

# Panasonic

## For speed control of 3-phase induction motor Low-Noise Inverter M2S Series **Operating Instructions**

Be sure to provide the customer with a copy of this manual.

- Thank you for purchasing a Panasonic Inverter.
- Be sure to read the instructions thoroughly before attempting to operate the inverter. After reading, be sure to keep in a safe place for future reference.

Industrial and Appliance Motor Division, Motor Company Matsushita Electric Industrial Co., Ltd
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Before use

Preparation and Adjustment

If necessary

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# Safety Precautions

Precautions that must be heeded in order to protect the user and others from harm and prevent property loss or damage are as follows:

- **The extent of injury or damage that could be suffered by improper use contrary to directions is ranked as follows:**




## **DANGER**

Situation involving danger which could result in death or serious injury if equipment is handled incorrectly.



## **CAUTION**

Situation involving danger which could result in medium to light injury, or property damage if equipment is handled incorrectly.

Items labeled as  **CAUTION** could be connected with core serious consequences, depending upon the circumstances. In any case, these instructions are extremely important and should be observed in all cases.

## ■ Installation



## **CAUTION**

- Install on non-combustible material such as metal.  
Failure to do so could result in fire.
- Do not locate near combustibles.  
Doing so could result in fire.
- Do not carry by the front case when moving the inverter.  
Doing so is dangerous and could result in injury if dropped.
- Do not allow foreign material such as metal chips to get inside the inverter.  
Doing so could result in fire.
- Be sure to install on a base capable of supporting the inverter's weight in accordance with the directions giving in the instruction manual.  
Failure to do so could result in the inverter dropping or falling.

## ■ Wiring



### DANGER

- Make sure the power is cut off before handling wiring.  
Failure to do so could result in electrical shock or fire.
- Be sure to install a no-fuse breaker (NFB).  
Failure to do so could result in fire.
- Be sure to ground the GND terminal.  
Failure to do so could result in electrical shock or fire.
- Have wiring work done a licensed electrician.  
Failure to do so could result in electrical shock or fire.
- Be sure to install the inverter before wiring.  
Failure to do so could result in electrical shock or fire.



### CAUTION

- Do not ground the AC power source with the output terminals (U/T1, V/T2, W/T3).  
Doing so could result in injury or fire.
- Make sure the voltage of the AC power source agrees with the rated voltage of the inverter.  
If not, it could result in injury or fire.

# Safety Precautions

## ■ Operation



### DANGER

- Be sure to mount the case and cover before turning the power on. Never remove the case or cover while the inverter is receiving power.  
Failure to mount or removing the case/cover could result in electric shock.
- The operator should secure the area before turning the power on or off.  
Failure to do so could result in injury.
- Never operate the switches with wet hands.  
Doing so could result in electric shock.
- Never touch the terminals of the inverter when it is charged with power, even when it is not running. Doing so could result in electric shock.
- If the retry function is selected, the inverter could unexpectedly start operating again if tripped. Do not approach the inverter in the condition.  
Doing so could result in injury.
- If trip reset is carried out with the operate signal ON, the inverter could unexpectedly start operating again. Do not approach the inverter in the condition.  
Doing so could result in injury.



### CAUTION

- The radiator and regenerative resistor become very hot.  
Touching these parts could result in skin burning injury.
- The inverter can be easily set to operate at speeds ranging from low to high. Set the operating speed so that the motor and machine tolerance is not exceeded.  
Failure to do so could result in injury.

## ■ Maintenance/Inspection



**DANGER**

- Wait for at least 5 minutes after turning off the power to perform inspections.  
Failure to do so could result in electric shock.
- Maintenance and inspection should not be performed by anyone except a qualified repairman.  
The repairman should remove all metallic objects (watch, rings, etc.) before performing maintenance or inspection.  
Use only insulated tools when performing maintenance or inspection.  
Failure to do so could result in electric shock or injury.

## ■ Other



**DANGER**

- Absolutely DO NOT modify the inverter in any way.  
Doing so could result in electric shock, injury or fire.

## GENERAL PRECAUTIONS

The diagrams given in this instruction manual may show the cases, covers or safety breakers removed in order to show details.

When operating, be sure to return the cases, covers or safety breakers and operate as specified in the manual.

When disposing of the inverter, treat it as industrial waste.

For the earth connection avoid direct contact between aluminum and copper. Tinplated cable lugs can be used if the plating does not contain zinc. When tightening the screws take care not to damage the thread in the aluminum frame.

Where residual-current-operated protective device (RCD) is used for protection in case of this Electric Equipment (EE). Otherwise, another protective measure shall be applied such as separation of the EE from environment by double reinforced or isolation of EE and supply system by transformer.

When you use a regenerative resister, enclose it with something incombustible so that your hands can not touch it.

# Introduction

## When unpacking

- Is the model correct?
- Was the equipment damaged in transport?

If there is anything wrong with the equipment, contact your Panasonic dealer.

## Inverter model check

### Nameplate

<b>Panasonic</b>		Model No	M 2 S 0 8 3 C S A	Model number
Rated input	POWER INPUT	750W 4.6A 3PH AC200~230V 50/60Hz		
	OUTPUT	4.0A 3PH AC200~230V 0~400Hz		
Rated output	SER. No.	99070001		Production number (serial number)
Matsushita Electric Industrial Co., Ltd. MADE IN JAPAN				

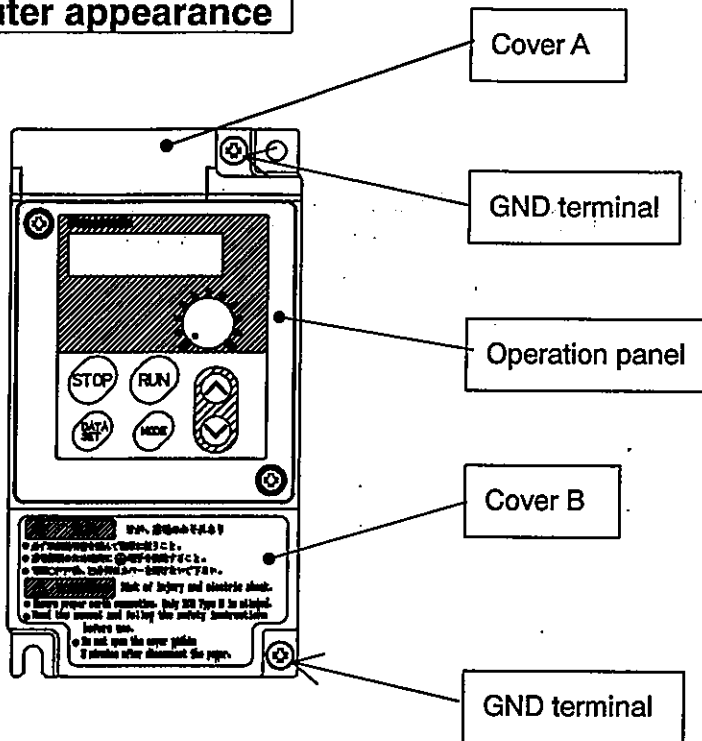
### Product No.

M 2 S		0 8		3	C	S	A
Series name							
Code	Motor capacity						
01	0.1 kW						
02	0.2 kW						
04	0.4 kW						
08	0.75 kW						
Code	Voltage class						
2	Single-phase 200 V						
3	3-phase 200 V						
Code	Interface specs.						
A	Without communication function/ standard type (NPN logic)						
B	Without communication function/ standard type (PNP logic)						
Code	Operation panel specs.						
S	Without volume (standard)						
V	With volume						
N	Blank cover						
Code	Regenerative brake specs.						
A	Without regenerative brake circuit						
C	With regenerative brake circuit (built-in)						



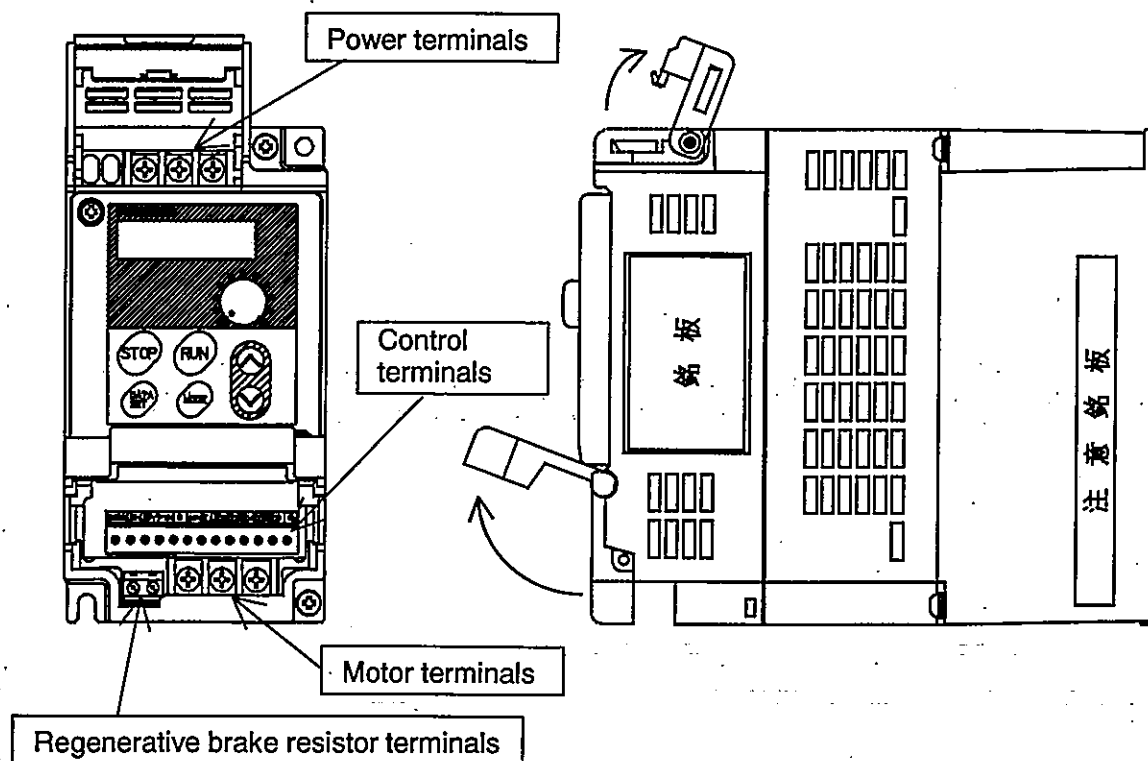
# Parts Identification

## Outer appearance



In case of M2S083CSA

## With cover opened



- Be very careful of static electricity when wiring.
- After wiring, always replace the cover to their original positions.

# Precautions

**Note the following precautions in order to use the inverter properly.**

1. Arrange for the power source capacity to be between 1.5 to 500kVA the inverter's capacity. An excessively high peak current may flow to the power input circuit, and damage the converter section if the wiring length between the power source and the inverter is shorter than 100 m with a power source exceeding 500kVA, or the phase-advancing capacitor is switched on the power source side. In this case, provide individual power factor-enhancing AC reactors that match the inverter's capacity on the inverter input side.
2. Do not connect the phase-advancing capacitor to the output side of the inverter. Doing so could result in damage to the phase-advancing capacitor.
3. Do not provide a magnetic contactor between the inverter and motor. To turn the motor on/off, use the RUN switch on the control panel or the control input terminal. Avoid frequently turning the magnetic contactor, provided on the power source, on and off.
4. Operating the motor by the inverter could increase leakage current and trip the earth leakage breaker. In this case, use earth leakage breakers designed for high frequency for this system and other systems.
5. Take the following precautions if using a built-in electronic thermal relay contained in the inverter:
  - Check the rated current of your 3-phase induction motor, and set the appropriate electronic thermal value.
  - Use one motor for each inverter.
6. If operating the inverter with multiple motors connected in parallel, select an inverter of a capacity that does not exceed the total rated current of the inverter. When calculating by total output of the motor, the inverter's rated current may be exceeded, depending on the type of motor.
7. The total wiring length between inverter and motor should not exceed 30 meters. If the wiring is to be longer than this, you should provide a reactor, etc., between inverter and motor.
8. Install the inverter securely to avoid injuries in the case of an earthquake.
9. Before running the inverter following an earthquake, check installation of the inverter and motor and make sure they are safe to operate.
10. Observing the following instructions makes this inverter a UL508C standard authorized and EN50178 approved product. Use the inverter in environment with the pollution degree 2 or higher provided in IEC60664-1. For example, installing in a control panel of IP54 makes the pollution degree of environment 2. To achieve IP54. Use the inverter in environment with the over voltage category II in IEC60664-1. For example, use the isolation transformer of earthed star provided in IEC or EN direction.

**Applicable standards** Compliance with the EMC requirements need to be shown on system level after installation of the equipment.

Subject	Applicable standard	
Motor and Driver	EN50178	Standards Referenced by Low-Voltage Directive
	EN55011 Radio Disturbance Characteristics of Industrial, Science and Medical (ISM) Radio-Frequency Equipment	Standard Referenced by EMC Directives (IEC61000-6-2)
	EN61000-4-2 Electrostatic Discharge Immunity Test	
	EN61000-4-3 Radio-Frequency Electromagnetic Field Immunity Test	
	EN61000-4-4 Electric High-speed Transition Phenomenon-Burst Immunity Test	
	EN61000-4-5 Lightning Surge Immunity Test	
	EN61000-4-6 High Frequency Conduction-Immunity Test	
	EN61000-4-11 Instantaneous Outage-Immunity Test	

# Installation

Install the inverter properly to prevent equipment failure or accidents.

## Inverter

### Installation location

- ① Install the inverter indoors in a place not exposed to rain or direct sunlight. The inverter is not waterproof.
- ② Install in a place not exposed to corrosive/flammable gases, grinding fluid, oil mist, metal powder or chips.
- ③ Place with adequate ventilation, which is not exposed to excessive humidity, dirt or dust.
- ④ Place not subject to vibration.

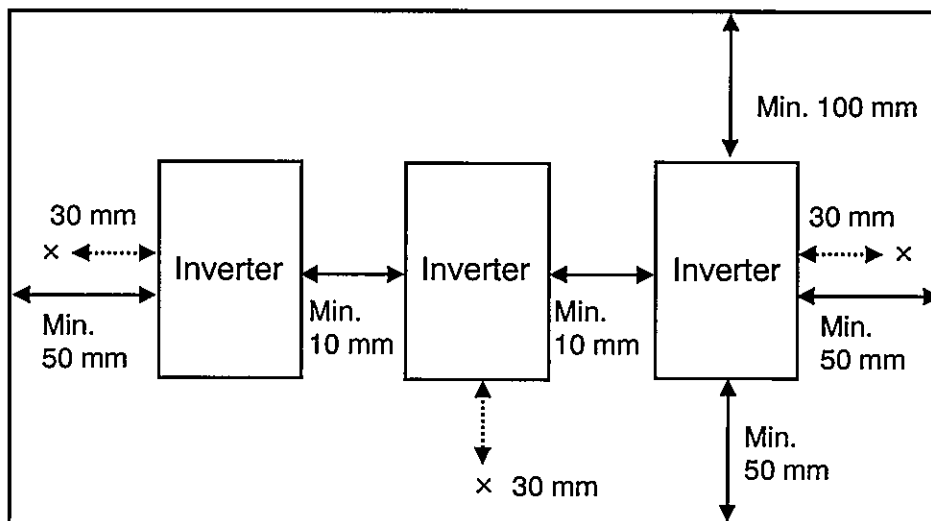
### Environmental conditions

Item	Conditions
Ambient temperature	$-10 \sim 50^{\circ}\text{C}$ (Must not freeze) Single-phase input specifications: $-10$ to $40^{\circ}\text{C}$
Ambient humidity	Max. 90%RH (Must be no condensation)
Storage temperature	$-20^{\circ}\text{C} \sim 65^{\circ}\text{C}$ (Must not freeze)
Storage humidity	Max. 90 %RH (Must be no condensation)
Protection structure	IP40 (Built-in the panel)
Vibration	Max. $5.9 \text{ m/s}^2$ ( $10 \sim 60 \text{ Hz}$ )
Elevation	Max. 1000 m

\* Short-term temperature during transport

### Mounting direction and clearance

- Provide sufficient clearance for effective cooling.

