


NOTE FOR SAFE OPERATION

Read this instruction manual thoroughly before installation, operation, maintenance or inspection of the inverter. And only authorized personnel should be permitted to perform maintenance, inspections or parts replacement.

In this manual, notes for safe operation are classified as

"WARNING" or "CAUTION".

 **WARNING** : Indicates a potentially hazardous situation which,

 **CAUTION** : Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.

This inverter has been put through demanding tests at the factory before shipment. After unpacking, check for the following:

1. Verify the part numbers with the purchase order sheet and/or packing slip.
2. Do not install or operate any inverter which is damaged or missed parts.
3. Do not install or operate any inverter that has no QC marking.

Contact our representative, if you found any above shown problem.

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CAUTION AND WARNING:



WARNING

- Do not change the wiring while power is applied to the circuit.
- After turning off the main circuit supply, do not touch circuit components until DISPLAY LED is extinguished.
- Never connect power circuit output T1, T2, T3 to AC power supply.
- When the retry function (P52) is selected, motor may restart suddenly after being stopped by momentary power loss.

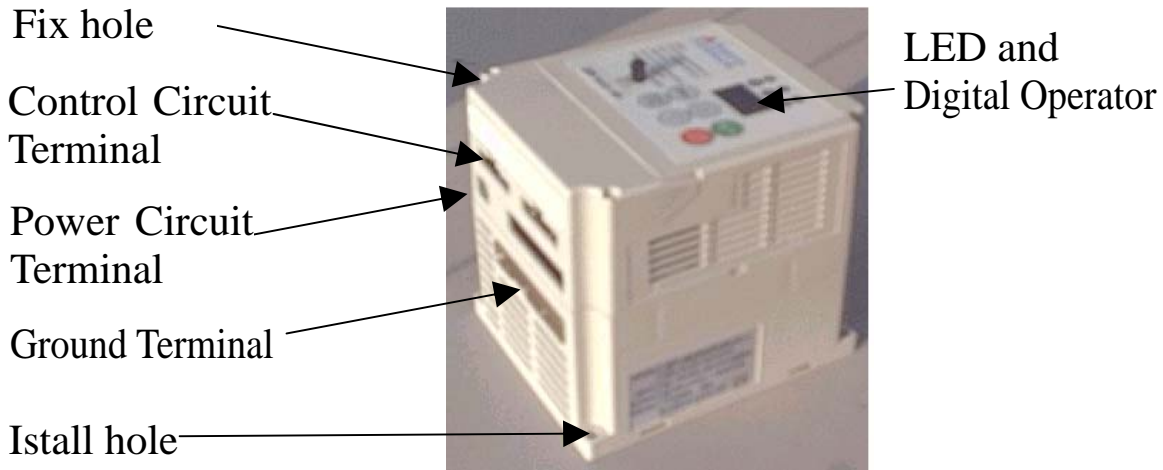


CAUTION

- When mounting units in an enclosure, install a fan or other cooling device to keep the intake air temperature below 45°C ◦
- Do not perform a withstand voltage test to the inverter.
- All the constants of the inverter have been preset at the factory. Do not change the settings unnecessarily.

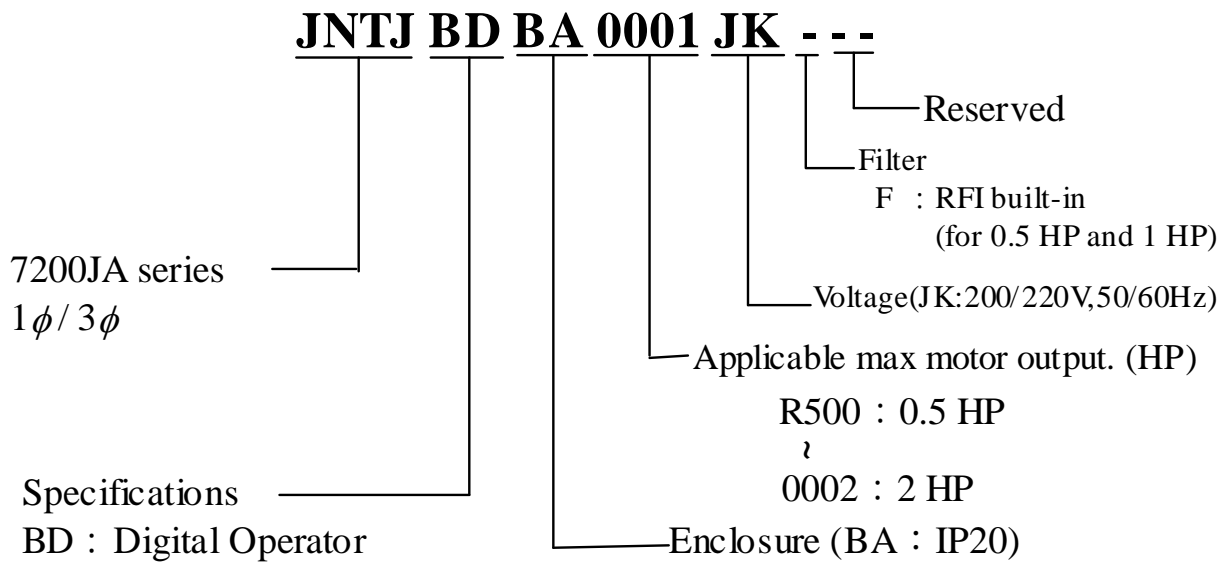
1. MODEL CODE

The inverter is all-digital, mini size and low noise. It can be controlled by digital operator and blank kit operator as shown below:



■
Mode

1 Designation:



2.

INSTALLTION AND WIRING



Environmental conditions are important for inverter to achieve its proper performance And normal operating life.

1. Ensure a minimum of 100mm space above and below the inverter for good ventilation.
2. Keep the inverter from rain, moisture direct sunlight, corrosive gases, liquid, airborne dust or metallic particles.
3. Avoid mounting in the place with vibration or strong magnetic field.

2.1 Power Circuit Breaker

Be sure to connect a circuit breaker as suggested below between power supply and inverter power input.

Model			Wire Size(mm ²)		MCCB (Note 1)	MC (Note 1)
Voltage	HP	A	Power line	Signal line		
220V 1 ϕ /3 ϕ	1/2	3.0	2 ~ 3.5	0.5 ~ 2	TO50E(15A)	CN-11
	1	5.0	2 ~ 3.5	0.5 ~ 2	TO50E(15A)	CN-11
	2	7.1	3.5 ~ 5.5	0.5 ~ 2	TO50E(20A)	CN-11

(Note 1) MCCB and MC is TAIAN products, the other same class products may be applicable.

(Note 2) If the wiring distance between inverter and motor is long, reduce the inverter carrier frequency as follows:

- Up to 30m — 10kHz (constant $\boxed{45} = 4$)
- Up to 50m — 7.5kHz ($\boxed{45} = 3$)
- Up to 100m — 5kHz ($\boxed{45} = 2$)
- 100m or longer — 2.5kHz ($\boxed{45} = 1$).

2.2 Power/Control Circuit Wiring



WARNING

Never connect 440V power supply to 7200JA class inverter.



CAUTION

1. Be sure to tighten the power circuit terminal screws.
2. Reduce the inverter carrier frequency to decrease harmonic leakage current from long cable.



CAUTION

1. Be sure to isolate power circuit wiring from control circuit wiring.
2. Use twisted shielded or twisted-pair shielded wire for control circuit leads.
3. If a transistor open collector is used as operation signal, its rating is 50V, 50mA.
4. If a multi-function photo-coupler is used to drive an inductive load such as relay coil through output terminals (11)-(12), be sure to parallel a free wheel diode.

Main Circuit Power Input

L1, L2 are used for single-phase power supply. Insert a noise filter close to inverter input, if there was noise interference problem.

Braking Resistor

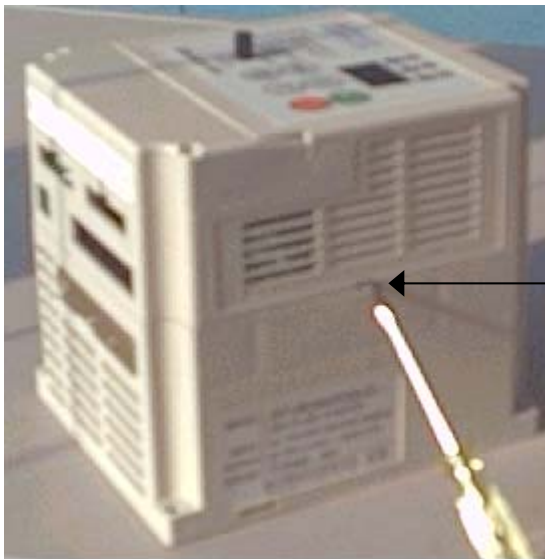
Braking resistor is connected between $\textcircled{\text{BR}}$ and $\textcircled{+}$.



CAUTION

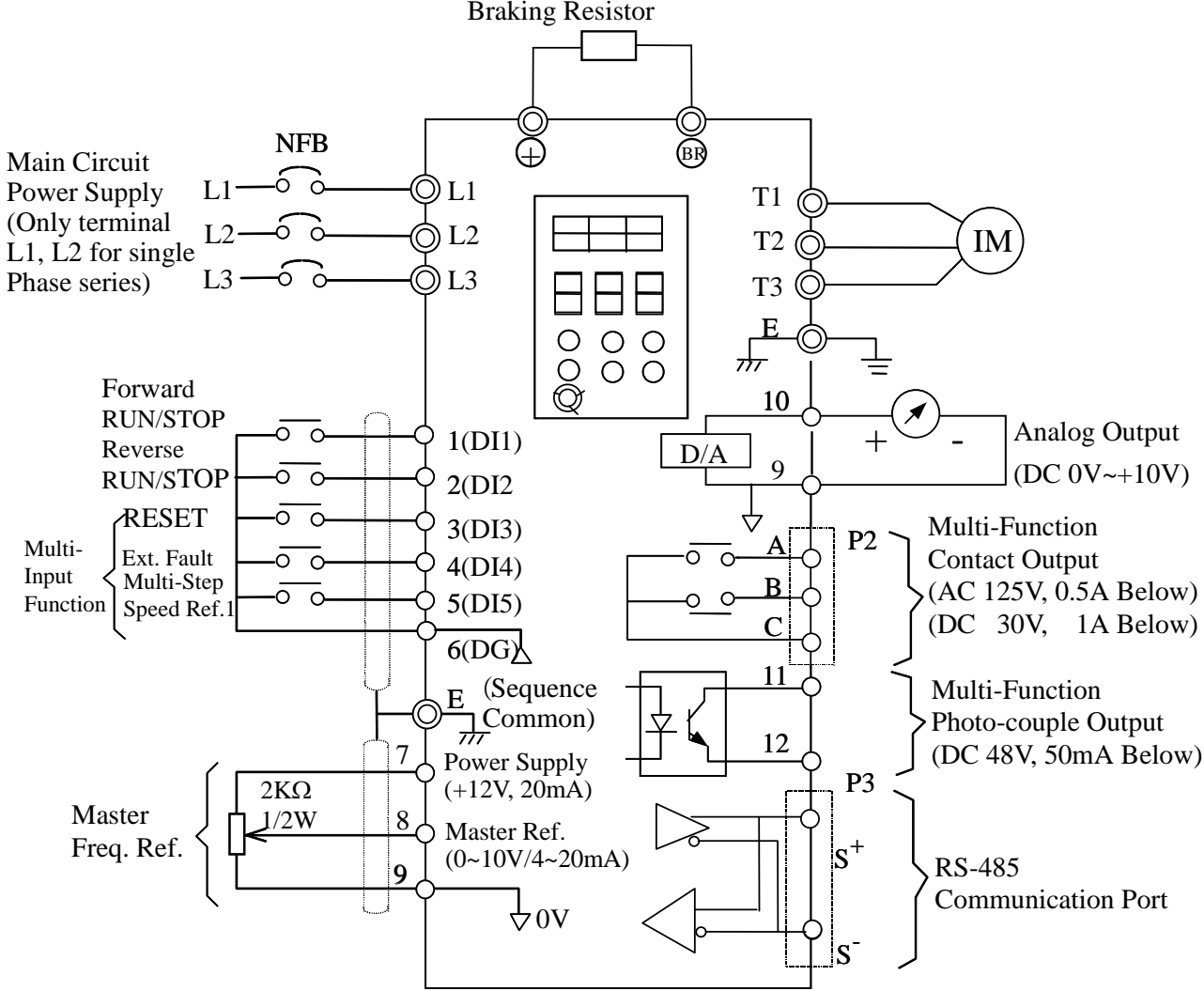
- Ensure that ground resistance is less than 100 Ohm.
- Use screen cable or insert output side use noise filter to reduce EMI problem.
- Inverter Output Connected to motor terminals (T1, T2, T3) respectively. Make grounding at the motor shell.

