

Panasonic

For speed control of 3-phase induction motor Low-Noise Inverter M1S 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.

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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.

Introduction

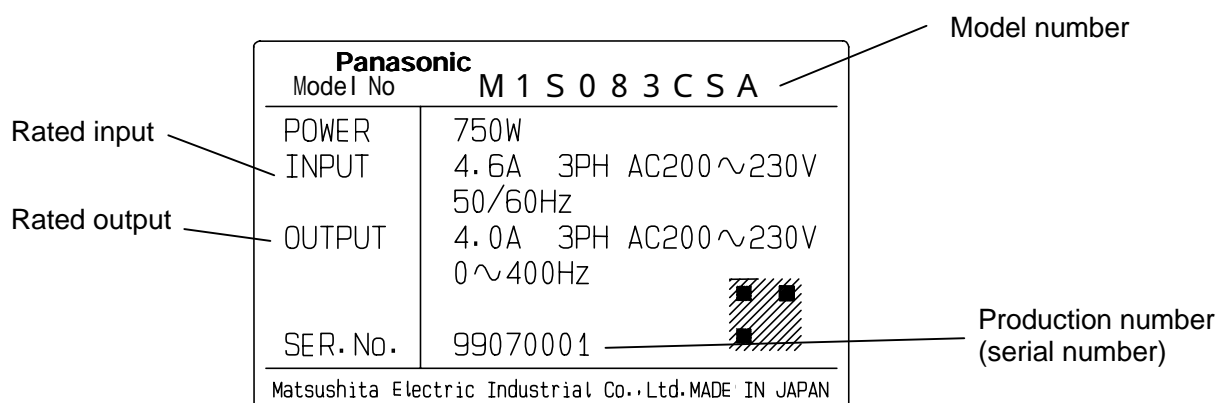
When unpacking

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

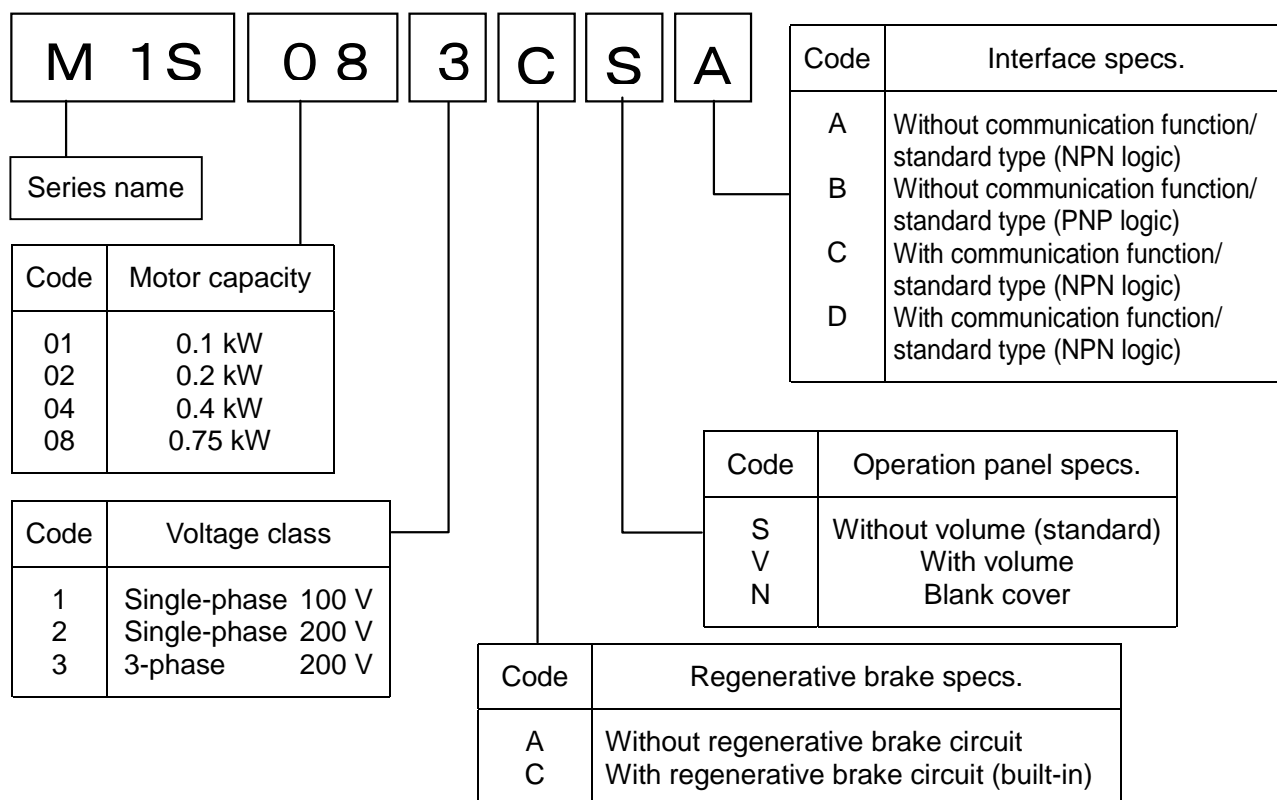
If there is anything wrong with the equipment, contact your Panasonic dealer.

