Foreword

Thank you very much for purchasing PI7800，PI7600 Family Frequency Inverters. This family is designed based on the experience of POWTRAN Company in the professional manufacture and sale of the products, and suitable for general-purpose machine, fan/pump drive, high frequency drive and heavy load machine.

This User's Manual provides the users with the instructions on the installation, parameter setting, fault diagnosis, routine maintenance and necessary precautions. Please read the Manual carefully before the installation of the product in order to ensure that it can be correctly installed and operated.

This User's Manual includes PI7800，PI7600, the general purpose control and special purpose control . The general purpose control ha F,G ,M and H; The special purpose control has S,T and Z:

F: FLOW LOAD

G:GENERAL LOAD

M: MEIDDLE LOAD

H: HEAVY LOAD.

S: TEXDRIVE.

T: WINDLASS.

Z: JETDRIVE.

Please contact the local dealers or directly contact our company.

Please keep this user's manual in good condition, for it will be helpful to the repair, maintenance, and applications in the future.

For information about other product, please visit our website: http://www.powtran.com.

CONTENTS

Section I. Inspection and Safety Precautions

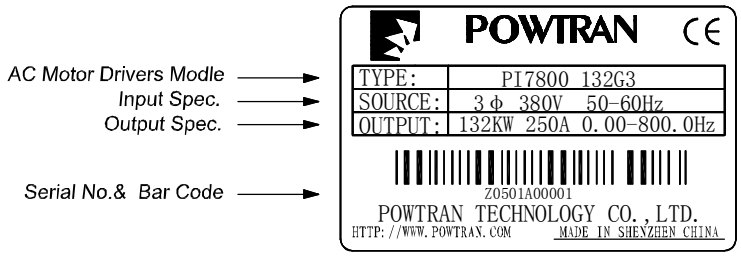
POWTRAN PI7800/7600 frequency inverters have been tested and inspected before leaving the manufacturer. Before unpacking the product, please check if its package is damaged due to careless transportation, and if the specifications and type of the product complies with the order. Please contact the supplier of POWTRAN products if any problems are found.

1-1. Inspection after Unpacking

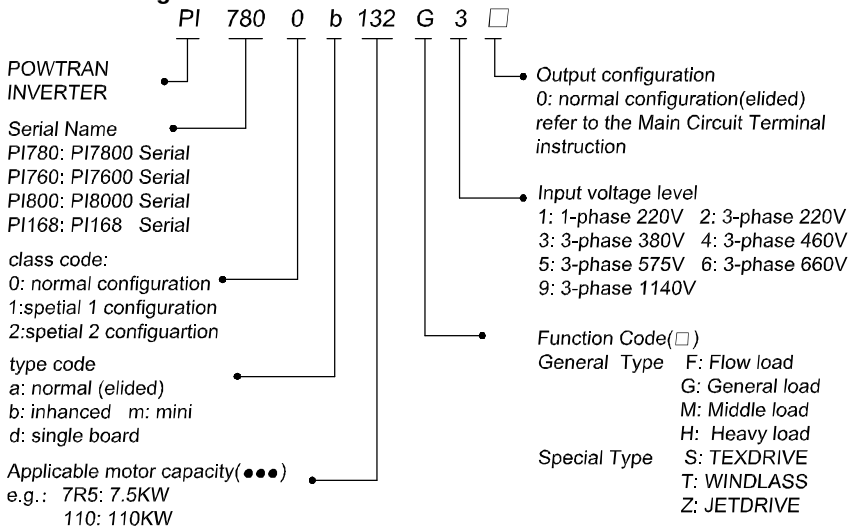
※ Inspect that the contents are complete (one PI7000/7100 frequency inverter, one Operation Manual).

※ Check the nameplate on the side of the frequency inverter to ensure that the product you have received is right the one you ordered.

Instructions on name plate: (giving 132kW/380V as example)



Model designation:



1-2. Safety Precautions

※ Never connect the A.C. power supply to the output terminals (U, V, W) of

the frequency inverter.

※ Fix and lock the panel before supplying power so as to avoid the danger caused by the poor capacity or other components inside the inverter.

※ After the power supply is switched on, do not perform wiring or check, etc.

※ Don't touch the circuit boards or its parts or components in the inverter when it is powered, so as to avoid danger of electric shock.

※ If the power supply is switched off, do not touch the PCB or other parts inside the inverter within 5 minutes after the keyboard indicator lamp goes off, and you must check by using the instrument that the inverter has completely discharged all its capacity before you start to work inside the inverter. Otherwise, there will be the danger of electric shock.

※ The static electricity in human body will cause serious damage to the MOS field effect transistor in the inverter. Please keep your hands away from the PCB, IGBT and other internal parts before taking actions to prevent static electricity. Otherwise, faults may be caused.

※ In use, the earthing terminal (E or ⏚) of the frequency inverter must be grounded to the earthing connections correctly and securely according to the national electrical safety specifications and other applicable standards.

※ Please don't shut off the unit by turning off the power supply. Turn off the power supply after the motor has stopped its operation.

※ Meet CE standard with EMI filter.

1-3. Application

※ Powtran inverter is generally applied to 3 phase AC asynchronism motors.

※ Powtran inverter is applied to the admisive occasion, the occasion where is not admissive may lead to fire, electric shock, explosion and so on.

※ If the inverter seizes up when it is applied to the equipment which may lead danger (e.g. lift tools of transportation, aviation system, saftety equipment, etc), it should be managed carefully. Do inquire the factory when it happens.

Only the well-trained personnel are allowed to use this unit, and such personnel must read through the parts of this manual relating to the safety, installation, operation and maintenance before using the unit. The safe operation of this unit depends on correct transport, installation, operation and maintenance!

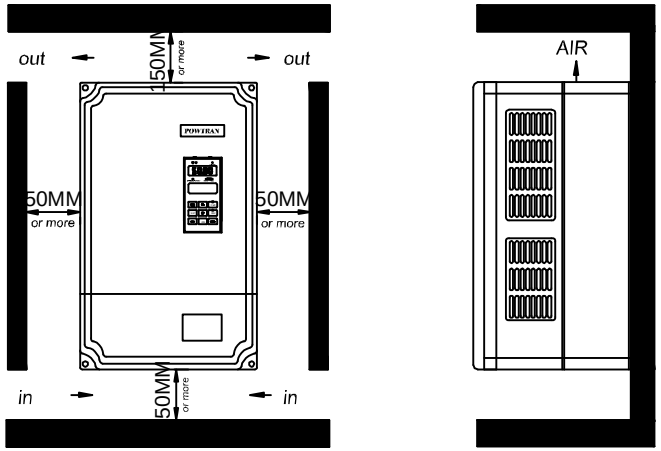
Section II. Installation & Standby Circuit

2-1. Conditions for Use

1) Ambient temperature -10˚C~40˚C.
2) Avoid electromagnetic interference and keep the unit away from the interference source.
3) Prevent dropping water, steam, dust, powder, cotton fiber or fine metal powder from entering it.
4) Prevent oil, salt and corrosive gas from entering it.
5) Avoid vibration.
6) Avoid high temperature and moisture and avoid being wetted due to raining, with the humidity below 90%RH (not dewing).
7) Prohibit the use in the dangerous environment where inflammable or combustible or explosive gas, liquid or solid exists.

2-2. Installation

The frequency inverter must be installed by wall hooking in the indoor room with adequate ventilation, with enough space left between it and the adjacent objects or damper (walls) surrounding it, as shown in the below figure:

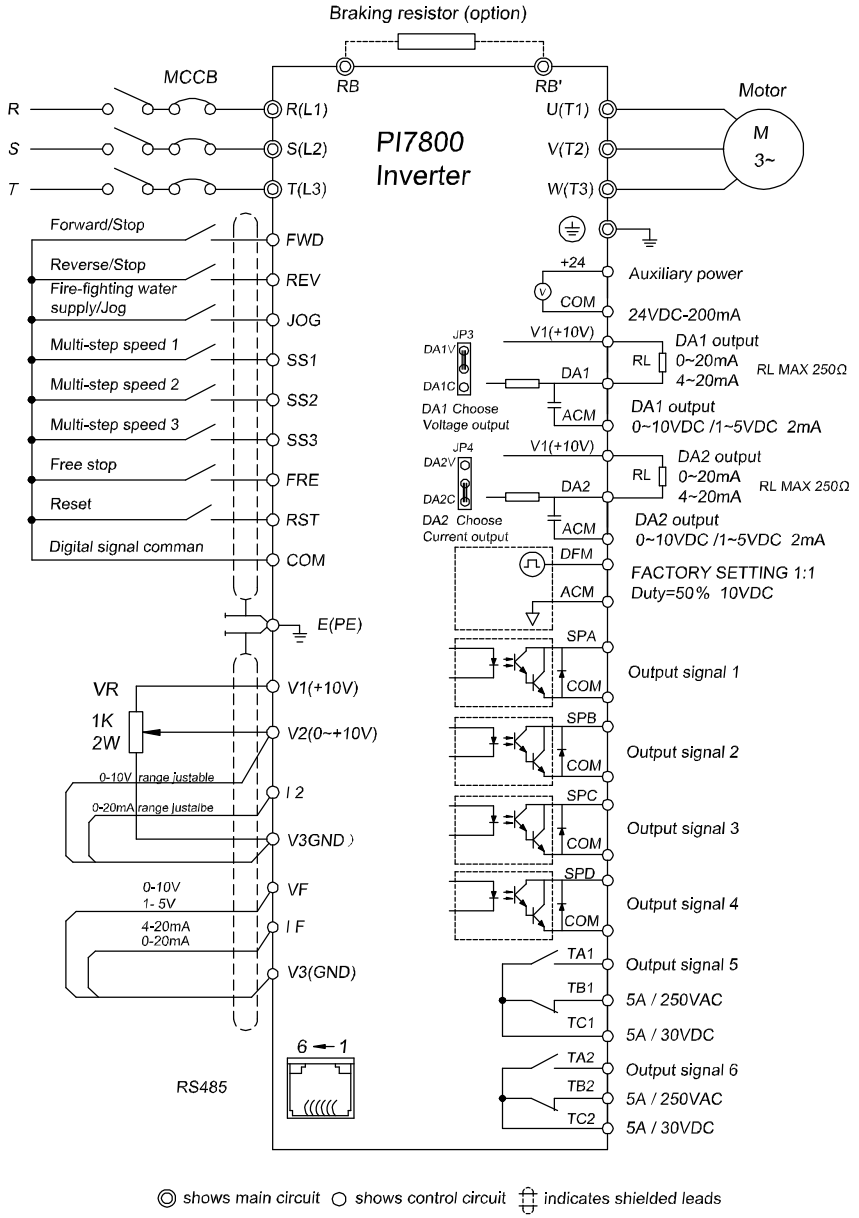


2-3. Wiring

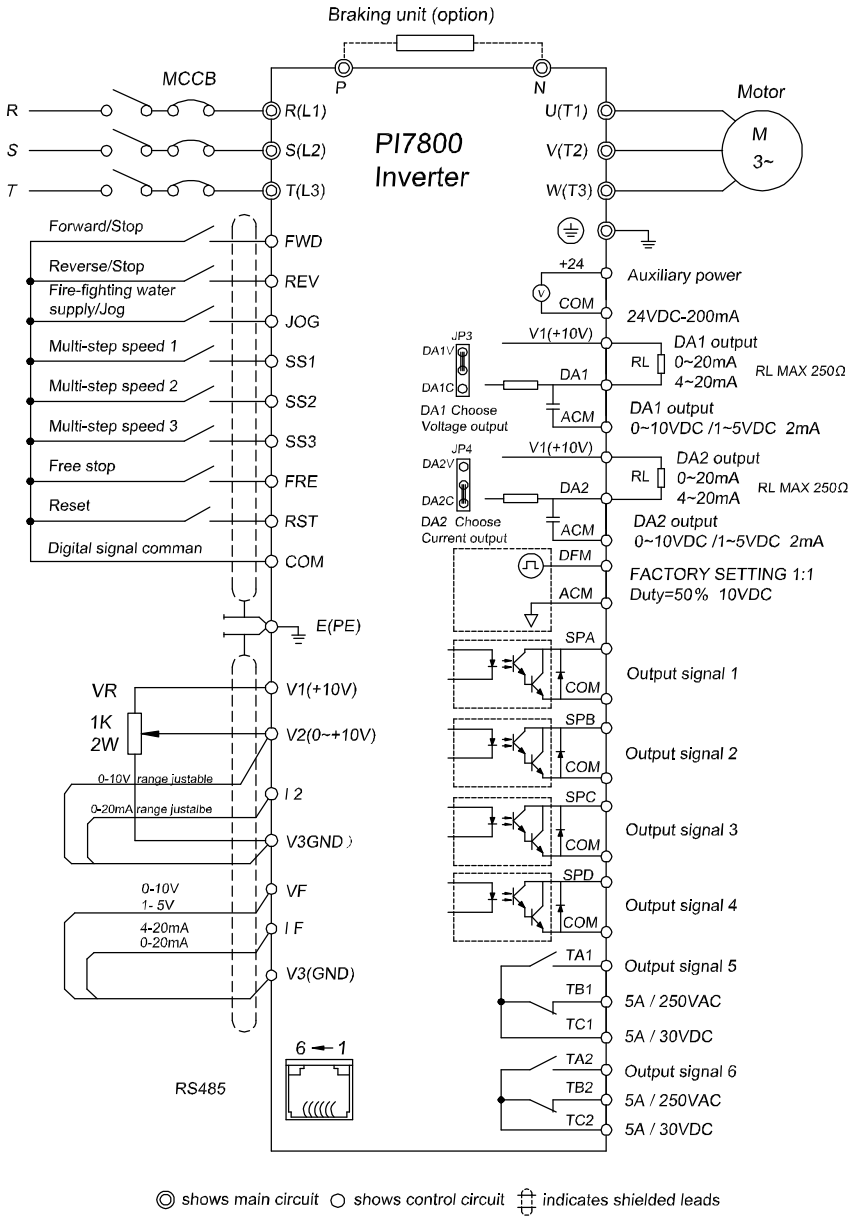
The wiring of frequency inverter includes two parts: main circuit and control circuit. The user must ensure correct connections according to the following connection diagram.

2-3-1. PI7800 Diagram

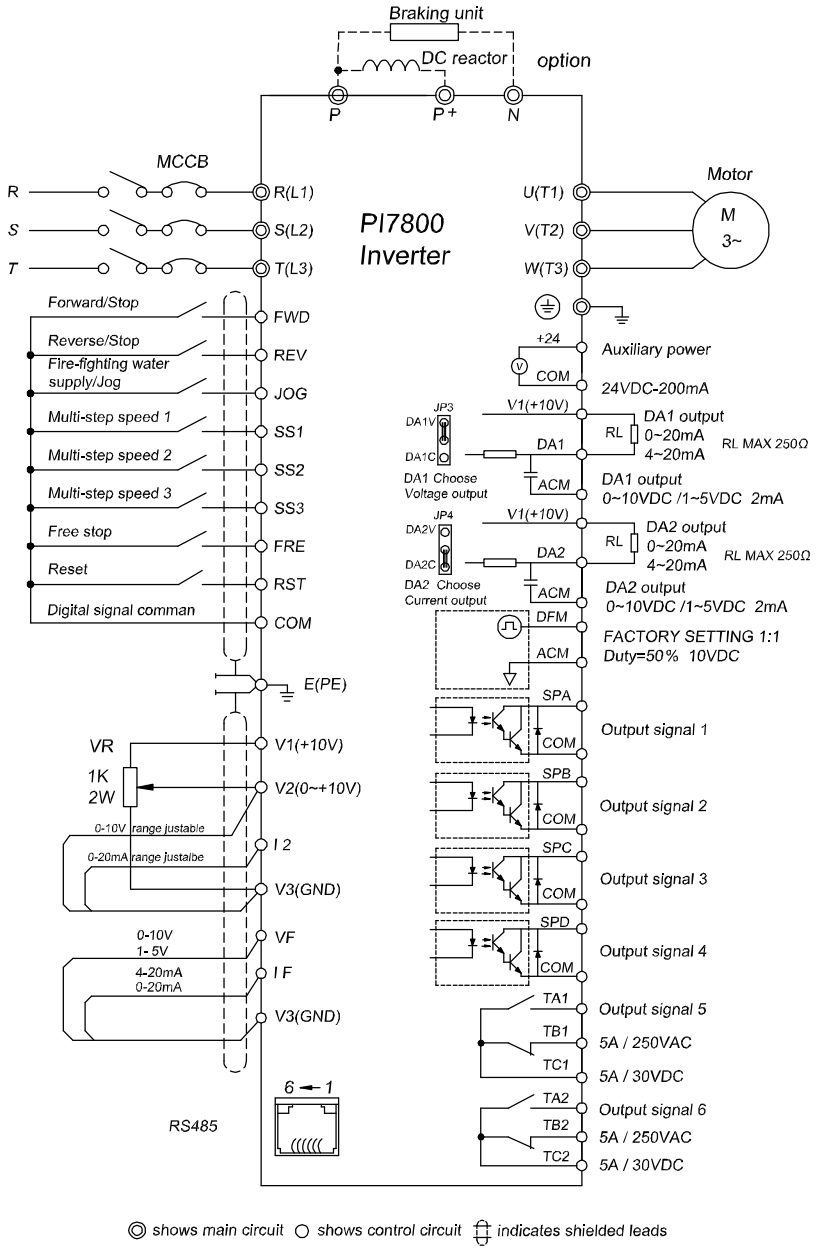
1. Wiring diagram 7.5KW~15KW and below



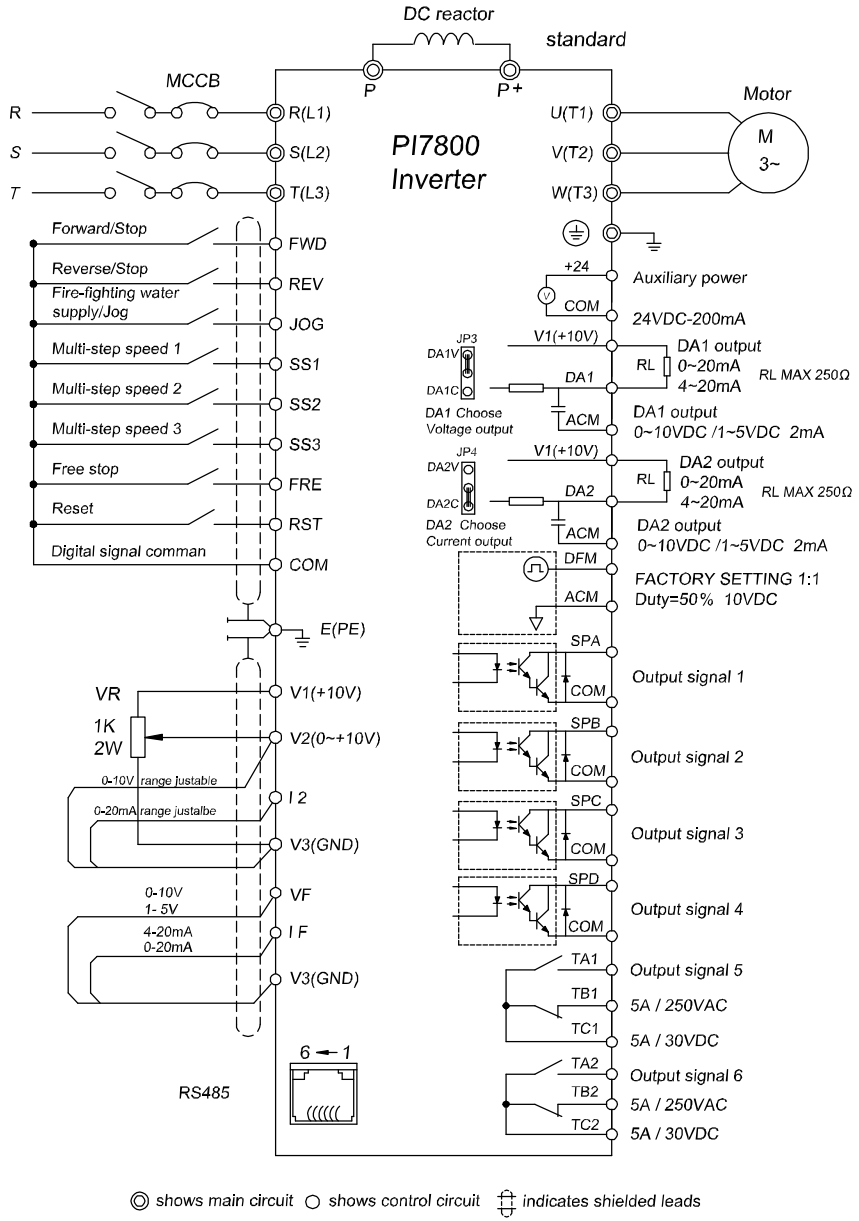
2. Wiring diagram 18.5KW~22KW



3. Wiring diagram 30~160KW

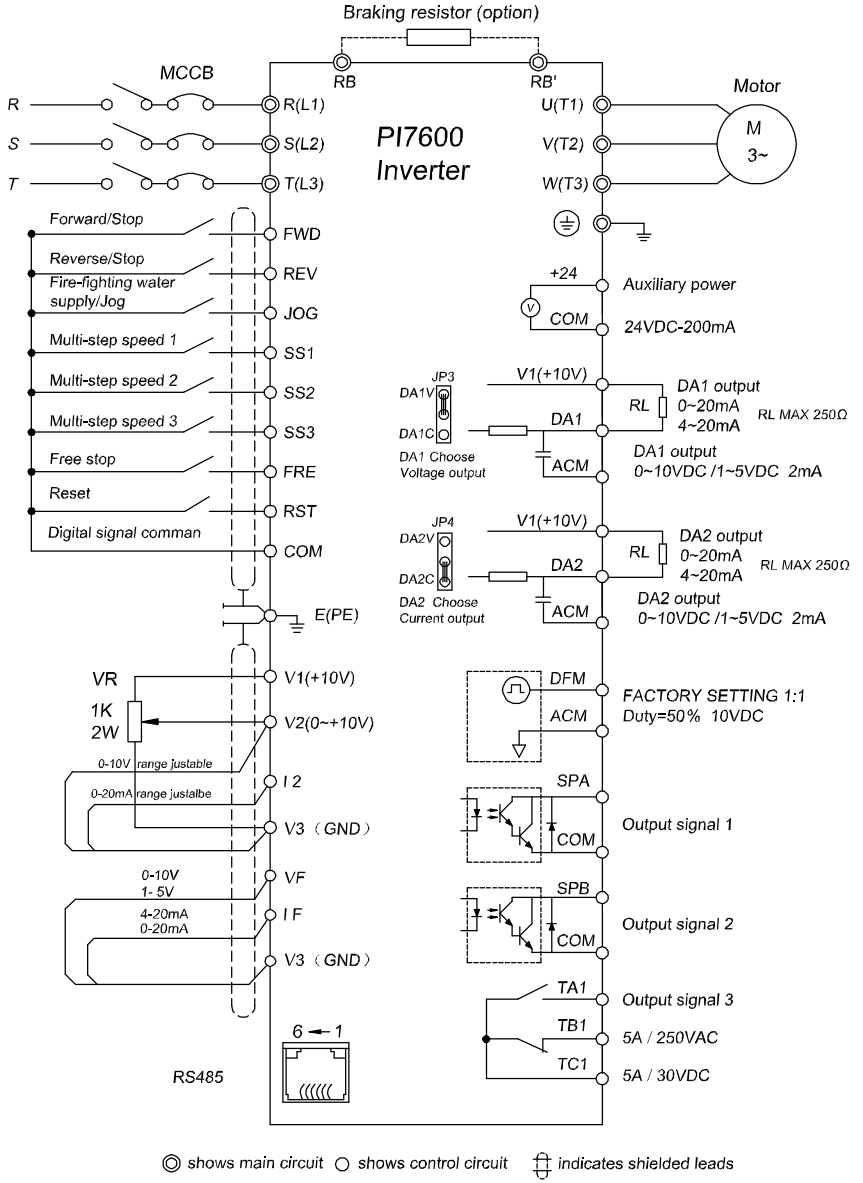


4. Wiring diagram1187~355KW



2-3-2. PI7600 Wiring diagram

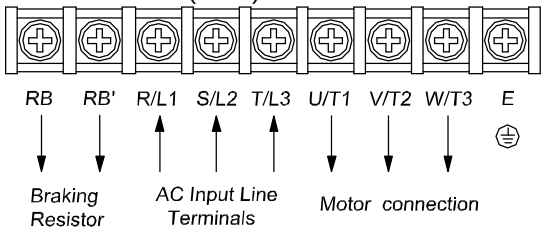
1. Wiring diagram 7.5KW and below



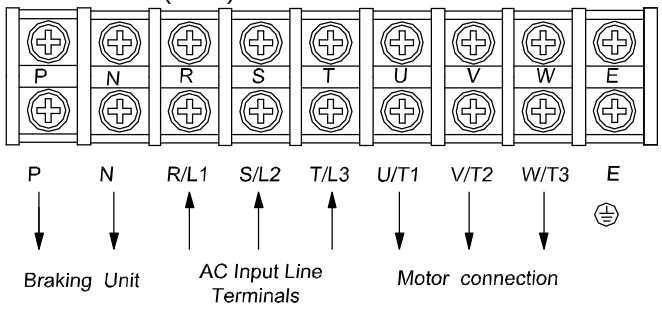
2-4. Main Circuit Terminals:

2-4-1. PI7800 Main Circuit Terminals

1. 7.5KW~15KW (380V) Main Circuit Terminal

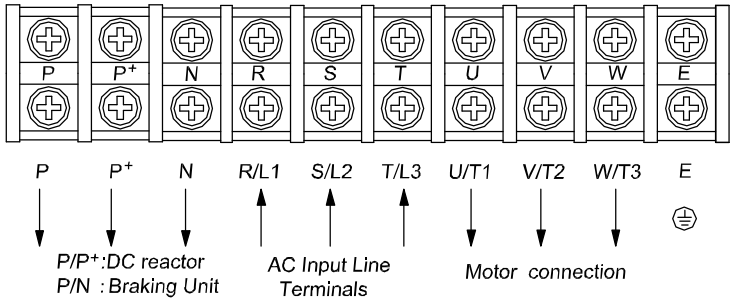


2. 18.5~22KW (380V) Main Circuit Terminal

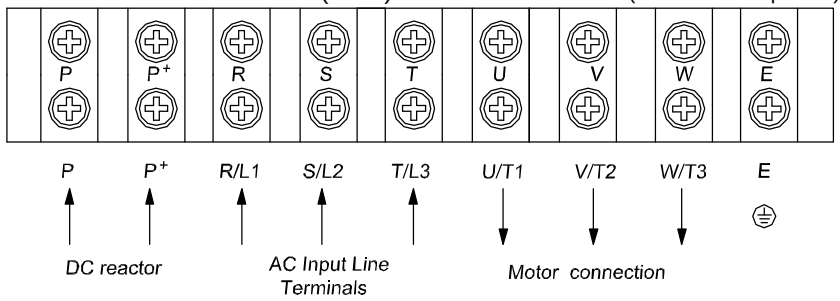


3. 30~160kW (380V) Main Circuit Terminal

Note: P/P+ Standard setting is short circuit; if it is with external reactance, please disconnect and then connect it.

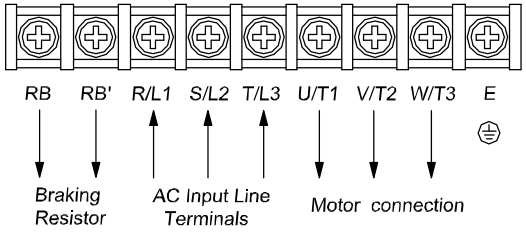


4.187KW~355KW and above (380V) Main Circuit Terminal (132~160KW optional)



2-4-2. PI7600 Main Circuit Terminal

1. 7.5KW and below (380V) Main Circuit Termial



For 4N2B and 4N3B panel, “E” is on the steel panel.

Note: The above KW categaries are for G type inverter.

2-4-3. Terminal Function

Terminal	Description	Functions
R/L1	Power input for frequency inverter	Connected to 3-phase power (Single input connected to R ,T)
S/L2		
T/L3		
E/PE	Grounding point	Grounded to the earth
RB, RB′	Connection point for braking resistance	Connect brake resistance
U/T1	3 Phase Output	Connected to 3-phase motor
V/T2		
W/T3		
P+, N	DC Bus output	Connect the brake unit
P, P+	DC reactance	Connect DC reactance

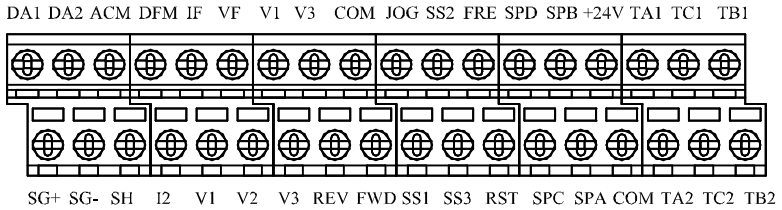
2-5. Control Circuit Terminals

Class	Terminal	Description	Function
Control signal	COM	Common point for control commands	
	FWD	Forward rotation command	F05=1, Edge triggers(F62=0),and runs forward in falling edge, stops in rising edge
			F05=3, Level triggers(F62=0/1/2)
	REV	Reverse rotation command	F05=1, Edge triggers (F62=0), and runs reverse in falling edge, stops in rising edge.
			F05=3, Level triggers(F62=0/1/2)
	JOG	Jog command	Level triggers, and executes JOG command in a lower level, stops in a high level
	SS1	Multi-step speed/acceleration	F63=1/2,Short-circuited to COM to compose 7-step speed and acceleration, level triggers, effective in a lower level
		Rising/Falling control	F04=4,for rising control
		Frequency mode switch	Switch the frequency setting mode with SS2

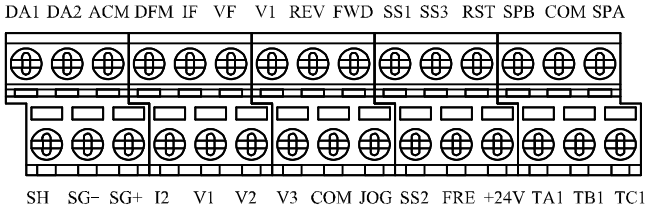
	SS2	Multi-step speed/acceleration	F63=1/2,Short-circuited to COM to compose 7-step speed and acceleration, level triggers, effective in a lower level
		Rising/Falling control	F04=4,for falling control
		Frequency mode switch	Switch the frequency setting mode with SS1
	SS3	Multi-step speed/acceleration	Short-circuited to COM to compose 7-step speed and acceleration, level triggers, effective in a lower level
		JOG control	F63=3 COM is short-circuited to SS3 to execute JOG reverse command, to JOG to execute JOG forward command, and the previous JOG direction is invalid.
		Three-line running control	F63=1/2,F62=2 Three-line terminal running for details
		Program running restart	For selecting the program running restart mode
	FRE	Free Run	Level triggers, and executes free stop command in a lower level
	RST	Restore	Level triggers, executes restore command in falling edge.
Output signal	TA1 TB1 TC1	Output signal 5	TA1-TC1 is open and TB1-TC1 is closed (programmable)
	TA2 TB2 TC2	Output signal 6	TA2-TC2 is open and TB2-TC2 is closed (programmable)
	SPA/COM	Output signal 1	Output open collector signal (24VDC-50mA)
	SPB/COM	Output signal 2	
	SPC/COM	Output signal 3	
	SPD/COM	Output signal 4	
Analog Input and output signal	V1,V3	Power Supply	+10V, GND
	V2	Voltage Input signal	Range is adjustable in 0~10V
	I2	Current Input signal	Range is adjustable in 0~20mA
	VF	Voltage feedback input signal	0~10V/1~5V
	IF	Current feedback input signal	0~20mA/4~20mA
	ACM	Common terminal of DA1 and DA2	Used for common terminal when DA1/DA2 selects voltage output
	V1	Power Supply of DA1 and DA2	Used for Power Supply when DA1/DA2 selects current output
	DA1	Multi-function analog signal output 1	0~10/1~5VDC 0~20/4~20mA
	DA2	Multi-function analog signal output 2	0~10/1~5VDC 0~20/4~20mA
	DFM	DFM multiple adjustment	Factory setting 1:1, duty=50%, 10VDC
Auxiliary Power	24V	Power Positive terminal	Maximal output 24V/200mA
	COM	Common point	
Communication Signal	SG+, SG-, SH	Communication positive/ negative signal, Screen signal	RS485 communication(refer to Appendix 1)

2-5-2 Control circuit terminal

1） 7KLCB.V4 Control circuit terminal



2） 7KSCB.V1 Control circuit terminal



2-6. Connection Precautions

※ Don't install power factor capacitance or resistance-capacitance absorbing device between the output terminals U, V, W of the frequency inverter.

※ To disassemble or replace the motor, the input power supply must be turned off for the frequency inverter.

※ The motor or power supply can be switched on/off only after the inverter stops its output.

※ In order to minimize the effect of electromagnetic interference, a surge absorbing device should be installed if used electromagnetic contactor and relay, etc. is near to the frequency inverter.

