EM8 Series Inverter User's Manual

EMHEATER

User's Manual

EM8 Series Frequency Inverter

China EM Technology Limited

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China EM Technology Limited

Foreword

Thanks for using EMHEATER EM8 series inverter.

EM8 series inverter is China EM Technology Limited adopted the new concept to research and developed high-performance product; With unique control model, this inverter can realize high torque, high precision, wide variable speed and low noise drive; With more superior performance than similar products, EM8 inverters have practical PID regulation, simple PLC, flexible input and output terminals, parameter online modification, automatic identification signal transmission failure, parameter storage of power outages and stop, fixed length control, swing frequency control, main and auxiliary given control, field bus control and a series of practical operation, control function, which provide a highly integrated solution for equipment manufacturers and terminal customers, in speed, energy saving, protection, automatic control and other aspects. EM8 inverter has great value to reduce the purchase and operating costs, enhance the reliability of customers' system.

Before installation, use and maintenance of this inverter, the relevant personnel please read the user manual carefully, to ensure the correct installation and operation of this product, make it play its best performance.

As for any query of frequency inverter application or having special requirements, you can feel free to contact my company's agents, but also can directly call our company after sale service department; we will make effort to service well for you.

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Table of Contents

1. Caution 1
1.1 Safety caution clause 1
1.1.1 To get the product's confirmation 1
1.1.2 Installation 1
1.1.3 Wiring 1
1.1.4 Running, maintenance, inspection 1
1.2 Precaution of use 2
1.2.1 Motor insulation confirmation 2
1.2.2 Negative torque load 2
1.2.3 Mechanical resonance of load equipment 2
1.2.4 The capacitor and piezoresistor of improving power factor of electricity 2
1.2.5 To drop down KW because of basic frequency setting 2
1.2.6 Running upper 50Hz 2
1.2.7 Electronic thermal protection of motor 2
1.2.8 To drop down KW because of altitude 2
1.2.9 About IP 3
1.3 End of life caution 3
2. Installation and Wiring 4
2.1 EM8 series inverter model explanation 4
2.2 Specification 5
2.3 Installation size of inverter 7
2.4 Cable sectional area of inverter and breaker 9
2.5 EM8 inverter circuit diagram 10
2.6 Main circuit terminal explanation 11
2.7 Terminal of control circuit 13
2.7.1 Explanation of terminals of control circuit 14
2.8 JP jumper explanation 15
3. Operation and Running 16
3.1 The panel layout 16
3.2 The eM8 series frequency inverter parameter categories 16
3.2.1 Basic parameter 16
3.2.2 Intermediate parameters 16
3.2.3 Senior parameters: 16
3.3 Working model of panel 17
3.3.1 Monitoring state mode 17
3.3.2 Parameter setting mode 17
3.3.3 Checking mode of monitoring parameter 17
3.3.4 The revise mode of digital setting frequency 17
3.4 Parameter explanation 17
3.5 Panel function description 17
3.6 Running way of panel 18
3.6.1Switching mode 18
3.6.2Monitor parameter inquiry 19
3.6.3 Setting parameter 19
3.6.4 Modification of digital setting frequency 19
4. Function Parameter List 21

4.1 Basic running parameters (Group A)....21
4.2 Intermediate running parameters (Group B)....23
4.3 Advanced running parameters (Group C)....27
4.4 State monitor parameter list....31
4.5 Protection and solution....33
4.6 Fault record inquiry....35
5. The Concrete Explanation of Function Parameters....36
5.1 Inverter running parameters (Group A)....36
5.2 Intermediate running parameters (Group B)....44
5.3 Advanced running parameter (Group C)....60
6. Care and Maintenance....76
6.1 Daily inspections and maintenance....76
6.2 Periodic maintenance....76
6.2.1 Inspection content....77
6.3 Inspection and replacement of damageable parts....77
6.3.1 Filtering capacitors....77
6.3.2 Cooling fan....77
6.4 Storage and warranty....77
6.4.1 Storage....77
6.4.2 Warranty....77
7. Application Examples....79
7.1 Panel control: start and stop, panel potentiometer set frequency....79
7.1.1 Parameter settings....79
7.1.2 Basic wiring diagram....79
7.1.3 Running description....79
7.2 Three wire control mode....79
7.2.1 Parameter settings....79
7.2.2 The basic diagram....80
7.2.3 Operating instructions....80
7.3 External control mode, external voltage setting frequency....80
7.3.1 Parameter settings....80
7.3.2 The basic wiring....80
7.3.3 Operating instructions....80
7.4 Multi-step speed running, external control mode....81
7.4.1 Parameter settings....81
7.4.2 Basic wiring diagram....81
7.4.3 Operating instructions....81
7.5 Programmable multi-step speed control....81
7.5.1 Parameter settings....81
7.5.2 Basic wiring....82
7.5.3 Operating instructions....82
7.6 The linkage control of many frequency inverter (Group Control)....82
7.6.1 To use external voltage to realize many sets of inverter linkage control....82
7.6.1.1 Parameter Setting....82
7.6.1.2 The basic diagram....82
7.6.1.3 Operating instructions....83
7.6.2 Using RS485 constitute a linkage running....83
7.6.2.1 Parameter settings....83
7.6.2.2 Basic wiring diagram....84

7.6.2.3 Operating instructions 84
7.7 Inverters constitute a closed-loop control system 85
7.7.1 Parameter settings 85
7.7.2 Wiring 85
7.8 Use upper computer (PC) control many sets frequency inverters 85
7.8.1 Parameter settings 85
7.8.2 Basic wiring diagram 85
7.8.3 Operating instructions 86
8. Optional Accessories 87
8.1 Remote control cable and adapter 87
8.2 Braking accessories 87
Appendix 1: RS485 Communication Protocol 88
1. Summary 88
1.1 Content of communication protocol 88
1.2 Scope of application 88
1.2.1 Applicable devices 88
1.2.2 Application type 88
2. Bus structure and specification of communication protocol 88
2.1 Bus structure 88
2.2 Specification of communication protocol 88
2.2.1 Data Format 88
2.2.2 Baud rate 89
2.2.3 Communication mode 89
2.2.4 Communication rules 89
2.3 Structure of message 89
2.3.1 Master command frame 90
2.3.2 Slave response frame. 90
2.4 Message data encoding 90
2.4.1 Frame header 90
2.4.2 Data of user 90
2.4.3 Frame footer(checksum) 93
3. Example of using 94

1. Caution

To ensure that you're personal, equipment and property safety, in use before frequency inverter, please be sure to read this chapter content, and comply with in the later carry, installation, running, debugging and maintenance, running process.

Warning

● This symbol can lead to death, serious injury or heavy losses of property.

Caution

● This symbol can lead to body moderate damage or minor injuries, equipment damage.

1.1 Safety caution clause

1.1.1 To get the product's confirmation

Caution:

● The damaged and lack of parts of the frequency inverter, do not install. Or you risk of injury.

1.1.2 Installation

Caution

● When carrying, please take the bottom of inverter, otherwise the inverter body may lose and hurt your foot.

● Please install in metal materials plate burning not easily. If installed near flammable materials, there is danger of fire.

1.1.3 Wiring

Warning

● Before wiring, please confirm the input power has cut off.

● Please let electrical engineering personnel wiring homework.

● Grounding terminals must be reliable grounding.

● Prohibit to input the power to output U, V, W terminal. Add in the output terminal voltage will lead frequency inverter internal damage.

● The emergency stop terminal after wiring, please check its actions are effective. Or you risk of injury.

● Prohibit to touch output terminal, short connect output terminals and shell and between output terminals.

Caution

● Please confirm the input power voltage is the same as inverter rated voltage.

● Please do not do withstand voltage test for frequency inverter.

● please connect brake unit and resistor according to frequency inverter circuit diagram.

Otherwise you may cause the damage of the semiconductor components, etc.

1.1.4 Running, maintenance, inspection

Warning

● Prohibit to touch inverter input and output terminals

● Before power on, please install terminal house properly, before you take off terminal house, please make sure power off.

● Amateur technicians, please do not for maintenance and inspection.

Caution

● The panel board, control circuit board, driving circuit boards installed the CMOS integrated circuit, when using, please pay special attention, Directly with finger touch circuit boards, electrostatic induction it might damage the circuit boards integrated chips.

● Power on, please do not change wiring or remove the terminal wiring. Have the risk of damage to equipment.

1.2 Precaution of use

In using of frequency inverter , please pay attention to following clause.

1.2.1 Motor insulation confirmation

When use inverter, please make sure motor insulation to avoid damaging other equipment. In the motor environment is poor, please routine check the insulation of the motor to ensure the safety of the system.

1.2.2 Negative torque load

Such as load of lift and elevator is negative torque load, the system will feedback current to inverter, so please consider to match optional braking resistor.

1.2.3 Mechanical resonance of load equipment

Inverter in certain output frequency range, may meet load mechanical resonance, must be set to avoid jumping through this frequency.

1.2.4 The capacitor and piezoresistor of improving power factor of electricity

As the inverter output voltage is pulse wave, so the output side cannot connect capacitor and piezoresistor, which will damage inverter, please take off. At same time, please do not add air switch and contactor on output of inverter. For 1-1 diagram, (if you must add switch device, please make sure the inverter no output current, and then you can take on-off switch).

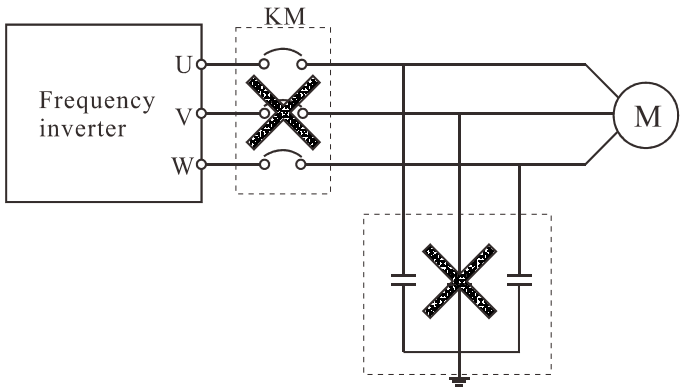


Diagram 1-1: **Prohibit to connect capacitor on output of inverter**

1.2.5 To drop down KW because of basic frequency setting

When basic frequency setting is lower than rated frequency, please drop down the KW of matched motor in avoiding motor overheat burnt.

1.2.6 Running upper 50Hz

If inverter output is upper 50Hz, except consider motor vibration, noise, please consider the rated speed of your motor avoiding damaging motor.

1.2.7 Electronic thermal protection of motor

When properly matched motor, inverter has thermal protection for motor. If inverter is not proper matched with motor, please adjust relative parameter to protect motor.

1.2.8 To drop down KW because of altitude

When the altitude is higher than 1000m, the inverter must be drop down to match motor because of thin air poor the cooling effect. As diagram 1-2 is the relationship curve of inverter rated current and altitude.

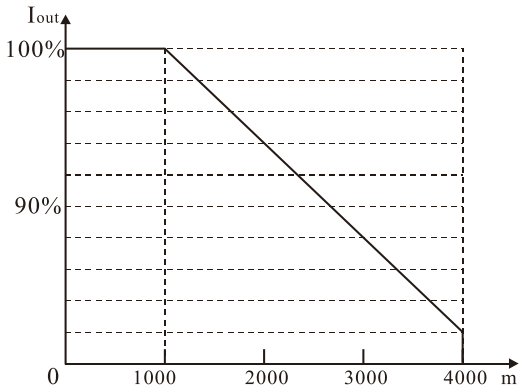


Diagram 1-2: The curve relationship of output current and altitude

1.2.9 About IP

Our inverter is IP20, you can add cabinet to improve its protection level.

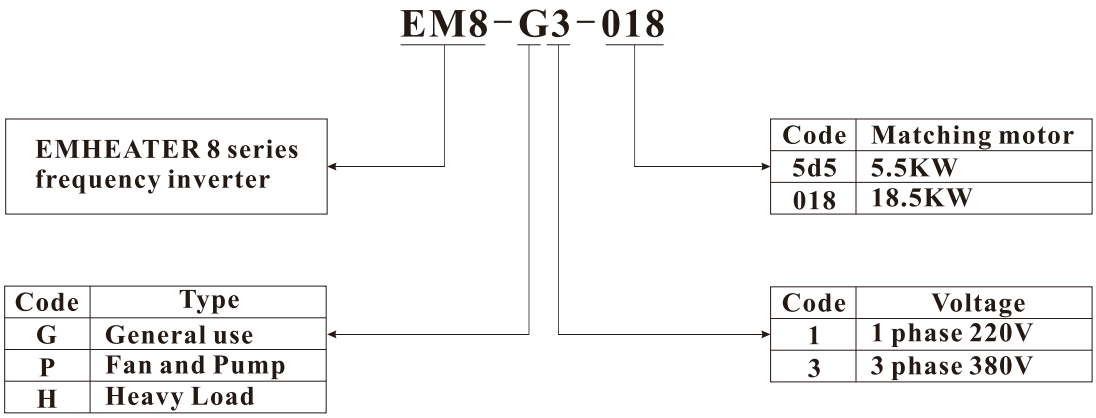
1.3 End of life caution

When you end of inverter life:

The capacitor of main circuit and board can not burn, it will explode; Plastic house cannot burn, it will emit toxic gas, please deal with it as industrial refuse.

2. Installation and Wiring

2.1 EM8 series inverter model explanation



Model No.		Voltage	Power	Current	G.W	Inverter size
G series	P series	(V)	(KW)	(A)	(KG)	H/W/D(mm)
EM8-G1-d75	--	220	0.75	5	2	150/85/115
EM8-G1-1d5	--	220	1.5	7.5		
EM8-G1-2d2	--	220	2.2	10	3	173/133/133
EM8-G3-d75	EM8-P3-1d5	380	0.75	2.5		
EM8-G3-1d5	EM8-P3-2d2	380	1.5	3.7		
EM8-G3-2d2	EM8-P3-004	380	2.2	5		
EM8-G3-004	EM8-P3-5d5	380	4.0	8.5	4	235/137/175
EM8-G3-5d5	EM8-P3-7d5	380	5.5	11	7	305/208/185
EM8-G3-7d5	EM8-P3-011	380	7.5	17		
EM8-G3-011	EM8-P3-015	380	11	25	12	390/240/235
EM8-G3-015	EM8-P3-018	380	15	33		
EM8-G3-018	EM8-P3-022	380	18.5	39		
EM8-G3-022	EM8-P3-030	380	22	45	21	460/260/248
EM8-G3-030	EM8-P3-037	380	30	60		
EM8-G3-037	EM8-P3-045	380	37	75	40	580/320/295
EM8-G3-045	EM8-P3-055	380	45	90		
EM8-G3-055	EM8-P3-075	380	55	110	45	590/380/312.5
EM8-G3-075	EM8-P3-093	380	75	150		
EM8-G3-093	EM8-P3-110	380	93	176	95	744/512/273
EM8-G3-110	EM8-P3-132	380	110	210		
EM8-G3-132	EM8-P3-160	380	132	250	140	793/583/315
EM8-G3-160	EM8-P3-185	380	160	300		
EM8-G3-185	EM8-P3-200	380	185	340		
EM8-G3-200	EM8-P3-220	380	200	380		
EM8-G3-220	EM8-P3-250	380	220	415	300	1172/790/397
EM8-G3-250	EM8-P3-280	380	250	470		
EM8-G3-280	EM8-P3-315	380	280	520		
EM8-G3-315	EM8-P3-350	380	315	600	450	1828/981/496

Model No.		Voltage	Power	Current	G.W	Inverter size
EM8-G3-350	EM8-P3-400	380	350	640	450	1828/981/496
EM8-G3-400	EM8-P3-500	380	400	690		
EM8-G3-500	EM8-P3-630	380	500	860		
EM8-G3-630	--	380	630	1100		

2.2 Specification

Items			Specification
Input	Rated voltage and frequency		Single phase 220/Three Phase 380V, 50/60Hz
	Voltage allowable deviation range		200V~240V,320V~460V
Output	Voltage		0~380V
	Frequency		0Hz~500Hz
	Over-load capability		G3 Series: 150% rated current for 1 minute 180% rated current for 2seconds P3 Series: 120% rated current for 1 minute 150% rated current for 2seconds
Control character	Control mode		V/F Control
	Frequency setting resolution	Analog terminal input	0.1% of max output frequency
		Digital setting	0.01Hz
		Panel analog setting	0.4 % of max frequency
		External pulse	0.1% of max frequency
	Frequency accuracy	Analog Input	Within ±0.2% of max. output frequency
		Digital Input	Within ±0.01% of setting output frequency
		External pulse	Within ±0.1% of max. output frequency
	V/F curve (Voltage-frequency character)		Base frequency can be set from 5~500Hz arbitrarily, and there are three kinds of curve: constant torque ,Dec torque 1 and Dec torque 2.
	Torque boost		Manual Setting: 0~20% of rated output, Auto-boost: Automatically boost torque according to output current.
	Auto energy-saving running		Adjust output voltage and slip compensation properly according to output current, which will make the motor working in highest efficiency.
	Acc./Dec time setting		0.1~6000seconds can be set continuously, and S type and line type can be selected.
	Braking	Dynamic braking	Over 75% (External braking resistor)
		DC braking	It is selected respectively at start and stop, and its frequency is 0~15Hz, the action voltage is 0~15%, and the action time is 0~20.0 second or act continuously.
	Auto current-limiting function		Fast auto current-limiting function ensures not to occur the over-current during the accelerate process or under the impact load.

Items			Specification
Control character	Overvoltage prevention		Ensure not over-voltage in Dec process.
	Low noise running		Carrier freq. can be adjusted continuously form 1.5KHz to 15.0KHz, which can reduce the motor's noise furthest.
	Speed tracking restart		It can realize the smoothness restart and instantaneous stop then restart function.
	Freq setting signal	Analog input	DC voltage 0~10V,-10V~10V, DC current 0~20mA (Upper limit and Lower limit can be selected).
		Digital setting	By the running panel.
		Pulse input	0~50.000kHz (Upper limit and Lower limit can be selected)
	Startup signal		FWD, REV, startup signal can be selected and self-keep (Three line control).
	Timer and Counter		Embedded one timer and one counter , which will help the system's integration.
	Multi-speed control function / Wobble frequency		Seven steps programmable multi-speed control at most, every step's running direction, running time can be set respectively. In external terminal control, It reaches 15 steps, and there are 6 kind of running modes. Include wobble frequency.
	Built-in PID control	Common PID	Expediently compose the simple control system without accessional PID controller.
		Special for water supply (Need accessories)	Make it possible to construct the constant-pressure water-supply system of 4 pumps switch at most, which includes the following functions: pressure upper or Lower limit alarm, Sleep or wake, Timing water-supply etc. multi kind running mode.
	Running function		Setting the upper and lower limit of frequency, frequency jump-running, reversal running limit, slip frequency compensation, auto constant-voltage running, RS485 communication frequency increment and decrement control, fault self-restore running, multi inverter coupled running.
	Output signal	Running status (OC Output)	During the running of inverter, frequency arrival, frequency level detection, over-load alarm, and external fault stop-machine. Frequency upper-limit arrival, Frequency lower-limit arrival, under-voltage stop, zero-speed running, programmable multi-speed running state, Internal counter arrival, Internal timer arrival, pressure lower-upper limit alarm.
		Indicating meter	Output Frequency, output current, output voltage, motor speed, PID setting and feedback, external voltmeter, external cymometer.

Items			Specification
Display	Running panel display	Running status	Output Frequency, output current, output voltage, motor rotate speed, setting frequency, PID setting, PID feedback, model temperature, accumulative running time, analog I/O, terminal Input status.
		Alarm content	Last six fault records, output frequency, setting frequency, output current, output voltage, DC voltage, model temperature, terminal status, accumulative running time of Last fault trip.
Protective / Alarm function			Over-current, over-voltage, under voltage, electronic thermal protection, over-heat, short-circuit.
Operating Environ-ment	Temperature		-10ºC to +50ºC (Put down one grade capacity in 40 ºC ~50 ºC)
	Humidity		Below 90%RH(non-dewing)
	Ambient environment		Indoors (no inflammable gasses or dust)
	Altitude		Under 1000m
Structure	Protective class		IP20
	Cooling method		Fans cooling
Mounting model			Wall mounting

2.3 Installation size of inverter

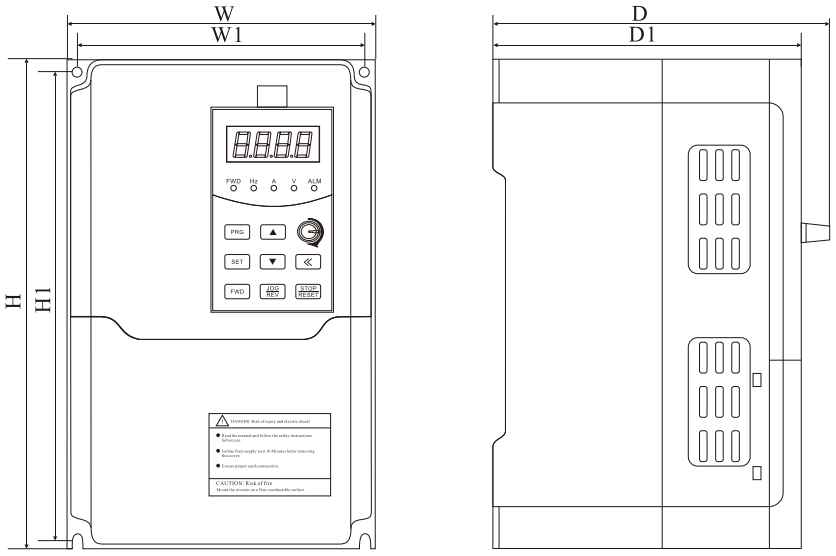


Diagram 2-1: Installation size of inverter

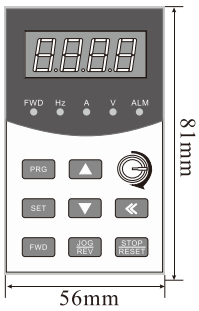
Inverter model		W1 (mm)	W (mm)	H1 (mm)	H (mm)	D1 (mm)	D (mm)	Screw standard
G Series EM8-G1/G3	P Series EM8-P3							
EM8-G1-d75		77	89	145	155	116	126	M4
EM8-G1-1d5								
EM8-G1-2d2		123	133	163	173	123	133	M4
EM8-G3-d75	EM8-P3-1d5	126	136	163	173	123	133	M4
EM8-G3-1d5	EM8-P3-2d2							
EM8-G3-2d2	EM8-P3-004							
EM8-G3-004	EM8-P3-5d5	123	137	225	235	160	175	M4

Inverter model		W1 (mm)	W (mm)	H1 (mm)	H (mm)	D1 (mm)	D (mm)	Screw standard
G Series EM8-G1/G3	P Series EM8-P3							
EM8-G3-5d5	EM8-P3-7d5	190	208	285	305	170	185	M4
EM8-G3-7d5	EM8-P3-011							
EM8-G3-011	EM8-P3-015	190	240	372	390	220	235	M6
EM8-G3-015	EM8-P3-018							
EM8-G3-018	EM8-P3-022							
EM8-G3-022	EM8-P3-030	242	260	440.5	460	233	248	M6
EM8-G3-030	EM8-P3-037							
EM8-G3-037	EM8-P3-045	283	320	550	580	280	295	M6
EM8-G3-045	EM8-P3-055							
EM8-G3-055	EM8-P3-075	320	380	568	590	297.5	312.5	M8
EM8-G3-075	EM8-P3-093							
EM8-G3-093	EM8-P3-110	445	512	714	744	258	273	M8
EM8-G3-110	EM8-P3-132							
EM8-G3-132	EM8-P3-160	515	583	760	793	300	315	M8
EM8-G3-160	EM8-P3-185							
EM8-G3-185	EM8-P3-200							
EM8-G3-200	EM8-P3-220							

Cabinet inverter:

Inverter model		W (mm)	H (mm)	D (mm)
G Series EM8-G1/G3	P Series EM8-P3			
EM8-G3-220	EM8-P3-250	790	1172	397
EM8-G3-250	EM8-P3-280			
EM8-G3-280	EM8-P3-315			
EM8-G3-315	EM8-P3-350	981	1828	496
EM8-G3-350	EM8-P3-400			
EM8-G3-400	EM8-P3-500			
EM8-G3-500	EM8-P3-630			

Panel size is as diagram 2-2:



Suitable for:

EM8-G1-d75~EM8-G1-2d2

EM8-G3-d75~EM8-G3-2d2

Suitable for:

EM8-G3-004~EM8-G3-630

EM8-P3-5d5~EM8-P3-630

Diagram 2-2: Digital display running panel size

The running panel disassemble and installation

Disassemble: Put your finger into the hole above panel and gently press down the fixed shrapnel, and then take off key panel.

Installation: Put the panel into the slot until to hear a voice "click".

Inverter installation direction and space

The EM8 series frequency inverter for wall hung should be installed vertically for air circulation and heat dissipation. The reserved space around inverter should be according to diagram 2-3. The fan of inverter cabinet should be according to the diagram 2-4 correct way. The installation of many pcs inverters should be installed as diagram 2-5 and diagram 2-6. As in the same vertical direction and installation, please note that application of diversion board.

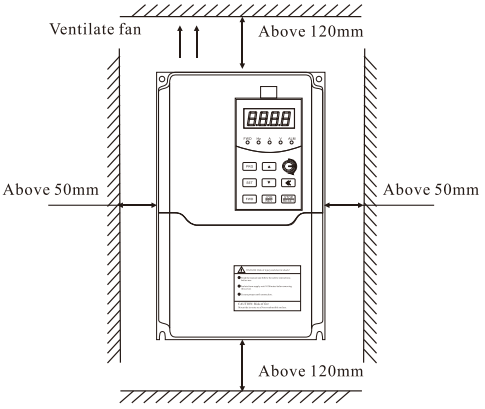


Diagram 2-3: Inverter around space

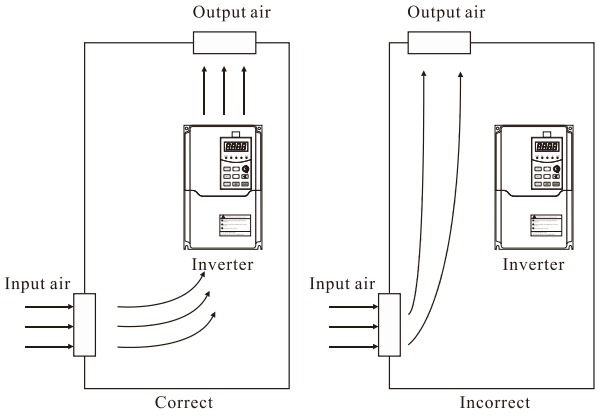


Diagram 2-4: Cabinet fan correct way

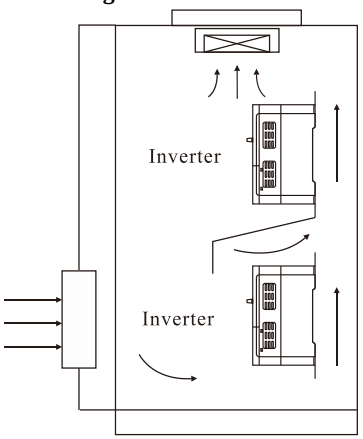


Diagram 2-5: The air division board

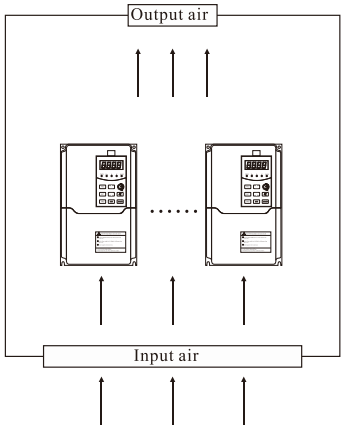


Diagram 2-6: Many pcs inverter installation

2.4 Cable sectional area of inverter and breaker

Please refer the following data to choose breaker capacity and cable sectional area.