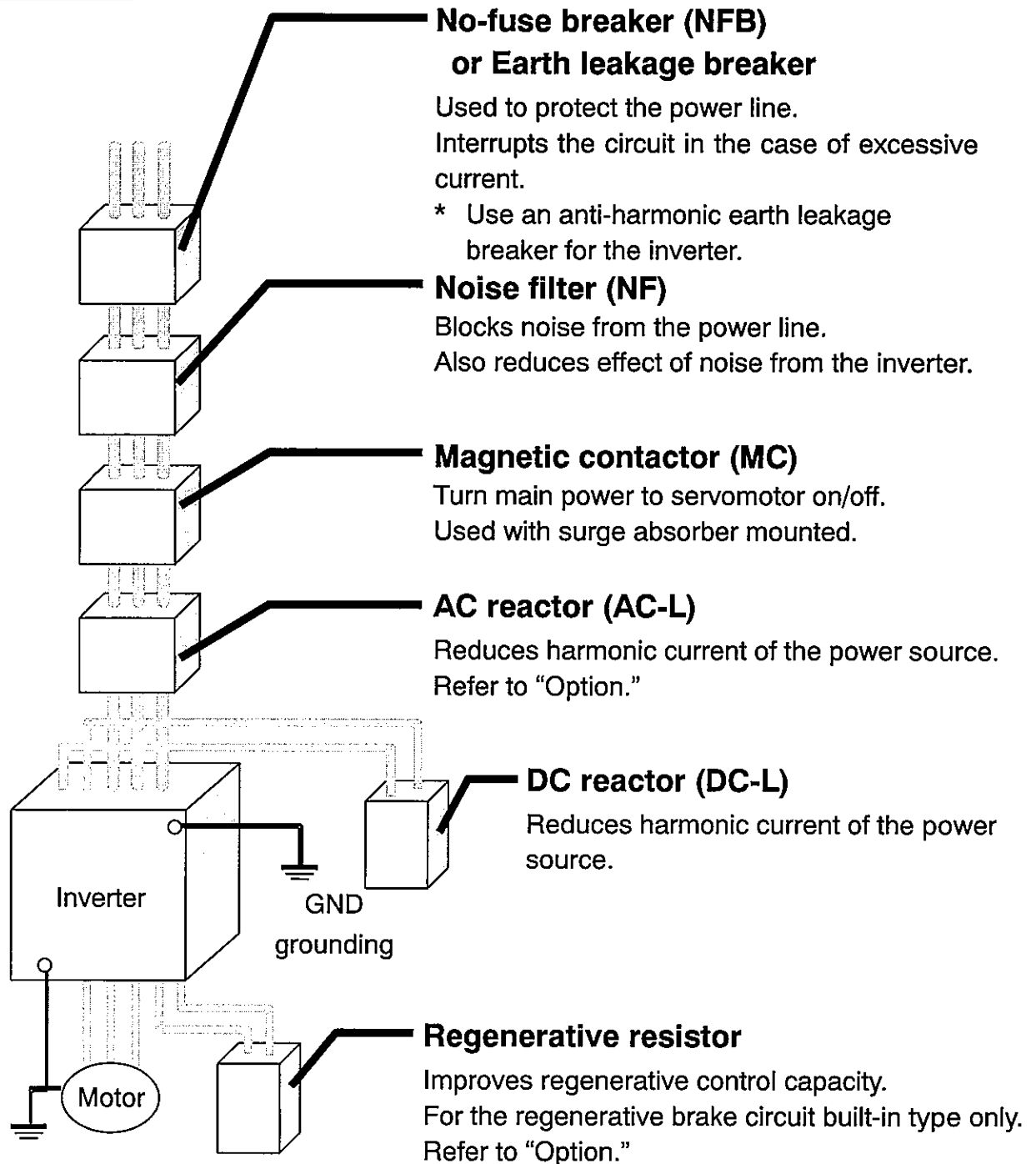


Make sure ambient temperature doesn't exceed allowable temperature at position indicated by X in the figure above.

# System Configuration and Wiring

## Wiring general view

### Main circuit



## Applicable peripheral equipment

### Wiring apparatus selection

- (1) Selection of no-fuse breaker, magnetic contactor, thermal relay, (Matsushita Electric Works No.) and wiring

Inverter No.	Applicable motor (kW)	No-fuse breaker (Rated current)	Magnetic contactor (Contact configuration)	Thermal relay (Current adjustment range)	Wiring (mm <sup>2</sup> ) *1	
					Main circuit	Control circuit
M2S01 <sup>2***</sup> <sub>3</sub>	0.1	BBC35N (5A)	BMFT61842N (3P+1a)	BMF901E (0.5~0.75A)	2.0 (AWG14)	0.75 (AWG18)
M2S02 <sup>2***</sup> <sub>3</sub>	0.2	BBC35N (5A)	BMFT61842N (3P+1a)	BMF902E (0.95~1.45A)	2.0 (AWG14)	0.75 (AWG18)
M2S04 <sup>2***</sup> <sub>3</sub>	0.4	BBC35N (5A)	BMFT61842N (3P+1a)	BMF904E (1.7~2.6A)	2.0 (AWG14)	0.75 (AWG18)
M2S08 <sup>2***</sup> <sub>3</sub>	0.75	BBC310N (10A)	BMFT61842N (3P+1a)	BMF907E (2.8~4.2A)	2.0 (AWG14)	0.75 (AWG18)

Use the same size of wire for GND terminal (⊕) as the wire for main circuit.

- (2) Relay selection

For relays used in control circuits such as the control input terminal, you should use a small signal relay (min. guaranteed current of 1mA or less) in order to prevent poor contact.

<Examples> Matsushita Electric Works: DS type, NK type, HC type  
Omron: G2A type

- (3) Control circuit switch selection

If using a switch instead of a relay, use a switch for extremely small current in order to prevent poor contact.

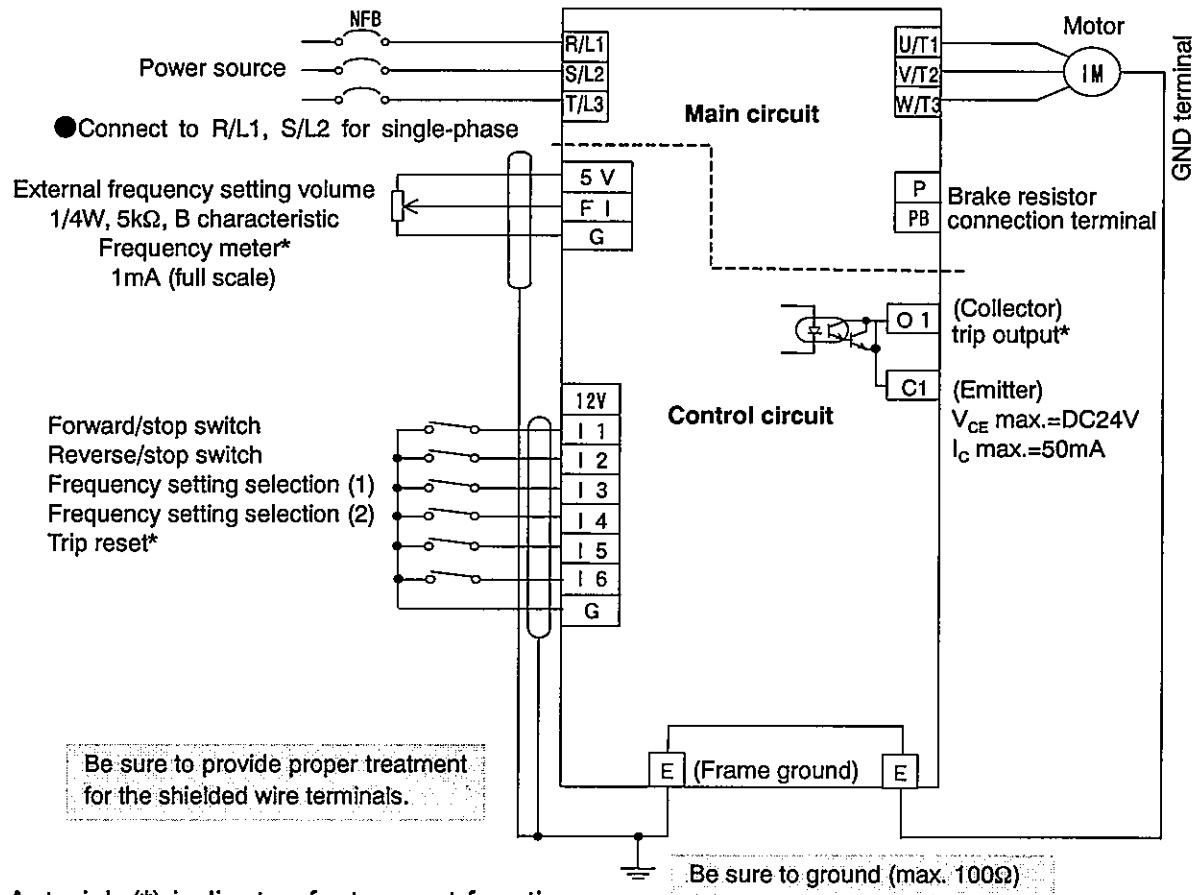
<Example> Nihon Kaiheiki: M-2012J-G

\*1 Motor cable is used if the distance between inverter and motor is 20 meters or less. If more than 20 meters, use a larger cable.

# System Configuration and Wiring

## Wiring

### Standard wiring diagram

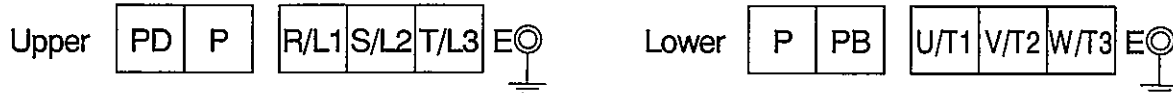


Asterisk (\*) indicates factory-set function.

In case of M2S083CVA

### Terminal function

(1) Main circuit terminal



Terminal No.	Terminal name	Function description	Terminal screw size	Tightening torque N·m
R, S, T L1, L2, L3	Power source input terminal	Connects to 3-phase or single-phase commercial power source	M3.5	0.8 ~ 1.0
U, V, W T1, T2, T3	Output terminal	Connects to 3-phase induction motor	M3.5	0.8 ~ 1.0
E	GND terminal	Terminal for grounding inverter base	M4	1.0 ~ 0.2
P, PB	Regenerative resistor terminal	Regenerative resistor connection terminal	M2.5	0.3 ~ 0.5

(2) Control terminal

01	C1	5V	FI	G	12V	I1	I2	I3	I4	I5	I6	G
----	----	----	----	---	-----	----	----	----	----	----	----	---

<Terminal screw size: M2, Tightening torque 0.22 - 0.25 N·m>

Use a screwdriver with the end shape No. 0 (bit).

Terminal No.		Terminal name	Function description															
5 V		Power source terminal for frequency setting	+ 5VDC applied. I max. = 20 mA															
1 2 V		Power source terminal for input terminal	+ 12VDC applied. I max. = 20 mA															
F I		Input terminal for frequency setting	Frequency can be set when 0 ~ +5VDC (or 0 - +10VDC) is input between "FI" and "G." If using these terminals, change "11" frequency command" to <u>0-5</u> or <u>0-10</u> .															
G		Ground for control	Common ground terminal for contact input.															
Input terminal	I 1	Forward/stop command terminal	Forward by shorting between "I1" and "G"; stop by release Reverse by shorting between "I2" and "G"; stop by release You can change "I1" to run/stop command and "I2" to forward/reverse command by altering "46" I1.12" function selection.															
	I 2	Reverse /stop command terminal																
	I 3 I 4 I 5 I 6	Frequency setting selection terminal	You can select the following functions by "18" operation mode selection." <table><tr><th>Operation mode</th><th>I3</th><th>I4</th><th>I5</th><th>I6</th></tr><tr><td>2-speed operation mode</td><td>Forward jogging</td><td>Reverse jogging</td><td colspan="2" rowspan="4">Select from among free-run, external forced trip, No. 2 acceleration/deceleration, trip reset</td></tr><tr><td>4-speed operation mode</td><td colspan="2" rowspan="3">Frequency setting selection</td></tr><tr><td>8-speed operation mode</td></tr><tr><td>16-speed operation mode</td></tr></table>	Operation mode	I3	I4	I5	I6	2-speed operation mode	Forward jogging	Reverse jogging	Select from among free-run, external forced trip, No. 2 acceleration/deceleration, trip reset		4-speed operation mode	Frequency setting selection		8-speed operation mode	16-speed operation mode
	Operation mode	I3	I4	I5	I6													
	2-speed operation mode	Forward jogging	Reverse jogging	Select from among free-run, external forced trip, No. 2 acceleration/deceleration, trip reset														
	4-speed operation mode	Frequency setting selection																
8-speed operation mode																		
16-speed operation mode																		
G	Ground for control	Contact input common ground terminal.																
Output terminal	O 1 C 1	Output signal terminal	Open-collector output terminal. (Not maintained when power is OFF.) You can select contents by "51" output signal (1) selection." Factory setting: "01" is trip signal (transistor ON when tripped) "O1" (collector) IC max. = 50mA "C1" (emitter) VCE max. = 24VDC															

# System Configuration and Wiring

## Precautions when wiring

The inner circuit is still energized with a high voltage after the input power is turned off. Do not touch the inverter for at least 5 minutes after turning off the power.

### Main circuit

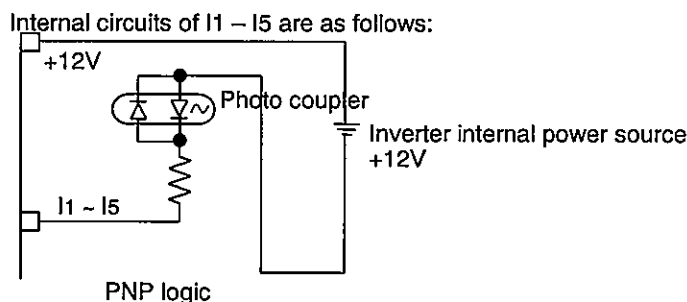
- (1) The inverter will be damaged if you invert the connections of the power input terminal and motor output terminal (U/L1, V/L2, W/L3). Absolutely do not invert connections.
- (2) Do not ground the main circuit terminal.
- (3) Do not short motor output terminals (U/L1, V/L2, W/L3) together.
- (4) The GND terminal (E) is the frame ground (FG) for the inverter. Ground with 100Ω maximum.
- (5) Be sure to use insulated crimp terminals for connecting to the main circuit terminals.

### Control circuit

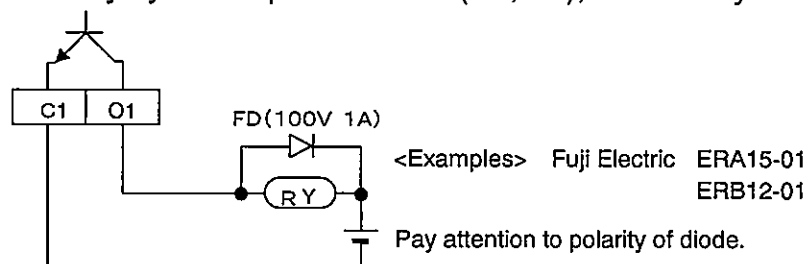
- (1) Use the wires with the insulation removed, as shown below, to wire the control circuit. If the exposed area is too long, there is the possibility of a short occurring with the adjacent wire. If it is too short, the wire could be pulled. Twist the bare wires when wiring, so that they will not get loose.



- (2) Use a wire which diameter is less than 0.9 mm when wiring using a bar terminal or single wire. If it is larger than 0.9 mm, the screw thread may be damaged when tightened.
- (3) Do not apply more than 24VDC, 50mA to the output terminals (O1, C1), or apply voltage to terminal in reverse.
- (4) Input terminal configuration is internally pulled up from approx. +12V by approx. 3.3kΩ. You can control by contact or by open collector output. Do not apply external voltage.



