2000-Q2000T3	200	400	C9	127	Air- Cooling	
E2000-Q2200T3	220	440	CA	185	Air- Cooling	
E2000-Q2500T3	250	480	CA	185.5	Air- Cooling	

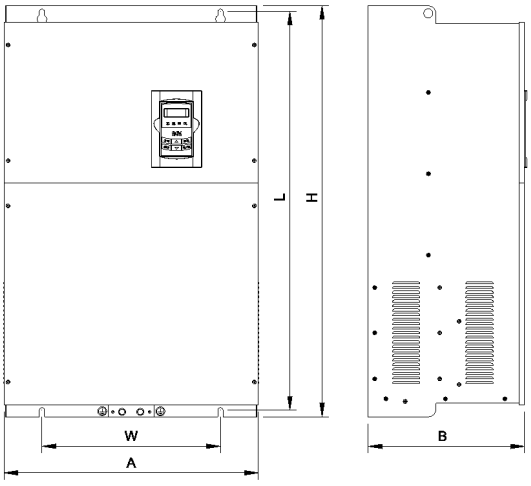
Table 3-2 Structure List

Structure Code	External Dimension [A×B(B1)×H][note1]	Mounting Size(W×L)	Mounting Bolt	Remarks
E2	106×150（157）×180	94×170	M4	Plastic Housing
E3	106×170（177）×180	94×170	M4	
E4	138×152（159）×235	126×225	M5	
E5	156×170（177）×265	146×255	M5	
E6	205×196（202）×340	194×330	M5	
C3	265×235×435	235×412	M6	Metal Housing
C4	315×234×480	274×465	M8	
C5	360×265×555	320×530	M8	
C6	410×300×630	370×600	M10	
C7	516×326×765	360×740	M10	
C8	560×342×910	390×882	M10	
C9	400×385×1310	280×1282	M10	
CA	535×380×1340	470×1310	M10	

Note 1: the unit is mm.



Plastic Profile



Metal Cabinet Profile

Note1: if keypad control unit has potentiometer, the external dimension is B1.

If keypad control unit has no potentiometer, the external dimension is B.

Appendix 3 Selection of Braking Resistance

Resistor selection for lifting application				
Inverter Models	Braking resistor (Ω)			Power
	Min value	Max value	Recommended value	
E2000-Q0007T3	250	500	300	≥350W
E2000-Q0015T3	160	320	250	≥750W
E2000-Q0022T3	100	200	160	≥1kW
E2000-Q0030T3	100	200	160	≥2KW
E2000-Q0040T3	75	150	100	≥2KW
E2000-Q0055T3	55	110	75	≥3KW
E2000-Q0075T3	40	80	55	≥4KW
E2000-Q0110T3	30	60	40	≥6kW
E2000-Q0150T3	25	50	30	≥8kW
E2000-Q0185T3	20	40	25	≥9kW
E2000-Q0220T3	15	30	20	≥11KW
E2000-Q0300T3	12	24	15	≥15KW
E2000-Q0370T3	9	18	12	≥19kW
E2000-Q0450T3	7	14	9	≥22KW
E2000-Q0550T3	6	12	7	≥28KW
E2000-Q0750T3	5	10	6	≥38kW
E2000-Q0900T3	4	8	5	≥45kW
E2000-Q1100T3	3.5	7	4	≥55kW
E2000-Q1320T3	3.2	6.5	3.5	≥65kW
E2000-Q1600T3	3	6	3.5	≥80kW
E2000-Q1800T3	2.5	5	3	≥90KW
E2000-Q2000T3	2.2	4.4	2.5	≥100KW
E2000-Q2200T3	1.8	3.6	2.2	≥110KW
E2000-Q2500T3	1.6	3.2	2	≥125KW

Resistor selection for translation application				
Inverter Models	Braking resistor (Ω)			Power
	Min value	Max value	Recommended value	
E2000-Q0007T3	250	500	300	≥150W
E2000-Q0015T3	160	320	250	≥300W
E2000-Q0022T3	100	200	160	≥500W
E2000-Q0030T3	100	200	160	≥600W
E2000-Q0040T3	75	150	100	≥800W
E2000-Q0055T3	55	110	75	≥1KW
E2000-Q0075T3	40	80	55	≥1.5KW
E2000-Q0110T3	30	60	40	≥2.5kW
E2000-Q0150T3	25	50	30	≥3kW
E2000-Q0185T3	20	40	25	≥4kW
E2000-Q0220T3	15	30	20	≥4.5KW
E2000-Q0300T3	12	24	15	≥6KW
E2000-Q0370T3	9	18	12	≥7.5kW
E2000-Q0450T3	7	14	9	≥9KW
E2000-Q0550T3	6	12	7	≥11KW
E2000-Q0750T3	5	10	6	≥15kW
E2000-Q0900T3	4	8	5	≥18KW
E2000-Q1100T3	3.5	7	4	≥22KW
E2000-Q1320T3	3.2	6.5	3.5	≥27KW
E2000-Q1600T3	3	6	3.5	≥32KW
E2000-Q1800T3	2.5	5	3	≥36KW
E2000-Q2000T3	2.2	4.4	2.5	≥40KW
E2000-Q2200T3	1.8	3.6	2.2	≥44KW
E2000-Q2500T3	1.6	3.2	2	≥50KW

Appendix 4 Communication Manual

(Version 1.8)

I. General

Modbus is a serial and asynchronous communication protocol. Modbus protocol is a general language applied to PLC and other controlling units. This protocol has defined an information structure which can be identified and used by a controlling unit regardless of whatever network they are transmitted.

You can read reference books or ask for the details of MODBUS from manufactures.

Modbus protocol does not require a special interface while a typical physical interface is RS485.

II. Modbus Protocol

2.1 Transmission mode

2.1.1 Format

1) ASCII mode

Start	Address	Function	Data				LRC check		End	
: (0X3A)	Inverter Address	Function Code	Data Length	Data 1	… …	Data N	High-order byte of LRC	Low-order byte of LRC	Return (0X0D)	Line Feed (0X0A)

2） RTU mode

Start	Address	Function	Data	CRC check		End
T1-T2-T3-T4	Inverter Address	Function Code	N data	Low-order byte of CRC	High-order byte of CRC	T1-T2-T3-T4

2.1.2 ASCII Mode

In ASCII mode, one Byte (hexadecimal format) is expressed by two ASCII characters.
For example, 31H (hexadecimal data) includes two ASCII characters'3(33H)','1(31H)'.

Common characters, ASCII characters are shown in the following table:

Characters	**'0'**	**'1'**	**'2'**	**'3'**	**'4'**	**'5'**	**'6'**	**'7'**
ASCII Code	**30H**	**31H**	**32H**	**33H**	**34H**	**35H**	**36H**	**37H**
Characters	**'8'**	**'9'**	**'A'**	**'B'**	**'C'**	**'D'**	**'E'**	**'F'**
ASCII Code	**38H**	**39H**	**41H**	**42H**	**43H**	**44H**	**45H**	**46H**

2.1.3 RTU Mode

In RTU mode, one Byte is expressed by hexadecimal format. For example, 31H is delivered to data packet.

2.2 Baud rate

Setting range: 1200, 2400, 4800, 9600, 19200, 38400, 57600

2.3 Frame structure:

ASCII mode

Byte	Function
1	Start Bit (Low Level)
7	Data Bit
0/1	Parity Check Bit (None for this bit in case of no checking. Otherwise 1 bit)
1/2	Stop Bit (1 bit in case of checking, otherwise 2 bits)

2) RTU mode

Byte	Function
1	Start Bit (Low Level)
8	Data Bit
0/1	Parity Check Bit (None for this bit in case of no checking. Otherwise 1 bit)
1/2	Stop Bit (1 bit in case of checking, otherwise 2 bits)

2.4 Error Check

2.4.1 ASCII mode

Longitudinal Redundancy Check (LRC): It is performed on the ASCII message field contents excluding the 'colon' character that begins the message, and excluding the CRLF pair at the end of the message.
The LRC is calculated by adding together successive 8–bit bytes of the message, discarding any carries, and then two's complementing the result.
A procedure for generating an LRC is:
1. Add all bytes in the message, excluding the starting 'colon' and ending CRLF. Add them into an 8–bit field, so that carries will be discarded.
2. Subtract the final field value from FF hex (all 1's), to produce the ones–complement.
3. Add 1 to produce the twos–complement.