Model	Input side	Main circuit(mm^2)		Control circuit(mm^2)
EM8-G/P	Breaker(A)	Input cable	Output cable	Control cable
G3/P3-d75	10	2.5	2.5	1
G3/P3-1d5	10	2.5	2.5	1
G3/P3-2d2	10	2.5	2.5	1
G3/P3-004	16	4	4	1
G3/P3-5d5	20	4	4	1
G3/P3-7d5	25	6	6	1
G3/P3-011	40	10	10	1
G3/P3-015	50	10	10	1
G3/P3-018	63	16	16	1
G3/P3-022	63	16	16	1
G3/P3-030	100	25	25	1

Model	Input side	Main circuit(mm^2)		Control circuit(mm^2)
EM8-G/P	Breaker(A)	Input cable	Output cable	Control cable
G3/P3-037	125	25	25	1
G3/P3-045	160	35	35	1
G3/P3-055	160	35	35	1
G3/P3-075	250	50	50	1
G3/P3-090	250	70	70	1
G3/P3-110	315	70	70	1
G3/P3-132	400	95	95	1
G3/P3-160	630	120	120	1
G3/P3-185	630	150	150	1
G3/P3-200	630	150	150	1
G3/P3-220	630	150	150	1
G3/P3-250	800	150	150	1
G3/P3-280	800	185	185	1
G3/P3-315	1000	185	185	1
G3/P3-350	1000	240	240	1
G3/P3-400	1250	240	240	1
G3/P3-500	1250	300	300	1
G3/P3-630	1250	300	300	1

2.5 EM8 inverter circuit diagram

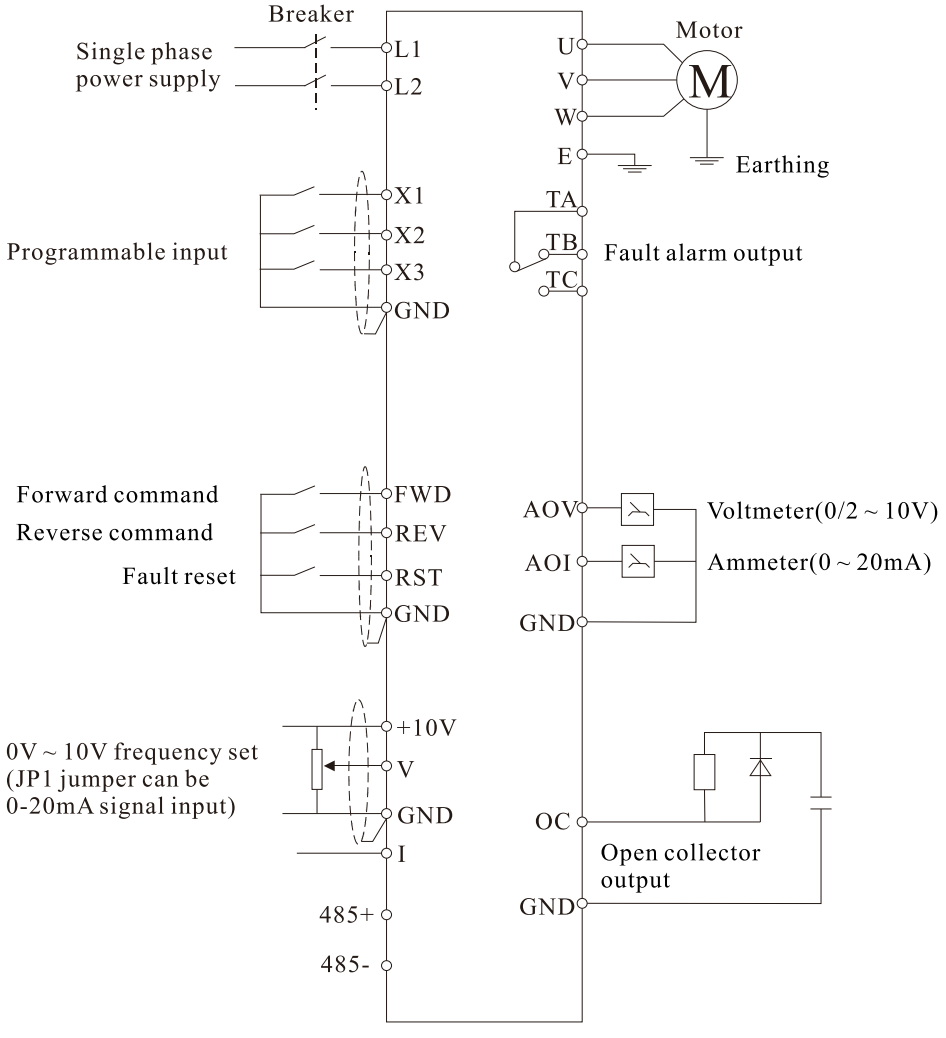


Diagram 2-7: EM8 single phase 220-240V inverter diagram

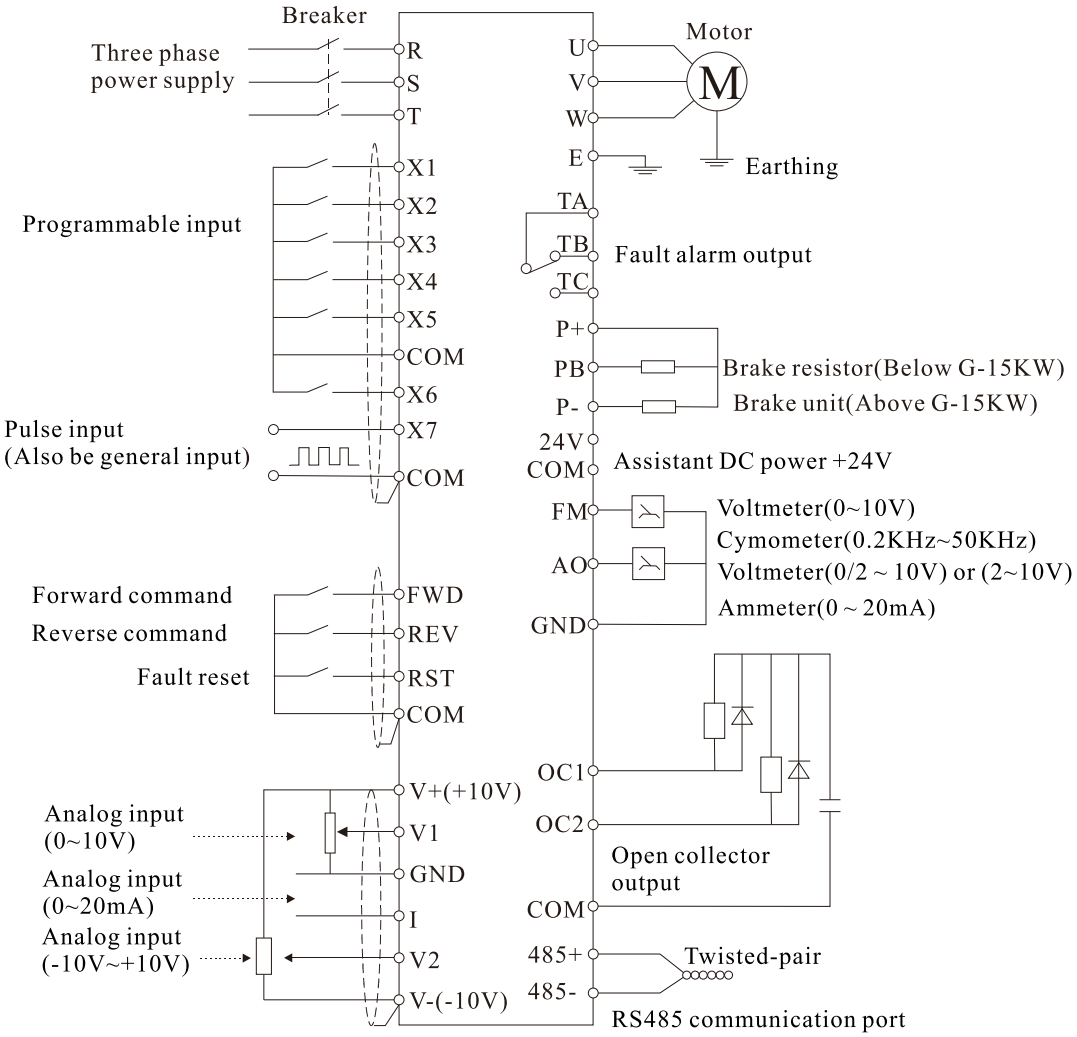


Diagram 2-8: EM8 Three phase 380V inverter diagram

2.6 Main circuit terminal explanation

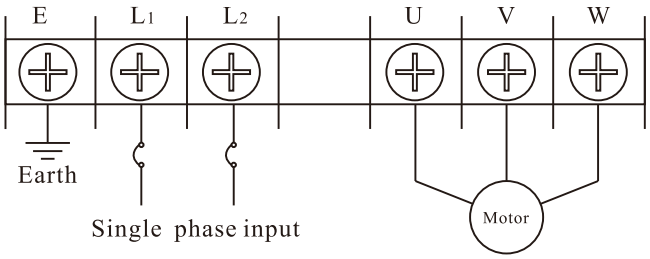


Diagram 2-9: Main circuit terminal (1)

Series	Suitable Inverter
G1	EM8-G1-d75~EM8-G1-2d2

Terminal mark	Function explanation
L_1,L_2	Single phase 220V AC power
U,V,W	Output three phase terminals connect with motor
E	Connect with earth terminal

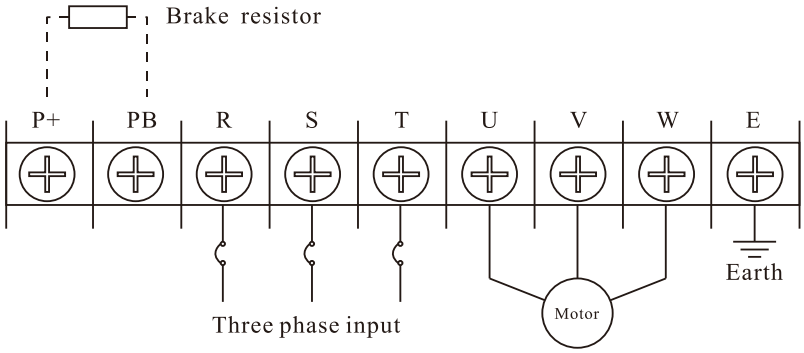


Diagram 2-10: Main circuit terminal (2)

Series	Suitable Inverter
G3	EM8-G3-d75~EM8-G3-2d2
P3	EM8-P3-1d5~EM8-P3-004

Terminal mark	Function explanation
P+	DC BUS positive pole
PB	The braking resistor connect between P+ and PB
R,S,T	Input three phase terminals connect with grid
U,V,W	Output three phase terminals connect with motor
E	Connect with earth terminal

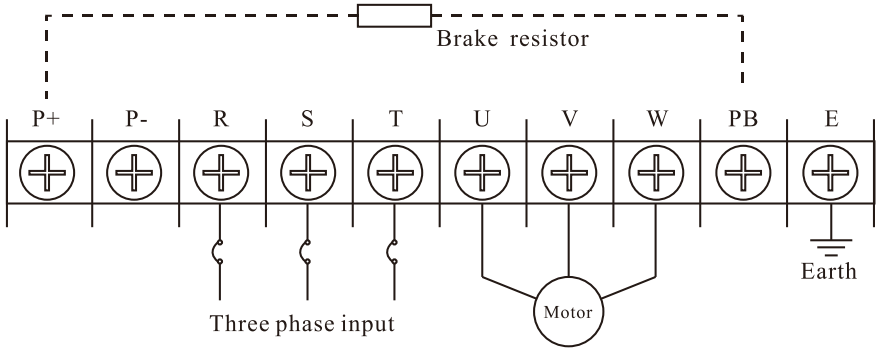


Diagram 2-11: Main circuit terminal (3)

Series	Suitable Inverter
G3	EM8-G3-004~EM8-G3-018
P3	EM8-P3-5d5~EM8-P3-022

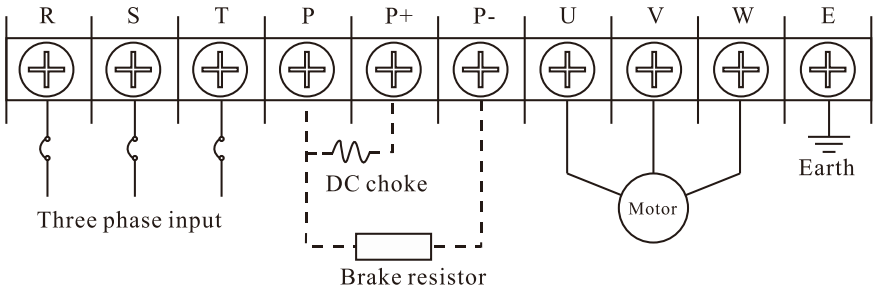


Diagram 2-12: Main circuit terminal (4)

Series	Suitable Inverter
G3	EM8-G3-022~EM8-G3-030
P3	EM8-P3-030~EM8-P3-037

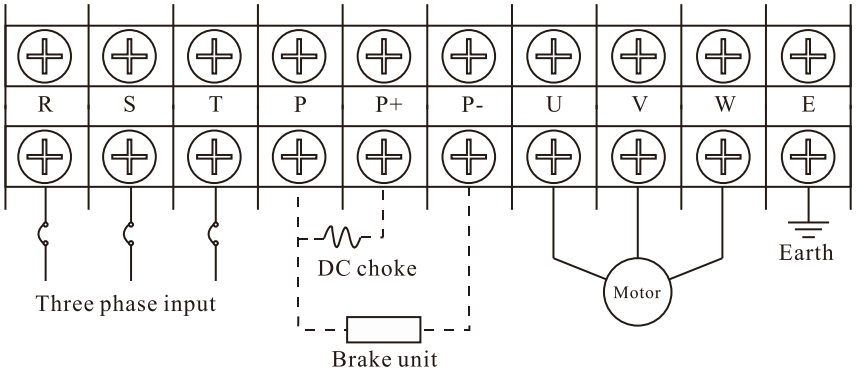


Diagram 2-13: Main circuit terminal (5)

Series	Suitable Inverter
G3	EM8-G3-037~EM8-G3-630
P3	EM8-P3-045~EM8-P3-630

2.7 Terminal of control circuit

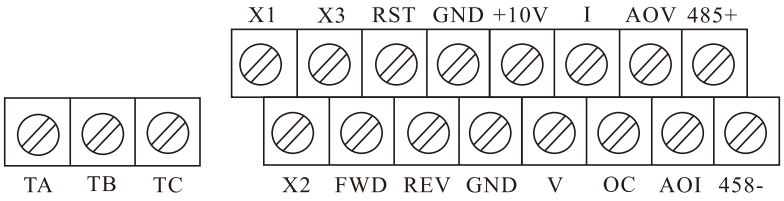


Diagram 2-14: Terminal of control circuit (1)

Series	Suitable Inverter
G1	EM8-G1-d75~EM8-G1-2d2

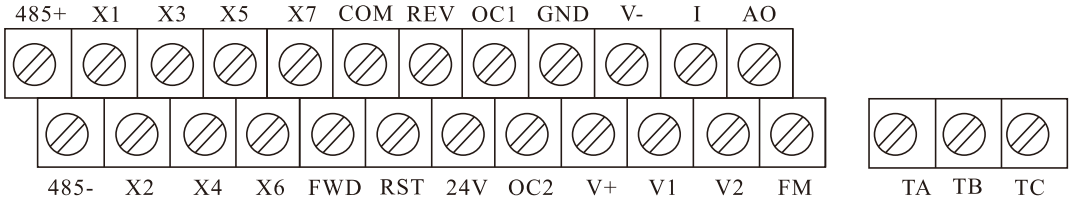


Diagram 2-15: Terminal of control circuit diagram (2)

Series	Suitable Inverter
G3	EM8-G3-d75~EM8-G3-2d2
P3	EM8-P3-1d5~EM8-P3-004

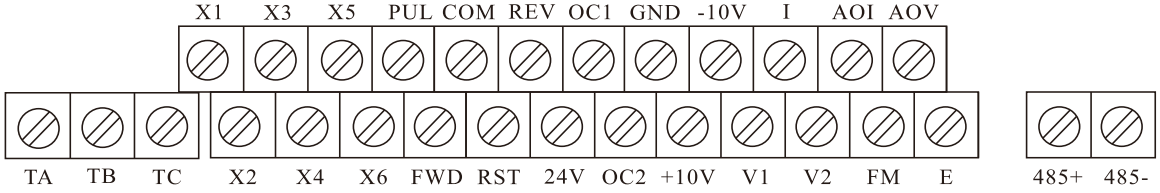


Diagram 2-16: Terminal of control circuit diagram (3)

Series	Suitable Inverter
G3	EM8-G3-004~EM8-G3-630
P3	EM8-P3-5d5~EM8-P3-630

2.7.1 Explanation of terminals of control circuit

Type	Terminal	Terminal function	Notes
Analog input	+10V/V+	Provide +5V/50mA power or +10V/10mA power to external	Selected by control panel JP1 (refer to the following diagram)
	-10V/V-	Provide -10V/10mA power	
	V/V1	Analog input voltage signal input terminal 1	0~10V
	V2	Analog input voltage signal input terminal 2	-10~10V
	I	Input positive terminal of frequency setting current signal (Current input terminal).	0~20mA
	GND	Command terminal of Frequency setting voltage signal (Power earth of V+,V-), Negative terminal of frequency setting current signal(Current output terminal).	
Control terminal	X1	Multi-function input terminal 1	The detailed function of Multi-function input terminal is set by parameter b-63~b-69, the terminal is valid while being closed with COM terminal.
	X2	Multi-function input terminal 2	
	X3	Multi-function input terminal 3	
	X4	Multi-function input terminal 4	
	X5	Multi-function input terminal 5	
	X6	Multi-function input terminal 6	
	PUL/X7	Multi-function input terminal 7,and it can also be as the input terminal of external pulse signal (refer to the following diagram).	
	FWD	FWD control command terminal	The terminal is valid while being closed with COM terminal. The close of terminals FWD and COM decides the inverter running direction under panel control mode..
	REV	REV control command terminal	
	RST	Fault resetting input terminal	
	COM	Command terminal of control terminal	
	+24V	Provide +24V/50mA Power (COM is the ground of power).	
	AOI	Analog voltage output, between GND and AOI connected a current meter	
	AOV	Analog voltage output, between GND and AOI connected a voltmeter	
Analog output	AO	Programmable voltage signal output terminal can connect the external voltmeter (set by parameter A-10).	Highest allowable Current: 1mA; Output voltage:0-10V
	FM	Programmable frequency signal output terminal can connect the external cymometer. (Set by parameter A-11)	Max. output signal frequency: 50KHz Signal amplitude value: 10V
OC output	OC1 OC2	Programmable open-circuit collector output is set by parameter A-15 and A-16.	The highest loadcurrent is 50m and The highest withstand voltage is 24V
Fault output	TA/TB/TC	Normal: TA-TB is closed, TA-TC is off Fault : TA-TB is off, TA-TC is closed	Contact capacity: AC250V 1A resistive load
RS485	485+/485-	RS485 communication terminal	
ERH	E	Earth terminal	

2.8 JP jumper explanation

The 0.4KW to 4KW JP on PCB board as following diagram 2-16:

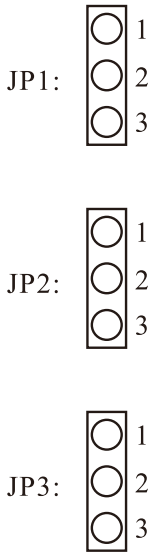


Diagram 2-17: 0.4KW~4KW Jumper

The 5.5KW to 630 KW JP on PCB board as following diagram 2-17:

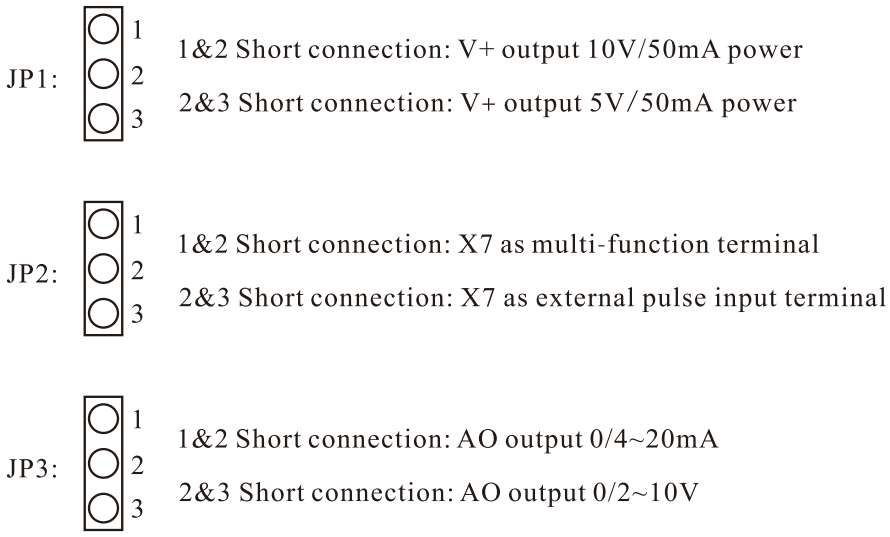


Diagram 2-18: 5.5KW~630KW Jumper

3. Operation and Running

3.1 The panel layout

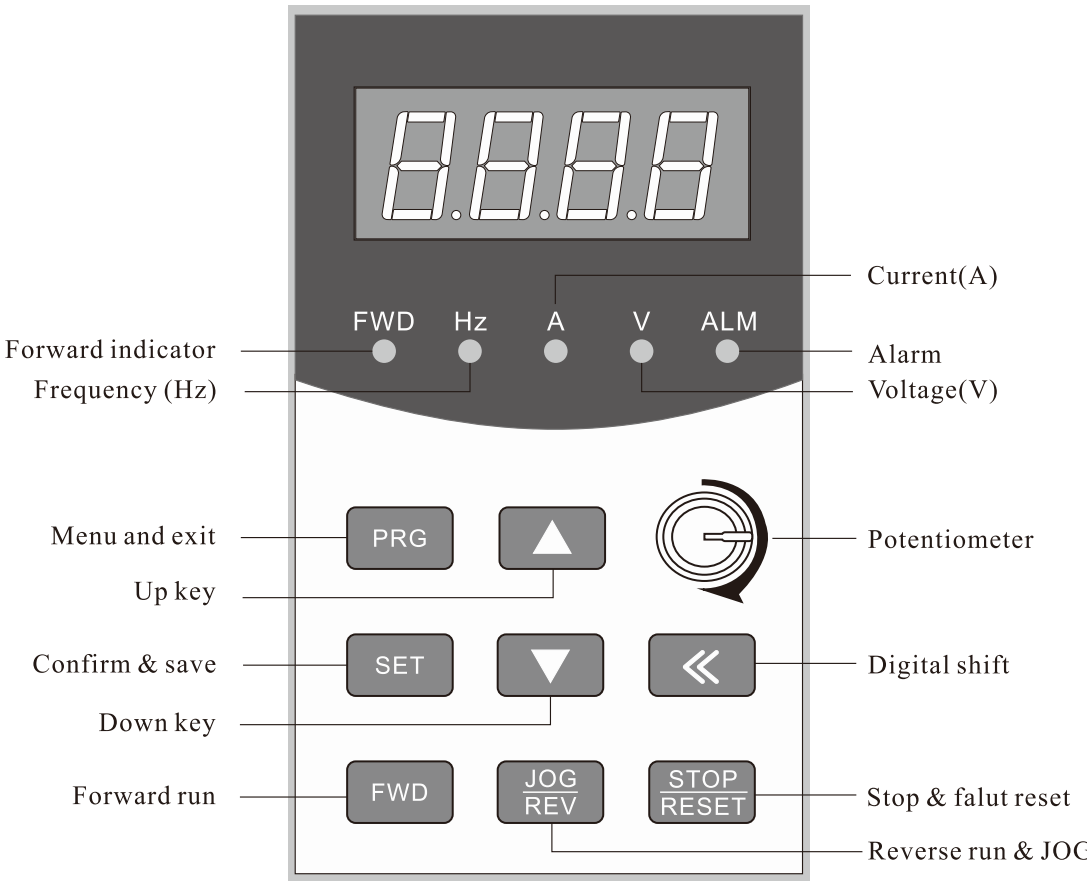


Diagram 3-1: Panel can set frequency, control model, display and monitor

3.2 The EM8 series frequency inverter parameter categories

3.2.1 Basic parameter

When you set "A-0" to "0", the inverter is under basic parameter control (group A); the intermediate parameters (group b) and senior parameters (group C) hide and do not work.

When inverter is used for simple speed adjustment, please choose basic parameter running mode. Under basic parameter mode, the advanced function was closed.

Remark

● When you change control mode from Group A& Group b to Group C, it will be valid after power off.

The factory setting is A-0=1. This intermediate control mode is suitable for most applications.

3.2.2 Intermediate parameters

When you set "A-0" to "1", the inverter is under basic parameter control (A group) and intermediate parameters (group b); the senior parameters (group C) hide, and do not work.

Remark

● When you change control mode from Group A& Group b to Group C, it will be valid after power off.

● The factory setting is A-0=1. This intermediate control mode is suitable for most applications.

3.2.3 Senior parameters:

When you set "A-0" to "2", the inverter is under senior control mode, and inverter all parameter will be valid. These functions must choose senior parameter model, such as: Inspection speed to start; Programmable multi-step speed; built-in PID control; more pieces inverter linkage control; RS-485 control.

3.3 Working model of panel

The panel can be divided into four control modes depends on the difference of content and command. Except digital control model, the control modes were switched by PRG key.

3.3.1 Monitoring state mode

Monitoring state is working state of panel in most cases, in any case, as long as the continuous 1 minute without key input, panel will automatically return to monitoring state.

Remark

● Inverter has 34 kinds monitoring states (d-0 to d-33); the parameter b-71 set to display one certain state.

● Under monitoring state, press ≪ to quickly check inverter output current, output frequency and output voltage.

3.3.2 Parameter setting mode

Under parameter setting mode, user can check and revise inverter function parameters.

Parameter setting mode and can be divided into the basic parameters setting mode, the intermediate running parameters setting mode and senior running parameters setting mode. Respectively display the corresponding parameter items or parameter values.

3.3.3 Checking mode of monitoring parameter

Under checking mode of monitoring parameter, user can check running parameter and fault record, the panel displays the "d-□□" or its corresponding parameters (□□ said parameter items).

3.3.4 The revise mode of digital setting frequency

Under Monitoring state mode, user press ▲ ▼ or PRG key to enter revise mode of digital setting frequency and quickly revise frequency set by digital.

Remark

●The revise mode of digital setting frequency is only valid after setting parameter [A-1]=1, which is digital frequency setting channel.

3.4 Parameter explanation

In this manual the parameter have three expressing styles.

[A-0] means A group 0 parameter item.

[A-0] means A group o parameter item setting value.

[A-0]=1 means A group 0 parameter item setting value is "1"

3.5 Panel function description

Items			Function description
Display function	Code display		Display the running parameter and setting parameter of inverter.
	State indicator	A, Hz, V	The corresponding unit of current number display.
		ALM	Alarm indicated light. It expresses that the inverter is in over-current or over-voltage restrain state.
		FWD	FWD indicated light. It expresses that inverter will output the positive phase. If connecting with the motor, the motor will run in positive direction.
Panel function	FWD		**FWD running key.** The running instruction of inverter channel can be set as panel control mode ([A-3]=0), press this key, send out the positive running instruction. The inverter will run to the setting frequency according to the appointed acc or dec curve.

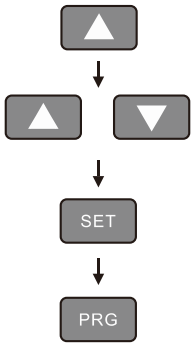
Items		Function description
Panel function	JOG REV	**REV and JOG key.** The detailed function of this key is selected by parameter [A-17]. When parameter [A-17] equals 0, this key will take effect as reverse startup. When parameter [A-17] equals 1, the key is used as Jog control.
	STOP RESET	**Stop and Fault reset key.** The inverter is in normal running mode. if the running instruction channel is set as panel stop valid mode, ([A-3] = 0, 2, 4),Press this key, the inverter will stop as the fixed mode. In fault state, press the key, will reset the inverter and return the normal stop state.
	PRG	**Menu switch mode.** It is used for changing the working mode of running panel.
	SET	**Confirming key.** It is used for confirming the current state or parameter (Parameters are stored into the internal memory). In monitor state, press the key, will enter the modification surface directly, at the same time, MOD indicator light will be on, at that time you can modify the instruction frequency by ▲▼.
	▲ ▼	**Data modification key.** It is used to modify the function code and parameter. Synchronously press ▲▼ key, will quicken the codification speed of parameter. First press ▲ key, then press ▼ key will quicken the speed of modifying data. Soften ▼ key will keep the current speed. If first press ▼ then press ▲ key will quicken the speed of modification data decreasing, soften ▲ key will keep the current speed. In state monitor mode, if the frequency instruction channel is panel digital setting mode ([A-1]=1), press ▲▼ key will modify the frequency instruction synchronously MOD indicated light will be on.
	≪	**Data bits switch key.** In any state of press key to modify the state of data, press the key ▲▼ to modify the digital bit, the modification bit will be displayed blink.

3.6 Running way of panel

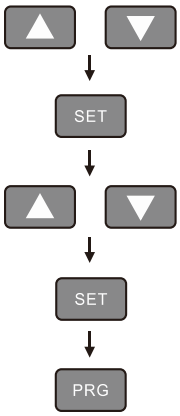
3.6.1Switching mode

Running	Description	Display
Change the working mode of running panel	Current state of running panel: State monitor mode	Display the current running parameter of inverter, for example: 50.00
Initial state ↓ PRG ↓ PRG ↓ PRG ↓ PRG ↓ PRG	Enter Monitor parameter inquiry mode	Display monitor code, for example: d-0
	Enter Basic running parameter setting mode	Display code: A-0
	Enter Intermediate running parameter setting mode	Display code:b-0
	Enter Advanced running parameter setting mode	Display code: C-0
	Enter State monitor mode	

3.6.2Monitor parameter inquiry

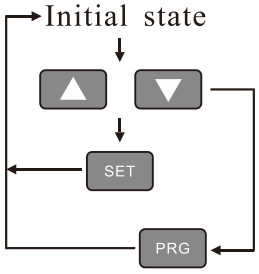
Running	Description	Display
For example: looking over the setting frequency	Current state of running panel monitor parameter inquiry mode.	d-0 (Example)
	Monitor code plus 1	d-1
	Modify monitor code to the parameter d-4 which needs inquiry.	d-4
	Confirm the inquiry monitor item.	Display the Parameter value according to d-4 to set the frequency.
	Switch the working mode of running panel according to needs.	

3.6.3 Setting parameter

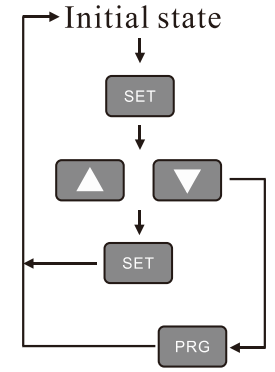
Running	Description	Display
Change Acc time 1 from 5.0s to 10.0s (For example)	Current state of running panel: parameter setting mode (Basic parameter for example).	A-0
	Modify the code of parameter to the expected value: A-7.	For example: A-7 (Acc time 1)
	Confirm the parameter item being modified.	Display the parameter value of A-7: 5.0
	Modify the parameter to the expected value: 10.0.	10.0
	Confirm the parameter value, and store them into the internal store memory.	A-7
	Switch the working mode of running panel according to needs.	

3.6.4 Modification of digital setting frequency

Mode 1:

Running	Description	Display
Change the current digital setting frequency	Current state of running panel: state monitor mode.	Running parameter (Decided by parameter b-71)
	Change digital setting frequency to the expected value.	Digital setting frequency.
	Store the digital setting frequency into the internal, and return the state monitor mode.	Running parameter (Decided by parameter b-71)
	The digital setting frequency after modification is not stored into the internal memory, the inverter will return the state monitor mode after power-off.	

Mode 2:

Running	Description	Display
Change the current digital setting frequency	Current state of running panel: state monitor mode.	Running parameter (Decided by parameter b-71)
	Enter digital frequency modification mod.	Digital setting frequency
	Modify the digital setting value to the expected value.	Digital setting frequency
	If digital setting frequency after modification are not stored into internal memory, after power-off, the inverter will return State monitor code.	Running parameter (Decided by parameter b-71)

Remark

● Enter the frequency setting mode in mode 1, if there is no key-press in three seconds, the inverter will return State monitor mode.