※ For external control of frequency inverter, a isolation device should be used for the control lines or screened cable should be used.

※ A screened cable should be used as the signal connection line for input command and must be routed separately as well, and it had better be installed far from the main circuit.

※ When the carrier frequency is less than 3kHz, the distance between the frequency inverter and motor must not be greater than 50 meters (maximum). When it is above 4kHz, this distance should be reduced. The cable for this connection had better be laid in metal conduit.

※ If the frequency inverter is equipped with peripheral devices (such as filter, reactor), first measure its insulation resistance to the earth with 1000V megohm meter, and ensure the resistance value is not below 4MΩ.

※ If the frequency inverter must be started frequently, don't switch off its power supply, and the operator must start or stop the inverter by using the COM/FWD of the control terminal or Keyboard or RS485, in order to avoid damage to the bridge rectifier.

※ Don't connect A.C. input power to the output terminals U, V, W of the frequency inverter.

※ In order to prevent unexpected accidents, earthing terminal E or ⏚ must be grounded to the earth securely (the grounding resistance should be below 100Ω). The cable size should be greater than half of below-mentioned corresponding cable size; otherwise current leakage will happen possibly.

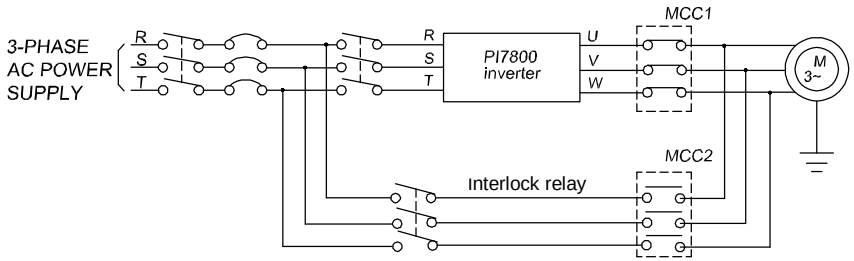
※ For wiring of main circuit, please refer to national rule.

※ Capacity of the motor should be equal to or smaller than that of the inverter.

2-7. Standby circuit

When the fault or trip of the inverter may cause great loss or accident, please add the standby circuit.

Note: confirm and test the running characteristic of the standby circuit, in order to ensure the industrial phase and the converter phase are in the same direction.

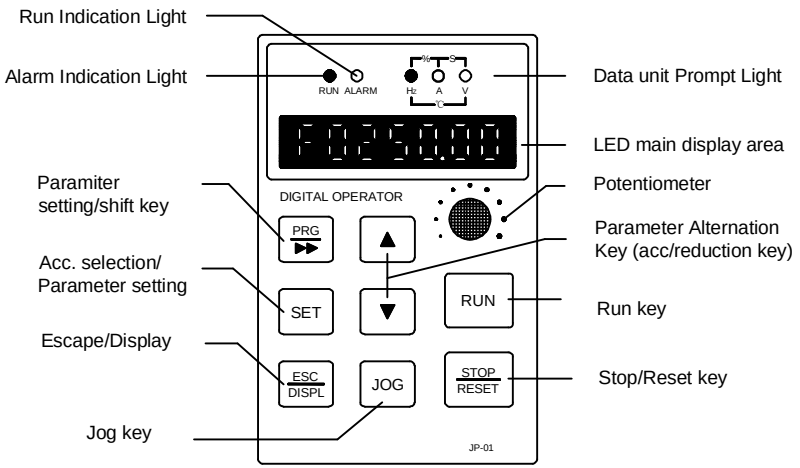


Section III. Operating keyboard

3-1. Operating keyboard

☆ JP3E7000 keyboard

Specification and function description

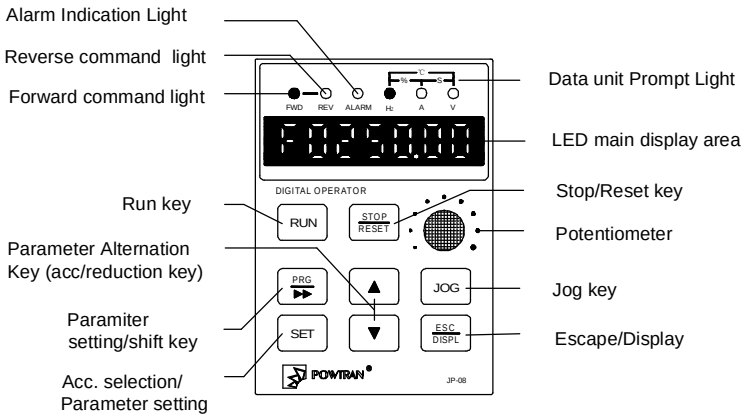


The detailed function description is in the following text (JP5E7000).

*JP3E7000 Keyboard is optional for PI7800, PI76000 Family inverter.

☆ JP5E7000 Keyboard

Specification and function description



Function description

Run key:
- drive forward.

Stop/Reset key:
- Drive stops, resets after abnormity and confirms fault.

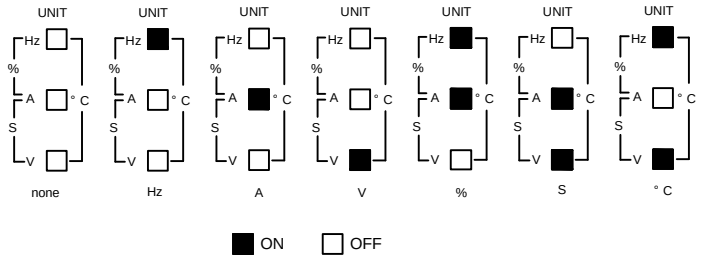
Acc. Selection /Parameter setting:
- When select parameter, press the SET key and add/reduction key, parameter code add/reduce 10
- Restore modified value
- alternate the monitor object and monitor

Escape/display
- Escape modifying the data of function parameters
- Escape of submenu or running into menu of status display from function menu
- Escape of fault status.

Jog key
- On: jog
- Off: stop

LED main display area
- Anterior 3 digits display the function code
- Latter 4 digits display the value as per the function code

Data unit prompt Light:
- It is formed up by 3 instruction light on the right upside of the keyboard, different status indicates different unit of the current parameter displayed in the LED. The units for the parameters as blow:

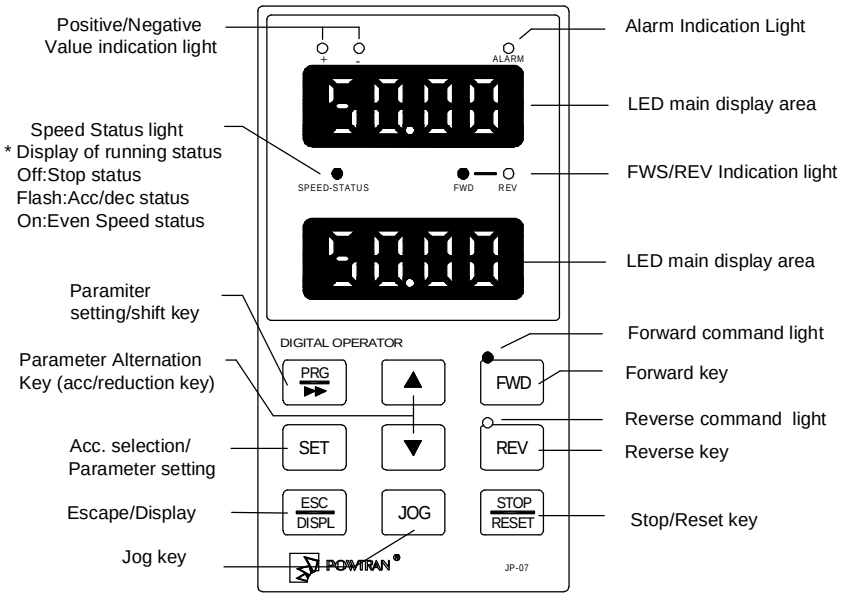


*JP5E7000 is the standard keyboard for PI7800, PI7600 Family inverter.

u For the 4 keypads, when the keypad is unlocked, press the and simultaneously for 3 seconds, the keypad is locked, LED displays normally after displaying “LoC” for 2 seconds; when the keypad is locked, press the and simultaneously for 3 seconds, the keypad is unlocked, LED displays normally after displaying “ULoC” for 2 seconds.

☆ JP6E7000, JP6C7000 keyboard

Specification and function description



function description

Forward key:
- Drive forward.

Reverse key:
- Drive reverse.

Stop/Reset key:
- Drive stops, resets after abnormity and confirms fault.

Acc. Selection /Parameter setting:
- When select parameter, press the SET key and add/reduction key, parameter code add/reduce 10
- Restore modified value
- alternate the monitor object and monitor

Escape/display
- Escape modifying the data of function parameters
- Escape of submenu or running into menu of status display from function menu
- Escape of fault status.

Jog key
- On: jog
- Off: stop

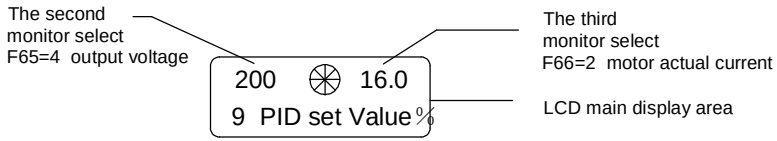
The upper LED main display area
- Display frequency, current, voltage, etc. Also display fuult code, password

right
FWD/REV Indication light
- Display motor's running state: forward or reverse.

The nether LED main display area
- Display function code
- Display set frequency during running

JP6E7000 is standard keyboard for PI7800, PI7600 Family inverter.

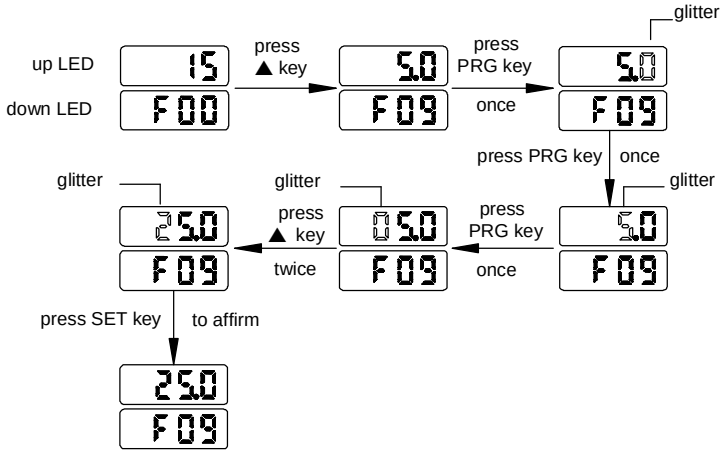
JP6C7000 keyboard has the same structure and instruction with those of JP6E7000. The difference is that the lower LED display is changed into LCD display which displays the state and parameters in English. JP6C7000 is the optional keyboard for PI7800, PI7600.



3-2. Parameters set mode

e.g. 1 Modify acceleration time F09=5.0 to F09=25.0:v

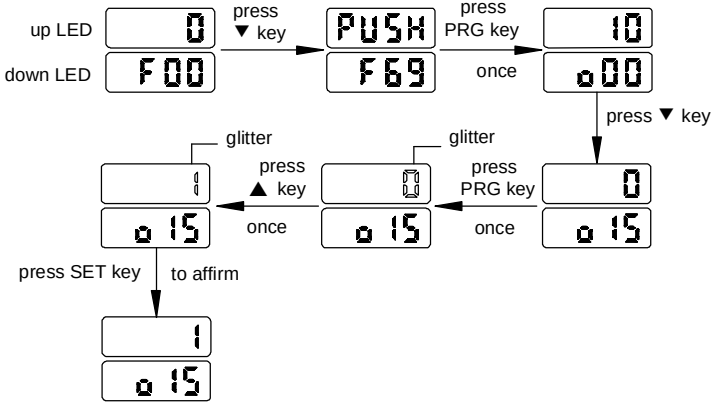
1. With F00 mode, press ▲ selecting F09, upper LED displays 5.0.
2. Press PRG for 3 times, upper LED ten digits "0" flashes.
3. Press ▲ for twice, upper LED ten digits displays "2".
4. Press SET confirming value modification.



e.g. 2 Modify o15=0 to o15=1

1. With F00, press ▼ selecting F69.
2. Press PRG entering I/O group parameters menu.
3. Press ▼ selecting o15.

4. Press PRG once modifying o15.
5. Press ▲ once, upper LED flashes "1".
6. Press SET confirming value modification.

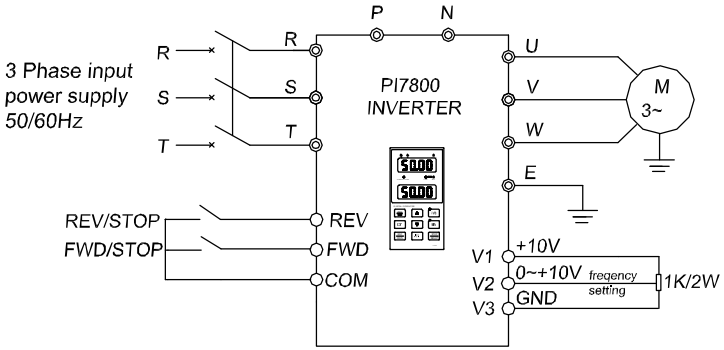


Section IV. Test running

- **u** Before connecting the power supply with the frequency converter, confirm that the input voltage of AC power is within the rated input voltage of the frequency converter.
- **u** Connect the power supply with the R, S and T terminals of frequency converter (connect with R and S terminals for single-phase input).
- **u** Select the proper operation control method.

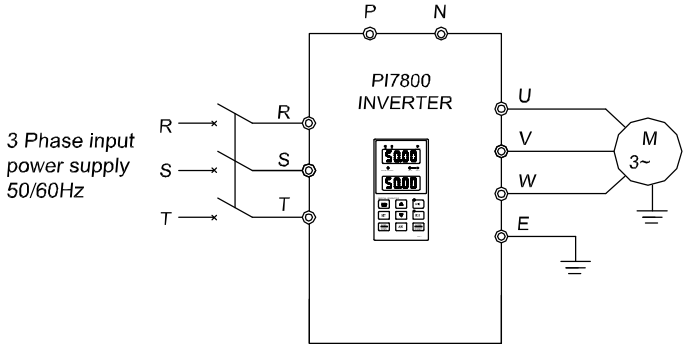
e.g.: analog voltage input + keyboard /terminal operating (Pr.F04=1, Pr.F05=1).

The frequency command is controlled by terminal V2, and the operation is controlled by the keyboard and terminal FWD、REV.



e.g.: keyboard adjust speed + keyboard operating (Pr.F04=0, Pr.F05=0)

The frequency command is controlled by the key , and operation is controlled by the key FWD、REV controlling the forward and reverse.



※ Running the unit without load, regulate the speed and check.

※ Confirm the min. and max values of the set output frequency.

※ Check JOG control.

※ Confirm the acceleration and deceleration time.

※ Connect with the motor.

※ Run the motor at low speed and check its rotation direction.

Check if all the displays and outputs during the operation are correct.

Section V. Function parameter table

5-1. Basic Parameters

Ref	LCD keyboard explanation	Range of set value		Unit	Factory setting	Y/N
F00	monitor select	Set frequency	0	-	0	Y
		Actual frequency	1			
		Motor actual current	2			
		Actual current percent	3			
		DC Bus voltage	4			
		Actual output voltage	5			
		Actual motor speed	6			
		Total running time	7			
		IGBT temperature	8			
		PID set value	9			
		PID feedback value	10			
		Motor output power	11			
		Excitation heft set value	12			
		Excitation heft actual value	13			
		Torque heft set value	14			
		Torque heft actual value	15			
F01	control methods	No PG V/F control	0	-	0	N
		PG V/F control	1			
		PG vector control	2			
F02	set frequency	Lower frequency~Upper frequency	F03=0	Hz	50.00	Y
			F03=1		500.0	
F03	fre. multiple set	×1	0	-	0	N
		×10	1			
F04	fre. set mode	Keypad	0	-	0	N
		V2	1			
		I2	2			
		V2+I2	3			
		Ascend/Descend control 1	4			
		Program running	5			
		Traverse running	6			
		PID control	7			
		Keypad potentionmeter set	8			

		V2 Forward/Reverse set	9			
		Keypad potentionmeter FWD/REV set	10			
		V2 proportional linkage adjustment	11			
		I2 proportional linkage	12			
		Ascend/Descend control 2	13			
F05	run control mode	Keypad+RS485/CAN	0	-	0	Y
		Keypad + terminal+RS485/CAN	1			
		RS485/CAN	2			
		terminal	3			
F06	waveform mode	Asynchronous space vector PWM	0	-	1	N
		Stepless & subsection synchronous space vector PWM	1			
		2 phase optimized space vector PWM	2			
F07	auto.torque boost	0~10		%	0	Y
F08	V/F boost mode	0~61		-	2	N
F09	accelerate time	0.1~3200.0		s	10.0	Y
F10	decelerate time	0.1~3200.0		s	10.0	Y
F11	slip compensate	0~10		%	0	N
F12	O.P. voltage ratio	50~110		%	100	N
F13	max. frequency	10.00~300.00	F03=0	Hz	50.00	N
		100.0~800.0	F03=1		500.0	
F14	basic frequency	5.00~ F13	F03=0	Hz	50.00	N
		50.0~ F13	F03=1		500.0	
F15	carrier frequency	1.0~16.0		kHz	★	Y
F16	Lower frequency	0.00~ F17	F03=0	Hz	0.00	N
		0.0~ F17	F03=1		0.0	
F17	upper frequency	F16~F13	F03=0	Hz	50.00	N
			F03=1		500.0	
F18	S curve acc. start	0.0~50.0		%	0.0	Y
F19	S curve acc. stop	0.0~50.0		%	0.0	Y
F20	S curve dec. start	0.0~50.0		%	0.0	Y
F21	S curve dec. stop	0.0~50.0		%	0.0	Y
F22	min. running fre.	0.00~ F13	F03=0	Hz	0.00	N
		0.0~ F13	F03=1		0.0	
F23	DC brake current	0~135		%	100	Y

F24	start brake time	0.0~60.0			s	0.0	N
F25	stop brake time	0.0~60.0			s	0.0	N
F26	brake start fre.	0.00~F13		F03=0	Hz	0.00	Y
		0.0~F13		F03=1		0.0	
F27	stopping mode	Deceleration stop		0	-	0	N
		Free stop		1			
F28	jog acc. time	0.1~3200.0			s	1.0	N
F29	jog dec. time	0.1~3200.0			s	1.0	N
F30	Jog function set	JOG stop mode	Ten's place	direction	digit	-	0	N
		Stop running	0	Forward	0			
		Reset to the state before JOG	1	Reverse	1			
F31	jog frequency set	F16~F17			F03=0	Hz	6.00	Y
					F03=1		60.0	
F32	traverse fre. 1	F33~F17			F03=0	Hz	40.00	Y
					F03=1		400.0	
F33	traverse fre. 2	F16~F32			F03=0	Hz	20.00	Y
					F03=1		200.0	
F34	traverse differ.	0.00~5.00			F03=0	Hz	2.00	Y
		0.0~50.0			F03=1		20.0	
F35	traverse time 1	0.0~3200.0				s	2.0	Y
F36	traverse time 2	0.0~3200.0				s	2.0	Y
F37	skip frequency 1	0.00~F13			F03=0	Hz	0.00	Y
		0.0~F13			F03=1		0.0	
F38	skip frequency 2	0.00~F13			F03=0	Hz	0.00	Y
		0.0~F13			F03=1		0.0	
F39	skip frequency 3	0.00~F13			F03=0	Hz	0.00	Y
		0.0~F13			F03=1		0.0	
F40	skip frequency range	0.00~5.00			F03=0	Hz	0.00	Y
		0.0~50.0			F03=1		0.0	
F41	auto. Voltage regulation	Invalid			0	-	0	Y
		Valid			1			
		Valid but useless when decelerating			2			
F42	OU stall protect	Invalid			0	-	1	Y
		Valid			1			
F43	current limit	Invalid			0	-	0	Y

		Valid			1			
F44	rate track select	Invalid			0	-	0	N
		Pick up mode when power down			1			
		Pick up mode when start			2			
F45	elec. o.h. protect	Invalid			0	-	1	Y
		Valid			1			
F46	protect level	120~250				%	★	N
F47	consumed brake	Invalid			0	-	0	Y
		Safe mode			1			
		General mode			2			
F48	Fault reset times	0~10				-	0	N
F49	Fault reset time	0.5~20.0				s	1.0	N
F50	Program running mode	Single circulation			0	-	0	N
		Continuous circulation			1			
		Single circulation command running			2			
F51	Restart mode	Runs at step 1			0	-	0	N
		Runs at the step before stopping			1			
F52	RST input signal	Reset			0	-	0	Y
		External fault/Reset			1			
F53	Fan start temp. (options)	0.0~60.0				℃	0.0	Y
F54	Motor run direction	FWD command,motor forwards			0	-	0	N
		FWD command,motor reverses			1			
F55	Motor reverse forbidden	Reverse allowable			0	-	0	N
		Reverse forbidden			1			
F56	Time unit setting	dec. time	hundred's place	Acc. time	tens place	reserved	digit	-	0	N
		×1s	0	×1s	0			
		×30s	1	×30s	1			
		×600s	2	×600s	2			
		×3600s	3	×3600s	3			
F57	% in energy saving energy	30~100				%	100	N
F58	FDT fre. set 1	F59~ F13			F03=0	Hz	0.00	Y
		F59~ F13			F03=1		0.0	
F59	FDT fre. set 2	0.00~ F58			F03=0	Hz	0.00	Y
		0.0~ F58			F03=1		0.0	

F60	Fre. Inspection range	0.00~5.00	F03=0	Hz	0.00	Y
		0.0~50.0	F03=1		0.0	
F61	Load type	General	0		0	N
		Water Pump	1			
		Blower fan	2			
		Plastic jetting mould machine	3			
		Braiding machine	4			
		Hoister	5			
		Pumping jack	6			
		Belt conveyor	7			
		Electromagnetic stirring power supply	8			
F62	Terminal control modes	Standard running control	0	-	0	N
		2-point running control	1			
		3-point running control	2			
F63	MSS terminal function selection	Invalid	0	-	0	N
		MSS multi-step speed control	1			
		MSS multi-step acceleration control	2			
		JOG forward/ reverse control	3			
		Frequency setting mode switch	4			
		Upper torque shifted	5			
		MSS time running	6			
		Control mode shifted	7			
		Reset program running segment	8			
F64	Polarity of input terminal	0~255		-	0	N
F65	Monitor Subject	Set frequency	0	-	1	N
F66	Reserved	Actual frequency	1	-	2	N
		Motor actual current	2			
		Actual current percent	3			
		DC Bus voltage	4			
		Actual output voltage	5			
		Actual motor speed	6			
		Total running time	7			
		IGBT temperature	8			
		PID set value	9			
		PID feedback value	10			
		Motor output power	11			

		Excitation heft set value	12			
		Excitation heft actual value	13			
		Torque heft set value	14			
		Torque heft actual value	15			
F67	V/F curve set	Useless	Press [PROG/ENT]	-		Y
F68	MSS speed control					
F69	I/O group select					
F70	CUR group select					
F71	SPD group select					
F72	PID group select					
F73	SYS group select					
F74	MOT group select					

5-2. Other Parameters

5-2-1. F67 V/F curve [V/F]

Ref	LCD keyboard explanation	Range of set value		Unit	Factory setting	Y/N
U00	V/F set fre 1	0.00~U02	F03=0	Hz	5.00	N
		0.0~U02	F03=1		50.0	
U01	V/F set voltage 1	0~U03		%	5	N
U02	V/F set fre. 2	U00~U04	F03=0	Hz	10.00	N
			F03=1		100.0	
U03	V/F set voltage 2	U01~U05		%	10	N
U04	V/F set fre. 3	U02~U06	F03=0	Hz	15.00	N
			F03=1		150.0	
U05	V/F set voltage 3	U03~U07		%	15	N
U06	V/F set fre. 4	U04~U08	F03=0	Hz	20.00	N
			F03=1		200.0	
U07	V/F set voltage 4	U05~U09		%	20	N
U08	V/F set fre. 5	U06~U10	F03=0	Hz	25.00	N
			F03=1		250.0	
U09	V/F set voltage 5	U07~ U11		%	25	N
U10	V/F set fre. 6	U08~U12	F03=0	Hz	30.00	N
			F03=1		300.0	
U11	V/F set voltage 6	U09~U13		%	30	N
U12	V/F set fre. 7	U10~U14	F03=0	Hz	35.00	N
			F03=1		350.0	
U13	V/F set voltage 7	U11~U15		%	35	N

U14	V/F set fre. 8	U12~F13	F03=0	Hz	40.00	N
			F03=1		400.0	
U15	V/F set voltage 8	U13~100		%	40	N

5-2-2. F68 MSS group [MSS]

Ref	LCD keyboard explanation	Range of set value		Unit	Factory setting	Y/N
H00	1 step speed 1X	F16~F17	F03=0	Hz	5.00	Y
			F03=1		50.0	
H01	2 step speed 2X	F16~F17	F03=0	Hz	30.00	Y
			F03=1		300.0	
H02	3 step speed 3X	F16~F17	F03=0	Hz	20.00	Y
			F03=1		200.0	
H03	4 step speed 4X	F16~F17	F03=0	Hz	30.00	Y
			F03=1		300.0	
H04	5 step speed 5X	F16~F17	F03=0	Hz	40.00	Y
			F03=1		400.0	
H05	6 step speed 6X	F16~F17	F03=0	Hz	45.00	Y
			F03=1		450.0	
H06	7 step speed 7X	F16~F17	F03=0	Hz	50.00	Y
			F03=1		500.0	
H07	1 step time T1	0.0~3200.0		s	2.0	Y
H08	2 step time T2	0.0~3200.0		s	2.0	Y
H09	3 step time T3	0.0~3200.0		s	2.0	Y
H10	4 step time T4	0.0~3200.0		s	2.0	Y
H11	5 step time T5	0.0~3200.0		s	2.0	Y
H12	6 step time T6	0.0~3200.0		s	2.0	Y
H13	7 step time T7	0.0~3200.0		s	2.0	Y
H14	acc. time at1	0.1~3200.0		s	10.0	Y
H15	dec. time dt1	0.1~3200.0		s	10.0	Y
H16	acc. time at2	0.1~3200.0		s	10.0	Y
H17	dec. time dt2	0.1~3200.0		s	10.0	Y
H18	acc. time at3	0.1~3200.0		s	10.0	Y
H19	dec. time dt3	0.1~3200.0		s	10.0	Y
H20	acc. time at4	0.1~3200.0		s	10.0	Y
H21	dec. time dt4	0.1~3200.0		s	10.0	Y
H22	acc. time at5	0.1~3200.0		s	10.0	Y
H23	dec. time dt5	0.1~3200.0		s	10.0	Y

H24	acc. time at6	0.1~3200.0												s	10.0	Y
H25	dec. time dt6	0.1~3200.0												s	10.0	Y
H26	acc. time at7	0.1~3200.0												s	10.0	Y
H27	dec. time dt7	0.1~3200.0												s	10.0	Y
H28	Multi-step speed 1 running direction	dec. time	kilobit	Acc. time	hundred's place	Running time	tens place	Running direction	digit	-	0	Y				
		×1s	0	×1s	0	×1s	0	forward	0							
		×30s	1	×30s	1	×10s	1									
		×600s	2	×600s	2	×100s	2	reverse	1							
		×3600s	3	×3600s	3	×1000s	3									
H29	Multi-step speed 1 running direction	dec. time	kilobit	Acc. time	hundred's place	Running time	tens place	Running direction	digit	-	0	Y				
		×1s	0	×1s	0	×1s	0	forward	0							
		×30s	1	×30s	1	×10s	1									
		×600s	2	×600s	2	×100s	2	reverse	1							
		×3600s	3	×3600s	3	×1000s	3									
H30	Multi-step speed 1 running direction	dec. time	kilobit	Acc. time	hundred's place	Running time	tens place	Running direction	digit	-	0	Y				
		×1s	0	×1s	0	×1s	0	forward	0							
		×30s	1	×30s	1	×10s	1									
		×600s	2	×600s	2	×100s	2	reverse	1							
		×3600s	3	×3600s	3	×1000s	3									
H31	Multi-step speed 1 running direction	dec. time	kilobit	Acc. time	hundred's place	Running time	tens place	Running direction	digit	-	0	Y				
		×1s	0	×1s	0	×1s	0	forward	0							
		×30s	1	×30s	1	×10s	1									
		×600s	2	×600s	2	×100s	2	reverse	1							
		×3600s	3	×3600s	3	×1000s	3									
H32	Multi-step speed 1 running direction	dec. time	kilobit	Acc. time	hundred's place	Running time	tens place	Running direction	digit	-	0	Y				
		×1s	0	×1s	0	×1s	0	forward	0							
		×30s	1	×30s	1	×10s	1									
		×600s	2	×600s	2	×100s	2	reverse	1							
		×3600s	3	×3600s	3	×1000s	3									
H33	Multi-step speed 1 running direction	dec. time	kilobit	Acc. time	hundred's place	Running time	tens place	Running direction	digit	-	0	Y				
		×1s	0	×1s	0	×1s	0	forward	0							
		×30s	1	×30s	1	×10s	1									
		×600s	2	×600s	2	×100s	2	reverse	1							
		×3600s	3	×3600s	3	×1000s	3									
H34	Multi-step speed 1	dec. time	kilobit	Acc. time	hundred's place	Running time	tens place	Running direction	digit	-	0	Y				
		×1s	0	×1s	0	×1s	0	forward	0							

	running direction	×30s	1	×30s	1	×10s	1	reverse	1			
		×600s	2	×600s	2	×100s	2					
		×3600s	3	×3600s	3	×1000s	3					

5-2-3. F69 I/O group [I/O]

Ref	LCD keyboard explanation	Range of set value		Unit	Factory setting	Y/N
o00	V2 input filter time	2~200		ms	10	Y
o01	V2 min. input voltage	0.00~o02		V	0.00	Y
o02	V2 max. input voltage	o01~10.00		V	10.00	Y
o03	I input filter time	2~200		ms	10	Y
o04	I input min. current	0.00~o05		mA	0.00	Y
o05	I input max. current	o04~20.00		mA	20.00	Y
o06 o07	DA1 Ouput DA2 Output	No Function	0	- -	0 0	Y Y
		Set frequency	1			
		Actual frequency	2			
		Actual current	3			
		Output voltage	4			
		Bus voltage	5			
		IGBT temperature	6			
		Output power	7			
		Output speed	8			
		Actual torque	9			
o08	DA1 output lower adjustment	0~o09		%	0.0	Y
o09	DA1 output upper adjustment	o08~100.0		%	100.0	Y
o10	DA2 output lower adjustment	0~ o11		%	0.0	Y
o11	DA2 output upper adjustment	o10~100.0		%	100.0	Y
o12	DFM multiple	1~20		-	1	Y
o13 o14 o15 o16 o17 o18	O.P. signal sel. 1 O.P. signal sel. 2 O.P. signal sel. 3 O.P. signal sel. 4 O.P. signal sel. 5 O.P. signal sel. 6	No function	0	- - - - - -	0 0 0 0 1 8	Y Y Y Y Y Y
		Fault alarm	1			
		Over current inspection	2			
		Over load inspection	3			
		Over voltage inspection	4			
		Lack voltage inspection	5			
		Low load inspection	6			
		Over heat inspection	7			
		Running state with command	8			

		PID feedback signal abnormity	9			
		Motor reverse	10			
		Set frequency arrival	11			
		Upper limit frequency	12			
		Lower limit frequency	13			
		FDT frequency 1 arrival	14			
		FDT frequency level inspection	15			
		0 speed running	16			
		Position arrival	17			
		PG fault	18			
		Program running 1 cycle finished	19			
		Speed pursue mode inspection	20			
		Running state without command	21			
		Inverter reverse command	22			
		Deceleration running	23			
		Acceleration running	24			
		High pressure arrival	25			
		Low pressure arrival	26			
		Inverter's rated current arrival	27			
		Motor's rated current arrival	28			
		Set fre. arrives lower fre.	29			
		FDT frequency set 2 arrives	30			
		Fault code output (o13~o16 valid)	31			
		Digits of frequency output (o13~o16 valid)	32			
o19	Minimum input frequency	0.00~F13	F03=0	-	0.00	Y
		0.0~F13	F03=1		0.0	
o20	Maximum input frequency	0.00~F13	F03=0	-	50.00	Y
		0.0~F13	F03=1		500.0	

5-2-4. F70 CUR group [CUR]

Ref	LCD keyboard explanation	Range of set value	Unit	Factory setting	Y/N
C00	detect filter time	2~200	ms	10	Y
C01	re. filter time	2~200	ms	10	Y
C02	integral time of current loop	0~9999	ms	500	Y
C03	proportion gain	0~1000	%	100	Y

C04	torque setting	0.0~100.0	%	80.0	Y
C05	excitation setting	0.0~100.0	%	60.0	Y

5-2-5. F71 SPD group [SPD]

Ref	LCD keyboard explanation	Range of set value	Unit	Factory setting	Y/N
d00	filter time	2~200	ms	10	Y
d01	integral time	0.01~100.00	s	0.25	Y
d02	differential time	0.000~1.000	s	0.000	Y
d03	proportion gain	0~1000	%	100	Y

5-2-6.F72 PID group [PID]

Ref	LCD keyboard explanation	Range of set value				Unit	Factory setting	Y/N
P00	PID regulate mode	Abnormity management	Tens digit	Adjustment mode	Unit	-	10	N
		Warning Continuous running	1	Negative action	0			
		Warning Decelerating running	2	Positive action	1			
		Warning Free stop	3					
P01	O.P. fre. limit	0~110				%	100	N
P02	Feedback signal select	External terminal IF:0~20mA			0	-	2	N
		External terminal IF:4~20mA			1			
		External terminal VF:0~10V			2			
		External terminal VF:1~5V			3			
P03	set signal select	External terminal I2:0~20mA			0	-	3	N
		External terminal I2:4~20mA			1			
		External terminal V2:0~10V			2			
		Keyboard input			3			
		RS485 input			4			
		Setting by keypad potentionmeter			5			
P04	key set signal	0.0~100.0				%	50.0	Y
P05	integral time	0.01~100.00				s	0.25	Y
P06	differential time	0.000~1.000				s	0.000	Y
P07	proportion gain	0~1000				%	100	Y
P08	fault detect time	0.0~3200.0				s	300.0	Y

5-2-7. SYS group [SYS]

Ref	LCD keyboard explanation	Range of set value			Unit	Factory setting	Y/N
y00	Restore factory setting	No reset		0	-	0	N
		Instant reset		1			
y01	fault record 1	Press [PRG] and [▲], the frequency, current and running state of fault time can be known.			-	-	N
y02	fault record 2						
y03	fault record 3						
y04	fault record 4						
y05	fault record 5						
y06	Fault record reset	No activity		0	-	0	Y
		Reset		1			
y07	rated O.P. current	0.1~1000.0			A	★	N
y08	rated I.P. voltage	100~1140			V	★	N
y09	product series	70	0	3	-	★	N
		Family serial	Function code	Input voltage level			
y10	software version	-			-	-	N
y11	baud rate	Baud rate 1200		0	-	3	N
		Baud rate 2400		1			
		Baud rate 4800		2			
		Baud rate 9600		3			
		Baud rate 19200		4			
		Baud rate 38400		5			
y12	communi. address	1~128			-	8	N
y13	total time set	Clear automatically after starting		0	-	1	Y
		Continuous accumulation after starting		1			
y14	total time unit	Hour		0	-	0	Y
		Day		1			
y15	Manufacture date	YYYY			-	-	N
y16	making month/day	MMDD			-	-	N
y17	decode input	0~9999		set range	-	-	Y
		Record of times of wrong decode		display content			
y18	password input	0~9999		set range	-	-	Y
		No setting password or Input decode correct	deco	display content			
		Parameters locked	code				

5-2-8. MOT group [MOT]

Ref	LCD keyboard explanation	Range of set value		Unit	Factory setting	Y/N
b00	motor poles	1~8		-	2	N
b01	motor rated cur.	y07×(30%~120%)		A	★	N
b02	motor rated vol.	100~1140		V	★	N
b03	motor rated speed	500~5000		rpm	1500	N
b04	motor rated frequency	0.00~F13	F03=0	%	50.00	N
		0.0~F13	F03=0		500.0	
b05	Motor un-load cur.	0~b01		A	★	N
b06	stator resistor	0.000~30.000		ohm	0.000	N
b07	rotor resistor	0.000~30.000		ohm	0.000	N
b08	leakage inductance	0.0~3200.0		mH	0.0	N
b09	mutual inductance	0.0~3200.0		mH	0.0	N
b10	PG pulse	300~9999		-	2048	N
b11	PG cut action	Continue running	0	-	0	N
		Alarm & decelerate to stop	1			
		Alarm and stop freely	2			
b12	PG rotate direct.	Phase A is foregoing when motor forwards	0	-	0	N
		Phase B is foregoing when motor forwards	1			
b13	Motor parameter measure	No measurement	0	-	0	N
		Measured before running	1			
b14	Rotate speed display plus	0.1~2000.0		%	100.0	Y
b15	Percentage linkage modulus	0.10~10.00		-	1.00	Y
b16	reserved	0		-	0	N
b17	reserved	0		-	0	N

NOTE:

1) Y/N means the parameter is adjustable or not during running, Y means it is adjustable, N means it is not.
2) ★ means the parameter's factory setting is affected by the power and type.