Inverter model check

Nameplate



Product No.

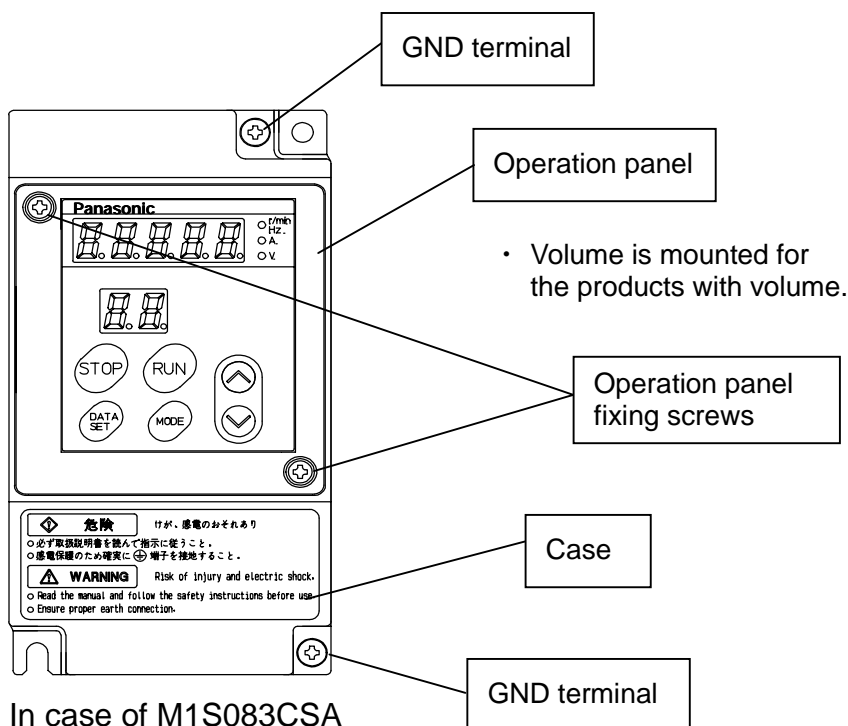


Consult your Panasonic dealer regarding products with communication functions.

Parts Identification

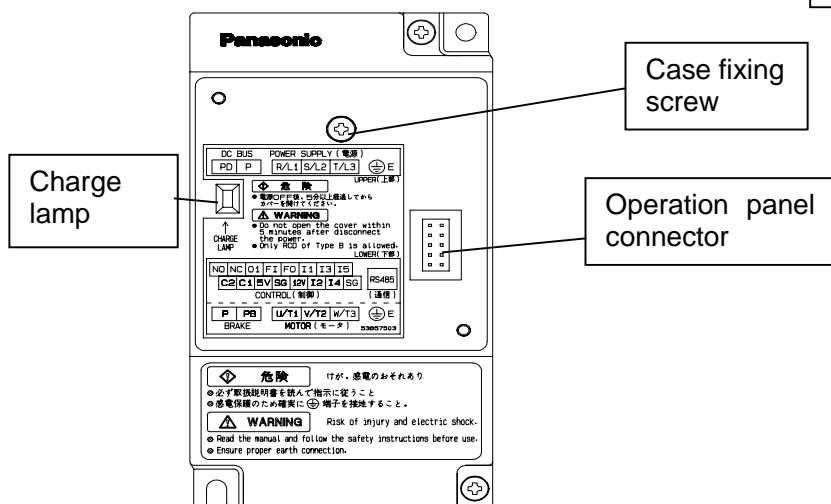
Outer appearance

- You can remove the operation panel using the operation panel fixing screws.
- You can remove the case by removing the case fixing screw and pulling the lower claw outward.