● Enter frequency setting mode in mode 2, if there is no key-press in ten seconds, the inverter will return State monitor mode.

4. Function Parameter List

Description of symbols in the list:

" × " means that the parameter cannot be changed during running.

" * " means that the parameter has relation to the model of inverter.

"---" means that the parameter is the reserved one and displays " ---".

4.1 Basic running parameters (Group A)

Code	Name	Description	Min. unit	Factory setting	Change	Code addr.
A-0	Running parameter selection	0: Basic running parameter 1: Intermediate running parameter 2: Senior running parameter	1	1	×	00H
A-1	Frequency input channel selection	0: Panel potentiometer 1: Panel digital setup 2: External voltage signal 1 3: External voltage signal 2 4: External current signal 5: UP/ DW Acc and Dec control 6: External pluse signal 7: RS485 interface 8: Combination given 9: External terminal selection	1	0		01H
A-2	Frequency digital setup	0.0~Upper limit frequency	0.01	0.0		02H
A-3	Running command channel selection	0: Panel control 1: External terminal (Key STOP is invalid) 2: External terminal (Key STOP is valid) 3: RS485 terminal (Key STOP is invalid) 4: RS485 terminal (Key STOP is valid)	1	0		03H
A-4	Running direction control	0: Same with the setting direction 1: Reverse with the setting direction 2: Reverse is prevented	1	0		04H
A-5	Rated voltage of load motor	200~500V	1	220/380	×	05H
A-6	Rated frequency of load motor	5.00~500.0Hz	0.01	50.00	×	06H
A-7	Acceleration time 1	0.1~6000s.	0.1	*		07H
A-8	Deceleration time 1	0.1~6000s.	0.1	*		08H
A-9	Acc & Dec mode	0:Straight Line 1: S curve	1	0		09H

Code	Name	Description	Min. unit	Factory setting	Change	Code addr.
A-10	Analog output (AOI) setting	0: Output frequency 1: Output current 2: Output voltage 3: Motor rotate speed 4: PID setting 5: PID feedback 6. Panel potentiometer 7. Panel digital setup 8. External voltage signal 1 9. External voltage signal 2 10. External current signal 11. External pluse signal	1	0		0AH
A-11	Frequency output (FM) setting		1	0		0BH
A-12	Analog output(AOI) gain	0.50~2.00	0.01	1.00		0CH
A-13	Frequency output (FM) gain	0.10~5.00	0.01	1.00		0DH
A-14	Analog output(AO1) selection	0: AO output 1: 0~10V 2: 2~10V 3: 0~20mA 4: 4~20mA	1	3		0EH
A-15	OC1 Output setting	0: In the running 1: Frequency arrival 2: Frequency level detection signal (FDT) 3: Over-load alarm 4: External fault stop 5: Output frequency upper limit is reached 6: Output frequency lower limit is reached 7: Inverter under-voltage stop 8: Inverter is running at zero speed 9: In the running process of PLC 10: Finish after a running cycle of PLC 11: Finish after a running step of PLC 12: PLC end of running 13: Internal timer reaches the setting time	1	0		0FH
A-16	OC2 Output setting		1	1		10H

Code	Name	Description	Min. unit	Factory setting	Change	Code addr.
A-16	OC2 Output setting	14: Internal counter reaches peak value 15: Internal counter value reaches t the specified value 16: Upper limit of pressure alarm 17: Lower limit of pressure alarm	1	1		10H
A-17	REV/JOG key function selection	0: REV control; 1: JOG control	1	0		11H

4.2 Intermediate running parameters (Group B)

Code	Name	Description	Min. unit	Factory setting	Change	Code addr.
b-0	V/F curve type selection	0: Constant torque curve 1: Decreasing torque curve 1 2: Decreasing torque curve 2	1	0	×	12H
b-1	Torque boost	0~20%	1	*		13H
b-2	Torque boost mode	0: Manual 1: Auto	1	0		14H
b-3	Upper limit frequency	Lower limit frequency~500.0 Hz	0.01	50.00		15H
b-4	Lower limit frequency	0.0~Upper limit frequency	0.01	0.50		16H
b-5	Lower limit frequency running mode	0: Stop 1: Run as the lower-limit frequency	1	0	×	17H
b-6	Start mode	0: Start up from start frequency 1: First brake, then restart 2: Inspection and start	1	0		18H
b-7	Start frequency	0.00~10.00Hz	0.01	0.50		19H
b-8	Duration time at start frequency	0.0~20.0s	0.1	0.0	×	1AH
b-9	DC brake voltage at start	0~15%	1	0	×	1BH
b-10	DC brake time at start	0.0~20.0s	0.1	0	×	1CH
b-11	Stop mode	0: Deceleration 1: Free stop	1	0		1DH
b-12	The starting frequency of DC braking stop	0.00~15.00Hz	0.01	3.00		1EH
b-13	The action time of DC braking stop	0.0~20.0s	0.1	0.0	×	1FH

Code	Name	Description	Min. unit	Factory setting	Change	Code addr.
b-14	The voltage of DC braking stop	0~15%	1	5	×	20H
b-15	Jog frequency	0.00~Upper limit frequency	0.01	10.00		21H
b-16	Jog Acc. time	0.1~6000s	0.1	10.0		22H
b-17	Jog Dec. time	0.1~6000s	0.1	10.0		23H
b-18	Multi-speed frequency 1	0.00~Upper limit frequency	0.01	35.00		24H
b-19	Multi-speed frequency 2	0.00~Upper limit frequency	0.01	15.00		25H
b-20	Multi-speed frequency 3	0.00~Upper limit frequency	0.01	3.00		26H
b-21	Multi-speed frequency 4	0.00~Upper limit frequency	0.01	20.00		27H
b-22	Multi-speed frequency 5	0.0~Upper limit frequency	0.01	25.00		28H
b-23	Multi-speed frequency 6	0.00~Upper limit frequency	0.01	30.00		29H
b-24	Multi-speed frequency 7	0.00~Upper limit frequency	0.01	35.00		2AH
b-25	Multi-speed frequency 8	0.00~Upper limit frequency	0.01	40.00		2BH
b-26	Multi-speed frequency 9	0.00~Upper limit frequency	0.01	45.00		2CH
b-27	Multi-speed frequency 10	0.00~Upper limit frequency	0.01	50.00		2DH
b-28	Multi-speed frequency 11	0.00~Upper limit frequency	0.01	40.00		2EH
b-29	Multi-speed frequency 12	0.00~Upper limit frequency	0.01	30.00		2FH
b-30	Multi-speed Frequency 13	0.00~Upper limit frequency	0.01	20.00		30H
b-31	Multi-speed frequency 14	0.00~Upper limit frequency	0.01	10.00		31H
b-32	Multi-speed frequency 15	0.00~Upper limit frequency	0.01	5.00		32H
b-33	External running command mode selection	0: Two-line control mode 1 1: Two-line control mode 2 2: Three-line control mode	1	0	×	33H
b-34	V1 Input lower-limit voltage	0.00V~[b-35]	0.01	0.00		34H
b-35	V1 Input upper-limit voltage	[b-34]~10.00V	0.01	10.00		35H

Code	Name	Description	Min. unit	Factory setting	Change	Code addr.
b-36	V1 Input adjustment coefficient	0.01~5.00	0.01	1.00		36H
b-37	V2 Input lower-limit voltage	-10.0V~[b-38]	0.1	0.0		37H
b-38	V2 Input upper-limit voltage	[b-37]~10.0V	0.1	10.0		38H
b-39	V2 Input adjustment coefficient	0.01~5.00	0.01	1.00		39H
b-40	V2 Input zero offset	-1.00~1.00V	0.01	0.00		3AH
b-41	V2 Input bipolar control	0: Invalid 1: Valid	1	0		3BH
b-42	V2 Input bipolar control zero relay width	0.00~1.00V	0.01	0.20		3CH
b-43	Input lower-limit current	0.00mA~[b-44]	0.01	4.00		3DH
b-44	Input upper-limit current	[b-43]~20.00mA	0.01	20.00		3EH
b-45	Input adjustment coefficient	0.01~5.00	0.01	1.00		3FH
b-46	Pulse input lower-limit frequency	0.000KHz~[b-47]	0.001	0.000		40H
b-47	Pulse input upper-limit frequency	[b-46]~50.00KHz	0.01	10.00		41H
b-48	Pulse input adjustment coefficient	0.01~5.00	0.01	1.00		42H
b-49	Inputting lower-limit equal to set frequency	0.00~Upper-limit frequency	0.01	0.00		43H
b-50	Inputting upper-limit equal to set frequency	0.00~Upper-limit frequency	0.01	50.00		44H
b-51	Running monitor item selection 2	0~19	1	1		45H
b-52	Running monitor item selection 3	0~19	1	2		46H
b-53	Running monitor item recycle quantity	1~3	1	3		47H
b-54	Stop monitor item selection	0~19	1	0		48H
b-55	Analog input channel filter time constant	0.01~5.00s	0.01	0.20		49H
b-56	Frequency input channel combination	Refer to the detailed description of function	100	101	×	4AH

Code	Name	Description	Min. unit	Factory setting	Change	Code addr.
b-57	Carrier frequency	1.5~15KHz	0.1	*		4BH
b-58	Frequency reach checkout amplitude	0. 00~20.00Hz	0.01	5.00		4CH
b-59	FDT (frequency reach detection)	0.00~Upper-limit frequency	0.01	10.00		4DH
b-60	FDT output delay time	0.0~20.0s	0.1	2.0		4EH
b-61	Over-load alarm level	50~200%	1	110		4FH
b-62	Over-load alarm delay time	0.0~20.0s	0.1	2.0		50H
b-63	Input terminal 1 function selection (X1: 0~28)	0: Control terminal is idle 1: Multi-speed control terminal 1 2: Multi-speed control terminal 2 3: Multi-speed control terminal 3 4: Multi-speed control terminal 4 5: FWD Jog control 6: REV Jog control 7: Free stop control 8: External device fault input 9: Acc & Dec time selection terminal 1 10: Acc & Dec time selection terminal 2 11: Freq. ascending control (UP) 12: Freq descending control (DW) 13: Frequency setting channel selection terminal 1 14: Frequency setting channel selection terminal 2 15: Frequency setting channel selection terminal 3 16: Simple PLC pause 17: Three-line running control 18: DC brake control 19: Internal timer trigger terminal 20: Internal timer reset terminal 21: Internal counter clear terminal 22: Closed-loop control invalid 23~28: Reserved 29:Internal counter clock terminal 30. External pulse input	1	1	×	51H
b-64	Input terminal 2 function selection (X2: 0~28)		1	2	×	52H
b-65	Input terminal 3 function selection (X3: 0~28)		1	3	×	53H
b-66	Input terminal 4 function selection (X4: 0~28)		1	4	×	54H
b-67	Input terminal 5 function selection (X5: 0~28)		1	6	×	55H
b-68	Input terminal 6 function selection (X6: 0~29)		1	0	×	56H
b-69	Input terminal 7 function selection (X7: 0~30)		1	30	×	57H
b-70	Linear speed coefficient setting	0.01~100.0	0.01	1.00		58H

Code	Name	Description	Min. unit	Factory setting	Change	Code addr.
b-71	Monitor item selection	0~19	1	0		59H
b-72	Parameter revise protection	0: All parameters are allowed to be revised 1: Prohibit to revise all parameters except for parameter [b-72] 2: Prohibit revise all parameters	1	0		5AH
b-73	Parameter initialization	0: No action 1: Initialization action 2: Clear the fault records	1	0	×	5BH

4.3 Advanced running parameters (Group C)

Code	Name	Description	Min. unit	Factory setting	Change	Code addr.
C-0	Slip frequency compensation	0~150%	1	0	×	5CH
C-1	Over-load & over-heat protection mode	0: Lock the output 1: Limit-current running(Alarm)	1	0		5DH
C-2	Motor over-load protection	50~110%	1	110	×	5EH
C-3	Auto energy-saving	0: Invalid 1: Valid	1	0	×	5FH
C-4	Restart after power-off	0: Invalid 1: Valid	1	0	×	60H
C-5	Waiting time for restart after power-off	1~10s	1	5	×	61H
C-6	Fault self-restoring	0, 1, 2	1	0	×	62H
C-7	Self-restoring interval	2~20s	1	5	×	63H
C-8	Auto stable voltage	0: Invalid 1: Valid 2: Invalid only at deceleration	1	0		64H
C-9	Current-limit level	110%~200%	1	150		65H
C-10	FWD & REV dead time	0.0~5.0s	0.1	0.1	×	66H
C-11	Internal timer set value	0.1~6000.0s	0.1	0.0	×	67H
C-12	Final value set of internal counter	1~60000	1	1	×	68H
C-13	Internal counter setting	1~60000	1	1	×	69H

Code	Name	Description	Min. unit	Factory setting	Change	Code addr.
C-14	Programmable multi-speed running setting	LED Ten digital: simple PLC running time unit: 1: Min 0: Second LED first digital: PLC running style: 0: No action 1: Single loop 2: Continuous loop 3: Keep the final value 4: Wobble frequency running 5: Single loop stop mode 6: Continuous loop stop mode 7: Keep the final value stop mode	1	0	×	6AH
C-15	Step 1 running time	0.1~6000s	0.1	10.0	×	6BH
C-16	Step 1 running direction	0: FWD 1: REV	1	0		6CH
C-17	Step 1 Acc/Dec time	0.1~6000s	0.1	10.0		6DH
C-18	Step 2 running time	0.0~6000s	0.1	10.0	×	6EH
C-19	Step 2 running direction	0: FWD 1: REV	1	0		6FH
C-20	Step 2 Acc/Dec time	0.1~6000s	0.1	10.0		70H
C-21	Step 3 running time	0.0~6000s	0.1	10.0	×	71H
C-22	Step 3 running direction	0: FWD 1: REV	1	0		72H
C-23	Step 3 Acc/Dec time	0.1~6000s	0.1	10.0		73H
C-24	Step 4 running time	0.0~6000s	0.1	10.0	×	74H
C-25	Step 4 running direction	0: FWD 1: REV	1	0		75H
C-26	Step 4 Acc/Dec time	0.1~6000s	0.1	10.0		76H
C-27	Step 5 running time	0.0~6000s	0.1	10.0	×	77H
C-28	Step 5 running direction	0: FWD 1: REV	1	0		78H
C-29	Step 5 Acc/Dec time	0.1~6000s	0.1	10.0		79H
C-30	Step 6 running time	0.0~6000s	0.1	10.0	×	7AH
C-31	Step 6 running direction	0: FWD 1: REV	1	0		7BH
C-32	Step 6 Acc/Dec time	0.1~6000s	0.1	10.0		7CH
C-33	Step 7 running time	0.0~6000s	0.1	10.0	×	7DH

Code	Name	Description	Min. unit	Factory setting	Change	Code addr.
C-34	Step 7 running direction	0: FWD 1: REV	1	0		7EH
C-35	Step 7 Acc/Dec time	0.1~6000s	0.1	10.0		7FH
C-36	Jump frequency 1	0.00~Upper-limit frequency	0.01	0.00		80H
C-37	Amplitude of jump frequency 1	0.00 ~5.00Hz	0.01	0.00		81H
C-38	Jump frequency 2	0.00~Upper-limit frequency	0.01	0.00		82H
C-39	Amplitude of jump frequency 2	0.0 0~5.00Hz	0.01	0.00		83H
C-40	Jump frequency 3	0.00~Upper-limit frequency	0.01	0.00		84H
C-41	Amplitude of jump frequency 3	0.00 ~5.00Hz	0.01	0.00		85H
C-42	Acceleration time 2	0.1~ 6000s	0.1	*		86H
C-43	Deceleration time 2	0.1~ 6000s	0.1	*		87H
C-44	Acceleration time 3	0.1~ 6000s	0.1	*		88H
C-45	Deceleration time 3	0.1~ 6000s	0.1	*		89H
C-46	Acceleration time 4	0.1~ 6000s	0.1	*		8AH
C-47	Deceleration time 4	0.1~ 6000s	0.1	*		8BH
C-48	Built-in PID control	0: No PID control 1: Normal PID control 2: Constant-pressure water-supply PID 3: Double-pump constant pressure water-supply PID (Need accessory) 4: Triple-pump constant pressure water-supply PID (Need accessory) 5: Four-pump constant pressure water-supply (Need accessories)	1	0	×	8CH
C-49	Built-in PID configuration channel selection	0: Panel potentiometer 1: Panel digital setting 2: External voltage signal 1 (0~10V) 3: External voltage signal 2 (-10V~10V) 4: External current signal 5: External pulse signal 6: RS485 interface setting	1	0	×	8DH

Code	Name	Description	Min. unit	Factory setting	Change	Code addr.
C-50	PID feedback channel selection	0: Voltage input 1 (0~10V) 1: Current input 2: Pulse input 3: Voltage input 2 (-10V~10V)	1	3	×	8EH
C-51	Feedback signal character	0: Positive character 1: Negative character	1	0	×	8FH
C-52	Feedback channel gain	0.01~10.00	0.01	1.00		90H
C-53	PID setup and feedback display coefficient	0.01~100.000	0.01	1.00		91H
C-54	PID controller structure selection	0: Proportion 1: Integral 2: Proportion & integral 3: Proportion & Integral & Differential	1	1	×	92H
C-55	Proportion gain	0.00~5.00	0.01	0.50		93H
C-56	Integration time constant	0.1~100.0s	0.1	10.0		94H
C-57	Differential gain	0.0~5.0	0.1	0.1	×	95H
C-58	Sampling period	0.01~1.00s	0.01	0.10		96H
C-59	Allowable deviation	0~20%	1	0		97H
C-60	PID feedback wire-break detection threshold	0.0~20.0%	0.1	0.0		98H
C-61	PID feedback wire-break action selection	0: Stop 1: Running as the digital setting frequency 2: Running as the upper-limit frequency 3: Running as the half of upper-limit frequency	1	0		99H
C-62	Full scale of remote manometer	0.001~20.00Mpa	0.001	1.000		9AH
C-63	Alarm lower-limit pressure	0.001~[C-64]	0.001	0.000		9BH
C-64	Alarm upper-limit pressure	[C-63]~[C-62]	0.001	1.000		9CH
C-65	Lower-limit value of pressure	0.001~[C-66]	0.001	0.000		9DH
C-66	Upper-limit value of pressure	[C-65]~[C-62]	0.001	1.000		9EH

Code	Name	Description	Min. unit	Factory setting	Change	Code addr.
C-67	Wake up threshold value	0.001~[C-68]	0.001	0.000		9FH
C-68	Sleep threshold value	[C-67]~[C-62]	0.001	1.000		A0H
C-69	Pump switch time	0.1s~1000s	0.1	300.0		A1H
C-70	Electromagnetic switch delay time	0.1~10.0h	0.1	0.5	×	A2H
C-71	Multi-pump running mode	0: Switch as the fixed sequence 1: Timing alternation run	1	0		A3H
C-72	Timing alter interval	0.5~100.0h	0.1	5.0		A4H
C-73	Timing water-supply	0.5~24.0h	0.1	24.0		A5H
C-74	AM output hardware calibration factor	95.0~104.5%	0.1	100%		A6H
C-75	AO output hardware calibration factor	95.0~104.5%	0.1	100%		A7H
C-76	Suppress swing of analog input	0~30	1	3		A8H
C-77	Braking unit usage	0~100	1	25		A9H
C-78	Inverter address	0~30	1	0	×	AAH
C-79	Data format	0: No parity check 1: Even parity check 2: Odd parity check	1	0	×	ABH
C-80	Baud rate	0: 1200 bps 1: 2400 bps 2: 4800 bps 3: 9600 bps 4: 19200 bps	1	3	×	ACH
C-81	Master inverter setting	0: The inverter is slave 1: The inverter is master	1	0	×	ADH
C-82	Linkage run setting ratio	0.10~10.00	0.01	1.00		AEH
C-83	RS485 communication wire-break action mode	0: Stop 1: Keep the existing state	1	0		AFH
C-84	Panel potentiometer gain factor	0.01~5.00	0.01	1.00		B0H

4.4 State monitor parameter list

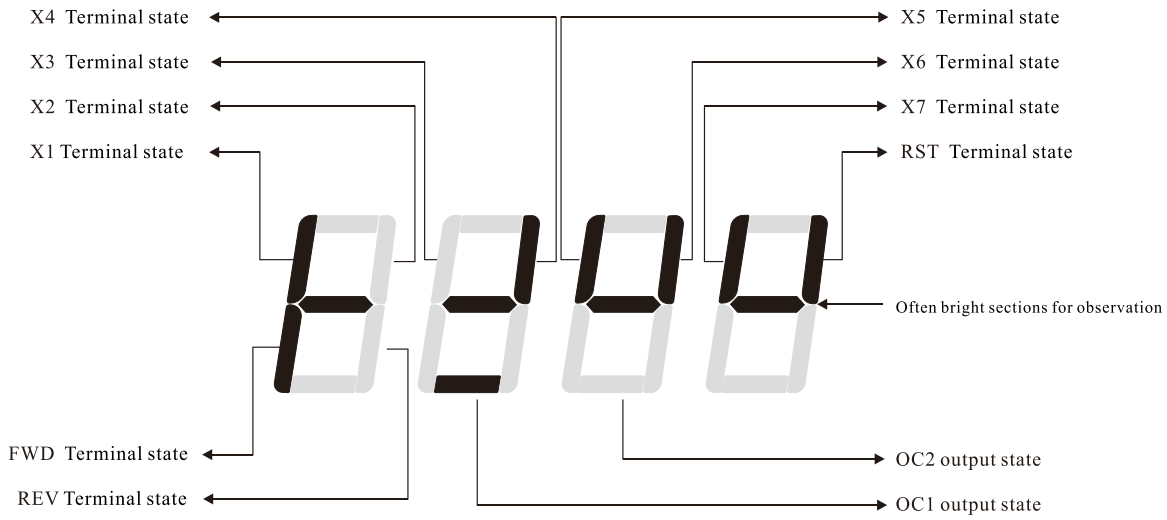
Monitor code	Content	Unit	Address of code
d-0	Present output frequency of inverter	0.01Hz	D8H
d-1	Present output current of inverter	0.1A	DCH
d-2	Present output volt of inverter	1V	DDH
d-3	Motor’s current speed	1Rpm	DEH

Monitor code	Content	Unit	Address of code
d-4	Present setting frequency of inverter	0.01Hz	DFH
d-5	DC bus voltage	1V	E0H
d-6	PID setting value	0.1%Mpa*	E1H
d-7	PID feedback value	0.1%Mpa*	E2H
d-8	Running linear speed	0.01*	E3H
d-9	Setting linear speed	0.01*	E4H
d-10	Input AC voltage	1V	E5H
d-11	Temperature of IGBT	0.1^{o}C	E6H
d-12	Total running time	1H	E7H
d-13	Input terminal state		E8H
d-14	Analog input voltage V1	0.1V	E9H
d-15	Analog input voltage V2	0.1V	EAH
d-16	Analog input current I	0.1mA	EBH
d-17	External pulse input	0.01KHz	ECH
d-18	Analog output AO	0.01V	EDH
d-19	Frequency output FM	0.01Hz*	EEH
d-20	First fault record		EFH
d-21	Second fault record		F0H
d-22	Third fault record		F1H
d-23	Fourth fault record		F2H
d-24	Fifth fault record		F3H
d-25	Sixth fault record		F4H
d-26	Output frequency of last fault	0.01Hz	F5H
d-27	Setting frequency of last fault	0.01Hz	F6H
d-28	Output current of last fault	0.1A	F7H
d-29	Output voltage of last fault	1V	F8H
d-30	DC voltage of last fault	1V	F9H
d-31	IGBT temperature of last fault	0.1^{o}C	FAH
d-32	Input terminal state of last fault		FBH
d-33	Accumulated running time of last fault	1H	FCH

Remark

● Code address is the appointed address while visiting these monitor parameters by RS485 interface.

Parameters d-13, d-32 display symbols and the external input terminal state corresponding relation is as follows:



LED light on: said effective:

LED light off: said invalid

The current input terminal state:
Effective:X1,X4,X5,X6,X7,RST,FWD
Invalid: X2,X3,REV
Output terminal state:
Effective: OC1
Invalid: OC2

4.5 Protection and solution

Code	Probable Cause	Fault description	Solution
Er. 01	Over-current during Acc	1. Acceleration time is too short. 2. Torque boost is too high or V/F curve is not suitable.	1. Extend the acceleration time. 2. Descend the torque boost or adjust the V/F curve.
Er. 02	Over-current during Dec	Deceleration time is too short.	Increase the deceleration time.
Er. 03	Over-current During running	Load occurs mutation.	Decrease fluctuation of load.
Er. 04	Over-voltage in acceleration	1. Input -voltage is too high. 2. Power switch is turned on and off frequently.	1. Check the voltage of power. 2. Control the on-off of inverter by the control terminal.
Er. 05	Over-voltage in deceleration	1. Deceleration time is too short. 2. Input-voltage is abnormal.	1. Extend the deceleration time. 2. Check the voltage of power supply. 3. Installation or reselect the braking resistor.
Er. 06	Over-voltage during running	1. Power voltage is abnormal. 2. There are energy feedback load.	1. Check the voltage of power supply. 2. Installation or reselect the braking resistor.
Er. 07	Over-voltage at stop	Power voltage is abnormal.	Check the voltage of power.
Er. 08	Low-voltage during running	1. Power voltage is abnormal there is great fluctuation of load in electric network.	1. Check the voltage of power. 2. Provide the supply power separately.

Code	Probable Cause	Fault description	Solution
Er. 09	Inverter overload	1. Load is too heavy. 2. Acc time is too short. 3. Torque boost is too high or V/F curve is not suitable. 4. Electric network is too low.	1. Reduce the load or replace with higher capacity inverter. 2. Prolong Acc time. 3. Decrease the torque boost voltage or adjusting V/F curve. 4. Check mains voltage.
Er. 10	Motor overload	1. Load is too heavy. 2. Acc time is too short. 3. The setting of protection factor is too little. 4. Torque boost is too high or V/F curve is not suitable.	1. Reduce the load. 2. Prolong Acc time. 3. Increase the over-load protection factor of motor (C-2). 4. Decrease torque boost voltage and adjust V/F curve.
Er. 11	Inverter overheat	1. Air duct is blocked. 2. Too high environment temperature. 3. Fan is damaged.	1. Clear air duct or improve the air condition. 2. Improve ventilation condition or decrease carrier frequency. 3. Replace fan.
Er. 12	Output grounded	1. The output terminal of inverter grounds. 2. The wire is too long between inverter and motor and the carrier frequency is too high.	1. Check the connecting wire. 2. Shorten the connection wire or reduce the carrier frequency.
Er. 13	Interference	Miss-running because of ambient electromagnetic interference.	Add the absorption capacitor to the interference source around inverter.
Er. 14	Output lack phase	Badness or disconnection of wire between Inverter and motor.	Check the connection wire.
Er. 15	IPM fault	1. Output being short circuit or grounding. 2. Load is too heavy.	1. Check the wire. 2. Look for the service to the manufacture.
Er. 16	External equipment fault	There are signal input on the peripheral equipment fault input terminal of Inverter.	Check the signal source and the pertinent equipments.
Er. 17	Current detecting fault	1. The current detecting equipment or circuit is damaged. 2. Auxiliary power source has problem.	Look for the services to manufacture.
Er. 18	RS485 communication fault	The sending and receiving of data occurs error in series communication.	1. Detect the wire. 2. Look for the help to the manufacture.

Code	Probable Cause	Fault description	Solution
Er. 19	PID feedback fault	1. PID feedback signal wire is disconnection. 2. The transistor which is used to detect the feedback signal, occurs the fault. 3. The feedback signal is inconsistent with the setting signal.	1. Check the feedback channel. 2. Check whether there is fault on transistor. 3. Checkup the feedback signal whether consistent with the setting.
Er. 20	The accessories connecting with the water supply system occurs the fault	1. No special accessories but select multi-pump constant-pressure water supply PID mode. 2. The connection with the accessory occurs the error.	1. Improve the ordinary PID or single-pump constant-pressure water-supply mode. 2. Purchase the accessory. 3. Check whether the connection between main control panel and accessories is solid.

4.6 Fault record inquiry

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

Monitor item	Contents
d-20	First fault record
d-21	Second fault record
d-22	Third fault record
d-23	Fourth fault record
d-24	Fifth fault record
d-25	Sixth fault record
d-26	Output frequency of last fault
d-27	Setting frequency of last fault
d-28	Output current of last fault
d-29	Output voltage of last fault
d-30	DC voltage of last fault
d-31	IGBT temperature of last fault
d-32	Input terminal state of last fault
d-33	Accumulated running time of last fault

5. The Concrete Explanation of Function Parameters

5.1 Inverter running parameters (Group A)

Code	Name	Description	Factory setting
A-0	Running parameter Selection	0: Basic running parameter 1: Intermediate running parameter 2: Senior running parameter	1

[A-0] is used to set running model to simplify the running, user can choose according to application.

0: Basic running parameter. Inverter working and controlled by(A-0~A-17). Other parameters hide and will not affect the running of the frequency inverter.

1: Intermediate running parameter. Inverter working and controlled by(A-0~A-17) and (b-0~b-73). Other parameters hide and will not affect the running of the frequency inverter.

2: Senior running parameter. Inverter working and controlled by(A-0~A-17) and (b-0~b-73) and senior parameter (C-0~C-84).

Remark

● Changing running mode will be valid after power off.

Code	Name	Description	Factory setting
A-1	Frequency input channel selection	0: Panel potentiometer 1: Panel digital setup 2: External voltage signal 1 3: External voltage signal 2 4: External current signal 5: UP/ DW Acc and Dec control 6: External pluse signal 7: RS485 interface 8: Combination given 9: External terminal selection	0

0: Panel potentiometer. The running frequency input by potentiometer of panel.

1: Panel digital setup. The running frequency input by keys of panel.

2: External voltage signal 1. The running frequency input by external analog voltage terminal "VI1" (0~10V).

3: External voltage signal 2. The running frequency input by external analog voltage terminal "VI2"(-10~ 10V).

4: External current signal. The running frequency input by external analog current terminal II(0~20mA).