2.4.2 RTU Mode

Cyclical Redundancy Check (CRC): The CRC field is two bytes, containing a 16–bit binary value.
The CRC is started by first preloading a 16–bit register to all 1's. Then a process begins of applying successive 8–bit bytes of the message to the current contents of the register. Only the eight bits of data in each character are used for generating the CRC. Start and stop bits, and the parity bit, do not apply to the CRC.
A procedure for generating a CRC-16 is:
1. Load a 16–bit register with FFFF hex (all 1's). Call this the CRC register.
2. Exclusive OR the first 8–bit byte of the message with the high–order byte of the 16–bit CRC register, putting the result in the CRC register.
3. Shift the CRC register one bit to the right (toward the LSB), zero–filling the MSB. Extract and examine the LSB.
4. (If the LSB was 0): Repeat Step 3 (another shift).
(If the LSB was 1): Exclusive OR the CRC register with the polynomial value A001 hex (1010 0000 0000 0001).
5. Repeat Steps 3 and 4 until 8 shifts have been performed. When this is done, a complete 8–bit byte will have been processed.
When the CRC is appended to the message, the low-order byte is appended first, followed by the high-order byte.

2.4.3 Protocol Converter

It is easy to turn a RTU command into an ASCII command followed by the lists:

1) Use the LRC replacing the CRC.
2) Transform each byte in RTU command into a corresponding two byte ASCII. For example: transform 0x03 into 0x30, 0x33 (ASCII code for 0 and ASCII code for 3).
3) Add a 'colon' (:) character (ASCII 3A hex) at the beginning of the message.
4) End with a 'carriage return – line feed' (CRLF) pair (ASCII 0D and 0A hex).

So we will introduce RTU Mode in followed part. If you use ASCII mode, you can use the up lists to convert.

2.5 Command Type & Format

2.5.1 The listing below shows the function codes.

code	name	description
03	Read Holding Registers	Read the binary contents of holding registers in the slave. (Less than 10 registers once time)
06	Preset Single Register	Preset a value into holding register

2.5.2 Address and meaning

The part introduces inverter running, inverter status and related parameters setting.

Description of rules of function codes parameters address:

1) Use the function code as parameter address

General Series:

High-order byte: 01~0A (hexadecimal)

Low-order byte: 00~50 (max range) (hexadecimal) Function code range of each partition is not the same. The specific range refers to manual.

For example: parameter address of F114 is 010E (hexadecimal).

parameter address of F201 is 0201 (hexadecimal).

Note: in this situation, it allows to read six function codes and write only one function code. Some function codes can only be checked but cannot be modified; some function codes can neither be checked nor be modified; some function codes can not be modified in run state; some function codes can not be modified both in stop and run state.

In case parameters of all function codes are changed, the effective range, unit and related instructions shall refer to user manual of related series of inverters. Otherwise, unexpected results may occur.

2) Use different parameters as parameter address

(The above address and parameters descriptions are in hexadecimal format, for example, the decimal digit 4096 is represented by hexadecimal 1000).

1. Running status parameters

Parameters Address	Parameter Description（read only）
1000	Output frequency
1001	Output voltage
1002	Output current
1003	Pole numbers/ control mode, high-order byte is pole numbers, low-order byte is control mode.

1004	Bus-line voltage
1005 ----E2000-Q	Drive ratio/inverter status High-order byte is drive ratio, low-order byte is inverter status Inverter status: 0X00: Standby mode 0X01: Forward running 0X02: Reverse running 0X04: Over-current (OC) 0X05: DC over-current (OE) 0X06: Input Phase loss (PF1) 0X07: Frequency Over-load (OL1) 0X08: Under-voltage (LU) 0X09: Overheat (OH) 0X0A: Motor overload (OL2) 0X0B: Interference (Err) 0X0C: LL 0X0D: External Malfunction (ESP) 0X0E: Err1 0X0F: Err2 0X10: Err3 0X11: Err4 0X12: OC1 0X13:PF0 0X14: Analog disconnected protection (AErr) 0X15: EP3 0X16:Under-load protection (EP) 0X17: PP 0X18: Pressure control protection (nP) 0X19: PID parameters are set incorrectly (Err5) 0X2D: Communication timeout (CE) 0X2E: Speed track fault (FL) 0X31: Watchdog fault (Err6)
1006	The percent of output torque
1007	Inverter radiator temperature
1008	PID given value
1009	PID feedback value

Reading parameter address	Function	Remarks
100A	Read integer power value	The integer power value is read by PC.
100B	DI terminal status	DI1~DI8—bit0~bit7
100C	Terminal output status	bit0-OUT1 bit1-OUT2 bit2-fault relay
100D	AI1	0~4095 read input analog digital value
100E	AI2	0~4095 read input analog digital value
100F	AI3	0~4095 read input analog digital value
1010	Reserved	
1011	0~10000	0~100.00% the percent of input pulse
1012	0~10000	0~100.00% the percent of output pulse
1013	Present-stage speed value 0000 : no function 0001 : stage speed 1 0010 : stage speed 2 0011 : stage speed 3 0100 : stage speed 4 0101 : stage speed 5 0110 : stage speed 6 0111 : stage speed 7 1000 : stage speed 8 1001 : stage speed 9 1010 : stage speed 10	Monitoring in which stage speed inverter is.

	1011 : stage speed 11 1100 : stage speed 12 1101 : stage speed 13 1110 : stage speed 14 1111 : stage speed 15	
1014	External counting value	Monitoring external counting value
1015	AO1 （0~100.00）	Monitoring analog output percent
1016	AO2 （0~100.00）	Monitoring analog output percent
1017	Current speed	Monitoring current speed.
1018	Read accurate power value	Correct the power to 1 decimal place.

2. Control commands

Parameters Address	Parameters Description（write only）
2000	Command meaning: 0001：Forward running (no parameters） 0002：Reverse running（no parameters） 0003：Deceleration stop 0004：Free stop 0005：Forward jogging start 0006：Forward jogging stop 0007：Reserved 0008：Run（no directions）0009：Fault reset 000A: Forward jogging stop 000B: Reverse jogging stop
2001	Lock parameters 0001：Relieve system locked (remote control locked） 0002：Lock remote control (any remote control commands are no valid before unlocking） 0003: RAM and eeprom are permitted to be written. 0004: Only RAM is permitted to be written, eeprom is prohibited being written.

Writing parameter address	Function	Remarks
2002	AO1output percent is set by PC/PLC. Setting range: 0~1000	F431=7 AO1 token output analog is controlled by PC/PLC.
2003	AO2 output percent is set by PC/PLC. Setting range: 0~1000	F432=7 AO2 token output analog is controlled by PC/PLC.
2004	FO output percent is set by PC/PLC. Setting range: 0~1000	F453=7 FO token output pulse is controlled by PC/PLC.
2005	Multi-function output terminal code 21	1 means token output is valid. 0 means token output is invalid.
2006	Multi-function output terminal code 22	
2007	Multi-function output terminal code 23	

2. Illegal Response When Reading Parameters

Command Description	Function	Data
Slave parameters response	The highest-order byte changes into 1.	Command meaning: 0001: Illegal function code 0002: Illegal address 0003: Illegal data 0004: Slave fault [note 2]

Note 2: Illegal response 0004 appears below two cases:

1. Do not reset inverter when inverter is in the malfunction state.
2. Do not unlock inverter when inverter is in the locked state.

2.5.3 Additional Remarks

Expressions during communication process:

Parameter Values of Frequency＝actual value X 100 (General Series)
Parameter Values of Frequency＝actual value X 10 (Medium Frequency Series)
Parameter Values of Time=actual value X 10
Parameter Values of Current=actual value X 10
Parameter Values of Voltage=actual value X 1
Parameter Values of Power=actual value X 100
Parameter Values of Drive Ratio=actual value X 100
Parameter Values of Version No. =actual value X 100

Instruction: Parameter value is the value sent in the data package. Actual value is the actual value of inverter. After PC/PLC receives the parameter value, it will divide the corresponding coefficient to get the actual value.

NOTE: Take no account of radix point of the data in the data package when PC/PLC transmits command to inverter. The valid value is range from 0 to 65535.

Ⅲ Function Codes Related to Communication

Function Code	Function Definition	Setting Rang	Mfr's Value
F200	Source of start command	0: Keypad command; 1: Terminal command; 2: Keypad＋Terminal; 3:MODBUS; 4: Keypad＋Terminal＋MODBUS	0
F201	Source of stop command	0: Keypad command; 1: Terminal command; 2: Keypad＋Terminal; 3:MODBUS; 4: Keypad＋Terminal＋MODBUS	0
F203	Main frequency source X	0: Digital setting memory; 1: External analog AI1; 2: External analog AI2; 3: Pulse input given; 4: Stage speed control;	0
F900	Inverter Address	1~247	1
F901	Modbus Mode Selection	1: ASCII mode 2: RTU mode	1
F903	Parity Check	0: Invalid 1: Odd 2: Even	0

F904	Baud Rate	0: 1200 1: 2400 2: 4800 3: 9600 4: 19200	3

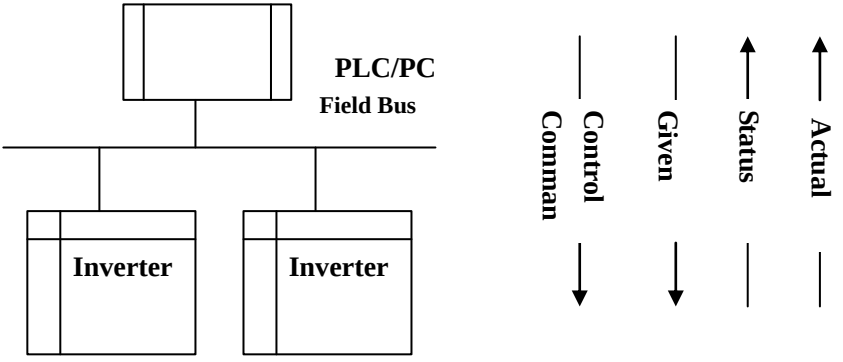
Please set functions code related to communication consonant with the PLC/PC communication parameters, when inverter communicates with PLC/PC.