If it is necessary to open the cover for repairing or other reason, please insert – screw driver into holes beside of the inverter and move the screw driver smoothly. The cover will be opened as below figure shown.



where to insert –
screw driver

2.4 Standard Wiring Diagram



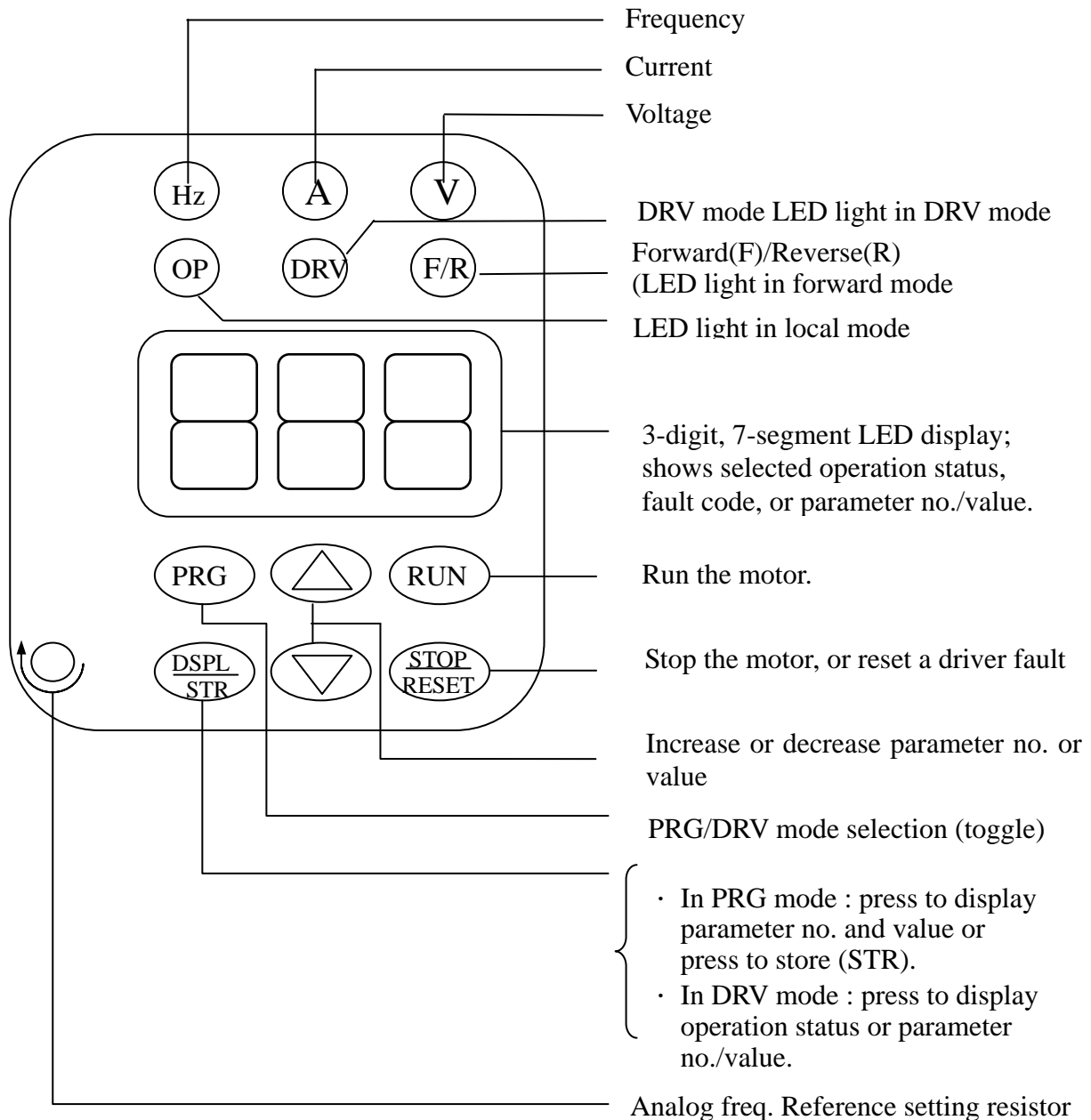
2.5 Terminal Functions

Classification	Terminal	Terminal Name	Terminal Function			
Main circuit Terminal	L1, L2, L3	Main Circuit Power Input	L1, L2 are used for single-phase			
	T1, T2, T3	Inverter Output	—			
	BR , \oplus	Braking resistor	for external braking resistor connection			
	E	Grounding	Ground resistance should be $\leq 100\Omega$			
Control circuit Terminal	Input	Sequence Input Signal	1	Forward Run / Stop	"Close" : Forward Run	Photo-coupler insulation Input DC 24V, 8mA
			2	Reverse Run / Stop	"Close" : Reverse Run	
			3	Multi-function input 1	Factory set as "RESET"	
			4	Multi-function input 2	Factory set as "EXT.FAULT"	
			5	Multi-function input 3	Factory set as "SPEED REF. 1"	
			6	Sequence control input Common terminal	—	
	Analog Input Signal	7	Power supply for frequency setting	+12V (allowable 20mA max)		
		8	Frequency Reference	0 ~ 10V (20k Ω), 4 ~ 20mA (with external resistor)		
		9	Common terminal for control terminal	—		
	Output	10	Analog output	Factory set as "Output frequency"	0~11Vmax 2mA or less	
		9	Common			
		Multi-function Output	11	Photo-coupler output	Factory set as "During Running"	Less than DC 48V, 50mA
			12	Photo-coupler output common		
			A	Contact output("a" contact)	Contact capacity: AC 125V, 0.5A or less DC 30V, 1A or less Factory set as "FAULT"	
		B	Contact output("b" contact)			
C	Contact output common					
RS485	S+	RS-485 signal send/receive "+" terminal	—			

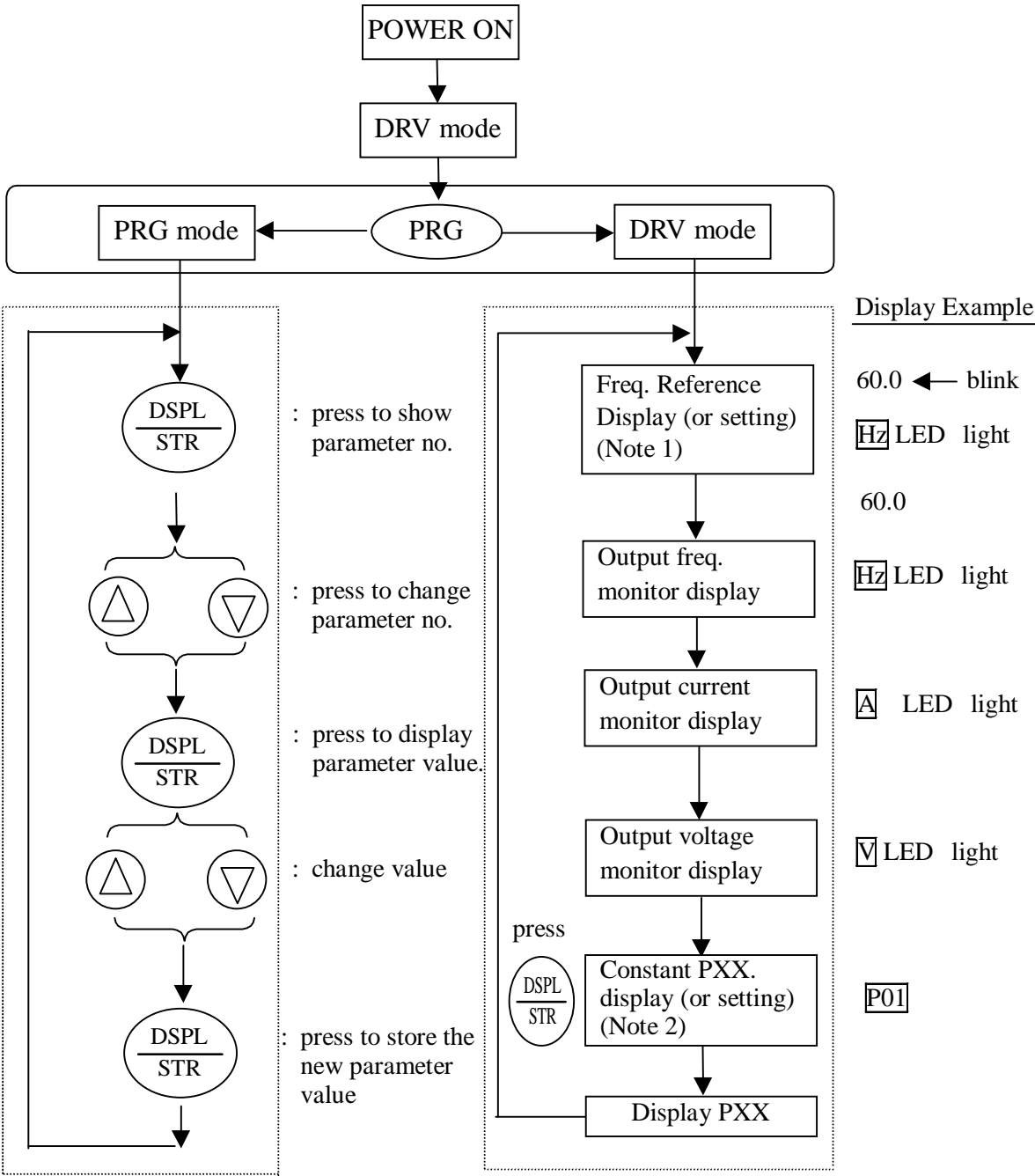
	S-	RS-485 signal send/ receive “-” terminal	
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3.DIGITAL OPERATOR DISPLAY AND OPERATION

3.1 Digital Operator Function



3.2 PRG/DRV mode selection (toggle).

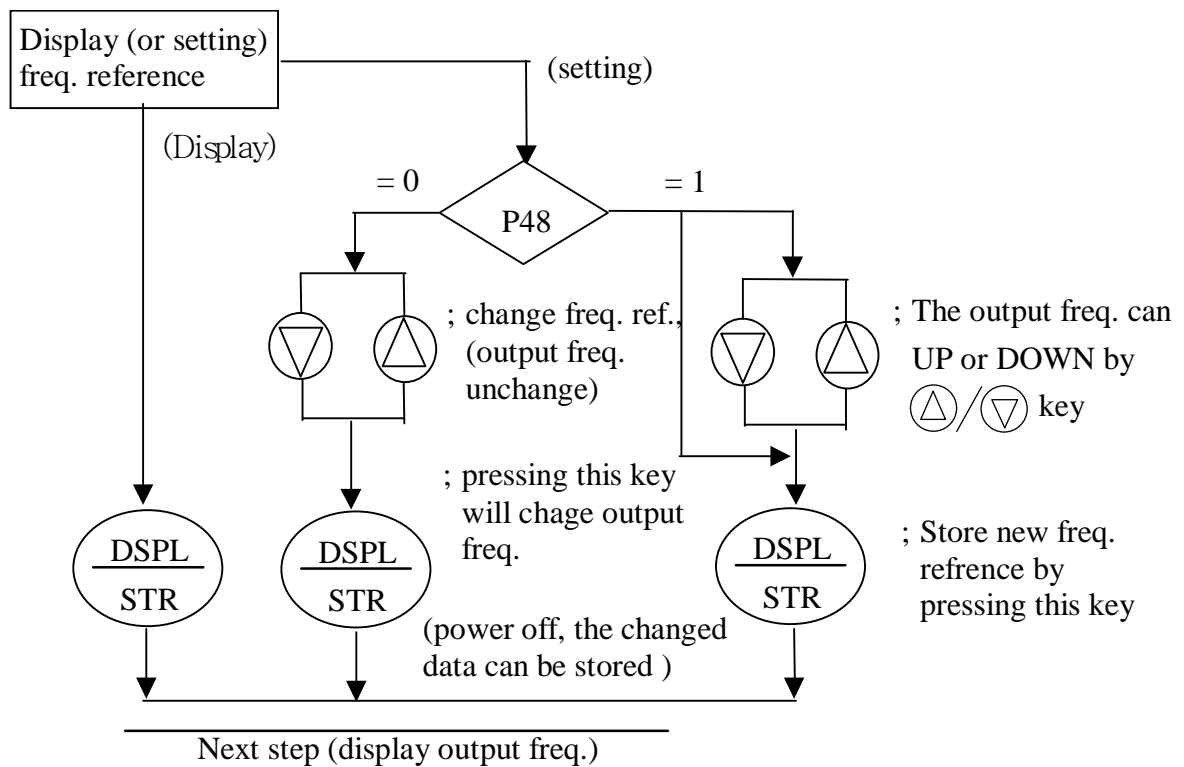


- Description :
- (1) Power on enter the Drive (DRV) mode.
 - (2) PRG/DRV mode can be switched only during stop.
 - (3) PRG mode can only display parameter no. and value.
 - (4) Press $\frac{DSPL}{STR}$ key in DRV mode, can cyclically display