5: UP/DW terminal Acc and Dec control. The running frequency input by terminal UP/DW (UP,DW terminal parameter set by b-63~b-69), when UP-COM close, running frequency increase, when DW-COM chose, the running frequency decrease. UP/DOWN together close to COM, the running frequency no change. The frequency UP/DOWN ratio set by parameter of increase and decrease time.

6: External pulse signal. The running frequency input by external pulse signal. The input terminal of pulse set by parameter "b-69" (X7).

7: RS485 interface. The running frequency input by upper PC through RS485 port, when use PLC or linkage control many pieces inverter, please choose this frequency input mode.

8: Combination given. The running frequency input by linear combination of all input channels, the combination style set by parameter b-56.

9: External terminals selection. The input channel of running frequency choose by external terminals (external terminals set parameter b-63~b-69). The relationship between terminals state and running

frequency channel is as the follow columns:

Frequency setting choose terminal-3	Frequency setting choose terminal-2	Frequency setting choose terminal-1	Frequency input channel
0	0	0	Panel potentiometer
0	0	1	Panel digital setup
0	1	0	External voltage signal VI1
0	1	1	External voltage signal VI2
1	0	0	External current signal II
1	0	1	UP/DW terminal
1	1	0	External pulse
1	1	1	RS485 interface

Remark

- "0" means the corresponding terminal close to COM, "1" means open.

Code	Name	Description	Factory setting
A-2	Frequency digital setup	0.0~Upper limit frequency	0.0

When frequency input channel was choose "panel digital input" ([A-1] = 1), the inverter output frequency decided by [A-2] value.

Under panel state monitoring mode, user press ▲ or ▼ key can directly revise [A-2] value {please refer to 3.4~panel running method: (4) the revise of digital setting frequency}.

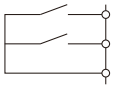
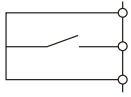
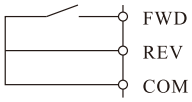
Code	Name	Description	Factory setting
A-3	Running command channel selection	0: Panel control 1: External terminal (STOP key is invalid) 2: External terminal (STOP key is valid) 3: RS485 interface(STOP key is invalid) 4: RS485 interface (STOP key is valid)	0

The parameter is used to choose stop or start command channel.

0: Panel command. Inverter stop and start command was controlled by panel. The running direction was controlled by state of external terminals FWD-COM. FWD-COM close, inverter forwarder running, FWD-COM loose, inverter reverse running. The terminal FWD-COM state also decide JOG running direction.

1: External terminal command (STOP key is invalid). The start and stop of inverter was controlled by external terminal FWD,REV connect and disconnect with COM. The inverter factory setting is as following diagram mode. Under this mode, the panel is invalid.

2: External terminal command (STOP key is valid). The basic function is same as mode 1; Under this mode, panel STOP key can be press to stop inverter, if user wants restart, please use external input to stop command and input start command to restart inverter.

Command	Stop command		Forward command	Reverse command
Terminal state STOP RESET				

3: RS485 interface (STOP key is invalid). The RS485 interface will receive the running command from upper PC or PLC or master inverter. The keys of panel are invalid under this control mode.

4: RS485 interface (STOP key is valid).The basic function is same as mode 3; under this model, the panel STOP key can be press to stop inverter, if user wants to restart inverter, please use RS485 to input stop command and input start command to restart inverter

Code	Name	Description	Factory setting
A-4	Running direction control	0: Same with setting direction 1: Reverse with setting direction 2: Reverse prevented	0

This parameter is used to change inverter output three phase sequences, to change motor running direction

0: Same with setting direction

1: Reversed with setting direction: When user choose this direction mode, the inverter output phase sequence is reversed to setting direction, for example FWD short connect with COM, motor will reverse, and panel FWD key will become reverse command key.

2: Reverse prevented. The inverter will only forward running.

Remark

● [A-4] Setting is valid together with direction control of external terminals.

Code	Name	Description	Factory setting
A-5	Rated voltage of load motor	200~500V	220V/380V
A-6	Rated frequency of load motor	5.00~500.0Hz	50.00

Please set this parameter according to motor nameplate.

Code	Name	Description	Factory setting
A-7	Acceleration time 1	0.1~6000s.	*
A-8	Deceleration time 1	0.1~6000s.	*

Acceleration time is the time that inverter output frequency increases from 0.0Hz to 50.00Hz.

Deceleration time is the time that inverter output frequency decreases from 50.00Hz to 0.0Hz.

Code	Name	Description	Factory setting
A-9	Acc & Dec mode	0:Straight line 1: S curve	0

0: Straight line: The acceleration and deceleration of straight line is proper for most loads.

1: S curve: The acceleration and deceleration of S curve is proper for load with starting noise and vibration. As diagram 5-1.

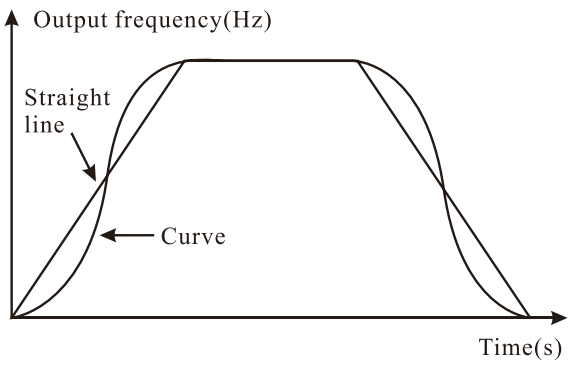


Diagram 5-1: The inverter acceleration and deceleration curve

Code	Name	Description	Factory setting
A-10	Analog output (AOI) setting	0: Output frequency 1: Output current 2: Output voltage 3: Motor rotate speed 4: PID setting 5: PID feedback 6. Panel potentiometer 7. Panel digital setup 8. External voltage signal 1 9. External voltage signal 2 10. External current signal 11. External pluse signal	0
A-11	Frequency output (FM) setting		0

The definition of analog output terminal (AO) and frequency output terminal (FM):

0: Inverter output frequency

1: Inverter output current

2: Inverter output voltage

3: Motor rpm

4: PID setting

5: PID feedback

6: Panel potentiometer

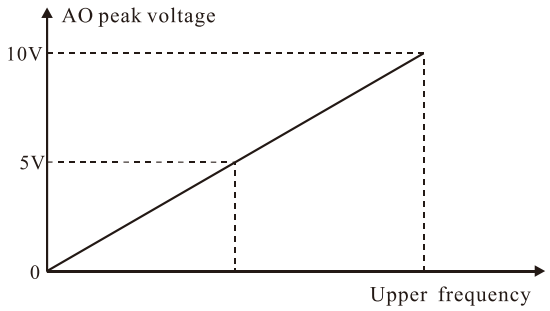
7: Panel digital setting

8: External voltage signal 1

9: External voltage signal 2

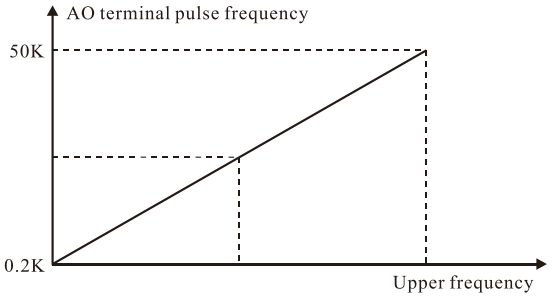
10: External current signal

11: External pluse signal



Set value:	0:	
	1:	Rated current
	2:	Motor rated voltage
	3:	Motor rated speed
	4:	PID full width setting
	5:	PID full width feedback
	6:	Panel potentiometer full width value
	7:	Panel digital setting full width value
	8:	External voltage signal 1 full width value
	9:	External voltage signal 2 full width value
	10:	External current signal full width value
	11:	External pulse signal full width value

Diagram 5-2: The output content of analog output terminal AO

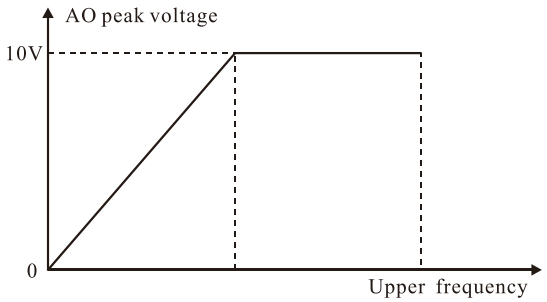


Set value:	0:	
	1:	Rated current
	2:	Motor rated voltage
	3:	Motor rated speed
	4:	PID full width setting
	5:	PID full width feedback
	6:	Panel potentiometer full width value
	7:	Panel digital setting full width value
	8:	External voltage signal 1 full width value
	9:	External voltage signal 2 full width value
	10:	External current signal full width value
	11:	External pulse signal full width value

Diagram 5-3: The output content of frequency output terminal AO

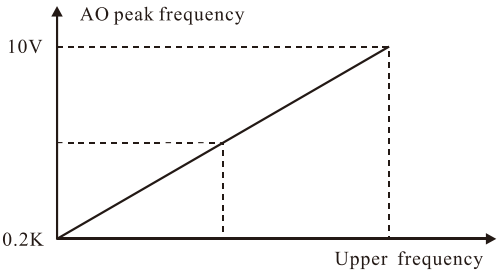
AO has 5 kinds of output mode(0:Pulse output, 1:0~10V analog output, 2:2~10V analog output, 3:0~20mA analog output, 4:4~20mA analog output), please refer to b-14 explanation for more details.

Code	Name	Description	Factory setting
A-12	Analog output (AOI) gain	0.50~2.00	1.00
A-13	Frequency output (FM) gain	0.10~5.00	1.00



Set value:	0:	
	1:	Rated current
	2:	Motor rated voltage
	3:	Motor rated speed
	4:	PID full width setting
	5:	PID full width feedback
	6:	Panel potentiometer full width value
	7:	Panel digital setting full width value
	8:	External voltage signal 1 full width value
	9:	External voltage signal 2 full width value
	10:	External current signal full width value
	11:	External pulse signal full width value

Diagram 5-4: [A-12] = 2.00



Set value:	0:	
	1:	Rated current
	2:	Motor rated voltage
	3:	Motor rated speed
	4:	PID full width setting
	5:	PID full width feedback
	6:	Panel potentiometer full width value
	7:	Panel digital setting full width value
	8:	External voltage signal 1 full width value
	9:	External voltage signal 2 full width value
	10:	External current signal full width value
	11:	External pulse signal full width value

Diagram 5-5: [A-13] = 5.00

[A-12],[A-13] is used set value of AO terminal output voltage and FM terminal output frequency.
That is Crosscourt slope ratio of diagram 5-4, diagram 5-5:

Code	Name	Description	Factory setting
A-14	Analog output(AO1) selection	0: AO output 1: 0~10V 2: 2~10V 3: 0~20mA 4: 4~20mA	3

0: AO Output

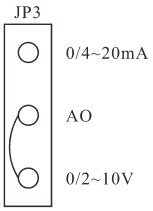
1: Output 0~10V

2: Output 2~10V

3: Output 0~20mA

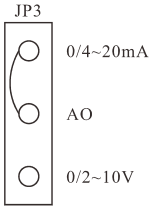
4: Output 4~20mA.

When A-14choose 1 or 2, the diagram of JP3 is like right picture.



Take off the jumper between AO and FM, and use this jumper to connect AO terminal of JP3 to terminal of "0/2~10V", same as diagram, set [A-14] is 1, and external terminal AO output is 0~10V,[A-14] is 2: the external terminal AO output is 2~10V.

When [A-14] set to 3 or 4, jumper JP3connection is as diagram.



Take off the jumper between AO and FM, and use the jumper to connect AO terminal of JP3 of terminal of 0/4~20mA, same as diagram, set [A-14] is 3, and external terminal AO output is 0~20mA；[A-14] is 4: the external terminal AO output is 4~20mA.

Affected by the environment and the dispensability of AO devices, the output may be offset, if this happens, please refer to the description of parameters (C-74, C-75).

A-14 is set at the same time decided D-19 output, when the selection is 0, D-19 display AO output frequency corresponding to the current operating frequency (correspondence between the user's own decision). When a choice of 1 or 2, D-19 display output AO present voltage value; when the option 3, D-19 displays the AO value of the output present current, corresponding to the present operating frequency.

Code	Name	Description	Factory setting
A-15	OC1 Output setting	0: Inverter running 1: Frequency arrival 2: Frequency level detection signal(FDT) 3: Over-load alarm 4: External fault stop 5: Output frequency upper limit is reached 6: Output frequency lower limit is reached 7: Inverter under-voltage stop 8: Inverter is running at zero speed 9: In the running process of PLC 10: Finish after a running cycle of PLC 11: Finish after a running step of PLC 12: PLC end of running 13: Internal timer reaches the setting time 14: Internal counter reaches peak value 15: Internal counter value reaches the specified value 16: Upper limit of pressure alarm 17: Lower limit of pressure alarm	0
A-16	OC2 Output setting		1

Definition open collector output terminal OC1, OC2 said: OC output terminals of the internal wiring diagram as shown in diagram 5-6, or refer to chapter 2 of the OC terminal wiring.

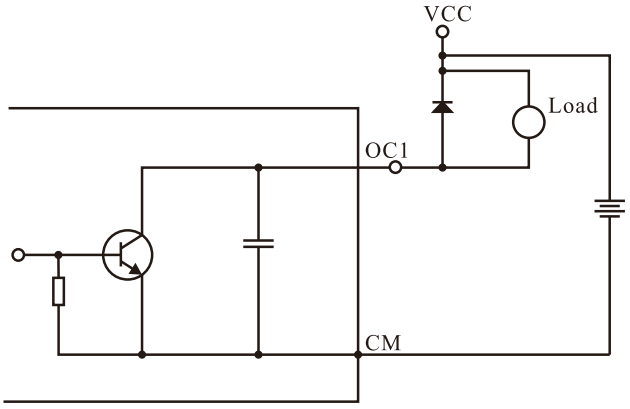


Diagram 5-6: OC output terminal internal wiring

Remark

●When inverter connect extra inductive elements (such as relay coil), must parallel freewheeling diode.

0: Inverter running. When the inverter is running, the output signal (low level), a shutdown state outputs an invalid signal (high resistance).

1: Frequency arrival.

When the inverter output frequency is close to the set frequency to a certain range (the range of parameters is determined by b-58, [A- 0] = 0, fixed for 5.00Hz), output signal (low level), or outputs an invalid signal (high resistance). Frequency of signal arrival as shown: 5-7.

Remark

●If the external power supply, the best selection is DC 24V/50mA.

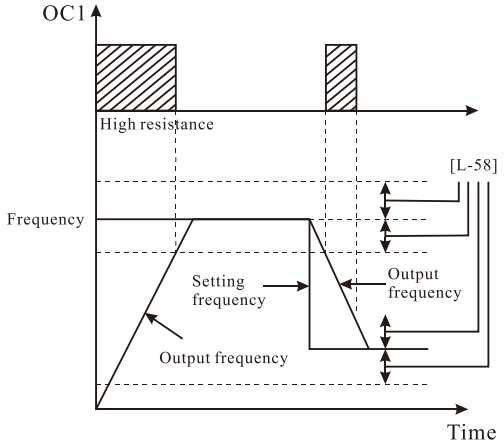


Diagram 5-7: Frequency arrival signals

2: Frequency level detection signal(FDT) When the inverter output frequency is more than FDT frequency level, after set delay time, the output signal (low level), when the inverter output frequency is lower than the FDT frequency level, after the same delay time, outputs an invalid signal (high resistance). Frequency level detection (FDT) is as shown in Diagram 5-8:

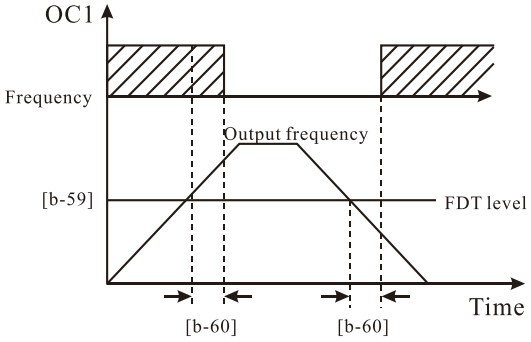


Diagram 5-8: Frequency level detection (FDT)

Remark

- The level of FDT is set by parameter b-59, [A-0] = 0, fixed 10.0Hz.
- The delay time is set by the parameter b-60, [A-0] = 0, fixed for 2 seconds.

3: Over-load alarm. When the inverter output current exceeds the overload alarm level, after the set alarm delay time, inverter outputs a signal (low level). When the inverter output current is lower overload alarm level, after the same delay time, inverter outputs an invalid signal (high resistance). Overload alarm diagram is as shown in diagram 5-9:

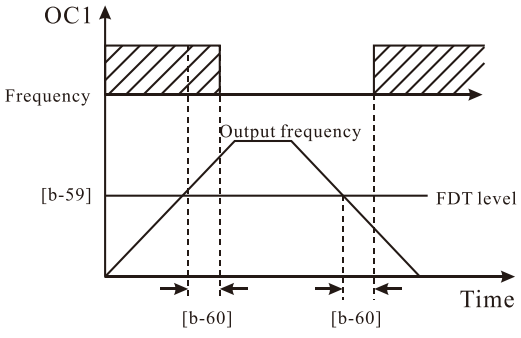


Diagram 5-9: Schematic diagram of overload alarm

Remark

- Overload alarm level set by parameter b-61, when [A-0] = 0，the fixed is 110%.
- The alarm delay time is set by parameter b-62, when [A-0] = 0，fixed is 2s

4: External fault stop: When the inverter external fault input signal will result in inverter shutdown, the port output signal (low level), or outputs an invalid signal (high resistance).

5: Output frequency upper limit is reached: When the inverter output frequency reached upper limit, the port outputs valid signal (low level), or outputs an invalid signal (high resistance).

6: Output frequency lower limit is reached: When the inverter output frequency reached lower limit, the port outputs valid signal (low level), or outputs an invalid signal (high resistance).

7: Inverter under-voltage stop: When the inverter DC BUS side voltage is lower than a specified value, frequency inverter to stop running, at the same time this port output signal (low level).

8: Inverter is running at zero speed. When the inverter output frequency is 0, but there is output voltage (such as DC braking, reversing process dead-time), the port output signal (low level).

9: In the running process of PLC. Programmable multi-step speed running, the port output signal (low level)

10: Finish after a running cycle of PLC. When the PLC finishes running a period, this port output an effective pulse signal of 0.5seconds width (low level).

11: Finish after a running step of PLC. Using programmable multi-step speed, frequency inverter finish each section of speed, this port output a effective pulse signal of 0.5seconds width (low level), refer to diagram 5-27, 5-28.

12: PLC end of running: When the programmable multi step speed running cycle at the end, the port output effective pulse signal of 0.5seconds width (low level).

13: Internal timer reaches the setting time: When the inverter internal timer timing time arrived, the port output a effective pulse signal of 0.5seconds width of (low level).

14: Internal counter reaches peak value: Please refer to C-12 parameter description.

15: Internal counter value reaches the specified value: Please refer to C-13 parameter description

16: Upper limit of pressure alarm: When the feedback pressure is greater than the upper limit of pressure alarm set value ([C-64]), and the output frequency of the inverter has reached the lower frequency running (in multiple pump system, other pump has stopped), the port output signal (low level), this function can be used to indicate the pipeline plug situation of water supply.

17: Lower limit of pressure alarm: When the feedback pressure is smaller than the lower limit of pressure alarm set value ([C-63]), and the output frequency of the inverter has reached the upper limit frequency of running (in multiple pump system, other pumps have been in power frequency running), this port output signal (low level), this function can be used for indicating water pipe leakage.

Code	Name	Description	Factory setting
A-17	REV/JOG key function selection	0: REV control; 1: Jog Control	0

0: Reverse control: Setting [A-17]=0, the key JOG REV is reverse running command when control mode ([b-3]=0).

1: JOG control: Setting [A-17]=1, the key JOG REV is JOG running command , press this key, inverter will JOG running according to set frequency of (L-15).

5.2 Intermediate running parameters (Group B)

Code	Name	Description	Factory setting
b-0	V/F curve type selection	0: Constant torque curve 1: Decreasing torque curve 1 2: Decreasing torque curve 2	0

0: Constant torque curve: The inverter output voltage and the output frequency is proportional to the load, for the majority, by this way.

1: Decreasing torque curve 1: The inverter output voltage and the output frequency is quadratic curve, suitable for fan and water pump.

2: Decreasing torque curve 2: The inverter output voltage and the output frequency is quadratic curve, suitable for fan and water pump. If the light load running is instable, please switch to decreasing torque curves 1.V/F curve as diagram 5-10 shown:

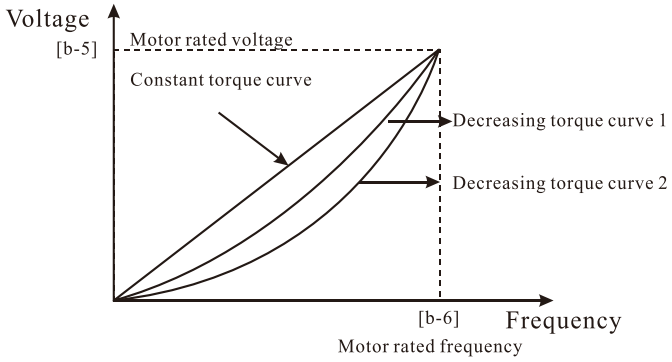


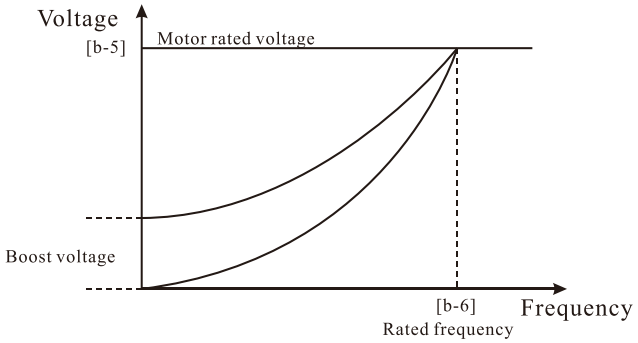
Diagram 5-10: V/F curve

Code	Name	Description	Factory setting
b-1	Torque boost	0~20%	*

Used to improve inverter torque at low frequency; and in the low-frequency running to improve the output voltage of the inverter, torque boost diagram is as shown in Diagram 5-11:

Improvement voltage=[b-1]/200* motor rated voltage

a) Decreasing torque boost curve diagram:



b) Constant torque boost curve diagram:

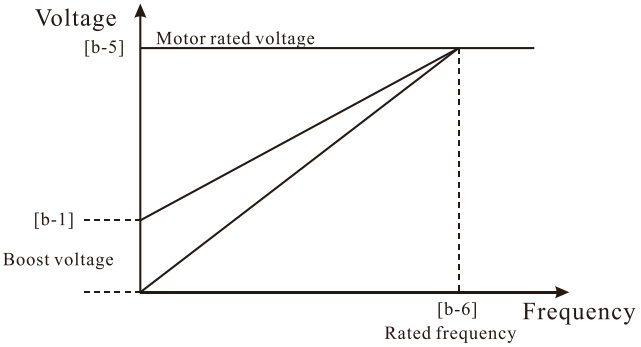


Diagram 5-11: Torque boost

Remark

● Torque boost setting value is too high, may appear over current protection, or cannot start normally.

Code	Name	Description	Factory setting
b-2	Torque boost mode	0: Manual 1: Auto	0

0: Manual boost: Torque boost voltage entirely set by parameter [b-1], which is characterized by the fixed boosted voltage, light-load motor easily meets magnetic saturation.

1: Automatic torque boost: Torque boost voltage is changed with the stator current, the stator current is the greater the boosted voltage is greater.

$$\text{Boost voltage} = \frac{[b\text{-}1]}{200} \times \text{motor rated voltage} \times \frac{\text{inverter output current}}{2 \times \text{inverter rated current}}$$

Automatic torque boost can prevent the motor at light load improved over voltage cause the magnetic saturation, thereby avoiding motor overheat phenomenon operating at a low frequency.

Code	Name	Description	Factory setting
b-3	Upper limit frequency	Lower limit frequency ~500.0 Hz	50.00

(fu) represents frequency upper limit value in following description:

Code	Name	Description	Factory setting
b-4	Lower limit frequency	0.0~Upper limit frequency	0.50
b-5	Lower limit frequency running mode	0: Stop 1: Run as the lower-limit frequency	0

(f_L) represents frequency upper limit value in following description:

When the actual setting frequency is less than the frequency lower limit, inverter will reduce the output frequency, arrived at the lower frequency, according to the lower limit running mode to determine the steady output. If the lower frequency running mode selection for 0 (stop mode), inverter will continue to reduce the output frequency to stop, if lower frequency running mode selection 1 (running mode), inverter will run according to the frequency of lower limit.

Under the stop mode ([b-5] = 0) , the inverter work at the lower frequency mode as shown in diagram 5-12:

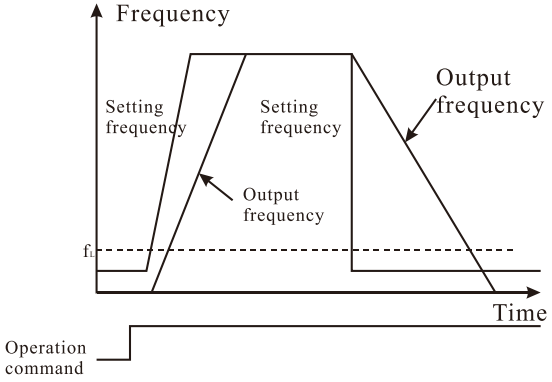


Diagram 5-12: The lower limit frequency running mode under Stop mode ([b-5]=0)

Code	Name	Description	Factory setting
b-6	Start mode	0: Start up from start freq 1: First brake, then restart 2: Speed inspection startup	0

0: Start up from start frequency. After receiving startup command, the inverter will firstly run according to preset start frequency(set by b-7),and after the duration time of start frequency(set by b-8), and then run to set frequency according to acceleration or deceleration time.

1: First brake, then restart. Frequency inverter exerts a DC braking energy to load motor (i.e., electromagnetic brake, set by parameters B-9, B-10), and then restart, which is applicable to the small inertia load, that stop state has the positive rotation or inversion phenomenon in.

2: Speed inspection startup. Frequency inverter firstly detects the motor speed, and then with the detected speed as a starting point, to start motor to the set frequency according to acceleration and deceleration time.

Code	Name	Description	Factory setting
b-7	Start frequency	0.0~10.00Hz	0.50

Start frequency can be matched with the torque boost function and optimally adjust the starting torque characteristics, but if the set value is too large, sometimes over current fault. Start Frequency continuous time means the starting frequency operating duration time. If the "Set Frequency" is lower than the "Start Frequency", the inverter firstly start according to Start Frequency, after reaching the continuous time, then according to the preset deceleration time falls down to the Set Frequency. Start frequency starting as shown in diagram 5-13:

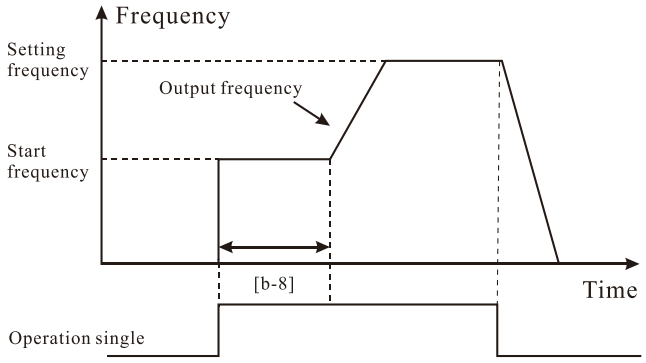


Diagram 5-13: Start according to preset start frequency

Code	Name	Description	Factory setting
b-8	Duration time at start frequency	0.0~20.0s	0.0
b-9	DC brake voltage at start	0~15%	0
b-10	DC brake time at start	0.0~20.0s	0

When the start mode set for the first brake, then start, the DC braking function of starting is valid. The parameter set for corresponding to the DC braking voltage and duration time. when DC braking, the inverter output DC voltage and DC braking start relationship is as shown in diagram 5-14.

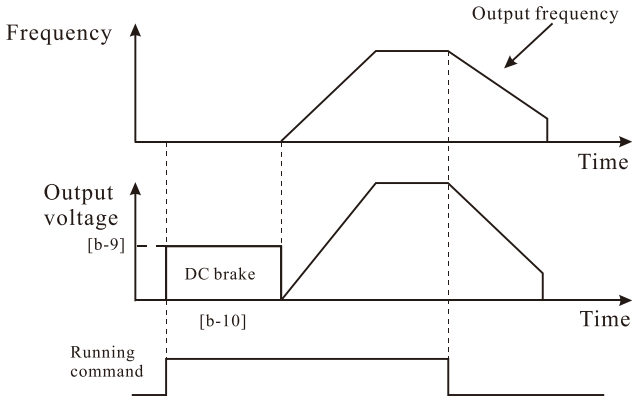


Diagram 5-14: DC braking starting mode

Code	Name	Description	Factory setting
b-11	Stop mode	0: Deceleration stop mode: 1: Free stop mode	0

0: Deceleration stop mode: Inverter stops according to deceleration time decrease and stop.

1: Free stop mode: Inverter cut off output and motor free stop.

Under free stop mode, if inverter restart the running motor from zero Hz, may occur with over current or overvoltage protection, this time please set [b-6] parameter to 2, inverter will firstly detect the speed and then start.

Code	Name	Description	Factory setting
b-12	The starting frequency of DC braking stop	0.0~15.00Hz	3.00
b-13	The action time of DC braking stop	0.0~20.0s	0.0
b-14	The voltage of DC braking stop	0~15%	5

These 3 parameters are used to define the frequency inverter in DC braking function of stopping. when the inverter output frequency is lower than the starting frequency of DC braking, inverter will automatically start the DC braking function.

DC braking action time means the duration time of DC braking. When this parameter set to 0, the DC braking function is invalid. The inverter output DC voltage of DC braking is like following formula:

$$\text{Boost voltage} = \frac{[b\text{-}14]}{200} \times \text{Motor rated voltage}$$

DC braking function can provide torque at zero speed, usually used to improve the accuracy of stopping, but cannot use for braking of deceleration at normal running. DC braking at stopping function is as shown in Diagram 5-15:

Remark

● If DC braking voltage set too high, inverter is easy to over current fault.