Ⅳ Physical Interface

4.1 Interface instruction

Communication interface of RS485 is located on the most left of control terminals, marked underneath with A+ and B-

4.2 Structure of Field Bus



Connecting Diagram of Field Bus

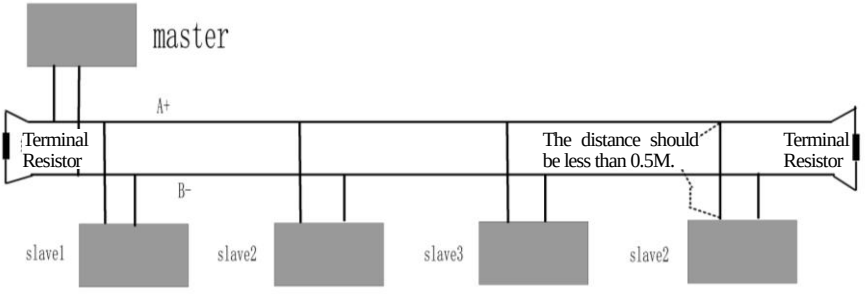
RS485 Half-duplex communication mode is adopted for E2000-Q series inverter. Daisy chain structure is adopted by 485 Bus-line. Do not use 'spur' lines or a star configuration. Reflect signals which are produced by spur lines or star configuration will interfere in 485 communications.

Please note that for the same time in half-duplex connection, only one inverter can have communication with PC/PLC. Should two or more than two inverters upload data at the same time, then bus competition will occur, which will not only lead to communication failure, but higher current to certain elements as well.

3. Grounding and Terminal

Terminal resistance of 120 Ω will be adopted for terminal of RS485 network, to diminish the reflection of signals. Terminal resistance shall not be used for intermediate network.

No direct grounding shall be allowed for any point of RS485 network. All the equipment in the network shall be well grounded via their own grounding terminal. Please note that grounding wires will not form closed loop in any case.



Connecting Diagram of Terminal Resistance

Please think over the drive capacity of PC/PLC and the distance between PC/PLC and inverter when wiring. Add a repeaters if drive capacity is not enough.

All wiring connections for installation shall have to be made when the inverter is disconnected from power supply.

V. Examples

Eg1: In RTU mode, change acc time (F114) to 10.0s in NO.01 inverter.

Query

Address	Function	Register Address Hi	Register Address Lo	Preset Data Hi	Preset Data Lo	CRC Lo	CRC Hi
01	06	01	0E	00	64	E8	1E

Function code F114 Value: 10.0S

Normal Response

Address	Function	Register Address Hi	Register Address Lo	Response Data Hi	Response Data Lo	CRC Lo	CRC Hi
01	06	01	0E	00	64	E8	1E

Function code F114 Normal Response

Abnormal Response

Address	Function	Abnormal code	CRC Lo	CRC Hi
01	86	04	43	A3

The max value of function code is 1. Slave fault

Eg 2： Read output frequency, output voltage, output current and current rotate speed from N0.2 inverter.

Host Query

Address	Function	First Register Address Hi	First Register Address Lo	Register count Hi	Register count L0	CRC Lo	CRC Hi
02	03	10	00	00	04	40	FA

Communication Parameters Address 1000H

Slave Response：

Address	Function	Byte Count	Data Hi	Data Lo	Data Hi	Data Lo	Data Hi	Data Lo	Data Hi	Data Lo	Crc Lo	Crc Hi
02	03	08	13	88	01	90	00	3C	02	00	82	F6

Output Frequency Output Voltage Output Current Numbers of Pole Pairs Control Mode

NO.2 Inverter's output frequency is 50.00Hz, output voltage is 380V, output current is 0.6A, numbers of pole pairs are 2 and control mode keypad control.

Eg 3： NO.1 Inverter runs forwardly.

Host Query:

Address	Function	Register Hi	Register Lo	Write status Hi	Write status Lo	CRC Lo	CRC Hi
01	06	20	00	00	01	43	CA

Communication parameters address 2000H Forward running

Slave Normal Response:

Address	Function	Register Hi	Register Lo	Write status Hi	Write status Lo	CRC Lo	CRC Hi
01	06	20	00	00	01	43	CA

Normal Response

Slave Abnormal Response:

Address	Function	Abnormal Code	CRC Lo	CRC Hi
01	86	01	83	A0

The max value of function code is 1. Illegal function code (assumption)

Eg4: Read the value of F113, F114 from NO.2 inverter

Host Query：

Address	Function	Register Address Hi	Register Address Lo	Register Count Hi	Register Count L0	CRC Lo	CRC Hi
02	03	01	0D	00	02	54	07

Communication Parameter Address F10DH Numbers of Read Registers

Slave Normal Response:

Address	Function	Byte count	The first parameters status Hi	The first parameters status Lo	The second parameters status Hi	The second parameters status Lo	CRC Lo	CRC Hi
02	03	04	03	E8	00	78	49	61

The actual value is 10.00. The actual value is 12.00.

Slave Abnormal Response：

Address	Function Code	Abnormal Code	CRC Lo	CRC Hi
02	83	08	B0	F6

The max value of function code is 1. **Parity check fault**

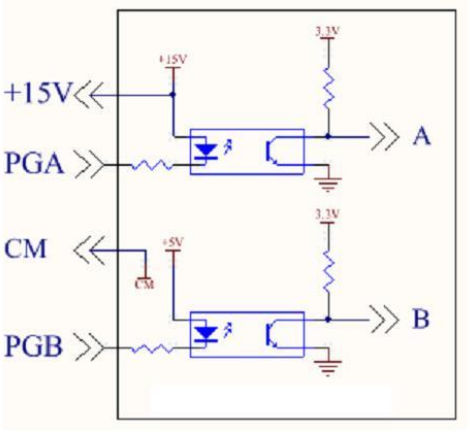
Appendix 5 Introduction of PG card

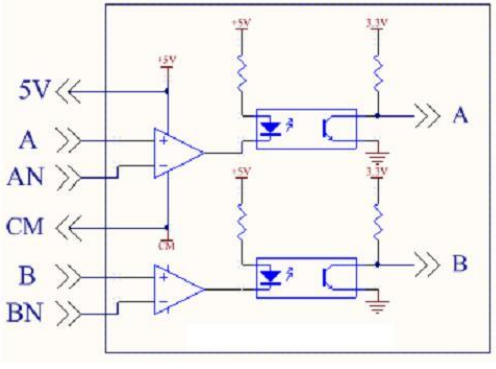
1. Introduction

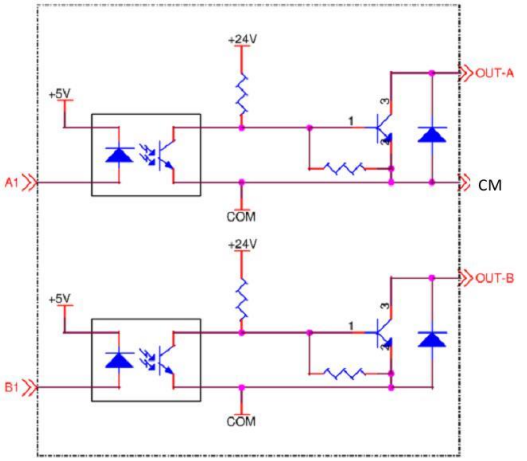
1.1 When F106=1, close-loop vector control mode is selected, PG expand card should be selected. User should connect encoder line correctly. PGA and PGB terminals can receive two-way orthogonal encoder signal (only NPN type encoder can be connected), the power supply of encoder is +12V.

User should select shielding wire and one end of it should be connected to the grounding, the length of wire should be shorter than 30m.