- (5) Do not short the frequency setting power source terminal (5V) and ground for control terminal (G).
- (6) To directly drive the relay by the output terminals (O1, C1), mount a flywheel diode (FD).



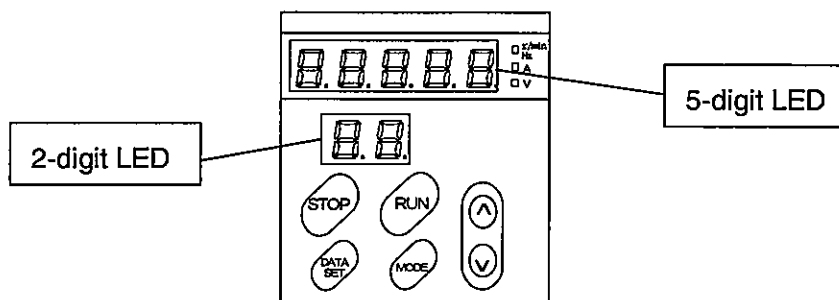
- (7) Use shielded wires for the cable to be connected to the control circuit.



# Parameter Setting

## Setting

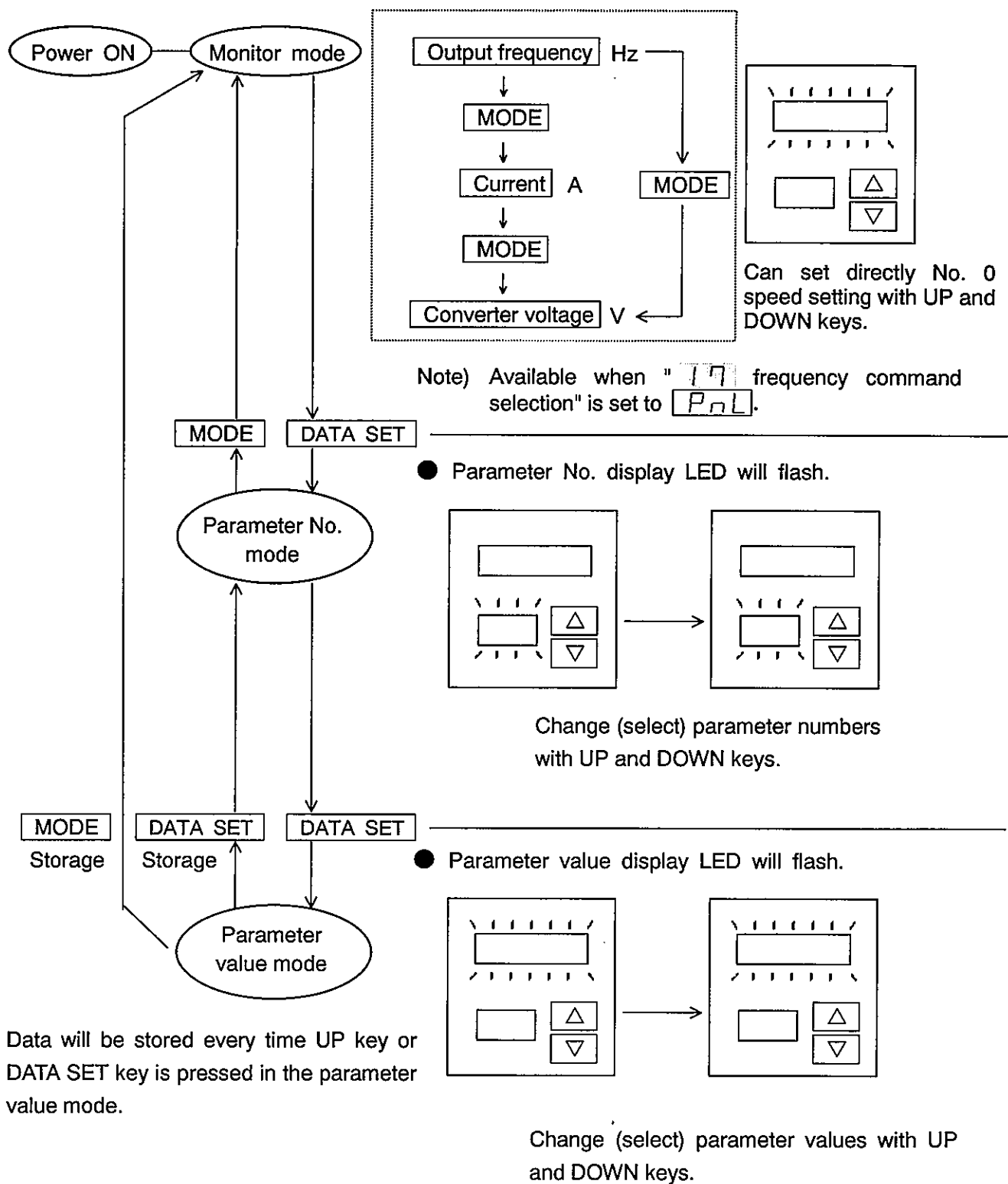
### Operation Panel



Frequency Hz is displayed when in the normal monitor mode.

You can display synchronized rotations for the parameter "51" display power."

5-digit LED	Displays output frequency, set frequency or display power, cause of error, or parameter.						
2-digit LED	Displays parameter No. Direction of rotation is displayed in the monitor mode.						
MODE switch	Switch for changing monitor mode. Pressing the switch changes the mode in the cycle of: Output frequency → Converter voltage → Motor current ↑						
DATA SET switch	Switch for selecting parameter No. mode and parameter value mode, setting parameter value. <div> <div>● Mode description</div> <table> <tr> <td>Monitor mode</td><td>Displays output frequency, converter voltage or motor current. <b>Mode when the power is turned on.</b> When in the parameter No. mode or parameter value mode, pressing the <b>MODE</b> switch changes to the monitor mode.</td></tr> <tr> <td>Parameter No. mode</td><td>Displays parameter No. (00 ~ 99) by flashing. When in the monitor mode, pressing the <b>DATA SET</b> switch changes to the parameter No. mode.</td></tr> <tr> <td>Parameter value mode</td><td>Displays parameter contents (setting value) <b>by flashing.</b> You can change the setting value with the <b>Δ</b> <b>▽</b> switches. After changing the setting, press the <b>DATA SET</b> switch to enter the setting in the memory.</td></tr> </table> </div>	Monitor mode	Displays output frequency, converter voltage or motor current. <b>Mode when the power is turned on.</b> When in the parameter No. mode or parameter value mode, pressing the <b>MODE</b> switch changes to the monitor mode.	Parameter No. mode	Displays parameter No. (00 ~ 99) by flashing. When in the monitor mode, pressing the <b>DATA SET</b> switch changes to the parameter No. mode.	Parameter value mode	Displays parameter contents (setting value) <b>by flashing.</b> You can change the setting value with the <b>Δ</b> <b>▽</b> switches. After changing the setting, press the <b>DATA SET</b> switch to enter the setting in the memory.
Monitor mode	Displays output frequency, converter voltage or motor current. <b>Mode when the power is turned on.</b> When in the parameter No. mode or parameter value mode, pressing the <b>MODE</b> switch changes to the monitor mode.						
Parameter No. mode	Displays parameter No. (00 ~ 99) by flashing. When in the monitor mode, pressing the <b>DATA SET</b> switch changes to the parameter No. mode.						
Parameter value mode	Displays parameter contents (setting value) <b>by flashing.</b> You can change the setting value with the <b>Δ</b> <b>▽</b> switches. After changing the setting, press the <b>DATA SET</b> switch to enter the setting in the memory.						
<b>Δ</b> <b>▽</b> switch	Enable you to select parameters, and set/change contents.						
<b>RUN</b> switch	Commands the inverter to run.						
<b>STOP</b> switch	Commands the inverter to stop.						



Data will be stored every time UP key or DATA SET key is pressed in the parameter value mode.

# Test Operation

## Pre-operation inspections

After installing and wiring, inspect the following before running the inverter.

- (1) Is the wiring connected correctly? (Especially power input terminals R/L1, S/L2 and T/L3, output terminals U/T1, V/T2 and W/T3, load side short or ground)
- (2) Does input power comply with the rating?
- (3) Are there any places that could be shorted by wire cuttings, etc?
- (4) Are any screws or terminals loose?

## Test operation

- (1) Conduct the following for safe operation.

- ① Set the motor so that the motor can be operated independently.
- ② Set all of the input of the control terminal base to "OFF" (Open)

- (2) Turn ON the power and run a test operation by following the procedures shown below.

Operation	Operation panel		Remarks
	Switch	LED display	
① Turn on the power		<div>000</div> <div>00</div>	<ul style="list-style-type: none"> <li>Turn ON the power in the monitor mode. (Output frequency is displayed.)</li> </ul>
When setting with the volume on the operation panel, set "0" frequency command selection" to 00L Volume. (See page 31.)			
Operation	Operation panel		Remarks
	Switch	LED display	
② Frequency setting	Press <span>Δ</span> .  Press <span>Δ</span> to set frequency.	<div>000</div> <div>00</div> <div>6000</div> <div>00</div>	<ul style="list-style-type: none"> <li>No. 0 speed frequency is displayed. (Output setting: 0.0 Hz)</li> <li>Set No. 0 speed frequency to 60 Hz.</li> </ul>
③ Return to the monitor mode	Press <span>MODE</span> .	<div>000</div> <div>00</div>	
④ Run command (forward rotation)	Press <span>RUN</span> .	<div>6000</div> <div>F</div>	<ul style="list-style-type: none"> <li>Frequency is gradually changed.</li> <li>Rotating direction is displayed.</li> </ul>
⑤ Stop command	Press <span>STOP</span> .	<div>000</div> <div>00</div>	<ul style="list-style-type: none"> <li>Frequency is gradually changed.</li> </ul>

<Points to check when running a test operation>

- (1) Is the motor running smoothly? Are there any abnormal sounds or vibrations?
- (2) Are acceleration and deceleration smooth?
- (3) Is the direction of rotating of the motor correct?

# Operation Method

## Selection of operation commands

You can perform the following six kinds of operation using the frequency command and run command on the operation panel or using the terminal block with the MIS series inverters.

	Frequency command		Run command		Parameter setting	
	Operation panel or volume	Terminal block "FI"	Operation panel	Terminal block	<b>17</b> Frequency command selection	<b>16</b> Run command selection
1	<input type="radio"/>		<input type="radio"/> *1	<input type="radio"/> *1	<b>PnL</b> or <b>UOL</b>	<b>b0FH</b> (both)
2		<input type="radio"/>	<input type="radio"/> *1	<input type="radio"/> *1	<b>0-5</b> or <b>0-10</b>	<b>b0FH</b> (both)
3	<input type="radio"/>		<input type="radio"/>		<b>PnL</b> or <b>UOL</b>	<b>PnL</b> (panel)
4		<input type="radio"/>	<input type="radio"/>		<b>0-5</b> or <b>0-10</b>	<b>PnL</b> (panel)
5	<input type="radio"/>			<input type="radio"/>	<b>PnL</b> or <b>UOL</b>	<b>FEr</b> (terminal block)
6		<input type="radio"/>		<input type="radio"/>	<b>0-5</b> or <b>0-10</b>	<b>FEr</b> (terminal block)

"**17**" frequency command selection "**PnL**" and "**16**" run command selection "**b0FH**" are factory-set values.

## How to change operation command

(Ex.) Change "**17**" frequency command selection" to "**UOL**" from "**PnL**".

Operation	Operation panel	
	Switch	LED display
① Turn on the power		
② Parameter No. mode	Press <b>DATA SET</b> . Press <b>Δ</b> , and select the parameter No.	 Press <b>Δ</b> , and select the parameter No.
③ Parameter value mode	Press <b>DATA SET</b> .  Store the setting with <b>MODE</b> or <b>DATA SET</b> .	  Press <b>Δ</b> , and select the parameter No.

\*1 When the operation command is set for the operation panel and you are using the terminal block, the terminal block has priority.

RUN switch on the operation panel is valid only when both the forward/stop switch "I1" and the reverse/stop switch "I2" on the terminal block are "OFF." When either or both of "I1" and "I2" on the terminal block is turned "ON," the previously set of the RUN switch will be cancelled.

# Operation Function

Inverters of this series provide the following operation functions. You can issue commands using the switches on the operation panel or on the terminal block.

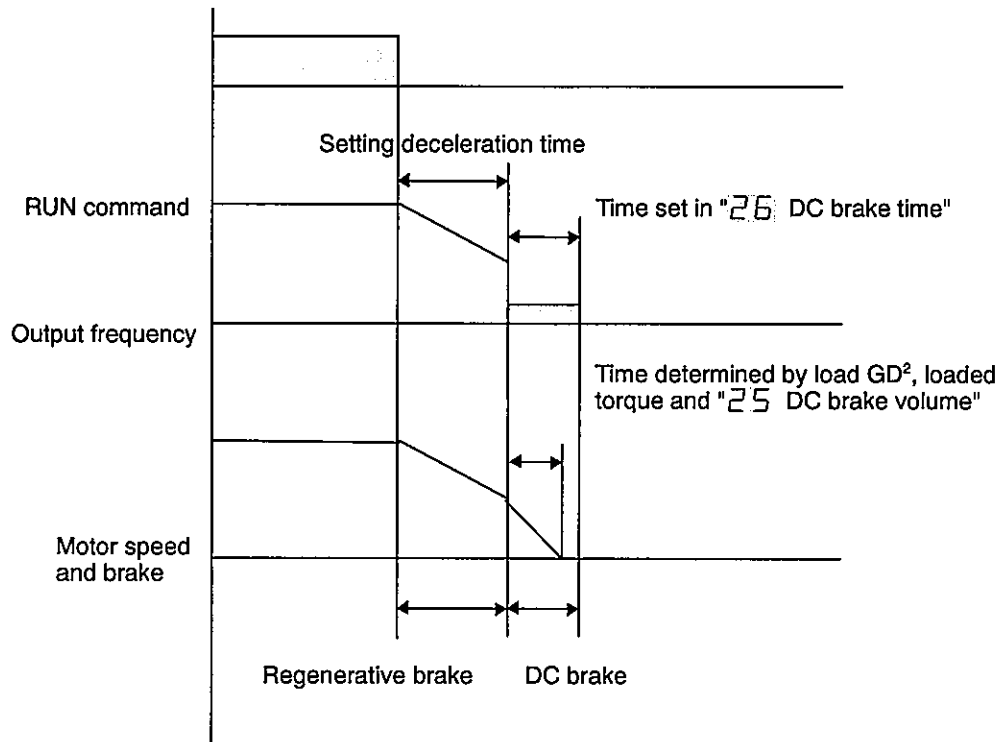
Operation function	Explanation
Normal operation	<ul style="list-style-type: none"> <li>■ Operation function with acceleration/deceleration time setting. You can set acceleration time and deceleration time individually within the range of 0 to 3600 seconds. *1</li> </ul>
JOG (Jogging) operation	<ul style="list-style-type: none"> <li>■ Operation function with zero acceleration/deceleration time. This function is useful for positioning.</li> <li>When the "operation mode" is set to JOG (jogging) mode, the JOG (jogging) operation becomes valid.</li> <li>When a forward or reverse operation command is given after making the control terminals between "I3" and "G" short, it becomes available to change to normal operation from JOG (jogging) operation.</li> <li>JOG (jogging) frequency can be set within the range of 0 to 30 Hz.</li> <li>However, please note that when it is too high, a trip caused by an over-current may occur.</li> </ul>
Free-run stop	<ul style="list-style-type: none"> <li>■ This function trips the applied voltage to the motor, and sets the motor to a free-run.</li> <li>This is useful when braking mechanically. However, be very careful not to touch the output terminals of the motor (U/T1, V/T2, W/T3) even if the motor is free-running, because you can receive a serious electric shock.</li> </ul>
DC brake	<ul style="list-style-type: none"> <li>■ This brakes the motor by applying direct current to the motor when the inverter stops from the operating status. When a forward, reverse, or JOG (jogging) operation command is given while the DC brake is activated, the DC brake is stopped, and the specified operation is started.</li> </ul>
Positioning DC brake	<ul style="list-style-type: none"> <li>■ If a stop command is given during normal operation, soft-stop and braking are activated when output frequency reaches 3 Hz (can be changed by the parameter setting.)</li> <li>■ If the setting frequency is set to zero, braking is activated when output frequency becomes 1 Hz or lower.</li> <li>■ Braking strength (torque) and time can be set by the parameters.</li> </ul>
Sudden stop (all regions) DC brake	<ul style="list-style-type: none"> <li>■ If a stop command is given during normal operation, braking is activated immediately without soft-stop.</li> <li>■ Braking strength (torque) and time can be set by the parameters.</li> <li>■ Braking time will be twice the time of "positioning DC brake mode".</li> </ul>