Section VI. Function Parameter Description

6-1. Basic parameter:

F00: **Monitor selection** **factory setting: 0**

The value range is 0~15 monitoring 0~15 different objects under running.

Monitor objects under running

0: Set frequency
Set frequency under frequency setting mode.
1: Actual frequency
Current output frequency.
2: Motor actual current
Detected value of motor's current.
3: Actual current percentage
Percentage of motor's actual current and rated current.
4: DC bus voltage
Detected voltage of DC bus.
5: Output voltage
Actual output voltage of inverter.
6: Actual motor speed rpm
During running, the display of the adjusted motor's actual rotate speed=60 × Actual output frequency × Rotate speed display plus/Motor poles
e.g. Actual output frequency50.00Hz, Rotate speed display plus b14=100.0%, Motor poles b00=2, the display of the adjusted motor's actual rotate speed=1500rpm.
During stopping state, checking the motor speed according to residual stress, renewed speed 500ms.
The display of the adjusted motor's actual rotate speed=60 × residual stress frequency × rotate speed display plus/Motor poles
7: Total running time
This parameter indicates the total running time, and the unit is hour or day.
e.g. If led display value is 10.31, y14 is 0, the actual running time of the machine is 10 hours,18 minutes and 36 seconds; if led display value is 20.03 and y14 is 1, the actual running time of the machine is 20 days,43 minutes and 12 seconds.
8: IGBT temperature
Detected IGBT temperature inside inverter.
9: PID set value
Set value percentage when running under PID adjustment.
10: PID feedback value
11: Motor output power
Motor actual output power percentage.
12: Excitation heft set value
Motor's set excitation heft percentage.
13: Excitation heft actual value
Motor's actual excitation heft percentage.
14: Torque heft set value
Motor set torque percentage.

15: Torque heft actual value
Motor actual torque hefts percentage.

F01: **Control mode** **factory setting: 0**

This parameter value range is 0~2.
0: Without PG V/F control. V/F space voltage vector control.
1: With PG V/F control. V/F space voltage vector control + speed sensor.
2: With PG vector control .vector control + speed sensor

F02: **Set frequency** **factory setting: 50.00/500.0Hz**

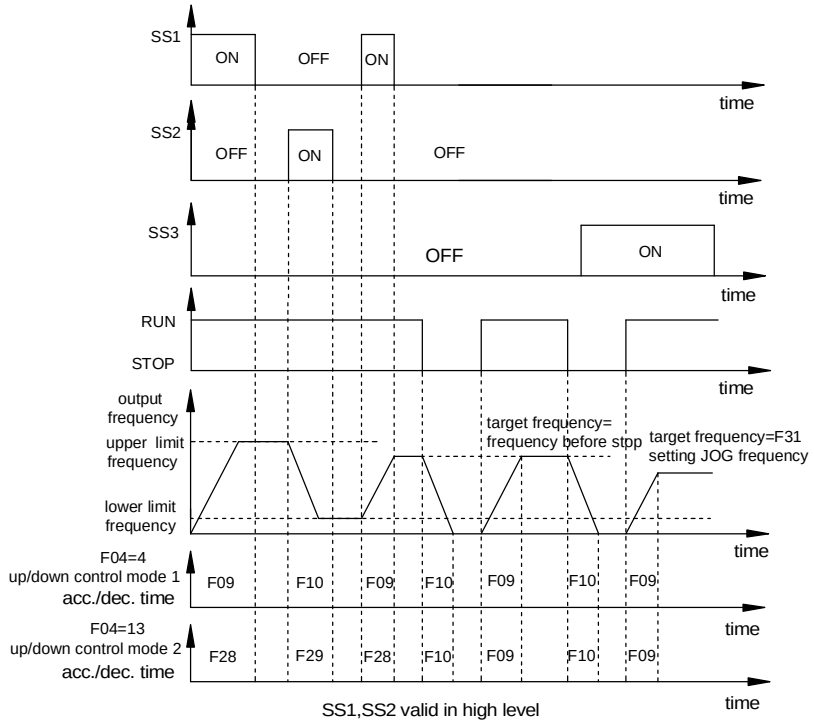
Setting running frequency can be from lower frequency to upper frequency.

F03: Frequency multiple setting **factory setting: 0**

0: Set frequency display accuracy is 0.01Hz. With this accuracy, F13 maximum frequency range is 10.00~300.00Hz.
1: Set frequency display accuracy is 0.1Hz. With this accuracy, F13 maximum frequency range is 100.0~800.0Hz.

F04: Frequency setting mode **factory setting: 0**

Frequency setting modes can be set by the value 0~10, as following:
0: Keypad or RS485 set
1: Set frequency by analog input V2
2: Set frequency by analog input I2
3: By analog input V2 and I2 simultaneity
4: Ascend/Descend control:



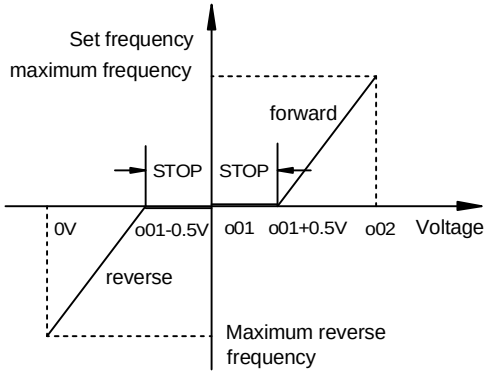
This function is to control ascend/descend and target frequency with the terminals SS1, SS2, SS3.
It is OFF when SS1, SS2, SS3 are disconnected with COM, ON when they are short circuited.

SS1	Ascend control is to change the frequency increased	
SS2	Descend control is to change the frequency reduced, has precedence over SS1	
SS3	ON	During stopping state, change the frequency caused by SS1/SS2 and turn it to F31 jog frequency
	OFF	During stopping state, keep the frequency caused by SS1/SS2

The Ascend/Descend control time in Ascend/Descend control 1 is set by modifying F09/ F10.

The Ascend/Descend time in Ascend/Descend control 2 mode is setted by modifing F28/F29.

5: Program Running
No limitation of the reverse forbidden. Setting value of H28~H34 and terminal FWD/REV decide the running direction
6: Traverse running
Running by setting traverse.
7: PID adjustment running
Applicable for pressure, current close loop control.
8: Keypad potentiometer set
Frequency set by the potentiometer on the keypad.
9. V2 Forward/Reverse set
Anolog input signal V2 is to the signal to forward/reverse frequency, when V2 is larger than o01 (V2 minimum input voltage), it is the signal to forward frequency;when V2 is smaller than o01, it is the signal to reverse frequency.



10. Keypad potentionmeter FWD/REV set
11: V2 proportion linkage tiny adjust
12: I2 proportion linkage tiny adjust
13: Ascend/Descend control 2

F05: Running control mode **factory setting: 0**

0: Keypad+RS485/CAN control
1: Keypad + terminal control+RS485/CAN control
To terminal control, edge triggers. Execute FOR/REV command in falling edge and execute STOP command in rising edge.
Note: F62=0 is valid.
2: RS485/CAN
3: Terminal, level triggers. F62=0/1/2 is valid.
4.Proportional linkage function (improved)
For this function, the host computer should be set with the following parameters:

y12	Communication add.	128

For this function, the slave computer should be set with the following parameters:

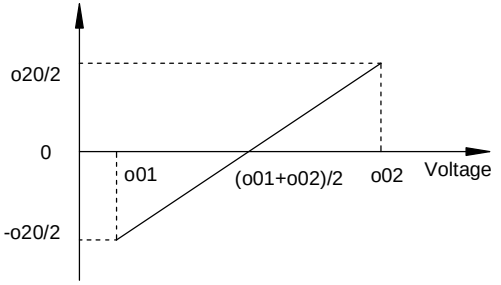
F04	Fre. Set mode	V2 proportional linkage adjustment	11
		I2 proportional linkage adjustment	12
F05	Run control mode	proportional linkage control	4
F13	Max. frequency	Max. output frequency of inverter	
F22	Min. running fre.	Min. output frequency of inverter	
y12	Communi. address	0~127	
y11	Baud rate	The same with that of host inverter	
b15	Proportional linkage factor	0.10~10.00	
o01	V2 min. input voltage	Adjustment range min. voltage	
o02	V2 max. input voltage	Adjustment range max voltage	
o19	Min. input frequency	0.00	
o20	Max. input frequency	Adjustment range	

- Set 128, the inverter is the host inverter among the proportional linkage. There is only one host inverter in one proportional linkage.
- The F04 and F05 parameters of the host inverter can be any settings. The running states of the slave inverters follow the host inverter.
- If the host inverter F04=11/12, setting proportional linkage adjustment, then F63=1 automatically, the frequency of the host inverter controlled by MSS multi-step speed SS1/SS2/SS3.

SS3	SS2	SS1	The host inverter frequency
0	0	0	Potentiometer adjustment
0	0	1	1 step speed + Potentiometer adjustment
0	1	0	2 step speed + Potentiometer adjustment
0	1	1	3 step speed + Potentiometer adjustment
1	0	0	4 step speed + Potentiometer adjustment
1	0	1	5 step speed + Potentiometer adjustment
1	1	0	6 step speed + Potentiometer adjustment
1	1	1	7 step speed + Potentiometer adjustment

- The host inverter controls the slave inverter's running state.

- The inverter set frequency=proportional linkage factor × host inverter frequency + value adjusted by the potentiometer.
- The range of inverter's set frequency: F22 min. running frequency~F13 max. frequency.



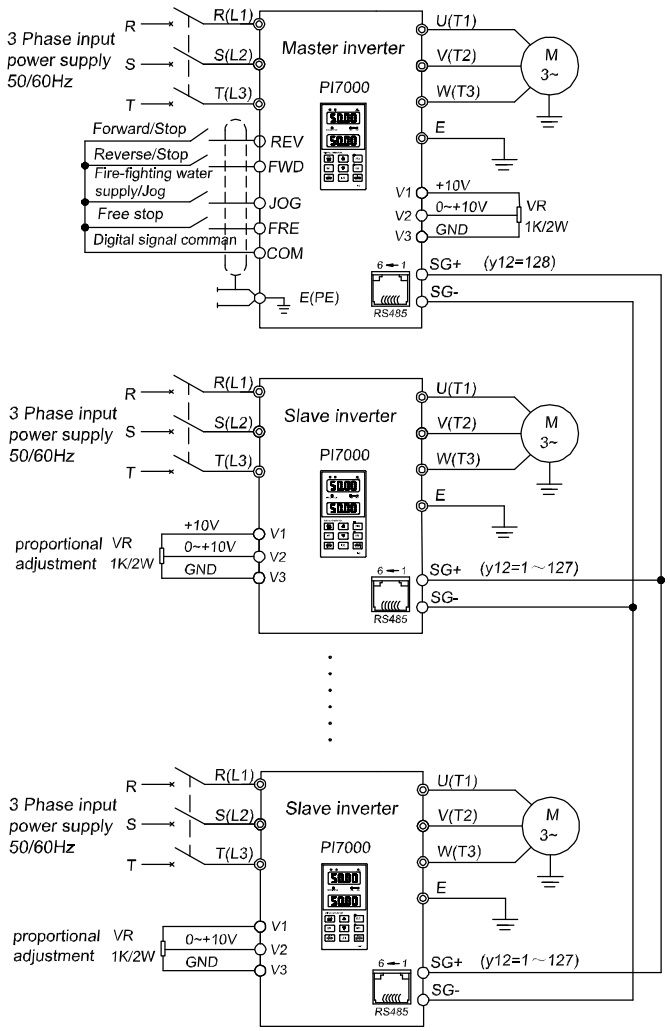
E.g. Host inverter set:

F04	Fre. Set mode	V2 proportional linkage adjustment	11
y12	Communi. address	128	
y11	Baud rate	3	
o01	V2 min. input voltage	2V	
o02	V2 max. input voltage	10V	
o19	Min. input frequency	0.00Hz	
o20	Max. input frequency	20.00Hz	

Slave inverter set:

F04	Fre. Set mode	11:V2 proportional linkage adjustment
F05	Run control mode	4
F13	Max. frequency	50.00Hz
F22	Min. running fre.	0.00Hz
y12	Communi. address	8
y11	Baud rate	The same with that of the host inverter
b15	Proportional linkage factor	1.00
o01	V2 min. input voltage	2V
o02	V2 max. input voltage	10V
o19	Min. input frequency	0．00Hz
o20	Max. input frequency	20.00Hz

Potentiometer adjustment range 20.00Hz
2V -10Hz
6V 0Hz
10V +10Hz
The proportional linkage wiring:



F06: Waveform occurrence mode **factory setting: 1**

PWM waveform occurrence mode

0: PWM Asynchronous space vector.

1: Step less & subsection synchronous space vector PWM, harmonic wave minimized, symmetric output waveform.

2: 2 phase optimized space vector PWM, switch loss minimized, asymmetry output waveform.

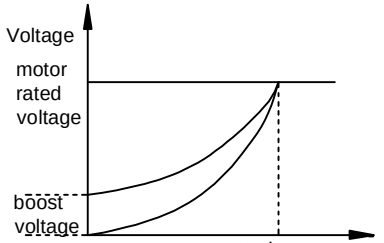
F07: Auto torque boost **factory setting: 0%**

The parameter is used to improve the inverter characteristic in lower frequency,

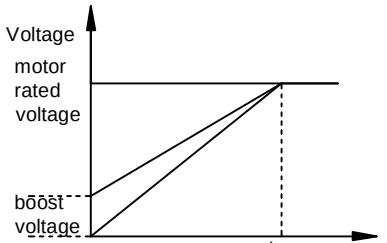
and boost output voltage when the inverter is running in low frequency.

The calculating form is:

boost voltage =motor rated voltage × (inverter actual output current / 2 times of motor rated current) × F07



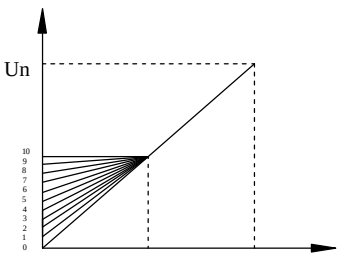
torque boost in drop torque curve



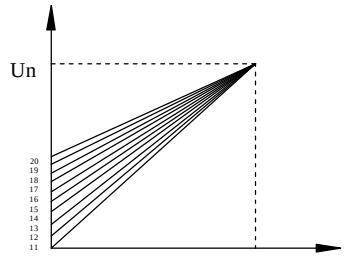
torque boost in constant torque curve

F08: V/F boost mode **factory setting: 2**

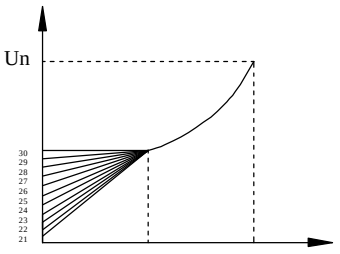
Totally 62 V/F boost modes, there into 0~20 for constant torque load, 21~40 for 1.5 power descending torque load, 41~50 for square descending torque load, 51~60 for cube descending torque load, 61 is user-defined.



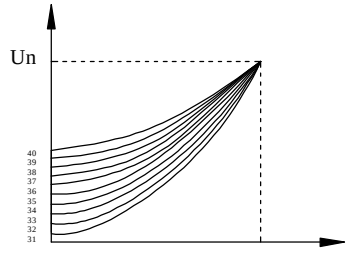
0~10



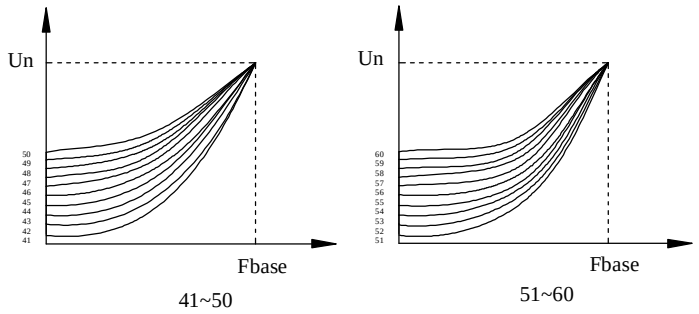
11~20



21~30

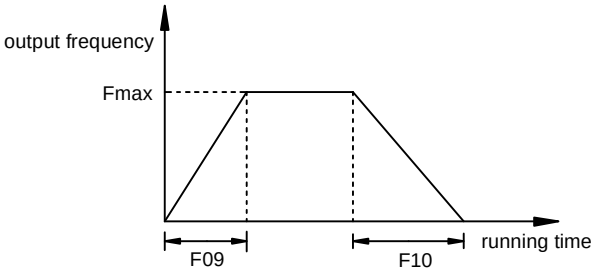


31~40



F09: Acceleration time **factory setting: 5.0s**
Acceleration time is the time from 0Hz to maximum frequency, as below:

F10: Deceleration time **factory setting: 5.0s**
Deceleration time is the time from maximum frequency to 0Hz, as below:



Actual acc/dec time equals to the set acc/dec time multiples a time multiple which is decided by the tens digit of F56. Please refer to F56.

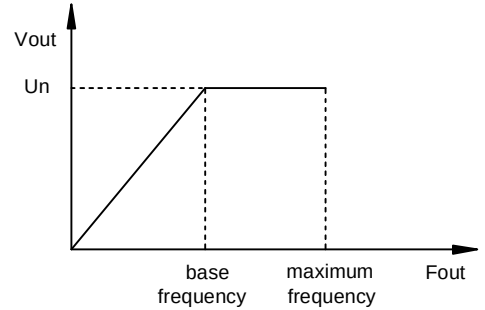
F11: Slip compensate **factory setting: 0%**
When drives drive the asynchronous motor, the load is added, slip enhanced, this parameter can set compensate frequency, reduce slip, so that the motor runs much closer to the synchronous speed under rated current. If the value set to 0, no slip compensation functions.
This function is based on correctly setting b01 motor's rated current, b05 motor's current without load.
The calculating form is:
Compensate frequency=Slip compensate × Rated frequency
× (I_{MX} – I_{M0}) / (I_{MN} – I_{M0})
I_{MX}: Motor actual working current
I_{MN}: Motor rated current
I_{M0}: Motor current without load

F12: Output voltage percentage **factory setting: 100%**
Percentage of actual output voltage and rated output voltage
This parameter is for adjusting output voltage, output voltage=inverter rated output voltage × output voltage percentage.

F13: Maximum frequency **factory setting: 50.00/500.0Hz**

Allowable maximum frequency by Inverter's adjusting speed, also the base for setting acceleration/deceleration time.
Setting this parameter should consider the characteristic and ability of motor.

F14: Basic frequency **factory setting: 50.00/500.0Hz**
This function is for motors with different base frequency.
Basic V/F feature curve:



F15: Carrier frequency **factory setting: refer to following table**
This function is chiefly used to improve the possible noise and vibration during the operation of frequency converter. When carrier frequency is higher, the output current has better wave, the torque is great at lower frequency and the motor produces light noise. So it is very suitable for use in the applications where great torque is output at low frequency quietly. But in these applications, the damage to the switches of main components and the heat generated by the inverter are great, the efficiency is decreased and the output capacity is reduced. At the same time, more serious radio interference is resulted and special attention must be paid for application where very low EMI is needed, and filter option can be used if necessary. Another problem for application of high carrier frequency is the increase of capacitance-leakage current. The protector for leakage current may invalidate function, and over current is also possibly caused.
When low carrier frequency is applied, the case is almost contrary to the above-mentioned one.
Different motor has different reflection to the carrier frequency. The best carrier frequency is gained after regulation according to actual conditions. The higher the motor capacity is, the lower the carrier frequency should be selected.

The company reserves the right to limit maximum carrier frequency as following:

Carrier frequency	Motor noise	Electric disturbance	Switch dissipation
1.0kHz	Great	Small	Small
8.0kHz	↕	↕	↕
16.0kHz	Small	Great	Great

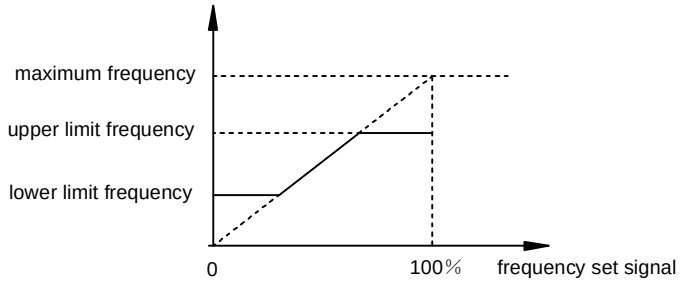
The relation between carrier frequency and the power is expressed as following:

Power (kW)	0.4~18.5	22~30	37~55	75~110	132~200	220 above (including 220)
Carrier frequency (Hz)	8.0k	7.0k	4.0k	3.6k	3.0k	2.5k

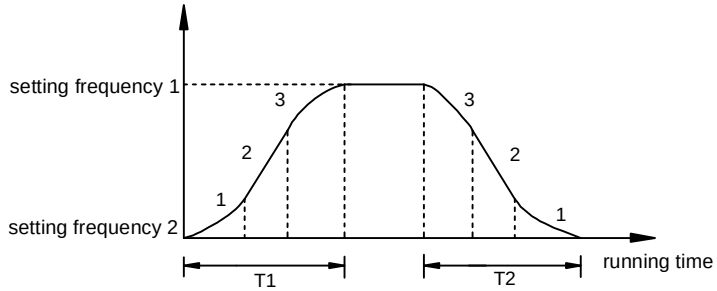
Note: The higher carrier frequency causes the higher converter heat.

F16: Lower limit frequency **factory setting: 0.00/0.0Hz**
Lower limit of output frequency.

F17: Upper limit frequency **factory setting: 50.00/500.0Hz**
Upper limit of output frequency.
When the frequency setting command is greater than upper limit, the operation frequency is the upper limit. When the frequency setting command is below the lower limit, the operation frequency is the lower limit. When starting the standstill motor, the frequency converter's output is accelerated towards the lower limit or set value from 0Hz according to the acceleration time 1. When the motor stops, the running frequency starts to decelerate towards 0Hz according to the deceleration time.



F18: S curve start time at the acceleration step **factory setting: 0.0%**
F19: S curve stop time at the acceleration step **factory setting: 0.0%**
F20: S curve start time at the deceleration step **factory setting: 0.0%**
F21: S curve stop time at the deceleration step **factory setting: 0.0%**



S curve acceleration/deceleration

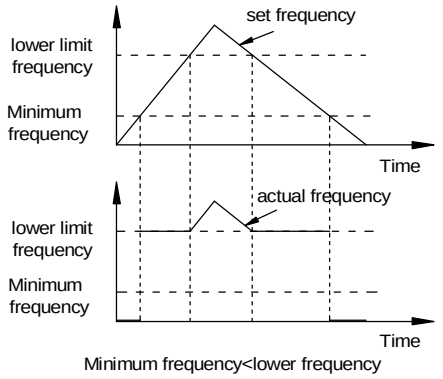
1. Slope of output frequency is enhanced from 0 to maximum level.
2. Slope of output frequency at the constant level.
3. Slope of output frequency is reduced from maximum level to 0.

If setting S curve acceleration/deceleration, the acceleration/deceleration time is calculated as:

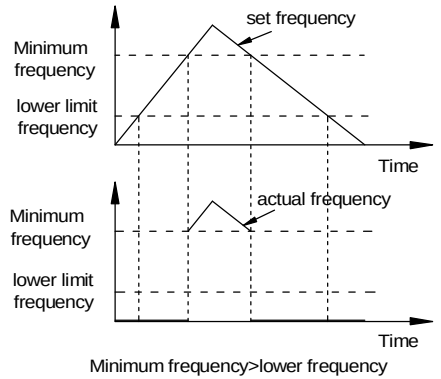
Acceleration time=Selected acceleration time+〔S feature time at the beginning of acceleration + S feature time at the end of acceleration〕×2
That is: Acceleration timeT1=F09+〔(F09×F18)+(F09×F19)〕×2

Deceleration time=Selected deceleration time+〔S feature time at the beginning of deceleration + S feature time at the end of deceleration〕×2
That is: Deceleration timeT2=F10+〔(F10×F20)+(F10×F21)〕×2

F22: Minimum running frequency **factory setting: 0.00/0.0Hz**
Inverter stops when the set frequency is lower than the minimum running frequency, that is: set frequency is 0.0Hz when set frequency is lower than the minimum running frequency.
"Minimum running frequency" is in priority rather than "Lower frequency". "Lower frequency" is in priority only with the set minimum running frequency 0Hz.



Minimum frequency<lower frequency



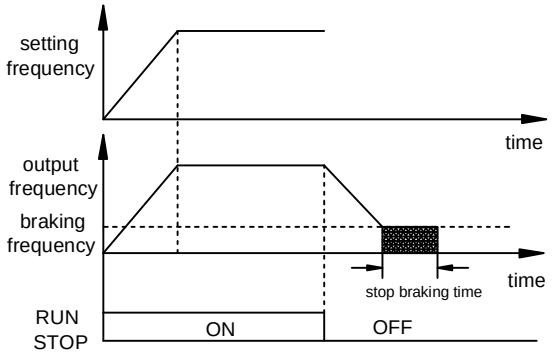
Minimum frequency>lower frequency

F23: DC braking current **factory setting: 100%**
This parameter set the percentage of DC braking current at DC braking. It is based on the rated current (inverter's rated current percentage). When setting it, do increase the value gradually until it provides enough braking torque.

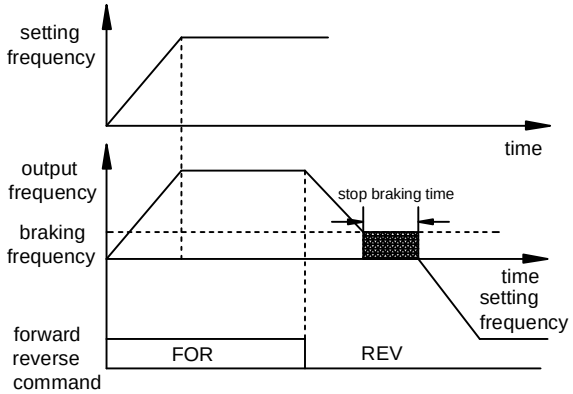
F24: DC braking time when starting **factory setting: 0.0s**
Standing time of DC braking voltage when starting.

F25: DC braking time when stopping **factory setting: 0.0s**
Standing time of DC braking voltage when stopping.

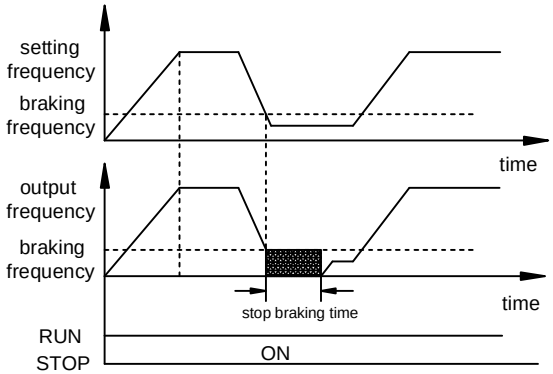
F26: Braking start up frequency **factory setting: 0.00/.00Hz**
When the frequency converter decelerates to this frequency, it stops the output of PWM waves, and then starts to output the D.C. brake wave.



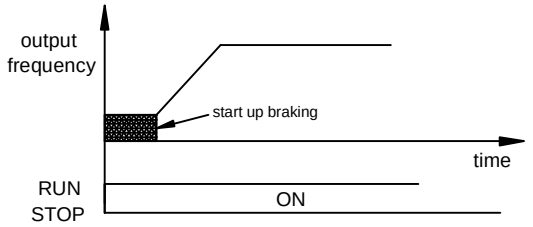
stop braking (RUN→STOP)



stop braking (forward and reverse rotate)



stop braking (run state)



start up braking

F27: Stop mode set **factory setting: 0**

When receiving "stop" command, it sets the stop mode according to this parameter.

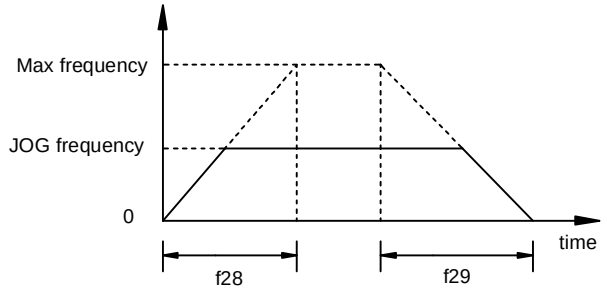
0: Deceleration stop mode, according to the deceleration time set by this parameter, inverter decelerates to the lowest frequency and stops.

1: Free stop mode. "Stop" command to the inverter, it stops output, motor runs free until stops due to the effects of load inertia.

F28: Jog acceleration time **factory setting: 1.0s**

F29: Jog deceleration time **factory setting: 1.0s**

Jog acceleration time defines the same step acceleration/deceleration.