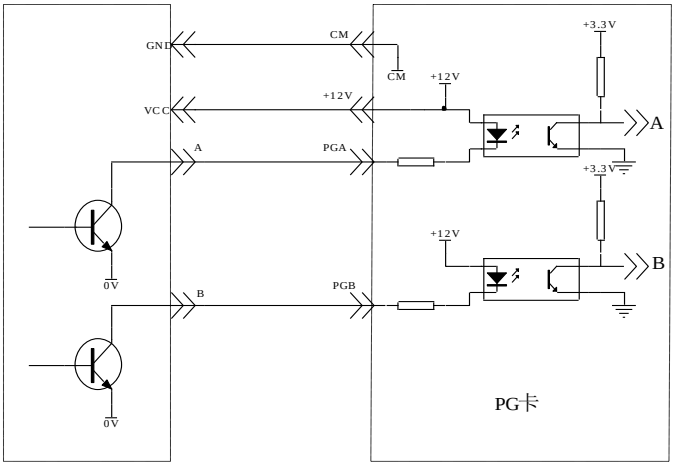
1.2





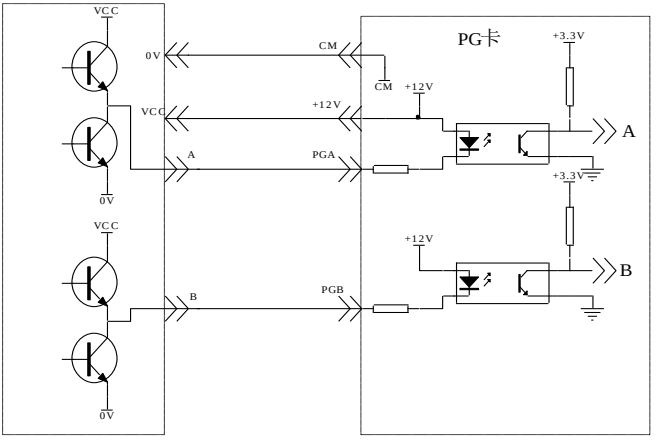


1.3 Application

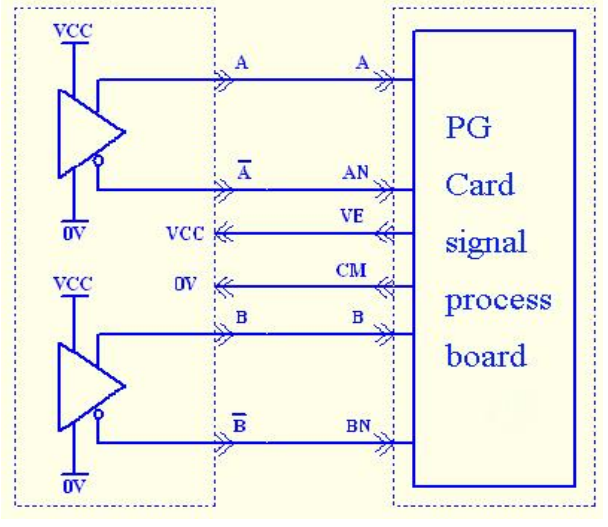


开路集电极输出编码器

1.3.2 Push-Pull output encoder



1.3.3 Differential encoder



Note: VCC=5V, please pay attention.

1.4 Installation

For 3.7kW and above 3.7kW inverter, PG card is installed inside of inverter by 3*5 tapping screw. User can connect J4 of PG card to J6 or J4 of control board by 20-core wire. For 2.2kW and below 2.2kW inverter,

PG card is installed outside of inverter, the length of wire should be shorter than 30cm, please refer to following table:

PG CARD	External size (mm)	Installation size (mm)
	86*35	76*25

2. Note

1. The signal wire of encoder should be far away from power wire.

2. Please select shielding wire as the encoder signal wire, and one end of it should be connected to grounding.

3. The length of shielding wire should be shorter than 30m, if user needs the wire longer than 30m, please indicate it.

4. The given direction of inverter, the rotation direction of motor (from output axis of motor) and the rotation direction of encoder should be the same.

Appendix 6 Zoom Table of Function Code

Basic parameters: F100-F160

Function Code	Function Definition	Setting Range	Mfr's Value	Change
F100	User's Password	0～9999		√
F102	Inverter's Rated Current (A)		Subject to inverter model	*
F103	Inverter Power (kW)		Subject to inverter model	*
F104	Reserved			
F105	Software Edition No.	1.00～10.00	Subject to inverter model	*
F106	Control mode	Setting range: 0:Sensorless vector control (SVC); 1: Close-loop vector control(VC) 2: V/F; 3: Vector control 1	2	×
F107	Password Valid or Not	0: invalid; 1: valid	0	√
F108	Setting User's Password	0～9999	8	√
F109	Starting Frequency (Hz)	0.0～10.00Hz	0.00Hz	√
F110	Holding Time of Starting Frequency (S)	0.0～999.9	0.0	√
F111	Max Frequency (Hz)	F113～650.0Hz	50.00	√
F112	Min Frequency (Hz)	0.00Hz～F113	0.50	√
F113	Target Frequency (Hz)	F112～F111	50.00	√
F114	1st Acceleration Time (S)	0.1～3000	subject to inverter model	√
F115	1st Deceleration Time (S)	0.1～3000		√
F116	2nd Acceleration Time (S)	0.1～3000		√
F117	2nd Deceleration Time (S)	0.1～3000		√
F118	Turnover Frequency (Hz)	15.00～650.0	50.00	×
F119	Reference of setting accel/decel time	0: 0~50.00Hz 1: 0~max frequency	0	×
F120	Forward/Reverse Switchover dead-Time	0.0～3000S	0.0S	√
F121	Reserved			
F122	Reverse Running Forbidden	0: invalid; 1: valid	0	×
F123	Minus frequency is valid in the mode of combined speed control.	0：Invalid；1：valid	0	×
F124	Jogging Frequency	F112～F111	5.00Hz	√
F125	Jogging Acceleration Time	0.1～3000S	subject to inverter model	√
F126	Jogging Deceleration Time	0.1～3000S		√

F127	Skip Frequency A	0.00～150.0Hz	0.00	√
F128	Skip Width A	0.00～±2.50Hz	0.00	√
F129	Skip Frequency B	0.00～150.0Hz	0.00	√
F130	Skip Width B	0.00～±2.50Hz	0.00	√
F131	Running Display Items	0－Present output frequency / function code 1－Current output rotary speed 2－Output current 4－Output voltage 8－PN voltage 16－Reserved 32－Temperature 64－Reserved 128－Reserved 256－Reserved 512－Reserved 1024－Reserved 2048－Output power 4096－ Output torque	0+1＋2＋4＋8＝15	√
F132	Display items of stop	0: frequency / function code 1: Reserved 2: Target rotary speed 4: PN voltage 8: Reserved 16: Temperature 32: Reserved 64: Reserved 128: Reserved 256: Reserved 512: Reserved	2＋4＝6	√
F133	Drive Ratio of Driven System	0.10～200.0	1.0	√
F134	Transmission-wheel radius	0.001～1.000（m）	0.001	√
F135	Reserved			
F136	Slip compensation	0～10%	0	×
F137	Modes of torque compensation	0: Linear compensation; 1: Square compensation; 2: User-defined multipoint compensation 3: Auto torque compensation	0	×
F138	Linear compensation	1～16	subject to inverter model	×

F139	Square compensation	1：1.5； 2：1.8； 3：1.9； 4：2.0	1	×
F140	Voltage compensation point frequency	0～F142	1.00	×
F141	Voltage compensation point 1 (%)	0～100	4	×
F142	User-defined frequency point 2	F140～F144	5.00	×
F143	User-defined voltage point 2	0～100%	13	×
F144	User-defined frequency point 3	F142～F146	10.00	×
F145	User-defined voltage point 3	0～100%	24	×
F146	User-defined frequency point 4	F144～F148	20.00	×
F147	User-defined voltage point 4	0～100%	45	×
F148	User-defined frequency point 5	F146～F150	30.00	×
F149	User-defined voltage point 5	0～100%	63	×
F150	User-defined frequency point 6	F148～F118	40.00	×
F151	User-defined voltage point 6	0～100%	81	×
F152	Output voltage corresponding to turnover frequency	0～100%	100	×
F153	Carrier frequency setting	10～100	subject to inverter model	×
F154	Automatic voltage rectification	Setting range: 0: Invalid 1: Valid 2:Invalid during deceleration process	0	×
F155	Digital accessorial frequency setting	0～F111	0	×
F156	Digital accessorial frequency polarity setting	0~1	0	×
F157	Reading accessorial frequency			△
F158	Reading accessorial frequency polarity			△
F159	Random carrier-wave frequency selection	0: Control speed normally; 1: Random carrier-wave frequency	0	
F160	Reverting to manufacturer values	0: Not reverting to manufacturer values; 1: Reverting to manufacturer values	0	×