\*1 Time that changes in 50 Hz

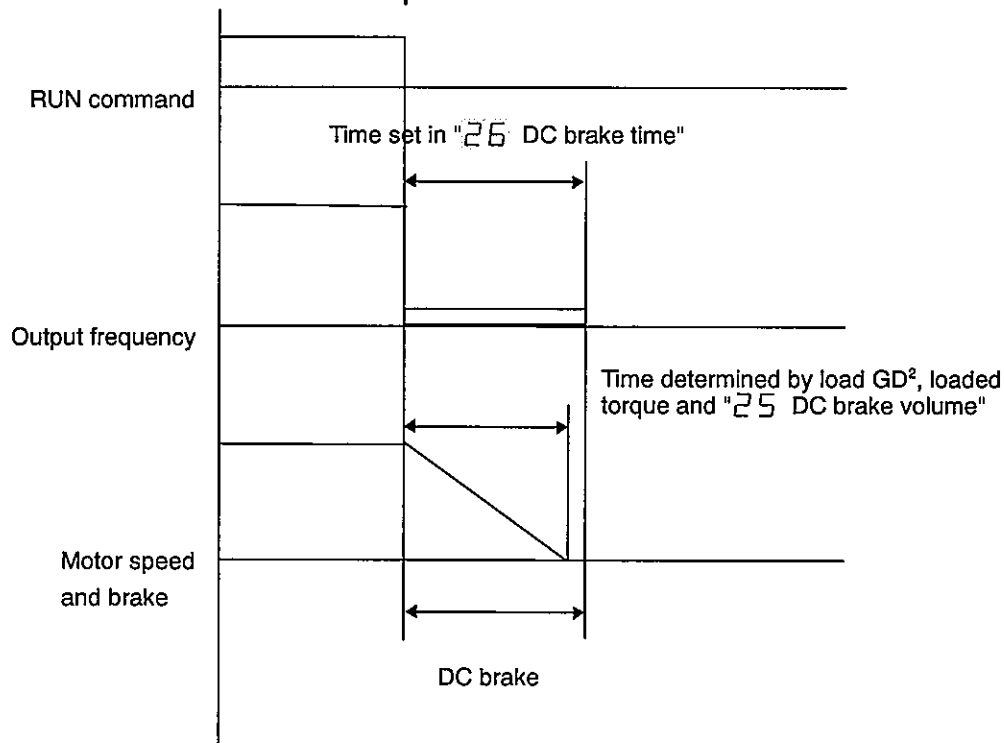
# Operation Function

<DC brake operation pattern example>

## Positioning DC brake



## Sudden stop DC brake



Inverters of this series provide the following kinds of operation mode.

Select an operation mode in the parameter "18 operation mode selection".

Operation mode	Function of terminal block						"Value on 18 operation mode selection"
	11	12	13	14	15*1	16*1	
2-speed operation mode	Forward	Reverse	Forward jogging	Reverse jogging	Free-run External forced trip No. 2 acceleration/deceleration time Trip reset		<input type="text" value="2"/>
4-speed operation mode	Forward	Reverse	Frequency setting selection		Free-run External forced trip No. 2 acceleration/deceleration time Trip reset		<input type="text" value="4"/> [Factory setting]
8-speed operation mode	Forward	Reverse	Frequency setting selection			Free-run External forced trip No. 2 acceleration/ deceleration time, Trip reset	<input type="text" value="8"/>
16-speed operation mode	Forward	Reverse	Frequency setting selection				<input type="text" value="16"/>

You can perform multi-speed operation shown on the next page by conducting "Short"/"Open" settings in frequency setting selection terminals for operation modes with 4-speed or higher. No. 0 speed frequency is selected and the setting by the parameter "□ setting frequency (0 speed)" or by the external frequency setting dial is possible when all of the terminals are set to "Open."

(In "17 frequency command selection", select whether 0 speed frequency is set by the parameter setting or by the external setting.)

#### ■ Explanation of input terminal function

(1) Priority for the function of input terminals is as follows:

DC brake < Normal operation < Jogging operation < Free-run stop < External forced trip

Ex.) ① The inverter goes into the operation immediately when a run command is given while the DC brake is activated.

② Free-run stop is performed when a free-run stop command is given during jogging operation.

③ The operation does not start even if a run command is given while free-run stop is performed.

A stop command is activated if a contradicting command is given (for example, command of forward and reverse operations are given at the same time).

(2) The trip status can be released when forward and reverse operation commands are both given while tripping. Release the trip after removing the causes of the trip.

\*1 Select using "47 15 Function Selection" and "47 16 Function Selection"

# Operation Function

## ■ Selection method of the type of frequency setting for multi-speed operation

- (1) When "49 Multi-speed input selection" is set to  (1 bit): 1 bit input

You can select 1 type of multi-speed frequency for 1 terminal of the "Frequency setting selection terminals" using this setting. This runs the inverter in 3 speeds in 4-speed operation mode and 4 speeds in 8-speed operation mode.

Ex.) With 8-speed mode operation

Input terminals				Frequency setting
I3	I4	I5	I6	
OFF	OFF	OFF	OFF	No. 0 speed frequency
ON	x	x	x	No. 1 speed frequency
OFF	ON	x	x	No. 2 speed frequency
OFF	OFF	ON	x	No. 3 speed frequency
OFF	OFF	OFF	ON	No. 4 speed frequency

- "ON" and "OFF" are related to "G" terminal
- "x" means that either of "ON" or "OFF" is selectable.

- (2) When "49 multi-speed input selection" is set to  (Binary): Binary input

You can select the frequency by setting "Frequency setting selection terminals" in binary using this setting.

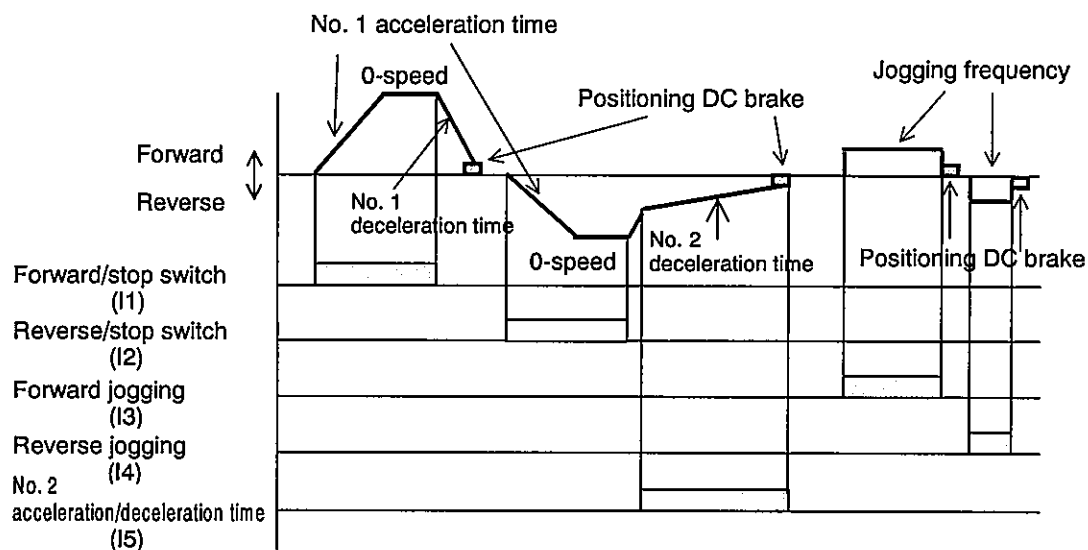
<With 16-speed operation mode>

"I3"	"I4"	"I5"	"I6"	Frequency setting
OFF	OFF	OFF	OFF	No. 0 speed frequency
ON	OFF	OFF	OFF	No. 1 speed frequency
OFF	ON	OFF	OFF	No. 2 speed frequency
ON	ON	OFF	OFF	No. 3 speed frequency
OFF	OFF	ON	OFF	No. 4 speed frequency
ON	OFF	ON	OFF	No. 5 speed frequency
OFF	ON	ON	OFF	No. 6 speed frequency
ON	ON	ON	OFF	No. 7 speed frequency
OFF	OFF	OFF	ON	No. 8 speed frequency
ON	OFF	OFF	ON	No. 9 speed frequency
OFF	ON	OFF	ON	No. 10 speed frequency
ON	ON	OFF	ON	No. 11 speed frequency
OFF	OFF	ON	ON	No. 12 speed frequency
ON	OFF	ON	ON	No. 13 speed frequency
OFF	ON	ON	ON	No. 14 speed frequency
ON	ON	ON	ON	No. 15 speed frequency

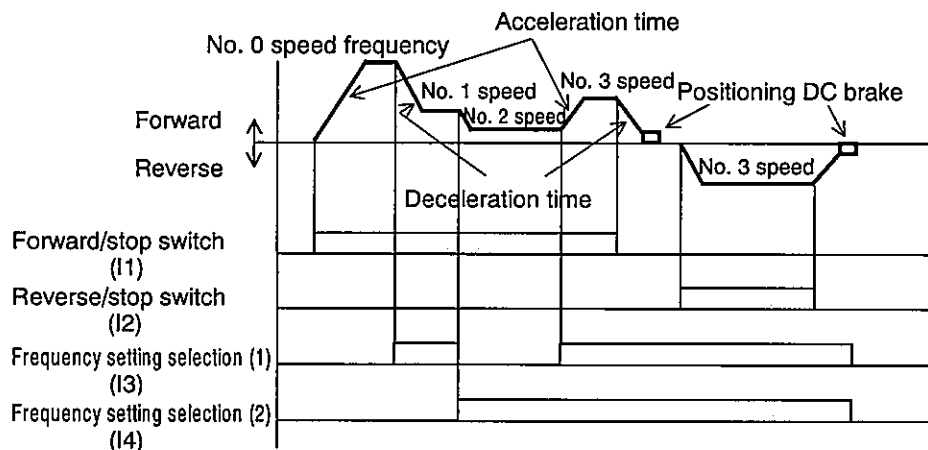


■ Operation pattern example in the 2-speed operation mode

When "4 7 15 function selection" is set to U - d : 2-speed acceleration/deceleration time



■ Operation pattern example in the 4-speed operation mode (factory setting)



# Protective Function

## Protective functions

The protective functions classified as shown below are built-in the inverters of this series.

- ① Functions that display a warning.
- ② Functions that do not display a warning, but act to avoid a tripping of the system.
- ③ Functions that display a warning and shut off inverter output.
- ④ Functions that trip the inverter. (Trip signal cannot be retained when the power is turned off.)

Classification	5-digit LED display	Description of protection	Countermeasures, etc.
①	Electronic thermal relay operation (Monitor) (Flashes)	Monitor display flashes when output current reaches the electronic thermal relay level and the timer operates.	Electronic thermal relay trip. Be careful of the size of the load when using.
②	Acceleration/ deceleration stall prevention (no display)	Prevents tripping when acceleration/ deceleration time becomes too long in the following situations: <ul style="list-style-type: none"> <li>• DC voltage of the converter exceeds approx. 375V.</li> <li>• Motor current exceeds inverter's current limit operation point.</li> </ul>	Increase acceleration/ deceleration time or decrease inertia load.
③	Insufficient voltage warning  Instantaneous power failure protection  L	If DC voltage of the converter drops below approx. 170V, it is regarded as "instantaneous power failure," and inverter output is shut off. *1 If it drops below approx. 100V, the control circuit is reset. If voltage is restored by the time the control circuit is reset, operation can be restarted automatically. *2	Investigate the wiring and power source information.
	Reverse prevention *3  rEUP.	Selecting the reverse prevention function prevents reverse operation if the inverter receives a reverse signal.	Check if the reverse command has been given.
	Restart prevention when power is restored *2  rP	Prevents the inverter from restarting automatically if already given the run command when power is turned, restored following power failure or reset.	After commanding the inverter to stop, command it to run again.

\*1 The inverter will operate correctly if power failure does not exceed approx. 15ms.

\*2 Prevents the inverter from restarting automatically if "00 restart prevention when power is restored" is selected for YES.

\*3 Effective only when "08 reverse prevention" is selected for YES.

# Protective Function



Classification	5-digit LED display	Description of protection	Countermeasures, etc.
④	Over-current trip <div>O.C.</div>	Trips if inverter output current exceeds the rated current approx. by 200%.	Possible causes include drop in power source voltage, excessive GD <sup>2</sup> load, acceleration/ deceleration time is set too short, load short, or grounding. Take the proper measures to determine the cause.
	Regenerative over-voltage trip <div>O.U.</div>	Trips if DC voltage of the converter rises above approx. 400V for 200V-model, 200V for 100V-model.	If it trips while the inverter is running, deceleration time could be too short. Try setting deceleration time longer. If it trips when the power is turned on, the inductance of the power-boosting AC reactor provided on the input side of the inverter may be too high. Select an AC reactor that matches the inverter capacity.
	Over-voltage trip retry when power is turned on <div>E.O.U.</div>	If over-voltage trip occurs when the power is turned on because the inductance of the power-boosting AC reactor provided on the input side of the inverter is too high, etc., <div>E.O.U.</div> is displayed and output is shut off. The trip is automatically reset when DC voltage of the converter drops below approx. 400V for 200V-model, 200V for 100V-model, enabling normal operation.*1	The capacity of the power-boosting AC reactor provided on the input side of the inverter may be too large. Select a reactor that matches the inverter capacity.
	Over-load trip (Electronic thermal relay) <div>Flr</div>	If motor current continues to exceed the electronic thermal relay setting value, load is regarded as being too high causing the function to trip.	Try reducing load, modifying operating pattern, or raising capacity of inverter.
	CPU error <div>Err.</div>	Trips if a control microcomputer error is detected.	A malfunction caused by outside noise could have occurred. Check the area for noise and remove the source of noise.


\*1 Effective only when "11 over-voltage trip retry when power is turned on" is selected for **YES**.

Classification	5-digit LED display	Description of protection	Countermeasures, etc.
④	Self-diagnosis trip CAU	Trips if parameter such as "18 operation mode selection" is changed.	There is nothing wrong with the equipment. The results of the change become effective when the trip is reset.
	External forced trip OL	Trips when "47 I5 function selection" is set by external forced trip and I5 – G becomes open. Cancel by trip after shorting.	Investigate the cause of overload. Try reducing the load, changing the operation pattern, or raising the capacity of the inverter and motor.

## Method of resetting trip

In the event of a trip, remove the cause and cancel by one of the following methods.

- [1] Turn off the inverter's power. When the trip display disappears, turn the power back on.
- [2] Short between both I1 – G and I2 – G for at least 0.1 seconds while the cause of the current trip is being displayed. \*1
- [3] Press both   switches on the operation panel simultaneously for at least 1 second while the cause of the current trip is being displayed.
- [4] Input the trip reset command while the cause of the current trip is being displayed.\*2

※ A CPU error  cannot be reset by methods 2, 3 or 4. Reset by method 1 given above.

\*1 Cannot be reset if "45 I1.I2 function selection" is set to I1: Run/stop or I2: Forward/reverse.

\*2 Effective only when "47 I5 function selection" is selected for .

# Maintenance/Inspection

You should perform maintenance/inspection on a regular basis in order to ensure safety and keep the inverter in good running order.

## Precautions when performing maintenance/inspections

- (1) The power should be turned on/off only by the person performing the task.
- (2) The internal circuits of the inverter remain charged with high voltage for a short while after power is turned off. To perform inspection, first turn off the power and then wait for the LED display on the front panel to go off (min. 5 minutes).
- (3) Do not perform insulation resistance measurement on the inverter. Doing so will damage the inverter.