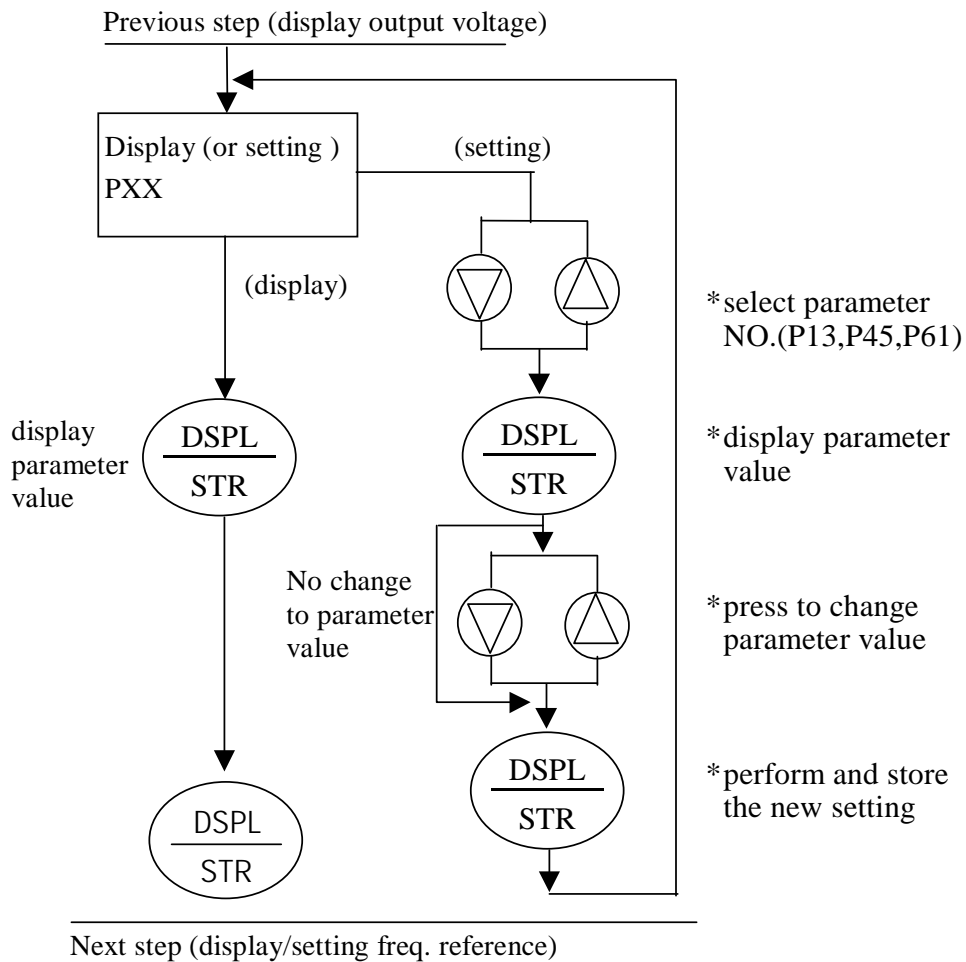
Freq. Ref. → Output freq. → Output current → Output voltage →

(Fcmd) (Fout) (Iout) (Vout)
parameter no. → parameter value → Freq. ref.
(Pxx) (xxx) (Fcmd)

(Note 1) During running, frequency reference can be changed by: Use parameter **48** and \triangle/∇ key to control output frequency, operation sequence as below figure.



(Note 2) In DRV mode, the main speed reference (Parameter P13), carrier frequency (P45) and Forward/Reverse (P61) can be set,(ref. To page 21 ~ 23), as below shown.



4. INITIAL POWER UP



WARNING

When the run command is set to be remote controlled (Parameter P01 = 02, 03 or 06), be sure the run command is in "OFF" status before turning on the Inverter power.



CAUTION

Before trying to operate the inverter and motor be sure all procedures including installation and wiring have been properly followed.

The run/stop operation can be controlled by the keypad or by control devices wired to control terminals. Original setting is set to be controlled

by the keypad. Initial start up procedures are:

Operation procedure	OP display	Function LEDs
(1) After power ON, display freq. reference	6.0	$\overline{\text{Hz}}$ LED light
(2) By \triangle/∇ key to change the required running speed, eg. 60.0 Hz (or setting parameter $\overline{13}$ = 60.0 at PRG mode)	60.0	$\overline{\text{F/r}}$ LED light (Forward: motor rotates counter clockwise when viewed from opposite drive end)
(3) Depressed RUN key, motor accel. to the setting speed (parameter 13) according the accel. time (constant $\overline{09}$) * During motor running, can adjust motor speed by \triangle/∇ key to change the frequency reference (when parameter P48=1)		
(4) Pressed STOP/RESET key, motor decelerate to stop according decel. Time (P10).		

5. INVERTER STATUS DISPLAY

5.1 Status Display and Alarm Display

The inverter status can be monitored by the DISPLAY. The corrective actions for fault occurred:

(a) The corrective actions for blank kit operator (JNEP-31) type:

(1) Reset by remote control, or turn off the power supply and turn it on again.

(2) If the fault still exists, then turn off the power supply, check the

external wiring.

(b) The corrective active for digital operator type: Check the inverter fault display by digital operator as page 44 ~ 46, the latest fault display can be monitored by parameter P53, and press the \triangle key with $\frac{\text{DSPL}}{\text{STR}}$ and $\frac{\text{STOP}}{\text{RESET}}$ key pressed can read out the stored inverter operation status before fault trip cyclically.

5.2 Fault Display And Checking Method

When faults occurred, the inverter can store the operation status at the time of the fault before fault trip: output frequency (F_{out}), frequency reference (F_{cmd}), output current (I_{out}), input voltage (V_{pn} , can be calculated to input Voltage V_{in}) and Output voltage (V_{out}).

Read the stored operation status at PRG mode as follows:

(1) Monitoring the latest fault display by parameter P53.

(2) Press $\frac{\text{DSPL}}{\text{STR}}$ and $\frac{\text{STOP}}{\text{RESET}}$ key simultaneously, then press the \triangle

key to read the inverter operation status at the time of the fault as below:

Operation Key	Display Content	Unit	Display Example	LED
	Output frequency (F_{out})	0.1Hz(100Hz ↓) 1Hz(100Hz ↑)	60.0	$\boxed{\text{Hz}}$ Light
	Frequency peferece (F_{cmd})	0.1Hz(100Hz ↓) 1Hz(100Hz ↑)	60.0	$\boxed{\text{Hz}}$ Light
	Output current (I_{out})	0.1A	4.8	$\boxed{\text{A}}$ light

	Input voltage (V _{pn})	1V	350	<input type="checkbox"/> light
	Output voltage (V _{out})	1V	220	<input type="checkbox"/> light

(Press  to leave fault display mode)

6. SPECIFICATIONS

Voltage Class		220V, 1 ϕ /3 ϕ		
Inverter Model		JNTJBDBA□□□□JK-		
		R500	0001	0002
Max. Applicable Motor Output HP*		1/2	1	2
Output Characteristics	Inverter Capacity(KVA)	1.2	2.0	2.8
	Rated Output Current(A)	3.0	5.0	7.1
	Max. Output volt.(V)	200~230V, 3 ϕ (Proportional to input voltage)		
	Max. Output Freq. (Hz)	400Hz (Up to 400 Hz available)		
Power Supply	Rated Input Volt. and Freq.	1 ϕ /3 ϕ 200/208/220V, 50Hz 200/208/220/230V, 60Hz		
	Allowable Volt. Fluctuation	-15 % ~ +10 %		
	Allowable Freq. Fluctuation	\pm 5 %		
Control Characteristics	Control Method	Sine wave PWM		
	Freq. Control Range	0.5 ~ 400Hz		
	Freq. Accuracy (Temp. Change)	Digital:0.1 % (<100Hz), 1Hz(\geq 100Hz)		
	Freq. Setting Resolution	0.1Hz		
	Overload Capacity	150 % rated output current for 1 minute		
	Freq. Setting Signal	DC 0 ~ 10V, 4 ~ 20mA (with external resistor)		
	Accel/Decel Time	0.1 ~ 3600sec		
	Braking Torque	Approx. 20%(up to 100% possible with optional braking resistor)		
V/F Characteristic	Possible to set any pattern of V/F			
Ive Function	Stall Prevention Level	Possible to set operating current		
	Instantaneous Overcurrent (OC)	Motor coasts to a stop at approx. 200 % rated current.		

Overload (OL)	Motor coasts to a stop at approx. 150 % rated current for 1 minute.
Motor Overload Protection	Motor coasts to a stop
Over Voltage (OV)	Motor coasts to a stop when DC voltage exceeds 410V.
Under Voltage (UV)	Motor coasts to a stop when DC voltage drops to below 170V.
Momentary Power Loss	Stop if power loss time ≥ 15 ms
Cooling Fin Overheat	Thermostate
Power Charge Indication	Monitored by POWER LED or Digital operator

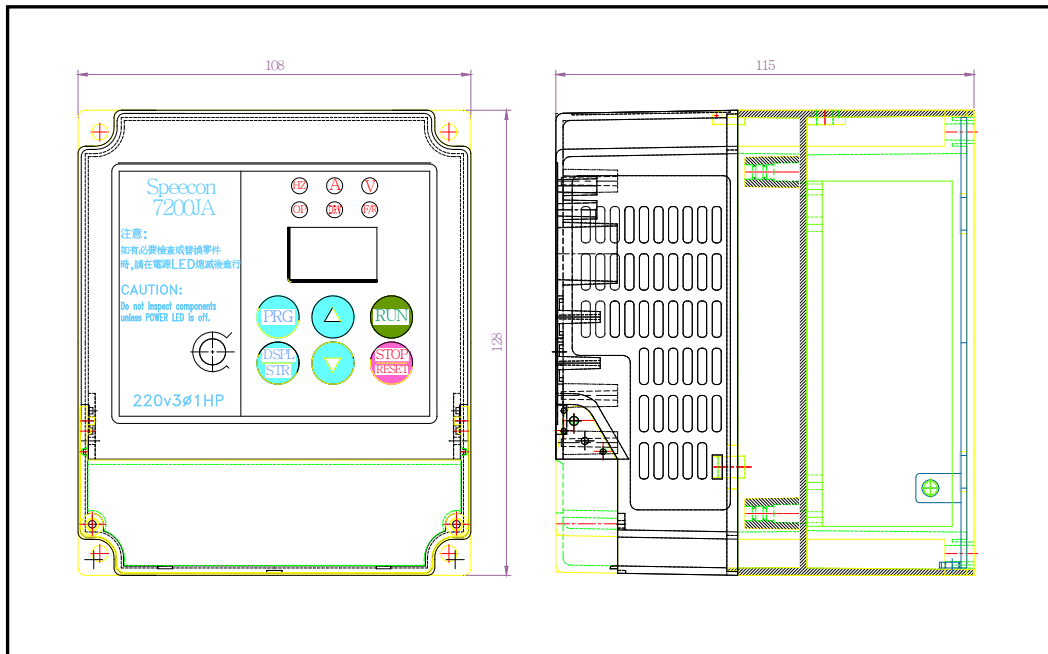
*Standard 4-pole motor is used for max. applicable motor output.