Running control mode: F200-F230

F200	Source of start command	0: Keypad command; 1: Terminal command; 2: Keypad＋Terminal; 3:MODBUS; 4: Keypad＋Terminal＋MODBUS	4	×
F201	Source of stop command	0: Keypad command; 1: Terminal command; 2: Keypad＋Terminal; 3:MODBUS; 4: Keypad＋Terminal＋MODBUS	4	×
F202	Mode of direction setting	0: Forward running locking; 1: Reverse running locking; 2: Terminal setting	0	×
F203	Main frequency source X	0: Digital setting memory; 1: External analog AI1; 2: External analog AI2; 3: Pulse input given; 4: Stage speed control; 5: No memory by digital setting; 6: Analog AI2; 7: Reserved; 8: Reserved; 9: Reserved; 10: MODBUS	0	×
F204	Accessorial frequency source Y	0: Digital setting memory; 1: External analog AI1; 2: External analog AI2; 3: Pulse input given; 4: Stage speed control; 5: Reserved; 6: Keypad potentiometer AI3	0	×
F205	Reference for selecting accessorial frequency source Y range	0: Relative to max frequency; 1: Relative to main frequency X	0	×
F206	Accessorial frequency Y range	0～100%	100	×
F207	Frequency source selecting	0: X;　1: X+Y; 2: X or Y (terminal switchover); 3: X or X+Y (terminal switchover); 4: Combination of stage speed and analog 5: X-Y　6: X+Y-Y_{MAX}*50%	0	×
F208	Terminal two-line/three-line operation control	0: No function; 1: Two-line operation mode 1; 2: Two-line operation mode 2; 3: three-line operation mode 1; 4: three-line operation mode 2; 5: start/stop controlled by direction pulse	0	×

F209	Selecting the mode of stopping the motor	0: stop by deceleration time; 1: free stop	0	×
F210	Frequency display accuracy	0.01～2.00	0.01	√
F211	Speed of digital control	0.01～100.00Hz/S	5.00	√
F224	when target frequency is lower than Min frequency	Setting range: 0: stop 1: run at min frequency	0	×
F229	Crane macro setting	0：invalid 1：lifting motion 2：translation motion 3：rotating motion	0	×

Multifunctional Input and Output Terminals: F300-F330

Function Code	Function Definition	Setting Range	Mfr's Value	Change
F300	Relay token output	0: no function; 1: inverter fault protection; 2: over latent frequency 1; 3: over latent frequency 2; 4: free stop; 5: in running status 1; 6: reserved 7: accel/decel time switchover; 8: reserved 9: reserved 10: inverter overload pre-alarm; 11: motor overload pre-alarm; 12: stalling; 13: Inverter is ready to run 14: in running status 2; 15: frequency arrival output; 16: overheat pre-alarm; 17: over latent current output 18: Analog line disconnection protection 19: reserved 20: Zero current detecting output 21: DO1 Output controlled by PC/PLC n 22: DO2 Output controlled by PC/PLC 23: TA\TC Output controlled by PC/PLC 24:watchdog output token 40: No.1 motor brake command output 41: No.1 motor brake command output 42:Motor switchover 44:overload protection	1	√
F301	DO1 token output		14	√
F302	DO2 token output		5	
F303	DO output types selection	0: level output 1 : pulse output	0	√
F304	S curve beginning stage proportion	2.0～50.0	30.0	√
F305	S curve ending stage proportion	2.0～50.0	30.0	√
F306	Accel/decel mode	0：Straight-line 1: S curve	0	×
F307	Characteristic frequency 1	F112～F111	10.00Hz	√
F308	Characteristic frequency 2	F112～F111	50.00Hz	√
F309	Characteristic frequency width (%)	0～100	50%	√
F310	Characteristic current (A)	0～1000A	Rated current	√
F311	Characteristic current width (%)	0～100	10	√

F312	Frequency arrival threshold (Hz)	0.00～5.00	0.00	√
F313	Count frequency divisions	1～65000	1	√
F314	Set count value	F315～65000	1000	√
F315	Designated count value	1～F314	500	√
F316	DI1 terminal function setting	Setting range: 0: no function; 1: running terminal; 2: stop terminal; 3: multi-stage speed terminal 1; 4: multi-stage speed terminal 2; 5: multi-stage speed terminal 3; 6: multi-stage speed terminal 4; 7: reset terminal; 8: free stop terminal; 9: external emergency stop terminal; 10: acceleration/deceleration forbidden terminal; 11: forward run jogging; 12: reverse run jogging; 13: UP frequency increasing terminal; 14: DOWN frequency decreasing terminal; 15: “FWD” terminal; 16: “REV” terminal; 17: reserved 18: acceleration/deceleration time switchover 1; 19: Reserved; 20: switchover between speed and torque 21: frequency source switchover terminal; 47: forward impact stop 49: brake feedback of No.1 motor 50: brake feedback of No.2 motor 51: motor switchover 52:reverse impact stop 62:startup of suspending at zero-speed 63: stop of suspending at zero-speed	11	√
F317	DI2 terminal function setting		9	√
F318	DI3 terminal function setting		15	√
F319	DI4 terminal function setting		16	√
F320	DI5 terminal function setting		7	√
F321	DI6 terminal function setting		8	√
F322	DI7 terminal function setting		1	√
F323	DI8 terminal function setting		2	√
F324	Free stop terminal logic	0: positive logic (valid for low level); 1: negative logic (valid for high level)	0	×
F325	External emergency stop terminal logic		0	×
F326	Watchdog time	0.0~3000.0	10.0	√

F327	Stop mode	0: Free stop 1: Deceleration to stop	0	×
F328	Terminal filter times	1～100	10	√
F329	Reserved			
F330	Diagnostics of DIX terminal			√
F331	Monitoring AI1		Only read	
F332	Monitoring AI2		Only read	
F333	Monitoring AI3		Only read	
F335	Relay output simulation	Setting range: 0：Output active. 1：Output inactive.	0	×
F336	DO1 output simulation		0	×
F337	DO2 output simulation		0	×
F338	AO1 output simulation	Setting range: 0～4095	0	×
F339	AO2 output simulation	Setting range: 0～4095	0	×
F340	Terminal negative logic selection	Setting range： 0:invalid 1：DI1 negative logic 2：DI2 negative logic 4：DI3 negative logic 8：DI4 negative logic 16：DI5 negative logic 32：DI6 negative logic 64：DI7 negative logic 128：DI8 negative logic	0	√

Analog Input and Output: F400-F480

F400	Lower limit of AI1 channel input	0.00～F402	0.01V	○
F401	Corresponding setting for lower limit of AI1 input	0～F403	1.00	√
F402	Upper limit of AI1 channel input	F400～10.00V	10.00V	○
F403	Corresponding setting for upper limit of AI1 input	Max（1.00，F401）～2.00	2.00	√
F404	AI1 channel proportional gain K1	0.0～10.0	1.0	√
F405	AI1 filtering time constant	0.01～10.0	0.10	√
F406	Lower limit of AI2 channel input	0.00～F408	0.01V	○
F407	Corresponding setting for lower limit of AI2 input	0～F409	1.00	√
F408	Upper limit of AI2 channel input	F406～10.00V	10.00V	○
F409	Corresponding setting for upper limit of AI2 input	Max（1.00，F407）～2.00	2.00	√
F410	AI2 channel proportional gain K2	0.0～10.0	1.0	√
F411	AI2 filtering time constant	0.01～10.0	0.10	√
F412	Lower limit of AI3 channel input	0.00～F414	0.05	○
F413	Corresponding setting for lower limit of AI3 input	0～F415	1.00	√
F414	Upper limit of AI3 channel input	F412～10.0V	10.0V	○
F415	Corresponding setting for upper limit of AI3 input	Max（1.00，F413）～2.00	2.00	√
F416	AI3 channel proportional gain K1	0.0～10.0	1.0	√
F417	AI3 filtering time constant	0.1～10.00	0.10	√
F418	AI1 channel 0Hz voltage dead zone	0～0.5V (Positive-Negative)	0.00	√
F419	AI2 channel 0Hz voltage dead zone	0～0.5V (Positive-Negative)	0.00	√
F420	AI3 channel 0Hz voltage dead zone	0～0.5V (Positive-Negative)	0.00	√
F421	Panel selection	0: Local keypad panel 1: Auto switchover between local panel and remote control panel 2: Local keypad panel + remote control panel	1	√
F422	Potentiometer selection	0: Potentiometer in local panel 1: Potentiometer in remote control panel	0	√
F423	AO1 output range	0：0～5V；1：0～10V or 0-20mA 2: 4-20mA	1	√

F424	AO1 lowest corresponding frequency	0.0～F425	0.05Hz	√
F425	AO1 highest corresponding frequency	F424～F111	50.00Hz	√
F426	AO1 output compensation	0～120	100	√
F427	AO2 output range	0：0～20mA；1：4～20mA	0	√
F428	AO2 lowest corresponding frequency	0.0～F429	0.05Hz	√
F429	AO2 highest corresponding frequency	F428～F111	50.00Hz	√
F430	AO2 output compensation	0～120%	100	√
F431	AO1 analog output signal selecting	0: Running frequency; 1: Output current; 2: Output voltage; 3: AI1　4: AI2 5: Input pulse 6: Output torque 7: Given by PC/PLC 8: Target frequency 9: Speed 10:output torque 2	0	√
F432	AO2 analog output signal selecting		1	√
F433	Corresponding current for full range of external voltmeter	0.01～5.00 times of rated current	2	×
F434	Corresponding current for full range of external ammeter		2	×
F437	Analog filter width	1～100	10	*
F438-F439	Reserved			
F440	Min frequency of input pulse FI	0.00～F442	0.00	√
F441	Corresponding setting of FI min frequency	0.00～F443	1.00	√
F442	Max frequency of input pulse FI	F440～50.00K	10.00	√
F443	Corresponding setting of FI max frequency	Max（1.00，F441）～2.00	2.00	√
F444	Reserved			
F445	Filtering constant of FI input pulse	0～100	0	√
F446	FI channel 0Hz frequency dead zone	0～F442Hz (Positive-Negative)	0.00	√
F447-F448	Reserved			
F449	Max frequency of output pulse FO	0.00～50.00	10.00K	√
F450	Zero bias coefficient of output pulse frequency	0.0～100.0	0.0%	√
F451	Frequency gain of output pulse	0.00～10.00	1.00	√
F452	Reserved			