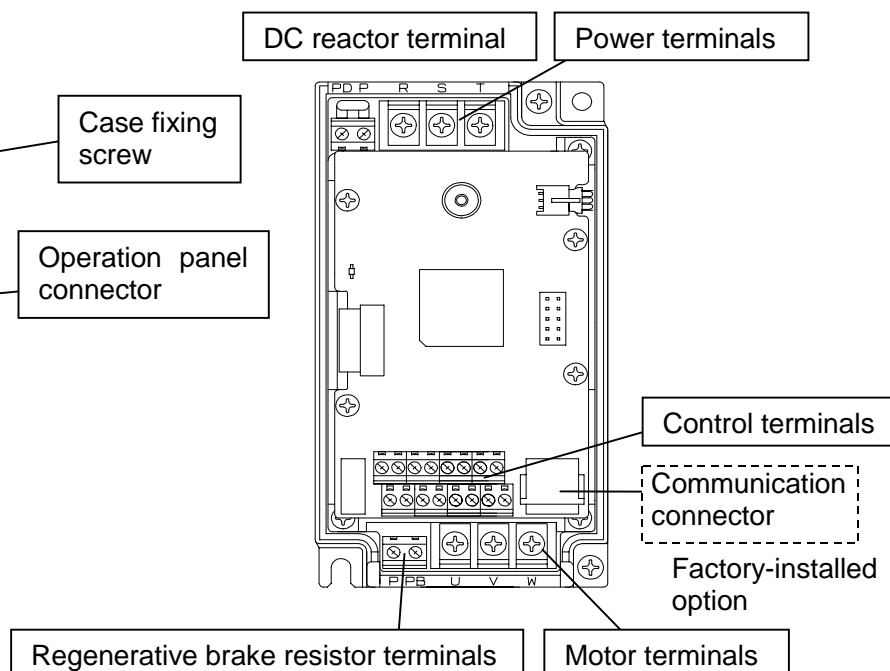


In case of M1S083CSA

With operation panel removed



With case removed



- Be very careful of static electricity when wiring.
- After wiring, always replace the case and the operation panel 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.

Installation

Install the inverter properly to prevent equipment failure or accidents.

Inverter

Installation location

Install the inverter indoors in a place not exposed to rain or direct sunlight. The inverter is not waterproof.

Install in a place not exposed to corrosive/flammable gases, grinding fluid, oil mist, metal powder or chips.

Place with adequate ventilation, which is not exposed to excessive humidity, dirt or dust.

Place not subject to vibration.

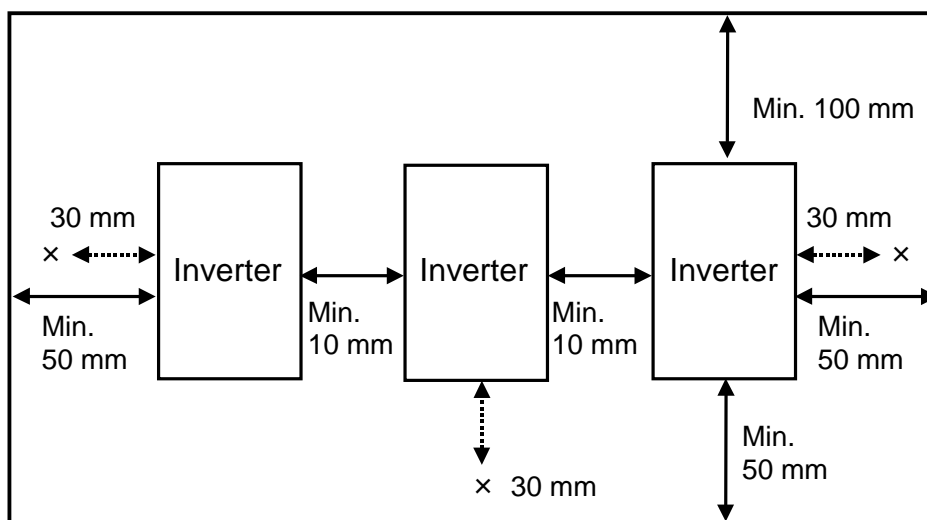
Environmental conditions

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

* Short-term temperature during transport

Mounting direction and clearance

- Provide sufficient clearance for effective cooling.