(continued)				
Voltage Class		220V, 1 ϕ /3 ϕ		
Inverter Model		JNTJBDBA□□□□JK---		
		R500	0001	0002
Operation Conditions	Input Signals	Operation signal	Forward Run/Reverse Run by individual command	
		Multi-function input	3-wire sequence, fault reset, external fault, multi-speed command, jog operation, accel./decel. time select, external base-block, Local/Remote, frequency UP/DOWN.	
	Output Signals	Analog Output	0 ~ 10V(output freq. or current selectable)	
		Multi-function Output	fault, during running, freq. agreement, zero speed freq. detection, base-block, overtorque detection, UV detection, Local running.	
	Display	Status Display LED & Digital Operator	LED & 7-segment Displays setting freq., output freq., output current, rotating direction, and the contents at protective function operation.	
Built-in Function		Full auto-torque boost, slip compensation, freq. reference bias/ gain , fault retry, DC injection braking at start/stop etc.		
Protective configuration		Enclosed wall-mounted type IP20		
Cooling Method		Self-cooling		
Net (Kg)		0.9	0.9	0.9

Environmental conditions	Location	Indoor(protected from corrosive gases and dust)
	Ambient Temp.	-10°C ~ +40°C (not frozen)
	Storage Temp.	-20°C ~ +60°C
	Humidity	90 % RH or less (non-condensing)
	Dibration	up to 1G at less 20Hz, up to 0.2G at 20 to 50Hz
Communication Function	Built-in RS-485	
Noise Interference Suppression	En50081-2 (1φ, 0.5~1 HP Build in noise filter, others with specified noise filter)	
Noise Immunity	Pr EN50082-2	

7. DIMENSIONS

$$W \times H \times D = 108 \times 128 \times 115$$



8. LOW VOLTAGE AND EMC DIRECTIVES

The inverter has been fully evaluated for compliance with:

- 73/23/EEC Low Voltage Directive
- EN60204-1 Safety of Machinery
- Pr EN50082-2 EMC Directive

When installed according to the recommendation described in the product manual using the specified EMC filters, the inverter can comply with the EN 50081-2 EMC Directive.

Test specification:

Standard Tested To	Test Level
ESD. EN 61000-4-2	Air Discharge:8KV Contact Discharge:6KV
RF Field IEC 1000-4-3	80M-1GHz 10V/m 80 % AM(1KHz)
CS. ENV 50141	150K ~ 80MHz 10V 80 % Sine wave (1KHz)
Fast Transient Burst Power Line Signal & Control Line	2 KV 2 KV
Emissions test (With external Noise Filter) EN 55011 Radiated Emissions Conducted Emission	Class A Limits Class A Limits

A EC Declaration of Conformity is available on request.

9. PARAMETER MENU

Parameter	Name	Setting Range	Default Setting	Ref.	Note
P00	Password/Initialization	0 ~ 4	1	10.1	
P01	Local/Remote Selection	0 ~ 6	0	10.2	
P02	Maximum Frequency (Fmax)	50.0 ~ 400 Hz	60.0 Hz	10.3	
P03	Maximum Voltage (Vmax)	1~255 V	220 V		
P04	Base Frequency (Fbase)	0.5 ~ 400 Hz	60.0 Hz		
P05	Intermediate Frequency (Fmid)	0.5 ~ 399 Hz	1.5 Hz		
P06	Intermediate Voltage (Vmid)	1 ~ 255 V	13 V		
P07	Minimum Frequency (Fmid)	0.5 ~ 10.0 Hz	1.5 Hz		
P08	Minimum Voltage (Vmin)	1~50 V	13 V		
P09	Acceleration Time 1	0.1 ~600 s	10.0 s		10.4
P10	Deceleration Time 1			✓	
P11	Acceleration Time 2			✓	
P12	Deceleration Time 2			✓	
P13	Frequency Reference 1	0.0~400 Hz	6.0 Hz	10.5 10.29	✓
P14	Frequency Reference 2		✓		
P15	Frequency Reference 3		✓		
P16	Frequency Reference 4		✓		
P17	Frequency Reference 5		0.0 Hz		✓
P18	Frequency Reference 6		✓		
P19	Frequency Reference 7		✓		
P20	Frequency Reference 8		✓		
P21	Jog Frequency Reference	0.0 ~400Hz	6.0Hz	10.6	
P22	Electronic Thermal Motor Protection	0 ~ 4	1	10.7	
P23	Motor Rated Current	—	—	10.30	
P24	Stall Prevention During Deceleration	0 ~ 1	0	10.8	
P25	Analog Monitor Selection	0 ~ 1	0	10.9	
P26	Frequency Reference Gain	0.1 ~2.0	1.0	10.10	
P27	Frequency Reference Bias	-99 ~ +99%	0 %	10.10	

Note 1. Parameter value is changeable during running.

Parameter	Name	Setting Range	Default Setting	Ref.	Note
P28	Frequency Upper Limit	0 ~ 10 %	100%	10.11	
P29	Frequency Lower Limit	0 ~ 110%	0%		
P30	DC Injection Braking Current	0 ~ 100 %	50%	10.12	
P31	DC Injection Braking Time At Stop	0.0 ~ 5.0 S	0.5S		
P32	DC Injection Braking Time At Start	0.0 ~ 5.0S	0.0S		
P33	Automatic Torque Boost Gain	0.0 ~3.0	1.0	10.13	
P34	Stall prevention Level During Acceleration	30~200%	170%	10.8	
P35	Stall prevention Level At Set Speed	30~200%	160%		
P36	Multi-Function Input Selection 1(Terminal (3))	0~13	2	10.14	
P37	Multi-Function Input Selection 2(Terminal (4))	2~14	3		
P38	Multi-Function Input Selection 3(Terminal (5))	3~15	5		
P39	Multi-Function Output Selection 1(Terminal (11)-(12))	0~8	0	10.15	
P40	Multi-Function Output Selection 2(Terminal A-B-C)		1		
P41	Desired Speed Detection Level	0.0~400Hz	0.0Hz	10.15	
P42	Overtorque Detection Function Selection	0~4	0	10.16	
P43	Overtorque Detection Level	30~200%	160%		
P44	Overtorque Detection Time	0.1~10.0S	0.1S		
P45	Carrier Frequency	1~4(2.5-10KHz)	4(10KHz)	—	✓
P46	Stopping Method Selection	0~1	0	10.17	
P47	Reverse Run Prohibit Selection	0~1	0	10.18	
P48	Frequency UP/DOWN Operation	0~1	0	10.19	
P49	S-Curve Accel/Decel Selection	0~3	0	10.20	
P50	Analog Monitor Fain	0.00~2.00	1.00	10.9	
P51	Momentary Power Loss Function Selection	0~1	0	10.21	
P52	Fault Retry	0~10	0	10.22	
P53	Fault Trace	—	—	10.23	
P54	PROM Software Version	—	—	—	

Parameter	Name	Setting Range	Default Setting	Ref.	Note
P55	Jump Frequency 1	0.0~400Hz	0.0Hz	10.24	
P56	Jump Frequency 2				
P57	Jump Frequency 3				
P58	Jump Frequency Width	0.0~25.5Hz	1.0Hz		
P59	Motor Rated Slip	0.0~9.9 %	0.0%	10.25	
P60	Motor No-Load Current	0~99%	35%		
P61	Forward/Reverse Run Selection	F.r	F	10.26	✓
P62	Accel/Decel Time Factor	1~6	1	10.4	
P63	Not Used	—	—	—	
P64	Zero Frequency Lock Torque Selection	0~1	0	10.27	
P65	Inverter Address	1~31	1	10.28	
P66	RS-485 Communication Baud Rate	0~3	1		
P67	RS-485 Communication Parity	0~2	0		
P68	Not Used	—	—		
P69	RS-485 Communication Error Stopping Method	0~2	0		
P70	Not Used	—	—	—	
P71	Automatic Run Pattern Selection	0~3	0	10.29	
P72	Automatic Run 1st Step Time	0.0~600S	0.0S		
P73	Automatic Run 2nd Step Time				
P74	Automatic Run 3rd Step Time				
P75	Automatic Run 4th Step Time				
P76	Automatic Run 5th Step Time				
P77	Automatic Run 6th Step Time				
P78	Automatic Run 7th Step Time				
P79	Automatic Run 8th Step Time				
P80	Automatic Run Direction Selection			0~255	0
P81	Frequency Reference Selection	0~1	0	10.10	
P82	0-10V/4-20mA Frequency Reference Selection	0~1	0		
P83	Not Used	—	—	—	
P84	Inverter Capacity Selection	—	—	10.30	

10. DESCRIPTION OF PARAMETERS

The following describes the functions and setting of parameters by digital operator. Parameter PXX is shown as \boxed{N} .

10.1 Display of Digital Operator

Parameter	Name	Units	Setting Range	Default Setting
$\boxed{00}$	Password/Initialization	1	0 ~ 4	1

- $\boxed{00}$ = 0 : $\boxed{00}$ can be set and read, $\boxed{01}$ ~ $\boxed{84}$ can be read only.
- = 1 : $\boxed{00}$ ~ $\boxed{84}$ can be set and read.
- = 2 : Initialization, terminal functions are returned to the factory setting .(2-wire sequence).
- = 3 : Initialization, terminal functions are of 3-wire squence (ref. page 32)
- = 4 : fault Trace ($\boxed{53}$) is cleared.

10.2 Local/Remote Selection

Parameter	Name	Units	Setting Range	Default Setting
$\boxed{01}$	Local/Remote Selection	1	0 ~ 6	0

Local Mode : Freq. reference, RUN/STOP operation and parameters setting can be performed from the digital operator or control circuit terminal input.

Remote Mode : Freq. reference, RUN/STOP operation and parameters setting can be performed from RS-485 ports.

Local/Remote selection as shown below:

$\boxed{01}$ =	Frequency command	RUN/STOP Command	Description
0	OP	OP	Local Mode (Note 1)
1	TER	OP	
2	OP	TER	
3	TER	TER	
4	SER	SER	Remote Mode
5	TER	SER	Semi-Remote
6	SER	TER	Mode (Note2)

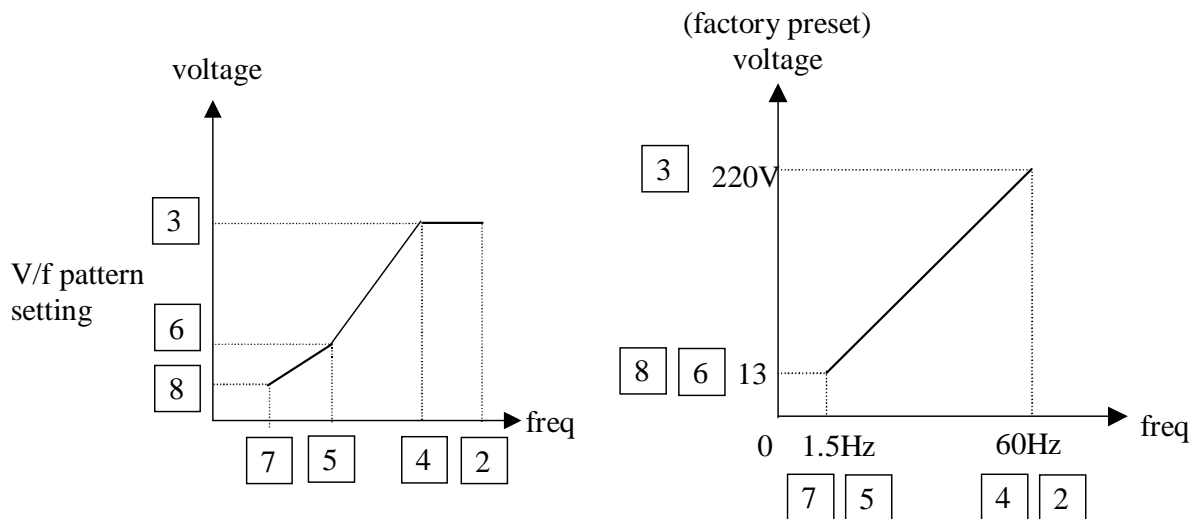
(Note.1) OP:digital operator (ref. $\boxed{81}$)
 TER:control circuit terminal
 SER:RS-485
 Communication port

(Note.2) At semi-Remote mode,RS-485 can be use to read out constant setting data and status of inverter. RS-485 can also be used to change freq. reference 1 ($\boxed{13}$)

10.3 v/f Characteristic Setting

Parameter	Name	Units	Setting Range	Default Setting
02	Max. Frequency (Fmax)	0.1Hz(<100Hz) 1Hz(≥100Hz)	50.0~400Hz	60.0Hz
03	Max. Voltage (Vmax)	1V	1 ~ 255V	220V (Note 4)
04	Base Frequency (Fbase)	0.1Hz(<100Hz)	0.5~400Hz	60Hz
05	Intermediate Frequency (Fmid)	1Hz(≥100Hz)	0.5~399Hz	1.5Hz
06	Intermediate Voltage(Vmid)	1V	1~255V	220V (Note 4)
07	Min. Frequency (Fmin)	0.1Hz	0.5~10.0Hz	1.5Hz
08	Min. Voltage (Vmin)	1V	1~50V	13V

The factory preset value is set to 60 Hz saturation type pattern. Any desired v/f pattern can be set for special specifications.