F453	Output pulse signal	0: Running frequency 1: Output current 2: Output voltage 3: AI1 4: AI2 5: Input pulse 6: Output torque 7: Given by PC/PLC 8: Target frequency	0	√
F460	AI1channel input mode	0: straight line mode 1: folding line mode	0	×
F461	AI2 channel input mode	0: straight line mode 1: folding line mode	0	×
F462	AI1 insertion point A1 voltage value	F400～F464	2.00V	×
F463	AI1 insertion point A1 setting value	F401～F465	1.20	×
F464	AI1 insertion point A2 voltage value	F462～F466	5.00V	×
F465	AI1 insertion point A2 setting value	F463～F467	1.50	×
F466	AI1 insertion point A3 voltage value	F464～F402	8.00V	×
F467	AI1 insertion point A3 setting value	F465～F403	1.80	×
F468	AI2 insertion point B1 voltage value	F406～F470	2.00V	×
F469	AI2 insertion point B1 setting value	F407～F471	1.20	×
F470	AI2 insertion point B2 voltage value	F468～F472	5.00V	×
F471	AI2 insertion point B2 setting value	F469～F473	1.50	×
F472	AI2 insertion point B3 voltage value	F470～F412	8.00V	×
F473	AI2 insertion point B3 setting value	F471～F413	1.80	×

Multi-stage Speed Control: F500-F580

F500	Stage speed type	0: 3-stage speed; 1: 15-stage speed; 2: Max 8-stage speed auto circulating	1	×
F501	Selection of Stage Speed Under Auto-circulation Speed Control	2～8	7	√
F502	Selection of Times of Auto- Circulation Speed Control	0～9999（when the value is set to 0, the inverter will carry out infinite circulating）	0	√
F503	Status after auto circulation running Finished	0: Stop 1: Keep running at last stage speed	0	√
F504	Frequency setting for stage 1 speed	F112～F111	5.00Hz	√
F505	Frequency setting for stage 2 speed	F112～F111	10.00Hz	√
F506	Frequency setting for stage 3 speed	F112～F111	15.00Hz	√
F507	Frequency setting for stage 4 speed	F112～F111	20.00Hz	√

F508	Frequency setting for stage 5 speed	F112～F111	25.00Hz	√
F509	Frequency setting for stage 6 speed	F112～F111	30.00Hz	√
F510	Frequency setting for stage 7 speed	F112～F111	35.00Hz	√
F511	Frequency setting for stage 8 speed	F112～F111	40.00Hz	√
F512	Frequency setting for stage 9 speed	F112～F111	5.00Hz	√
F513	Frequency setting for stage 10 speed	F112～F111	10.00Hz	√
F514	Frequency setting for stage 11 speed	F112～F111	15.00Hz	√
F515	Frequency setting for stage 12 speed	F112～F111	20.00Hz	√
F516	Frequency setting for stage 13 speed	F112～F111	25.00Hz	√
F517	Frequency setting for stage 14 speed	F112～F111	30.00Hz	√
F518	Frequency setting for stage 15 speed	F112～F111	35.00Hz	√
F519-F533	Acceleration time setting for the speeds from Stage 1 to stage 15	0.1～3000S	Subject to inverter model	√
F534-F548	Deceleration time setting for the speeds from Stage 1 to stage 15	0.1～3000S		√
F549-F556	Running directions of stage speeds from Stage 1 to stage 8	0: forward running; 1: reverse running	0	√
F557-F564	Running time of stage speeds from Stage 1 to stage 8	0.1～3000S	1.0S	√
F565-F572	Stop time after finishing stages from Stage 1 to stage 8.	0.0～3000S	0.0S	√
F573-F579	Running directions of stage speeds from Stage 9 to stage 15.	0: forward running; 1: reverse running	0	√
F580	Reserved			

Auxiliary Functions: F600-F650

F600	DC Braking Function Selection	0: Invalid; 1: braking before starting; 2: braking during stopping; 3: braking during starting and stopping	0	√
F601	Initial Frequency for DC Braking	0.20～5.00	1.00	√
F602	DC Braking efficiency before Starting	0～100	10	√
F603	DC Braking efficiency During Stop	0～100	10	√
F604	Braking Lasting Time Before Starting	0.00～30.0	0.5	√
F605	Braking Lasting Time During Stopping	0.00～30.0	0.5	√
F607	Selection of Stalling Adjusting Function	Setting range: 0~2:Reserved 3: Voltage/current control 4: Voltage control 5: Current control	0	√
F608	Stalling Current Adjusting (%)	60～200	160	√
F609	Stalling Voltage Adjusting (%)	110～200	140	√

F610	Stalling Protection Judging Time	0.1～3000.0	5.0	√
F611	Dynamic Braking threshold (V)	200~2000	Subject to inverter model	Δ
F612	Dynamic braking duty ratio (%)	0～100%	100	×
F613	Speed track	0: invalid 1: valid 2: valid at the first time	0	×
F614	Speed track mode	0: Speed track from frequency memory 1: Speed track from 0Hz 2: Speed track from max frequency	0	×
F615	Speed track rate	1～100	20	×
F616-F640	Reserved			
F641	Inhibition of current oscillation at low frequency	0: Invalid 1: Valid	Subject to inverter model	
F642-F655	Reserved			
F656	Time of DC braking when stop	0.00~30.00	0	√○
F657	Instantaneous power failure selection	0: Invalid 1: Valid	0	×
F658	Voltage rally acceleration time	0.0～3000s 0.0: F114	0.0	√
F659	Voltage rally deceleration time	0.0～3000s 0.0: F115	0.0	√
F660	Action judging voltage at instantaneous power failure	200～F661	Subject to inverter model	×○
F661	Action stop voltage at instantaneous power failure	F660~1300	Subject to inverter model	×○

Timing Control and Protection: F700-F760

F700	Selection of terminal free stop mode	0: free stop immediately; 1: delayed free stop	0	√
F701	Delay time for free stop and programmable terminal action	0.0～60.0s	0.0	√
F702	Fan control mode	0:controlled by temperature 1: Running when inverter is powered on 2: Controlled by running status	2	×
F704	Inverter Overloading pre-alarm Coefficient (%)	50~100	80	
F705	Overloading adjusting gains	50~100	80	×

F706	Inverter Overloading coefficient%	120～190	150	×
F707	Motor Overloading coefficient %	20～100	100	×
F708	Record of The Latest Malfunction Type	Refer to appendix 1 for details		Δ
F709	Record of Malfunction Type for Last but One			Δ
F710	Record of Malfunction Type for Last but Two			Δ
F711	Fault Frequency of The Latest Malfunction			Δ
F712	Fault Current of The Latest Malfunction			Δ
F713	Fault PN Voltage of The Latest Malfunction			Δ
F714	Fault Frequency of Last Malfunction but One			Δ
F715	Fault Current of Last Malfunction but One			Δ
F716	Fault PN Voltage of Last Malfunction but			Δ
F717	Fault Frequency of Last Malfunction but			Δ
F718	Fault Current of Last Malfunction but Two			Δ
F719	Fault PN Voltage of Last Malfunction but			Δ
F720	Record of overcurrent protection fault			Δ
F721	Record of overvoltage protection fault			Δ
F722	Record of overheat protection fault times			Δ
F723	Record of overload protection fault times			Δ
F724	Input phase loss	0: invalid; 1: valid	1	×
F726	Overheat	0: invalid; 1: valid	1	×
F727	Output phase loss	0: invalid; 1: valid	0	×
F728	Input phase loss filtering constant	1～60	5	√
F729	Under-voltage filtering constant	1～3000	5.0	√
F730	Overheat protection filtering constant	0.1～60.0	5.0	√
F737	Over-current 1 protection	0: Invalid 1:Valid	0	
F738	Over-current 1 protection coefficient	0.50～3.00	2.50	
F739	Over-current 1 protection record			Δ
F741	Analog disconnected protection	0: Invalid 1: Stop and AErr displays. 2: Stop and AErr is not displayed. 3: Inverter runs at the min frequency. 4: Reserved.	0	√