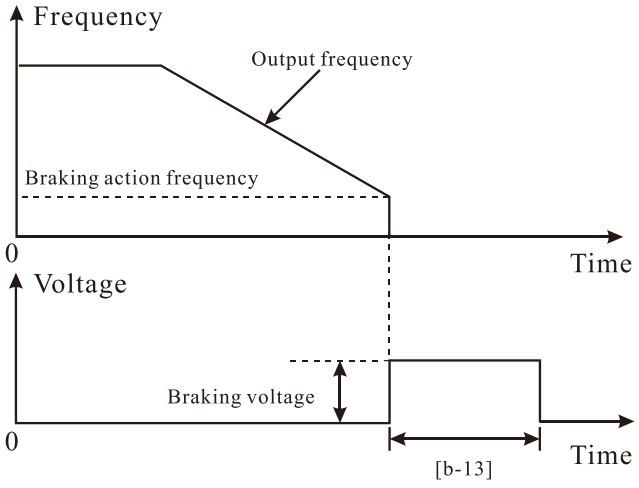


Diagram 5-15: DC braking functions at stopping

Code	Name	Description	Factory setting
b-15	Jog frequency	0.0~Upper Limit frequency	10.00
b-16	Jog acceleration time	0.1~6000s	10.0
b-17	Jog deceleration time	0.1~6000s	10.0

Jog frequency having the highest priority. Inverter in any state, as long as there is JOG input, inverter immediately turn to JOG running according to acceleration and deceleration time.

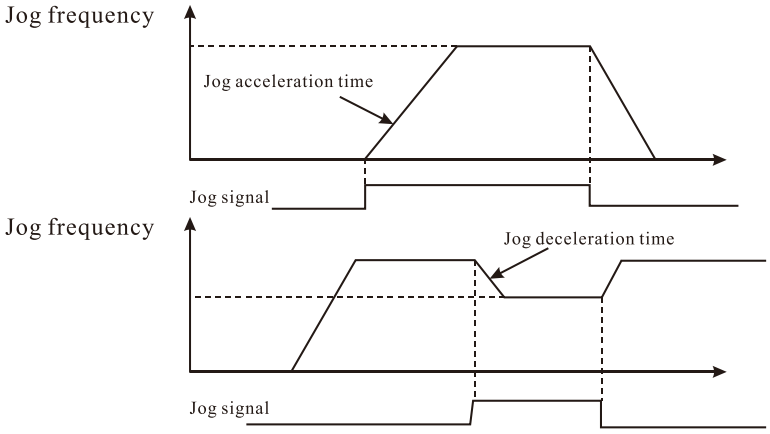


Diagram 5-16: JOG running

Code	Name	Description	Factory setting
b-18	Multi-speed frequency 1	0.0~Upper limit frequency	35.00
b-19	Multi-speed frequency 2	0.0~Upper limit frequency	15.00
b-20	Multi-speed frequency 3	0.0~Upper limit frequency	3.00
b-21	Multi-speed frequency 4	0.0~Upper limit frequency	20.00
b-22	Multi-speed frequency 5	0.0~Upper limit frequency	25.00
b-23	Multi-speed frequency 6	0.0~Upper limit frequency	30.00
b-24	Multi-speed frequency 7	0.0~Upper limit frequency	35.00
b-25	Multi-speed frequency 8	0.0~Upper limit frequency	40.00
b-26	Multi-speed frequency 9	0.0~Upper limit frequency	45.00
b-27	Multi-speed frequency 10	0.0~Upper limit frequency	50.00
b-28	Multi-speed frequency 11	0.0~Upper limit frequency	40.00
b-29	Multi-speed frequency 12	0.0~Upper limit frequency	30.00
b-30	Multi-speed frequency 13	0.0~Upper limit frequency	20.00
b-31	Multi-speed frequency 14	0.0~Upper limit frequency	10.00
b-32	Multi-speed frequency 15	0.0~Upper limit frequency	5.00

These parameters are used to set output frequency of multi-step speed control by terminal control or program. Multi-step speed control is priority is lower than jog frequency control, but is higher than other frequency control mode.

The below column is corresponding multi-step speed frequency decided by combination style of multi-step speed terminals. Wherein, multi-step speed terminal corresponding 1 is high level, corresponding 0 is low level. Multi-step speed frequency set by parameters (b-18 to b-32).

Terminal 1	Terminal 2	Terminal 3	Terminal 4	Multi-step terminal
1	0	0	0	1
0	1	0	0	2
1	1	0	0	3
0	0	1	0	4
1	0	1	0	5
0	1	1	0	6
1	1	1	0	7
0	0	0	1	8
1	0	0	1	9
0	1	0	1	10
1	1	0	1	11
0	0	1	1	12
1	0	1	1	13
0	1	1	1	14
1	1	1	1	15

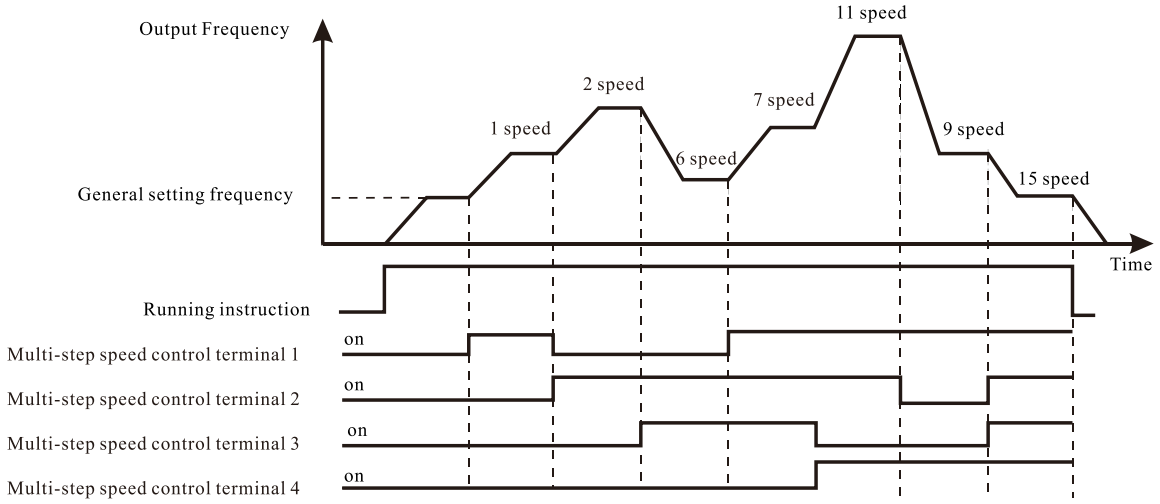


Diagram 5-17: Multi-step running diagram

Multi-step control terminals were set by parameter b-63~b-69,the factory setting:X1,X2,X3 were Used for multi-step speed control terminals.

The deceleration time of external terminal control section can be set separately, respectively corresponding to:

Multi speed	ACC/DEC Time
Speed 1	Step 1 Acc/Dec time (C-17)
Speed 2	Step 2Acc/Dec time(C-20)
Speed 3	Step3Acc/Dec time(C-23)
Speed 4	Step 4Acc/Dec time(C-26)
Speed 5	Step 5Acc/Dec time(C-29)
Speed 6	Step 6Acc/Dec time(C-32)
Speed 7	Step 7Acc/Dec time(C-35)
Speed 8	Acc/Dec time1(A-7,A-8)
Speed 9	Acc/Dec time2(C-42,C-43)
Speed 10	Acc/Dec time3(C-44,C-45)
Speed 11	Acc/Dec time4(C-46,C-47)
Speed 12	Acc/Dec time1(A-7,A-8)

Multi speed	ACC/DEC Time
Speed 13	Acc/Dec time1(A-7,A-8)
Speed 14	Acc/Dec time1(A-7,A-8)
Speed 15	Acc/Dec time1(A-7,A-8)

The running mode, direction, and time of programmable multi-step speed can be set by parameter C-14~C-35.

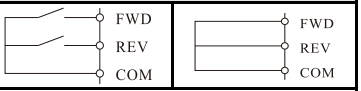
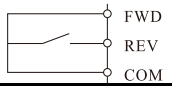
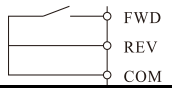
This parameter is used to set external command control mode.

Code	Name	Description	Factory setting
b-33	External running command mode selection	0: Two-line control mode 1 1: Two-line control mode 2 2: Three-line control mode	0

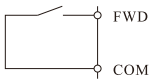
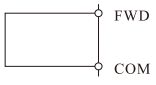
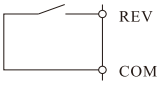
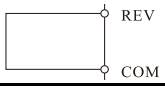
Remark

● Only set external control [A-3] = 1,2, this parameter is valid.

0: Two-line control model 1 (Inverter factory setting is this mode)

Command	Terminal state
Stop	
Forward	
Reverse	

1: Two-line control model 2

Command	Terminal state
Stop	
Run	
Forward	
Reverse	

2: Three-line control model: Three line control mode must choose a terminal of three line (refer to b-63~b-69 explanation).

The wiring of three control model as diagram 5-18:

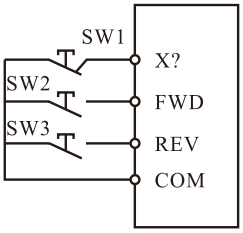
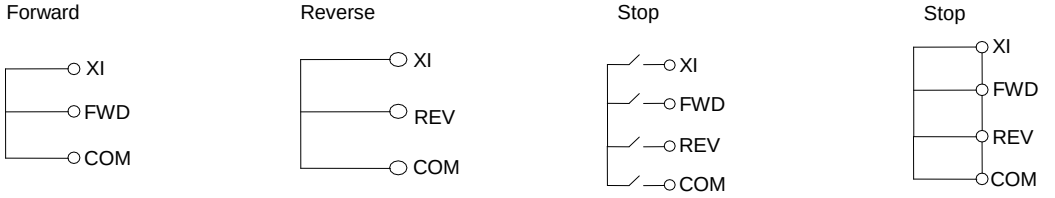


Diagram 5-18: The wiring of three control mode

X* is three line control terminal, parameter b-63~b-69 to select input terminal one terminal X1~X7, for example: select terminal X1, the wiring is as following diagram:



Trigger switch function explanation:

1. SW2~forward trigger switch
2. SW3~reverse trigger switch
3. SW1~inverter stop trigger switch

Code	Name	Description	Factory setting
b-34	V1 Input lower-limit voltage	0.00V~[b-35]	0.00
b-35	V1 Input upper-limit voltage	[b-34]~10.00V	10.00
b-36	V1 Input adjustment coefficient	0.01~5.00	1.00

These parameters are used to define the range of analog voltage input (VI1) according to input signal.
Input adjustment coefficient is used to adjust input voltage, In the combinatorial set mode can change the channel weight coefficient.

Code	Name	Description	Factory setting
b-37	V2 Input lower-limit voltage	-10.0V~[b-38]	0.0
b-38	V2 Input upper-limit voltage	[b-37]~10.0V	10.0
b-39	V2 Input adjustment coefficient	0.01~5.00	1.00

These parameters are used to define the range of analog voltage input (V2) according to input signal.
Input adjustment coefficient is used to adjust input voltage, In the combinatorial set mode can change the channel weight coefficient.

Code	Name	Description	Factory setting
b-40	V2 Input zero offset	-1.00~1.00V	0.0
b-41	V2 Input bipolar control	0: Invalid 1: Valid	0
b-42	V2 Input bipolar control zero relay width	0.00~1.00V	0.20

These parameters were used to set bipolar control function of voltage input channel (V2).
Bipolar control means to control inverter output phase sequence, which is controlled by input voltage V2,and ignore other direction command. When VI2 > 0, inverter output forward phase sequence, motor forward runs; when output voltage V2 < 0, inverter output reverse phase sequence, and motor reverse runs.
The bipolar control function is valid after setting frequency channel V2([A-1] = 3), and then the frequency setting value is decided by the absolute value of V2. In a single polarity control([b-41] = 0)and in bipolar control([b-41] = 1), The relationship of VI and setting frequency as diagram 5-19 and diagram 5-20 shown.

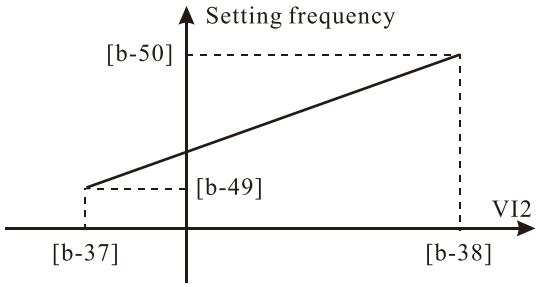


Diagram 5-19: The relationship between single polarity control V2 ([b-41] = 0)and setting frequency

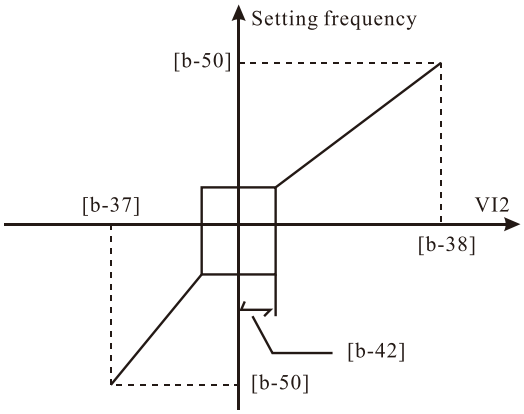


Diagram 5- 20: The relationship between bipolar control V2 ([b-41]=1) and setting frequency

In single polarity control, V2 input lower-limit voltage [b-37] can be greater than 0,also can smaller than 0, The linear relationship with output frequency is no change, Diagram 5-19 shown [b-37] < 0, inverter output phase sequence by external terminal or panel instruction determine.

In bipolar control, parameter b-49 is invalid (default for 0), when V2 > 0, the input voltage of V2 within 0~[b-38] is linear relationship with frequency within 0.0Hz~[b-50], inverter output forward phase sequence. WhenVI2 < 0, the input voltage of V2 within 0~[b-37] is linear relationship with frequency 0.0Hz~[b-50], inverter output reverse phase sequence. Parameter [b-42] set hysteresis loop width of phase sequence in zero voltage point.

Although inverter set to bipolar control mode, the input upper or lower limit of V2 was set to same polar (parameter b-37,b-38 > 0 or < 0 simultaneous), the bipolar control is invalid.

Parameter [b-40] is used to adjust dead-center position of V2 input voltage that is useless in single polarity control.

Code	Name	Description	Factory setting
b-43	Input lower-limit current	0.00mA~[b-44]	4.00
b-44	Input upper-limit current	[b-43]~20.0mA	20.0
b-45	Input adjustment coefficient	0.01~5.00	1.00

To define analog input current channel II range. According to the actual situation of access signal set

The correction coefficient can correct input current; inverter in the combined set mode can change the channel weight coefficient.

Code	Name	Description	Factory setting
b-46	Pulse input lower-limit frequency	0.000KHz~[b-47]	0.000
b-47	Pulse input upper-limit frequency	[b-46]~50.00KHz	10.00

Code	Name	Description	Factory setting
b-48	Pulse input adjustment coefficient	0.01~5.00	1.00

To define pulse frequency range of pulse input channel, according to the actual situation of access signal set. The correction coefficient can correct pulse input frequency, inverter in the combined set mode can change the channel weight coefficient.

Code	Name	Description	Factory setting
b-49	Inputting lower-limit equal to set frequency	00.0~Upper-limit frequency	0.00
b-50	Inputting upper-limit equal to set frequency	00.0~Upper-limit frequency	50.00

These parameters are used to set relationship between external input signal and setting frequency.
External input signal includes: Input voltage V1, input voltageV2, input current I and external pulse, their input upper and lower limit set by parameter: b-34~b-47, the minimal analog input corresponding setting frequency (f_{min}) means the corresponding setting frequency of analog input lower limit value, the maximal analog input corresponding setting frequency (f_{max}) means the corresponding setting frequency of analog input upper limit value. The relationship between input value and setting frequency is as diagram 5-21 shown:

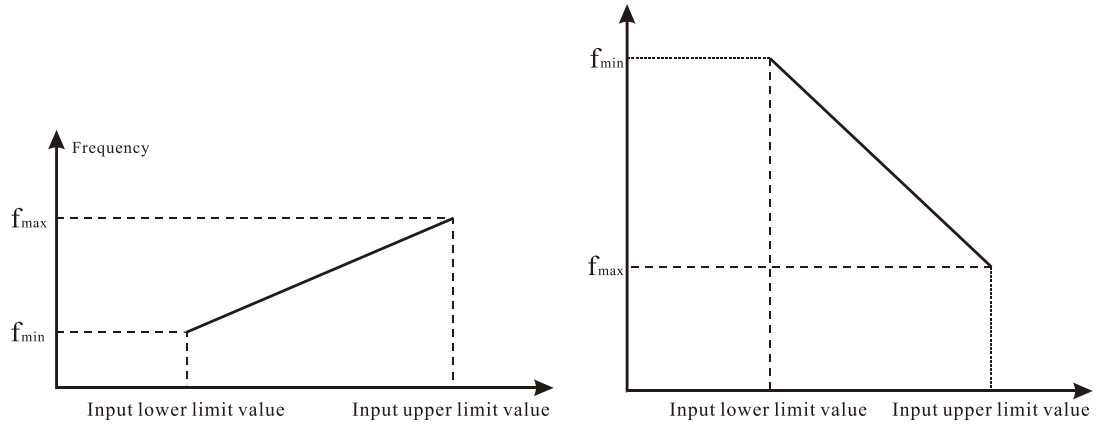


Diagram 5-21: The relationship between input value and setting frequency

Code	Name	Description	Factory setting
b-51	Running monitor item selection 2	0~19	1

The parameters are used to determine the panel second display item under inverter monitoring state, please refer to following parameters list of monitoring state for items of selection.

Code	Name	Description	Factory setting
b-52	Running monitor item selection 3	0~19	2

The parameters are used to determine the panel third display item under inverter monitoring state, please refer to following parameters list of monitoring state for items of selection.

Parameters list of monitoring state

Code	Content	Unit	Code address
d-0	Inverter present output frequency	Hz	DBH
d-1	Inverter present output current	A	DCH
d-2	Inverter present output voltage	V	DDH
d-3	Present motor speed	Rpm	DEH
d-4	Inverter present set frequency	Hz	DFH
d-5	DC BUS voltage	V	E0H
d-6	PID set value	%/MPA	E1H
d-7	PID feedback value	%/MPA	E2H
d-8	Running linear speed		E3H
d-9	Setting linear speed		E4H
d-10	Input AC voltage	V	E5H
d-11	Temperature of IGBT	^{o}C	E6H
d-12	Total running time	H	E7H
d-13	Input terminal state		E8H
d-14	Analog input V1	V	E9H
d-15	Analog input V2	V	EAH
d-16	Analog input I	mV	EBH
d-17	External pulse input	KHz	ECH
d-18	AO output	V	EDH
d-19	AO output		EEH

Remark

● b-51,b-52 and b-71 is for the selection of monitoring items, the user can according to their need to set the frequency inverter at run time set mostly want to see three monitoring states, and can use Shift keys to switch between the three running states monitoring project.

Code	Name	Description	Factory setting
b-53	Running monitor item recycle quantity	1~3	3

The parameter is used to set circle monitoring states number, the max is three monitoring states. When [b-53] set to 1, the monitoring state always is [b-71] set state, when [b-53] set to 2 or 3, the monitoring state is circle display of monitoring states set by [b-71],[b-51 and [b-52].

Code	Name	Description	Factory setting
b-54	Stop monitor item selection	0~19	0

The parameter is used to select monitoring item of stopping, the items list please refer to parameters list of monitoring state.

Code	Name	Description	Factory setting
b-55	Analog input channel filter time constant	0.01~5.00s	0.20

When set frequency by external analog channel or panel potentiometer, this parameter is used to set inverter internal filter time constant of analog signal. When the cable is longer or be serious interference,

leading to set frequency instability, user can improve the signal quality by increasing the filter time constant.

Code	Name	Description	Factory setting
b-56	Frequency input channel combination	Refer to the detailed description of function	101

The setting frequency of inverter is decided by linear combination of many channels of input.

The parameter is only valid under frequency channel chose "combination setting"([A-1] = 8).

This parameter hundred digit decide the combination mode of two channels, the value of ten digit and unit digit decide the signal source of first channel and second channel. User through the combination of hundred and ten and unit digit value to set frequency. Example as following:

LED hundred digital defines to combination mode, there are six combination style(1~6):

1: First channel + second channel

2: First channel - second channel

3: First channel * second channel

4: Take bigger value of two channels

5: Take smaller value of two channels

6: Two channel nonzero value effectively, the first channel priority

LED ten digit is defined as the first channel input form, it was divided into analog channel and the digital channel, this is seven forms :(0~6)

Analog channel:

0: Potentiometer

1: External voltage signal 1

2: External voltage signal 2

3: External current signal

4: External pulse signal

Digital channel:

5: Panel digital setting

6: RS485 interface

LED unit digit is defined as second channel input form, it was divided into analog channel, and digit channel, here is seven forms :(0~6)

Analog Channel:

0: Panel potentiometer

1: External voltage signal 1

2: External voltage signal 2

3: External current signal

4: External pulse signal

Digital Channel:

5: Panel digital setting

6: RS485 interface

Remark

● When choosing analog channel (0 to 4), the analog of zero calibration represent 0Hz, the analog quantity of full scale represent frequency 50Hz, for example: external voltage signal 1, its input 0V represent 0Hz, its input 10V representative frequency 50Hz, and for strict linear relationship.

Eg: When [b-56] set 123, the input frequency of combination: external voltage signal 2(Channel 1) +External current signal (Channel 2).

When combination mode of input frequency (LED hundred digital) set to 3(channel 1*channel 2 mode) this time, the channel 1 is basic set frequency, the channel 2 is scale factor.

Set frequency=Channel 1 set frequency* Kx(scale factor of channel 2).

When choose input analog channel 2 (parameter set 0~4), The scale factor calculation is as:

Kx=Inx*Ax

Kx: Channel 2 scale factor

Inx: Input analog set value (when input analog signal inputs full-scale value, Inx is 100.00%. For example, set parameter to 1(external voltage signal 1), when input analog signal is 10V, Inx is 100.00%).

Ax: Analog channel gain (The corresponding parameters for adjusting analog channel (0~4) gain is as following:

0: Panel potentiometer: [C-84]

1: External voltage signal 1: [b-36]

2: External voltage signal 2: [b-39]

3: External current signal: [b-45]

4: External pulse signal: [b-48]

For example: When [b-56] set to 310, the combination input of set frequencies (channel 1*channel 2), the channel 1(basic frequency set) is external voltage signal 1; the channel 2 is 0; the corresponding gain parameter C-84 is 3.24, the scale factor of channel 2: Kx= Inx*324.00%, this means range of Kx is 0~324.00%. And then, the combined input frequency: External voltage signal 1*Kx, that is(V1 terminal set frequency) *(0~324.00%).

When choose digital input (parameter set 5~6 to choose channel 2), the relationship between pulse input and gain factor is as following diagram 5-22:

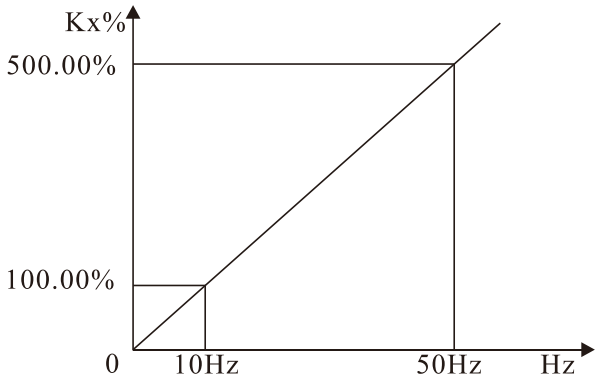


Diagram 5- 22: Digital quantity and gain corresponding relation

Fox example: When [b-56] set 315, the combination set frequency is(channel 1* channel 2), the channel 1 (basic frequency set) is external voltage signal 1, the channel 2 is 5(set by panel), panel digital set is 23.00, it means the scale factor of channel 2 is 230.00%. The combination set input frequency is (External voltage signal 1)*230.00 %(Hz).

Code	Name	Description	Factory setting
b-57	Carrier frequency	1.5~15KHz	*

Carrier frequency is main influence in running of the audio noise and heating effect.

When the environment temperature is higher, motor load heavy, should be appropriately reduced carrier frequency to improve thermal characteristics of the frequency inverter.

Code	Name	Description	Factory setting
b-58	Frequency reach checkout amplitude	0. 00~20.00Hz	5.00

This parameter is complementary for frequency reach output signal, when the inverter output frequency is near preset frequency within the detecting range, the output terminal(OC1 and OC2)will output valid signal(refer to diagram 5-7 and explanation of parameter A-15,A-16).

Code	Name	Description	Factory setting
b-59	FDT (frequency reach detection)	0.00~Upper-limit freq	10.00
b-60	FDT output delay time	0.0~20.0s	2.0

The parameter is used to inspect inverter frequency and output a signal, when output frequency reach setting value of FDT, after the [b-60] set delay time, open collector terminal output a valid signal(OC1or OC2 terminal, please refer to diagram 5-8 and explanation of parameter A-15,A-16).

Code	Name	Description	Factory setting
b-61	Over-load alarm level	50~200%	110
b-62	Over-load alarm delay time	0.0~20.0s	2.0

If the inverter output current surpass [b-61] set value, after the [b-62] delay time, open collector terminal output a valid signal(OC1or OC2 terminal, please refer to diagram 5-9 and explanation of parameter A-15,A-16).

Code	Name	Description	Factory setting
b-63	Input terminal 1 function selection (X1: 0~28)	0: Control terminal is idle 1: Multi-speed control terminal 1 2: Multi-speed control terminal 2 3: Multi-speed control terminal 3 4: Multi-speed control terminal 4 5: FWD Jog control 6: REV Jog control 7: Free stop control 8: External device fault input 9: Acc & Dec time selection terminal 1 10: Acc & Dec time selection terminal 2 11: Freq ascending control (UP) 12: Freq descending control (DW) 13: Freq setting channel selection terminal 1 14: Freq setting channel selection terminal 2 15: Freq setting channel selection terminal 3 16: Simple PLC pause 17: Three-line running control 18: DC brake control 19: Internal timer trigger terminal 20: Internal timer reset terminal 21: Internal counter clear terminal 22: Closed-loop control invalid 23~28: Reserved 29:Internal counter clock terminal 30. External pulse input	1
b-64	Input terminal 2 function selection (X2: 0~28)		2
b-65	Input terminal 3 function selection (X3: 0~28)		3
b-66	Input terminal 4 function selection (X4: 0~28)		4
b-67	Input terminal 5 function selection (X5: 0~28)		6
b-68	Input terminal 6 function selection (X6: 0~29)		0
b-69	Input terminal 7 function selection (X7: 0~30)		30

These parameters are used to select functions of programmable input terminal X1~X7, as following:

Set value	Terminal function
0	No function
1	Multi-step speed 1
2	Multi-step speed 2
3	Multi-step speed 3
4	Multi-step speed 4
5	Forward JOG
6	Reverse JOG
7	Free stop
8	External equipment fault input
9	Acceleration/Deceleration time selection 1
10	Acceleration/ Deceleration time selection 2
11	Increase frequency (UP)
12	Decrease frequency (DW)
13	Set frequency channel 1
14	Set frequency channel 2
15	Set frequency channel 3
16	Simple PLC pause control
17	Three line type run control
18	DC brake control
19	Internal timer trigger terminal
20	Internal counter reset terminal
21	Internal counter zero clearing terminal
22	Closed-loop control failure
23-28	Reserve
29	Internal counter clock terminal
30	External pulse input

Remark

● With external terminal to realize free stopping control (terminal function 7), when user withdraw the external free the stop signal, the inverter will recover running with inspecting speed restart way.

Code	Name	Description	Factory setting
b-70	Linear speed coefficient setting	0.01~100.0	1.00

This parameter decided to display numerical of running linear speed and setting linear speed, used to display other physical quantities being proportional with output frequency.

Running linear speed (d-8)=[b-70]×output frequency(d-0)

Set linear speed (d-9)=[b-70]×set frequency(d-4)

When actual display value ≥ 10000, Least significant point light, said a 0 , for example "1234" **m**eans 12340.

Code	Name	Description	Factory setting
b-71	Monitor item selection	0~19	0

The parameters are used to determine the running panel display content in the monitoring mode and on inverter just power on moment, please refer to the monitoring state parameter list.

Code	Name	Description	Factory setting
b-72	Parameter revise protection	0: All parameters are allowed to be revised 1: Prohibit to revise all parameters except for parameter [b-72] 2: Prohibit revise all parameters	0

This function is used to prevent parameter error modification.

0: All parameter can be revised.

1: Only digital set frequency (A-2) and b-72 can be revised.

2: Only b-72 parameter can be revised, other all parameter locked.

All parameter locked, if user try to revise parameter, inverter will display "--".

Remark

● When [b-72] is 0, all parameters can be revised, but when inverter is running, some parameter also cannot be revised, and will show "--" for revise running, if user wants to revise the parameter, please stop inverter.

Code	Name	Description	Factory setting
b-73	Parameter initialization	0: No action 1: Initialization action 2: Clear the fault records	0

This parameter is used to recover inverter all parameter to factory setting.

0: No action.

1: Recover all parameter to factory setting.

2: Clear all fault record.

Remark

● Parameter [A-0],[A-1],[A-3],[A-14] cannot be recover to factory setting.

5.3 Advanced running parameter (Group C)

Code	Name	Description	Factory setting
C-0	Slip frequency compensation	0~150%	0

With this parameter, we can adjust the inverter's output frequency according to the actual load, so as to compensate for the slip frequency of the asynchronous motor dynamically, keeping a desired motor speed. When working with Automatic Torque Boost function, it will deliver even better low speed torque performance. Slip frequency compensation is shown as diagram 5-23.

When this parameter is set to 100(%), and the inverter delivers rated current:

Actual output frequency = set frequency + 2.50Hz.

While the output frequency reading isn’t changed. Default value for this parameter is set to 0, with slip compensation invalid.