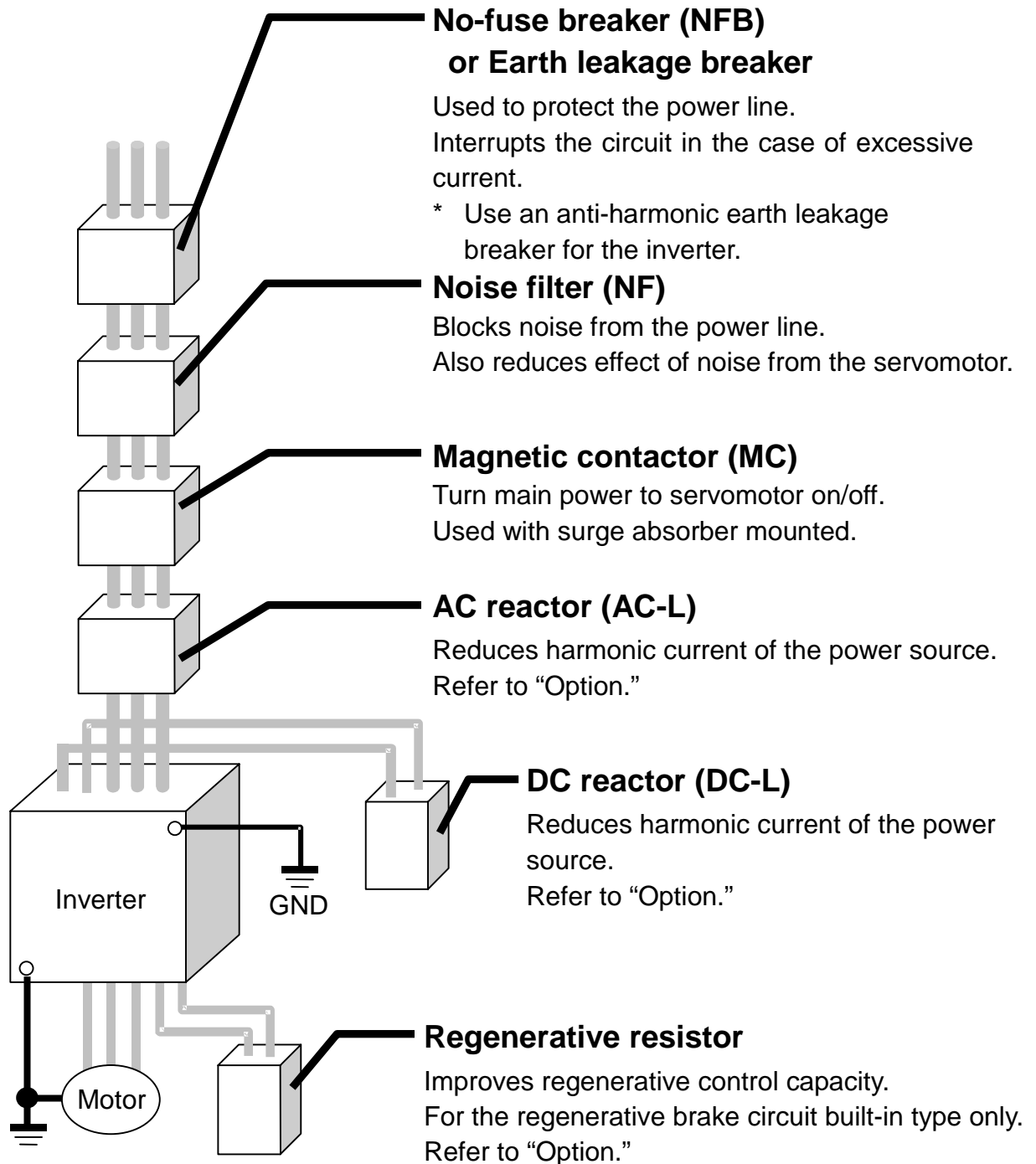


Make sure ambient temperature doesn't exceed allowable temperature at position indicated by X in the figure above.

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 ²) *1	
					Main circuit	Control circuit
MIS011***	0.1	BBP25 (5A)	BMFT61842N (3P+1a)	BMF902E (0.95 ~ 1.45A)	2.0 (AWG14)	0.75 (AWG18)
MIS021***	0.2	BBP35 (5A)	BMFT61842N (3P+1a)	BMF904E (1.7 ~ 2.6A)	2.0 (AWG14)	0.75 (AWG18)
MIS041***	0.4	BBP310 (10A)	BMFT61842N (3P+1a)	BMF907E (2.8 ~ 4.2A)	2.0 (AWG14)	0.75 (AWG18)
MIS01 ₃ ^{2***}	0.1	BBP35 (5A)	BMFT61842N (3P+1a)	BMF901E (0.5 ~ 0.75A)	2.0 (AWG14)	0.75 (AWG18)
MIS02 ₃ ^{2***}	0.2	BBP35 (5A)	BMFT61842N (3P+1a)	BMF902E (0.95 ~ 1.45A)	2.0 (AWG14)	0.75 (AWG18)
MIS04 ₃ ^{2***}	0.4	BBP35 (5A)	BMFT61842N (3P+1a)	BMF904E (1.7 ~ 2.6A)	2.0 (AWG14)	0.75 (AWG18)
MIS08 ₃ ^{2***}	0.75	BBP310 (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.