- (Note)1. If an excessively large value is set in low speed area (3 Hz or less), motor overheat or inverter malfunction may occur. Change the setting gradually by monitoring load or motor current.
- The V/f settings have to satisfy the following conditions:
 max. frequency (02) ≥ min. frequency (07).
 intermediate frequency (05) = min. frequency (07),
 - When intermediate frequency (05) = min. frequency (07), intermediate voltage (06) is disregarded.
 - For 440V class, the value is twice as that of 220V class.

10.4 Accel/Decel Time Setting

Parameter	Name	Units	Setting Range	Default Setting
<u>09</u>	Accel Time 1	0.1s(<100s) 1s(≥ 100s)	~600s	10.0sS
<u>10</u>	Decel Time 1			
<u>11</u>	Accel Time 2			
<u>12</u>	Decel Time 2			
<u>36</u> <u>37</u> <u>38</u>	Accel/Decel Time Select	1		Ref.10.4
<u>62</u>	Accel/Decel Time Factor	1	1~6	1

- Accel/decel time can be set individually.
The set time indicates the time to accelerate from OHE to max. frequency (set by 02).
- Accel/decel time can be set for two-step switching using multifunction contact input (control circuit terminals ③, ④ or ⑤), even during running.
- Using 62 can extend the accel/decel time to max 3600 sec. Ie. Actual accel/decel time= (09 , 10 or 11, 12) × 62

10.5 Multi-Step Speed change

Parameter	Name	Units	Setting Range	Default Setting
<u>13</u> ~ <u>20</u>	Frequency Reference 1 ~ 8	0.1Hz(100Hz ↑) 1Hz(100Hz ↓)	0.0~400Hz	Ref. Page 33,43
<u>36</u> ~ <u>38</u>	Multi-Function Input Selection 1 ~ 3	1	0~15	Ref. Page 32

Up to 8 steps of speed can be set by multifunction contact input terminal ③ ~ ⑤.

Speed	External Terminal		
	⑤	④	③
1 st step speed (Freq. Reference 1)	0	0	0
2nd step speed (Freq. Reference 2)	0	0	1
3rd step speed (Freq. Reference 3)	0	1	0
4th step speed (Freq. Reference 4)	0	1	1
5th step speed (Freq. Reference 5)	1	0	0
6th step speed (Freq. Reference 6)	1	0	1
7th step speed (Freq. Reference 7)	1	1	0
8th step speed (Freq. Reference 8)	1	1	1

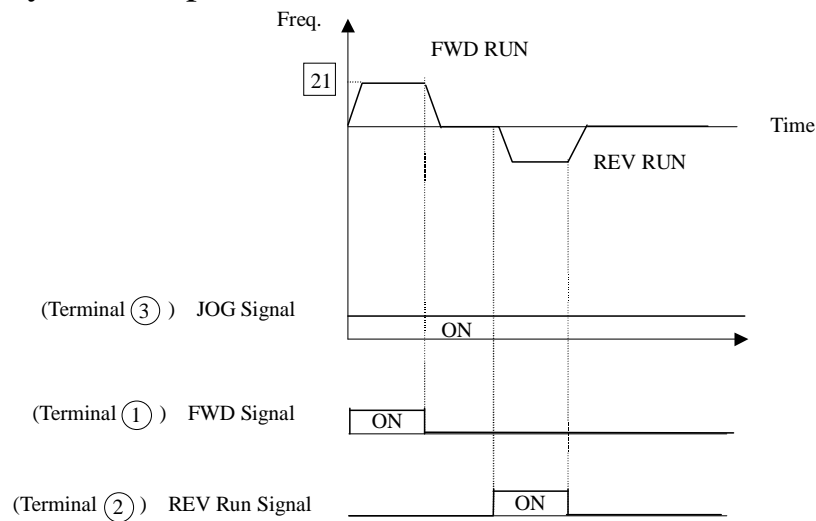
"1" = "Close"

"0" = "Open"

10.6 Jog Operation

Parameter	Name	Units	Setting Range	Default Setting
21	Jog Frequency Reference	0.1Hz(100Hz ↑) 1Hz(100Hz ↓)	0.0~400Hz	6.0Hz
36 ~ 38	Jog command Selection	1	0~15	Ref. Page 32

Select the jog mode (closed between terminals ③ ~ ⑥), and setting parameter 36 = 08), and jog operation can be performed by FWD/REV run command. jog operation is only valid at parameter 01 = 2 or 3.



10.7 Thermal Overload Protection

Parameter	Name	Units	Setting Range	Default Setting
22	Thermal Motor Protection	1	0~4	1
23	Motor Rated Current	0.1A		Depend on Motor Capacity. (Ref. 10.30)

Motor output current is detected by the inverter built-in electronic thermal overload function, and inverter exclusive-use motors or standard motors are prevented from overloading.

- 23 = Motor rated current value. Set the motor rated current value according to the value on the motor nameplate.
(setting range is 10~120% of inverter rated current)
- 22 = 0 : Thermal overload protection disabled.
 = 1 : Standard motor with standard overload time constant.
 = 2 : Standard motor with standard overload time constant.
 = 3 : Inverter motor with standard overload time constant.
 = 4 : Inverter motor with short-term overload time constant.

10.8 Motor Stall Prevention

Parameter	Name	Units	Setting Range	Default Setting
24	Stall Prevention During Deceleration	1	0 ~ 1	0
34	Stall Prevention Level During Acceleration	1 %	30 ~ 200 %	170 % (Note.1)
35	Stall Prevention Level At Set Speed	1 %	30 ~ 200 %	160 % (Note.2)

(Note 1) Inverter rated current = 100 %

- Stall prevention during acceleration: If the motor current exceeds the value set to **34** during acceleration, acceleration is stopped until the motor current is reduced to the **34** set value or less.
- Stall prevention during running: If the motor current exceeds the value set to **35** because of impact load during running, output freq. is automatically lowered. When the motor current is reduced to the **35** set value or less, the motor starts acceleration again and the operation is continued.
- Stall prevention during deceleration: Automatically adjusts deceleration rate with monitoring DC volt. to prevent overvoltage during deceleration. Set **24** = 1 for connecting braking resistor.

24 = 0 : stall prevention during decel. enabled.
 = 1 : stall prevention during decel. disabled.

10.9 Analog Monitor Selection

Parameter	Name	Units	Setting Range	Default Setting
25	Analog Monitor Selection	1	0 ~ 1	0
50	Analog Monitor Gain	1.00	0.00 ~ 2.00	1.00

Either output frequency or output current can be monitored by analog output between control circuit terminals ⑬ and ⑭, (0 to 10V output)

25 = 0 : output frequency monitor
 = 1 : output current monitor

Analog output monitor gain can be set by **50**

10.10 Analog Frequency Command Selection And Adjustment

Parameter	Name	Units	Setting Range	Default Setting
26	Frequency Reference Gain	0.1	0.1 ~ 2.0	1.0
27	Frequency Reference Bias	1 %	-99 ~ +99 %	0 %
81	Frequency Reference Selection	1	0 ~ 1	0
82	0-10V/4-20mA Freq. Reference Selection	1	0 ~ 1	0

- When freq. reference is input from digital operator, according to Parameter **81**,

81 = 0 : Digital freq. reference (by \triangle , ∇ key).

= 1 : Analog freq. reference (by the variable resistor on digital operator).

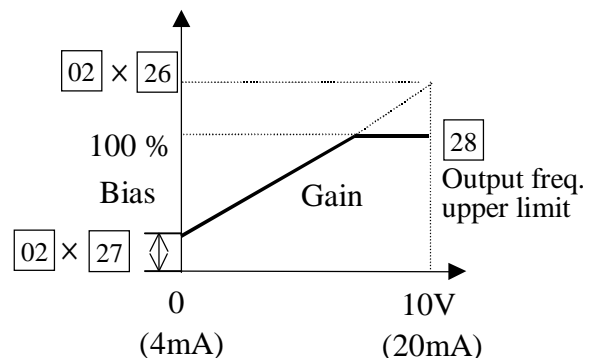
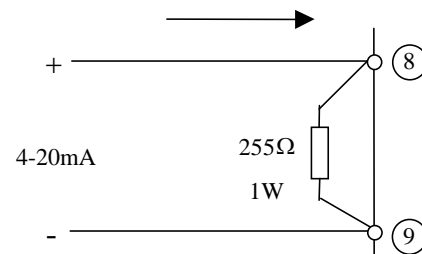
- When freq. reference is input from control circuit terminal **8** ~ **9** (**01** = 1, 3 or 5), according to parameter **82**,

82 = 0 : 0 - 10V

= 1 : 4-20mA

If the freq. reference input command is 4-20mA signal, between terminal **8** ~ **9** must connect one 255 Ω , 1W resistor, as right example shown.

- Output frequency (gain/bias) can be set freely by **26** and **27**, according to 0-10V or 4-20mA frequency setting command inputting from control circuit terminal **8**~**9**, as right example shown.



10.11 Output Frequency Limit

Parameter	Name	Units	Setting Range	Default Setting
28	Frequency Upper Limit	1 %	0 ~ 110 %	100 %
29	Frequency Lower Limit	1 %	0 ~ 110 %	0 %

The upper and lower limits for the output frequency can be set. When the lower limit is not 0, acceleration to that lower limit setpoint begin until frequency reference reaches the lower limit value when the start command is input.

10.12 DC Injection Braking

Parameter	Name	Units	Setting Range	Default Setting
30	DC Injection Braking Current	1 %	0 ~ 100 %	50%
31	DC Injection Braking Time at Stop	0.1s	0.0 ~ 5.0s	0.5s
32	DC Injection Braking Time at Start	0.1s	0.0 ~ 5.0s	0.0s
46	Stopping Method Selection	1	0 ~ 1	Ref. Page34

- DC injection braking at stop :

If output frequency becomes minimum freq. **07** or less, DC injection brake is applied for the time set by **31** , and the motor is stopped. By setting 0.0s to **31**, DC injection braking current becomes disabled. The motor coast to stop when the output freq **07**.

- DC injection braking at start :

Starts a coasting motor without tripping even when the direction of rotation is unknown. When the run command is input, DC injection brake is applied for the time set by **32** , and the motor stops. Then the motor starts operation.

- DC braking current :

DC injection braking current 100% equals the inverter rated current. It is set to 50 % at factory prior to shipment.

10.13 Full Range Automatic Torque Boost

Parameter	Name	Units	Setting Range	Default Setting
33	Automatic Torque Boost Gain	0.1	0.0 ~ 3.0	1.0

When the wiring distance between the inverter and motor is long (normally approx. 100m), the motor torque may be not enough due to voltage drop short. Increase torque boost gain gradually by checking the motor current.

10.14 Multi-Function Contact Input Function Selection

Parameter	Name	Units	Setting Range	Default Setting
36 37 38	Multi-Function Input Selection 1 ~ 3	1	0 ~ 15	Ref. Page 26,27,34

The function of control circuit terminals ③, ④, ⑤ can be changed of necessary, Set **38**, **37**, **38** in descending order:

38 set value < **37** set value < **38** set value.

Terminal ③ function : Set to **36** .

Terminal ④ function : Set to **37** .