Actual jog time equals to the set acc/dec time multiples a time multiple which is decided by the tens digit of F56. Please refer to F56.

F30: Jog function set **factory setting: 0**

End of jog	Tens digit	Description
Stop running	0	Stop running when jog ends
Reset to the status before jog	1	Reset to the status before jog
Direction	Unit	Descritption
Forward	0	Jog Forward
Reverse	1	Jog Reverse

F31: Jog frequency set **factory setting: 6.00/60.0Hz**

Jog frequency setting range is from lower limit frequency to upper limit frequency.

F32: Traverse running frequency f1 **factory setting: 40.00/400.0Hz**

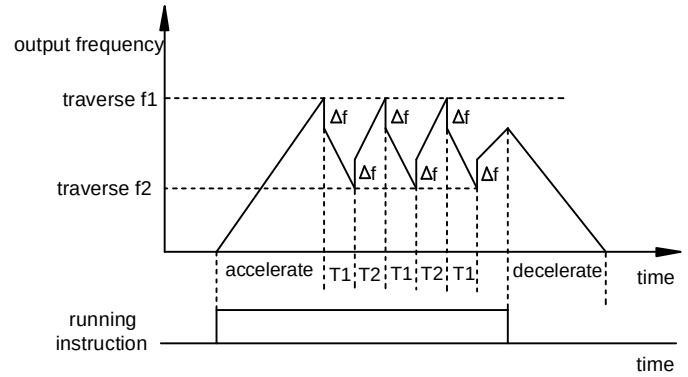
F33: Traverse running frequency f2 **factory setting: 20.00/200.0Hz**

F34: Traverse running difference △f **factory setting: 2.00/20.0Hz**

F35: Traverse running timing T1 **factory setting: 2.0s**

F36: Traverse running timing T2 **factory setting: 2.0s**

Calculating acceleration/deceleration time with f1、f2、△f、T1、T2.



F37: Skip frequency 1 **factory setting: 0.00/0.0Hz**

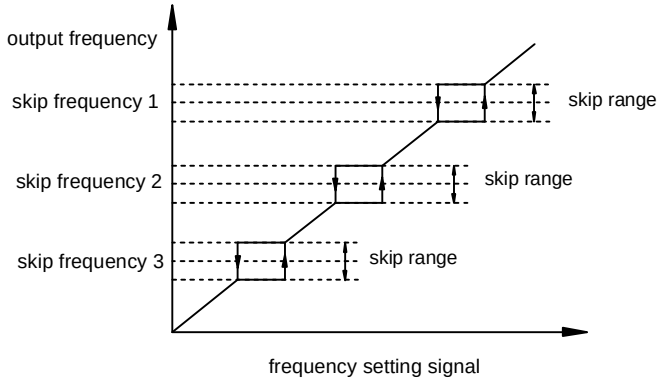
F38: Skip frequency 2 **factory setting: 0.00/0.0Hz**

F39: Skip frequency 3 **factory setting: 0.00/0.0Hz**

F40: Skip frequency range **factory setting: 0.00/0.0Hz**

During running, to skip resonance produced by the immanent resonance point in the machine system, skip mode can do this.

At most 3 resonance points can be set to skip.



Skip frequency range is the up and down frequency range on the base of skip frequency.

During acc/dec, the output frequency could normally go through the skip

frequency area.

F41: Automatic voltage regulation **factory setting: 0**

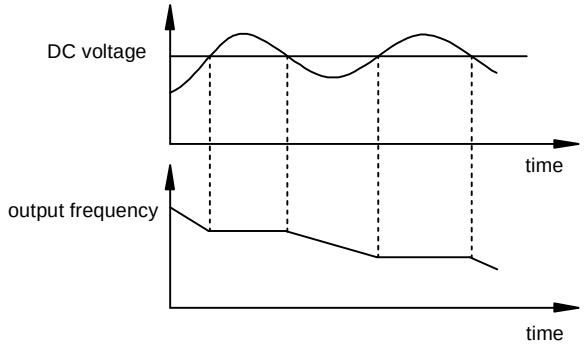
CPU automatically inspects the DC bus voltage and deal with it at the real time, when electric network voltage fluctuates, output voltage fluctuation is very small, and the V/F feature always is close to the setting state with rated input voltage.

0: Invalid

1: Valid

2: Invalid but useless when deceleration

F42: Over voltage stall protection **factory setting: 1**



0: Invalid

1: Valid

When this function is valid and the frequency converter decelerates, the motor generates voltage back to the inside of frequency converter due to the effects of load inertia. This will lead the voltage on direct current side to rise above the allowable max. Value, therefore, at this time the inverter will stop deceleration (output frequency remains unchanged) and will not decelerate until the voltage is below the set value.

This function should be set to 0 for B type frequency converter or frequency converter with external braking unit.

F43: current limit function **factory setting: 0**

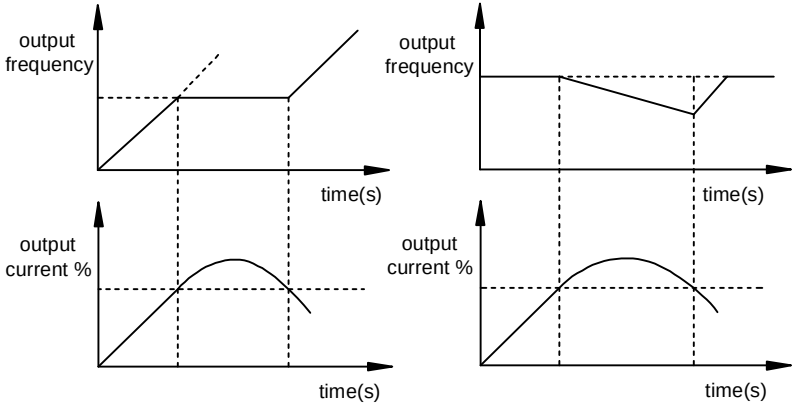
0: Invalid

1: Valid

When this function is valid and the frequency converter accelerates, its output current will rise very quickly due to too fast acceleration or too heavy load of the motor. When the current exceeds the limited value (G/S: 140% of the rated current; F: 120% of the rated current; Z/M/T: 170% of the rated current; H: 230% of the rated current), the frequency converter will stop acceleration while when the current is below the limited value, the converter will continue acceleration.

When this function is valid and the frequency converter runs steadily, its output current will rise very quickly due to too fast acceleration or too heavy load of the motor. When the current exceeds the limited value (G/S: 140% of the rated current; F: 120% of the rated current; Z/H/T: 170% of the rated current; H: 230% of the rated current), the frequency converter will reduce the output frequency, and when the current is below the limited value, the converter will accelerate

again to the setting value.



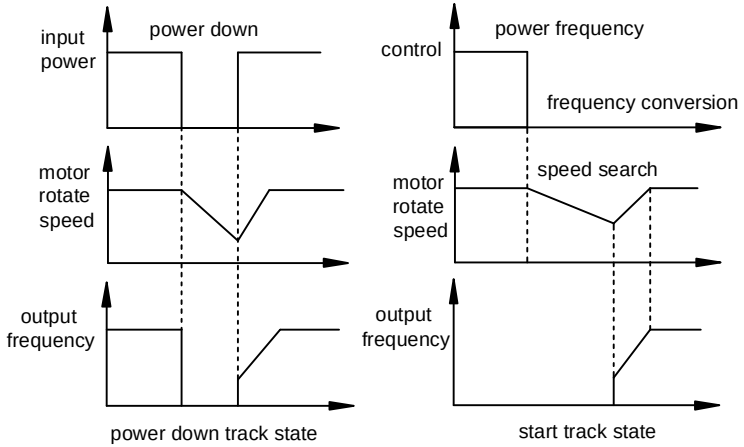
F44: Pick up selection **factory setting: 0**

This parameter is used for selecting pick up mode.

0: Invalid. Start from 0Hz or starting frequency.

1: Pick up when power down. When inverter power down instantly and restarts, motor keeps running at the current speed and direction.

2: Pick up when start. When power on, inspects the motor speed and direction, runs at the current speed and direction.



F45: Electronic thermal relay protection selection factory setting: 1

This function is to protect the motor when overheat happens to the motor without other thermal relays. Inverter's some parameters calculate the motor's high temperature, meanwhile estimating whether the current would make the motor overheat or not. Inverter stops output and display the protection information when electronic thermal relay protection function is valid.

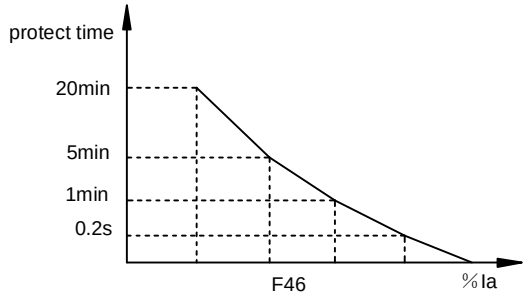
0: Invalid

1: Valid

F46: Electronic thermal relay protection level factory setting: refer to the below

The current is set by the inverter when diagnosing the over heat of the motor. The protection takes effect in 1 minute when the current equals to the product of the motor's rated current multi-pled the value of F46, that is the actual current is F46 times of rated current.

The factory value is 120% for type F, 150% for type G/S, 180% for type Z/M/T, 180% for type H.



F47: Power consuming braking selection **factory setting: 0**

0: Invalid

1: Safe mode

Only during the deceleration and inspection of DC bus voltage higher than the set value, this function takes effect.

2: General mode

Under any status, it takes effect only inspecting DC bus voltage higher than the set value.

Over voltage or over current probably occurs when inverter instantly decelerates or the load's fluctuation is big. This phenomenon occurs much easily when the load inertia is relatively big. Inside inverter DC high voltage is inspected over certain value, power consuming brake can be realized by output brake signal via external brake resistor.

F48: Fault reset times **factory setting: 0**

During running, if over current (OC) or over voltage (OU) occurs, this function makes inverter automatically reset and run at the setting state when there was no fault. Reset times are based on this parameter, at most 10 times can be set. When it is "0", automatic reset function is invalid after fault occurrence. But if DC main circuit's main relay fault MCC or lack voltage LU fault occurs, the automatic reset is not limited by this.

Restart and runs normally after fault for over 36s, the previous fault rest times is set.

Fault last for over 10s then the fault reset function could not be executed.

F49: Fault reset time **factory setting: 1.0s**

This function is for setting time interval of fault auto-reset. Inverter stops after fault, it takes more time.

For no-fault inspection than fault reset time, then fault auto-resets.

F50: Program running mode **factory setting: 0**

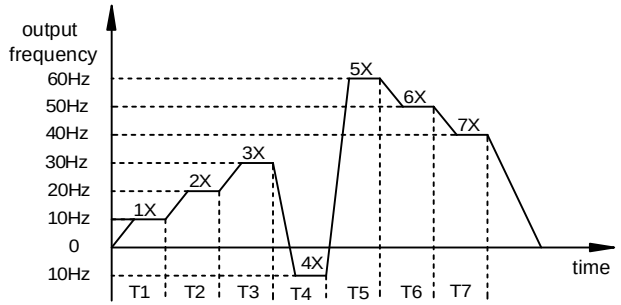
0: Single circulation.

1: Continuous circulation.

2: Single circulation, continuous running at step 7 speed, and stop when receiving STOP command.

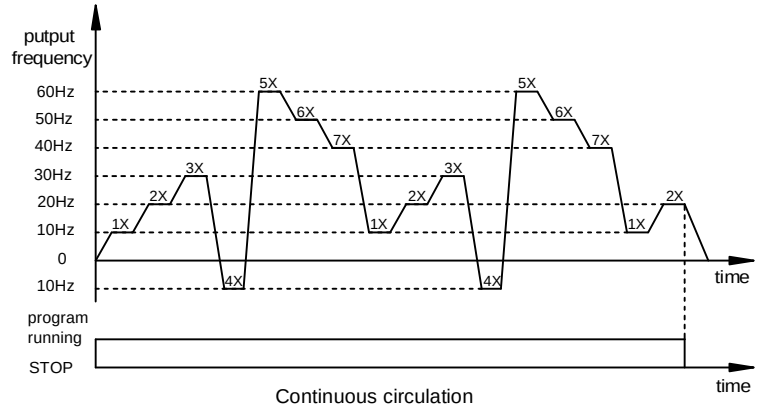
The 3 program running modes are as below:

e.g. 1 Single ciruculation



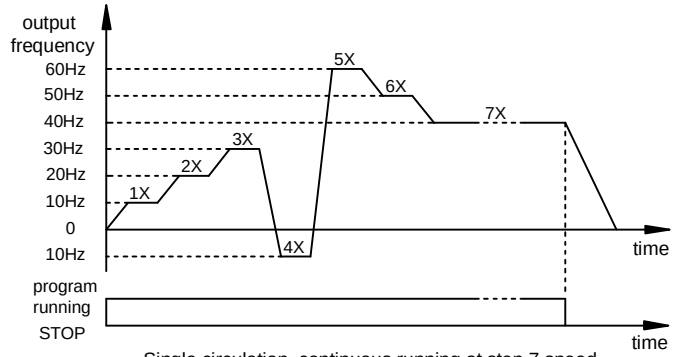
Single circulation

e.g. 2 Continuous circulation



Continuous circulation

e.g. 3 Single circulation, as per the 7 step speed running mode

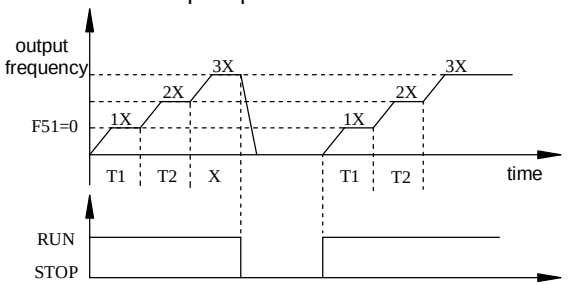


Single circulation, continuous running at step 7 speed

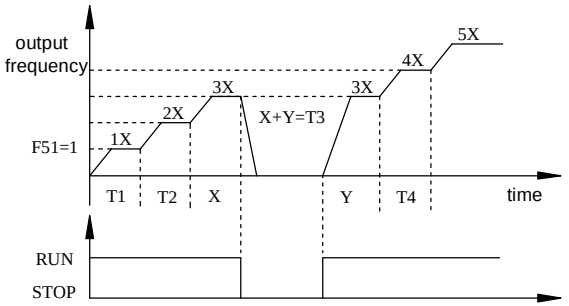
F51: Restart mode **factory setting: 0**

Stop during program running and reset restart mode. (Including normal stop and fault reset)

0: Runs at the step 1 speed.



1: Runs at the speed before stopping.



F52: RST input signal selection **factory setting: 0**

0: it is used as the reset input signal only in the fault state, and it is illegal in the normal state.

1: it is used as the external fault input signal in normal state and as the reset input signal in fault state.

As the external fault input signal, it is considered the fault is effective when RST and COM terminal is closed; As the RESET signal, it is considered the RESET signal is effective when the RST terminal is closed first and open then.

F53: Fan start temperature (options) **factory setting: 0.0℃**

The temperature of the fan starts. Fan operates when the actual temperature is higher than this setting temperature.

F54: Motor running direction **factory setting: 0**

0: Forward command, motor forwards.
1: Forward command, motor reverses.

F55: Motor reverse forbidden **factory setting: 0**

0: Reverse is allowable.
1: Reverse is forbidden.

F56: Running time setting **factory setting: 0**

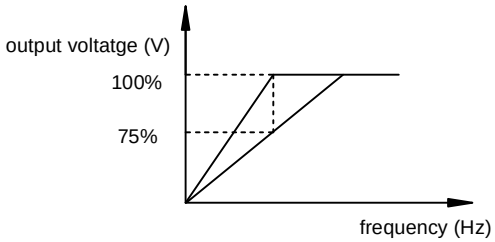
Adjustment unit of actual running time. The unit describes the running time, the tens digit describes the acc time(line acc time, jog acc/dec time F09, jog acc time F28), the 100s digit describes the dec time(line dec time F10, jog dec time F29), the describtion is as below:

Acc/dec time	10s, 100s digit	Range(eg.F09, F10=3200.0)
×1s	0	3200.0s
×30s	1	3200.0X30=96000s=1600m
x600s	2	3200.0X600=32000m=533.33h
X3600s	3	3200.0X3600=192000m=3200h

F57: Percentage in energy saving running **factory setting: 100%**

This parameter is for minimum output voltage percentage in energy saving running For constant torque running, inverter can calculate the optimized output voltage to the load according to the load state. Calculation is invalid during acceleration or deceleration. This function is to save energy by lower the output voltage and enhance the frequency factors, this parameter confirms the minimum reduced output voltage; if the parameter is set 100%, the energy saving running mode is closed.

If energy saving is effective, inverter's actual voltage output value=inverter's rated output voltage × output voltage percentage × energy saving output voltage percentage.



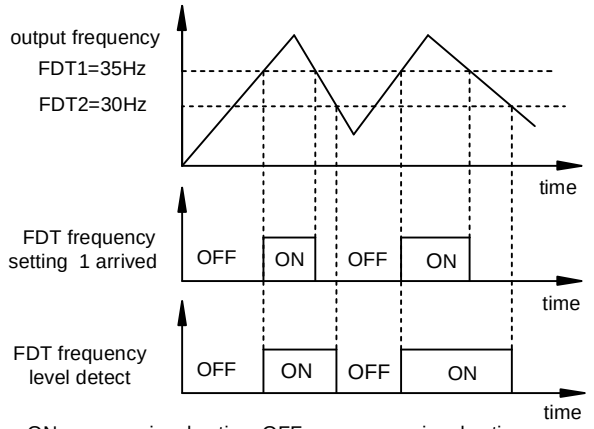
F58: FDT frequency set 1 **factory setting: 0.00/0.0Hz**
F59: FDT frequency set 2 **factory setting:0.00/0.0Hz**

When output signal select(o13-o18) 14, inverter's output frequency arrives or accesses FDT frequency set 1, output signal terminal actions; inverter's output frequency is lower than the set frequency, output signal does not action.

When output signal select(o13-o18) 15，firstly FDT frequency set 1 inspected,

inverter's output frequency arrives or accesses FDT frequency set 1, output signal terminal actions; after terminal action, FDT frequency set 2 inspected, inverter's output frequency is lower than FDT frequency set 2, output signal terminal does not action.

e.g. FDT frequency set 1 is 35Hz, FDT frequency set 2 is 30Hz, output signal terminal actions as below:



ON express signal action; OFF express no signal action

F60: Frequency inspection range **factory setting: 0.00/0.0Hz**

This parameter defines frequency inspection range for adjusting I/O output function: 11 set frequency reaching the inspection range.

F61: Load type **factory setting: 0**

The parameter defines the load type, the system automatically adjust the parameters according to the load type to satisfy different requirement of different load. Please inquir Powtran technician to select the right load type. Wrong load type may damage the equipment.

0: general
1: pump
2: Blower fan
3: Plastic jetting mould machine
4: Braiding machine
5: Hoister
6: Pumping jack
7: Belt conveyor
8: Frequency conversion power supply

F61=8:

I Frequency conversion power supply output frequency adjust.

F04	Frequency Set mode	Keypad/RS485	0
		V2	1
		I2	2

		V2+I2	3
		Keypad potentionmeter set	8

The output frequency of frequency conversion power supply can be set for the 5 modes.

- Selecting current limit function, but inverter would automatically lower the output Voltage and keep the same frequency once the output current accesses the rated value.

F43	Current limit	Invalid	0
		Valid	1

- Time of raising/lowering voltage

F28	Jog acc. time	0.1~64.0	s	5.0	N
F29	Jog dec. time	0.1~64.0	s	5.0	N

- Frequency conversion power supply Voltage set percentage

P02	Feedback signal select	External terminal IF:0~20mA	0
		External terminal IF:4~20mA	1
		External terminal VF:0~10V	2
		External terminal VF:1~5V	3

10 could be monitored by F00：PID feedback value monitors the voltage set percentage 0.0%~100.0% with correspondent max output voltage (1.15 multiples input voltage)

- Output voltage limit

Adjust the output voltage percentage, with correspondent max output capacity(to input voltage) × F12

F12	O.P. voltage ratio	50~110

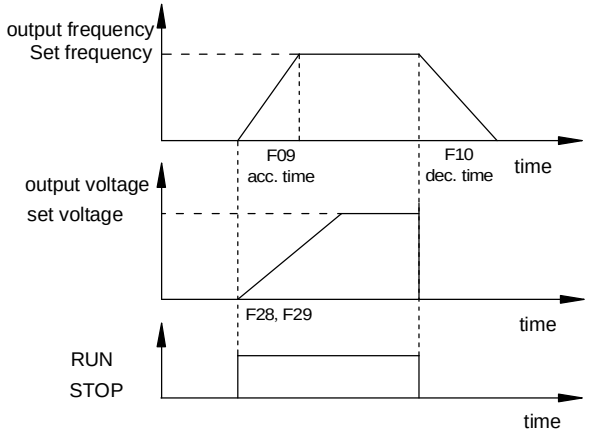
It sets the O.U protection to the load.

If load voltage needs 200V, max voltage 210V, input voltage 380V, and F12＝210/380=55%

- Running mode

Adjustment of the acc/dec time could adjust the frequency acc/dec time.

Adjustment of F28, F29 could adjust the voltage raising time and voltage responding time.

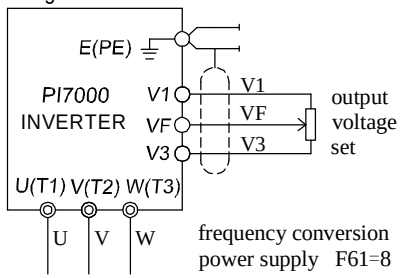


- Application sample:

number	Design require	Set parameters	
1	Frequency conversion power supply	F12	55%

	output voltage200V, maximum voltage<210V.	F61	8
		F28	5s
		F29	5s
2	Frequency conversion power supply frequency 400Hz.	F03	1
		F09	5s
		F10	5s
		F13	400.0Hz
		F17	400.0Hz
3	Frequency set mode is keypad set.	F02	400.0Hz
		F04	0
4	Output voltage set mode 0~10V.	P02	2

Wring:



9: Double pumps supply water under constant pressure

10: Three pumps supply water under constant pressure

11: Four pumps supply water under constant pressure

When F61=1, 9, 10, 11 Select water pump and F04=7 PID control, parameters change as below:

F70 CUR group parameters change as below:

1: CUR group parameters range changes accordingly, F04=7 PID regulate mode is canceled and the range will change the original mode.

2: CUR group defaulted parameters remain, if F04=7 PID regulate mode, set the CUR group parameters to make PID work normally.

3: LCD keypad display still describes the original CUR group parameters, there maybe inconvenience but not serious so it would not be modified.

4: PID set the constant filter time is decided by I/O V2 and I filter time o00, o05.

5: PID feedback the filter time which is decided by C00

Ref	LCD keyboard explanation	Range of set value	Unit	Factory setting	Y/N
C00	Detect filter time	2~200	ms	10	Y
C01	Start Pressure percentage	2~100	%	10	Y
C02	Stop pressure percentage	0~150	%	150	N
C03	Maximum deviation value allowable	0~20	%	0	N
C04	Arriving high pressure value	0~100.0	%	80.0	Y
C05	Arriving low pressure value	0~100.0	%	60.0	Y

C00 Defect filter time

Feedback the constant filter time of VF, IF, feedback a little if C00 is increased; feedback a lot if C00 is reduced.

C01 Start Pressure percentage

Start pressure=Start pressure percentage X set pressure

Feedback pressure is lower than start pressure and it keeps more than 5 seconds, inverter restarts in stop condition.

This parameter is to avoid inverter stop and start frequently.

C02 Stop pressure percentage

Stop pressure=Stop pressure X set pressure

Feedback pressure is higher than stop pressure and it keeps more than 10seconds, inverter stops in running condition.

The smaller the parameter is, the easier it would stop. If it is set 100%, the stop pressure and start pressure control function is invalid.

C01, C02 group is to control system control (energy saving) running and water pressure adjustment in the water-supplying system.

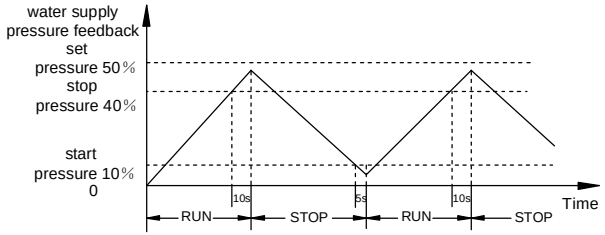
e.g.:

Set pressure=50%

Start pressure percentage 20%, start pressure=set pressure X start pressure percentage=10%

Stop pressure percentage 80%, stop pressure=set pressure X stop pressure percentage=40%

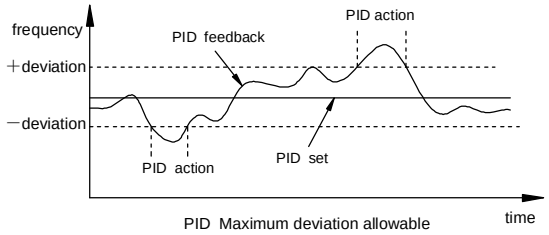
System running condition: start pressure is lower than stop pressure, otherwise inverter stops.



C03 Maximum deviation value allowable

|Set value – feedback value|≤Maximum deviation value allowable, PID controller stop action.

This parameter is for the system which requires precision not so much but avoids frequent adjustment.



C04 Arriving high pressure value

Feedback pressure arrives or excesses the arriving high pressure set by this parameter, I/O output function terminal select 25 arriving pressure and output arriving signal.

C05 Arriving low pressure value

Feedback pressure arrives or is lower than the arriving low pressure set by this parameter, I/O output function terminal select 26 arriving pressure and output arriving signal.

F71 SPD group parameters change as below:

1: CUR group parameters range changes accordingly, F04=7 PID regulate mode is canceled and the range will change the original mode.

2: CUR group defaulted parameters remain, if F04=7 PID regulate mode, set the CUR group parameters to make PID work normally.

3: LCD keypad display still describes the original CUR group parameters.

d00	Water supplying timing	1~200	Hour	10	Y
d01	Timing the interval time of shifting the pumps	0.01~100.00	Hour	0.25	Y
d02	Time-lapse of electromagnetism on and off	0.000~1.000	S	0.000	N
d03	Estimating time of changing pump	0~1000	S	100	N

.d00: Water supplying timing

Set the time of the inverters supplying water under constant pressure. After the inverter starts, when the running time arrives such setting time, it will stop automatically and wait for the next run command. If d00=200, water supplying timing is canceled.

.d01: Timing the interval time of shifting the pumps

Control the shifting way and time

.d01=100.00 hours, d01 function is canceled.

.d01=0.01~100.00, it runs stably for certain time (0.01~100.00), inverter will shift the pump according the opening firstly or closing firstly to ensure each pump could run for equal chance and equal time, and avoid some pumps rust if it does not run for long time.

E.g. pump A, pump B, pump C

After first shift: pump B, pump C, pump D

After second shift: pump C, pump D, pump A

.d02: Time-lapse of electromagnetism on and off

It is the time-lapse of electromagnetism on and off while making 1 pump (drive motor) changes from frequency conversion to power frequency, or power frequency to frequency conversion.

It is to avoid the inverter's output short-circuited with the AC power frequency because of the slow action of electromagnetism on and off.

.d03: Estimating time of changing pump

Estimate the time when inverter's output frequency arrives upper frequency until the pump (drive motor) quantity increased.

Or estimate the time when inverter's output frequency arrives lower frequency until the pump (drive motor) quantity reduced.

The time more or less depends on the pressure changes quickly or slowly. It had be better be shorter during stable range.

Inverter will add or reduce the pumps according to the stopping firstly or starting firstly to ensure each pump could have chance to run and avoid some pumps rust if it does not run for long time. If each pump could run for equal chance and equal time, set d01.

Add pumps order: pump A→ pump B → pump C → pump D

Reduce pumps order: pump D→ pump C→ pump B→ pump A

If current state: pump A, pump B, pump C

After reducing pumps: pump A, pump B

After adding pumps: pump A, pump B, pump D,

After reducing pumps: pump A, pump B

After reducing pumps: pump A

After adding pumps: pump A, pump C,
After adding pumps: pump A, pump C, pump D,
After adding pumps: pump A, pump C, pump D, pump B

12: Torque control
This function is valid under F01=2 vector control
Torque setting way:
It is the same with the original frequency setting way, such function is to set analogy set torque with the setting frequency.
Torque setting display: F00=14 set torque
Set torque=Set frequency/maximum frequency X upper torque
Set torque range:
0~C04 upper torque
E.g. Set torque=40.0%
Torque setting way: F04=1 V2 set by potentionmeter
1~10V 1~maximum torque.o00, o01, o02 are factory setting
Torque setting range: 0~80.0%. C04=80.0%
Set torque=40.0/80.0% *(10V-1V) + 1V=5.5V

13: regulated power supply

- Adjust regulated power supply output frequency

F04	Fre. Set modes	Keypad or RS485	0
		V2	1
		I2	2
		V2+I2	3
		Keypad potentionmeter set	8

Regulated power supply output frequency could be set by such 5 modes.

- Regulated power supply set max voltage

b02	Motor rated vol.	100~1140V

- Selecting current limit function, but inverter would automatically lower the output Voltage and keep the same frequency once the output current accesses the rated value.

F43	Current limit	Invalid	0
		Valid	1

- Time of raising/lowering voltage

F28	Jog acc. time	0.1~64.0	s	5.0	N
F29	Jog dec. time	0.1~64.0	s	5.0	N

- Regulated power supply Voltage set percentage

P03	setting signal select	External terminal I2:0~20mA	0
		External terminal I2:4~20mA	1
		External terminal V2:0~10V	2
		Keypad input	3
		RS485 input	4
		Keypad potentionmeter set	5

9 could be monitored by F00：PID feedback value monitors the voltage set percentage

0.0%~100.0% with correspondent voltage 0~b02

- Regulated power supply Voltage feedback percentage

P02	Feedback signal select	External terminal IF:0~20mA	0
		External terminal IF:4~20mA	1
		External terminal VF:0~10V	2
		External terminal VF:1~5V	3

10 could be monitored by F00：PID feedback value monitors the voltage set percentage
0.0%~100.0% with correspondent set voltage 0~b02

- Output voltage limit

Adjust the output voltage percentage, with correspondent max output capacity(to input voltage) × F12

F12	O.P. voltage ratio	50~110

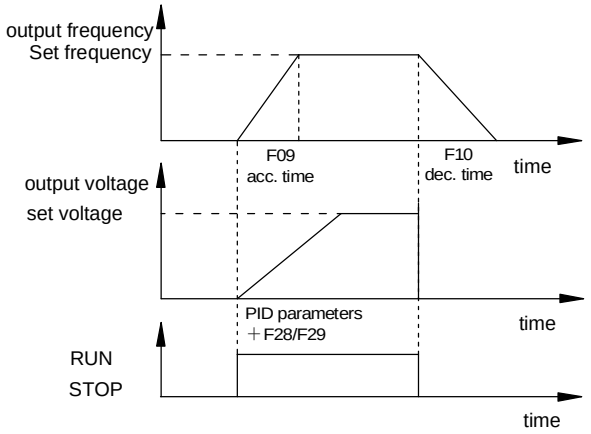
Adjust PID output limit, max output voltage=max input voltage×P01×F12

P01	Output fre limit	0~110

Generally, only adjust F12 and P01 could keep factory setting 100%.
It sets the protection to the load when the set regulated power supply out of the PID control (set, feedback signal invalid).
If load voltage needs 200V, max voltage 210V, input voltage 380V, and
F12＝210/380=55%

- Running mode

Adjustment of the acc/dec time could adjust the frequency acc/dec time.
Adjustment PID and F28, F29 could adjust the voltage raising time and voltage responding time.



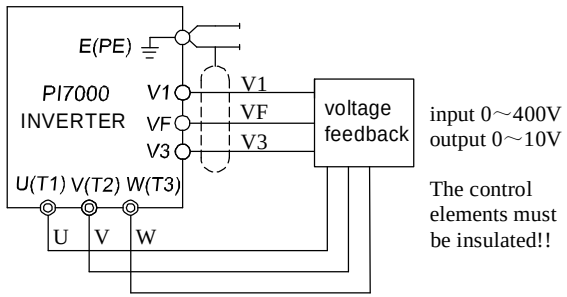
PID adjustment：
Respond fast, raise P07, system will oscillate if P07 is too large.
Respond fast, raise P05, system will oscillate if P05 is too small.
Advance voltage regulation precision, raise P07, reduce P05.
Adjust differential time P06, reduce the time of adjusting the system, complete PID control can be set 0.

- Application sample:

number	Design require	Set parameters

1	Stabilized voltage supply output voltage200V, maximum voltage<210V.	F12	55%
		F28	5s
		F29	5s
		F61	13
		P01	100%
		P04	50.0%
2	Stabilized voltage supply frequency 400Hz.	F03	1
		F13	400.0Hz
		F17	400.0Hz
		o20	400.0Hz
3	Frequency set mode is keypad set.	F02	400.0Hz
		F09	5s
		F10	5s
		F04	0
4	Output voltage set mode 0~10V.	P03	3
5	Output voltage feedback mode 0~10V	P02	2
6	Regulated power supply set max voltage 400V	b02	400V

Wiring：



Frequency conversion regulated power supply F61=13

14: constant current power supply

- Constant current power supply output frequency adjustment

F04	Fre. Set modes	Keypad or RS485	0
		V2	1
		I2	2
		V2+I2	3
		Keypad potentionmeter set	8

Constant current power supply output frequency could be set by such 5 modes.