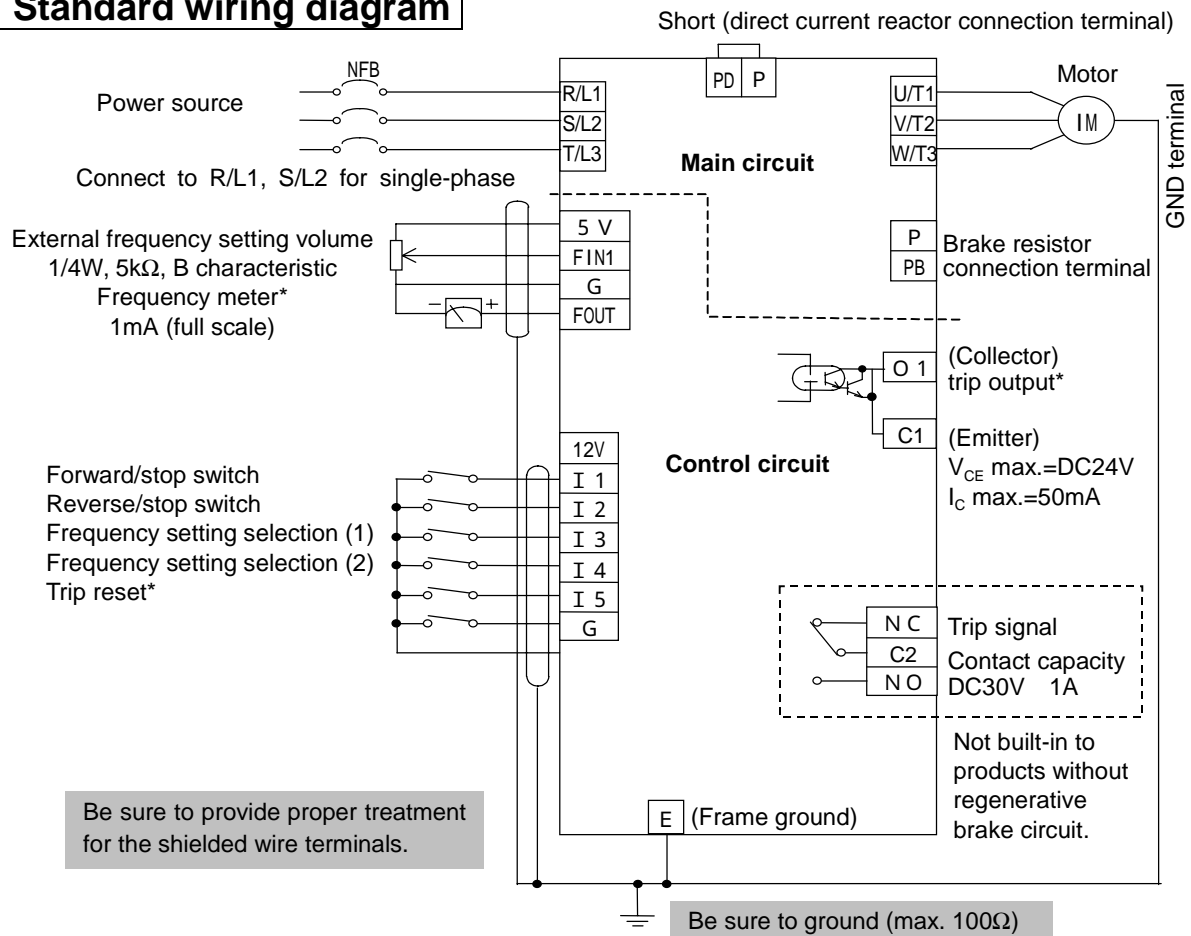
< Example > Nihon Kaiheiki: M-2012J-G

*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 M1S083CSA

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
PD, P	Reactor terminal	DC reactor connection terminal	M2.5	0.3 ~ 0.5
P, PB	Regenerative resistor terminal	Regenerative resistor connection terminal	M2.5	0.3 ~ 0.5