Terminal ⑤ function : Set to **38**

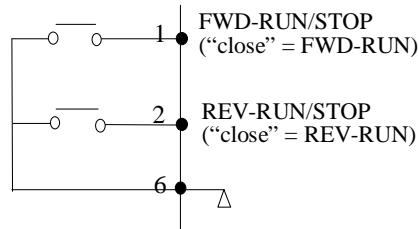
Set value function shown below:

Set Value	Function	Description	Ref. Page
0	FWD/REV Run command (3-Wire A)(Note 2)	36 only	32
1	FWD/Run/REV Run/stop (3-Wire B)	36 only (Note 2)	32
2	Fault RESET	—	—
3	External Fault (NO Contact Input)	During external fault, inverter output base block, and display "E3~E5" (red to terminal (③~⑤))	47
4	External Fault (NC Contact Input)		
5	Multi-Step Speed Reference 1	(Note 3)	26,32
6	Multi-Step Speed Reference 2		
7	Multi-Step Speed Reference 3		
8	Jog Command Select	—	27
9	Accel/Decel Time Select	—	26
10	External Base Block (NO Contact Input)	During External Base Block, Inverter output Base Block, And Display "bb"	46
11	External Base Block (NO Contact Input)		
12	Accel/Decel Prohibit Command	—	36
13	OP/NORMAL RUN Command Select	"Close" : Depend on OP operation "Open" :Depend on 01 setting	24
14	Frequency UP/DOWN Function (Only 37 can be used)	37 = 14, Terminal ④ is UP function, and 38 setting function disable, Terminal ⑤ is DOWN Function.	34
15	Force Run Select (Note 1)	—	—

(Note 1) Contact your TECO representative to make sure the function.

(Note 2) 2-Wire/3-Wire sequence as following:

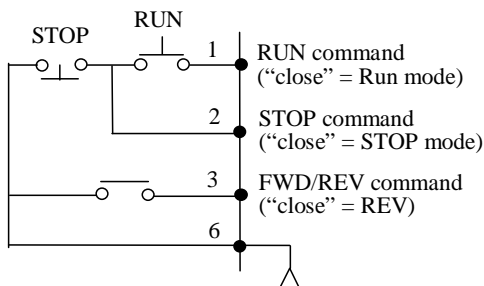
(a) 2-Wire Sequence Connection



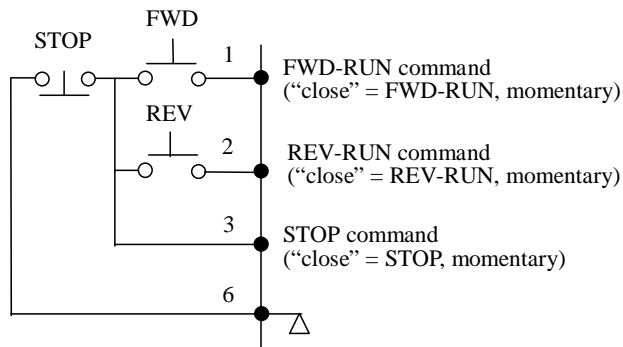
<Note> When Terminal (1), (2) are "close" At the same time, Inverter stop

(b) 3-Wire (A) Sequence Connection Parameter $\boxed{01} = 2, 3 \text{ or } 6$

Parameter $\boxed{36} = 0$



(c) 3-Wire (B) Sequence Connection



Parameter $\boxed{01} = 2 \text{ or } 3$

Parameter $\boxed{36} = 1$

(Note 3) 8-step speed change example:

Up to 8 steps of speed can be set by setting freq. reference 1-8 (Parameter 13 ~ 20) and by control circuit terminals (3) ~ (5). See the following example.

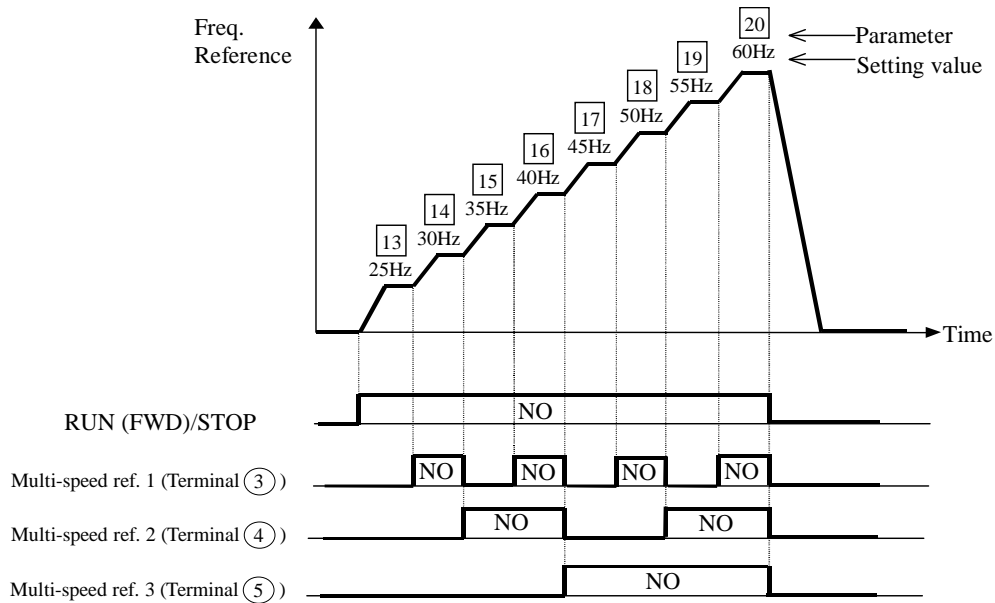
Parameter $\boxed{01} = 02$

Parameter $\boxed{13} \sim \boxed{20} = \text{as shown below.}$

$\boxed{36} = 5$ (Terminal (3) = Freq. reference 1)

$\boxed{37} = 6$ (Terminal (4) = Freq. reference 2)

$\boxed{38} = 7$ (Terminal (5) = Freq. reference 3)



10.15 Multi-Function Relay Output Function Selection

Parameter	Name	Units	Setting Range	Default Setting
39 , 40	Multi-Function Output Selection 1~2	1	0 ~ 8	—
41	Desired speed Detection Level	0.1Hz(100Hz ↑) 1Hz(100Hz ↓)	0.0~400Hz	0.0Hz

Functions of control circuit terminals ⑪-⑫, and Ⓐ-Ⓑ-Ⓒ can be switched.

Function of terminal ⑪-⑫ : set into **39**.

Function of terminal Ⓐ-Ⓑ-Ⓒ : set into **40**.

Set value function as below shown:

Set Value	Function	Description	Ref. Page
0	Fault	"close":Inverter Fault	—
1	During Running	"close":Inverter FWD or REV Running	—
2	Frequency Agreed (Note 1)	"close"Output Freq. = Freq. Ref. ± 2 Hz	—
3	Zero Speed	"close":Output Freq. =Min.Freq. (07)	—
4	Frequency Detection (Notel)	"close":Output Freq. ≥ 41 setting value	—
5	Overtrque Detected	—	10.16
6	During Base Block	'close":During Inverter Output Baseblock	—
7	During Undervotage Detection	"close":During Undervoltage Detection	—

8	During Local Mode Operation	"close":During Local Mode Operation	10.2
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(Note 1) Detection width = $\pm 2\text{Hz}$

10.16 Overtorque Detection Function

Parameter	Name	Units	Setting Range	Default Setting
42	Overtorque Detection Function section	1	0~4	0
43	Overtorque Detection Level	1 %	30~200%	160%
44	Overtorque Detection Time	0.1S	0.1~10.0S	0.1S
39 , 40	Multi-Function Output Selection 1 ~ 2	1	0~8	Ref.10.15

- When excess load is placed on the machine, if current exceeding the value set by **43** lasts for a time exceeding the value set by **44**, the overtorque detection signal is output to control circuit terminal $\text{\textcircled{11}}$ - $\text{\textcircled{12}}$, or $\text{\textcircled{A}}$ - $\text{\textcircled{B}}$ - $\text{\textcircled{C}}$ until the current is reduced to the **43** set value or less. (Set **39** or **40** to 5)
- 42** = 0 : Overtorque detection function disable.
 = 1 : Detected only during agreed speed, continuous operation after overtorque detection.
 = 2 : Detected only during agreed speed, output shut off at overtorque detection.
 = 3 : Detected during running , continuous operation after overtorque detection.
 = 4 : Detected during running, output shut off at overtorque detection.

10.17 Stop Procedure Selection

Parameter	Name	Units	Setting Range	Default Setting
46	Stopping Method Selection	1	0~1	0

- Stop procedure can be set by **46** :
46 = 0 : Deceleration to stop
 = 1 : Coasting to stop

DC injection braking function is disabled at setting $46 = 1$.

10.18 Prohibition of REV Run

Parameter	Name	Units	Setting Range	Default Setting
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47	Reverse Run Prohibit Selection	1	0~1	0
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- When setting 47 as reverse run prohibition function, OP Rev key or control circuit terminal REV input is disregarded.

47 = 0 : Reverse rotation is allowed.

= 1: Reverse rotation is not allowed.

10.19 Frequency UP/DOWN Function

Parameter	Name	Units	Setting Range	Default Setting
48	Frequency UP/DOWN Operation	1	0~1	0
37 ~ 38	Multi-Function Input Selection 2, 3	1	—	Ref. Page 32

UP/DOWN output frequency can be operated by digital operator key or control circuit terminals (④, ⑤).

- Output freq. UP/DOWN Operation by digital operator key: At Local mode, after setting parameter 01 = 0 or 2, and 48 = 1, the output frequency can UP or DOWN by press Δ or ∇ key at DRV mode.

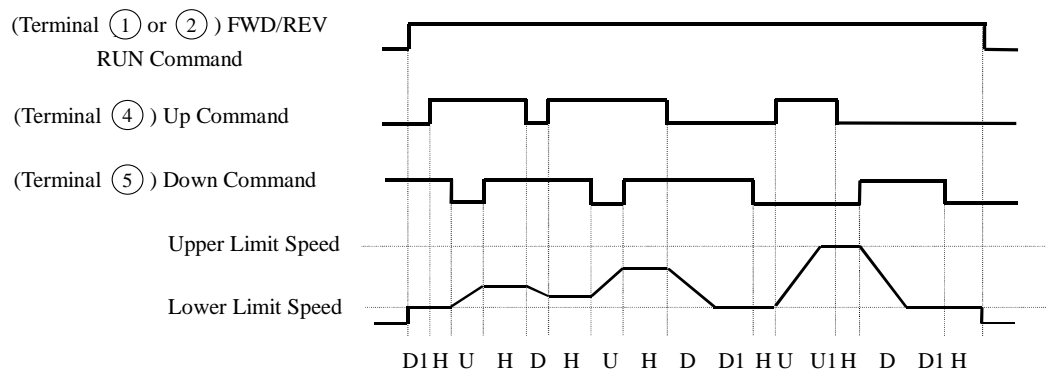
48 = 0 : Change the req. ref. by increment or decrement (Δ or ∇) key, after depress the $\frac{DSPL}{STR}$ key, then the output frequency can start to UP or DOWN).

= 1 : The output frequency start to UP or DOWN by increment or decrement (Δ or ∇) key directly, without depress $\frac{DSPL}{STR}$ key. If press the $\frac{DSPL}{STR}$ key, then the output freq. ref. Set by increment/decrement key, will be stored.

- Output freq. UP/DOWN operation by control circuit terminals: Setting parameter 01 = 1, 3 or 5, the freq. command is input from control circuit terminals, then setting 37 = 14, define terminal ④ as UP function, terminal ⑤ as DOWN function.

UP/DOWN operation sequence as following:

External Terminal ④ = UP function	ON	OFF	OFF	ON
External Terminal ⑤ = DOWN function	OFF	ON	OFF	ON
Status	Accel (UP)	Decel (DOWN)	Hold	Hold



U=UP (Accel) status

D=DOWN (Decel) Status

H=HOLD (Constant speed)status

U1=During clamp at Upper Limit Speed Even in UP Status

D1=During clamp at Lower Limit Speed Even in DOWN Status

- Accel/decel speed prohibit operation:
Define terminal ③, ④ or ⑤ as accel/decel prohibit command function (set 36, 37 or 38 value as 12), as long as accel/decel prohibit command is input, accel/decel speed is prohibited and the output freq. At that time is held.

10.20 S-Curve Pattern Selection

Parameter	Name	Units	Setting Range	Default Setting
49	S-Curve Accel/Decel Selection	1	0 ~ 3	0

To prevent shock at machine starting/stopping, accel/decel in S-curve pattern is enabled by the setting of 49.

- 49 = 0 : S-curve section not provided (linear accel.decel)
 = 1 : S-curve section 0.2 second.
 = 2 : S-curve section 0.5 second.
 = 3 : S-curve section 1 second.

10.21 Operation at Momentary Power Loss

Parameter	Name	Units	Setting Range	Default Setting
51	Momentary Power Loss Function Selection	1	0 ~ 1	0

- Even of a momentary power loss occurs, operation can be continued without any problem.
51 = 0 : Continues operation after momentary power loss not provided.
= 1 : Continuous operation after momentary power loss provided.
- Keep Run (FWD or REV) Command ON. If continuous operation after momentary power loss is required.