## Inspection items and environment

### ● Ordinary/normal usage conditions

Ambient conditions: Annual mean temperature 30°C, min. 20 hrs/day at max. load rate 80%

### ● Perform daily and periodic inspections in accordance with the following items:

Classification	Inspection cycle	Inspection items
Daily inspection	Daily	<ul style="list-style-type: none"><li>• Ambient temperature, humidity, dirt, dust, foreign objects, etc.</li><li>• Is there abnormal vibration/noise?</li><li>• Is main circuit voltage normal?</li><li>• Is there strange odor?</li><li>• Is there lint in the air holes?</li><li>• Cleanliness of control unit</li><li>• Is wiring damaged?</li><li>• Are equipment connections loose or off center?</li><li>• Are foreign objects lodged in at the load side?</li></ul>
Periodic inspections	1 year	<ul style="list-style-type: none"><li>• Are fastened sections loose?</li><li>• Is there evidence of overheating?</li><li>• Are terminal blocks damaged?</li></ul>

### <Caution>

Inspection cycle for periodic inspections may vary if usage conditions differ from those given above.

## Approximate period for part replacement

Period for part replacement varies according to how the inverter is used. Parts must be replaced or repaired when something is wrong with them. Under the ordinary/normal usage conditions.

Product name	Part name	Standard replacement period (hrs)	Remarks
Inverter	Smoothing capacitor	Approx. 5 years	Standard replacement period gives a number of years for reference only. If a part becomes faulty it must be replaced even if the standard replacement period has not yet been reached.
	Cooling fan	2~3 years (1~30,000 hrs)	
	Aluminum electrolytic capacitor of PC board	Approx. 5 years	

# Troubleshooting

## Inspection to determine cause of problem

When a problem occurs, perform the inspections and take the measures prescribed in the following table. If you cannot determine the cause of the problem, if you suspect that the inverter is not working properly, if a part is damaged, or there are any other problems you cannot solve, contact your Panasonic dealer.

Problem	Description of inspection	Corrective measures, etc.
Motor doesn't work.	Is there anything wrong with the wiring?	Wire correctly.
	Is power being supplied to the power input terminals?	Turn on the power. Turn off the power once, and then turn back on.
	Is the LED on the operation panel lit?	Recheck the above.
	Is the voltage of the power input terminals normal?	Check power source voltage.
	Is an error being displayed?	See "protective function".
	Has free-run been commanded?	Cancel free-run.
	Are both the forward AND reverse switches on?	Turn either the forward OR reverse switch on, and the other off.
	Is there anything wrong with the frequency setting?	Check the frequency setting.
	Is the motor locked? (Is the load too heavy?)	Cancel the motor lock. (Reduce the load.)
	Is phase interruption operation being carried out?	Recheck the wiring between the inverter and motor.
Motor turns in reverse.	Is there a mistake in the phase order of the output terminals (U/T1, V/T2, W/T3)?	Match the phase order of the output terminals (U/T1, V/T2, W/T3) with the motor.
The motor runs but speed doesn't change.	Is the load too heavy?	Reduce the load.
Motor speed is not correct.	Are the number of poles and voltage of the motor correct?	Check the specification manual and name plate.
	Is voltage of the power input terminals (R/L1, S/L2, T/L3) correct?	Check power source voltage.
	Is the frequency setting range normal?	"04 lower limit frequency" "05 upper limit frequency"
	Has motor terminal voltage dropped excessively?	"35 base frequency" "36 max. output voltage adjustment" "37 V/F reduction characteristics"
	Is the load too heavy?	Reduce the load.
Motor speed is unsteady.	Is load variation too large?	Reduce load variation. Raise the capacity of the inverter and motor.

# Detailed Explanation of Parameters

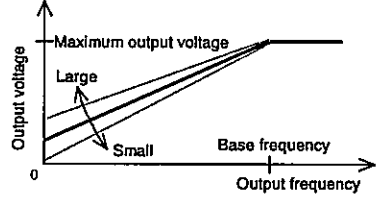
## Parameter functions

No.	Parameter name	Explanation															
00	Setting frequency (0 speed)	Sets the frequency with which you want to run the machine. Valid when " 17 frequency command select" is PnL .															
01	1 <sup>st</sup> speed frequency	This sets the frequency when running in multi-speed mode. Valid when " 18 Running mode select" is higher than 4 <sup>th</sup> speed operation.  Allows you to set 4 <sup>th</sup> speed frequency to 7 <sup>th</sup> speed frequency when you select 8 speed running mode for " 18 Running Mode Select."															
02	2 <sup>nd</sup> speed frequency																
03	3 <sup>rd</sup> speed frequency																
04	4 <sup>th</sup> speed frequency																
05	5 <sup>th</sup> speed frequency																
06	6 <sup>th</sup> speed frequency																
07	7 <sup>th</sup> speed frequency																
08	8 <sup>rd</sup> speed frequency																
09	9 <sup>th</sup> speed frequency																
10	10 <sup>th</sup> speed frequency																
11	11 <sup>th</sup> speed frequency	<table><tr><th>Operation mode</th><th>I3</th><th>I4</th><th>I5</th><th>I6</th></tr><tr><td>2-speed operation mode</td><td>Forward jogging</td><td>Reverse jogging</td><td colspan="2" rowspan="4">Select from among free-run, external forced trip, No. 2 acceleration/deceleration, trip reset</td></tr><tr><td>4-speed operation mode</td><td colspan="2" rowspan="3">Frequency setting selection</td></tr><tr><td>8-speed operation mode</td></tr><tr><td>16-speed operation mode</td></tr></table>	Operation mode	I3	I4	I5	I6	2-speed operation mode	Forward jogging	Reverse jogging	Select from among free-run, external forced trip, No. 2 acceleration/deceleration, trip reset		4-speed operation mode	Frequency setting selection		8-speed operation mode	16-speed operation mode
Operation mode	I3		I4	I5	I6												
2-speed operation mode	Forward jogging		Reverse jogging	Select from among free-run, external forced trip, No. 2 acceleration/deceleration, trip reset													
4-speed operation mode	Frequency setting selection																
8-speed operation mode																	
16-speed operation mode																	
12	12 <sup>th</sup> speed frequency																
13	13 <sup>th</sup> speed frequency																
14	14 <sup>th</sup> speed frequency																
15	15 <sup>th</sup> speed frequency																
16	Run command selection	This selects the run command from the following.  ● PnL (PANEL) : RUN switch on the operation panel.  ● TER (TERMINAL) : Input terminals "I1" and "I2"  ■ BOTH (BOTH): Both operation panel and input terminals are valid.  ※ When PnL is selected, you cannot use the input terminal as the run command.															
17	Frequency command selection	This selects whether to set the 0 speed frequency using " 00 setting frequency (0 speed), " the input terminal for Frequency Setting Selections "F1" or the switch on the main unit.  ■ PnL "00 setting frequency (0 speed)"  ● 0-5 Analog Command "F1" (Voltage Command) DC 0 to 5 V  ● 0-10 Analog Command "F1" (Voltage Command) DC 0 to 10 V  ● UOL Volume on Main Unit *															

■ Values set at ex-factory.

\* You cannot operate inverters without volume under the 0 speed frequency when **UOL** is selected.

# Detailed Explanation of Parameters

No.	Parameter name	Explanation
18	Operation mode selection	<p>These are the parameters that select the operation mode.</p> <p>● <input type="text" value="2"/> 2<sup>nd</sup> Speed mode</p> <p>■ <input type="text" value="4"/> 4<sup>th</sup> Speed mode</p> <p>● <input type="text" value="8"/> 8<sup>th</sup> Speed mode</p>
19	Torque control	<p>● <input type="text" value="0"/> ~ <input type="text" value="100"/> : Manual torque boost</p> <p>This adjusts the voltage output of the inverter at a low frequency region.</p> <p>※ Be aware that as the settings are increased, excessive current will flow which will cause a trip.</p>  <p>● <input type="text" value="AUF.0"/> : Auto-boost Controls for the optimum auto-torque for the inverter and motor with the same capacity.</p> <p>● <input type="text" value="SLIP"/> : Controls slip frequency compensation. Controls compensation of the slip frequency for the motor selected by " <input type="text" value="80"/> motor selection."</p> <p>&lt;Precautions regarding the selection of Auto-boost and slip frequency compensation&gt;</p> <ul style="list-style-type: none"> <li>• Select parameters when the motor is stopped.</li> <li>• Do not use when running in serial.</li> <li>• There are cases in which the system will be unstable depending on the conditions of the load. If that should occur, set the manual torque boost.</li> <li>• When running at a high power supply voltage, adjust to lower the output voltage of the inverter using " <input type="text" value="35"/> Base frequency" or " <input type="text" value="36"/> Maximum output voltage adjustment."</li> </ul>
20	Jogging frequency	This sets the frequency for operating in the jogging mode.
21	Acceleration time	<p>This determines the rate of change of the output frequency during acceleration.</p> <ul style="list-style-type: none"> <li>• <u>Sets the time that changes in 50 Hz.</u></li> <li>• When set to 0 seconds, acceleration is at its optimum speed and deceleration will be 0.01 second.</li> <li>• When less than 3 seconds set to 0.01 sec intervals; When 3 to 10 seconds set to 0.1 sec intervals; When 10 seconds or more set to 1 sec intervals.</li> </ul>
22	No. 2 Acceleration time	<p>This sets the acceleration time of the No. 2 Acceleration.</p> <p>This is valid when you select " <input type="text" value="47"/> I5 Function Selection" in the <input type="text" value="U-d"/></p> <p>No. 2 Acceleration.</p>

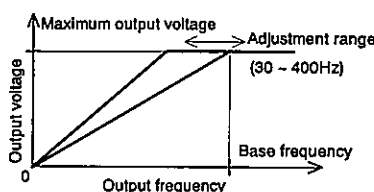
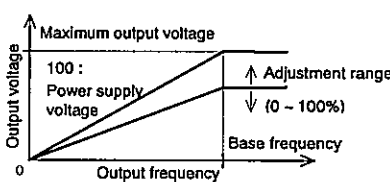
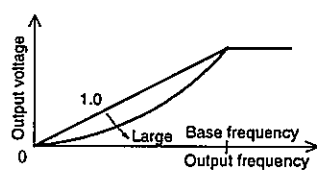
■ Values set at ex-factory.



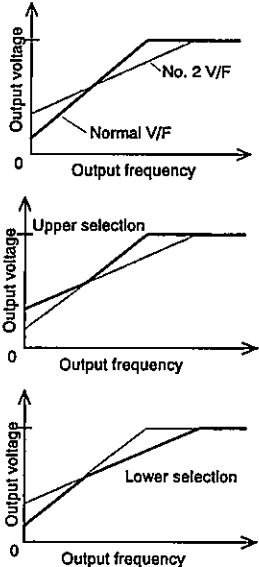
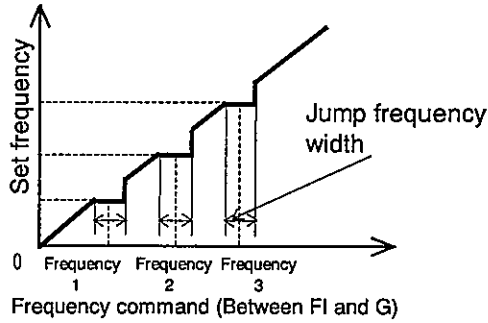
No.	Parameter name	Explanation																				
23	Not used																					
24	Not used																					
25 26	DC brake volume DC brake time	<p>This adjusts the DC brake time and the DC brake volume when shifting from inverter drive to a stopped state.</p> <ul style="list-style-type: none"><li>- The machine will enter a free-run when either or both the time and volume are set to 0 (zero).</li></ul> <p>※ The DC brake time when you select a sudden brake (all regions) will be twice the time of the positioning brake.</p>																				
27	DC braking time	<p>This selects the type of DC brake.</p> <p>■ <span style="border: 1px solid black; padding: 2px;">POS</span> : Position    ● <span style="border: 1px solid black; padding: 2px;">-POS</span> : Sudden stop (all regions)</p>																				
28	Starting brake time	<p>This runs the inverter after applying the DC brake to the motor for the amount of time set when you are starting up. This does not function when you set to 0 (zero).</p> <ul style="list-style-type: none"><li>• The strength (torque) of the DC brake (torque) is the " <span style="border: 1px solid black; padding: 2px;">25</span> DC brake volume" but be careful because it does not operate when set to 0.</li></ul>																				
29	Brake start frequency	<p>This adjusts the frequency for starting to apply the positioning DC brake.</p> <ul style="list-style-type: none"><li>• The DC brake will be applied when the output frequency is lower than "Brake start frequency" when you cause a soft-stop using the stop command and stop from normal operation.</li><li>• The DC brake will be applied when lower than 1 Hz regardless of the settings of "Brake start frequency" when it stops because the frequency settings are low while in normal operation.</li></ul>																				
30	Carrier frequency variable	<p>This is the parameter that selects the carrier frequency. This selects the following 8. Change the carrier frequency when the motor is stopped. Do not change while it is operating.</p> <table><tr><th>Setting value</th><th>Carrier frequency</th></tr><tr><td>0</td><td>1.2kHz</td></tr><tr><td>1</td><td>2.6kHz</td></tr><tr><td>2</td><td>3.9kHz</td></tr><tr><td>3</td><td>6.0kHz</td></tr></table> <table><tr><th>Setting value</th><th>Carrier frequency</th></tr><tr><td>4</td><td>8.0kHz</td></tr><tr><td>5</td><td>10.1kHz</td></tr><tr><td>6</td><td>12.0kHz</td></tr><tr><td>7</td><td>14.9kHz</td></tr></table>	Setting value	Carrier frequency	0	1.2kHz	1	2.6kHz	2	3.9kHz	3	6.0kHz	Setting value	Carrier frequency	4	8.0kHz	5	10.1kHz	6	12.0kHz	7	14.9kHz
Setting value	Carrier frequency																					
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7	14.9kHz																					

■ Values set at ex-factory.

# Detailed Explanation of Parameters

No.	Parameter name	Explanation
31	Deceleration time	<p>This determines the rate of change of the output frequency when decelerating.</p> <ul style="list-style-type: none"> <li>• <b><u>Sets the time that changes in 50 Hz.</u></b></li> <li>• When set to 0 seconds, acceleration is at its optimum speed and deceleration will be 0.01 second.</li> <li>• When less than 3 seconds set to 0.01 sec intervals; When 3 to 10 seconds set to 0.1 sec intervals; When 10 or more seconds set to 1 sec intervals.</li> </ul>
32	No. 2 deceleration time	<p>This sets the deceleration time of the No. 2 Deceleration.</p> <p>This is valid when you select "47" I5 Function Selection" in the <span style="border: 1px solid black; padding: 2px;">U-d</span> No. 2 Acceleration.</p>
33	Not used	
34	Not used	
35	Base frequency	<p>This sets the base frequency (maximum frequency of the torque region) to any frequency within the range of 30 to 400 Hz that matches the motor rating.</p>  <p>The graph shows a linear relationship between output voltage and output frequency. A horizontal line at the top represents the maximum output voltage. A vertical line marks the base frequency. The adjustment range is indicated as (30 ~ 400Hz).</p>
36	Max. Output voltage adjustment	<p>This adjusts the maximum output voltage (base frequency voltage). The range of adjustment is 0 to 100%.</p>  <p>The graph shows a linear relationship between output voltage and output frequency. A horizontal line at the top represents the maximum output voltage. A vertical line marks the base frequency. The adjustment range is indicated as (0 ~ 100%).</p>
37	V/F reduction characteristics	<p>This adjusts the V/F characteristics to match the load characteristics.</p> <p>● <span style="border: 1px solid black; padding: 2px;">1.0</span> Rated torque load</p> <p>● <span style="border: 1px solid black; padding: 2px;">2.0</span> Reduction torque load</p> <p>You can make fine adjustments between 1.0 and 2.0.</p> <p>Note: This is valid only when you have selected "torque control" in the manual boost.</p>  <p>The graph shows a linear relationship between output voltage and output frequency. A curve labeled 1.0 represents the rated torque load. A point labeled Large is marked on the curve.</p>

■: Values set at ex-factory.