(2) Control terminal

NO	NC	01	FI	F0	I1	I3	I5
C2	C1	5V	G	12V	I2	I4	G

<Terminal screw size: M2, Tightening torque 0.25 ~ 0.3 N·m>

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 “FIN1” and “G.” If using these terminals, change “ frequency command” to - or - .												
G		Ground for control	Common ground terminal for contact input.												
F O U T		Frequency meter terminal	Outputs voltage proportional to output frequency between “FOUT” and “G.” Connect full-scale 1 mA DC ammeter. You can output pulses synchronized with output frequency by altering “ FOUT switch”.												
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“ I1.12” function selection.												
	I 2	Reverse /stop command terminal													
	I 3 I 4 I 5	Frequency setting selection terminal	You can select the following functions by “ operation mode selection.” <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th>Operation mode</th><th>I3</th><th>I4</th><th>I5</th></tr></thead><tbody><tr><td>2-speed operation mode</td><td>Forward jogging</td><td>Reverse jogging</td><td rowspan="3"></td></tr><tr><td>4-speed operation mode</td><td colspan="2" rowspan="2"></td></tr><tr><td>8-speed operation mode</td></tr></tbody></table>	Operation mode	I3	I4	I5	2-speed operation mode	Forward jogging	Reverse jogging		4-speed operation mode			8-speed operation mode
	Operation mode	I3	I4	I5											
	2-speed operation mode	Forward jogging	Reverse jogging												
4-speed operation mode															
8-speed operation mode															
G	Ground for control	Contact input common ground terminal.													
Output terminal	O 1 C1	Output signal terminal	Open-collector output terminal. (Not maintained when power is OFF.) You can select contents by “ output signal (1) selection.” Factory setting: “01” is trip signal (transistor ON when tripped) “O1” (collector) IC max. = 50mA “C1” (emitter) VCE max. = 24VDC												
	N C N O C2	Output signal terminal	Relay output terminal. 30VDC 1A (max.) (Not maintained when power is OFF.) You can select output contents by “ relay output polarity selection.” Not built-in to products without regenerative brake circuit.												

System Configuration and Wiring

Precautions when wiring

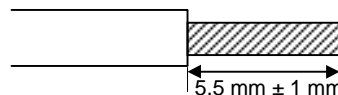
The inner circuit is still energized with a high voltage after the input power is turned off. Do not touch the inverter for at least 5 minutes after turning off the power.

Main circuit

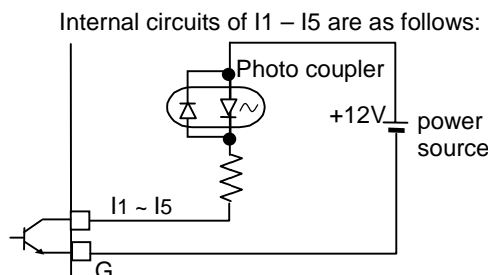
- (1) The inverter will be damaged if you invert the connections of the power input terminal and motor output terminal (U/L1, V/L2, W/L3). Absolutely do not invert connections.
- (2) Do not ground the main circuit terminal.
- (3) Do not short motor output terminals (U/L1, V/L2, W/L3) together.
- (4)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

Control circuit

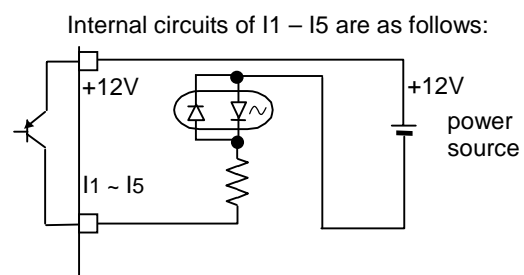
- (1) Use the wires with the insulation removed, as shown below, to wire the control circuit. If the exposed area is too long, there is the possibility of a short occurring with the adjacent wire. If it is too short, the wire could be pulled. Twist the bare wires when wiring, so that they will not get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

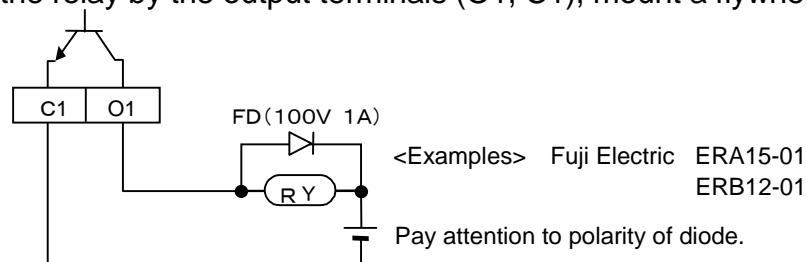


NPN logic



PNP logic

- (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).