F745	Threshold of pre-alarm overheat (%)	0~100	80	○
F747	Carrier frequency auto-adjusting	0: Invalid 1: Valid	1	√
F753	Selection of overload protection	0: Normal motor 1: Variable frequency motor	1	×
F754	Zero-current threshold (%)	0~200	5	×
F755	Duration time of zero-current	0~60	0.5	√
F760	Grounding protection	0:invalid	1	*
F761	Switchover mode of FWD/REV	Setting range: 0: At zero	0	×

Motor parameters: F800-F830

F800	Motor's parameters selection	Setting range: 0: Invalid; 1: Rotating tuning.; 2: Stationary tuning	0	×
F801	Rated power	0.1～1000kW	Subject to inverter	×
F802	Rated voltage	1～1300V		×
F803	Rated current	0.1～6533.5A		×
F804	Number of motor poles	2～100	4	×
F805	Rated rotary speed	1～30000		×
F806	Stator resistance	For 15kw and below 15kw inverter:0.001～65.53Ω For above 15kw inverter: 0.1～6553mΩ	Subject to inverter model	×
F807	Rotor resistance	For 15kw and below 15kw inverter:0.001～65.53Ω For above 15kw inverter: 0.1～6553mΩ	Subject to inverter mode	×
F808	Leakage inductance	For 15kw and below 15kw inverter:0.01～655.3mH For above 15kw inverter: 0.001～65.53mH	Subject to inverter mode	×
F809	Mutual inductance	For 15kw and below 15kw inverter:0.01～655.3mH For above 15kw inverter: 0.001～65.53mH	Subject to inverter mode	×
F810	Motor rated power	1.00~150.0Hz	50.00	×
F812	Pre-exciting time	0.000～30.00S	0.300S	√
F813	Rotary speed loop KP1	1～100	30	√
F814	Rotary speed loop KI1	0.01～10.00	0.5	√

F815	Rotary speed loop KP2	1～100	Subject to inverter model	√
F816	Rotary speed loop KI2	0.01～10	1	√
F817	PID switching frequency 1	0~F1818	5.00	√
F818	PID switching frequency 2	F817~F111	50.00	√
F820	Filtering coefficient of speed loop	0～100	0	√
F844	Motor current without load （A）	0.1～F803	Subject to model	
F851	Encoder resolution	1～9999	1000	

Communication parameter: F900-F930

F900	Communication Address	1~255: single inverter address 0: broadcast address	1	√
F901	Communication Mode	1: ASCII 2: RTU	2	√
F902	Stop Bits	1~2	2	√
F903	Parity Check	0: Invalid 1: Odd 2: Even	0	√
F904	Baud Rate	0: 1200; 1: 2400; 2: 4800; 3: 9600 ; 4: 19200 5: 38400 6: 57600	3	√
F905	Communication timeout period	0.0~3000.0S	0.0	√
F907	Communication timeout period 2	0.0~3000.0S	0.0	√

Torque control parameters: FC00-FC40

FC00	Speed/torque control selection	0：Speed control 1：Torque control 2：Terminal switchover	0	√
FC02	Torque accel/decel time (S)	0.1～100.0	1	√
FC03-FC05	Reserved			
FC06	Torque given channel	0: Digital given (FC09) 1: Analog input AI1 2: Analog input AI2 3: Analog input AI3 4: Pulse input channel FI 5: Reserved	0	×
FC07	Torque given coefficient	0～3.000	3.000	×
FC08	Reserved			
FC09	Torque given command value (%)	0～300.0	100.0	√
FC10-FC13	Reserved			
FC14	Offset torque given channel	0: Digital given (FC17) 1: Analog input AI1 2: Analog input AI2 3: Analog input AI3 4: Pulse input channel FI 5: Reserved	0	×
FC15	Offset torque coefficient	0~0.500	0.500	×
FC16	Offset torque cut-off frequency (%)	0~100.0	10.00	×
FC17	Offset torque command value (%)	0~50.0	10.00	√
FC18-FC21	Reserved			
FC22	Forward speed limited channel	0: Digital given (FC23) 1: Analog input AI1 2: Analog input AI2 3: Analog input AI3 4: Pulse input channel FI 5: Reserved	0	×
FC23	Forward speed limited (%)	0～100.0	10.00	√
FC24	Reverse speed limited channel	0: Digital given (FC25) 1: Analog input AI1 2: Analog input AI2	0	×

		3: Analog input AI3 4: Pulse input channel FI 5: Reserved		
FC25	Reverse speed limited (%)	0～100.0	10.00	√
FC26- FC27	Reserved			
FC28	Electric torque limited channel	0: Digital given (FC30) 1: Analog input AI1 2: Analog input AI2 3: Analog input AI3 4: Pulse input channel FI 5: Reserved	0	×
FC29	Electric torque limited coefficient	0～3.000	3.000	×
FC30	Electric torque limited (%)	0～300.0	200.0	√
FC31	Reserved			
FC32	Reserved			
FC33	Braking torque limited channel	0: Digital given (FC35) 1: Analog input AI1 2: Analog input AI2 3: Analog input AI3 4: Pulse input channel FI 5: Reserved	0	×
FC34	Braking torque limited coefficient	0～3.000	3.000	×
FC35	Braking torque limited (%)	0～300.0	200.00	√
FC36- FC40	Reserved			

Parameters for crane application

Fd00	Braking function enabled	Bit 1: No. 1 motor braking enabled 0: Disabled 1: Enabled Bit 0: No. 2 motor braking enabled 0: Disabled 1: Enabled	01	×
Fd05	Brake release Freq (FWD)	1.00～50.00	1.50	√
Fd06	Brake release Freq (REV)	1.00～50.00	1.50	√

Fd07	Brake release current (FWD)（%）	0～200	30	√
Fd08	Brake release current (REV)（%）	0～200	30	√
Fd09	Brake release delay time (s)	0.00～60.00	0.50	√
Fd10	Brake close Frequency(Hz)	Fd13～50.00	2.00	√
Fd11	Filtering time of switchover between FWD/REV terminal	0.0～5.0	0.3	×
Fd13	Slip prevention Frequency	1.00～Fd10	2.00	√
Fd14	Slip prevention Time (s)	0.00～60.00	0.50	√
Fd15	Braking feedback function	0: invalid 1:valid at two point 2:valid as inverter starts running	0	×
Fd16	Braking feedback filtering time(S)	0.1～10.0	0.1	√
Fd17	Braking feedback logic selection	0：Low level 1：High level	0	×
Fd28	Load loss protection	0: Invalid 1: Valid	1	√
Fd29	Load loss detection time	0.0~60.0S	0.2	√
Fd31	No. 2 motor brake release Freq (FWD)	1.00～50.00	1.50	√
Fd32	No. 2 motor brake release Freq (REV)	1.00～50.00	1.50	√
Fd33	No. 2 motor brake release current (FWD)	0～200	30	√
Fd34	No. 2 motor brake release current (REV)	0～200	30	√
Fd35	No. 2 motor brake release delay time (s)	0.00～60.00	0.50	√
Fd36	Brake close Frequency（Hz）	Fd39～50.00	2.00	√
Fd37	Filtering time of switchover between FWD/REV terminal	0.0～5.0	0.3	×
Fd39	Slip prevention Frequency	1.00～Fd36	2.00	√
Fd40	Slip prevention Time (s)	0.00～60.00	0.50	√
Fd41	Braking feedback function	0：invalid 1:valid at two point 2:valid when inverter is running	0	×
Fd42	Braking feedback filtering time（S）	0.1～10.0	0.1	√
Fd43	Braking feedback logic selection	0：Low level 1：High level	0	×
Fd44	Start direction selection as brake releases	0: inverter runs reversely 1: inverter starts forward and switches to reverse running	0	×

Fd45	Restart in the process of braking	0: invalid 1: valid	0	×
Fd46	Brake failure detection in stopped status	0: invalid 1: valid	0	×
Fd49	Reverse control in running status	0:inverter runs reversely after stops 1:inverter runs reversely directly	0	×
Fd50	Tripping frequency(Hz)	0.00～20.00	2.00	√
Fd51	Selecting the mode of stopping the No.2 motor	0:stop by deceleration time 1: free stop	0	×
Fd52	Abnormal frequency detection period (S)	0.00～1.00	0.50	√
Fd53	Frequency following detection period(S)	0.00～1.00	0.50	√
Fd54	Frequency following difference（%）	0～25.00	10.00	√
Fd55	Reserved			
Fd56	Reserved			
Fd57	Frequency adjustment with bus voltage	0～1	0	×
Fd58	Action voltage for frequency adjustment with bus voltage（%）	70～95	85	×
Fd59	Acceleration gain for light-load (%)	100.0～300.0	100.0	×
Fd60	Acceleration torque 1 for light-load (%)	0.0～Fd61	5.0	×
Fd61	Acceleration torque 2 for light-load (%)	Fd60～Fd62	35.0	×
Fd62	Acceleration torque 3 for light-load (%)	Fd61～100.0	80.0	×
Fd63	Detection time（S）	0.0～5.0	0.5	×