No.	Parameter name	Explanation																			
38 39 40	No. 2 V/F selection No. 2 V/F base frequency No. 2 V/F boost	<p>This sets the special V/F pattern using "No. 2 V/F selection."</p> <p>This selects the No. 2 V/F upper pattern <input type="text" value="UP"/> or the lower pattern <input type="text" value="LO"/> set using the normal V/F and "No. 2 V/F base frequency" and "No. 2 V/F boost."</p> <p>■ <input type="text" value="n0"/> Normal pattern</p> <p>● <input type="text" value="UP"/> Upper pattern</p> <p>● <input type="text" value="LO"/> Lower pattern</p>  <p>Note: This is valid only when you have selected "<input type="text" value="19"/> torque control" in the manual boost.</p>																			
41 42 43 44 45	Jump frequency width Jump frequency 1 Jump frequency 2 Jump frequency 3 Jump frequency 4	<p>This creates areas that cannot set the frequency in a range set by "<input type="text" value="41"/> Jump frequency width" above and below as the center of the frequency set by "<input type="text" value="42"/> Jump frequency 1" to "<input type="text" value="45"/> Jump frequency 4" in order to avoid mechanical resonance.</p>  <p>Frequency command (Between F1 and G)</p> <ul style="list-style-type: none"><li>• Acceleration time outputs the frequency even in the jump region.</li><li>• If jump frequency ranges are overlapped, it jumps all overlapping ranges.</li></ul>																			
46	I1/I2 function selection	<p>This switches the input terminals "I1" and "I2" in the following manner.</p> <table border="1"><thead><tr><th rowspan="2">Input terminal</th><th colspan="2">Between "I1" and "G"</th><th colspan="2">Between "I2" and "G"</th></tr><tr><th>Short</th><th>Open</th><th>Short</th><th>Open</th></tr></thead><tbody><tr><td>■ <input type="text" value="F5.r5"/></td><td>Forward Operation</td><td>Stop</td><td>Reverse Operation</td><td>Stop</td></tr><tr><td><input type="text" value="r5.Fr"/></td><td>Operation</td><td>Stop</td><td>Reverse</td><td>Forward</td></tr></tbody></table> <p>(F5.r5 : Fwd-Stop/Rev-Stop    r5.Fr : Run-Stop/Fwd-Rev)</p>	Input terminal	Between "I1" and "G"		Between "I2" and "G"		Short	Open	Short	Open	■ <input type="text" value="F5.r5"/>	Forward Operation	Stop	Reverse Operation	Stop	<input type="text" value="r5.Fr"/>	Operation	Stop	Reverse	Forward
Input terminal	Between "I1" and "G"			Between "I2" and "G"																	
	Short	Open	Short	Open																	
■ <input type="text" value="F5.r5"/>	Forward Operation	Stop	Reverse Operation	Stop																	
<input type="text" value="r5.Fr"/>	Operation	Stop	Reverse	Forward																	

■: Values set at ex-factory.

# Detailed Explanation of Parameters

No.	Parameter name	Explanation																							
47 48	15 function selection 16 function selection	<p>This selects the input terminals "15" functions in the following manner.</p> <p>● <b>FREE</b> (FREE) : "Terminal" – "G" Short → Free-run Stop</p> <p>● <b>THr</b> (THermal) : "Terminal" – "G" → External forced trip command</p> <p>● <b>U-d</b> (Up-Down) : "Terminal" – "G" short → No. 2 acceleration and deceleration time selection</p> <p>■ <b>rST</b> (ReSeT) "Terminal" – "G" short → Trip reset command</p> <p>※ Set the status of the short "Terminal" – "G" before selecting " <b>THr</b> ." When open, a trip occurs.</p>																							
49	Multi-speed input selection	<p>This selects the type of frequency setting for multi-speed operation.</p> <p>● <b>1b 1f</b> (1bit) : 1 bit input</p> <p>This selects 1 type of multi-speed frequency for 1 terminal of the "Frequency setting selection terminals." This runs the inverter in 3 speeds in 4 speed operation mode and 4 speeds in 8 speed operation mode.</p> <p>Ex.) With 8 speed mode operation</p> <table><tr><th colspan="3">Input terminals</th><th rowspan="2">Frequency setting</th></tr><tr><th>I3</th><th>I4</th><th>I5</th></tr><tr><td>Open</td><td>Open</td><td>Open</td><td>No. 0 speed frequency</td></tr><tr><td>Short</td><td>×</td><td>×</td><td>No. 1 speed frequency</td></tr><tr><td>Open</td><td>Short</td><td>×</td><td>No. 2 speed frequency</td></tr><tr><td>Open</td><td>Open</td><td>Short</td><td>No. 3 speed frequency</td></tr></table> <p>■ <b>bin</b> (Binary) : Binary input</p> <p>This selects the frequency by setting "Frequency setting selection terminals" in binary.</p> <p>• Open and short are related to "G" and terminals.</p> <p>• × means there is no relationship between short and open.</p>	Input terminals			Frequency setting	I3	I4	I5	Open	Open	Open	No. 0 speed frequency	Short	×	×	No. 1 speed frequency	Open	Short	×	No. 2 speed frequency	Open	Open	Short	No. 3 speed frequency
Input terminals			Frequency setting																						
I3	I4	I5																							
Open	Open	Open	No. 0 speed frequency																						
Short	×	×	No. 1 speed frequency																						
Open	Short	×	No. 2 speed frequency																						
Open	Open	Short	No. 3 speed frequency																						
50	Not used																								

■: Values set at ex-factory.

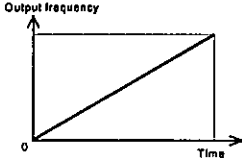
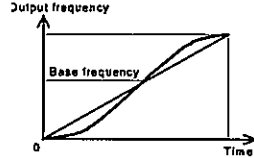
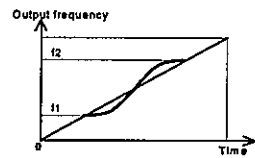
No.	Parameter name	Explanation																											
51 52	Output signal 1 selection Not used	<p>This selects the output signal between output terminals "O1" to "O2" in the following manner.</p> <ul style="list-style-type: none"> <li>■ <span style="border: 1px solid black; padding: 2px;">TrIP</span> (TRIP) : Trip output signal (When trip: ON*)</li> <li>● <span style="border: 1px solid black; padding: 2px;">STaBL</span> (STaBL) : Arrival signal (When arrival: ON*)</li> <li>● <span style="border: 1px solid black; padding: 2px;">rUn</span> (RUN) : Run/Stop signal (When run: ON*)</li> <li>● <span style="border: 1px solid black; padding: 2px;">FrEE</span> (FREE) : Free-run signal (While Free-run: ON*)</li> <li>● <span style="border: 1px solid black; padding: 2px;">F</span> (Fwd) : Forward operation signal (While forward operation: ON*)</li> <li>● <span style="border: 1px solid black; padding: 2px;">r</span> (Rev) : Reverse operation signal (While reverse operation: ON*)</li> <li>● <span style="border: 1px solid black; padding: 2px;">CE-F</span> (Check-F) : Output frequency detection signal → Refer to: <span style="border: 1px solid black; padding: 2px;">65</span> Compare frequency A" and " <span style="border: 1px solid black; padding: 2px;">66</span> Compare frequency B"</li> <li>● <span style="border: 1px solid black; padding: 2px;">CE-C</span> (Check-C) : Motor current detection signal → Refer to " <span style="border: 1px solid black; padding: 2px;">54</span> Motor current detection level"</li> <li>● <span style="border: 1px solid black; padding: 2px;">dC-b</span> (DC-Brake) : DC brake signal (While DC brake: ON*)</li> <li>● <span style="border: 1px solid black; padding: 2px;">CAUS</span> (CAUS) : Trip cause detection signal</li> </ul> <p>The following signals are output when a trip occurs.*</p> <table border="1"> <thead> <tr> <th>Trip contents</th><th>ON time</th><th>OFF time</th></tr> </thead> <tbody> <tr> <td><span style="border: 1px solid black; padding: 2px;">OC</span> Normal over-current</td><td>Continuous</td><td></td></tr> <tr> <td><span style="border: 1px solid black; padding: 2px;">OC-U</span> Acceleration over-current</td><td>3 seconds</td><td>1 second</td></tr> <tr> <td><span style="border: 1px solid black; padding: 2px;">OC-d</span> Deceleration over-current</td><td>1 second</td><td>3 seconds</td></tr> <tr> <td><span style="border: 1px solid black; padding: 2px;">OV</span> Over-voltage</td><td>1 second</td><td>1 second</td></tr> <tr> <td><span style="border: 1px solid black; padding: 2px;">OL</span> External forced trip</td><td>0.25 second</td><td>0.25 second</td></tr> <tr> <td><span style="border: 1px solid black; padding: 2px;">Thr</span> Electronic thermal</td><td>0.9 second</td><td>0.1 second</td></tr> <tr> <td><span style="border: 1px solid black; padding: 2px;">Err</span> CPU error</td><td>0.1 second</td><td>0.4 second</td></tr> <tr> <td><span style="border: 1px solid black; padding: 2px;">CAU</span> Self-diagnosis</td><td>0.5 second</td><td>0.5 second</td></tr> </tbody> </table> <p>* " <span style="border: 1px solid black; padding: 2px;">51</span> output signal 1 selection" can invert " <span style="border: 1px solid black; padding: 2px;">55</span> output signal 1 polarity selection."</p>	Trip contents	ON time	OFF time	<span style="border: 1px solid black; padding: 2px;">OC</span> Normal over-current	Continuous		<span style="border: 1px solid black; padding: 2px;">OC-U</span> Acceleration over-current	3 seconds	1 second	<span style="border: 1px solid black; padding: 2px;">OC-d</span> Deceleration over-current	1 second	3 seconds	<span style="border: 1px solid black; padding: 2px;">OV</span> Over-voltage	1 second	1 second	<span style="border: 1px solid black; padding: 2px;">OL</span> External forced trip	0.25 second	0.25 second	<span style="border: 1px solid black; padding: 2px;">Thr</span> Electronic thermal	0.9 second	0.1 second	<span style="border: 1px solid black; padding: 2px;">Err</span> CPU error	0.1 second	0.4 second	<span style="border: 1px solid black; padding: 2px;">CAU</span> Self-diagnosis	0.5 second	0.5 second
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■: Values set at ex-factory.

# Detailed Explanation of Parameters

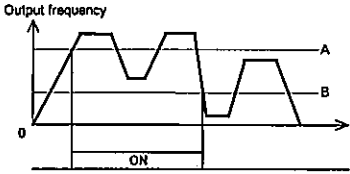
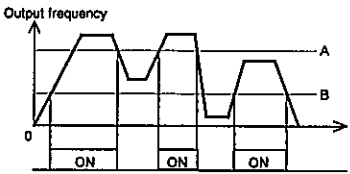
No.	Parameter name	Explanation
53	Not used	
54	Motor current detection level	Set the current level you want to detect using a percentage for the rated current of the inverter when you selected "51 Output signal 1 selection" and "53 Relay output selection" in <b>CE-C</b> . The output terminal will operate when the motor current exceeds the detection level you set and it will turn "OFF" when it is below.
55	Output signal 1 polarity selection	This function inverts the polarity of the output signal between output terminals "O1" and "C1." <div> <div>■</div> <div><b>nor</b></div> <div>(NORmal): When operation: transistor "ON"</div> </div> <div> <div>●</div> <div><b>rev</b></div> <div>(REVerse): When operation: transistor "OFF"</div> </div>
56	Current limit operating point	This limits the operating point for the motor current that was set. Numbers are percentages for the inverter rated current.

■ Values set at ex-factory.

No.	Parameter name	Explanation										
57	Stall deceleration magnification	<p>This adjusts the deceleration time when the stall prevention function of the deceleration is operating.</p> <ul style="list-style-type: none"> <li>Set in percentages for the deceleration time of the normal setting.</li> </ul>										
58 59	Acceleration mode switch  Deceleration mode switch	<p>This selects the straight line acceleration/deceleration or curved line (S) acceleration/deceleration independently.</p> <p> <input checked="" type="checkbox"/> <span style="border: 1px solid black; padding: 2px;">LI</span> Straight line            <input type="checkbox"/> <span style="border: 1px solid black; padding: 2px;">S-1</span> S Shape 1            <input type="checkbox"/> <span style="border: 1px solid black; padding: 2px;">S-2</span> S Shape 2       </p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>This is a general acceleration mode to accelerate and decelerate on a straight line up to the set frequency.</p> </div> <div style="text-align: center;">  <p>With large output of the motor torque, the incline is steep and when the output torque is small, the incline is gentle.</p> </div> <div style="text-align: center;">  <p>This shows an S characteristic between running frequencies f1 to f2. This is a smooth acceleration and deceleration characteristic.</p> </div> </div> <p>* This changes using the acceleration and deceleration time set when under the base frequency if you select <span style="border: 1px solid black; padding: 2px;">S-1</span> S shape 1, but when over the base frequency, the incline is gentler than the set time.</p>										
60	Monitor mode switch	<p>This selects the content that displays in the 5 digit LED.</p> <p>The value to which the <span style="border: 1px solid black; padding: 2px;">61</span> display magnification" was applied is displayed with the frequency display.</p> <p> <input checked="" type="checkbox"/> <span style="border: 1px solid black; padding: 2px;">0-F</span> Output frequency            <input type="checkbox"/> <span style="border: 1px solid black; padding: 2px;">CU</span> Output current  <input type="checkbox"/> <span style="border: 1px solid black; padding: 2px;">S-F</span> Set frequency            <input type="checkbox"/> <span style="border: 1px solid black; padding: 2px;">dc-U</span> Converter unit DC voltage       </p>										
61	Display magnification	<p>This sets the magnification of the value that displays in the 5 digit LED. This displays the motor synchronized rotation or the line speed.</p> <p>* The parameters related to frequency (below) display the value to which the display magnification was applied when you change the display magnification.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;"><span style="border: 1px solid black; padding: 2px;">00~15</span> 0 to 15<sup>th</sup> speed frequency"</td> <td style="padding: 5px;"><span style="border: 1px solid black; padding: 2px;">65~66</span> Compare frequency"</td> </tr> <tr> <td style="padding: 5px;"><span style="border: 1px solid black; padding: 2px;">20</span> Jogging frequency"</td> <td style="padding: 5px;"><span style="border: 1px solid black; padding: 2px;">67</span> Matching detection width"</td> </tr> <tr> <td style="padding: 5px;"><span style="border: 1px solid black; padding: 2px;">29</span> Brake start frequency"</td> <td style="padding: 5px;"><span style="border: 1px solid black; padding: 2px;">68</span> Instantaneous drop frequency"</td> </tr> <tr> <td style="padding: 5px;"><span style="border: 1px solid black; padding: 2px;">41~45</span> Jump frequency"</td> <td style="padding: 5px;"><span style="border: 1px solid black; padding: 2px;">74</span> Lower limit frequency"</td> </tr> <tr> <td style="padding: 5px;"><span style="border: 1px solid black; padding: 2px;">63</span> Frequency meter full scale indication"</td> <td style="padding: 5px;"><span style="border: 1px solid black; padding: 2px;">75</span> Upper limit frequency"</td> </tr> </table>	<span style="border: 1px solid black; padding: 2px;">00~15</span> 0 to 15 <sup>th</sup> speed frequency"	<span style="border: 1px solid black; padding: 2px;">65~66</span> Compare frequency"	<span style="border: 1px solid black; padding: 2px;">20</span> Jogging frequency"	<span style="border: 1px solid black; padding: 2px;">67</span> Matching detection width"	<span style="border: 1px solid black; padding: 2px;">29</span> Brake start frequency"	<span style="border: 1px solid black; padding: 2px;">68</span> Instantaneous drop frequency"	<span style="border: 1px solid black; padding: 2px;">41~45</span> Jump frequency"	<span style="border: 1px solid black; padding: 2px;">74</span> Lower limit frequency"	<span style="border: 1px solid black; padding: 2px;">63</span> Frequency meter full scale indication"	<span style="border: 1px solid black; padding: 2px;">75</span> Upper limit frequency"
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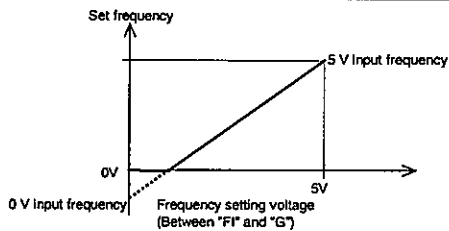
■ Values set at ex-factory.