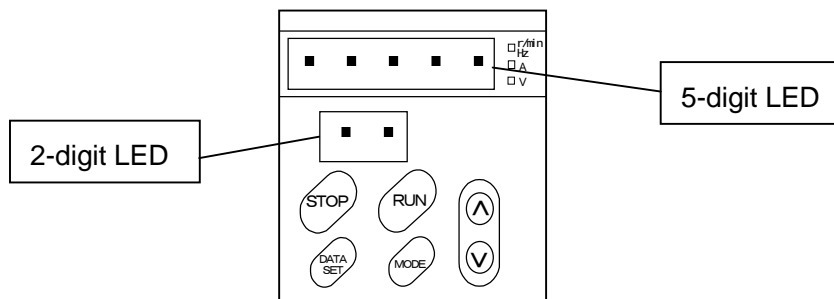


- (7) Use shielded wires for the cable to be connected to the control circuit.


Parameter Setting


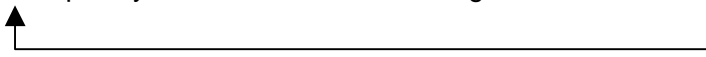

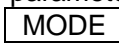





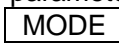





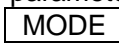








Setting

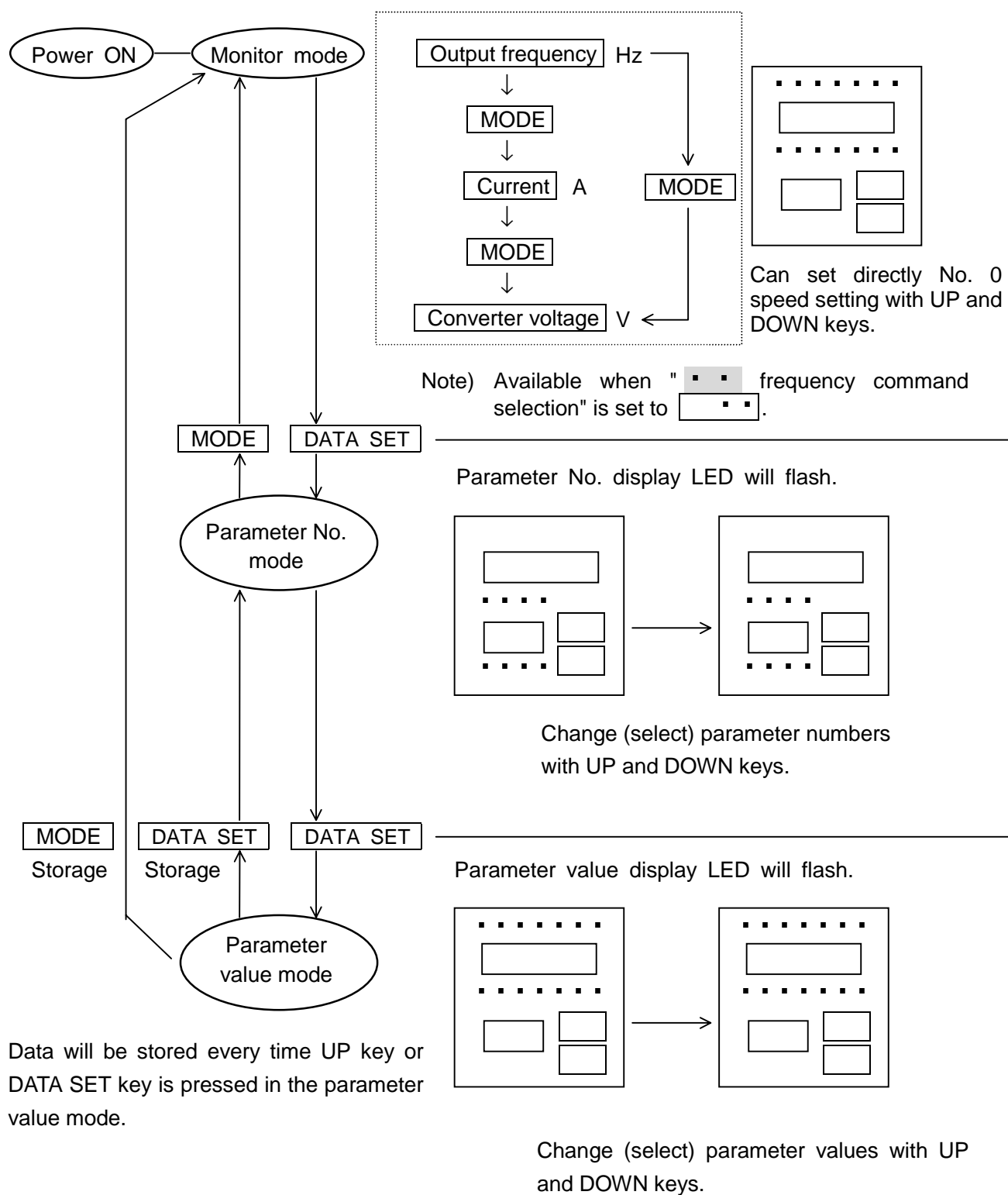
Operation Panel



Frequency Hz is displayed when in the normal monitor mode.