Fd64	Detection frequency（Hz）	5.00～50.00	40.00	×
Fd65	Positive modification（%）	0～100.0	100.0	×
Fd66	Negative modification（%）	0～100.0	100.0	×
Fd67	Torque limit for heavy-load	0.0～150.0	0	×
Fd68	Impact stop mode	0:invalid 1: impact stop mode 1 2: impact stop mode 2	0	×
Fd69	Impact stop creep frequency(Hz)	F112～F111	3.00	×
Fd70	Impact stop creep time(S)	0.0～20.0	10.0	×
Fd71	Impact stop detection current(%)	80～200	100	×
Fd72	Impact stop detection time(S)	0.1～1.0	0.5	×

The second motor parameters: FE00-FE60

FE00	Motor switchover	Ones: motor selection 0: No. 1 motor 1: No. 2 motor 2: Terminal switchover Tens: control mode of No.2 motor 0: sensorless vector control (SVC) 1: Closed-loop vector control (VC) 2:V/F control 3:vector control 1	20	×
FE01	Rated power of motor 2(kW)	0.1～1000.0	Subject to inverter model	×
FE02	Rated voltage of motor 2(V)	1～1300		×
FE03	Rated current of motor 2(A)	0.2~6553.5		×
FE04	Number of motor 2 poles	2～100	4	×
FE05	Rated speed of motor 2(rmp)	1～30000	Subject to inverter model	×
FE06	Motor 2 stator resistor	0.001～65.53Ω (≤15kW) 0.1～6553mΩ(>15kW)	Subject to inverter model	×
FE07	Motor 2 rotor resistor	0.001～65.53Ω (≤15kW) 0.1～6553mΩ(>15kW)	Subject to inverter model	×
FE08	Motor 2 leakage inductance	0.01～655.3mH (≤15kW) 0.001～65.53mH (>15kW)	Subject to inverter model	×
FE09	Motor 2 mutual inductance	0.01～655.3mH (≤15kW)	Subject to	×

		0.001～65.53mH (>15kW)	inverter model	
FE10	Motor 2 rated frequency(Hz)	1.00～650.00	50.00	×
FE11	Motor 2 no-load current(A)	0.1～FE03	Subject to inverter model	×
FE12	Type of motor 2	0: Normal motor 1: variable frequency motor	1	×
FE13	Motor 2 rotary speed loop KP1	1～100	30	√
FE14	Motor 2 rotary speed loop KI1	0.01～10.00	0.50	√
FE15	Motor 2 rotary speed loop KP2	1～100	20	√
FE16	Motor 2 rotary speed loop KI2	0.01～10.00	1.00	√
FE17	Motor 2 switching frequency 1	0.00～F818	5.00	√
FE18	Motor 2 switching frequency 2	FE17～F111	10.00	√
FE19	Accel/decel time of motor 2	0: same with accel/decal time of motor 1 1: 1st accel/decal time 2: 2ed accel/decal time	0	√
FE20	Torque compensation of motor 2	1～20	Subject to inverter model	×
FE21	Overload coefficient of motor 2	20～100	100	×
FE22	Motor 2 overloading pre-alarm Coefficient (%)	50～100	80	×
FE23	Motor 2 oscillation inhibition coefficient	0~100	Subject to inverter model	×
FE24	Reserved			
FE25	Motor 2 speed loop filtering constant	0～100	0	√
FE26-FE32	Reserved			
FE33	Motor 2 record of the latest malfunction type			Δ
FE34	Motor 2 record of malfunction type for last but one			Δ
FE35	Motor 2 record of malfunction type for last but two			Δ
FE36	Motor 2 fault frequency of the latest malfunction(Hz)			Δ
FE37	Motor 2 fault current of the latest malfunction(A)			Δ
FE38	Motor 2 fault PN voltage of the latest malfunction(V)			Δ
FE39	Motor 2 fault frequency of last			Δ

	malfunction but one(Hz)			
FE40	Motor 2 fault current of last malfunction but one(A)			Δ
FE41	Motor 2 fault PN voltage of last malfunction but one(V)			Δ
FE42	Motor 2 fault frequency of last malfunction but two(Hz)			Δ
FE43	Motor 2 fault current of last malfunction but two(A)			Δ
FE44	Motor 2 fault PN voltage of last malfunction but two(V)			Δ
FE45	Motor 2 record of overcurrent protection fault times			Δ
FE46	Motor 2 record of overvoltage protection fault times			Δ
FE47	Motor 2 record of overheat protection fault times			Δ
FE48	Motor 2 record of overload protection fault times			Δ
FE49	Motor 2 software overcurrent coefficient	0.50～3.00	2.50	×
FE50	Motor 2 software overcurrent times			Δ
FE51	Motor 2 encoder line numbers	1～9999	1000	×
FE52-FE60	Reserved			

Parameters display:

H000	Running frequency / target frequency (Hz)			Δ
H001	Speed with load / target speed			Δ
H002	Output current (A)			Δ
H003	Output voltage（V）			Δ
H004	PN voltage（V）			Δ
H006	Temperature（℃）			Δ
H012	Output power			Δ
H013	Output torque（%）			Δ
H014	Target torque（%）			Δ
H015	Reserved			Δ

H016	Reserved			Δ
H017	Current stage speed for multi-stage speed			Δ
H018	Input pulse frequency (0.01KHz)			Δ
H019	Feedback speed（Hz）			Δ
H020	Feedback speed (rpm)			Δ
H021	Monitoring AI1			Δ
H022	Monitoring AI2			Δ
H023	Monitoring AI3			Δ
H024	Reserved			Δ
H025	Power-On time (h)			Δ
H026	Running time (h)			Δ
H027	Input pulse frequency（Hz）			Δ
H028	Reserved			Δ
H029	Reserved			Δ
H030	Main frequency X（Hz）			Δ
H031	Accessorial frequency Y(Hz)			Δ
H032-H040	Reserved			Δ

Note: × indicating that function code can only be modified in stop state.

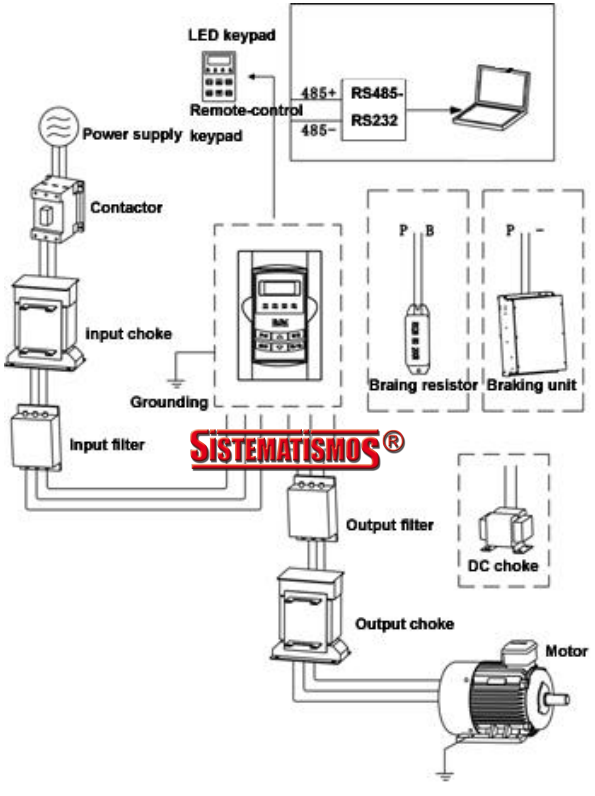
√ indicating that function code can be modified both in stop and run state.

Δ indicating that function code can only be checked in stop or run state but cannot be modified.

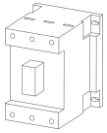
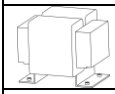
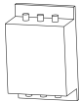
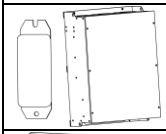
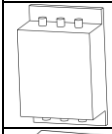
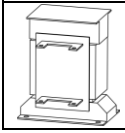
○ indicating that function code cannot be initialized as inverter restores manufacturer's value but can only be modified manually.

Appendix 7 Periphery option

1. Periphery wring



2.

Picture	Name	Description
	Cables	Device to transfer the electronic signals
	Breaker	Prevent from electric shock or protect the power supply and the cables system from over-current when short circuits occur. (Please select the breaker with the function of reducing high order harmonic and the rated sensitive current to 1 one inverter should be above 30mA)
	Input choke	The device is used to improve the power factor of the input side of the inverter and control higher harmonic current.
	DC choke	
	Input filter	Control the electromagnetic interference generated from the inverter, please install close to the input terminal side of the inverter.
	Braking unit or resistor	Shorten the DEC time.
	Output choke	Control the interference from the output side of the inverter, please install close to the output terminal side of the inverter.
	Output choke	Prolong the effective transmit distance of the inverter to control the sudden high voltage when switching on/off the IGBT of the inverter.