10.22 Automatic Reset and Restart Function

Parameter	Name	Units	Setting Range	Default Setting
52	Fault Retry	1	0 ~ 10	0

If an inverter fault occurs during running, the inverter performs self-diagnosis to restart automatically. The number of the self diagnosis and restarting times can be set up to 10 times to 52. By setting 0 times, the fault retry function becomes disabled.

10.23 Fault Trace

Parameter	Name	Units	Setting Range	Default Setting
53	Fault Trace	—	—	Setting Disable

- Parameter 53 stores and displays most recent inverter fault, is a display-only function.
- When faults occurred, inverter can store the operation status before trip : output freq., freq. Ref., output current, input volt., output volt.
- Press the \triangle key with $\textcircled{\text{DSPL STR}}$ and $\textcircled{\text{STOP RESET}}$ key pressed to read out the stored operation status cyclically . Ref to page 15 example.

10.24 Frequency Jump Control

Parameter	Name	Units	Setting Range	Default Setting
55 56 57	Jump freq. 1~3	0.1Hz(100Hz \uparrow) 1Hz(100Hz \downarrow)	0.0~400Hz	0.0Hz
58	Jump freq. Width	0.1 Hz	0~25.5Hz	0.1Hz

- To operate the inverter without oscillation caused by machine system characteristic freq., oscillation generating freq. Can be allowed to jump.
- Set jump freq. 1 to 3 as described below : Jump freq. 3 (57) \leq Jump freq. 2 (56) \leq Jump freq.1 (55)
- Constant-speed operation id prohibited within the jump freq. Width (58).

10.25 Slip Compensation Speed Control

Parameter	Name	Units	Setting Range	Default Setting
59	Motor Rated Slip	0.1 %	0.0 ~ 9.9 %	0.0 %
60	Motor NO-Load Current	1 %	0 ~ 99 %	35 % (Note 1)
23	Motor Rated Current	0.1 A	—	Ref. Page 44

Simple speed control (slip compensation) is available without motor speed detection. The amount of freq. Compensation is determined by the formula below:

$$\text{Amount of output freq. Compensation} = \text{motor rated slip (59)} \times \frac{\text{output current} - \text{motor no load current (60)}}{\text{Motor rated current (23)} - \text{motor no load current (60)}}$$

(Note 1) Motor rated current (23) = 100 %

10.26 Forward/Reverse Run Selection

Parameter	Name	Units	Setting Range	Default Setting
61	FWD/REV Run Selection	—	F, r	F

Set the rotation direction of the motor when a Run Command is given by the digital operator. Display of F = forward run, r = reverse run, parameter 61 toggles between these two presets.

10.27 Zero Frequency Lock Torque Setting

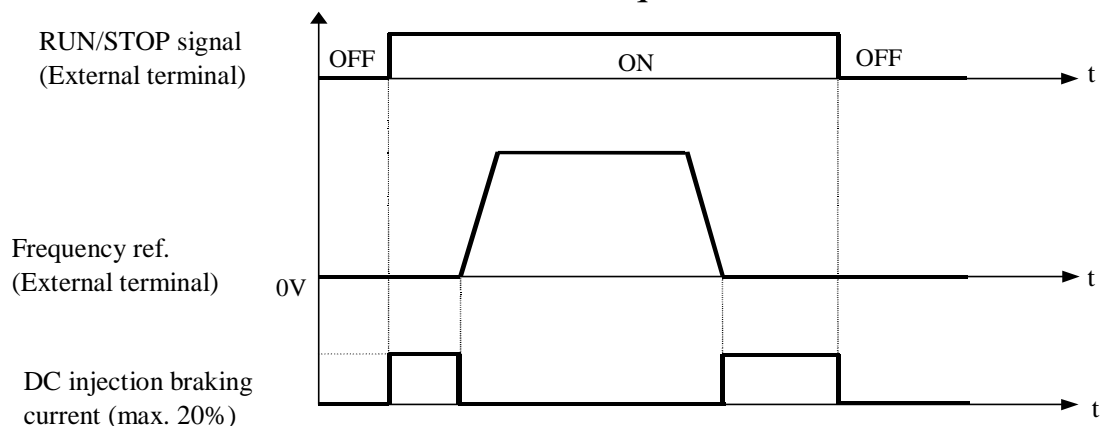
Parameter	Name	Units	Setting Range	Default Setting
64	Zero Freq. Lock Torque Selection	1 %	0~1	0
30	DC Injection Braking Current	1 %	0~100%	Ref.10.12
01	Local/Remote Selection	1	0~6	Ref.10.2

- Set 01 = 03, external frequency reference is 0V, and run (FWD/REV) command is ON, motor can produce lock torque by zero freq. lock torque selection function.

64 = 0 : Zero freq. lock torque function not provided.

= 1 : Zero freq. lock torque function provided.

- At zero freq. lock torque operation (64 = 1), DC injection braking current is limited at 0% - 20%. The sequence is as follows:



10.28 RS-485 communication Function

Parameter	Name	Units	Setting Range	Default Setting
65	Inverter Address	1	1~31	1
66	RS-485 Communication Baud Rate	1	0~3	1
67	RS-485 Communication Parity	1	0~2	0
69	RS-485 Communication Error Stopping Method	1	0~2	0
01	Local/Remote Selection	1	0~6	0

- RS-485 communication function is built as standard for the inverter, can be used to monitor inverter operation status or to read the Parameter value. During Remote mode (01 = 4), the external device can be used to change the inverter parameter value and to control the inverter run or stop.

- The RS-485 communication protocol is MODBUS standard.

- Each parameter definition as below:

65 : Inverter address, setting range 1~31

66 = 0 : 1200 bps(data transmission speed bit/second)

= 1 : 2400 bps

= 2 : 4800 bps

= 3 : 9600 bps

67 = 0 : no parity

= 1 : even parity

= 2 : odd parity

69 = 0 : Deceleration to stop

= 1 : Coasting to stop

= 2 : Continuous operation (stopped by  key)

- Each transmission data format is 11 bits, 1 start bit, 8 data bits, 1 parity bit and 1 stop bit. If parameter 67 = 0, the parity bit must be "1".

- Three types communication command between inverter and external device.
- (1) READ command : External device can read inverter internal memory data.
 - (2) WRITE command : External device can write data into inverter internal memory to control the inverter.
 - (3) LOOP TEST command : Used to test the communication loop between inverter and external device.
- The changed setting value of parameter 65 , 66 and 67 is valid only after turning OFF the power supply and then ON again.
 - During external device writing data into inverter, inverter DRV/PRG switching is prohibited.
 - RS-485 programming method, reference to 「RS-485 instruction manual」.
 - RS-485 communication function is valid from software version 310 or after version.

10.29 8-Steps PLC Function

Parameter	Name	Units	Setting Range	Default Setting
71	Automatic Run Pattern Selection	1	0~3	0(Note 1)
72 ~ 79	Automatic Run Step Time (1~8)	0.1s(100s ↑) 1s(100s ↓)	0.1~600S	0.0 S
80	Automatic Run Direction Selection	1	0~255	0
13 ~ 30	Freq. Reference 1~8	0.1Hz(100Hz ↑) 1Hz(100Hz ↓)	0.0~400	—

(Note 1) At 8-steps PLC function mode (71 =1, 2 or 3), multi-stop speed reference 1~3, (terminal ③~⑤) disable (ref. to parameter 36 ~38 setting).

- Use multi-step frequency reference (constant 13 ~ 20), automatic run step time (parameter 72~79)and automatic run pattern selection can perform as 8-steps PLC function, each step rotation direction can be set by parameter 80.

71 = 0 : 8-steps PLC operation disabled.

= 1 : one-cycle PLC operation.

= 2 : cyclical PLC operation.

= 3 : After one-cycle PLC operation, keep running by the last step reference

80 : rotation direction setting value as below shown:

Bit	Decimal Value	Description	Note
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0	1	Direction of 1st step time	<ul style="list-style-type: none"> • Bit 0~7: 0:Forward 1:Reverse • Constant $\boxed{80}$ setting value is the total sum of each bit equivalent decimal value. • If constant $\boxed{47} = 1$ reverse rotation is disabled.
1	2	Direction of 2nd step time	
2	4	Direction of 3rd step time	
3	8	Direction of 4th step time	
4	16	Direction of 5th step time	
5	32	Direction of 6th step time	
6	64	Direction of 7th step time	
7	128	Direction of 8th step time	

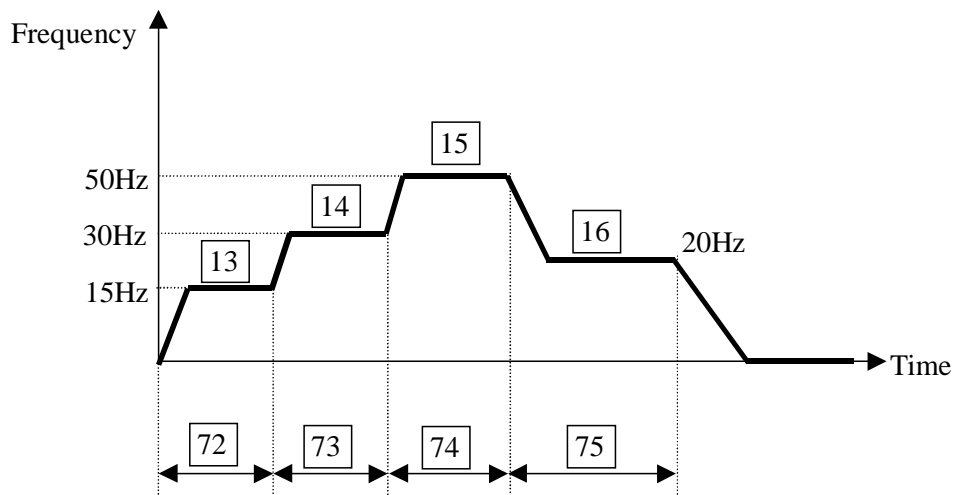
• Automatic run patterns are as below:

(a) One-cycle PLC operation

After completing one-cycle PLC operation according to data setting, inverter stops.

Example :

$\boxed{71} = 1$ $\boxed{80} = 0$ (ie 0000 0000)
 $\boxed{72} = 20s$ $\boxed{73} = 25s$ $\boxed{74} = 30s$ $\boxed{75} = 40s$ $\boxed{76} \sim \boxed{79} = 0$
 $\boxed{13} = 15Hz$ $\boxed{14} = 30Hz$ $\boxed{15} = 50Hz$ $\boxed{16} = 20Hz$ $\boxed{17} \sim \boxed{20} = 0$

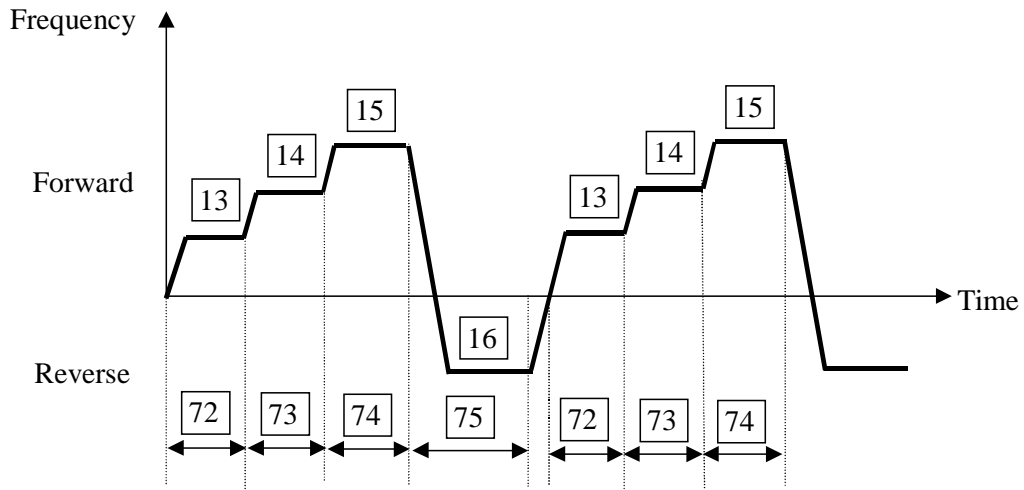


- (Note) 1. Accel/decel time according to parameter $\boxed{09}$, $\boxed{10}$ setting value.
2. When automatic run step time ($\boxed{72} \sim \boxed{79}$) setting value is 0, the PLC function becomes disabled.