- v set max current

b01	Motor rated cur.	30%~120% rated current of inverter

- Selecting current limit function, but inverter would automatically lower the output Voltage and keep the same frequency once the output current accesses the rated value.

F43	Current limit	Invalid	0
		Valid	1

- Time of raising/lowering voltage

F28	Jog acc. time	0.1~64.0	s	5.0	N
F29	Jog dec. time	0.1~64.0	s	5.0	N

- Constant current power supply set percentage

P03	setting signal select	External terminal I2:0~20mA	0
		External terminal I2:4~20mA	1
		External terminal V2:0~10V	2
		Keypad input	3
		RS485 input	4
		Keypad potentionmeter set	5

9 could be monitored by F00：PID feedback value monitors the voltage set percentage the set current range is 0.0%~100.0%

- Output voltage limit

Adjust the output voltage percentage, with correspondent max output capacity(to input voltage) × F12

F12	O.P. voltage ratio	50~110

Adjust PID output limit, max output voltage=max input voltage×P01×F12

P01	Output fre limit	0~110

Generally, only adjust F12 and P01 could keep factory setting 100%.

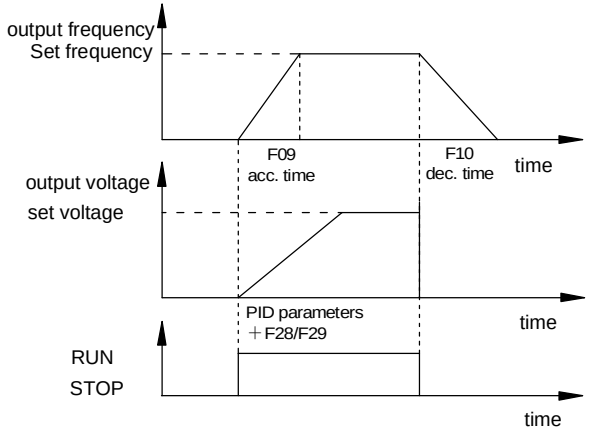
It sets the protection to the load when the set regulated power supply out of the PID control (set, feedback signal invalid).

If the max voltage that load voltage requires is 250V, input voltage 380V, and F12＝250/380=66%

- Running mode

Adjustment of the acc/dec time could adjust the frequency acc/dec time.

Adjustment PID and F28, F29 could adjust the voltage raising time and voltage responding time.



PID adjustment：

Respond fast, raise P07, system will oscillate if P07 is too large.

Respond fast, raise P05, system will oscillate if P05 is too small.

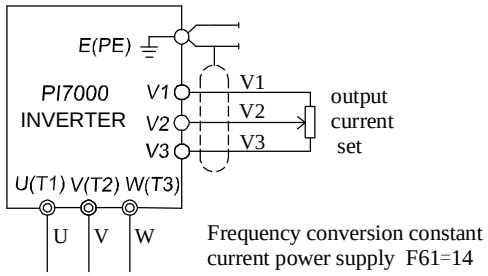
Advance voltage regulation precision, raise P07, reduce P05.

Adjust differential time P06, reduce the time of adjusting the system, complete PI control can be set 0.

I Application sample:

number	Design require	Set parameters	
1	Output current is 16A, rated current is 32A, maximum voltage<250V.	F12	66%
		F28	5s
		F29	5s
		F61	14
		P01	100%
2	frequency 400Hz.	F03	1
		F09	5s
		F10	5s
		F13	400.0Hz
		F17	400.0Hz
		o20	400.0Hz
3	Frequency set mode is keypad set.	F02	400.0Hz
		F04	0
4	Output voltage set mode 0~10V.	P03	3
5	Constant current power supply set max current 32A	b01	32A

Wiring：



F62: Terminal control modes **factory setting: 0**

0: standard running control

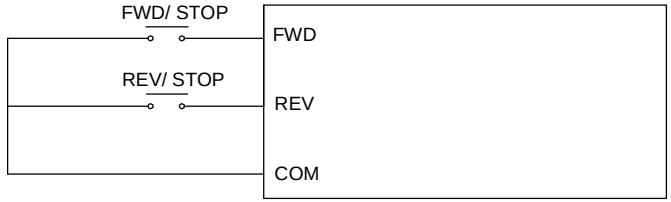
1: Two-line running control

2: three-line running control 1

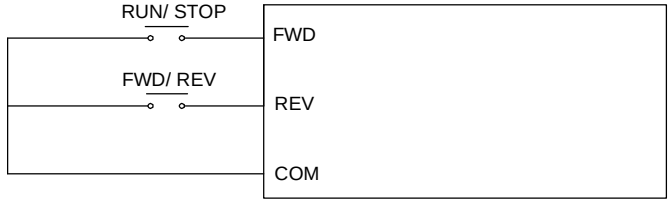
3: three-line running control 2

4: three-line running control 3

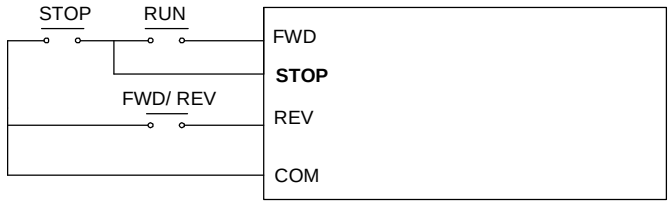
e.g.: Standard running control



e.g.: Two-line running control



e.g.: three-line running control 1/2/3



MSS terminal assign:

F62 terminal control mode	value	stop terminal	F63＝1/2	F63＝3
three-line running control 1	2	SS3	SS1/SS2 realize three Segment	JOG reverse forbid

			speed/acceleration	
three-line running control 2	3	SS2	Mul-segment speed/acceleration is invalid	SS3 JOG reverse
three-line running control 3	4	SS1	Mul-segment speed/acceleration is invalid	SS3 JOG reverse

Note: When terminal running control select 3-point running control (F62=2), if. F63 is1 or 2, SS1/SS2 executes 3-step speed/acceleration running, SS3 is only for 3-point running control; if.F63 is 3, SS3 is for jog reverse control in priority.

F63: MSS terminal function selection **factory setting: 0**

This parameter can control MSS multi-step speed or MSS multi-step acceleration.

0: Invalid.

1: MSS multi-step speed control. It is valid only when F04=0/1/2/3, multi-step speed in priority.
Level triggers, valid in low level.

2: MSS multi-step acceleration control. It is valid only when F04=0/1/2/3/8.
Level triggers, valid in low level.

3: Jog forward/reverse control.
Jog reverse running with SS3 and COM short circuited, Jog forward running with JOG and COM short circuited, previous set JOG direction is invalid.
Level triggers, valid in low level.
Note: F62=2 Terminal control mode is 3-point running control, SS3 is for jog forward/reverse control in priority.

4: Frequency setting mode switch
OFF when SS1, SS2, SS3 open to COM; ON when SS1,SS2,SS3 short circuited to COM.

SS3	SS2	SS1	Frequency setting mode switch
OFF	OFF	OFF	Program running (F04=5) Run at spped 1(F51=0)
OFF	OFF	ON	I2 (F04=2)
OFF	ON	OFF	V2(F04=1)
OFF	ON	ON	PID adjustment (F04=7)
ON	OFF	OFF	Program running(F04=5) Running at the speed before stop(F51=1)
ON	OFF	ON	V2+I2(F04=3)
ON	ON	OFF	Keyboard or RS485
ON	ON	ON	Keyboard petentionmeter

5: Upper torque shifted (Valid when F61=12 torque control mode)

SS3	SS2	SS1	Upper load shifted
ON	OFF	OFF	Upper load shifted set by C04
ON	OFF	ON	Upper load shifted set by H00 & C04
ON	ON	OFF	Upper load shifted set by H01& C04

ON	ON	OFF	Upper load shifted set by H02 & C04

H00, H01, H02 is for upper torque percentage:
Upper torque=H00 (H01 or H02)/max frequency x O04 x 100%
Set torque value=set frequency/max frequency x upper torque
E.g. max frequency=130Hz, C04=200%
H00=100Hz, and upper torque=100/130 x 200%=153.8%
H01=80Hz, and upper torque=80/130 x 200%=123.0%
H02=40Hz, and upper torque=40/130 x 200%=61.5%
E.g. set 20Hz, the set torque is:

SS3	SS2	SS1	Upper torque	Set torque
ON	OFF	OFF	200.0%	20/130×200.0=30.7
ON	OFF	ON	153.8%	20/130×153.8=23.6
ON	ON	OFF	123.0%	20/130×123.0=18.9
ON	ON	OFF	61.5%	20/130×61.5=9.4

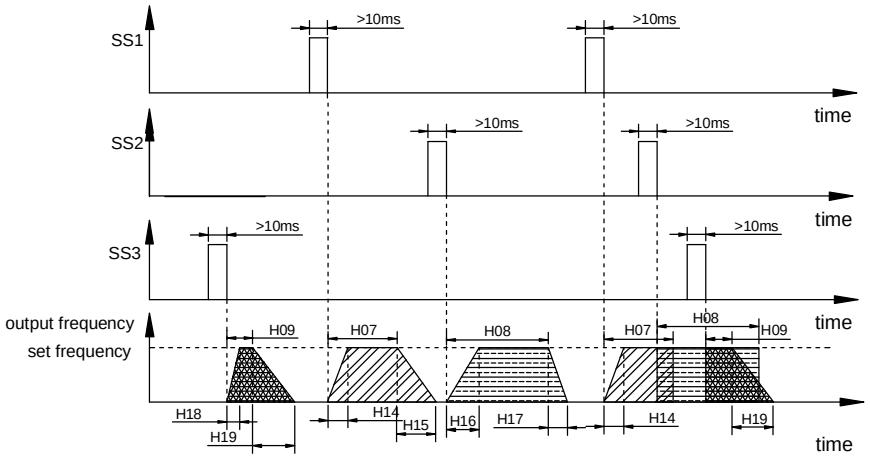
Note: If F01=2 vector control+F61=12 torque control, SS3 terminal could shift between the vector speed control and vector torque control.
SS3=ON: vector torque control
SS3=OFF: vector speed control

6: MSS time running

F63=6:MSS time running function.

Running time is setted by MSS terminal pulse signal. Running time is refreshed with the last terminal pulse signal, and is not cumulative.running time includes accelerate time,barring decelerate time. PRI is SS3>SS2>SS1.

Running parameter			SS1	SS2	SS3
F04	Keyboard and RS485	0	H00	H01	H02
	V2	1	V2	V2	V2
	I2	2	I2	I2	I2
	V2+I2	3	V2+I2	V2+I2	V2+I2
	Keypad potentionmeter	8	Keypad potentionmeter setting		
	V2 Forward/Reverse	9	V2 Forward/Reverse setting		
	Keypad potentionmeter FWD/REV	10	Keypad potentionmeter setting		
Accelerate/decelerate time			H14/H15	H16/H17	H18/H19
Running time			H07	H08	H09



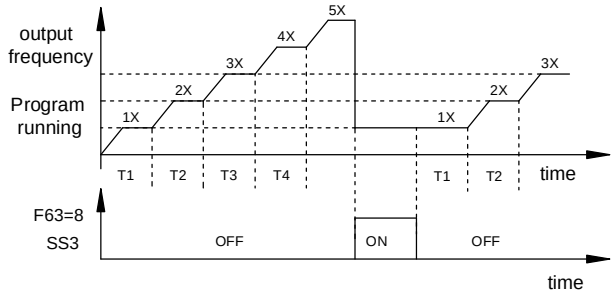
7: Control mode shifted

Running parameters		SS1	SS2	SS3
F01=0:VF control	0 Keypad or potentionmeter	0	0	0
	1step speed	1	0	0
	2 step speed	0	1	0
	3 step speed	1	1	0
F01=2: Vector control+ PG	0 Keypad or potentionmeter	0	0	1
	1step speed	1	0	1
	2 step speed	0	1	1
	3 step speed	1	1	1

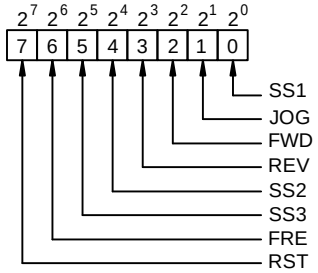
8: Reset program running segment

F04＝5 Program running, reset the current segments with SS3.

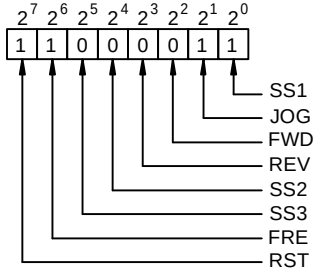
SS3	Reset program running segment
OFF	Normal program running
ON	program running segment reset to the parameters of the first segment



F64: Polarity of input terminal **factory setting: 0**



Set	Polarity of Input Terminal	
0	Low level valid(close)	Low level valid(close)
	Falling edge valid, rising edge invalid	Falling edge valid, rising edge invalid
1	High level valid(open)	High level valid(open)
	Rising edge valid, falling edge invalid	Rising edge valid, falling edge invalid



F64 $=bit7*2^7+bit6*2^6+\cdots\cdots+bit1*2^1+bit0*2^0$
$=1*2^7+1*2^6+0*2^5+0*2^4+0*2^3+0*2^2+1*2^1+1*2^0$
$=128+64+2+1$
$=195$

F65: Monitor Select **factory setting: 1**

F66: Monitor Select **factory setting: 2**

F65 and F66 are to select the second and the third monitor subject range from 0~15 (same as the monitor subject of F00), valid when JP6E7000 and JP6C7000 keypads are used. Please refer to the operation of the keypad in the section III.

F67: V/F curve set

F68: MSS speed control

F69: I/O group select

F70: CUR group select

F71: SPD group select

F72: PID group select

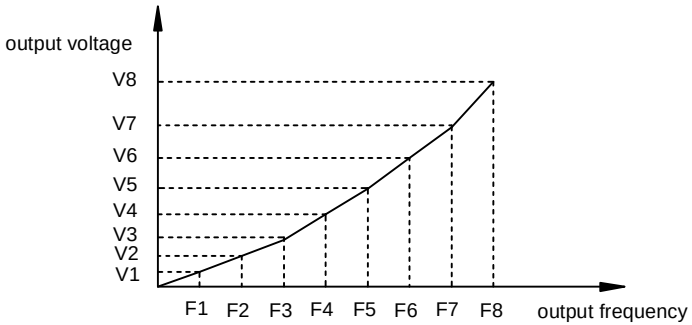
F73: SYS group select

F74: MOT group select

Selecting one of these above groups as expected, press PRG running into the relative group.

6-2. Other parameters

6-2-1. F67 V/F curve set [V/F]



U00: V/F set frequency 1 **factory setting: 5.00/50.0Hz**
User set the first frequency of V/F curve corresponding with V1.

U01: V/F set voltage 1 **factory setting: 5%**
User set the first voltage percentage of V/F curve corresponding with F1, by the reference of inverter's rated output voltage 100%.

U02: V/F set frequency 2 **factory setting: 10.00/100.0Hz**
User set the second frequency of V/F curve corresponding with V2.

U03: V/F set voltage 2 **factory setting: 10%**
User set the second voltage percentage of V/F curve corresponding with F2, by the reference of inverter's rated output voltage 100%.

U04: V/F set frequency 3 **factory setting: 15.00/150.0Hz**
User set the third frequency of V/F curve corresponding with V3.

U05: V/F set voltage 3 **factory setting: 15%**
User set the third voltage percentage of V/F curve corresponding with F3, by the reference of inverter's rated output voltage 100%.

U06: V/F set frequency 4 **factory setting: 20.00/200.0Hz**
User set the fourth frequency of V/F curve corresponding with V4.

U07: V/F set voltage 4 **factory setting: 20%**
User set the fourth voltage percentage of V/F curve corresponding with F4, by the reference of inverter's rated output voltage 100%.

U08: V/F set frequency 5 **factory setting: 25.00/250.0Hz**
User set the fifth frequency of V/F curve corresponding with V5.

U09: V/F set voltage 5 **factory setting: 25%**
User set the fifth voltage percentage of V/F curve corresponding with F5, by the reference of inverter's rated output voltage 100%.

U10: V/F set frequency 6 **factory setting: 30.00/300.0Hz**
User set the sixth frequency of V/F curve corresponding with V6.

U11: V/F set voltage 6 **factory setting: 30%**
User set the sixth voltage percentage of V/F curve corresponding with F6, by the reference of inverter's rated output voltage 100%.

U12: V/F set frequency 7 **factory setting: 35.00/350.0Hz**
User set the seventh frequency of V/F curve corresponding with V7.

U13: V/F set voltage 7 **factory setting: 35%**
User set the seventh voltage percentage of V/F curve corresponding with F7, by the reference of inverter's rated output voltage 100%.

U14: V/F set frequency 8 **factory setting: 40.00/400.0Hz**
User set the eighth frequency of V/F curve corresponding with V8.

U15: V/F set voltage 8 **factory setting: 40%**
User set the eighth voltage percentage of V/F curve corresponding with F8, by the reference of inverter's rated output voltage 100%.

6-2-2. F68 MSS speed control [MSS]

H00: 1X Multi-step speed 1X **factory setting: 5.00/50.0Hz**
H01: 2X Multi-step speed 2X **factory setting: 30.00/300.0Hz**
H02: 3X Multi-step speed 3X **factory setting: 20.00/200.0Hz**
H03: 4X Multi-step speed 4X **factory setting: 30.00/300.0Hz**
H04: 5X Multi-step speed 5X **factory setting: 40.00/400.0Hz**
H05: 6X Multi-step speed 6X **factory setting: 45.00/450.0Hz**
H06: 7X Multi-step speed 7X **factory setting: 50.00/500.0Hz**
Set the frequency of program running and the 7-step speed respectively. Achieve 7-step speed by short-circuit the terminal SS1, SS2, SS3 with COM combinatorially.

The definition of terminal multi-step speed is as follow:
ON=connect with COM OFF=disconnect with COM

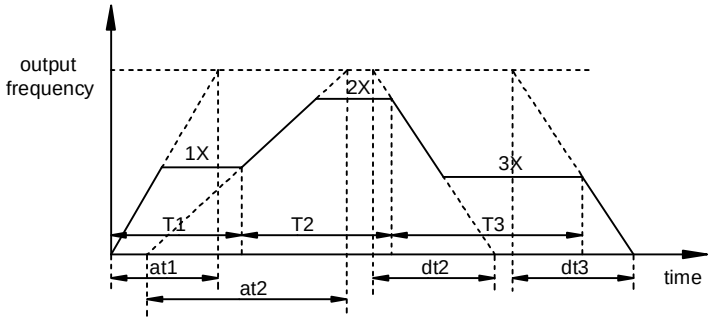
Speed / Terminal	1X	2X	3X	4X	5X	6X	7X
SS1	ON	OFF	ON	OFF	ON	OFF	ON
SS2	OFF	ON	ON	OFF	OFF	ON	ON
SS3	OFF	OFF	OFF	ON	ON	ON	ON

When SS1, SS2, SS3 is open to COM at the same time:

F04	Setting frequency	Accelerate time	Decelerate time
0	Keyboard setting	F09	F10
1	V2 setting	F09	F10
2	I2 setting	F09	F10
3	V2/I2 setting	F09	F10

H07: T1 Multi-step speed 1 running time T1 **factory setting: 2.0s**
H08: T2 Multi-step speed 2 running time T2 **factory setting: 2.0s**
H09: T3 Multi-step speed 3 running time T3 **factory setting: 2.0s**

H10: T4 Multi-step speed 4 running time T4 **factory setting: 2.0s**
H11: T5 Multi-step speed 5 running time T5 **factory setting: 2.0s**
H12: T6 Multi-step speed 6 running time T6 **factory setting: 2.0s**
H13: T7 Multi-step speed 7 running time T7 **factory setting: 2.0s**
Actual acc/dec time equals to the set acc/dec time multiples a time multiple which is decided by the tens digit of F56. Please refer to F56.
H14: Acceleration time at1 **factory setting: 10.0s**
H15: Deceleration time dt1 **factory setting: 10.0s**
H16: Acceleration time at2 **factory setting: 10.0s**
H17: Deceleration time dt2 **factory setting: 10.0s**
H18: Acceleration time at3 **factory setting: 10.0s**
H19: Deceleration time dt3 **factory setting: 10.0s**
H20: Acceleration time at4 **factory setting: 10.0s**
H21: Deceleration time dt4 **factory setting: 10.0s**
H22: Acceleration time at5 **factory setting: 10.0s**
H23: Deceleration time dt5 **factory setting: 10.0s**
H24: Acceleration time at6 **factory setting: 10.0s**
H25: Deceleration time dt6 **factory setting: 10.0s**
H26: Acceleration time at7 **factory setting: 10.0s**
H27: Deceleration time dt7 **factory setting: 10.0s**
Set the Acc/Dec time of 7 steps respectively. They determine the time needed to reach the speed, respectively depending on the acceleration time for acceleration or on the deceleration time for deceleration, but the time is not the actual time needed. Actual acc/dec time equals to the set acc/dec time multiples a time multiple which is decided by the tens digit of F56. Please refer to F56.
Definite acceleration and deceleration time for multi-step speed.



Definition of multi-step speed acceleration/deceleration time

at1: Step 1 acceleration time at2: Step 2 acceleration time
dt2: Step 2 deceleration time dt3: Step 3 deceleration time

H28: Multi-step speed 1 running direction **factory setting: 0**

H29: Multi-step speed 2 running direction **factory setting: 0**
H30: Multi-step speed 3 running direction **factory setting: 0**
H31: Multi-step speed 4 running direction **factory setting: 0**
H32: Multi-step speed 5 running direction **factory setting: 0**
H33: Multi-step speed 6 running direction **factory setting: 0**
H34: Multi-step speed 7 running direction **factory setting: 0**
In program multi-speed l running, the digit parameters decide the direction of each speed.

Running direction	Setting value
forward	0
reverse	1

When running control mode F05＝0/1/2, these parameters decide the direction of each speed.
When running control mode F05＝3, the setting value and terminal FWD/REV decide the direction of each speed together. FWD is first.

FWD=1 Running direction	REV=1 Running direction	Setting value
forward	reverse	0
reverse	forward	1

The parameter adjusts Actual running time unit. The digit determines running direction, the tens place determines running time (multi-step running time) unit, the hundred's place determines acceleration time unit, the kilobit determines deceleration time unit. Take Multi-step speed 1 for example, as following:

Acc/dec time	Tens/hundred's place	range（for example F09=3200.0）
×1s	0	3200.0 s
×30s	1	3200.0×30=96000 s=1600 min
×600s	2	3200.0×600=32000 min=533.33 h
×3600s	3	3200.0×3600=192000 min=3200 h
Running time	digit	range（for example H07=3200.0）
×1s	0	3200.0 min
×10s	1	3200.0×10=32000 s=533.33 min
×100s	2	3200.0×100=320000 s=5333.33 min
×1000s	3	3200.0×1000=3200000 s=888.88 h

6-2-3. F69 Input/output parameter [I/O]

o00: filter time of V2 signal input **factory setting: 10ms**
It may be 2~200ms. If the time is too long, setting frequency change is steady, but response speed will become bad; if the time is too short, setting frequency stability become badly, but response speed will be rapider.

o01: V2 minimum input voltage **factory setting: 0.00V**

The minimum input voltage of input terminal V2, may be any value between 0~V2 maximum input voltage.

o02: V2 maximum input voltage **factory setting: 10.00V**

The maximum input voltage of input terminal V2, may be any value between V2 minimum input voltage to 10V.

o03: I input filter time **factory setting: 10ms**

It may be 2~200ms. If the time is too long, setting frequency change is steady, but response speed will become bad; if the time is too short, setting frequency stability become badly, but response speed will be rapider.

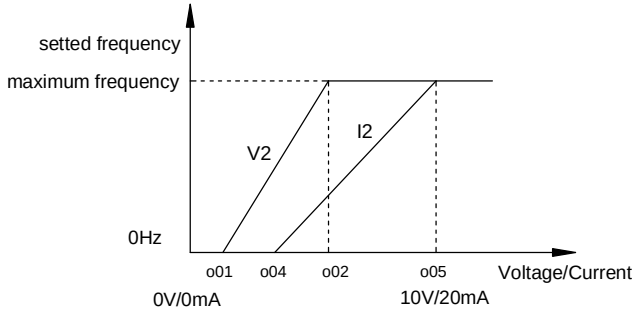
o04: I input minimum current **factory setting: 0.00mA**

The minimum input current of input terminal I2, may be any value between 0~I2 maximum current.

o05: I input maximum current **factory setting: 20.0mA**

The maximum input current of input terminal I2, may be any value between I2 minimum current to 20.00 mA.

e.g. V2 input 1~5V, o01=1V, o02=5V; I2 input 4-20mA, o04=4mA, o05=20mA



o06:DA1 output terminal **factory setting: 0**

***o07:Reserved** **factory setting: 0**

Value	Output	Output signal range define
0	No Function	No output
1	Set frequency	0~ max. frequencuy
2	Actual frequency	0~ max. frequencuy
3	Actual current	G/S: 200% of rated current, F: 150% of rated current, M/Z/T: 250% of rated current, H: 300% of rated current,
4	Output voltage	0~135% of rated input voltage
5	Bus voltage	0~135% of BUS line voltage
6	IGBT temperature	0~80℃
7	Output power	0~200%
8	Output speed	0~max. speed

9	Actual torque	0~200% torque

o08: DA1 output lower adjustment **factory setting: 0.0%**

o09: DA1 output upper adjustment **factory setting: 100.0%**

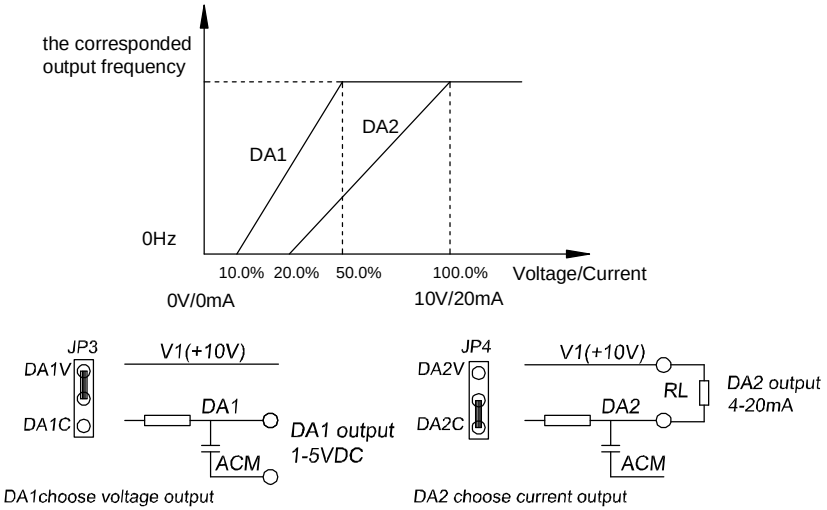
o10: DA2 output lower adjustment **factory setting: 0.0%**

o11: DA2 output upper adjustment **factory setting: 100.0%**

It is to set lower and upper DA1/DA2 output signal.

e.g. DA1 1-5V Output voltage o08=10.0%, o09=50.0%

DA2 4-20mA Output current o10=20.0%, o11=100.0%



Note: Each output terminal with 2 selection: voltage output (0~10V) and current output (0~20mA), the default selection is voltage output. Selecting voltage output, short circuit DA1V/DA2V of JP3/JP4 (on the control card); selecting current output, short circuit DA1C/DA2C of JP3/JP4 (on the control card).

o12: DFM multiple adjustment **factory setting: 1**

It defines the driver's output terminal (DFM-ACM) output frequency (10VDC, working cycle=50%) signal, also the output signal of SPA, SPA, SPC and SPD. Output impulse per second=output frequency ×o12.

DFM multiple set should be satisfied:maximum output frequency × o12<5000Hz.

o13: Output signal selection 1 **factory setting: 0**

o14: Output signal selection 2 **factory setting: 0**

o15: Output signal selection 3 **factory setting: 0**

o16: Output signal selection 4 **factory setting: 0**

o17: Output signal selection 5 **factory setting: 1**

o18: Output signal selection 6 **factory setting: 8**

Display	LED set value
0	No function

1	Fault alarm
2	Over current inspection
3	Over load inspection
4	Over voltage inspection
5	Lack voltage inspection
6	Low load inspection
7	Over heat inspection
8	Running state with command
9	PID feedback signal abnormity
10	Motor reverse
11	Set frequency arrival
12	Upper limit frequency
13	Lower limit frequency
14	FDT frequency 1 arrival
15	FDT frequency level inspection
16	0 speed running
17	Position arrival
18	PG fault
19	Program running 1 cycle finished
20	Speed pursue mode inspection
21	Running state without command
22	Inverter reverse command
23	Deceleration running
24	Acceleration running
25	High pressure arrival (Valid when F61=1,F04=7)
26	Low pressure arrival (Valid when F61=1,F04=7)
27	Inverter's rated current arrival
28	Motor's rated current arrival
29	Output lower frequency arrival
30	FDT frequency setting 2 arrival
31	Fault code output (o13~o16 valid)
32	Digits of frequency output (o13~o16 valid)

O13~o16=31, SPA, SPB, SPC, SPD terminal outputs are:

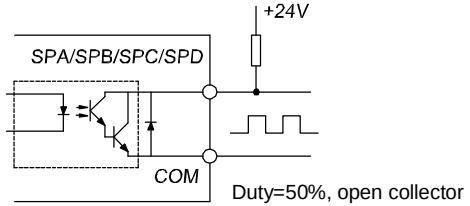
Item	LED display	Fault signal	Output terminal			
			SPD	SPC	SPB	SPA
1	OC_C	Over current signal from current detected circuit	OFF	OFF	OFF	ON
2	OCFA	Over current signal from drive circuit	OFF	OFF	ON	OFF
3	OC_2	Over current output, OC protection occurs when current	OFF	OFF	ON	ON

		exceeds 1.5~ 3 (G/S：2；F：1.5；Z/M/T：2.5；H：3)times of motor's rated current				
4	OU	Over voltage	OFF	ON	OFF	OFF
5	OL	Over load	OFF	ON	OFF	ON
6	PH_O	Phase-loss	OFF	ON	ON	OFF
7	OH	Over heat	OFF	ON	ON	ON
8	LU	Under voltage	ON	OFF	OFF	OFF
9	UL	Under load	ON	OFF	OFF	ON
10	EEPr	EEPROM error	ON	OFF	ON	OFF
11	OC_P	System is disturbed or impacted by instant over current	ON	OFF	ON	ON
12	E_FL	External fault	ON	ON	OFF	OFF
13	PG	PG error	ON	ON	OFF	ON
14	PID	PID regulation fault	ON	ON	ON	OFF
15	DATE	Time limit fault	ON	ON	ON	ON

When o13~o16=32, SPA, SPB, SPC, SPD output frequency (intergrate pole open, work period=50%) signal. Output pulse/second=output frequency x o12.

DFM multiple setting should satisfy:

Max output frequency x o12＜5000Hz



o19: Minimum input frequency **factory setting: 0.00/0.0Hz**

o20: Maximum input frequency **factory setting: 50.00/500.0Hz**

Define the connection of analog input and frequency, o19 is anolog V2, I2 sets the frequency to minimum voltage/current; o20 is V2, I2 sets the frequency to maximum voltage/current, the connection is effective when F04 is 1, 2, and 3.

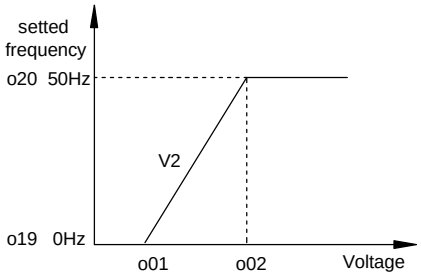
If o19<o20, it is positive input, if o19>o20, it is negative input.

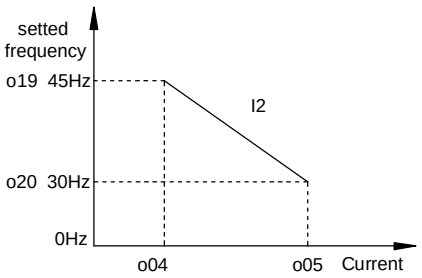
If V2 inputs 1~5V voltage, 0.00~50.00Hz, parameters are set as below:

O01=1V, o02=5V, O19=0.00Hz, o20=50.00Hz.

If V2 inputs 4~20mA current, 45.00~30.00Hz, the parameters are set as below:

O04=4mA, o05=20Ma, o19=45.00Hz, o20=30.00Hz





Note: o15, o16, o18 are invalid for PI7100 family inverter, 7.5KW and below; for PI7600 family inverter, 4KW and below.