# Detailed Explanation of Parameters

No.	Parameter name	Explanation
52	Frequency meter adjustment	This calibrates the frequency meter. Adjust using the $\triangle$ $\nabla$ switches so that the needle on the frequency meter points at the full scale.
53	Frequency meter full scale indication	This indicates the frequency when using the frequency meter full scale. This is set to 60 Hz full scale at ex-factory so adjust to be used higher than 60 Hz.
54	"FOUT" switch	This selects the frequency signal to output to the frequency output terminal "FO." ■ $\overline{A} \overline{A} \overline{A}$ Frequency analog output ● $\overline{d} \overline{1} \overline{0}$ Frequency digital output ● $\overline{C} \overline{A} \overline{A}$ Current analog output
55 56	Compare frequency A Compare frequency B	This sets the frequency to detect when you selected "51 output signal 1 selection" and "53 relay output selection" in the output frequency detection signal $\overline{C} \overline{E} - \overline{F}$ . - The output signal is ON when the output frequency exceeds "compare frequency A" and is OFF when it is less than "compare frequency B." <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>Between "01" and "C1"</p> <p>When <math>A \geq B</math></p> </div> <div style="text-align: center;">  <p>Between "01" and "C1"</p> <p>When <math>A &lt; B</math></p> </div> </div> * It does not turn ON or OFF if the difference of the output frequency and compare frequency does not exceed 1 Hz.
57	Match detection width	This adjusts the timing to output the arrival signal during acceleration and deceleration when you selected "51 output signal 1 selection" and "53 relay output selection" in the $\overline{5} \overline{F} \overline{b} \overline{L}$ arrival signal. - The arrival signal is output when the difference of the output frequency and the set frequency is smaller than "match detection width." - The arrival signal is not output when 0 is set. - The arrival signal is not output when forward/reverse are switched when stopped or during DC brake. - The arrival signal is output until immediately before stopping when "29 brake start frequency" < "match detection width."

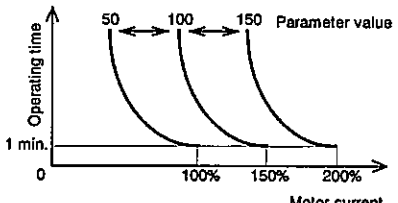
■ Values set at ex-factory.



No.	Parameter name	Explanation
68	Instantaneous drop frequency	<p>This adjusts the output frequency after instantaneous stop or after the power is restored.</p> <ul style="list-style-type: none"> <li>- This starts the output from the value that subtracted "Instantaneous drop frequency" from the output frequency of the instantaneous detection when power was restored.</li> <li>- It starts running from 0.5 Hz in the same way as when turning on the power under normal conditions even though power is restored and the control circuit was reset when the power cut was long.</li> </ul>
69	Instantaneous free-run time	This adjusts the free-run time after instantaneous stop or restoring power.
70	Restart prevention when power is restored	This prevents restarting after an instantaneous stop or after power was restored by setting <b>YES</b> .
71 72	Retry selection Retry start time	<p>You can try to continue running by automatically canceling the trip after "Retry start time" even when a trip occurs. This will retry (re-execute) the set number of times but if a trip does not occur in over approximately 120 minutes, the retry count will be initialized.</p> <ul style="list-style-type: none"> <li>■ <b>NO</b> (NO): Does not retry</li> <li>● <b>1</b> ~ <b>4</b> :Retries the set number of times</li> </ul> <ul style="list-style-type: none"> <li>• Outputs a trip signal and stops when the set number of retries is reached but does not output the trip signal (when trip is "51 output signal 1 selection" and "53 relay output selection") during a retry.</li> </ul> <p>* The retry function is invalid when Restart prevention when power is restored is set to <b>YES</b>.</p>
73	Frequency setting bias	<p>This sets the "0 V input frequency" of the frequency setting input terminal "FI."</p> 
74	Lower limit frequency	This sets the lower limit of the inverter output frequency.
75	Upper limit frequency	This sets the upper limit of the inverter output frequency.
76	Constant for input filter	<p>This sets the constant for input filter of the voltage or the current's frequency setting signal from an external source.</p> <p>* Increase the constant of the filter if you cannot attain stable operation because of the effects of noise. As you increase the setting value, response will worsen.</p>

■ Values set at ex-factory.

# Detailed Explanation of Parameters

No.	Parameter name	Explanation
77	Over-voltage trip retry when power is turned on	<p>This displays the <input type="text" value="E.O.U."/> and trips when an over-voltage trip occurs when turning on the power when you set to <input type="text" value="YES"/>.</p> <p>Also, the trip is automatically canceled at the point the DC voltage falls below approximately 400 V on the converter.</p> <p>※ The display will change from <input type="text" value="E.O.U."/> to <input type="text" value="O.U."/> and it will consider the normal over-voltage trip when you continue the over-voltage beyond a prescribed amount of time after turning on the power supply.</p>
78	Reverse prevention	This prevents the trouble caused by reversing when you set to <input type="text" value="YES"/> .
79	Electronic thermal relay	<p>This adjusts the amount that the electronic thermal relay functions.</p> <ul style="list-style-type: none"> <li>Set the percentage for the inverter's rated current.</li> <li>The operation panel display unit will flash when the motor current exceeds the set value.</li> </ul> <p>※ It is necessary to check the ambient temperature when the setting is higher than the ex-factory setting.</p> 
80	Trip cause clear	<p>This clears the cause of the trip.</p> <p>&lt;How to clear&gt;</p> <ol style="list-style-type: none"> <li>Use the <input type="text" value="Δ"/> switch to switch the power supply with the setting <input type="text" value="YES"/> as it is.</li> <li>After the display extinguishes, it will be cleared when the power is turned back on. <input type="text" value="CLR"/> will be displayed in the 5 digit LED.</li> <li>Switch the power supply again if the inverter does not operate in this state and use after turning on the power again.</li> </ol>
81 82 83 84 85	Trip cause 1 Trip cause 2 Trip cause 3 Trip cause 4 Trip cause 5	<p>This remembers the latest 5 trips.</p> <p>Refer to "Monitor" for details regarding the content of the display.</p>
86	Parameter initialization	<p>This initializes and returns all parameters to our standard ex-factory settings.</p> <p>&lt;How to initialize&gt;</p> <ol style="list-style-type: none"> <li>Use the <input type="text" value="Δ"/> switch to switch the power supply with the setting <input type="text" value="YES"/> as it is.</li> <li>After the display extinguishes, it will be initialized when the power is turned back on. <input type="text" value="-----"/> will be displayed in the 5 digit LED.</li> <li>Switch the power supply again if the inverter does not operate in this state and use after turning on the power again.</li> </ol>

No.	Parameter name	Explanation
B7	Motor selection	Set the motor volume and polarity to use when you selected <b>SLIP</b> (slip frequency compensation control) using " <b>19</b> torque control." * Select the motor when it is stopped.
B8	Start-up starting frequency	This sets the inverter output starting frequency. ※ This increases the starting torque but it is close to a direct startup and is not appropriate for a shock-less start. Also, there are cases of a trip occurring depending on the load.
B9	Automatic voltage regulation reference voltage	This selects the motor's rated voltage when using automatic voltage regulation.
90	Automatic voltage regulation selection	This corrects the output voltage and suppresses the variations in the output voltage for the variations of the input power supply voltage. However, you cannot output the value higher than the maximum output voltage or the input power voltage.
AA	Parameter lock	This locks the parameters that you set. <b>n0</b> Does not lock parameters <b>ALL</b> Locks all parameters. <b>PRG</b> Locks parameters for which setting is unnecessary. • Setting to <b>ALL</b> locks all parameters and the <b>MODE</b> <b>Δ</b> <b>▽</b> switches become invalid. None of the parameters can then be set. ( <b>RUN</b> and <b>STOP</b> switches are valid) • Setting to <b>PRG</b> allows setting of only the parameters selected by the "99 parameter extraction."
bb	Parameter copy	This copies parameters. <b>n0</b> Does not copy parameters. <b>PLDAd</b> Reads parameters to panel. <b>PPGI</b> Writes parameters to main unit. <b>PInIf</b> Parameters initialization on operation panel. Contact us for setting.

No.	Parameter name	Explanation
[0]	Motor rated current	This sets the motor rated current when using the slip frequency compensation control. *1
[1]	Motor current without load	This sets the motor current without load when using the slip frequency compensation control. *1
[2]	Motor 1 primary resistance	Sets the motor 1 primary resistance when using slip frequency compensation control.*1
[3]	Slip correction gain	Adjusts the slip correction gain when using slip frequency compensation control.
[4]	Slip correction response time	Sets the slip correction response time when using slip frequency compensation control.
99	Parameter extraction	This extracts the parameter. Contact us for setting.

\*1 Because slip frequency compensation control requires a motor constant, set to our standard motor constant that was set at ex-factory. Set the motor constant to use when driving another motor.

# Specifications

Part Number		M 2 S 01 <sub>3</sub> <sup>2***</sup>	M 2 S 02 <sub>3</sub> <sup>2***</sup>	M 2 S 04 <sub>3</sub> <sup>2***</sup>	M 2 S 08 <sub>3</sub> <sup>2***</sup>
Rated output	Applicable motor (kW) *1	0.1	0.2	0.4	0.75
	Output capacity (kVA) *2	0.32	0.6	1.2	1.6
	Rated output current (A) *3	0.8	1.4	2.5	4.0
	Rated output voltage *4	For 3-phase power source:3-phase AC 200 to 230 V Single phase power source:3-phase AC 200 to 240 V			
Power source	Voltage	For 3-phase power source:3-phase AC 200 to 230 V Single phase power source:1-phase AC 200 to 240 V			
	Frequency	50/60Hz			
	Allowable voltage	-15%, +10%			
	Allowable frequency	± 5%			
Control method	Control method	Low noise sine wave PWM style			
	Output frequency	0.5 to 400 Hz (Start and stop from 0.5 Hz)			
	Frequency	± 0.5% (25°C ± 10°C)			
	Frequency setting resolution	• Digital: 0.01 Hz • Analog: Setting frequency range/1000 Hz (minimum 0.05 Hz)			
	Frequency setting	DC0 to +5V, 0 to +10V			
	Voltage/Frequency characteristics	Base frequency: 30 to 400 Hz (1 Hz step), with reduced torque pattern			
	Rated overload	150%/minute			
	Regenerative brake torque	Short time average reduced torque: 100% min. Continuous regenerative torque: 20% min. With optional braking resistor: continuous regenerative torque 100% min.			
	DC brake	Brake start frequency/break operating time/break volume			
	Acceleration/deceleration time	0 to 3600 s(seconds) (0 to 3s: 0.01s step, 3 to 10s: 0.1s step, 10s or more: 1s step) *Time that changes in 50 Hz. Adjustable to a maximum of 4 kinds of acceleration/deceleration speeds.			
	Jogging frequency	0 to 30Hz			
	Operation mode	2-speed operation mode, 4-speed operation mode, 8-speed operation mode			
	Others	Automatic boost, AVR function/retry function selectable RS-485 communication function (factory-set option), parameter lock available			
Protective functions		Insufficient voltage protection, over-current protection, overvoltage protection, instantaneous power failure protection, stall prevention, over-load limitation (current limiter), overload trip (electric thermal relay), restart prevention when power is restored, self-diagnosis trip (the last 5 causes of trips are stored)			
Protective structure		Built-in the panel (IP20)			
Cooling method		Self-cooling method			
Weight (kg)		0.6	0.7	0.7	0.9

\*1 Applicable motor: For Panasonic 3-phase induction motor (4 poles)

When using another motor, select the motor within inverter ratings.

\*2 Output capacity: If the rated output voltage is 240V.

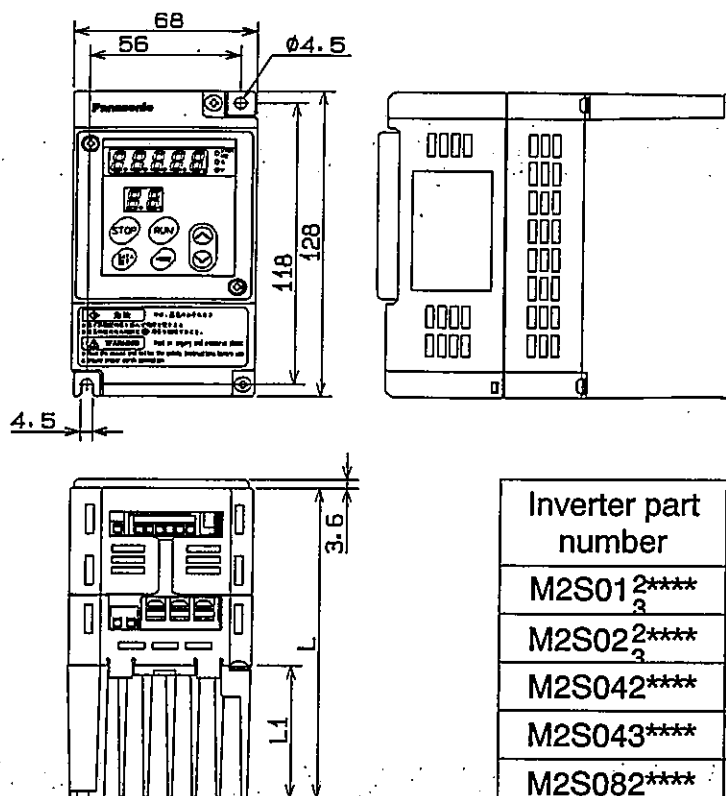
\*3 Rated current is 90% if carrier frequency of 3 or 4 is selected.

Rated current is 80% if carrier frequency of 5, 6 or 7 is selected.

\*4 Output voltage does not become higher than the power source voltage.

# Outer Dimensions (Unit: mm) Dimensional tolerances: $\pm 2$ mm

## ■ No. 1 frame



Inverter part number	Inverter capacity	L1	L
	kW	mm	mm
M2S01 <sup>2</sup> ****	0.1	12.5	87
M2S02 <sup>2</sup> ****	0.2	37.5	112
M2S042****	0.4	55.5	130
M2S043****	0.4	37.5	112
M2S082****	0.75	70.5	145
M2S083****	0.75	55.5	130


# Parameter Setting

## Parameter overview

Inverters of this series have various parameters that adjust/set characteristics and functions, etc. The objectives and functions of various parameters are described herein. Get a good understanding of the parameters and use to adjust inverter to the best condition for the customer's operating conditions.