(b) Cyclical PLC operation

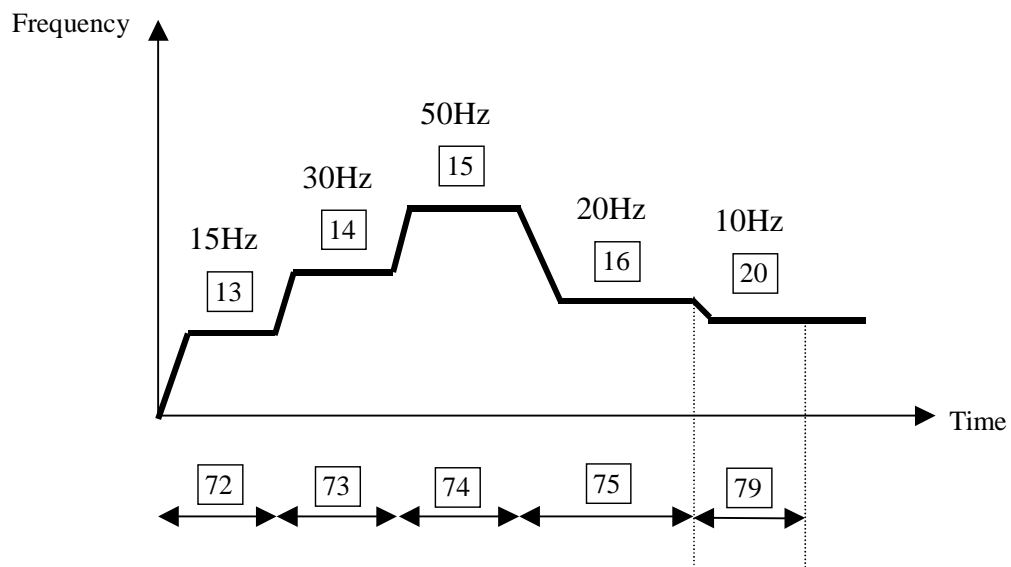
After completing one-cycle PLC operation, inverter will recycle the PLC operation.

Example : $\boxed{71} = 2$
 $\boxed{72} \sim \boxed{79}$, $\boxed{13} \sim \boxed{20}$, setting value is same as (a)
 $\boxed{80} = 8$ (ie 0000 1000)



(c) After one-cycle PLC operation, keep running by the last step reference.

Example : $\boxed{71} = 3$, $\boxed{80} = 0$ (ie 0000 0000)
 $\boxed{72} \sim \boxed{78}$, $\boxed{13} \sim \boxed{29}$ same as (a)
 $\boxed{79} = 15s$, $\boxed{20} = 10Hz$



10.30 Inverter Capacity Selection

Parameter	Name	Units	Setting Range	Default Setting
$\boxed{84}$	Inverter Capacity Selection	—	—	Depend on Motor

23	Motor Rated Current	0.1 A	—	Horsepower
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Inverter capacity has been preset at the factory. However, if a spare board is used, reset the inverter capacity referring to the table in the right side

84	Setting	HP			
	Value		1/2	1	2
TYPE					
110/220V, Single phase			13	14	15
220V, Three phase			23	24	25
440V, Three phase			43	44	45

The motor rated current standard set value for each capacity has already set at factory as following table. If the general purpose motor rated current value is different from the standard value, change the setting.

Motor Rated Current (A)	HP			
		1/2	1	2
TYPE				
220V, Three phase		2.1	3.3	6.4
440V, Three phase		1.0	1.7	2.9

11 FALUT DISPLAY AND TROUBLE-SHOOTING

Protective Function		Explanation	Monitor Display
Low Voltage Protection (Main circuit Voltage Insufficient.)		When the inverter power supply voltage drops, torque becomes insufficient and motor is overheated. Inverter output is stopped when the main circuit DC voltage becomes lower than the low voltage detection level. Detection level : Approx. 170V or less	UV 1 (UV1)
Over-current Protection		The inverter output is shut-off when the inverter output current becomes approx. 200% and above of inverter rated current.	OC (OC)
Over-voltage Protection		The inverter output is shut-off when the main circuit DC voltage becomes excessive because of regeneration energy caused by motor deceleration and negative load. Detection level : Approx. 410V or more	OV (OV)
Over-load Protection	Motor	The inverter output is stopped when output current to the motor is detected by the electronic thermal in the inverter. Either a inverter duty constant-torque specialized motor or general-purpose motor can be selected. If more than two motors are driven, overload protection should be disabled. Use a thermal relay or thermal protector for each motor.	OL 1 (OL1)
	Inverter	The electronic thermal operates by the inverse time limit and the inverter output is shut-off when 112% or more of the inverter rated current occurs. Overload capacity :150%, 1 min.	OL 2 (OL2)
	Over-torque Detection (Note 1)	The motor operates according to operation selection [parameter P-37] when the Inverter output current exceeds the over-torque detection level. This function is used to protect the machine or to monitor the output torque.	OL 3 (OL3)
Cooling Fin Overheat		The inverter output is shut-off when the cooling fin overheat is detected by thermistor.	OH (OH)

Fault Contact Output	Error Causes	Action to be taken
Operation	<ul style="list-style-type: none"> • Inverter capacity is too small. • Voltage drop due to wiring. • A motor of large capacity connected to the same power system has been started. • Rapid acceleration with generator power supply. • Operation sequence when power is off. • Defective electromagnetic contactor. 	<ul style="list-style-type: none"> • Check the power supply voltage. • Check the power capacity and the power system.
Operation	<ul style="list-style-type: none"> • Extremely rapid accel/decel. • Motor ON/OFF switching at the inverter output side. • Short-circuit at the inverter output side. • Motor of a capacity greater than the inverter rating has been started. • High-speed motor or pulse motor has been started. 	<p>Transistor error may occur. Investigate the error cause, correct it, then restart.</p>
Operation	<ul style="list-style-type: none"> • Insufficient deceleration time • Negative load (Motor is turned by the load.) • Light input voltage compared to motor rated voltage 	<ul style="list-style-type: none"> • If braking torque is not proper, extend the decel. time or connect a braking resistor unit (option). • Check that the load is not minus. • Check the power supply voltage.
Operation	<ul style="list-style-type: none"> • Overload, long operation at low speed, improper V/f characteristic setting. • Motor rated current [parameter P²³] setting is wrong. 	<ul style="list-style-type: none"> • Investigate the cause of overload and review the operation pattern, V/f characteristic, and motor/inverter capacities. (If inverter is repeatedly reset after an overload occurs, the inverter may fault. Investigate and correct the cause of overload before restart.) • Set the rated current of motor name plate value to parameter P²³. • If the above measures are not effective, lower the carrier freq. [parameter P⁴⁵].
Operation		
Operation	<p>Motor current exceeds the preset value because of machine error or overload.</p>	<p>Check the use of machine. Correct the overload cause or set a higher detection level [parameter P⁴³] which is within the allowable range.</p>
Operation	<ul style="list-style-type: none"> • Improper V/f characteristic setting. • Intake air temperature rise. • Extremely rapid accel/decel, and too much times. 	<ul style="list-style-type: none"> • Check Inverter load and V/f setting. • Intake air temperature: 104°F (40°C) or less

Protective Function	Explanation	Monitor Display
Low-voltage Protection (Main circuit Voltage Insufficient.)	Monitor display appears when the main circuit DC voltage drop under the detection level while the inverter output is off. Detection level : Approx. 170V or less	UU (UV, Blink)
Overvoltage Protection	Monitor display appears when the main circuit DC voltage rises above the detection level while the inverter output is off. Detection level : Approx. 410V or more	OU (OV, Blink)
Overtorque Detection	This function is used to protect the machine and to monitor the inverter output torque. The motor operates according to selection of parameter P42 when the inverter output current exceeds the overtorque detection level. The monitor blinks when "operation continues" is preset.	OL3 (OL3, Blink)
Simultaneous Forward and reverse Run commands	When forward and reverse run commands are simultaneously closed for a period of time exceeding 500ms, the inverter is stopped according to the preset stop method [parameter P46].	EF (EF, Blink)
Stall Prevention	During Acceleration Inverter acceleration is stopped when current requested by the load is 170% or more of the inverter rated current. This prevents overload protection (OL1, OL2) or overcurrent (OC) from occurring. When current is reduced to less than 170%, acceleration is enabled.	—
	During Normal Operation Output frequency is decreased when current requested by the load is 160% or more of the inverter rated current. This prevents motor and inverter overload (OL1, OL2). When current is reduced below 160%, inverter acceleration is enabled.	
	During Deceleration Deceleration is stopped when the DC voltage is caused to rise by motor regenerative energy. This prevents overvoltage trips (OV). When DC voltage decreases, deceleration to the set value resumes.	
External Baseblock Signal Input	When an external baseblock signal is input, the motor coasts to stop. When the external base-block signal is removed, the inverter output is immediately turned on at the previously set frequency.	bb (BB, Blink)
Ground Fault	The inverter output is shut-off when a ground-fault occurs at the inverter output side.	GF (GF)

Fault Contact Output	Error Causes	Action to be taken
Non-operation	Input voltage drop	<ul style="list-style-type: none"> • Check the main circuit DC voltage. • Check the power supply capacity and power system.
Non-operation	Input voltage rise.	<ul style="list-style-type: none"> • Check the main circuit DC voltage
Non-operation	Motor current exceeded the set value because of machine fault or overload.	Check the driven machine and correct the cause of the fault or increases the set value [parameter P43] up to the machine allowable value.
Non-operation	<ul style="list-style-type: none"> • Operation error • 3-wire/2-wire selection error 	<ul style="list-style-type: none"> • Recheck the control sequence. • Recheck parameter (P36 ~ 38).
Non-operation	<ul style="list-style-type: none"> • Insufficient power for accel/decel • Overload • Phase loss 	<ul style="list-style-type: none"> • Set proper accel/decel time [parameter P09 ~ 12] for smooth operation. • For stall prevention during normal operation, lighten the load or increase inverter capacity.
Non-operation	—	—
Non-operation	<ul style="list-style-type: none"> • Motor dielectric resistance is insufficient. • Wiring is not proper 	<ul style="list-style-type: none"> • Check for ground-fault in motor or wiring.

Protective Function	Explanation	Monitor Display
External Fault Signal Input	When an external alarm signal is input, the inverter output baseblock, the motor load is coasting to a stop.	E3 (E3) E4 (E4) E5 (E5)
Control Circuit Fault	Digital Operator Communication error 1	F00 (F00)
	Digital Operator Communication error 2	F01 (F01)
	NVRAM Fault.	F02 (F02)
	A/D converter fault in CPU	F03 (F03)
	<ul style="list-style-type: none"> • RS-485 communication error 1 • When setting the Local/Remote selection parameter 01 as 4,5 or 6, If the inverter can not accept read data from RS-485 port during 5 sec. 	F04 (F04, Blink)
	<ul style="list-style-type: none"> • When any communication error between inverter and master controller occurs, the inverter operates according to a preset stop method (ref. parameter 69). • RS-485 communication error 2. 	F05 (F05, Light or Blink)

Fault Contact Output	Error Causes	Action to be taken
Non-operation	<ul style="list-style-type: none"> External fault condition occurred. 	<ul style="list-style-type: none"> Correct the cause of the fault input.
Non-operation	<ul style="list-style-type: none"> External noise Excess Vibration or shock 	<ul style="list-style-type: none"> Check the digital operator connection. Turn OFF the power supply once and turn it ON again. If the fault still exists, replace the control board.
Non-operation		<ul style="list-style-type: none"> Record all data, then use parameter <u>00</u> for initializing. Turn OFF the power supply once and turn it ON again. If the fault still exists, replace the control board.
Non-operation		<ul style="list-style-type: none"> Check RS-485 communication cable. Check host controller communication software compatibility.
Non-operation		<ul style="list-style-type: none"> Record all setting data, and then make initialization (by parameter <u>00</u>). Check Rs-485 communication cable. Turn off the inverter power supply once and turn it on again. If the fault still exists, replace the inverter.
Non-operation		<ul style="list-style-type: none"> When parameter 69 = 0 or 1, if any RS-485 data transmission error occurs monitor display F5 light. When parameter 69 = 2, if any RS-485 data transmission error occurs, blink display F5. External Noise Excess vibration or shock