6-2-4. F70 Current loop parameters [CUR]

C00: detect filter time **factory setting: 10ms**
The detect filter time. The value is too great, the control is stable but response is slow; the value is too little, the system response is rapid but perhaps is unstable. So it is necessary to consider the stability and the response speed at the same time when setting the value.

C01: re. filter time **factory setting: 10ms**
The filter time to reference value. If the value is too great, the control is stable but response is slow; if the value is too little, the system response is rapid but perhaps is unstable.

C02: Integral time of current-loop **factory setting: 500ms**
It defines the integral time of the current-loop. If the integral time is too great, response is slow and the control of external disturbing signal become bad; if the time is too little, response is rapid, but perhaps brings the surge.

C03: proportion gain of current-loop **factory setting: 100%**
It defines the proportion gain. If the gain is great, the response is rapid, but too great, surge perhaps occur; if the gain is too little, response is slow.

C04: upper torque **factory setting: 80.0%**
The parameter is a ratio, that is user could set the maximum setting torque.

C05: excitation setting value **factory setting: 60.0%**
The parameter is a ratio, namely the setting excitation value of the motor/the rated excitation value of the motor.

6-2-5. speed-loop parameter [SPD]

d00: filter time of speed-loop **factory setting: 10ms**
It defines the filter time of the speed-loop. The range is 2~200ms.If the value is too great, the control is stable but response is slow; if the value is too little, the system response is rapid but perhaps is unstable. So it is necessary to consider the stability and the response speed at the same time when setting the value.

d01: integral time of speed-loop **factory setting: 0.25s**
It defines the integral time of the speed-loop. The range is 0.01~100.00s. If the integral time is too great, response is slow and the control of external disturbing

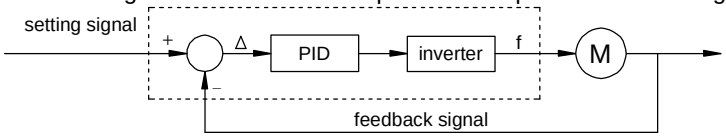
signal become bad; if the time is too little, response is rapid, but perhaps brings the surge.

d02: differential time of speed-loop **factory setting: 0.000s**
It defines the differential time of the speed-loop and the range is 0.000~1.000s. If the time is great enough, the surge which is caused by P action when difference occurring can attenuate quickly. But too great, the surge will happen contrary. When the time is little, the attenuation function is little too.

d03: proportion gain of speed-loop **factory setting: 100%**
It defines the proportion gain. And the range is 0~1000%.If the gain is great, the response is rapid, but too great, surge perhaps occurs; if the gain is too little, response is slower.

6-2-6. F72 PID parameter [PID]

P00: PID regulate mode **factory setting: 10**
The tens digit for P00 select PID feedback signal abnormity treatment:
1: Warning Continuous running: continue ruuning after abnormity feedback signal.
2: Warning Decelerating stop: decelerate and stop after abnormity feedback signal.
3: Warning Free stop: free stop after abnormity feedback signal .
PID regulate mode:
When the inverter receives start command, it can control output frequency automatically in the PID regulation mode after comparing the setting signal and feedback signal from terminal. The process is explained as following:



(Δ= setting signal - feedback signal)

PI7800/PI7600 PID regulation

0: negative action, when Δ is positive, frequency rises and when Δ is negative, frequency falls.
1: positive action, when Δ is positive, frequency falls and when Δ is negative, frequency rises.

P01: Output frequency limit **factory setting: 100%**
The parameter defines the range of the output when using PID control.

P02: feedback signal selection **factory setting: 2**
It selects the feedback signal when using PID control.
0: external terminal IF, the range is 0~20mA, the filter time of feedback signal is decided by o03.
1: external terminal IF, the range is 4~20mA, the filter time of feedback signal is decided by o03.
2: external terminal VF, the range is 0~10V, the filter time of feedback signal is decided by o00.
3: external terminal VF, the range is 1~5V, the filter time of feedback signal is decided by o00.

P03: setting signal selection **factory setting: 3**

It selects the getting signal when using PID control.
0: external terminal I2, the range is 0~20mA
1: external terminal I2, the range is 4~20mA
2: external terminal V2, the range is 0~10V
3: the getting signal is from keyboard input
4: the getting signal is from RS485 input
5: the getting signal is from keyboard potentionmeter

P04: Key set signal **factory setting: 50.0%**

When P03 is 3, the getting pressure set by the keyboard. 0.0~100.0% is 0 to the maximum pressure respectively.

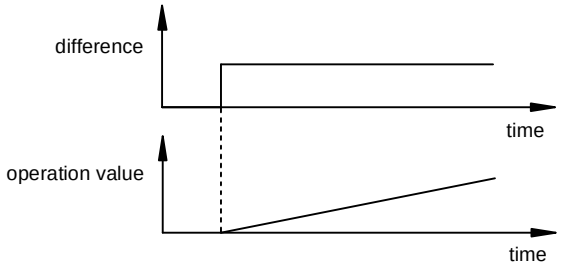
P05: PID integral time **factory setting: 0.25s**

0.01~100.00s

The parameter determines the integral regulation speed, the regulation acts on the difference between PID feedback and getting value by PID regulator.

When the difference between PID feedback and getting value is 100%, integral regulator continues to regulate output to(P01×F13×12.5%)Hz during the PID integral time.(single direction PID regulation, ignores proportion and differential effect).

If the value is great, the control is stable but response is slow; if the value is little, the system response is rapid but perhaps surge occurs.



P06: PID differential time **factory setting: 0.000s**

0.000~1.000s

The parameter determines the regulation intensity, the regulation acts on the change ratio of the difference between PID feedback and getting value by PID regulator.

When the change ratio of the difference between PID feedback and getting value is 100% in the differential time, PID regulator regulates output to(P01×F13×12.5%)Hz (single direction PID regulation, ignores proportion and integral effect).

If the value is great, the intensity is great, but system surge is easily to occur.

P07: PID proportion gain **factory setting: 100%**

0~1000%

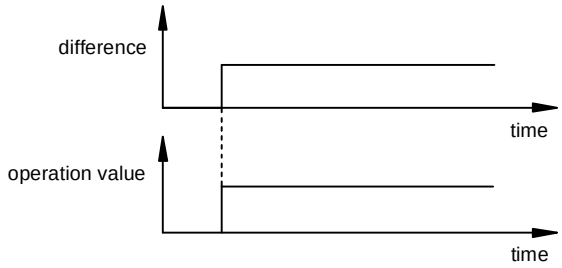
The parameter difines regulation intensity of PID regulator, the more the parameter is, the more the intensity is.

When proportion gain is 100%, and the difference between PID feedback and getting value is 100%, PID regulator's output is(P01×F13×12.5%)Hz(single

direction PID regulation, ignores differential and integral effect).

Proportion gain is the parameter decides PID regulator's response extent.

If the gain is great, the response is rapid, but if too great, the surge will occur; the gain is little, the response will lag.



P08: Fault detect time **factory setting: 300.0s**

0.1~3200.0

The parameter defines the longest time that PID can have a continuous integral. IF exceed the time, we consider it is a PID regulation fault.

6-2-7. F73 System parameter [SYS]

y00: restore factory setting **factory setting: 0**

0: not restore
1: restore

When the parameter is valid, all the parameters will restore the setting value before factory.

Those parameters which have no factory value will reserve the setting value.

y01: Fault record 1

y02: Fault record 2

y03: Fault record 3

y04: Fault record 4

y05: Fault record 5

These parameters register fault which happen in the last several times, and can inquire about the value of monitor object at the time of fault by 'PRG' and "plus or minutes" key.

The monitor object of fault state:

0: fault style

The fault code is expressed as following:

Serial number	LED display	Fault message
0	OC_C	Over current signal from current inspected circuit
1	OCFA	Over current signal from drive circuit.
2	OC_2	Output over current, OC protection when current exceeds motor's 1.5~3 times of rated current (G/S:2; F:1.5; Z/M/T:2.5; H:3)
3	OU	over voltage

4	OL	over load
5	PH_O	phase-loss
6	OH	over heat
7	LU	under voltage
8	UL	under load
9	EEPr	EEPROM error
10	OC_P	System is disturbed or impacted by instant over current
11	E_FL	external fault
12	PG	PG error
13	PID	PID regulation fault
14	DATE	Time limit fault

1: output frequency at the time of fault
The output frequency of the inverter at the time of fault
2: output current at the time of fault
The actual output current at the time of fault
3: output voltage at the time of fault
The actual output voltage at the time of fault
4: running state at the time of fault
The running state at the time of fault

LED display expresses the running state, and explains as following:

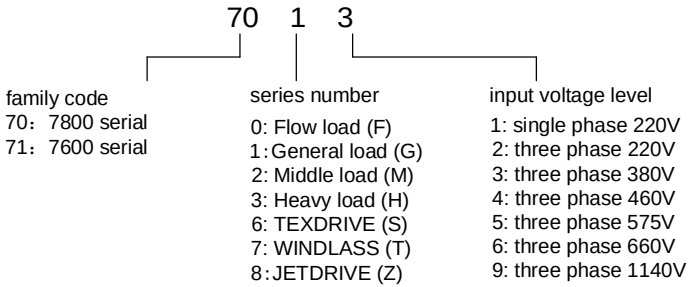
The first bit of LED		The second bit of LED		The third bit of LED	The fourth bit of LED	
F	forward command	F	forward state	compartmentation code	A	accelerate
R	reverse command	R	forward state		D	decelerate
S	stop command	S	stop state		E	running in a even speed
					S	stop state

y06: fault record reset **factory setting: 0**
0: no action, the fault records retains
1: the fault records resets

y07: rated output current
The rated output current of the inverter.

y08: rated input voltage
The rated input voltage of the inverter. It would be set as per inverter input voltage level before leaving factory.

y09: product series (only can be inquired)



y10: software version(only can be inquired)

y11: baud rate **factory setting: 3**
0:1200 1:2400 2:4800 3:9600 4:19200 5:38400

y12: communication address **factory setting: 8**
The only serial number distinguishes the one from the others, and can be set as the any value between 1 and 127.
For this function, the host computer should be set with the following parameters:

y12	Communication add.	128

For this function, the slave computer should be set with the following parameters:

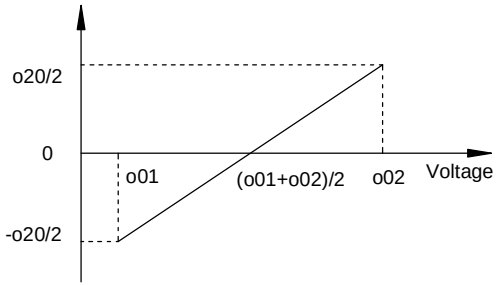
F04	Fre. Set mode	V2 proportional linkage adjustment	11
		I2 proportional linkage adjustment	12
F05	Run control mode	proportional linkage control	4
F13	Max. frequency	Max. output frequency of inverter	
F22	Min. running fre.	Min. output frequency of inverter	
y12	Communi. address	0~127	
y11	Baud rate	The same with that of host inverter	
b15	Proportional linkage factor	0.10~10.00	
o01	V2 min. input voltage	Adjustment range min. voltage	
o02	V2 max. input voltage	Adjustment range max voltage	
o19	Min. input frequency	0.00	
o20	Max. input frequency	Adjustment range	

- Set 128, the inverter is the host inverter among the proportional linkage. There is only one host inverter in one proportional linkage.
- The F04 and F05 parameters of the host inverter can be any settings. The running states of the slave inverters follow the host inverter.
- If the host inverter F04=11/12, setting proportional linkage adjustment, then F63=1 automatically, the frequency of the host inverter controlled by MSS multi-step speed SS1/SS2/SS3.

SS3	SS2	SS1	The host inverter frequency
0	0	0	Potentiometer adjustment
0	0	1	1 step speed + Potentiometer adjustment

0	1	0	2 step speed + Potentiometer adjustment
0	1	1	3 step speed + Potentiometer adjustment
1	0	0	4 step speed + Potentiometer adjustment
1	0	1	5 step speed + Potentiometer adjustment
1	1	0	6 step speed + Potentiometer adjustment
1	1	1	7 step speed + Potentiometer adjustment

- The host inverter controls the slave inverter's running state.
- The inverter set frequency=proportional linkage factor × host inverter frequency + value adjusted by the potentiometer.
- The range of inverter's set frequency: F22 min. running frequency~F13 max. frequency.



E.g. Host inverter set:

F04	Fre. Set mode	V2 proportional linkage adjustment	11
y12	Communi. address	128	
y11	Baud rate	3	
o01	V2 min. input voltage	2V	
o02	V2 max. input voltage	10V	
o19	Min. input frequency	0.00Hz	
o20	Max. input frequency	20.00Hz	

Slave inverter set:

F04	Fre. Set mode	11:V2 proportional linkage adjustment
F05	Run control mode	4
F13	Max. frequency	50.00Hz
F22	Min. running fre.	0.00Hz
y12	Communi. address	8
y11	Baud rate	The same with that of the host inverter
b15	Proportional linkage factor	1.00
o01	V2 min. input voltage	2V
o02	V2 max. input voltage	10V

o19	Min. input frequency	0．00Hz
o20	Max. input frequency	20.00Hz

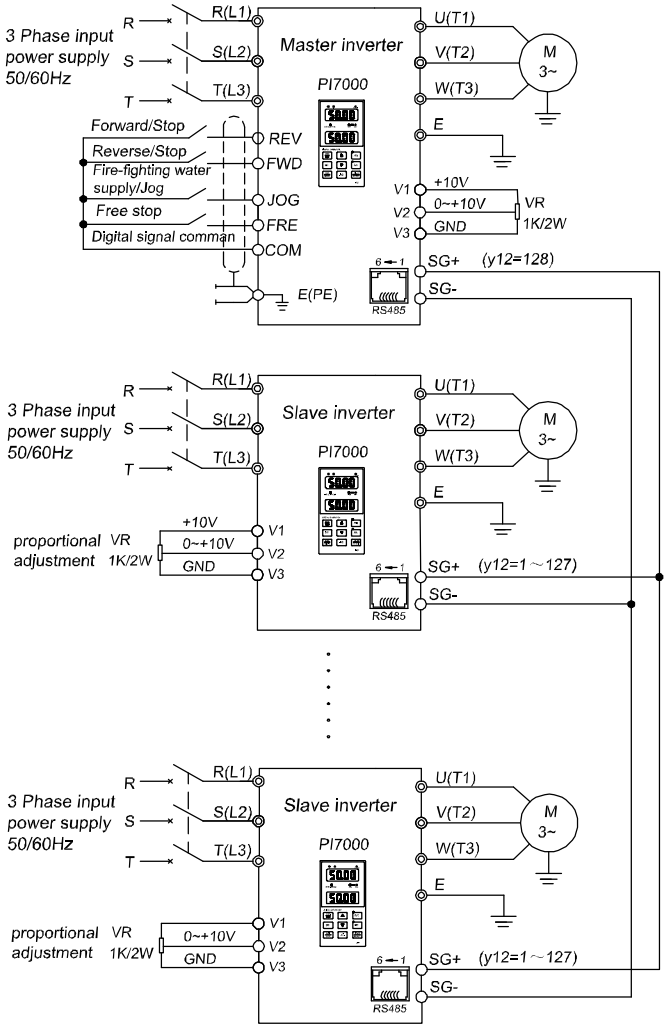
Potentiometer adjustment range 20.00Hz

2V -10Hz

6V 0Hz

10V +10Hz

The proportional linkage wiring:



y13: total running time setting **factory setting: 1**

It sets whether add the using time of the machine every time or not.

0: automatically clear after start
1: accumulate the time after start.

y14: total time unit **factory setting: 0**

It sets the unit of the total time.
0: the unit is hour
1: the unit is day

y15: Manufacture Date - year **factory setting: leaving factory date**

The parameter only can be inquired.

y16: Manufacture Date - month - day **factory setting: leaving factory date**

The parameter only can be inquired.

y17: decode input

In the state of locked parameter, LED displays the times of error input. There are three times input limit, if input is wrong in continuous three times, the systems will prohibit input of the password. It can prevent testing password in an illegal way, and need restart the machine to input again.
Once the input is right in any time during three times input limit, the parameter is unlocked.

y18: password input

The parameter sets the password, and the range is 0~9999. After setting the password, parameter locks and keyboard displays “code”; if the password is unlocked or password input is right, the keyboard will display “deco”.

6-2-8. F74 motor parameter [MOT]

b00: motor poles **factory setting: 2**

It is the half of the magnet poles of the motor.

b01: motor rated current **factory setting: (y07) A**

The rated current can be set, but can’t be more than the rated current of the inverter. The parameter confirms the OL protection capability of the motor and energy-saving running.
To prevent self-cooled motor form overheat when running in a low speed , and the motor capacity change when motor character change little, the user can correct the parameter to protect the motor.
The factory value is decided by power and default value is y07.

b02: motor rated voltage

The voltage in the rated state. If the rated voltage is lower than the voltage of the supply power, it is necessary to check the insulated intension.

b03: motor rated speed **factory setting: 1500rpm**

The speed when motor works in the rated power.

b04: motor rated frequency **factory setting: 50.00/500.0Hz**

Motor’s output frequency under rated state.
b00~b04 are the motor’s nameplate parameters which touch the precision.Set the parameters according to the motor’s nameplate.
Excellent vector control performance requires exact motor parameters. Exact parameters are base on the correct setting of motor’s rated parameters.
To assure the control performance, please match the right motor as per the

inverter’s standard, motor rated currentis limited between 30%~120% of inverter rated current.

b05: motor un-load current **factory setting: (y07×40%)A**

The un-load current, and affects the degree of the slip compensation directly.
The factory value is decided by power and default value is y07×40%.

b06: stator resistor **factory setting: 0.000ohm**

The stator resistor, when b13 is 1,the system scales automatically.

b07: rotor resistor **factory setting: 0.000ohm**

The rotor resistor, when b13 is 1, the system scales automatically.

b08: leakage inductance **factory setting: 0.0mH**

The leakage inductance of motor’s coil winding, when b13=1, system measures automatically.

b09: mutual inductance **factory setting: 0.0mH**

The mutual inductance of motor’s coil winding, when b13=1, system measures automatically.
b05~b09 is the motor’s basic electric parameters, these parameters is essential to achieve vector control calculation.
When b01 is set, b05~b09 would automatically reset to the defaulted standard Y series 4 poles asynchronism motor’s parameters. Inverter could get the motor parameters without automatic parameters setting.
If the inverter could not meet with the requirement, use b13 motor parameters setting to get the exact motor parameter. If the right motor parameters are available, it could be input manually.

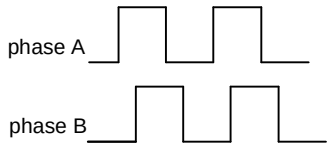
b10: PG pulse **factory setting: 2048**

The number of using PG pulses, setting value is the number of pulse when motor run a cycle.

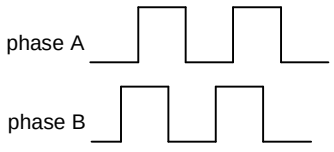
b11: PG cut action **factory setting: 0**

Set the stopping methods when detecting PG break-line.
0: continue running
1: alarm and decelerate to stop
2: alarm and stop freely

b12: PG rotation direction **factory setting: 0**



phase A is forward



phase B is forward

The parameter decide the rotation direction of encoder, and the motor forward direction is the reference direction.
0: If phase A is foregoing when motor forward, b12 is set as 0.
1: If phase B is foregoing when motor forward, b12 is set as 1.
Note: parameter: b10/11/12 are valid with PG. If needing PG board, please connect with our company.

b13: motor parameter measurement **factory setting: 0**

The parameter is set to achieve motor's dynamic measurement of parameters. Please disconnect the motor and load(run without load).
When b13=1, inverter start to measure parameters automatically.
When keyboard displays "CAL1": stator resistor measure, motor stops.
When keyboard displays "CAL2":rotor resistor, leakage inductance measure, motor stops.
When keyboard displays "CAL3": mutual inductance measure, motor runs in high speed, pay attention.
The measurement could be stopped by pressing "STOP" key.
Please prepare to run the motor well before setting, the motor will run in a high speed during the measurement .The measurement will end with "CAL3" diapapears.
b1 resets to 0 after measurement. The measured parameters will be stored automatically to b05~b09.

b14: **Rotate speed display plus** **factory setting: 100.0%**

Adjust the display of motor's actual running speed, refer to F00 monitor select: 6 Actual motor speed.

b15: Percentage linkage modulus **factory setting: 1.00**

The only number which differentiate other inverters.
The set range 1~127 is the address of slave inverters that could receive command and send the state of such slave inverters.
F73=128, the inverter is set to be one host inverter in the percentage linkage. There is only one host inverter in one percent application.
Set frequency of slave inverter=percentage linkage modulus X frequency of host inverter
The running state of slave inverter is controlled by host inverter.

b16: Reserved **factory setting: 0**

b17: Reserved **factory setting: 0**

Section VII. Fault Diagnosis and Solutions

Problems	Possible causes	Solutions
Keyboard can not control	Control mode setting is wrong	Check F05.
	Frequency setting is wrong	Check F04.
Potentiometer can't regulate speed	Control mode setting is wrong	Check F05.
	Frequency setting is wrong	Check F04.
The motor does not rotate	LED monitor indicates error message	
	No voltage exists between terminals P and N.	Check the voltage at R，S or T and charging circuit.
	U, V or W terminals produce no output or abnormal output.	Check the control mode and frequency parameter. Check the terminal condition if it is operated by an external terminal.
	Re-start after powering down or free run	Remember the set operating state.
	Too much load on the motor	Check and lower the load.
Over current OC	fault display OC-P	System is disturbed or instant over current
	fault display OC-C	OC signal from current self-inspected citcuit impact
	fault display OC-FA	OC signal from drive circuit
	fault display OC-2	Output over current and current exceed 1.5~3 times of motor's rated current (G/S: 2; F: 1.5; Z/M/T: 2.5;H:3).
	Over current during acceleration	Reset or modify the parameters of the functions F09, F18, F19.
	Over current during deceleration	Reset or modify the parameters of the functions F10, F20, F21.
	Over current during operation	Check the load change and eliminate it.
	Over current during starting or operation from time to time	Check if there is slight short circuit or grounding.
	Disturbance	Check the earthing wire, screened cable grounding and terminals.

overload OL	Too much load	Lower the load.or enlarge b01 in the allowable load range or enlarge F46 to raise the protection level.
	Inappropriate parameter is set	Modify the parameters of the functions b01.
Over voltage OU	Power voltage exceeds the limit	Checking voltage is right or not. Frequency inverter rated voltage setting is right or not.
	Too fast deceleration	Modify the parameters of the functions F10.
	The load has too much inertia	Reduce the load inertia, or raise the capacity of frequency converter, or use B type converter or add a braking unit.
Low voltage LU	Too low power voltage	Checking voltage is right or not. Frequency inverter rated voltage setting is right or not.
	The power is off transiently	Add options of capacitor boxes.
	The line has too small capacity or great rush current exists on the lines.	Make renovation on power supply system.
Overheat OH	Too high ambient temperature	Improve ambient conditions, when the fans are valid.
	The carrier frequency is too high	Check the setting value of function F15.

Note:

※ Switch off the power supply, and do not touch the PCBs and any parts inside in five minutes after the charging indicator light (!CHARGE) goes off. Ensure the capacitance has been discharged completely by measuring with the instrument before work inside. Otherwise, there is a danger of electric shock.

※ Do not touch the PCB or IGBT and other internal parts unless actions have been taken to prevent the static electricity. If not, the components may be damaged.

Section VIII. Standard Specifications

8-1. Specification

8-1-1. PI7800 specifications

Inverter type	Light Load F		Standard Load G		Medium Load M		Heavy Load H		Structure item
	P_F KW	I_F A	P_G KW	I_G A	P_M KW	I_M A	P_H KW	I_H A	
3 phase voltage 380V 50/60Hz									
PI7800●●●□3	11	25	7.5	16	5.5	13	5.5	13	1N2
PI7800●●●□3	15	32	11	25	7.5	16	7.5	16	1N2
PI7800●●●□3	18.5	38	15	32	11	25	11	25	1N2
PI7800●●●□3	22	45	18.5	38	15	32	11	25	1N3
PI7800●●●□3	30	60	22	45	18.5	38	15	32	1N3
PI7800●●●□3	37	75	30	60	22	45	18.5	38	2N1
PI7800●●●□3	45	90	37	75	30	60	22	45	2N1
PI7800●●●□3	55	110	45	90	37	75	30	60	2N2
PI7800●●●□3	75	150	55	110	45	90	37	75	2N2
PI7800●●●□3	93	170	75	150	55	110	45	90	2N2
PI7800●●●□3	110	210	93	170	75	150	55	110	2N3
PI7800●●●□3	132	250	110	210	93	170	75	150	2N3
PI7800●●●□3	160	300	132	250	110	210	93	170	2N4
PI7800●●●□3	187	340	160	300	132	250	110	210	2N4
PI7801●●●□3			132	250					3N1
PI7801●●●□3			160	300					3N1
PI7800●●●□3	200	380	187	340	160	300	132	250	3N1
PI7800●●●□3	220	415	200	380	187	340	160	300	3N1
PI7800●●●□3	250	470	220	415					3N1
PI7800●●●□3	280	520	250	470	200	380	187	340	3N2
PI7800●●●□3	315	600	280	520	220	415	200	380	3N2
PI7800●●●□3	355	640	315	600	250	470	220	415	3N2
PI7800●●●□3	400	750	355	640	280	520	250	470	3N2

8-1-2. PI7600 specification

Inverter type	Light Load F		Standard Load G		Medium Load M		Heavy Load H		Structure item
	P_F kW	I_F A	P_G kW	I_G A	P_Z kW	I_Z A	P_H kW	I_H A	
1 phase voltage 220V 50/60Hz									
PI7600●●●□1	0.75	4	0.4	2.5					4N2B
PI7600●●●□1	1.5	7	0.75	4	0.4	2.5			4N2B
PI7600●●●□1			1.5	7	0.75	4	0.4	2.5	4N2B
PI7600●●●□1	2.2	10	2.2	10	1.5	7	0.75	4	4N3B
PI7600●●●□1	4	16	4	16	2.2	10	1.5	7	4N3B
PI7600●●●□1	5.5	20	5.5	20	4	16	2.2	10	4N4B
3phase voltage 220V 50/60Hz									
PI7600●●●□2	0.75	4	0.4	2.5					4N2B
PI7600●●●□2	1.5	7	0.75	4	0.4	2.5			4N2B
PI7600●●●□2			1.5	7	0.75	4	0.4	2.5	4N2B
PI7600●●●□2	2.2	10	2.2	10	1.5	7	0.75	4	4N3B
PI7600●●●□2	4	16	4	16	2.2	10	1.5	7	4N3B
PI7600●●●□2	5.5	20	5.5	20	4	16	2.2	10	4N4B
3phase voltage 380V 50/60Hz									
PI7600●●●□3			0.75	2.5	0.75	2.5	0.75	2.5	4N2B
PI7600●●●□3	1.5	3.7	1.5	3.7	1.5	3.7	1.5	3.7	4N2B
PI7600●●●□3	2.2	5	2.2	5	2.2	5	2.2	5	4N2B
PI7600●●●□3	4	8.5	4	8.5	4	8.5	4	8.5	4N3B
PI7600●●●□3	5.5	13	5.5	13	5.5	13			4N3B
PI7600●●●□3	7.5	16	7.5	16	7.5	16	5.5	13	4N4B
PI7600●●●□3	11	25					7.5	16	4N4B

8-1-3. Table of rated current for different specifications

G/F/H/S/Z/T/M Type						
(V)	220V 1Φ	220V (240V)	380V (415V)	460V (440)	575V	660V
(KW)	(A)	(A)	(A)	(A)	(A)	(A)
0.4	2.5	2.5	–	–	–	–
0.75	4	4	2.5	2.5	1.7	–
1.5	7	7	3.7	3.7	2.5	–
2.2	10	10	5	5	4	–
4	16	16	8.5	8	6.5	5.5
5.5	20	20	13	11	8.5	7.5
7.5	30	30	16	15	10.5	9
11	42	42	25	22	17	15
15	55	55	32	27	22	18
18.5		70	38	34	26	22
22		80	45	40	33	28
30		110	60	55	41	35
37		130	75	65	52	45
45		160	90	80	62	52
55		200	110	100	76	63
75		260	150	130	104	86
93		320	170	147	117	98
110		380	210	180	145	121
132		420	250	216	173	150
160		550	300	259	207	175
187		600	340	300	230	198
200		660	380	328	263	218
220		720	415	358	287	240
250		–	470	400	325	270
280		–	520	449	360	330
315		–	600	516	415	345
375		–	680	600	450	390
400		–	750	650	520	430
500		–	920	800	650	540

8-2. Standard specification

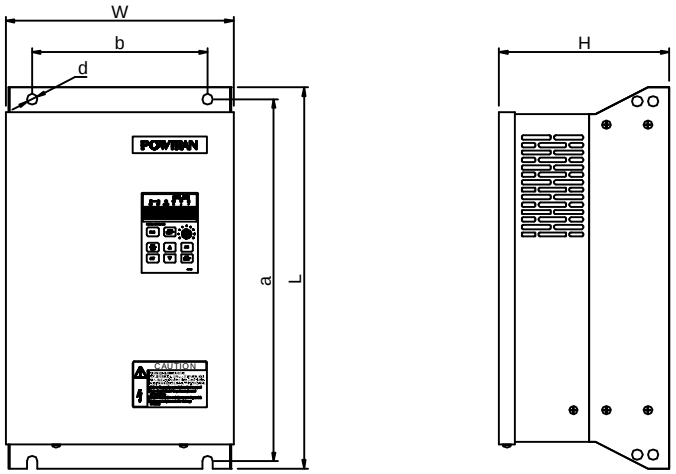
items			specifications
power	Voltage and frequency		Single-phase 200~240V,50/60Hz Three-phase 200~240V,50/60Hz Three-phase 380~415V,50/60Hz Three-phase 440~460V,50/60Hz Three-phase 575V,50/60Hz Three-phase 660V,50/60Hz Three-phase 1140V,50/60H
	Allowable Fluctuation range		voltage: ±15% frequency: ±5%
control	Control system		high performance vector control inverter based on DSP
	Output frequency		G/F/Z/S/T/M:0.00~800.0Hz,the maximum frequency range is 10.00~800.0Hz H:0.00~2000.0Hz,the maximum frequency range is 10.00~2000.0Hz.
	control method		V/F control, V/F+ PG control, vector + PG control
	waveform produce methods		asynchronous space vector PWM, step less and subsection synchronous space vector PWM,2 phase optimized vector PWM
	Auto torque boost function		Realize low frequency (1Hz) and large output torque control under the v/f control mode.
	Accelerate /decelerate control		Acceleration/Deceleration S curve subsection set mode. The maximum running time is 26 hours.
	Program running control		7 step speed program running, the maximum running time is 88 hours.
	frequency setting accuracy		Digital references:0.01Hz(300 Hz and below),0.1 Hz(above 300 Hz) Analog references:0.05Hz/60Hz
	frequency accuracy		Speed control tolerance 0.01%(25℃±10℃)
	V/F curve mode		Linear,square,8 V/F curve set by user
	Over load capability		G/S:150% for one minute, 200% for 0.1 second F:120% for one minute, 150% for 0.1 second Z/M/T:180% for one minute, 250% for 0.1 second H:250% for one minute, 300% for 0.1 second
	slip compensation		0~10% automatic slip compensation
running	Input signal	running method	Keypad/Terminal/Communication mode
		frequency setting	There are 11 frequency setting modes, including DC 0~10V, DC 0~20mA, DC 4~20mA, potentiometer on the keyboard.
		start signal	forward, reverse
		Multi-segment speed	can set 7 steps speed at most(using multi-function or program running)
		Multi-segment acceleration	At most 8 steps acceleration can be set (using multi function terminals or program running.)
		instant stop	Interrupt controller's output.
		traverse running	Program control running
		jog	running in low speed
		fault reset	When the protection function is affective, system can reset fault state automatically.
		PID feedback signal	DC 0~10V, DC 1~5V, DC 0~20mA, DC 4~20mA

running	Output signal	running state	motor state display, stop, accelerate/decelerate, seven-speed, program running state
		fault output	relay fault output: AC 250V 5A, DC 30V 5A
		analog output	2 analog output, 8 signals could be selected: frequency, current, voltage, temperature, etc, the output signal range is 0~10V/0~20Ma.
		output signal	6 output signals, each one with 22 signals for option.
	running function		Limit frequency, skip frequency, torque difference compensate, reverse protection, automatic adjustment, PID control
	DC brake		On base of non-OC, internal PID can regulate braking current to ensure enough braking torque.
Protection function	inverter protection		Over voltage, under voltage, over current, over load, overheat, over current stall, over voltage stall, phase loss (options), external fault, communication fault, PID feedback abnormity, PG fault.
	IGBT temperature display		Display of current IGBT temperature
	inverter fan control		Temperature of starting the fan can be set. (options)
	restart after momentary power loss		less than 15ms:continue running More than 15ms:automatic inspection of motor's speed, restart after transient power down.
	speed starting pursue mode		inverter pursue motor speed automatically before starting
	parameter protection function		protect inverter's parameter by setting password and decode
display	LCD English Display + LED keyboard	running message	set frequency, actual frequency, actual current, actual current percentage, DC bus voltage, actual output voltage, actual motor's speed, total running time, IGBT temperature, PID set value, PID feedback value, motor output power percentage, excitation heft set value, excitation heft actual value, torque heft set value, torque heft actual value. Display of 3parameters simultaneity at most: set frequency + actual frequency+ the monitored running message
		fault message	Store 5 fault messages at most, and can inquire about fault style, voltage, current, frequency and the work state at the same time
communication	RS485		Completely isolated RS485 communication module (options),realizes the communication with the host computer.
	CAN BUS		CAN BUS module(options)
environment	environment temperature		-10 ℃~ 40 ℃
	storage temperature		-20 ℃~65 ℃
	environment humidity		Less than 90 % RH
	Height / libration		less than 1,000 m, less than 5.9m/s²（=0.6g）
	application place		where there is no rust gas, no flammability gas, no grease and dust
cooling methods			Forced air cooling and natural cooling