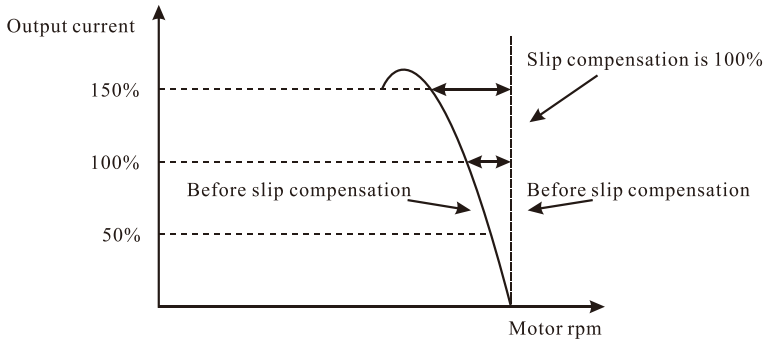


Diagram 5-23: Slip frequency compensation

Code	Name	Description	Factory setting
C-1	Over-load & over-heat protection mode	0: Lock the output 1: Limit-current running(Alarm)	0

This parameter is used to control how the inverter is protected from overload/overheat.

0: Stop output immediately. When there is overload/overheat, the inverter will stop output immediately and the motor will shutdown naturally.

1: Limit current (with warning). When there is overload/overheat, the inverter will still work but in a limited way. This means that the inverter may decrease the output frequency to lower the current of the load, and send out warning signal at the same time.

Remark

- Limit current mode is a protection measure of the inverter when there is overload/overheat, you can't set a current level for this function.
- Even in limit current mode, the inverter will shut down when the temperature of the internal modules overheat.

Code	Name	Description	Factory setting
C-2	Motor over-load protection	50~110%	110

This parameter is used to control the sensitivity of the thermal relay protection for the motor in the inverter. When rated current of the load motor is not matching that of the inverter, you can use this parameter to provide appropriate thermal protection for the load motor. Electrical thermal relay protection is shown as diagram 5-24.

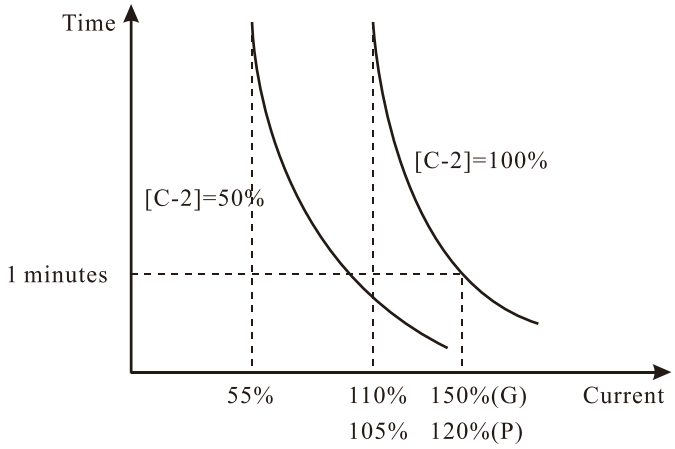


Diagram 5-24: Electrical thermal relay protection

Default overload value of the inverter is set as:

Model G: 150 %×rated current, 1 minute

Model P: 120 %×rated current, 1 minute

The setting value for this parameter is calculated as:

$$[C\text{-}2]= \frac{\text{Rated current of the motor}}{\text{Rated output current of the inverter}} \times 100$$

Remark

● When the inverter is working with several motors connected in parallel, the thermal relay protection will not function. To get appropriate protection, you need to install a thermal protection relay to each motor's inlet terminal.

Code	Name	Description	Factory setting
C-3	Auto energy-saving	0: Invalid 1: Valid	0

0: Invalid

1: Valid

When working in automatic power saving mode, the inverter will adjust the excitation state of the motor according to how much the load is, keeping the motor function with the highest efficiency. With this function, you will save great power when the load is changing frequently.

Code	Name	Description	Factory setting
C-4	Restart after power-off	0: Invalid 1: Valid	0
C-5	Waiting time for restart after power-off	0~10s	5

This parameter is used to control whether the inverter will restart after a power failure and how much the waiting time is.

When parameter C- 4 is set to 1, the inverter will stop instantly and restart after a power failure. If the inverter is in running state before a power failure, when the power supply is restored, the inverter will search the motor speed and restart in the waiting time set with C- 5. During this waiting time, the inverter will not restart even if you give a run command, but if you give a shutdown command, it will no longer search the motor speed and restart.

Remark

● As this function will automatically restart the inverter after power failure, it may lead to contingency. To protect you and your devices, please use this function with caution.

Code	Name	Description	Factory setting
C-6	Fault self-restoring	0, 1, 2	0
C-7	Self-restoring interval	2~20s	5

When set to "0", the inverter will not self-recover after failure; when set to "1" or "2", it will try self-recovery once or twice respectively after system failure.

Because load may vary in running, the inverter may malfunction and stop occasionally. To prevent it from out of service, you can use the self-recovery function. The inverter will search the motor speed and restart during a self-recovery. If it can't self-recover in a set attempt times, the inverter will shut down due to fail-safe. When the set self-recovery attempt times are cleared, the function will be invalid.

The self-recovery function is not available to failures caused by overload/overheat.

Remark

● To use self-recovery function, the inverter must has such function available and without any physical faulty.

Code	Name	Description	Factory setting
C-8	Auto stable voltage	0: Invalid 1: Valid 2: Invalid only at deceleration	0

0: Invalid

1: Valid

The function Automatic Voltage Regulator is designed to make sure that the output voltage of the inverter is stable. If the voltage from the power grid is surging greatly and you want a stable voltage in the motor, you can use this function.

2: Invalid only when motor deceleration

When the motor is decelerating to a stall, if you disable the AVR, the deceleration time will be shorter, and the running current will be higher; if you enable the AVR, the motor will decelerate stably, so the running current will be lower, and the deceleration time will be longer.

Code	Name	Description	Factory setting
C-9	Current-limit level	110%~200%	150

This parameter is used to set the max current in acceleration of the inverter, which is called Stall Level. During acceleration, when the output current of the inverter goes over this parameter, the inverter will adjust the acceleration time linearly to keep the output current within this parameter.

This parameter is expressed as a percentage of the rated current of the inverter. Current limitation in acceleration is shown as diagram 5-25.

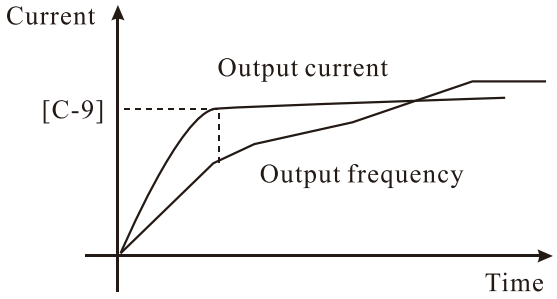


Diagram 5- 25: Current limitation in acceleration

Remark

● During starting, if the frequency of the inverter can't be accelerated to the desired value, but maintaining on a relatively stable range, this means that the current limitation mode is functioning, you need to reduce load or adjust corresponding parameters.

Code	Name	Description	Factory setting
C-10	FWD & REV dead time	0.0~5.0s	0.1

This parameter is used to control how much time the inverter maintains on zero frequency when changing rotation direction. Dead area between forward/reversal rotations is shown as diagram 5-26.

Forward/reversal rotation dead area time is generally set for loads that have great inertia and when there is mechanical dead area while the system rotation direction changes.

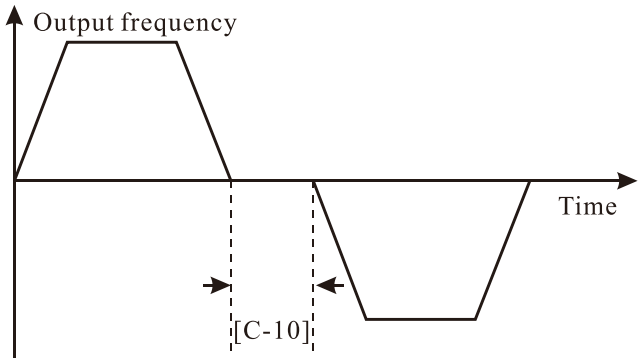


Diagram 5- 26: Dead area time of changing rotation direction

Code	Name	Description	Factory setting
C-11	Internal timer set value	0.1~6000.0s	0.0

This parameter is used to set the clocking of the internal timer of the inverter. The internal timer is triggered by an external signal which is set with parameters b-63~b-69. When the external signal is triggered, the relative OC terminal will generate a valid pulse (which has a width of 0.5s) after a set time.

Code	Name	Description	Factory setting
C-12	Final value set of internal counter	1~60000	1
C-13	Internal counter setting	1~60000	1

This parameter is used to control how the internal counter is working. The timer of the counter is set with parameters b-68 and b-69.

When the counter reaches the value set with C-12 for an external timer, the corresponding OC terminal will generate a valid pulse signal which has a width of the external timer period.

When the counter reaches the value set with C-13 for an external timer, the corresponding OC terminal will generate a valid pulse signal. The counter will continue counting until reading is over the value set with C-12, then it will be cleared, and the valid pulse signal will be released.

The clocking period of the counter must be more than 5ms, and the pulse width must be at least 2ms. The internal counter is shown as diagram 5-27.

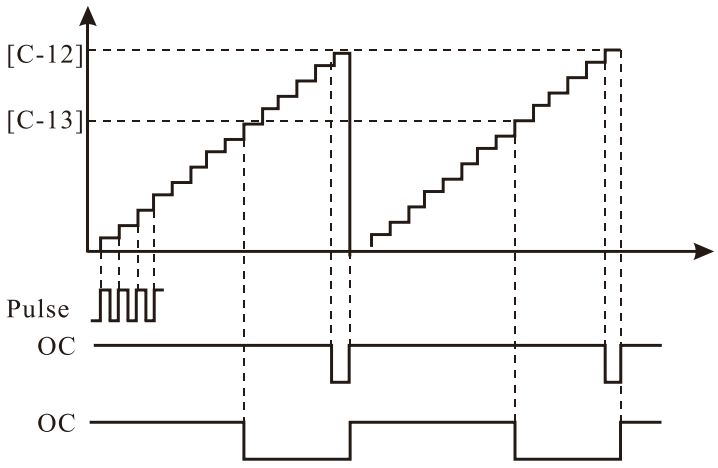


Diagram 5- 27: Internal counter

Code	Name	Description	Factory setting
C-14	Programmable multi-speed running setup	LED Ten digital: simple PLC running time unit: 1: Min 0:second LED first digital: PLC running style: 0: No action 1: Single loop 2: Continuous loop 3: Keep the final value 4: Wobble freq running 5: Single loop stop mode 6: Continuous loop stop mode 7: Keep the final value stop mode	0
C-15	Step 1 running time	0.1~6000s	10.0
C-16	Step 1 running direction	0: FWD 1: REV	0
C-17	Step 1 Acc/Dec time	0.1~6000s	10.0
C-18	Step 2 running time	0.0~6000s	10.0
C-19	Step 2 running direction	0: FWD 1: REV	0
C-20	Step 2 Acc/Dec time	0.1~6000s	10.0
C-21	Step 3 running time	0.0~6000s	10.0
C-22	Step 3 running direction	0: FWD 1: REV	0
C-23	Step 3 Acc/Dec time	0.1~6000s	10.0
C-24	Step 4 running time	0.0~6000s	10.0
C-25	Step 4 running direction	0: FWD 1: REV	0
C-26	Step 4 Acc/Dec time	0.1~6000s	10.0
C-27	Step 5 running time	0.0~6000s	10.0
C-28	Step 5 running direction	0: FWD 1: REV	0
C-29	Step 5 Acc/Dec time	0.1~6000s	10.0
C-30	Step 6 running time	0.0~6000s	10.0
C-31	Step 6 running direction	0: FWD 1: REV	0
C-32	Step 6 Acc/Dec time	0.1~6000s	10.0
C-33	Step 7 running time	0.0~6000s	10.0
C-34	Step 7 running direction	0: FWD 1: REV	0
C-35	Step 7 Acc/Dec time	0.1~6000s	10.0

These parameters are used to set programmable multi-step running (simple PLC running), which has priority over multi-step running that is controlled with external terminal.

Parameters C-15~C-35 are used to define the running time, direction and acceleration/deceleration time of

each step in the programmable multi-step running.

When programmable multi-step function is valid, these parameters are valid ([C-14] ≠ 0).

Parameter C-14 defines how the programmable multi-step is working:

Tens-digit of the LED: Time unit of simple PLC running.

1: Minute

0: Second

Ones-digit of the LED: Running mode of the PLC.

***0: Programmable multi-step running is invalid.**

***1: Single cycle.** When get running command, the inverter will run with multi-step 1 (set with b- 18), whose running time is set with parameter C-15. After a set running time, the inverter will go on to the next step. You can set the running time for each step. When all 7 steps are finished, the inverter will output 0 frequency. If you set zero running time for a step, it will be skipped in running.

***2: Continuous cycle.** The inverter will go back to step 1 and continuously running in cycle after all 7 steps are finished.

***3: Keep last step.** After the single cycle, the inverter will keep running with the last step whose running time is non-zero rather than stop. Keep last step mode is shown as diagram 5-28.

***4: Swing frequency.** The inverter changes the frequency according to a preset acceleration/deceleration time periodically. This function is especially useful in textile industry, in which the system needs to change the rotation speed according to the changing spool diameter. Swing frequency running is shown as diagram 5-29.

***5: Single cycle and stop.** After every step, the inverter will decelerate to zero frequency and then accelerate to the frequency required in the next step, while other running is the same as mode 1. Single cycle and stop mode is shown as diagram 5-30.

***6: Continuous cycle and stop.** After every step, the inverter will decelerate to zero frequency and then accelerate to the frequency required in the next step, while other running is the same as mode 2.

***7: Keep last step and stop.** After every step, the inverter will decelerate to zero frequency and then accelerate to the frequency required in the next step, while other running is the same as mode 3.

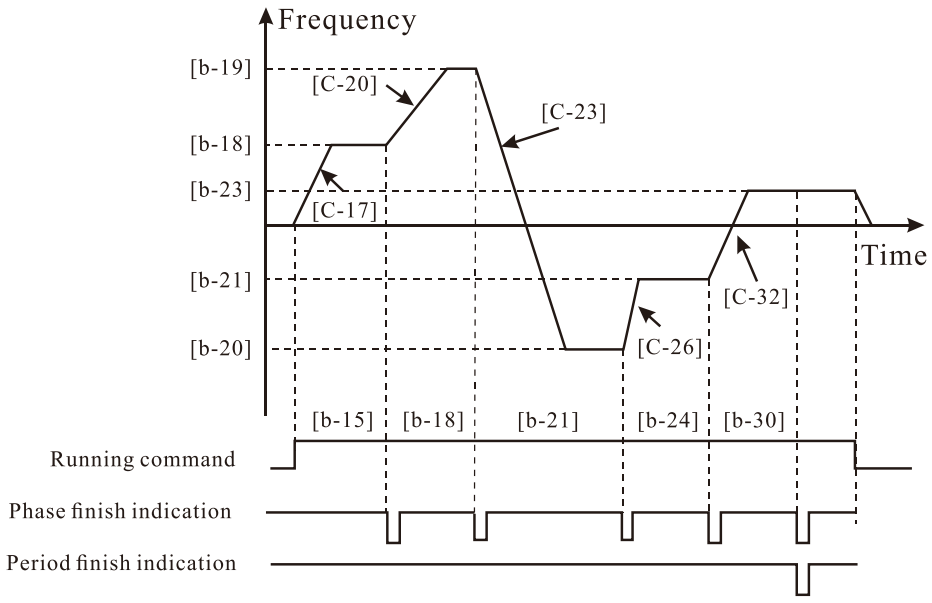


Diagram 5-28: Keep last step (mode 3)

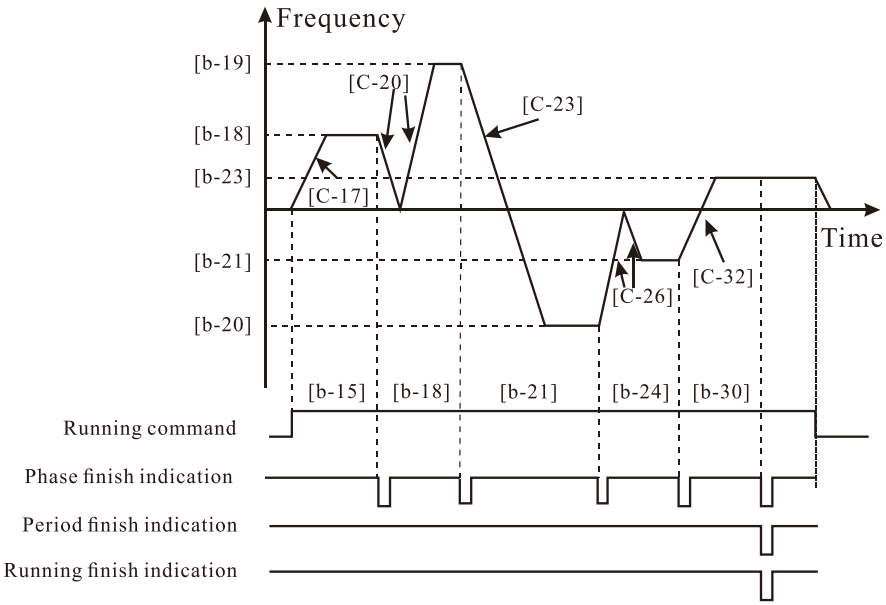


Diagram 5-29: Single cycle and stop (mode 5)

Parameters of the running curve in diagram 5-28 and 5-29 are set as: [C-14]= 3, keep last step mode [C-27]= 0, [C-33]= 0, running time for step 5 and step 7 is 0, so these two steps are skipped in the curve.

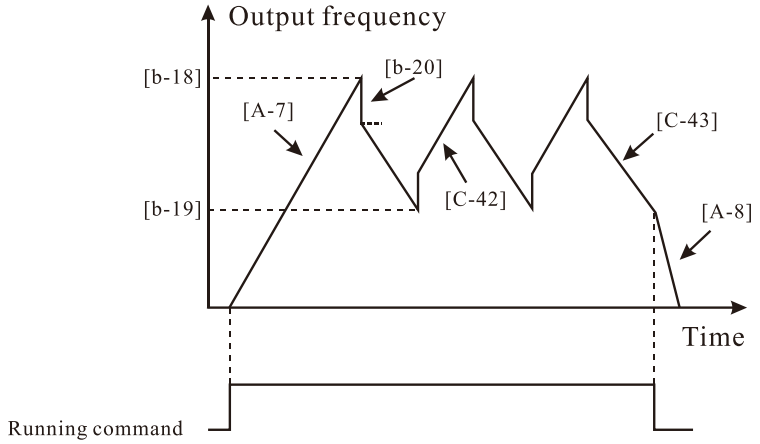


Diagram 5-30: Swing frequency running (mode 4)

Code	Name	Description	Factory setting
C-36	Jump frequency 1	0.00~Upper-limit frequency	0.00
C-37	Amplitude of jump frequency 1	0.00 ~5.00Hz	0.00
C-38	Jump frequency 2	0.00~Upper-limit frequency	0.00
C-39	Amplitude of jump frequency 2	0.00 ~5.00Hz	0.00
C-40	Jump frequency 3	0.00~Upper-limit frequency	0.00
C-41	Amplitude of jump frequency 3	0.00 ~5.00Hz	0.00

While mechanical resonance may happen at a certain frequency on the load connected to the inverter, you can avoid it with jump frequency.

You can choose from 3 kinds of jump frequency. If this parameter is set to 0, jump frequency function is invalid.

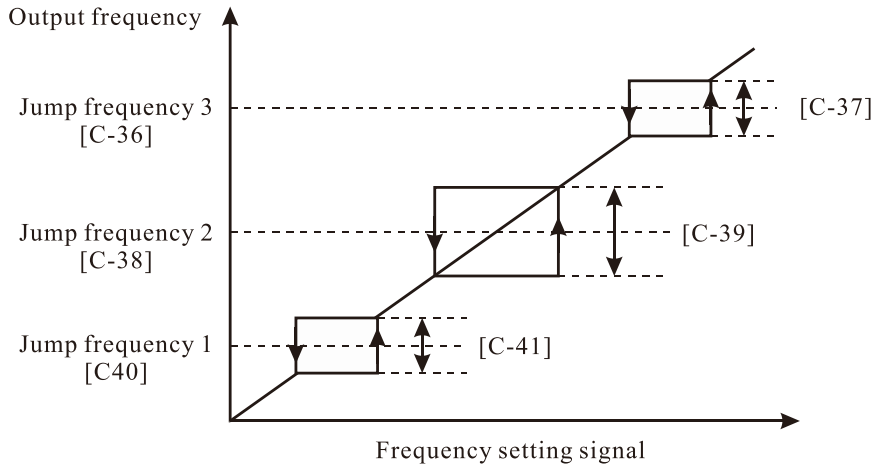


Diagram 5-31: Hopping frequency and its amplitude

Remark

● Hopping frequency means that the inverter will not running on certain frequency stably, but will use it during acceleration and deceleration.

Code	Name	Description	Factory setting
C-42	Acceleration time 2	0.1~ 6000s	*
C-43	Deceleration time 2	0.1~ 6000s	*
C-44	Acceleration time 3	0.1~ 6000s	*
C-45	Deceleration time 3	0.1~ 6000s	*
C-46	Acceleration time 4	0.1~ 6000s	*
C-47	Deceleration time 4	0.1~ 6000s	*

Setting values for the 2nd, 3rd and 4th acceleration time. Actual acceleration/deceleration time is set with external terminal.

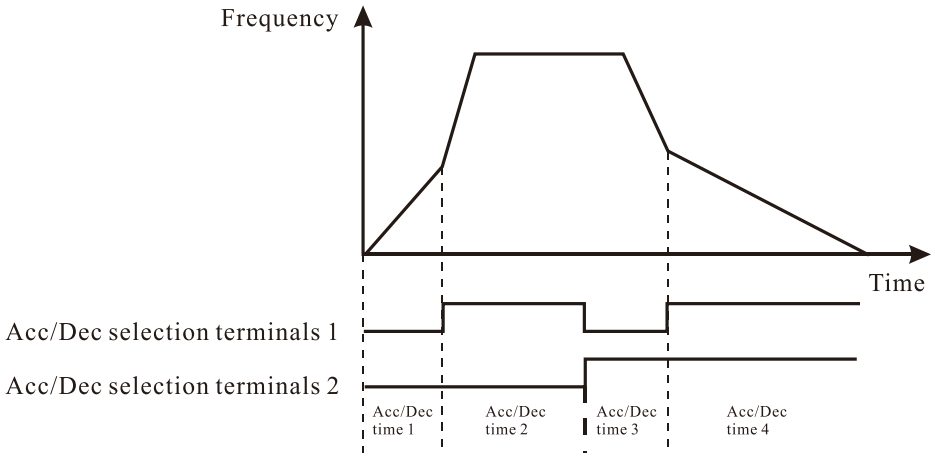


Diagram 5-32: Acceleration/deceleration time control

Acceleration/deceleration time controlling is shown as diagram 5-32. Acceleration/deceleration time of multi-step running and push-to-run running is controlled with the relative setting parameters rather than external terminal. Please refer to the description of relative parameters for details.

Code	Name	Description	Factory setting
C-48	Built-in PID control	0: No PID control 1: Normal PID control 2: Constant-pressure water-supply PID 3: Double-pump constant pressure water-supply PID (Need accessory) 4: Triple-pump constant pressure water-supply PID (Need accessory) 5: Four-pump constant pressure water-supply (Need accessories)	0

0: PID control invalid.

1: Conventional PID control.

2: PID control for constant pressure water supply system with single pump.

3: PID control for constant pressure water supply system with dual pumps.

4: PID control for constant pressure water supply system with three pumps.

5: PID control for constant pressure water supply system with four pumps.

When working with mode 3, 4 and 5, you need to purchase dedicated accessories for multi-pump constant pressure water supply system. Parameters C-69~C-73 are valid.

Important: in multi-pump constant pressure water supply system, the inverter does not provide RS485 communication feature.

Code	Name	Description	Factory setting
C-49	Built-in PID configuration channel selection	0: Panel potentiometer 1: Panel digital setting 2: External voltage signal 1 (0~10V) 3: External voltage signal 2 (-10V~10V) 4: External current signal 5: External pulse signal 6: RS485 interface setting	0

This parameter is used to choose input channel for PID commands.

0: Panel potentiometer. Set with the potentiometer on the panel.

1: Panel digital setting. Set with the digits on the panel.

2: External voltage signal 1. Set with external analog voltage VI1 (0V~+10V).

3: External voltage signal 2. Set with external analog voltage VI2 (-10V~+10V).

4: External current signal. Set with external analog current signal II (0~20mA).

5: External pulse signal. PID control is set with external pulse signal, and the pulse input terminal is set with parameter b- 69.

6: RS485 interface. PID control is set via RS485 communication port.

When PID is set via digits on panel or RS485 interface, with conventional PID control mode, value 100.0 corresponds to the max set value (the max feedback value). With PID control mode for constant pressure water supply system, the setting value is the pressure value, for example, when [A-2] = 0.500, it means that the set pressure is 0.5MpA.

Code	Name	Description	Factory setting
C-50	PID feedback channel selection	0: Voltage input 1 (0~10V) 1: Current input 2: Pulse input 3: Voltage input 2 (-10V~10V)	3

It is valid only when using PID control.

0: External voltage input VI1 as feedback input terminal (0~10V).

1: External current input II as feedback input terminal (0~20mA).

2: External pulse input as feedback input terminal.

3: External voltage input VI2 as feedback input terminal (0~ -10V).

You should set the upper and lower threshold for the input channel according to actual values of the feedback signal. (Please refer to description of parameters b-34~b-47 for details)

Code	Name	Description	Factory setting
C-51	Feedback signal character	0: Positive character 1: Negative character	0

This parameter is used to define the relationship of feedback signal and setting signal.

0: Positive. This means that the max feedback signal corresponds to the max setting value.

1: Negative. This means that the min feedback signal corresponds to the max setting value.

Code	Name	Description	Factory setting
C-52	Feedback channel gain	0.01~10.00	1.00

When the signal values mismatch between the feedback channel and the setting channel, you can use this parameter to adjust signal of the feedback channel.

Code	Name	Description	Factory setting
C-53	PID setup and feedback display coefficient	0.01~100.0	1.00

With conventional PID control mode, the full display scale of PID's setting value (d-6) and feedback value (d-7) is 100.0, so, the displayed value may differ from the physical value. In this case, you can modify the display scale with this parameter.

With PID control mode for constant pressure water supply system, the display of PID setting value (d-6) and feedback value (d-7) will show pressure setting or feedback value, depending on the setting value (C-62) of remote pressure meter's scale. When the displayed value differs from the actual value, you can use this parameter for correction.

Code	Name	Description	Factory setting
C-54	PID controller structure selection	0: Proportion 1: Integral 2: Proportion & integral 3: Proportion & Integral & differential	1

This parameter is used to choose the structure of the internal PID controller.

0: Proportional control

1: Integral control

2: Proportional-integral control

3: Proportional-integral-differential control

Code	Name	Description	Factory setting
C-55	Proportion gain	0.00~5.00	0.50
C-56	Integration time constant	0.1~100.0s	10.0
C-57	Differential gain	0.0~5.0	0.1

You should adjust the parameters of the internal PID control according to actual requirement and your system.

Code	Name	Description	Factory setting
C-58	Sampling period	0.01~1.00s	0.10

It is sampling period of feedback value.

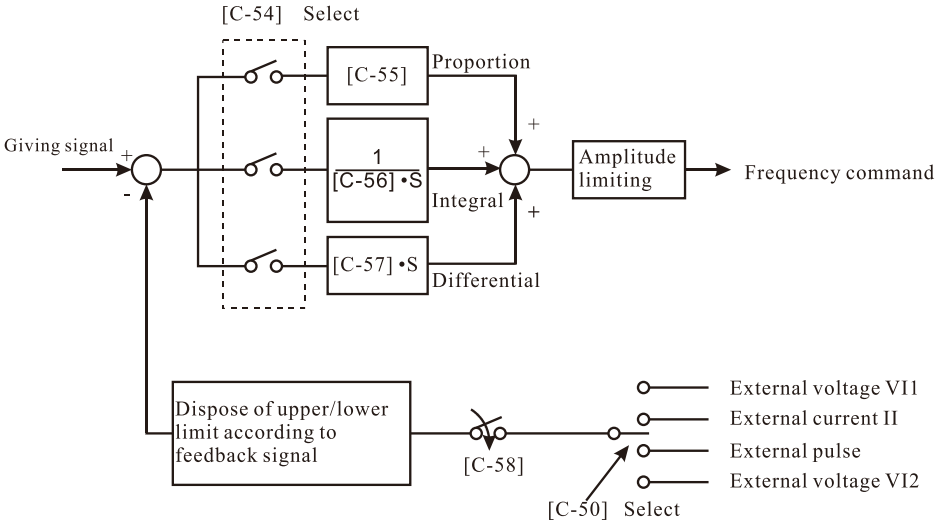


Diagram 5-33: PID controller's structure

Code	Name	Description	Factory setting
C-59	Allowable deviation	0~20%	0

This parameter defines the tolerance relative to the max setting value.PID controller stops when the difference between feedback value and setting value falls below this tolerance.

This function is mainly used in less precise systems that do not need frequent adjustment, such as constant pressure water supply system. PID controller tolerance is shown as diagram 5-34:

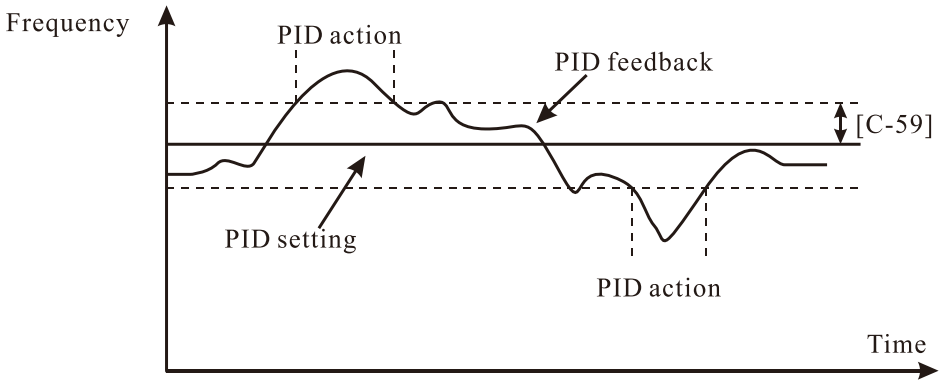


Diagram 5-34: PID controller tolerance

Code	Name	Description	Factory setting
C-60	PID feedback wire-break detection threshold	0.0~20.0%	0.0
C-61	PID feedback wire-break action selection	0: Stop 1: Running as the digital setting frequency 2: Running as the upper-limit frequency 3: Running as the half of upper-limit frequency	0

When PID's feedback detection value is lower than the threshold set with C-60, there must be a feedback offline. You can choose how the system responds to such problems with parameter C-61.