## Parameter configuration and list of parameters

No.	Parameter name	Parameter setting			
		Adjustment range	Min. unit	Factory setting	Check *1
00	Setting frequency (0 speed)	0. 0.50~upper limit frequency	0.01Hz *2	0Hz	
01	1 <sup>st</sup> speed frequency	0. 0.50~upper limit frequency	0.01Hz *2	50Hz	
02	2 <sup>nd</sup> speed frequency	0. 0.50~upper limit frequency	0.01Hz *2	30Hz	
03	3 <sup>rd</sup> speed frequency	0. 0.50~upper limit frequency	0.01Hz *2	15Hz	
04	4 <sup>th</sup> speed frequency	0. 0.50~upper limit frequency	0.01Hz *2	0Hz	
05	5 <sup>th</sup> speed frequency	0. 0.50~upper limit frequency	0.01Hz *2	0Hz	
06	6 <sup>th</sup> speed frequency	0. 0.50~upper limit frequency	0.01Hz *2	0Hz	
07	7 <sup>th</sup> speed frequency	0. 0.50~upper limit frequency	0.01Hz *2	0Hz	
08	8 <sup>th</sup> speed frequency	0. 0.50~upper limit frequency	0.01Hz *2	0Hz	
09	9 <sup>th</sup> speed frequency	0. 0.50~upper limit frequency	0.01Hz *2	0Hz	
10	10 <sup>th</sup> speed frequency	0. 0.50~upper limit frequency	0.01Hz *2	0Hz	
11	11 <sup>th</sup> speed frequency	0. 0.50~upper limit frequency	0.01Hz *2	0Hz	
12	12 <sup>th</sup> speed frequency	0. 0.50~upper limit frequency	0.01Hz *2	0Hz	
13	13 <sup>th</sup> speed frequency	0. 0.50~upper limit frequency	0.01Hz *2	0Hz	
14	14 <sup>th</sup> speed frequency	0. 0.50~upper limit frequency	0.01Hz *2	0Hz	
15	15 <sup>th</sup> speed frequency	0. 0.50~upper limit frequency	0.01Hz *2	0Hz	
16	Run command selection	<div>PnL Operation panel</div> <div>TEr Terminal block,</div> <div>60FH Both</div>		60FH	
17	Frequency command selection	<div>PnL Operation panel</div> <div>UDL Volume</div> <div>0-5 0~5V</div> <div>0-10 0~10V</div>		PnL	
18	Operation mode selection	2, 4, 8, speed operation mode		4 speed operation mode	

\*1 Parameters marked by  in the Check column are tripped for safety if modified or memorized. Release the trip to use.

\*2 The minimum unit is 0.05 Hz when the setting frequency is min. 160 Hz.

No.	Parameter name	Parameter setting			
		Adjustment range	Min. unit	Factory setting	Check *1
19	Torque control	0 ~ 100	2	40	
		<input type="text" value="AUF.0"/> Automatic boost (standard)			
		<input type="text" value="SLIP"/> Slip correction control			
20	Jogging frequency	0. 0.5~30 Hz	0.01 Hz	7 Hz	
21	Acceleration time	0~3600 sec $\left\{ \begin{array}{l} \sim 3 \text{ sec} : 0.01 \text{ sec interval} \\ 3 \text{ sec} \sim 10 \text{ sec} : 0.1 \text{ sec interval} \\ 10 \text{ sec} \sim : 1 \text{ sec interval} \end{array} \right.$		5 sec	
22	No. 2 acceleration time			5 sec	
23	Not used			<input type="text" value="n0-F."/>	
24	Not used			<input type="text" value="n0-F."/>	
25	DC brake volume	0 ~ 100%	2	94	
26	DC brake time	Case of <input type="text" value="POS"/> : 0~3 sec	0.05 sec	0.5 sec	
		Case of <input type="text" value="-POS"/> : 0~6 sec	0.1 sec	1.0 sec	
27	DC brake selection	<input type="text" value="POS"/> Positioning <input type="text" value="-POS"/> Sudden stop		<input type="text" value="POS"/>	
28	Starting brake time	0 ~ 3 sec	0.05 sec	0 (non-operational)	
29	Brake start frequency	0.50 ~ 400 Hz	0.01 Hz *2	3 Hz	
30	Carrier frequency variable	0,1,2,3,4,5,6,7 *3		2	
31	Deceleration time	0~3600 sec $\left\{ \begin{array}{l} \sim 3 \text{ sec} : 0.01 \text{ sec interval} \\ 3 \text{ sec} \sim 10 \text{ sec} : 0.1 \text{ sec interval} \\ 10 \text{ sec} \sim : 1 \text{ sec interval} \end{array} \right.$		5 sec	
32	Not used			5 sec	
33	Not used			<input type="text" value="n0-F."/>	
34	No. 4 deceleration time			<input type="text" value="n0-F."/>	
35	Base cycle	30 ~ 400 Hz	1 Hz	60 Hz	
36	Max. output voltage adjustment	0 ~ 100%	1	100	
37	V/F reduction characteristics	1.0 ~ 2.0 squared	0.1	1.0	
38	No. 2 V/F selection	<input type="text" value="n0"/> No selected (usually V/F pattern)		<input type="text" value="n0"/>	
		<input type="text" value="UP"/> Upper selection			
		<input type="text" value="LO"/> Lower selection			
39	No. 2 V/F base frequency	30 ~ 400 Hz	1 Hz	60 Hz	
40	No. 2 V/F boost	0 ~ 100%	2	0	

\*1 Parameters marked by  in the Check column are tripped for safety if modified or memorized. Release the trip to use.


\*2 The minimum unit is 0.05 Hz when the setting frequency is min. 160 Hz.

\*3 Rated current is 90% if carrier frequency of 3 or 4 is selected.  
Rated current is 80% if carrier frequency of 5, 6 or 7 is selected.




# Parameter Setting

No.	Parameter name	Parameter setting			
		Adjustment range	Min. unit	Factory setting	Check *1
41	Jump frequency width	0. 0.50~400 Hz	0.01 Hz *2	0 Hz	
42	Jump frequency ①	0. 0.50~400 Hz	0.01 Hz *2	0 Hz	
43	Jump frequency ②	0. 0.50~400 Hz	0.01 Hz *2	0 Hz	
44	Jump frequency ③	0. 0.50~400 Hz	0.01 Hz *2	0 Hz	
45	Jump frequency ④	0. 0.50~400 Hz	0.01 Hz *2	0 Hz	
46	I1/I2 function selection	<div>FSrS</div> <div>rS.Fr</div> I1: Forward/Stop. I2: Reverse/Stop I1: Run/Stop. I2: Forward/Reverse		FSrS	
47	I5 function selection	<div>FrEE</div> <div>rHr</div> Free-run. External forced		rSf	
48	I6 function selection	<div>U-d</div> <div>rSf</div> No. 2 acceleration/deceleration Trip reset		FrEE	
49	Multi-speed input selection	<div>1b 1f</div> <div>b 1n</div> 1 bit Binary		b 1n	
50	Not used			nD-F.	
51	Output signal ① selection	<div>Fr IP</div> <div>rUn</div> <div>FrEE</div> <div>F</div> Trip. <div>Sf bL</div> Arrival Running Free-run Forward. <div>r</div> Reverse		Fr IP	
52	Not used	<div>CE-F</div> <div>CE-C</div> <div>CAUS</div> <div>dC-P</div> Output frequency detection Motor current detection Trip cause DC brake		nD-F.	
53	Not used			nD-F.	
54	Motor current detection level	50~150%	5%	100%	
55	Output signal polarity selection	<div>nDr</div> <div>rEU</div> Forward polarity, Reverse polarity		nDr	

\*1 Parameters marked by  in the Check column are tripped for safety if modified or memorized. Release the trip to use.

\*2 The minimum unit is 0.05 Hz when the setting frequency is min. 160 Hz.


No.	Parameter name	Parameter setting			
		Adjustment range	Min. unit	Factory setting	Check *1
56	Current limit operation point	50~200%	10%	180%	
57	Stall time deceleration power	1, 2, 4, 8, 16		8	
58	Acceleration mode switching	<input type="checkbox"/> L In Straight line	<input type="checkbox"/> S-1 S-curve①	<input type="checkbox"/> L In	
59	Deceleration mode switching	<input type="checkbox"/> S-2 S-curve②		<input type="checkbox"/> L In	
60	Monitor mode switching	<input type="checkbox"/> S-F Set frequency <input type="checkbox"/> O-F Output frequency <input type="checkbox"/> dC-U DC voltage <input type="checkbox"/> C U r Output current		<input type="checkbox"/> O-F	
61	Display power	0.1 ~ 60.0	0.1	1.0	
62	Frequency meter adjustment	-	-	-	
63	Frequency meter full scale indication	0 ~ 400 Hz	1 Hz	60 Hz	
64	FOUT switching Not used	<input type="checkbox"/> A n A Analogous output current <input type="checkbox"/> d I G Digital <input type="checkbox"/> A n A Analog		<input type="checkbox"/> A n A	
65	Comparison frequency A	0.050~400 Hz	0.01 Hz *2	0 Hz	
66	Comparison frequency B	0.050~400 Hz	0.01 Hz *2	0 Hz	
67	Agreement detection width	0.050~400 Hz	0.01 Hz *2	3 Hz	
68	Reduced frequency at instantaneous stop	0.050~400 Hz	0.01 Hz *2	3 Hz	
69	Instantaneous stop free-run time	1, 2, 3, 4, 5	1	1	
70	Restart prevention when power is restored	<input type="checkbox"/> n 0 Restart <input checked="" type="checkbox"/> Y E S Restart prevention		<input type="checkbox"/> n 0	
71	Retry selection	<input type="checkbox"/> n 0 No retry <input type="checkbox"/> 1 ~ <input type="checkbox"/> 4 Retry No. of set times		<input type="checkbox"/> n 0	
72	Retry start time	0~120 sec	2 sec	4 sec	
73	Frequency setting bias	0~60 Hz	0.01 Hz	0 Hz	
74	Lower limit frequency	0.05~(Maximum frequency - 0.01) Hz	0.01 Hz	0 Hz	
75	Upper limit frequency	(Minimum frequency + 0.01)~400 Hz	0.01 Hz	60 Hz	
76	Constant for input filter	1, 2, 3, 4, 5		1	
77	Over-current trip retry when power is turned on	<input type="checkbox"/> n 0 No retry <input checked="" type="checkbox"/> Y E S Retry		<input type="checkbox"/> n 0	
78	Reverse prevention	<input type="checkbox"/> n 0 Reverse <input checked="" type="checkbox"/> Y E S Reverse prevention		<input type="checkbox"/> n 0	
79	Electronic thermal relay	30~150%. <input type="checkbox"/> n 0	5%	115%	

\*1 Parameters marked by  in the Check column are tripped for safety if modified or memorized. Release the trip to use.

\*2 The minimum unit is 0.05 Hz when the setting frequency is min. 160 Hz.

# Parameter Setting

No.	Parameter name	Parameter setting			
		Adjustment range	Min. unit	Factory setting	Check *1
00	Trip cause clear	<input type="text" value="n0"/> <input type="text" value="YES"/>		<input type="text" value="n0"/>	
01	Trip cause ①	-	-	-	
02	Trip cause ②	-	-	-	
03	Trip cause ③	-	-	-	
04	Trip cause ④	-	-	-	
05	Trip cause ⑤	-	-	-	
06	Parameter initialization	<input type="text" value="n0"/> <input type="text" value="YES"/>		<input type="text" value="n0"/>	
07	Motor selection	<input type="text" value="4P. 08"/> Motor capacity *2 No. of motor poles		4 poles, inverter capacity *3	
08	Start-up starting frequency	0.50~10 Hz	0.01 Hz	1	
09	Automatic voltage adjustment reference voltage	200,220,230,240V		200	
90	Automatic voltage adjustment selection	<input type="text" value="n0"/> No automatic voltage adjustment <input type="text" value="YES-1"/> Automatic voltage adjustment <input type="text" value="YES-2"/> No automatic voltage adjustment only when decelerating		<input type="text" value="n0"/>	
AA	Parameter lock	<input type="text" value="n0"/> No parameter lock <input type="text" value="ALL"/> All parameters locked <input type="text" value="PART"/> Parameters that don't need to be set locked		<input type="text" value="n0"/>	
bb	Parameter copy	<input type="text" value="n0"/> Parameters not copied <input type="text" value="PLOAD"/> Parameters read-out to panel side <input type="text" value="PPG1"/> Parameters written in inverter side <input type="text" value="P.INIT"/> Parameters initialization on operation panel.		<input type="text" value="n0"/>	
c0	Motor rated current	0 ~100A	0.1	*	
c1	Motor current without load	0 ~100A	0.1	*	
c2	Motor primary resistance	0 ~100Ω	0.01	*	
c3	Slip correction gain	0, 1, 2, 3, 4, 5, 6, 7		4	
c4	Slip correction response time	0, 1, 2, 3, 4, 5, 6, 7		0	
99	Parameter extraction	Parameter No.	-	-	

\*1 Parameters marked by  in the Check column are tripped for safety if modified or memorized. Release the trip to use.

\*2 Motor capacity is : 0.2kW, : 0.4kW, : 0.75kW.

\*3 4-pole motor of same capacity as inverter rating set when shipped from the factory.

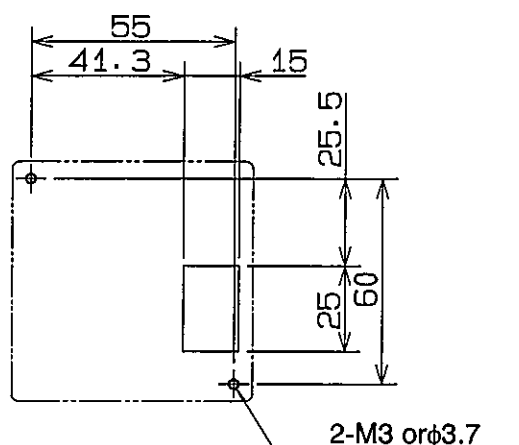
# Optional Parts

## Operation panel

### ■ Operation panel

Optional part number	Specifications
DV0P20704	Standard
DV0P20702	With volume

### ■ Operation panel cut dimensions



## Operation panel remote cable

Optional part number	Length (m)
DV0P20801	0.5
DV0P20802	1.5
DV0P20803	3.0

## Regenerative brake resistor

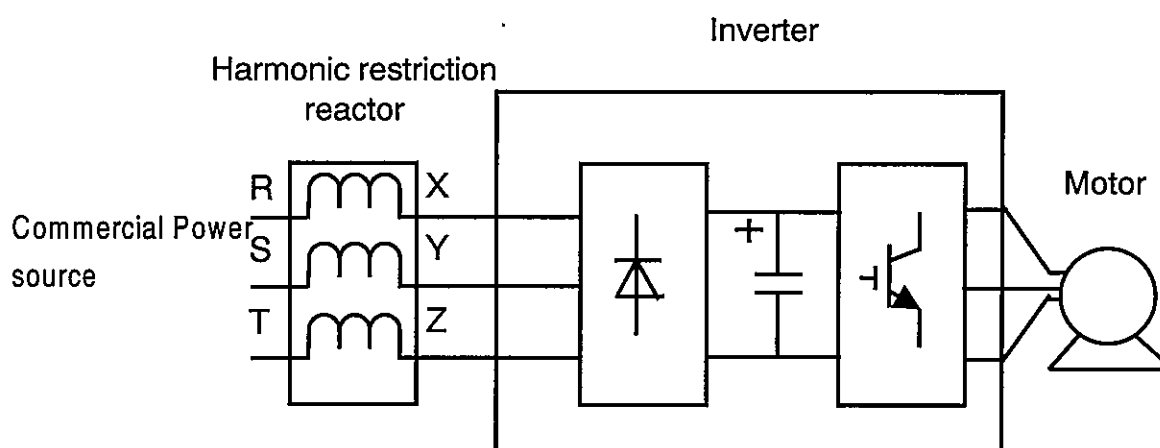
Optional part number	Specifications	Power source voltage
DV0P23501	60 W/200 $\Omega$	200 V
DV0P23502	60 W/50 $\Omega$	100 V

# Optional Parts

## AC reactor

Products of the 200 V class 3.7kW or lower are the products subjected to the "Home appliances and general purpose product harmonic restriction guide line" announced by the Ministry of International Trade and Industry on September, 1994. In accordance with this guideline, the regulating levels have been set by Japanese Electric Industry Association. A harmonic restriction reactor must be connected to the inverter to make it comply with this standard.

Reactor connection diagram



Optional part number	Inverter capacity
	kW
DV0P142-1	0.2/0.4
DV0P142-2	0.75
DV0P142-3	1.5
DV0P142-4	2.2
DV0P142-5	3.7
DV0P142-6	5.5
DV0P142-7	7.5

# Servicing (Repair)

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## Repair

- Consult your Panasonic dealer for repairs of your Panasonic inverter.  
Consult your machine or device manufacturer when the inverter is installed in a machine or device.

For your convenience: (Please fill in the blank when you need to consult for repairs.)

Date purchased	Year/Month/Date	Model number	
Shop purchased			
	Phone number		

**Industrial and Appliance Motor Division, Motor Company,  
Matsushita Electric Industrial Co., Ltd.**