8-3 Sharp size

8-3-1. PI7800 family (3phase voltage 380V~415V, 50/60Hz)

1. 1N2~1N3, 2N1~2N4



1) 1N2

Type	(kW)	Structure item	Shape			Installation dimension			Net Weight kg	Gross weight kg	Keypad
			L	W	H	a	b	d			
F	11~18.5	1N2	360	235	207	340	150	Ø10	10	11	JP6E7000
G	7.5~15										
M	5.5~11										
H	5.5~11										

2) 1N3

Type	(kW)	Structure item	Shape			Installation dimension			Net Weight kg	Gross weight kg	Keypad
			L	W	H	a	b	d			
F	22~30	1N3	410	264	242	390	165	Ø10	14	15.5	JP6E7000
G	18.5~22										
M	15~18.5										
H	11~15										

3) 2N1

Type	(kW)	Structure item	Shape			Installation dimension			Net Weight kg	Gross weight kg	Keypad
			L	W	H	a	b	d			
F	37~45	2N1	560	300	243	540	200	Ø10	22	23.5	JP6E7000
G	30~37										
M	22~30										
H	18.5~22										

4) 2N2

Type	(kW)	Structure item	Shape			Installation dimension			Net Weight kg	Gross weight kg	Keypad
			L	W	H	a	b	d			
F	55~93	2N2	660	365	293	640	250	Ø10	40	48	JP6E7000
G	45~75										
M	37~55										
H	30~45										

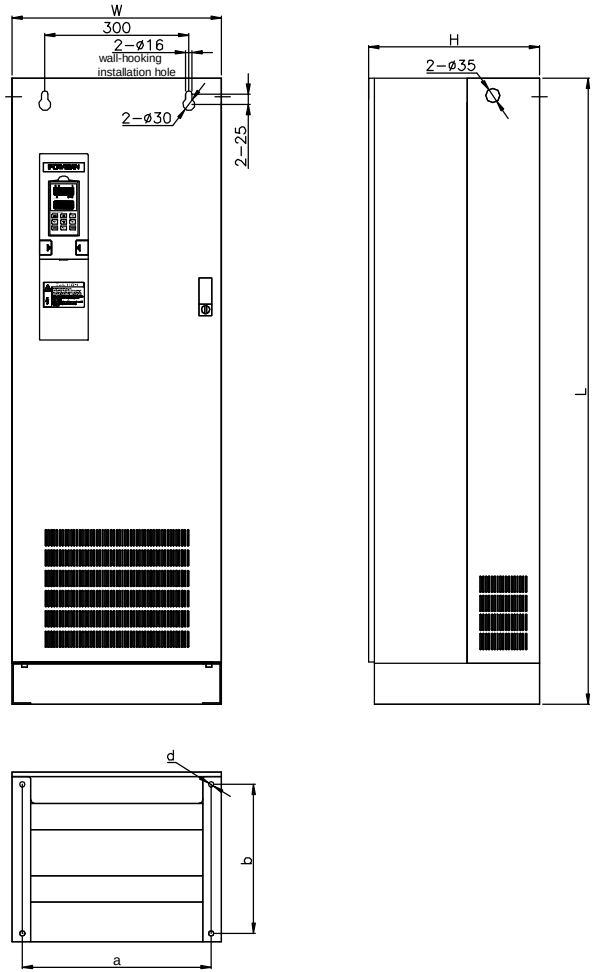
5) 2N3

Type	(kW)	Structure item	Shape			Installation dimension			Net Weight kg	Gross weight kg	Keypad
			L	W	H	a	b	d			
F	110~132	2N3	710	455	293	690	350	Ø10	57	68	JP6E7000
G	93~110										
M	75~93										
H	55~75										

6) 2N4

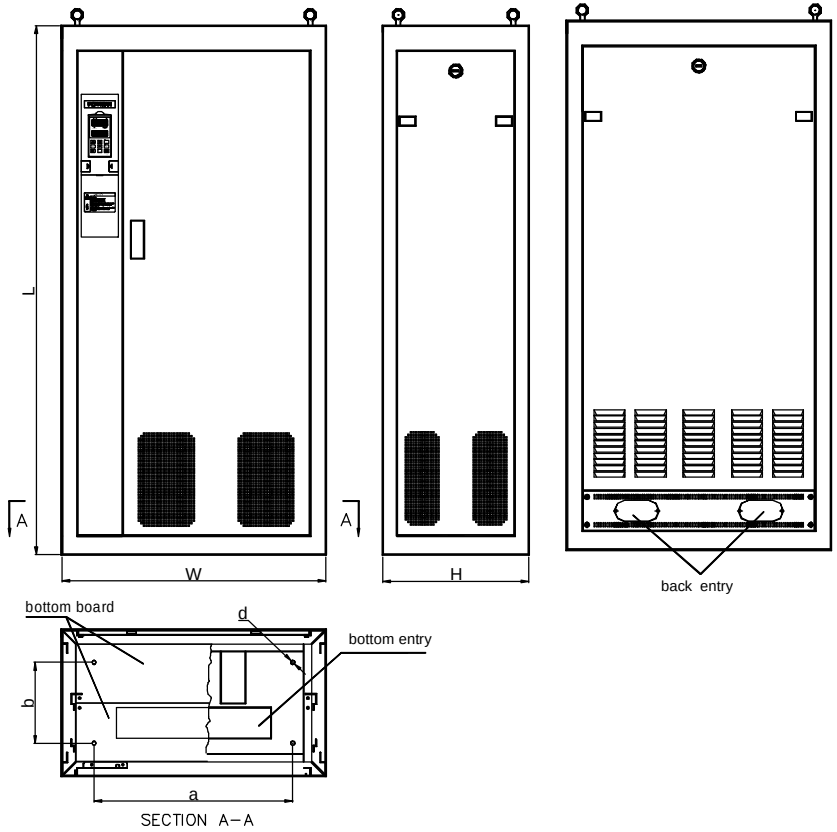
Type	(kW)	Structure item	Shape			Installation dimension			Net Weight kg	Gross weight kg	Keypad
			L	W	H	a	b	d			
F	160~187	2N4	910	480	342	890	350	Ø10	72	86	JP6E7000
G	132~160										
M	110~132										
H	93~110										

2. 3N1



Type	(kW)	Structure item	Shape			Installation dimension			Net Weight kg	Gross weight kg	Keypad
			L	W	H	a	b	d			
F	200~250	3N1	1540	515	443	465	367	Ø13	160	190	JP6E7000
G	187~220										
M	160~1877										
H	132~160										

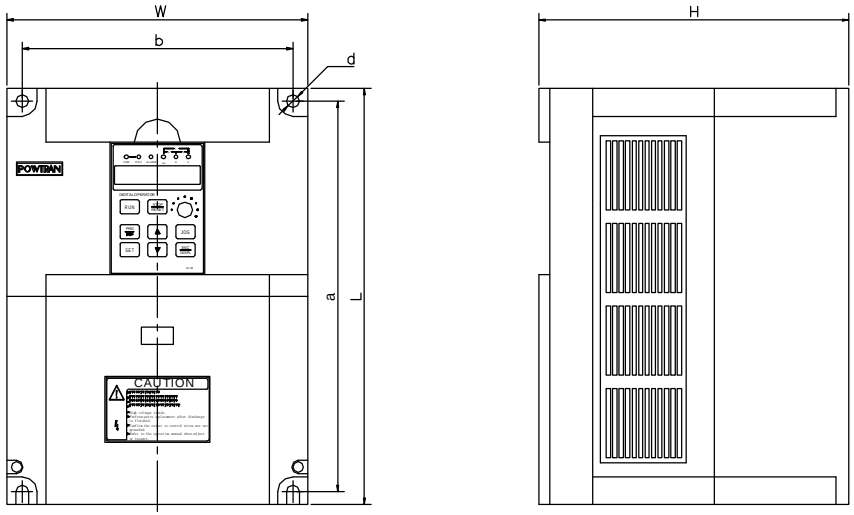
3. 3N2



Type	(kW)	Structure item	Shape			Installation dimension			Net Weight kg	Gross weight kg	Keypad
			L	W	H	a	b	d			
F	280~400	3N2	1700	850	492	640	260	Ø13	280	350	JP6E7000
G	250~355										
M	200~280										
H	187~250										

8-3-2 PI7600

1. 4N2B-4N4B



1) 4N2B

Voltage	Type	(kW)	Structure item	Shape			Installation Dimension			Net weight kg	Net weight kg	Keypad
				L	W	H	a	b	d			
1 phase 220v	F	0.75~1.5	4N2B	170	125	162	160	112	Ø5	2	2.4	JP5E7000
	G	0.4~1.5										
	M	0.4~0.75										
	H	0.4										
3phase 220v	F	0.75~1.5	4N2B	170	125	162	160	112	Ø5	2	2.4	JP5E7000
	G	0.4~1.5										
	M	0.4~0.75										
	H	0.4										
3phase 380v	F	1.5~2.2	4N2B	170	125	162	160	112	Ø5	2	2.4	JP5E7000
	G	0.75~2.2										
	M	0.75~2.2										
	H	0.75~2.2										

2) 4N3B

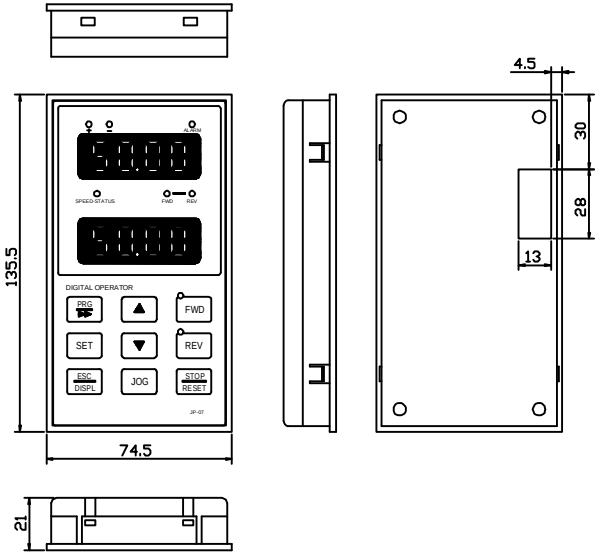
Voltage	Type	(kW)	Structure item	Shape			Installation Dimension			Net weight kg	Net weight kg	Keypad
				L	W	H	a	b	d			
1phase 220v	F	2.2~4	4N3B	220	150	178	205	138	Ø5.5	3	3.5	JP5E7000
	G	2.2~4										
	M	1.5~2.2										
	H	0.75~1.5										
3phase 220v	F	2.2~4	4N3B	220	150	178	205	138	Ø5.5	3	3.5	JP5E7000
	G	2.2~4										
	M	1.5~2.2										
	H	0.75~1.5										
3phase 380v	F	4~5.5	4N3B	220	150	178	205	138	Ø5.5	3	3.5	JP5E7000
	G	4~5.5										
	M	4~5.5										
	H	4										

3) 4N4B

Voltage	Type	(kW)	Structure item	Shape			Installation Dimension			Net weight kg	Net weight kg	Keypad
				L	W	H	a	b	d			
1phase 220v	F	5.5	4N4B	300	218	212	288	203	Ø6.5	6	7	JP6E7000
	G	5.5										
	M	4										
	H	2.2										
3phase 220v	F	5.5	4N4B	300	218	212	288	203	Ø6.5	6	7	JP6E7000
	G	5.5										
	M	4										
	H	2.2										
3phase 380v	F	7.5~11	4N4B	300	218	212	288	203	Ø6.5	6	7	JP6E7000
	G	7.5										
	M	7.5										
	H	5.5~7.5										

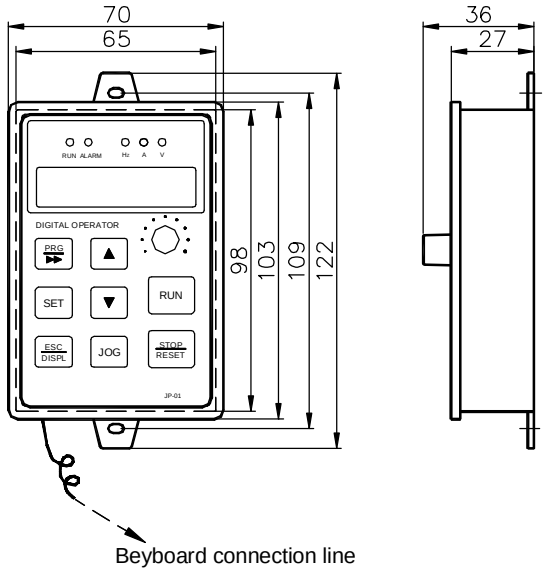
8-3-3. Keyboard size

JP6E7000/JP6C7000 Keyboard size



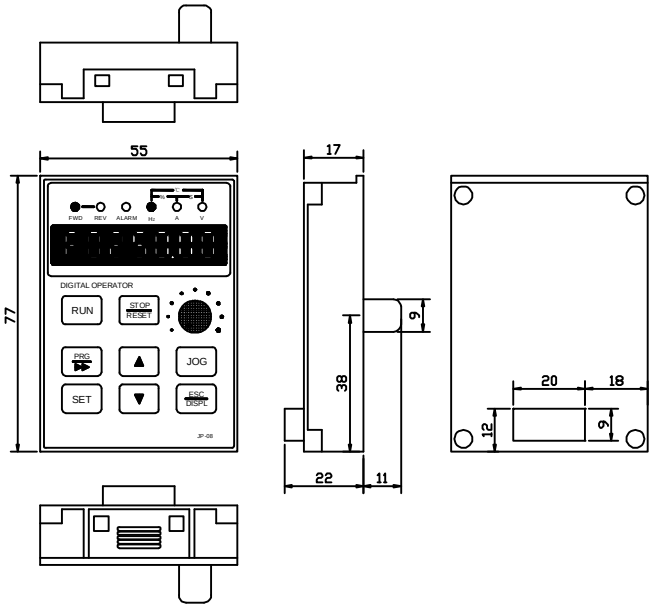
Fixed on the panel, hole's dimension：(131±0.1)×(70.8±0.1)

JP3E7000 Keyboard size

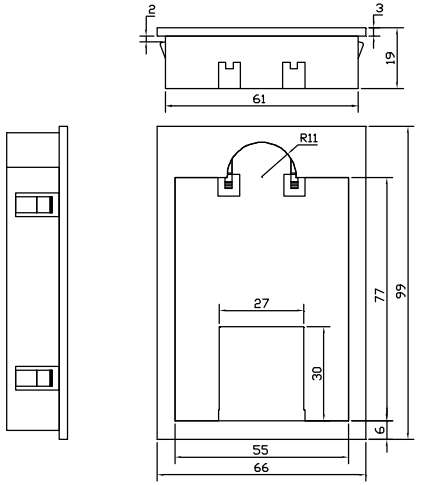


Beyboard connection line

JP5E7000 Keyboard size



Small keyboard box JP5D7000 dimension：



Fixed on the panel,hoel's dimension：(94.5±0.1)×(61.3±0.1)

Section IX. Maintenance

9-1 Inspection and Maintenance

Under normal working conditions,in addition to daily inspection, the frequency converter should be subject to regular inspection (for example inspection for overhaul or as specified but at an interval of six months at most). Please refer to the following table in order to prevent faults.

Check time		Check point	Check item	Check to be done	Method	Criterion
D	R					
√		Display	LED and LCD display	If there is any abnormal display	Visual check	As per use state
√	√	Cooling system	Fan	If abnormal noise or vibration is produced.	Visual and audible check	No abnormal sound or vibration
√		Body	Surrounding conditions	Temperature, humidity, dust content, harmful gas, etc.	Check visually, by smelling and feeling	As per Section 2-1
√		Input/ output terminal	Voltage	If input, output voltage is abnormal	Measure at R, S, T and U, V, W terminals	As per standard specifications
	√	Main circuit	Overall conditions	If the fastenings come loose, if any signs show overheat, discharging, or too high dust content, or the air piping is blocked	Check visually, tighten the fastenings, and clean the related parts	No abnormal conditions
			Electrolytic capacitance	If there is abnormal appearance	Check visually	No abnormal condition
			Current-conducting leads or blocks	If the parts come loose	Check visually	No abnormal condition
			Terminals	If the screws or bolts come loose	Tighten the loose screws or bolts	No abnormal condition

"D" means daily check and "R" means regularly check.
"√" means need daily check or regularly check

For inspection, do not disassemble or shake the parts without reason, and still less pull off the plug-in-parts at random. Otherwise, the unit will not operate normally, or can not enter the mode of fault display, or causes faults of components or even parts of the main switch components IGBT module is damaged.

If measuring is necessary, the user should note that much different results will be gained possibly if the measuring is performed with different instruments. It is recommended that the input voltage be measured with pointer-type voltmeter, output voltage with rectification voltmeter, input and output current with tong-test ammeter, and power with electrically-driven wattmeter.

9-2. Periodically-Replaced Parts

In order to ensure the operation reliability of the frequency converter, in addition to regular maintenance and inspection, all the parts suffering long-term mechanical wear should be replaced at a regular interval, which includes all cooling fans and the filtering capacitors of main circuits for energy buffer and interchange and PCBs. For continuous use under normal conditions, these parts can be replaced according to the following table and the operating environment, loads and the current state of frequency converter.

Part name	Interval for replacement
Cooling fan	1~3 years
Filtering capacitor	4~5 years
PCB (printed circuit board)	5~8 years

9-3. Storage

The following actions must be taken if the frequency converter is not put into use immediately after delivery to the user and need to keep well for the time being or stored for a long time:

※ Stored in a dry and adequately-ventilated place without dust and metal powder at the temperature specified in the specifications.

※ If the frequency converter is not put into use after one year, a charge test should be made, so as to resume the performance of the filtering capacitor of main circuit in it. For charging, a voltage regulator should be used to slowly increase the input voltage of the frequency converter until it reaches the rating, and the charge should last more than 1~2 hours. This test should be made at least once a year.

※ Don't perform breakdown test at random, for this test will cause shorter life of the frequency converter. The insulation test must be performed after the insulation resistance is measured with a 500-volt megaohm and this value must not be less than 4MΩ.

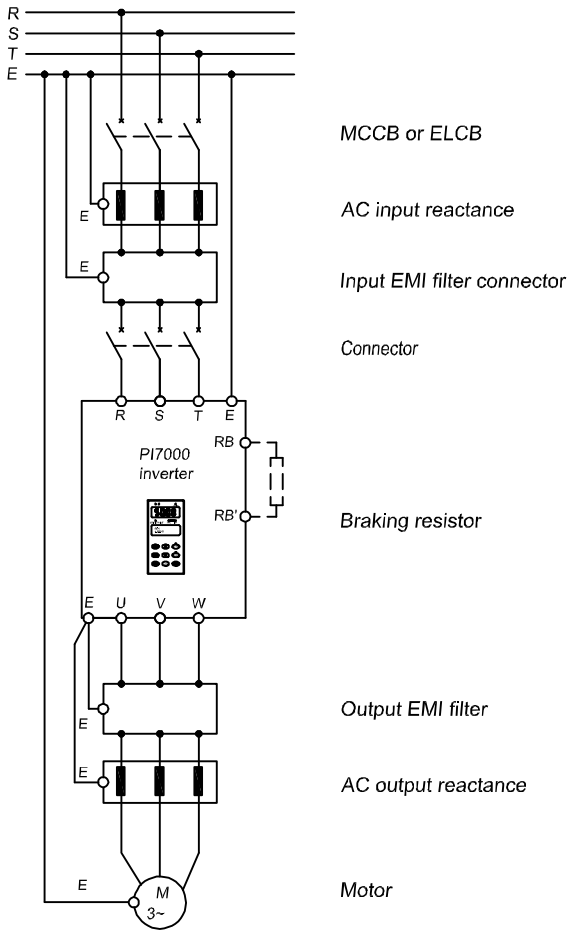
9-4. Measuring and Judgment

※ If the current is measured with the general instrument, imbalance will exists for the current at the input terminal. Generally, differing by not more than 10% is normal. If it differs by 30%, inform the factory to replace the rectification bridge, or check if the error of three-phase input voltage is above 5V.

※ If the three-phase output voltage is measured with a general multi-meter, the reading is not accurate due to the interference of carrier frequency and only for reference.

Section X. Options

The series can acquire the peripheral equipment by user because of the different using condition and requirement. See the wiring diagram as below:



MCCB or ELCB

AC input reactance

Input EMI filter connector

Connector

Braking resistor

Output EMI filter

AC output reactance

Motor

10-1. MCCB OR ELCB

As power switch of the inverter, MCCB or ELCB can protect supply power, but can't control inverter to run or stop.

10-2. AC reactance

AC reactance is able to restrain the high harmonic wave of converter input current and improve converter's power factor obviously. It's recommended that

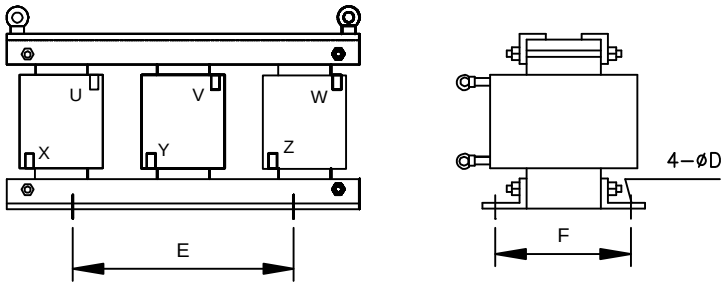
AC reactance will be used in the following condition:

※ The capacity of power source is ten times more than the capacity of converter.

※ SCR load or power factor compensated device with ON/OFF is connected with the same power supply.

※ Unbalanced 3-phase voltage is bigger (more than 3%).

The common size of AC input reactance:



Sharp size:

Inverter standard		Size (mm)						Gross Weight (kg)
Voltage	Capacity (kW)	A	B	C	D	E	F	
200V 230V	0.75	155	125	95	7	89	60	3.0
	1.5	155	125	95	7	89	60	3.0
	2.2	155	125	95	7	89	60	3.0
	4	155	125	95	7	89	60	3.5
	5.5	155	125	100	7	89	60	3.5
	7.5	155	125	112	7	89	70	4.0
	11	155	125	112	7	89	70	6.0
	15	180	140	112	8	90	80	8.0
	18.5	180	140	112	8	90	90	8.0
	22	180	140	112	8	90	90	8.0
	30	230	175	122	10	160	90	12.0
	37	230	175	132	10	160	100	15.0
	45	230	175	150	10	160	110	23.0
	55	230	175	160	10	160	120	23.0
	75	285	220	230	14	180	130	30.0

380V 460V	0.75	155	125	95	7	89	60	3.0
	1.5	155	125	95	7	89	60	3.0
	2.2	155	125	95	7	89	60	3.0
	4	155	125	95	7	89	60	3.5
	5.5	155	125	100	7	89	60	3.5
	7.5	155	125	112	7	89	70	4.0
	11	155	125	112	7	89	70	6.0
	15	180	140	112	8	90	80	8.0
	18.5	180	140	112	8	90	90	8.0
	22	180	140	112	8	90	90	8.0
	30	230	175	122	10	160	90	12.0
	37	230	175	132	10	160	100	15.0
	45	230	175	150	10	160	110	23.0
	55	230	175	160	10	160	120	23.0
	75	285	220	230	14	180	130	30.0
	110	285	250	230	14	210	140	33.0
	160	360	260	230	14	210	140	40.0
	200	360	270	230	14	210	140	45.0
	250	400	330	240	14	240	140	55.0
	315	400	350	285	14	270	160	90.0

10-3. Noise filter

The filter is used to restrain the conduction of electrical magnetic wave interference noise produced by the converter or shock the interferential form radio or momentary concussion. The common size of 3-phase EMI noise filter is shown as following: confirm the power supply is 3-phase three lines or 3-phase four lines or single phase. Earthling wire is as short as possible, try to place the filter near the converter.

Please choose EMI filter when the converter is used in residential area, commercial area, science area or other. Please need to prevent magnetic interference, or need meet CE, UL, and CSA standard.
Note: If needing the filter, please connect with our company.

10-4. Connector

It can cut off the supply power in action of the system protection function, to prohibit fault enlarging. But can't control the motor start or stop by connector.

10-5. Braking Unit & braking resistor

There is braking unit inside when using "B" type frequency converter, the maximum braking torque is 50%. Please choose braking resistor according to the following table:

Type	Converter power (kW)	Braking resistor (Ω)	Braking resistor Power (W)
220V	0.75	200	120
	1.5	100	300
	2.2	70	300
	4	40	500
	5.5	30	500
	7.5	20	780
	11	13.6	2000
	15	10	3000
	18	8	4000
	22	6.8	4500
380V	0.75	750	120
	1.5	400	300
	2.2	250	300
	4	150	500
	5.5	100	500
	7.5	75	780
	11	50	1000
	15	40	1500

Please choose POWTRAN BRAKING UNIT if you need more braking torque. Please refer to the catalog of braking unit.
There is no braking unit inside the large capacity frequency converter. Please choose POWTRAN BRAKING UNIT if you need braking.

10-6. output EMI filter

The fittings can restrain the disturbance noise and lead leak current produced in the output side.

10-7. AC output reactor

When the line from inverter to motor is longer than 20 meters, it can restrain the over-current caused by the distributing current and the wireless disturbance of the inverter.

Appendix 1. PI7000 RS485 communication protocol

1. Use introduce

This chapter introduces something about the install and handle of RS485 communication between inverter and PLC, PC, factory computer.

RS485 standard interface

- can communicate with all computer
- using multi-drop link system, can link more to 127 inverters
- completely isolated, and noise shield
- The user would use all types of RS232-485 inverter, if only the inverter had "automatic RTS control" function inside.

2. Specification

Communication function:

Items	Specification
Communication baud rate	38400/19200/**9600**/4800/2400/1200 bps is selectable
Interface methods	Asynchronism communication methods, semiduplex
System code	ASCII (8 bit)
Data formula	1 start bit, 8 data bits, 1 stop bit, and no parity bit
Slave address	1~127

3. Setup

Communication connection

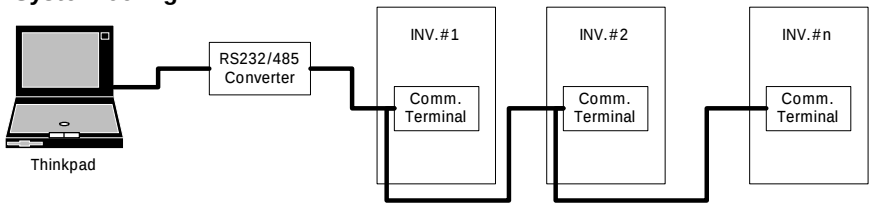
- Link RS485 communication cables to inverter control terminals (SG+), (SG-).
- when using RS232-485 transform, connect Inverter "SG+" to RS485 "T+", Inverter "SG-" to RS485 "T-".
- After Confirming connection again, turn on inverter power.
- If connection is right, set communication parameters as following:

  y11 baud rate: 0:1200, 1:2400, 2:4800, 3:9600, 4:19200, 5:38400;

  y12 current inverter communication address 1~127 (If there are more than 1 inverters, don't use the same number);

  When using RS485 running control methods, set F05=0/1/2(Keypad + RS485/CAN)

System config



- The number of inverter can be connected is no more than 127.
- Though the length of communication cable can add up to 1300m, considering the stability, the length limit within 800m.
- All the control signal cable use the shielded cable, and link to the terminal "SH".

4. Communication protocol

Communication structure is that the inverters use as slave and computer uses as host.

Base format

Host command frame format

Frame header	Slave address	Host command	Command index	Setting data	Check sum	Frame trail
1 byte	2 bytes	2 bytes	4 bytes	4 bytes	2 bytes	1 byte

Slave responsion frame format

Frame header	Slave address	Slave responsion	Command index	responsion data	Check sum	Frame trail
1 byte	2 bytes	2 bytes	4 bytes	4 bytes	2 bytes	1 byte

Explain:

Setting data and responsion data may not exist in some frame.

1: Frame header

7EH="~".

2: Slave address

Slave address can be set by y12. A network has an only marked address, and the range is 1~127.

00H=0 means the broadcast communication address.

When sending, takes apart the slave address to higher 4 bits and lower 4 bits, and converts to ASCII code, then sends higher 4 bits firstly.

For example: If the slave address is 08H, the system sends "0"=30H, then sends "8"=38H。

3: Host command/slave responsion

The host sends the command, and the slave respond to the command.

When sending, takes apart the slave address to higher 4 bits and lower 4 bit, and converts to ASCII code, then sends higher 4 bits firstly.

For example: If the slave address is 03H, the system sends "0"=30H, then

sends “3”＝33H。

- **Command code function class:**
  00H=control the slave running
  01H=read function parameter of the slave
  02H=set function parameter of the slave
  03H=read the fault history record
  04H=read the state of the slave
  05H=set the function parameter of the slave and EEPROM
- **Responsion code function class:**
  00H=the control of the slave’s running is normal
  01H=the read of the slave’s function parameter is normal
  02H=the setting of the slave’s function parameter is normal
  03H=the read of fault history record is normal
  04H=the read of the slave’s state is normal
  05H=the setting of the slave’s function parameter and EEPROM is normal
  11H=the frame check is wrong
  12H=the controller’s right is limited
  13H=the setting number exceeds the limit
  14H=the number of command is of no effect
  15H=the number of command index is of no effect
  16H=the operation is useless, and the setting is of no effect in the state
  17H=the fault history record is empty

4: Command index and data meaning

Data meaning:

For the host command, command index and setting data are made of double bytes.

When sending, takes apart the command index and setting data to higher 4 bits and lower 4 bit, and converts to ASCII code, then sends higher 4 bits firstly.

For example:

If the double byte of the command index is 010AH, then the data is sent in the following order‘0’=30H, ‘1’=31H, ‘0’=30H, ‘A’=41H

If the double byte of the setting data is 01F4H, then the data is sent in the following order: ‘0’=30H, ‘1’=31H, ‘F’=46H, ‘4’=34H

The data format of the host commands:

<table>
<tr><th>Command code</th><th>The higher byte of command index</th><th colspan="2">The lower byte of command index</th><th>The double bytes of setting data</th></tr>
<tr><td rowspan="6">00H (Control the slave running)</td><td rowspan="6">00H</td><td>Running command</td><td>data</td><td rowspan="6">empty</td></tr>
<tr><td>FWD</td><td>00H</td></tr>
<tr><td>REV</td><td>01H</td></tr>
<tr><td>STOP/RESET</td><td>02H</td></tr>
<tr><td>JOG</td><td>03H</td></tr>
<tr><td>FORCE STOP</td><td>04H</td></tr>
</table>

<table>
<tr><td rowspan="11">01H (Read the function parameter of the Slave)</td><td>Parameter group</td><td>The higher byte data</td><td>The byte is parameter number</td><td rowspan="11">empty</td></tr>
<tr><td>F</td><td>00H</td><td>0~66</td></tr>
<tr><td>U</td><td>01H</td><td>0~15</td></tr>
<tr><td>H</td><td>02H</td><td>0~34</td></tr>
<tr><td>o</td><td>03H</td><td>0~20</td></tr>
<tr><td>C</td><td>04H</td><td>0~5</td></tr>
<tr><td>d</td><td>05H</td><td>0~3</td></tr>
<tr><td>P</td><td>06H</td><td>0~8</td></tr>
<tr><td>y</td><td>07H</td><td>0~18 NOTE 1</td></tr>
<tr><td>b</td><td>08H</td><td>0~17</td></tr>
<tr><td>A</td><td>09H</td><td>0~15</td></tr>
<tr><td rowspan="11">02H (Set the function parameter of the Slave)</td><td>Parameter group</td><td>The higher byte data</td><td>The byte is parameter number</td><td rowspan="11">setting data</td></tr>
<tr><td>F</td><td>00H</td><td>0~66</td></tr>
<tr><td>U</td><td>01H</td><td>0~15</td></tr>
<tr><td>H</td><td>02H</td><td>0~34</td></tr>
<tr><td>o</td><td>03H</td><td>0~20</td></tr>
<tr><td>C</td><td>04H</td><td>0~5</td></tr>
<tr><td>d</td><td>05H</td><td>0~3</td></tr>
<tr><td>P</td><td>06H</td><td>0~8</td></tr>
<tr><td>y</td><td>07H</td><td>0~18 NOTE 1</td></tr>
<tr><td>b</td><td>08H</td><td>0~17</td></tr>
<tr><td rowspan="6">03H (Read the fault history record)</td><td colspan="2">Fault record</td><td>data</td><td>Fault inquiry content</td><td>data</td><td rowspan="6">empty</td></tr>
<tr><td colspan="2">fault history record 1</td><td>00H</td><td>Fault Style NOTE 3</td><td>00H</td></tr>
<tr><td colspan="2">fault history record 2</td><td>01H</td><td>Output frequency</td><td>01H</td></tr>
<tr><td colspan="2">fault history record 3</td><td>02H</td><td>Output current</td><td>02H</td></tr>
<tr><td colspan="2">fault history record 4</td><td>03H</td><td>Output voltage</td><td>03H</td></tr>
<tr><td colspan="2">fault history record 5</td><td>04H</td><td>Running style NOTE 2</td><td>04H</td></tr>
<tr><td>04H (Read the running State of the slave)</td><td colspan="3">empty</td><td colspan="2">empty</td><td>empty</td></tr>
</table>

05H (Set the function parameter of the Slave +EEPROM)	Parameter group	The higher byte data	The byte is parameter number	The setting data
	F	00H	0~66	
	U	01H	0~15	
	H	02H	0~34	
	o	03H	0~20	
	C	04H	0~5	
	d	05H	0~3	
	P	06H	0~8	
	y	07H	0~18 NOTE 1	
	b	08H	0~17	

For the slave responsion, command index and responsion are made up of double byte

When sending, takes apart the command index and responsion data to higher 4 bits and lower 4 bit, and converts to ASCII code, then sends higher 4 bits firstly.