0: Stop

1: Running as the digital setting frequency

2: Running as the upper-limit frequency

3: Running as the half of upper-limit frequency

Feedback offline detection value is shown as a percentage of the full scale.

When a PID feedback offline is detected, the inverter will run with the above modes, while displays Er.19 and running status parameter alternately.

Code	Name	Description	Factory setting
C-62	Full scale of remote manometer	0.001~20.00Mpa	1.000

This setting should match the scale of the actually installed pressure meter.

Code	Name	Description	Factory setting
C-63	Alarm lower-limit pressure	0.001~[C-64]	0.000
C-64	Alarm upper-limit pressure	[C-63]~[C-62]	1.000

When pressure in the pipeline is lower than the lower limit pressure, and the running frequency of the inverter reaches upper limit of the set frequency, or all of the pumps are working at power frequency, this means that the pipeline is under pressure, and the inverter may send alert signal (if parameter A-15 or A-16 is set to 17). You can use this function to help checking if there is a leakage in the pipeline.

When pressure in the pipeline is higher than the upper limit pressure, and the running frequency of the inverter reaches lower limit of the set frequency, this means that the pipeline is overpressure, and the inverter may send alert signal (if parameter A-15 or A-16 is set to 16). You can use this function to help checking if there is a blockage in the pipeline.

Code	Name	Description	Factory setting
C-65	Lower-limit value of pressure	0.001~[C-66]	0.000
C-66	Upper-limit value of pressure	[C-65]~[C-62]	1.000

This parameter is used to define the upper/lower limit of pressure setting.

Code	Name	Description	Factory setting
C-67	Wake up threshold value	0.001~[C-68]	0.000

This parameter is used to define the pressure limitation for system to wake up from asleep.
When the pressure of the pipeline is lower than this value, it means that the water supply is under pressure or the water consumption is increased, and the variable frequency water supply system will wake up automatically and go working.

Code	Name	Description	Factory setting
C-68	Sleep threshold value	[C-67]~[C-62]	1.000

This parameter is used to define at which pressure the system will go asleep.
When the pressure in the pipeline goes above this setting value, and variable frequency water supply system is working at the lower limit of the running frequency, this means the water consumption is decreased greatly or the water supply pressure is OK, the inverter will go asleep at this time automatically untill be waked up.
When the water supply system reaches wake up or asleep conditions, the inverter will wake up or go asleep after a waiting time, which is set with parameter C-69.

Code	Name	Description	Factory setting
C-69	Pump switch time	0.1s~1000s	300.0

This parameter is used to set the judgment time for starting the next pump after the inverter's output frequency reaches upper limit setting and stopping a pump when the inverter's output frequency reaches lower limit setting. If set to a small value, the system pressure may fluctuate greatly while respond rapidly.

Code	Name	Description	Factory setting
C-70	Electromagnetic switch delay time	0.1~10.0h	0.5

This parameter is used to define the delay time for solenoid switch when the system changes from power frequency to variable frequency or vice versa, to make sure that the solenoid switch will respond timely, thus there is no short circuit between the output terminal and the power supply.

Code	Name	Description	Factory setting
C-71	Multi-pump running mode	0: Switch as the fixed sequence 1: Timing alternation run	0
C-72	Timing alteration interval	0.5~100.0h	5.0

These two parameters are used to define when the pumps will be switched multi-pumps running (for system with same capacity pumps).
0: Fixed order switch. Increase/decrease pump(s) in a fixed controlling order according to the detected pressure. Generally, it will be started from pump with number zero.
1: Switch periodically. With this setting, each pump will be redefined with a new number after the system has been running for a certain time, thus each pump has the same chance to run and will run for the same time, avoiding some pumps be clogged by rust buildup from long idle time. Pumps' running time is set with parameter C-72.

Code	Name	Description	Factory setting
C-73	Timing water-supply	0.5~24.0h	24.0

When the inverter is running in constant pressure water supply system, you can use this parameter to define

when the inverter will run. Timing from the very beginning, the inverter will stop automatically when the preset water supply time is elapsed, until a new running command is input.
When this parameter is set to 24.0, water supply on fixed time function is invalid.

Code	Name	Description	Factory setting
C-74	AM output hardware calibration factor	95.0~104.5%	100%
C-75	AO output hardware calibration factor	95.0~104.5%	100%
C-76	Suppress swing of analog input	0~30	3

You can suppress swing of analog input setting by increasing parameter C- 76:
Default: C-76=3
Setting rang: 0~30
When there is severe interference, you can suppress the swing by increasing parameter C-76.
This setting is valid for all of the analog input channels.

Code	Name	Description	Factory setting
C-77	Braking unit usage	0~100	25

This parameter is specially designed for models ZC-G-0.75~11KW and ZC-P-1.5~15KW that with braking units. You can set this parameter according to your actual condition. When there is no need for accurate braking, you can set a lower usage value, otherwise, set a higher value.

Remark

- This parameter is valid for models under ZC-G-11KW and ZC-P-15KW.
- If it brakes repeat, we suggest you purchasing braking units and braking resistors, and set C-77=0.

Code	Name	Description	Factory setting
C-78	Inverter address	0~30	0

This parameter is used to define the inverter's address when working with RS485 communication. The inverter will only receive data from host that has a matching address. Parameters C-78~C-82 are used to define RS485 communication settings. Please refer to appendix 1: RS485 communication protocol.

Code	Name	Description	Factory setting
C-79	Data format	0: No parity check 1: Even parity check 2: Odd parity check	0

This parameter is used to define the data format used in RS485 communication. Each party in the communication must use the same data format.
0: 1 start bit, 8 data bits, 1 stop bit, no parity checking
1: 1 start bit, 8 data bits, 1 stop bit, even parity
2: 1 start bit, 8 data bits, 1 stop bit, odd parity

Code	Name	Description	Factory setting
C-80	Baud rate	0: 1200 bps 1: 2400 bps 2: 4800 bps 3: 9600 bps 4: 19200 bps	3

This parameter is used to define the baud rate used in RS485 communication. Each party in the communication must use the same baud rate.

0: 1200 bps

1: 2400 bps

2: 4800 bps

3: 9600 bps

4: 19200 bps

ode	Name	Description	Factory setting
C-81	Master inverter setting	0: The inverter is slave 1: The inverter is master	0

This parameter is used to define the host and slave settings in linked controlling. Without linked controlling, you should set it as slave.

0: Local inverter as slave

1: Local inverter as host

When the inverter is set as host, it sends running status (commands and frequency settings) via RS485 interface according to a preset protocol continuously. If the inverter is connected with inverters that are set as slave via RS485 interface, and all of the slave inverters use RS485 interface to set running commands channel and frequency setting channel, the host inverter controls all slave inverters, including running commands, frequency settings and push-to-run running, which must follow host's setting strictly.

Code	Name	Description	Factory setting
C-82	Linkage run setting ratio	0.10~10.00	1.00

This parameter is used to define the weight coefficient for the inverter to receive frequency commands via RS485 interface. The actual running frequency of the inverter equals to this parameter multiplied by frequency setting command received via RS485 interface.

In linked controlling running, this parameter can be used to set the proportion of running frequency for multiple inverters.

Code	Name	Description	Factory setting
C-83	RS485 communication wire-break action mode	0: Stop 1: Keep the existing state	0

0: Stop. If the command setting channel (A-3) of the inverter is set to RS485 interface, when RS485 communication offline (the inverter does not receive command from host for over 1second), the inverter will shut down automatically. If the frequency input channel (A-1) or PID setting channel of the inverter is set to RS485 interface, when RS485 communication offline, the inverter will change the parameter to 0 automatically.

1: Keep the existing state. When RS485 communication offline, the inverter will keep the current running status and setting value, until it got the next command.

Code	Name	Description	Factory setting
C-84	Panel potentiometer gain factor	0.01~5.00	1.00

This parameter is used to adjust the panel potentiometer's gain for frequency input combination mode. Please refer to description of parameter b-56 for details.

6. Care and Maintenance

6.1 Daily inspections and maintenance

High temperature, humidity, dust, vibration and aging parts may affect the steady running of the EM8 series inverter. To avoid this, it is recommend to perform a periodic inspection every 3-6 months.

Warning

● Only skilled professionals allowed to perform the inspection. When necessary, make sure to remove the input power before performing inspection.

Period		Inspection Item	Inspection Content	Criterion
Daily	periodic			
√		Ambient environment	1.Temperature, humidity 2.Dust,gas	1. Temperature>40°C: open the cover board Humidity<90%: no freezing. 2. No peculiar smell, no inflammable, explosive gas.
	√	Cooling System	1.Installation environment 2.Fan built in frequency inverter	1. Well ventilated installation environment, no block in the air flue. 2. Running smoothly, no abnormal noise.
√		Frequency inverter body	1.Vibration, temperature 2.Noise 3.Wire,terminal	1. Steady vibration, normal temperature of air outlet. 2. No unusual noise and odors. 3. Tighten the screws without loose.
√		motor	1.Vibration, temperature 2.Noise	1. Running smoothly, normal temperature. 2. Usual and steady noise.
√		Input and output Parameter	1.Input voltage 2.Output current	1. Input voltage within the specified range. 2. Output current in the specified range.

Inspection and Maintenance Items

Recommended meter: input voltage: Moving-coil voltmeter input and output current: Clamp-on ammeter output voltage: Commutator voltmeter.

Warning

● Before leaving the factory, inverters have been tested by electrical insulation experiment. Inverters do not need to be high voltage tested.

● If the insulation test is necessary, circuit all the input and output terminals(R, S, T, U, V, W, P, P-, PB). Single terminal insulation is strictly forbidden. Use 500V mega meter to test.

● Do not use the mega meter to test the control loop.

● Before an insulation for the motor, dismantle the wires contacting motor with inverter.

6.2 Periodic maintenance

Periodic inspection is needed every 3 months or 6 months, base on the usage of user.

Warning

● Only trained professionals are allowed to perform the maintenance and components replacement of the inverter.

● Before opening the inverter, switch off all the electrical power supplies to the inverter, and wait LED light off.

● Measure the voltage between P+ and P- with DC high voltage meter (Less than 25V).

● Avoid screws and other conductive materials fall into the inverter. Otherwise inverter may burn or heavy damaged.

6.2.1 Inspection content

Tighten the screws of control circuit terminal.

1. Tighten the screws of the main circuit terminal. Check the overheating trace between the copper bars.
2. Check damage to the wires of the main circuit. Especially, If there is a cut trace of the skin contacting to the outside of the metal.
3. Confirm the insulation of the main circuit wires.
4. Clean the dust of air duct, fan and circuit board. Usually clean this frequently if there is always dust around surroundings.

6.3 Inspection and replacement of damageable parts

The inverter components may wear out and have performance degradations in long time running. To assure it working stable and reliable, inverter requires preventive maintenance. When necessary, the parts must be changed. Damageable parts of inverter include cooling fan and filtering capacitors. Their service life is related to environment and maintenance.

6.3.1 Filtering capacitors

Pulse current in the main circuit affect the performance of aluminum electrolytic filtering capacitor. Extent of the effect is related to ambient temperature and service conditions. In common cases, the electrolytic capacitor has a life span of 40,000 to 50,000 operating hours. Change it according to working hours.

While electrolyte capacitor leaking, relief valve opening or capacitor expansion, change the capacitor immediately.

6.3.2 Cooling fan

All the cooling fans in the inverter have a usage life about 30,000 to 40,000 hours(continuous use of two years).Check the fan carefully, when there is a crack in the fan blade or abnormal noise. Replace the fan, if there are any abnormalities.

6.4 Storage and warranty

6.4.1 Storage

If the inverter is not used temporarily or must be stored for a long time, pay attention to the following points:

(1) Avoid storing it in an environment with high temperature, humid, vibration or metal dust. Keep good ventilation.

(2) If the inverter is not used for a long time, it is needed to recovery the features of the filter capacitor that turn on the inverter every 2 years. Meanwhile, check the functions of the inverter. Turn it on and increase the voltage stability with an auto-transformer. And power supplying time must be more than 5 hours.

Caution

● If the inverter is not used for a long time, there is a drooping characteristic for the built-in filter capacitor.

6.4.2 Warranty

This inerter enjoy 12 months warranty (from the date of purchase). Our company provides free maintenance or replacement, if there is a failure or damage in normal use cases within warranty period.

Remark

● We only provide after sales service for our inverter under normal application.

Within warranty period, regular maintenance cost is needed, when damages of inverter are caused by Followings, we are not responsible for the applications:

(1) Not according to the manual, beyond the standard specification.

(2) Without allowed, fix or refit the inverter yourself.

(3) Incorrect storage.

(4) Applying the inverter to abnormal function.

(5) Fire, salt corrosion, gas corrosion, earthquake, storm, flood, thunder, abnormal voltage and other force majeure factors.

Remark

● We provide charging repair service after warranty.

7. Application Examples

7.1 Panel control: start and stop, panel potentiometer set frequency

7.1.1 Parameter settings

According to the motor rated nameplate data, set the parameter A-5, A-6 for setting. Must set parameters as following:

[A-1] = 0: parameter A-1 set to 0, choose panel potentiometer for frequency set.

[A-3] = 0: parameter A-3 set to 0, choose panel up, stop control.

7.1.2 Basic wiring diagram

Panel control start, stop, the basic wiring diagram of panel potentiometer set frequency as shown in diagram 7-1 shows (for reference only).

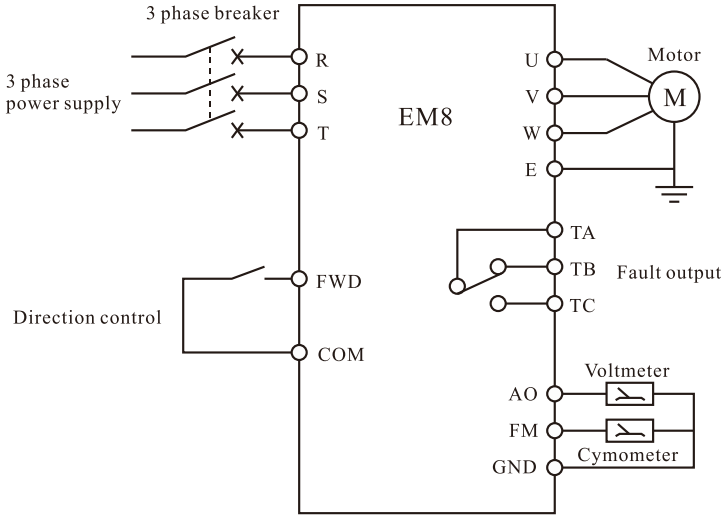


Diagram 7-1: Panel control: start and stop, panel potentiometer set frequency wiring

7.1.3 Running description

Press "FWD" key for Start frequency inverter, clockwise swirl panel potentiometer knob, set frequency will gradually increase. Counter clockwise swirl panel potentiometer knob, set frequency will gradually decrease. Press "STOP", the frequency inverter will stop.

Remark

● The external terminal FW decide the motor running direction. FWD-COM disconnection means the motor is turning. FWD-COM connect mean the Motor reversal.

7.2 Three wire control mode

7.2.1 Parameter settings

According to the motor rated nameplate data, the parameter A-5, A-6 for parameter setting.

[A-0] = 1: Parameter A-0 set to 1, select the intermediate running parameters.

[A-1] = 0: Parameter A-1 set to 0, choose panel potentiometer to determine the frequency input.

[A-3] = 1: Parameter A-3 set to 1, choose external control.

[A-10] = 2: Parameter A-10 set to 2, choose AO output for voltage output.

[A-11] = 0: Parameter A-11 set to 0, choose FM output for frequency output.

[b-33] = 2: Parameter b-33 set to 2, choose external running instruction mode for three line mode.

[b-63] = 17: Parameter b-63 set to 17, select input terminal 1 for three line type running control.

Other parameters set please according to particular case.

7.2.2 The basic diagram

Three lines control mode as shown in diagram 7-2 below (for reference only).

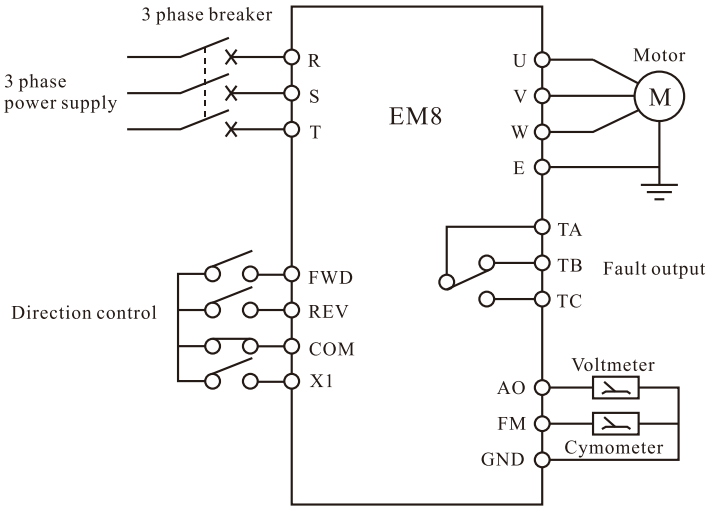


Diagram 7-2: Three lines control mode wiring

7.2.3 Operating instructions

FWD, X1, COM closed, the motor forward run (forward command); REV, X1, COM closed, the motor reverse run(reverse command). FWD, X1, COM together open or one terminal open ,or at this time let REV closed, frequency inverter stop. REV, X1, COM and at the same time open, or one of the terminal open, or will the FWD closed, frequency inverter stop.

7.3 External control mode, external voltage setting frequency

7.3.1 Parameter settings

According to the motor rated nameplate data, the parameter A-5, A-6 for parameter setting.

Must set parameters are as following:

[A-1] 2: Parameter A-1 set to 2, choose external voltage 1 (V1) can accept 0~10V signal for frequency setting.

[A-3] = 1: Parameter A-3 set to 1, choose external control.

7.3.2 The basic wiring

As diagram 7-3, the wiring of external control, external voltage is setting frequency.

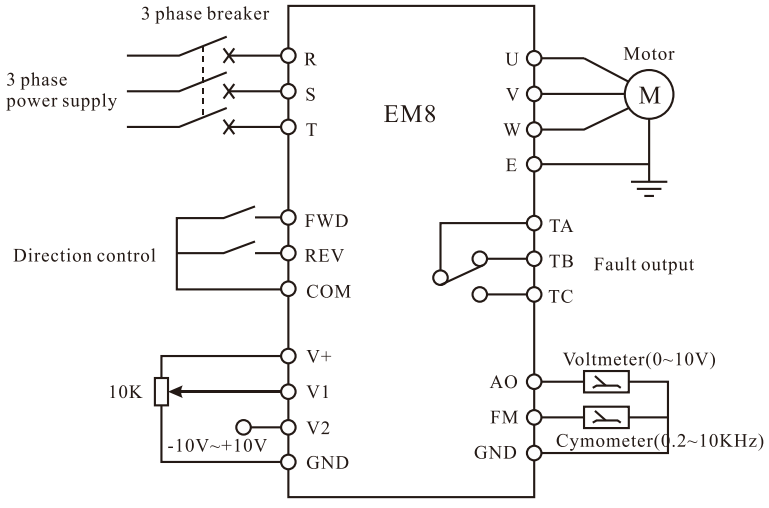


Diagram 7-3: The wiring of external control mode and external voltage setting frequency

7.3.3 Operating instructions

FWD - COM closed, the motor forward rung (forward command). REV - COM closed, the motor reverse

run (reverse command). FWD - COM, REV - COM and closed or open together, frequency inverter stop. Set frequency is by external voltage signal terminal 1 (V1).

Remark

● According to the parameter A-1 setting, choose the external input V1 or V2 as signal for frequency setting.

● Control mode of FWD, REV set by parameter b-33.

7.4 Multi-step speed running, external control mode

7.4.1 Parameter settings

According to the motor rated nameplate data, the parameter A-5, A-6 for parameter setting.

[A-3] = 1: Parameter A-3 set to 1, choose external control mode.

[b-18]~[b-32]: Multi step speed frequency set value (a total of 15 steps).

7.4.2 Basic wiring diagram

Multi-step speed running, external control mode basic wiring diagram as shown in diagram 7-4 .

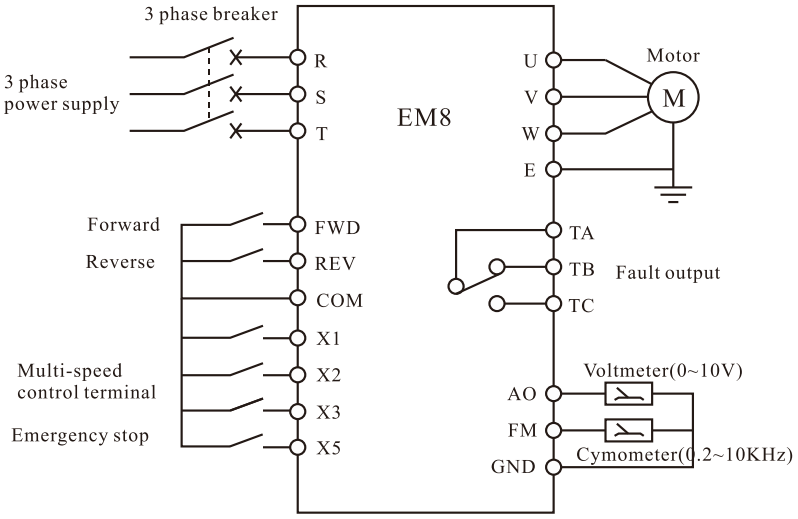


Diagram 7-4 :multi-step running, external control mode wiring

7.4.3 Operating instructions

FWD - COM closed, the motor forward run (forward command). REV - COM closed, the motor reverse run (reverse command). FWD - COM, REV - COM together closed or open, frequency inverter stop.

X1, X2 X3, all with COM terminal open, multi step speed running command is invalid, frequency inverter runs according to preset frequency running (the frequency setting channel set by parameter A–1).

X1, X2 X3, in any one or more terminals close to COM terminal (there are 7 kinds of combination), frequency inverter runs according to the multi-step speed frequency of X1, X2 X3(multi-step speed frequency set value by parameter b - 18 - b - 32).

Remark

● Choosing the multi-step speed terminal set by parameter B-63~B-69.When chooses the 4 speed control terminals, can realize 15 steps multi-step speed control.

7.5 Programmable multi-step speed control

7.5.1 Parameter settings

According to the rated nameplate data, the parameter A-5, A-6 is for parameter setting.

Must set parameters as following:

[A-0] = 2: Parameter [A-0] set to 2 to select senior parameters running mode.

[B-18]~[b-24]: Multi-step speed frequency set value (a total of 7 steps).

[C-14] = 1~7: Parameter C-14 chooses arbitrary value. 1~7 is according to need.

[C-15]~[C-35]: According to the running needs, set up simple PLC multi-step speed running time, running direction, each step's acceleration and deceleration time.

7.5.2 Basic wiring

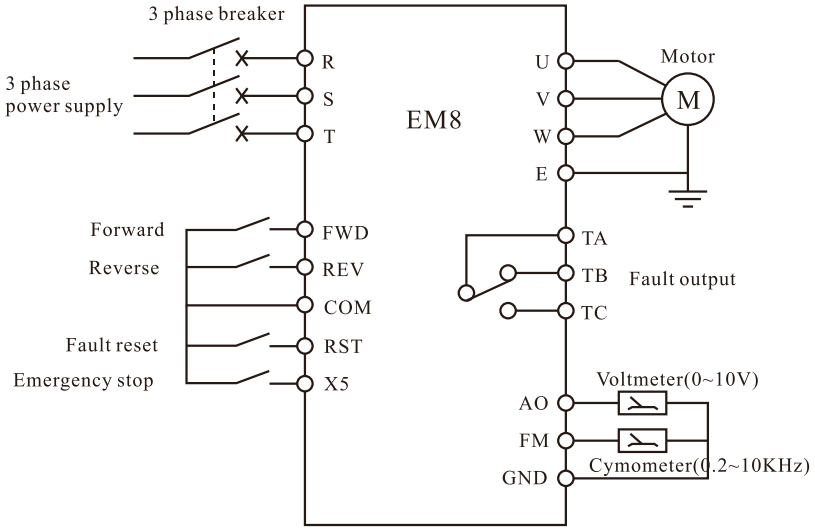


Diagram 7-5: The programmable multi-step speed basic wring

7.5.3 Operating instructions

Input start command, frequency inverter runs according to multi-step speed frequency 1 , reached the first step running time (this time set by parameter C-15), and then switch to multi-step speed frequency 2 running, and so on, until the multi-step speed frequency 7 to finish. And then to run according to the parameter C-14 set running mode (refer to the parameter C-14~C-35 functional specification).

In multi-step speed running process, inverter can stop through stop command, also can through the simple PLC suspension terminals to suspend programmable multi-step speed running.

7.6 The linkage control of many frequency inverter (Group Control)

7.6.1 To use external voltage to realize many sets of inverter linkage control

7.6.1.1 Parameter Setting

According to the motor rated nameplate data, to set parameter [A-5],[A-6].

Must set parameters are as following:

[A-0] = 2: Parameter A-0 set to 2 to select senior parameters control mode.

[A-1] = 8: Parameter A-1 set to 8, select frequency input channel for combination set mode.

[A-3] = 1: Parameter A-3 set to 1, select the running command channel for external terminal. Panel stop is invalid

[b-33] = 0: Parameter b-33 set to 0, select two lines control mode 1.

[b-56] = 310: Parameter b-33 set to 0, choose combination as the first channel * the second channel, the first channel is for external voltage signal 1, the second channel is for the panel adjustment potentiometer.

[C-84] = 1.00: Settings panel potentiometer input gain coefficient is 1.00 (if any deviation, user adjust parameters according to actual condition).

[b-36] = 1.00: Settings external voltage signal input gain coefficient is 1.00 (if any deviation, user adjustment parameters according to actual condition).

7.6.1.2 The basic diagram

External voltage realizes many sets inverter linkage running control mode diagram showing as diagram 7-6.

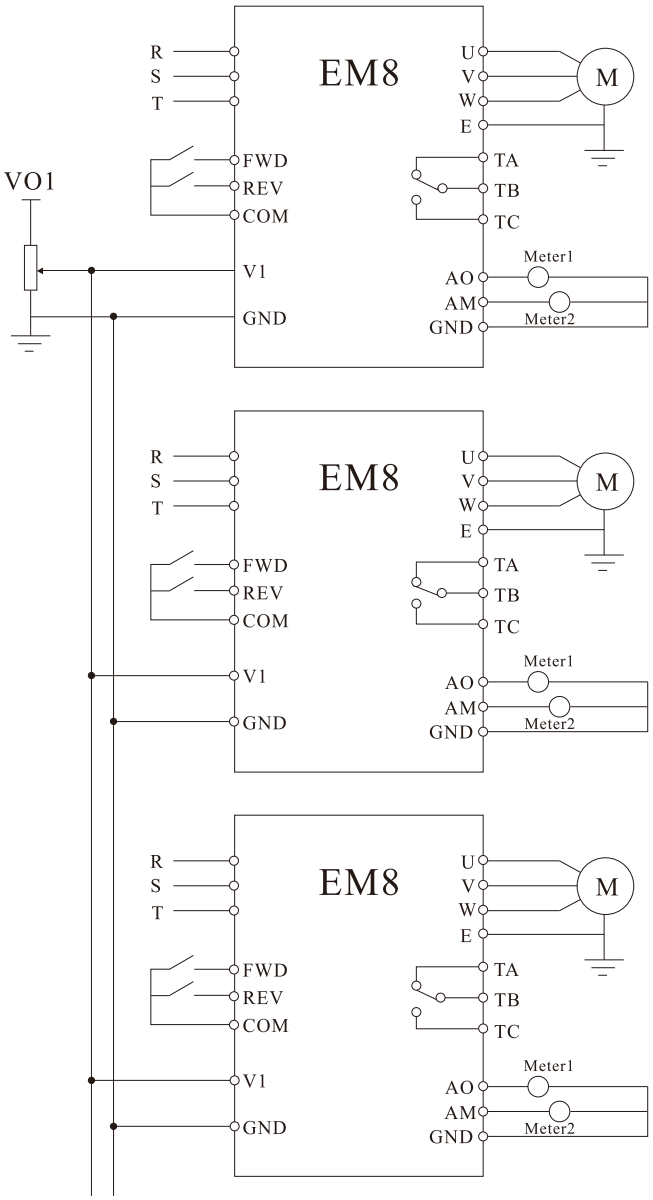


Diagram 7-6: External voltage realizes many sets inverter linkage running control mode diagram

7.6.1.3 Operating instructions

The diagram shows, there is a need for a constant power supply (10 V), a high power adjustable resistance, through regulating adjustable resistance voltage, all inverter V1 end input voltage will be changed. When many sets inverter operates, regulating V1 end input voltage; they at the same rate raise or lower the frequency. At this time, each table inverter input set function is: input set frequency = external voltage signal 1 (V1) * panel potentiometer input signal. The type show that external voltage signal (-10V) signal is same, when change panel potentiometer signal input, the table of the frequency inverter frequency input set change. So we realized the household output-related system of frequency input set.

7.6.2 Using RS485 constitute a linkage running

7.6.2.1 Parameter settings

According to the motor rated nameplate data, to set parameter A-5, A-6.

Must set parameters as following:

[A-0] = 2: Parameter A-0 set to 2 to choose senior parameters running mode.

[A-1] = 7: Slave inverter frequency setting channel set to RS485 mode.

[A-3] = 3, 4: Slave inverter running command channel set to RS485 mode.

[C-79]: Data format, all frequency inverters data format should set to be same.