For example:

If the double byte of the command index is 010Ah, then the data is sent in the following order:'0'=30H, '1'=31H, '0'=30H, 'A'=41H

If the double byte of responsion data is 01F4h, then the data is sent in the following order:'0'=30H, '1'=31H, 'F'=46H, '4'=34H

The data format of the slave responsion

Command code	The higher byte of command index		The lower byte of command index		The double bytes of setting data
00H (Control the slave running)	00H		Running command	data	empty
			FWD	00H	
			REV	01H	
			STOP/RESET	02H	
			JOG	03H	
			FORCE STOP	04H	
01H (Read the function parameter of the Slave)	Parameter group	The higher byte data	The byte is parameter number		The value of the inquired parameter
	F	00H	0~66		
	U	01H	0~15		
	H	02H	0~34		
	o	03H	0~20		
	C	04H	0~5		
	d	05H	0~3		
	P	06H	0~8		
	y	07H	0~18 NOTE 1		

	b	08H	0~17		
	A	09H	0~15		
02H (Set the function parameter of the Slave)	Parameter group	The higher byte data	The byte is parameter number		setting data
	F	00H	0~66		
	U	01H	0~15		
	H	02H	0~34		
	o	03H	0~20		
	C	04H	0~5		
	d	05H	0~3		
	P	06H	0~8		
	y	07H	0~18 NOTE 1		
	b	08H	0~17		
03H (Read the fault history record)	Fault record		data	Fault inquiry content	data	The content of the inquired fault
	fault history record 1		00H	Fault style NOTE 3	00H	
	fault history record 2		01H	Output frequency	01H	
	fault history record 3		02H	Output current	02H	
	fault history record 4		03H	Output voltage	03H	
	fault history record 5		04H	Running style NOTE2	04H	
04H (Read the running State of the slave)	empty			empty		16bit data NOTE2
05H (Set the function parameter of the Slave +EEPROM)	Parameter group	The higher byte data	The byte is parameter number			The setting data
	F	00H	0~66			
	U	01H	0~15			
	H	02H	0~34			
	o	03H	0~20			
	C	04H	0~5			
	d	05H	0~3			
	P	06H	0~8			
	y	07H	0~18 NOTE 1			
	b	08H	0~17			

NOTE 1:

	01H reading operation			02H writing operation	
y00 restore factory setting	return 0			invalid operation	
y01~y05 fault history record	empty record		00H	invalid operation	
	new record		01H		
	affirmed record		02H		
y06 restore fault record	return 0			invalid operation	
y09 Product series	70	0	3	invalid operation	
	Family serial	Function code	Input voltage level		
	The no. should be decimalization				
y17 Controller decode	decoded state	FFH		decoded state	Void operation
	locked state	error password input times		locked state	password input times
y18 Controller input the password	decoded state	FFH		decoded state	input password
	locked state	00H		locked state	void operation

NOTE 2:

BIT	15 BIT	14 BIT	13 BIT	12 BIT
meaning	current limit function 0:invalid 1:valid	OU stall protection 0:invalid 1:valid	reserved	0: no fault 1: fault occurs
BIT	11 BIT	10 BIT	9 BIT	8 BIT
meaning	000:new fault is saved in fault record 5 001:new fault is saved in fault record 1 010:new fault is saved in fault record 2 011:new fault is saved in fault record 3 100:new fault is saved in fault record 4			0: no JOG running 1: JOG running
BIT	7 BIT	6 BIT	5 BIT 、 4 BIT	
meaning	Lower limit frequency arrive or not 0:no 1:yes	Upper limit frequency arrive or not 0:no 1:yes	running state 00:stopping 10:decelerating 01:accelerating 11:running in a even speed	
BIT	3 BIT	2 BIT	1 BIT	0 BIT
meaning	direction state 0:reverse 1:forward	direction command 0:reverse 1:forward	reserved	running command 0: stop 1: running

NOTE 3: fault style code

serial number	LED display	fault message
0	OC_C	OC signal from current self-inspected citcuit impact
1	OCFA	OC signal from drive circuit
2	OC_2	Output over current,and current exceed 1.5~3 times of motor's rated current (G/S: 2; F: 1.5; Z/M/T: 2.5;H:3)
3	OU	over voltage
4	OL	over load
5	PH_O	phase open
6	OH	over heat
7	LU	lower voltage
8	UL	lower load
9	EEPr	EEPROM error
10	OC_P	IGBT power driver protect and produce hardware interrupt
11	E_FL	extern fault
12	PG	PG error
13	PID	PID regulation fault
14	DATE	Time limit fault

5: Check sum

Data meanings: data frame check sum, using the lower byte of the double bytes. When sending, takes apart lower byte of check sum to higher 4 bits and lower 4 bit, and convert to ASCII code, then sends higher 4 bits firstly.

For example: If the double byte of the check sum is 024BH, then the data is sent in the following order: '4'=34H, 'B'=42H

Check sum=higher 4 bits ASCII code of the slave address
+lower 4 bits ASCII code of the slave address
+higher 4 bits ASCII code of the host command
+lower 4 bits ASCII code of the host command
+higher 4 bits ASCII code of the higher byte of the command index
+lower 4 bits ASCII code of the higher byte of the command index
+higher 4 bits ASCII code of the lower byte of the command index
+lower 4 bits ASCII code of the lower byte of the command index
+higher 4 bits ASCII code of the higher byte of the setting data
+lower 4 bits ASCII code of the higher byte of the setting data
+higher 4 bits ASCII code of the lower byte of the setting data
+lower 4 bits ASCII code of the lower byte of the setting data

For example: the current running frequency of the slave set by the host is 58.00Hz, and the slave address is 08H. If the setting is successful and the communication is normal, the host command and slave responsion express as following:

The host command
=7EH+“08H”+“02H”+“00H”+“02H”+“16H”+“A8H”+“6CH”+0DH
The check sum
=30H+38H+30H+32H+30H+30H+30H+32H+31H+36H+41H+38H
=026CH
The sent data by the host
=7EH
+30H+38H+30H+32H+30H+30H+30H+32H+31H+36H+41H+38H
+36H+43H
+0DH

The slave responsion
=7EH+“08H”+“02H”+“00H”+“02H”+“16H”+“A8H”+“6CH”+0DH
The check sum
=30H+38H+30H+32H+30H+30H+30H+32H+31H+36H+41H+38H
=026CH
The slave responsion data
=7EH
+30H+38H+30H+32H+30H+30H+30H+32H+31H+36H+41H+38H
+36H+43H
+0DH

6: The security of data

- The data package is checked by means of LRC to ensure the security of data.
- The communication module is completely isolated to ensure communication security, and support hot insert-draw. When the module is connected successfully, system comes to the normal work.
- Data frame ensures the system receive correctly by using frame head and frame end. The data in the same frame, the time slot between two bytes that the slave can receive is no more than 300ms.
- The system is tested in 6 kinds of baud rate: 0:1200, 1:2400, 2:4800, 3:9600, 4:19200, 5:38400
  But in the bad situation, system improve the quality of the communication by reducing the baud rate
- The time that the inverter spends dealing with a frame is less than 100ms.

5. Example of communication protocol:

Example 1: control the slave running

The host controls NO 8 inverter running forward, and in the normal situation, the host command and slave responsion expresses as following:
Host command=7EH+“08H”+“00H”+“00H”+“00H”+*“88H”*+0DH
Note: The italic is the check code, gained by the calculation of the check num.
Check num=30H+38H+30H+30H+30H+30H+30H+30H+30H=0188H
The data sent by the host =7EH
+30H+38H+30H+30H+30H+30H+30H+30H
+38H+38H
+0DH

The data response by the slave=7EH+“08H”+“00H”+“00H”+“00H”+*“88H”*+0DH
Note: The italic is the check code, gained by the calculation of the check num.
Check sum=30H+38H+30H+30H+30H+30H+30H+30H+30H=0188H
The data sent by the slave =7EH
+30H+38H+30H+30H+30H+30H+30H+30H
+38H+38H
+0DH

Example 2: reading the function parameters of the slave

The host reads the setting frequency of NO 8 slave, and if the communication is normal, the host command and the slave responsion can express as following:
The host command=7EH+“08H”+“01H”+“00H”+“02H” +*“8BH”* +0DH
Note: The italic is the check code, gained by the calculation of the check num.
Check sum=30H+38H+30H+31H+30H+30H+30H+32H=018BH
The data sent by the host =7EH
+30H+38H+30H+31H+30H+30H+30H+32H
+38H+42H
+0DH
If the setting frequency of the slave is 0.00, the slave responsion is:
7EH+“08H”+“01H”+“00H”+“02H”+“00H”+“00H”+*“4BH”*+0DH
Note: ’00H’, ‘00H’ is the higher bits and lower bits of hex number of 0.00
Check num=30H+38H+30H+31H+30H+30H+30H+32H+30H+30H+30H+30H
=024BH
The data sent by the slave=7EH
+30H+38H+30H+31H+30H+30H+30H+32H+30H+30H+30H+30H
+34H+42H
+0DH

Example3: Set the function parameter of the slave

If the frequency setting mode of the slave set by the host is “raise and fall control” and the communication is normal, the host command and the slave responsion can express as following:
The host command =7EH
+“08H”+“02H”+“00H”+“04H”+“00H”+“04H”+*“52H”*+0DH
Note: The italic is the check code, gained by the calculation of the check num.
Check num =30H+38H+30H+32H+30H+30H+30H+34H+30H+30H+30H+34H
=0252H
The data sent by the host=7EH
+30H+38H+30H+32H+30H+30H+30H+34H+30H+30H+30H+34H
+35H+32H
+0DH
The slave responsion
=7EH+“08H”+“02H”+“00H”+“04H”+“00H”+“04H”+*“52H”*+0DH
Note: The italic is the check code, gained by the calculation of the check num.
Check sum =30H+38H+30H+32H+30H+30H+30H+34H+30H+30H+30H+34H
=0252H
The sent data by the slave=7EH
+30H+38H+30H+32H+30H+30H+30H+34H+30H+30H+30H+34H
+35H+32H

+0DH

Example 4: read the history fault record

If the host reads the fault style of history record 2 of the No.8 slave and the communication are normal, the host command and the slave response expresses as following:

The host command =7EH+"08H"+"03H"+"01H"+"00H"+ *"8CH"*+0DH

Note: The italic is the check code, gained by the calculation of the check num.

Check sum=30H+38H+30H+33H+30H+31H+30H+30H =018CH

The data sent by the host =7EH

+30H+38H+30H+33H+30H+31H+30H+30H

+38H+43H

+0DH

If the fault style of history record is "over current 200%", the slave responses as following:

The responsion of the slave=7EH

+"08H"+"03H"+"01H"+"00H"+"00H"+"02H"+*"4EH"*+0DH

Note: The italic is the check code, gained by the calculation of the check num.

Check sum =30H+38H+30H+33H+30H+31H+30H+30H+30H+30H+30H+32H

=024EH

The data sent by the slave =7EH

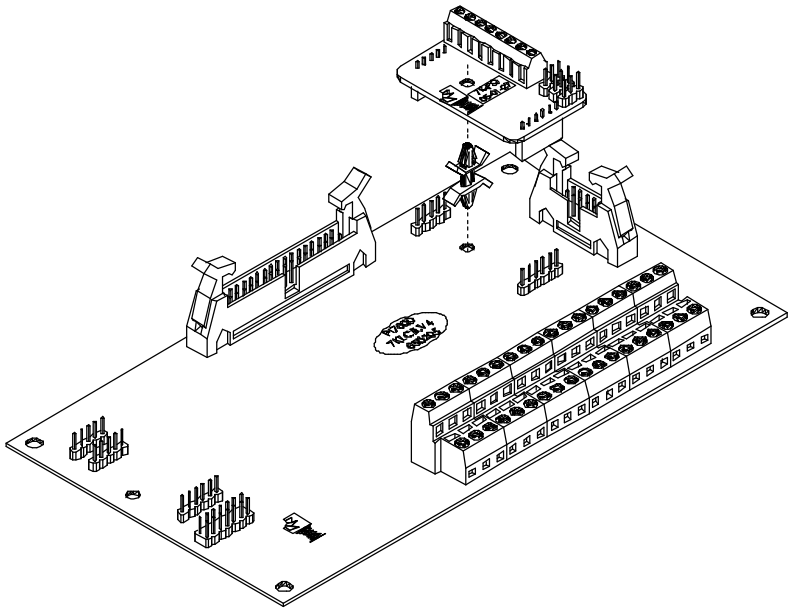
+30H+38H+30H+33H+30H+31H+30H+30H+30H+30H+30H+32H

+34H+45H

+0DH

Appendix 2. PG Instruction

1. 7K-PG installation



2. 7K-PG direction

7K-PG could be used with almost all encoders. Using 7K-PG should adjust the PG parameters according to the encoder's output mode. The followings should be adjusted:

☆ Short circuit of J4,J5,J6

☆ R1,R2,R3 value.

☆ Connection of terminal

According to the encoder's output mode, the adjust mode is as below:

1: Open collector

J4, J5, J6 are short circuited to OC

R1, R2, R3 200 ohm.

Terminal connection: A->A+, B->B+, Z->Z+

2: Line driver

J4, J5, J6 are short circuited to LD

R1, R2, R3 200 ohm

Terminal connection: A+ ->A+, B+ ->B+, Z+ ->Z+

A- ->A-, B- ->B-, Z- ->Z-

3: Complementary

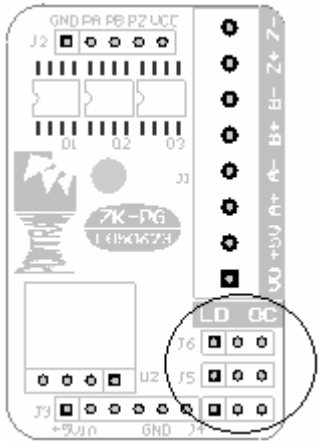
J4, J5, J6 are short circuited to OC

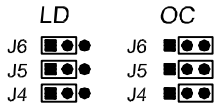
R1, R2, R3 values depend on the complementary resistors.

Terminal connection: A ->A+, B ->B+, Z ->Z+

4: Voltage
J4, 45, J6 are short circuited to OC
R1, R2, R3 values depend on the complementary resistors.
Terminal connection: A ->A+, B ->B+, Z ->Z+

J4/J5/J6 position and short circuit instruction:



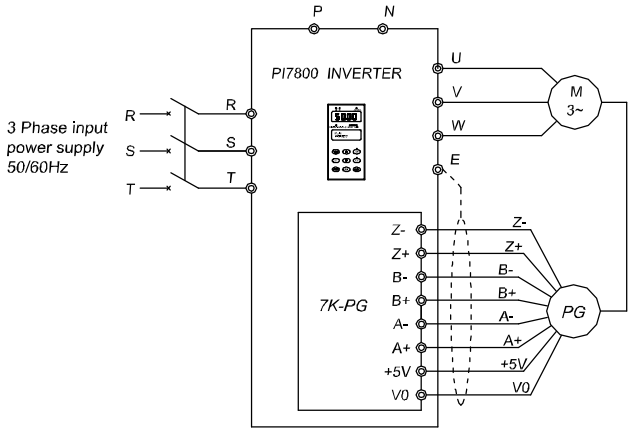


Terminals function description:

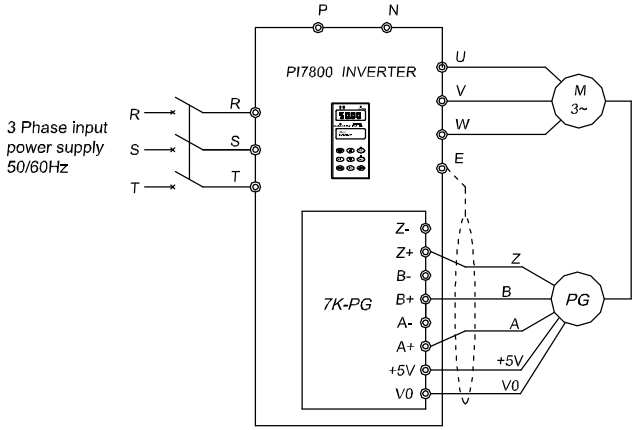
Terminal	Function
A+ A- , B+ B- , Z+ Z-	Encoder input signal (Select the right short circuit way according to encoder's output mode)
+5V	Encoder power supply
V0	Encoder earthing

Terminals short circuit description:

1. Open collector, complementary and voltage



2. Line driver



Appendix 3. Converter water supply controller instruction

1. Application

It is special appendix for multiple pumps, which run with PI7000 family inverter to control the multiple pumps water supply system effectively.

2. Operation and connection notice:

◇ If it is power frequency motor, probable thermal relay must be used to protect motor.

◇ AC contactor with machinery chain equipment should be used between the power frequency bypass and inverter output of aside the motor, lock logically on the electri control circuit to avoid the short circuit of the power frequency and inverter output which damage the inverter and equipments.

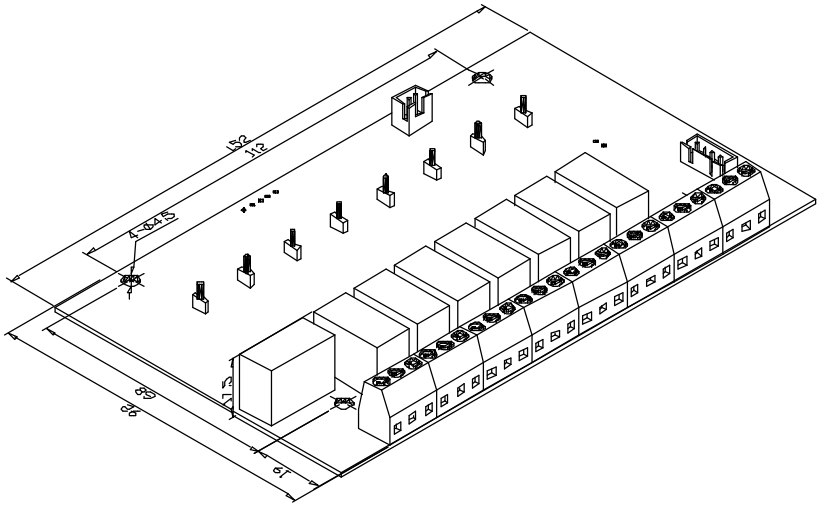
◇ The phase order of the power frequency to the motor should be the same with the phase order of the inverter output to avoid the motor reverse. Please confirm the phase order and operate.

◇ When wiring the control signal of the inverter, please leave it away with the driving line, and do not make them in the same wire, otherwise it will lead wrong action.

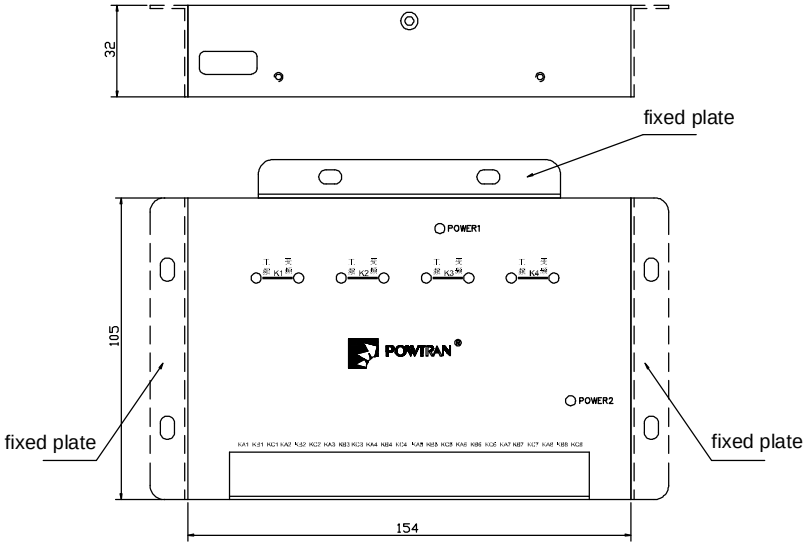
◇ Screen cable is used for Pressure set signal and pressure feedback signal.

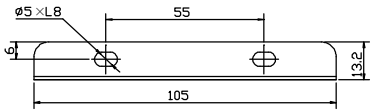
3. Dimension

3.1 Dimension of water supply control card



3.2 Dimension of water supply controller



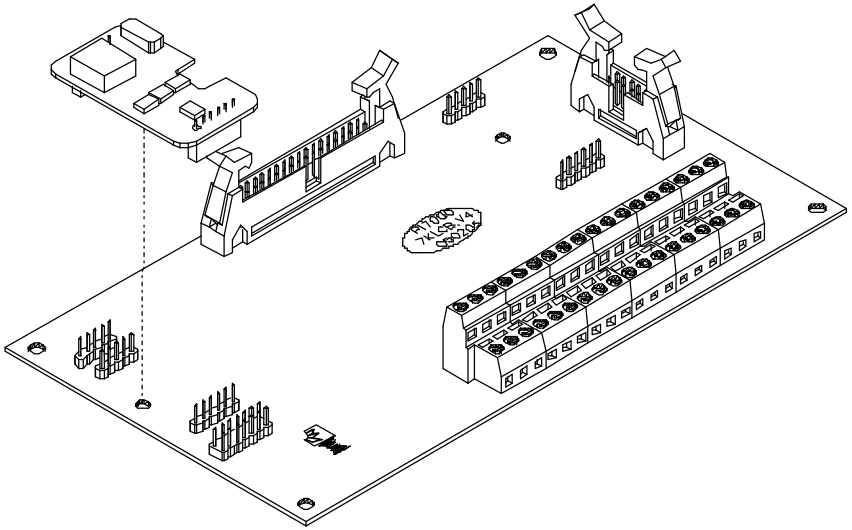


the size of fixed plate

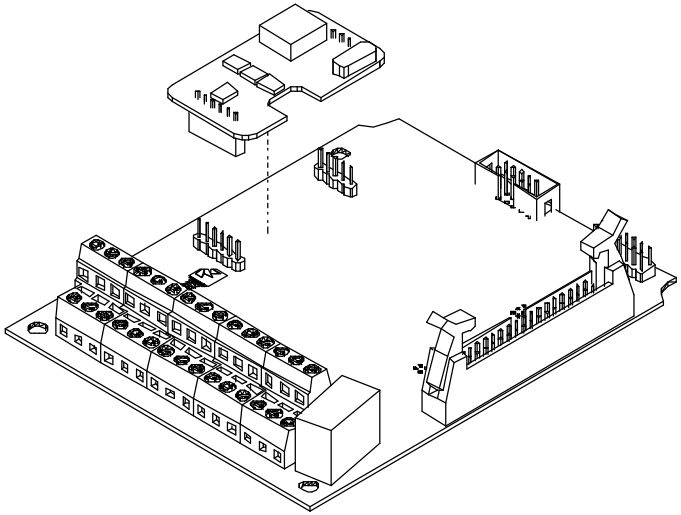
4. Connection of water supply controller with inverter

4.1Istall RS485 on the control card, the installation of the RS485 is showed below:

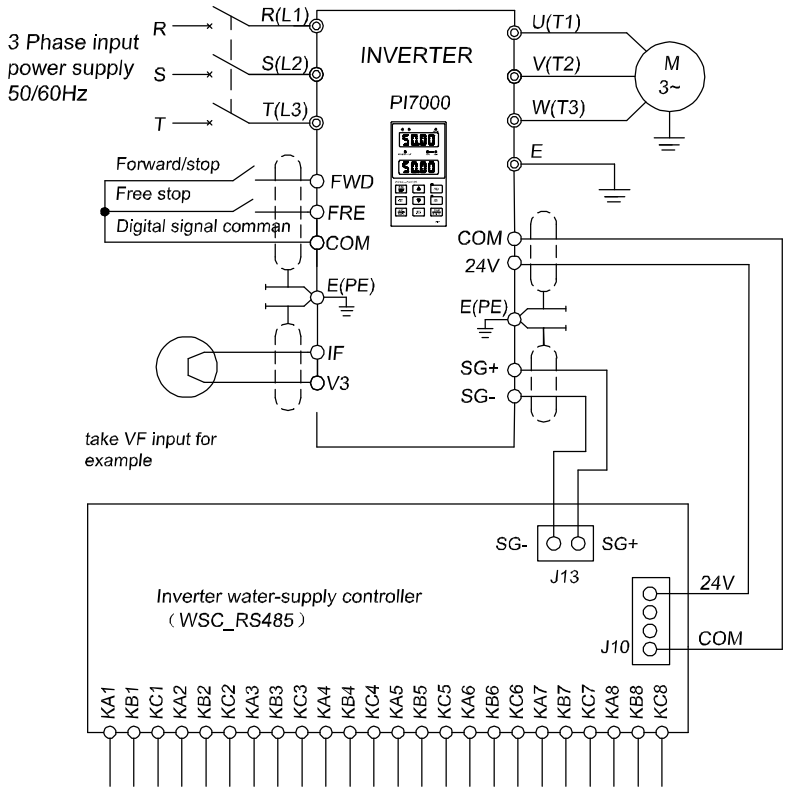
7K-RS485_S with 7KLCB



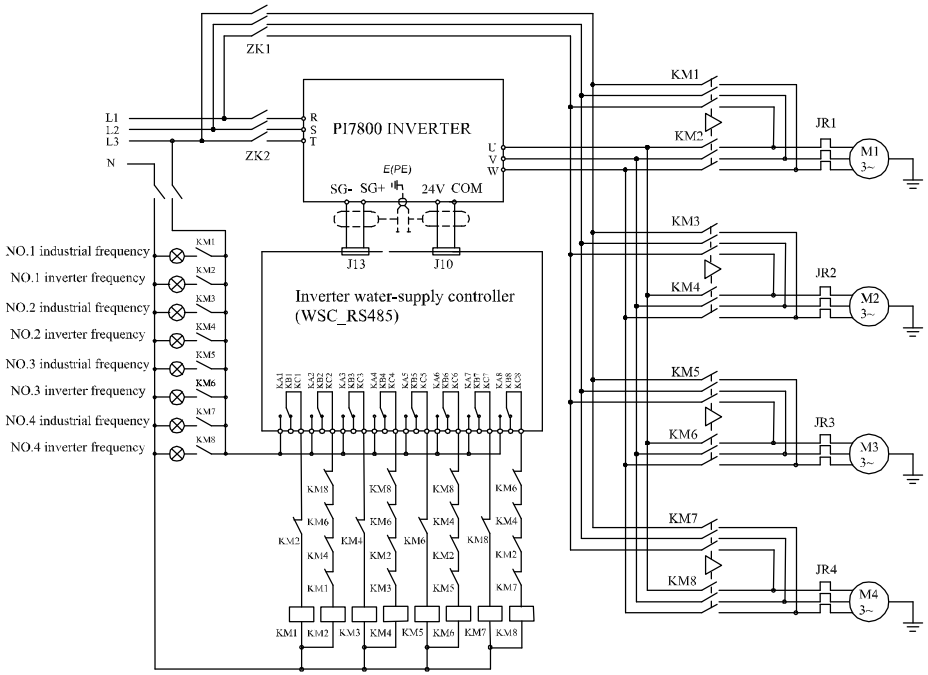
7K-RS485 With 7KSCB



Connection of water supply controller with inverter, the communniction cable and power cable are connected as below:



5. System diagram



ZK Air switch KM Contactor
JR Thermal relay M Motor

6. Water supply control mode

When several pumps supply water meanwhile, because of the different time(daytime and night), different season(winter and summer), the variation of the water flow is great. To save energy and protect the equipment, please run pumps as many as you need and stop pumps as many as you do not need.

Inverter will confirm the number of the running pumps according to the requirement of the pressure close loop control. In the set range, only one pump is controlled by the inverter at the same time.

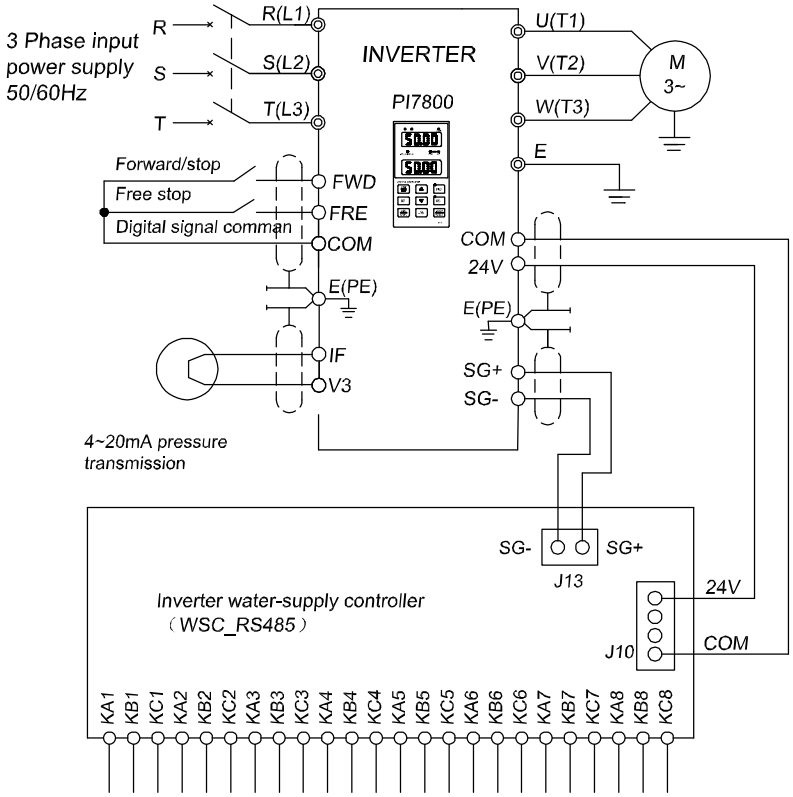
If the timing shift interval time is set 0.05~100.00, when the related running time is stable, inverter inverter will shift up the pumps according to stop first or open first to ensure each pump has the chance to run and avoid the pump rusted because of long time no use.

After the pumps run to the upper and lower, arrive the adding pumps or reducing pumps time, inverter will add or redcue the pumps according to stop first or open first to ensure each pump can run and avoid the pump rusted because of long time no use.

7. Water supply instruction

Example: 4 pumps water supply in constant pressure.

1) Pumps：4 convert pumps 15kW
2) Set pressure: 0.8Mpa
3) Pressure gage selection：pressure sensor，DC 4~20mA output，1.6Mpa
4) Inverter selection：PI7800 015F3 and WSC_RS485 water supply control card
5) Connections of hardware



6) Parameters setting

Item	Settings	Description
F61	11	4 pumps supply water under constant pressure
F04	7	Frequency setting mode is PID
P00	10	PID
P01	100	Output frequency limit
P02	1	Feedback signal selection：external terminal IF：4～20mA
P03	3	Getting signal from keyboard input
P04	50.0%	Key set signal：50.0%＝0.8Mpa/1.6Mpa×100%
P05	0.25s	PID integral time（PID parameters depend on the

P06	0.000	PID differential time
P07	100	PID proportion gain
P08	300.0s	PID fault detect time(larger than detect time of pumps
C00	10ms	Detect filter time
C01	C01,C02 For energy saving running in the control system and adjusting the water pressure in the water supply system, invalid in the multi pumps.	Start pressure percentage
C02		Stop pressure percentage
C03	10%	Max allowable deviation
C04	80%	High pressure arrived value
C05	60%	Low pressure arrived value
d00	200 hour	Timing to supply water:200hour, timingfunction deleted
d01	5 hour	Timing shift alternation time
d02	0.5s	Electromagnetism on/off action delay
d03	100s	Pumps shift judging time