[C-80]: Baud rate, all frequency inverters baud rate shall set to be same.

[C-81]: Host Settings, master inverter (host) set to 1, the other a frequency inverter Send to 0 (slave station).

[C-82]: According to need to set up the master and slave machine running frequency ratio, the parameter is only effectively for the slave inverter.

7.6.2.2 Basic wiring diagram

Using RS485 constitute a linkage running, basic wiring diagram as shown in diagram 7-7 shows.

7.6.2.3 Operating instructions

Just click on the master inverter (host) to start , stop and JOG control and frequency setting, all other inverter (slave station) running will strictly keeps consistent with master inverter, set frequency also fully consistent.

This series frequency inverter maximum is for 31 pieces inverters linkage running.

Remark

● JOG running, each inverter will be operated in accordance with their own set dynamic frequency. If at this time to maintain many sets of inverter synchronous, just set all of the frequency inverters JOG frequency the same.

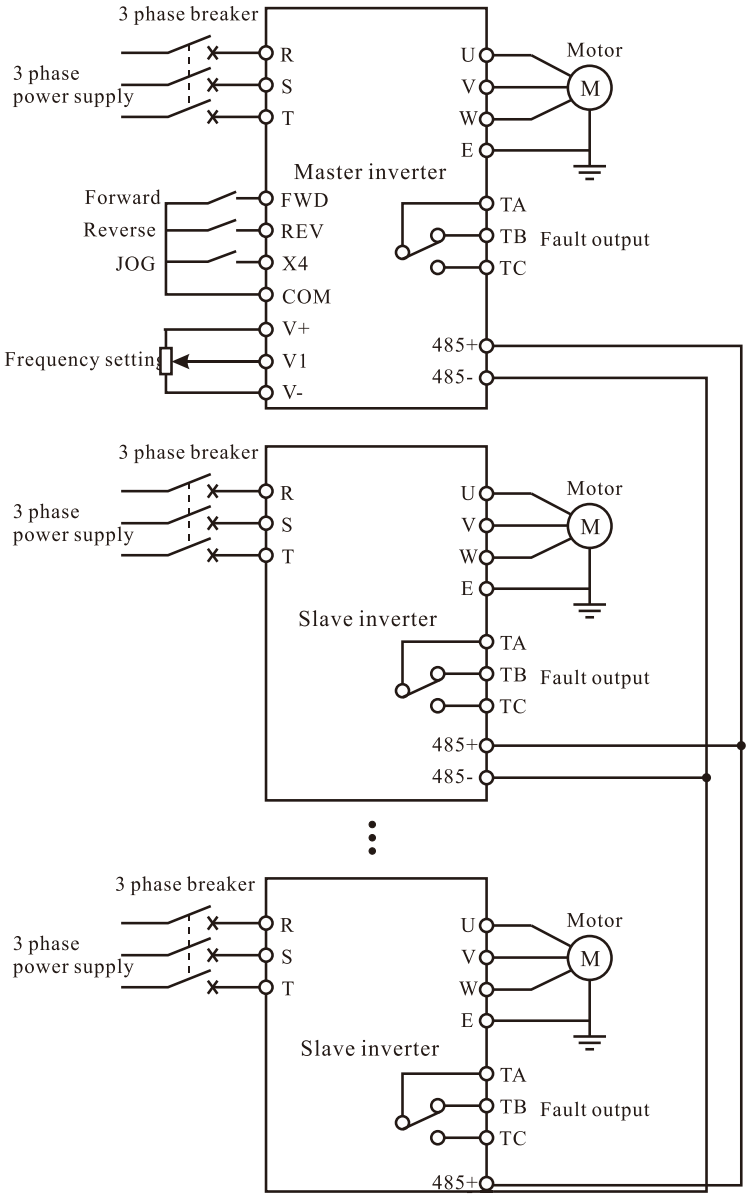


Diagram 7-7: Use RS485 to constitute linkage running basic diagram

7.7 Inverters constitute a closed-loop control system

7.7.1 Parameter settings

According to the motor rated nameplate data, to set parameter A-5, A-6.

Must set parameters as following:

[A-0] = 2: Parameter A-0 set to 2 to select senior parameters running mode.

[C-48] = 1: Parameter C-48 set to 1, select the built-in PID control.

[C-49] = 0: Setting channel selection, the selection panel potentiometer as PID setting channel.

[C-50] = 3: Feedback channel selection, here select voltage input 2 (V2) is used as the feedback channel, feedback signal – 10V~ 10V.

[C-54] = 2: Controller structure choice, the choice of PI controller.

[C-55] = 0.5: Proportional gain, according to the need to set.

[C-56] = 10.0: Integral time constant, according to the need to set.

[C-57] = 0.1: Differential gain, here doesn't work.

[C-58] = 0.10: Sampling period, general do not need to change.

7.7.2 Wiring

Frequency inverter constitute a close loop control system show as diagram 7-8:

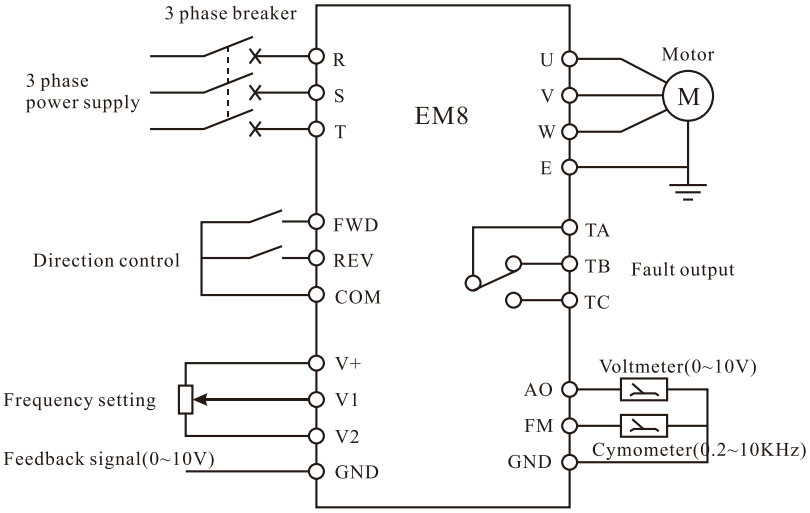


Diagram 7-8: Frequency inverter constitute a close loop control system

7.8 Use upper computer (PC) control many sets frequency inverters

7.8.1 Parameter settings

According to the motor rated nameplate data, to set parameter A-5, A-6.

Must set parameters as following:

[A-0] = 2: Parameter A-0 set to 2 select senior parameters running mode.

[AS] = 8: Frequency input channel select to combination setting.

[A-3] = 3: The slave inverter running command channel set to RS485 mode (= 3, 4)

[C-79]: Data format, all frequency inverters data format should set to same.

[C-80]: Baud rate, all frequency inverter baud rates shall set to same.

[C-81]: = 0 Inverter set to salve.

[C-83]: Set according to the needs of user

[b-56] = 161: Combination mode selection is the first channel +second channel (users can set according own need). The first channel input format is RS485 interface. The second channel input format is external voltage signal 1.

Other parameters, users can set according to own need.

7.8.2 Basic wiring diagram

Upper computer (PC) control many sets frequency inverters, basic wiring diagram as shown in diagram

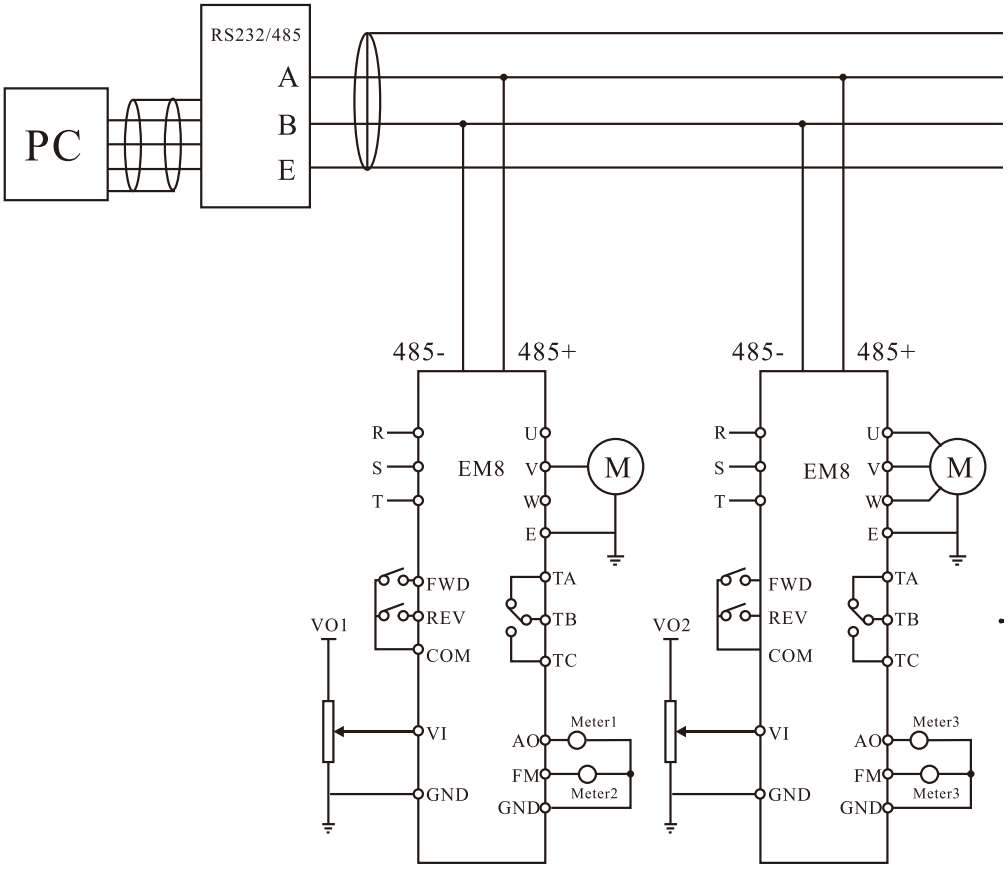


Diagram 7-9: Upper computer (PC) control many sets frequency inverters wiring diagram

7.8.3 Operating instructions

When the upper computer (PC) constitutes a system with frequency inverter, PC can always control the working conditions of each frequency inverter, and a timely response. Channel V1 used for manual adjustment, applied voltage (VO + 10 v), adjusting potentiometer knob, can adjust this frequency inverter input setting for fine-tuning. This system also can connect with other control system constitutes a closed loop control system.

8. Optional Accessories

8.1 Remote control cable and adapter

If user only use extend cable connect with panel and inverter, the farthest distance is 15 meters. If user choose remote control adapter to remote control, the farthest distance can be 1000 meters between inverter and panel.

Remote control cable specifications: There are 1.5m, 2m, 3m, 5m, 8m, 10m, and 15m.

We have stock for 1.5m, 2m, 3m extend panel cable, and if user needs remote cable longer than 5m, please specially mention it. The remote control cable is as Fig 8-1 shown:

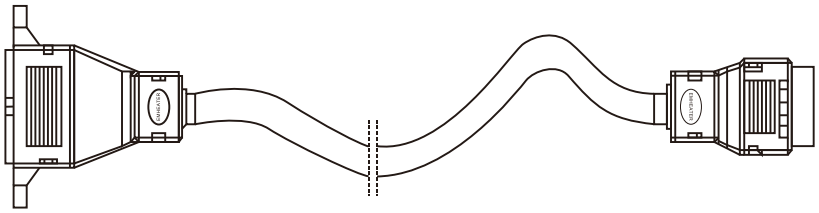


Diagram 8-1: Remote control cable

8.2 Braking accessories

Please according to inverter's voltage and power choose proper braking resistor, the normally braking resistor specification is as following

Model		Matched inverter(KW)	Braking power(KW)	Braking resistor(Ω)	Braking torque(%)
G Series	P Series				
EM8-G3-d75	EM8-P3-1d5	0.75/1.5	0.3	400	100
EM8-G3-1d5	EM8-P3-2d2	1.5/2.2	0.3	400	100
EM8-G3-2d2	EM8-P3-004	2.2/4	0.5	250	100
EM8-G3-004	EM8-P3-5d5	4/5.5	0.8	150	100
EM8-G3-5d5	EM8-P3-7d5	5.5/7.5	1.2	100	100
EM8-G3-7d5	EM8-P3-011	7.5/11	1.6	75	100
EM8-G3-011	EM8-P3-015	11/15	2.0	60	100
EM8-G3-015	EM8-P3-018	15/18.5	3.0	40	100
EM8-G3-018	EM8-P3-022	18.5/22	3.0	30	100
EM8-G3-022	EM8-P3-030	22/30	3.0	30	100
EM8-G3-030	EM8-P3-037	30/37	5.0	20	100
EM8-G3-037	EM8-P3-045	37/45	5.0	20	100
EM8-G3-045	EM8-P3-055	45/55	10.0	8	100
EM8-G3-055	EM8-P3-075	55/75	10.0	8	100
EM8-G3-075	EM8-P3-093	75/93	15	8	100
EM8-G3-093	EM8-P3-110	93/110	15	8	100
EM8-G3-110	EM8-P3-132	110/132	20	6	100
EM8-G3-132	EM8-P3-160	132/160	20	6	100
EM8-G3-160	EM8-P3-185	160/185	25	5	100
EM8-G3-185	EM8-P3-200	185/200	30	4	100
EM8-G3-200	EM8-P3-220	200/220	30	4	100
EM8-G3-220	EM8-P3-250	220/250	30	4	100
EM8-G3-250	EM8-P3-280	250/280	40	3	100
EM8-G3-280	EM8-P3-315	280/315	40	3	100
EM8-G3-315	EM8-P3-350	315/350	40	3	100
EM8-G3-350	EM8-P3-400	350/400	50	2.5	100
EM8-G3-400	EM8-P3-500	400/500	70	2	100
EM8-G3-500	EM8-P3-630	500/630	70	2	100

Appendix 1: RS485 Communication Protocol

1. Summary

EM8 series inverter provide RS485 communication interface. Users can realize centralized monitoring through PC/PLC (set the control command and monitor the running state of the inverter) to adapt specific application requirement. The protocol content of this appendix is designed for the above functions.

1.1 Content of communication protocol

This serial communication protocol defines the content of information transmitting in the serial communication and format for using. It includes host polling format and method of host coding. The content includes function code, transmit data and error checking for the demand action. The response of slave uses the same structure. This includes action confirmation, return data, error checking etc. Errors occur as slave receives messages or the slave cannot act as command of host, it will send fault information as a feedback to host.

1.2 Scope of application

1.2.1 Applicable devices

EM8 series frequency inverter

1.2.2 Application type

(1) Inverter inserts the multi-application PC/PLC control network having an RS485 terminal.

(2) Inverter insert the point-to-point PC/PLC control monitor having an RS485/RS232 terminal (RS232 need convert interface)

2. Bus structure and specification of communication protocol

2.1 Bus structure

(1)Interface type

RS485 (RS232 is optional, but it needs conversion accessory at same electrical level.)

(2)Transmission mode

For asynchronous serial and half-duplex transmission, at the same time, only one from master and slave send the data, the other one receive the data. The data is sent out as message by each frame in the processing of asynchronous serial.

(3)Topology model

Single master station system includes 32 devices at most. One of the devices is master, another is slave. The address of the slave ranges from 0 to 30. The 31(1FH) is address for broadcast communication. The address of slave must be unique. The point to point is a special application for single master and multi slave, as there is only one slave.

2.2 Specification of communication protocol

The communication protocol of EM8 series is a serial master-slave communication protocol. Only one device (the master) can build protocol, named as interrogation command. The other devices (the slaves) only provide data in response for interrogation command of the master. This master means PC,IPC, PLC etc. This slave means inverter. The master can access a slave individually. It also broadcast information to all the slaves. For the single-visiting command, the slave should return a message (named response). For the broadcast from the master, the slaves do not need to feedback the feedback message.

Remark

- Parameters related RS485:A-1, A-3, C-49, C-78 to C-83, please pay attention to the setting of these related parameter.

2.2.1 Data Format

Three optional data transmission forms:

(1)One start bit, eight digital bits, one stop bit, none check

(2)One start bit, eight digital bit, one stop bit, and odd parity check

(3)One start bit, eight digital bits, one stop bit, even parity check

Default in the slave: one start bit, eight digital bits, stop bit, none check

2.2.2 Baud rate

5 optional baud rate: 1200bps, 2400bps, 4800bps, 9600bps, 19200bps Default baud rate in the slave: 9600bps

2.2.3 Communication mode

(1) With master "polling" from slave "response" of the point to point communication.

(2) Use the inverter's panel to set the communication parameter of the inverter's serial interface. It includes local address, baud rate and data format.

Remark

The master must set the same baud rate and data format to slave inverter.

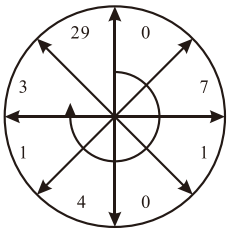
2.2.4 Communication rules

(1) Three handshake callings are designed in the master. When communication failures or breakdowns occur, the master can send present message three times at most.

(2) Keep 4 bytes or more between data frames for starting interval. The identified message will be valid, which has specified starting time interval. The slave sent each byte continuously in 1 frame, no interval. The time cost for sending a frame is according to baud rate.

(3) The waiting time for the master handshake and the response time of the inverter at most is the transmit time of 8 bytes. It is judged to failure due to timeout.

(4) The polling from the master to the slave can be built in a table defined by the user. The user can define the order of polling according to actual demand.



The polling table of the master:

0	7	1	0	4	1	3	29

(5) The master must make a regular polling for the slaves in the polling table. The polling period must be less than 1000ms, including calling three times as no response. It can ensure to find the communication failures of the slave in time. Also it can realize the function of plug and play.

(6) It is regarded as faults in lines, when the inverter receives no message with in a time (1000ms). Then it turns in safety running state. (The parameters of safety running are set by C-83)

2.3 Structure of message

Every message has 11 bytes. It includes three parts: frame header, frame data, frame footer.

It is diagram of the data format of frame.

Sending order	Start bit	Slave address	Encoding running	Encoding address	Parameter value	Running word	Setting value	Data verification
Sending byte	Single byte	Single byte	Single byte	Single byte	Double byte	Double byte	Double byte	Single byte
Definition	Frame header		Parameter data			Processing data		Frame footer
			User's data					

Specification:

(1)Frame header: R: Start bit, stop bit, slave address.

(2)Frame footer: Data verification.

(3)Data of user: Parameter data and processing data. Parameter data includes encoding running command / response, encoding address, encoding setting/actual value. Processing data includes control command of

the master, response of the slave, setting frequency for the master running, actual frequency of the slave running.

2.3.1 Master command frame

The sending message from the master is called master command frame. It is the diagram below:

Sending order	Start bit	Slave address	Master command	Encoding address	Parameter value	Running word	Setting word	Data verification
Data	5AH	0~30						
Sending byte	1	1	1	1	2	2	2	1
Definition	Frame header		Parameter data			Processing data		Frame footer
			User's data					

2.3.2 Slave response frame.

The data massage from the slave (inverter) is slave response frame, It is the diagram below:

Sending order	Start bit	Slave address	Slave response	Encoding address	Parameter/ error code	Status word	Actual frequency value	Data verification
Data	5AH	0~30						
Sending byte	1	1	1	1	2	2	2	1
Definition	Frame header		Parameter data			Processing data		Frame footer
			User's data					

2.4 Message data encoding

2.4.1 Frame header

(1) Start bit

This communication protocol provides: The start bit of every message is 5AH. But the start bit itself is not sufficient for the start of recognizing message. Because the 5AH itself may be other data in the work message except start bit. So this communication protocol defines a starting interval of transmit time of 4 bytes at least. The starting interval time is part of work message.

The starting interval time for messages of different baud rate

Baud rate(bps)	Starting interval(ms)	Baud rate(bps)	Starting interval(ms)
1200	36.8	2400	18.4
4800	9.2	9600	4.6
19200	2.3	38400	1.15

(2) Slave address

The inverter’s master address, hexadecimal notation, taking a bite, setting range: 0-30.

2.4.2 Data of user

(1) Parameter data

● **Master command frame**: **master command code**

Slave response frame: Slave response code command code from the master or the response code from the slave for the command, their data model is hexadecimal notation, single byte.

Parameter data	Code value	Description
Master command code	0	No task, do not read or change the parameter data.
	1	Read the parameter data: read the parameter data designated by the slave encoding address.

Parameter data	Code value	Description
Master command code	2	Change the parameter data: change the parameter data designated by the slave encoding address. This data cannot be saved if the slave loses the power supply.
	3	Change the parameter data and saved it in the EEPROM. Change the parameter data designated by the slave encoding address and saved it in the EEPROM.
Slave response code	0	No task response: The slave response for "no task "command from the master.
	1	Task finished: The slave finished the designated task of the command code from the master.
	2	Task unfinished, response parameter is error code: The slave did not finish the designated task by command code from the master. Reason for unfinished task is returned by error code.
	1F	Communication fault: verification and fault, the slave do not receive the specified byte number.

● Encoding address

Data definition: corresponding address value of the slave parameter.

Data type: hexadecimal notation, single byte.

Refer to the user manual for the slave parameter encoding address: Fourth chapter :function code list.

● The master command frame: **parameter value**

The slave response frame: parameter value or error code data type: hexadecimal notation, double byte, upper byte is behind.

To the master, parameter value is the data provided to the designed encoding address according to command code from the master. The value is any value in the range of the parameter value, when the command code is 0 or 1(no task or reading the parameter data).

To the slave, the parameter value is the returned parameter data with the specified master command code when the command code operated successfully. When the command operated fail, the returned data is error code. Detailed error code and means are below:

0: parameter modification is locked (writing is not allowed).

The inverter can allow or forbid the parameter modification by setting the middle rank parameter [b-72]. It will return this error code when user tries to modify the forbidden parameter.

1: Parameter cannot be modified in the running (writing is not allowed).

Some parameters cannot be modified in the running process of the inverter. It will return this error code when users try to modify these parameters.

2: Parameter is implied (reading and writing is not allowed).

The middle rank, high rank and inner parameter can be implied. The parameter can be read or written only if this parameter is open. Or it will return this error code.

3: Retention parameter (reading and writing is not allowed).

There is retention parameter which is not defined now. It will return this error code when users try to modify these parameters.

4: Number of parameter is exceeded. Writing will be failed.

It will return this error code when the parameter that users try to modify is exceeding the range of inverter setting.

5: Try to write the processing parameter (condition monitoring parameter).

The condition monitoring parameter [d-0]- [d-33] cannot be rewritten by outside. It will return this error

code when users try to modify these parameters.

6: Illegal function code

It will return this error code when the code address in the message is invalid (it is not the specified encoding address in the status monitoring list and function parameter list).

Remark

● Parameter value=setting parameter value/minimum unit.

For example, set the blackout restart waiting time as 5.6s. The minimum unit is 0.1, parameter value=5.6/0.1=56 hexadecimal number is 38H. Look for the minimum unit for each parameter in the function code list.

(2)Processing data

● Master command frame: running word.

Slave response frame: **status word**

Data meaning: The running word is data of the master controlling the slave. The status word is data of the response from the slave running. The detailed meaning is below:

Data type: hexadecimal notation, double byte, upper byte is behind.

Running word: **(upper computer → inverter)**

Bit	Meaning	Function description
0	Reserve	
1	Normal running	1: Make a normal running command to the slave(inverter) 0: Invalid
2	Reversal running	1: Make a reversal running to the slave(inverter) 0: Invalid
3	Error reset	1: Error reset 0: Invalid
4	Master control valid	1: The running word and setting value in the current data frame update the old data. Reset this point if you want to finish this control task. 0: The running word and setting value in the current data is invalid. the inverter should keep the control word and setting value in the last time.
5	Reserve	
6	Reverse	
7	Reserve	
8	Free stop	1: Give a free stop command to the slave(inverter) 0: Invalid
9	Reserve	
10	Reserve	
11	Reserve	
12	Reserve	
13	Reserve	
14	Normal inching turning	1: Give a normal inching turning command to the slave(inverter) 0: Invalid
15	Reverse JOG	1: Give a reverse JOG command to the slave(inverter) 0: Invalid

Remark

● Priority of the control order: forward inching turning, reversal inching turning, forward running, reversal running, free stop.

Status word:(inverter → upper computer)

Bit	Meaning	Function description
0	Dc voltage state	1: Normal dc voltage 0: Abnormal dc voltage
1	Motor direction	1: Motor reverse 0: Motor forward
2	Output phase sequence	1: Negative phase sequence 0: Positive phase sequence
3	System fault	1: Inverter fault 0: Inverter normal
4	Operating state	1: Inverter is running 0: Inverter is stop
5	Waiting to return after fault	1: Inverter is in the state of waiting to return after fault 2: Inverter is not in the state of waiting to return after fault
6	Reserve	
7	DC braking	1: Inverter is in the DC braking 0: Inverter is not in the DC braking
8	Free stop	1: Inverter in the state of free stop 0: Inverter not in the state of free stop
9	Inspection speed and restart	1: Inverter is in the state of inspection speed and restart 0: Inverter is not in the state of inspection speed and restart
10	Speed up	1: Inverter is in the processing of speed up 0: Inverter is not in the processing of speed up
11	Speed down	1: Inverter is in the processing of speed cut 0: Inverter is not in the processing of speed cut
12	Current limiting action	1: The limiting current function of inverter is acting 0: The limiting current function of inverter is not acting
13	Voltage limiting action	1: The voltage limiting function of inverter is acting 0: The voltage limiting function of inverter is not acting
14	JOG running	1: Inverter is in the state of inching running 0: Inverter is not in the state of inching running
15	Wait to restart after prompt shutdown	1: Inverter is in the state of waiting to restart after prompt shutdown 0: Inverter is not in the state of waiting to restart after prompt shutdown

● Master command frame: Setting frequency value.

Slave response frame: Actual frequency value data meaning:

Setting frequency value: Set the running frequency of the inverter according to command code from master.

Actual frequency value: Return with the actual running frequency according to command code from master.

Actual value will return corresponding fault code.

Data type: Hexadecimal notation, double byte, upper byte is behind.

Fault code is below:

Fault code	Description	Fault code	Description
0	No fault	1	Over current in the speed up
2	Over current in the deceleration	3	Over current in the steady running
4	Overvoltage in the acceleration	5	Overvoltage in the acceleration
6	Overvoltage in the steady running	7	Overvoltage in the stop
8	Under voltage in the inverter running	9	Inverter overload
10	Adapter motor overload	11	Inverter overheat
12	Earth fault	13	Interference fault
14	Output phase lack	15	IPM fault
16	External device fault	17	Current checking circuit fault
18	Communication fault		

2.4.3 Frame footer(checksum)

Data meaning: Computed result of data frame checksum

Data type: Hexadecimal notation, single byte.

Method of calculation: Accumulate all the bytes in the range from start bit to data of user. The checksum is the remainder of accumulated sum divide by 256(FF). Checksum fault will lead to communication fault.

For example: 1 frame data: 5A 30 03 02 88 13 00 00 00 00 2A

Calculation method of checksum: (5A+30+03+02+88+13+00+00+00+00) / FF=12A / FF the remainder is 2A.

3. Example of using

Example 1: Set the No.6 inverter digital frequency to 27.00Hz (parameter A-2).

Master sending frame:	Start bit	Slave address	Master command	Encoding address	Parameter value	Running word	Setting frequency value	Check sum
	5A	06	03	02	8C 0A	0000	00 00	FB
Slave response frame:	Start bit	Slave address	Slave response	Encoding address	Parameter/ fault code	State word	Actual frequency value	Check sum
	5A	06	01	02	8C 0A	0100	00 00	FA

Means: Slave inverter realized the task correctly.

Example 2: Set the rated frequency of load motor of No 0 inverter to 60.00Hz. (parameter A-6).

Master sending frame:	Start bit	Slave address	Master command	Encoding address	Parameter value	Running word	Setting frequency value	Check sum
	5A	00	03	06	7017	1200	00 00	FC
Slave response frame:	Start bit	Slave address	Slave response	Encoding address	Parameter/ fault code	State word	Actual frequency value	Check sum
	5A	00	01	06	7017	0100	00 00	E9

Means: Slave inverter realized the task correctly.

5A	00	02	06	0100	1100	00 00	74

Means: Slave is running, this parameter cannot be modified.

Example 3: Control No.1 inverter forward running with frequency 10.30Hz .

Master sending frame:	Start bit	Slave address	Master command	Encoding address	Parameter value	Running word	Setting frequency value	Check sum
	5A	01	00	00	0000	1200	06 40	77
Slave response frame:	Start bit	Slave address	Slave response	Encoding address	Parameter/ fault code	State word	Actual frequency value	Check sum
	5A	01	00	00	0000	1100	06 04	76

Means: Slave inverter realized the task correctly.

5A	01	00	00	0000	0900	01 00	65

Means: Slave inverter over current in acceleration.

Example 4: Set input voltage lower limit of No 0 inverter V1 terminal (parameter b-34) to 1.0 V, and let inverter forward running at setting frequency 30Hz.

Master sending frame:	Start bit	Slave address	Master command	Encoding address	Parameter value	Running word	Setting frequency value	Check sum
	5A	00	03	34	0A00	1200	B8 0B	6F
slave response frame:	Start bit	Slave address	Slave response	Encoding address	Parameter/ fault code	State word	Actual frequency value	Check sum
	5A	00	01	34	0A00	0500	00 00	9E

Means: Slave inverter realized the task correctly. The present slave inverter state is negative phase sequence with a normal DC voltage. Now the actual frequency is 0Hz.

5A	00	1F	34	0000	0500	0000	B2

Means: The communication of the slave occurred error, do not execute master command. The present state of slave is negative phase sequence with normal DC voltage. Now the actual frequency is 0Hz.

Example 5: set the PID feedback quantity broken line detection threshold of No 0 inverter or 9.5% (parameter C-60). And let inverter free stop.

Master sending frame:	Start bit	Slave address	Master command	Encoding address	Parameter value	Running word	Setting frequency value	Check sum
	5A	00	03	98	5F00	1001	0000	65
Slave response frame:	Start bit	Slave address	Slave response	Encoding address	Parameter/ fault code	State word	Actual frequency value	Check sum
	5A	00	01	98	5F00	1100	B8 0B	26

Means: Slave inverter realized the task correctly. The present actual frequency is 30Hz.