You can display synchronized rotations for the parameter "  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.						
 switch	Switch for changing monitor mode. Pressing the switch changes the mode in the cycle of: Output frequency → Converter voltage → Motor current 						
 switch	Switch for selecting parameter No. mode and parameter value mode, setting parameter value. Mode description <table border="1"> <tr> <td>Monitor mode</td><td>Displays output frequency, converter voltage or motor current. Mode when the power is turned on. When in the parameter No. mode or parameter value mode, pressing the  switch changes to the monitor mode.</td></tr> <tr> <td>Parameter No. mode</td><td>Displays parameter No. ( ~ ) by flashing. When in the monitor mode, pressing the  switch changes to the parameter No. mode.</td></tr> <tr> <td>Parameter value mode</td><td>Displays parameter contents (setting value) by flashing. You can change the setting value with the  switches. After changing the setting, press the  switch to enter the setting in the memory.</td></tr> </table>	Monitor mode	Displays output frequency, converter voltage or motor current. Mode when the power is turned on. When in the parameter No. mode or parameter value mode, pressing the  switch changes to the monitor mode.	Parameter No. mode	Displays parameter No. ( ~ ) by flashing. When in the monitor mode, pressing the  switch changes to the parameter No. mode.	Parameter value mode	Displays parameter contents (setting value) by flashing. You can change the setting value with the  switches. After changing the setting, press the  switch to enter the setting in the memory.
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Parameter value mode	Displays parameter contents (setting value) by flashing. You can change the setting value with the  switches. After changing the setting, press the  switch to enter the setting in the memory.						
 switch	Enable you to select parameters, and set/change contents.						
 switch	Commands the inverter to run.						
 switch	Commands the inverter to stop.						



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.

Set the motor so that the motor can be operated independently.

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	
Turn on the power		<div>■ ■ ■</div> <div>■ ■</div>	<ul style="list-style-type: none"> Turn ON the power in the monitor mode. (Output frequency is displayed.)
When setting with the volume on the operation panel, set "■ ■ ■ frequency command selection" to ■ ■ ■ Volume. (See page 21.)			
Operation	Operation panel		Remarks
	Switch	LED display	
Frequency setting	Press <div>■</div> . Press <div>■</div> to set frequency.	<div>■ ■ ■</div> <div>■ ■</div> <div>■ ■ ■ ■ ■ ■ ■ ■</div> <div>■ ■ ■ ■ ■ ■ ■ ■</div> <div>■ ■</div>	<ul style="list-style-type: none"> No. 0 speed frequency is displayed. (Output setting: 0.0 Hz) Set No. 0 speed frequency to 60 Hz.
Return to the monitor mode	Press <div>MODE</div> .	<div>■ ■ ■</div> <div>■ ■</div>	
Run command (forward rotation)	Press <div>RUN</div> .	<div>■ ■ ■ ■</div> <div>■</div>	<ul style="list-style-type: none"> Frequency is gradually changed. Rotating direction is displayed.
Stop command	Press <div>STOP</div> .	<div>■ ■ ■</div> <div>■ ■</div>	<ul style="list-style-type: none"> Frequency is gradually changed.

<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 "FIN1"	Operation panel	Terminal block	Frequency command selection	Run command selection
1			*1	*1	or	(both)
2			*1	*1	or	(both)
3					or	(panel)
4					or	(panel)
5					or	(terminal block)
6					or	(terminal block)

" " frequency command selection " " and " " run command selection " " are factory-set values.

How to change operation command

(Ex.) Change " " frequency command selection" to " " from " ".

Operation	Operation panel	
	Switch	LED display
Turn on the power		<div> <div></div> <div></div> </div>
Parameter No. mode	Press DATA SET . Press <input type="text"/> , and select the parameter No.	<div> <div></div> <div></div> <div></div> </div> <div> <div></div> <div></div> </div> <div> <div></div> <div></div> </div> Press <input type="text"/> , and select the parameter No.
Parameter value mode	Press DATA SET . Store the setting with MODE or DATA SET .	<div> <div></div> <div></div> </div> <div> <div></div> <div></div> </div> Press <input type="text"/> , 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.

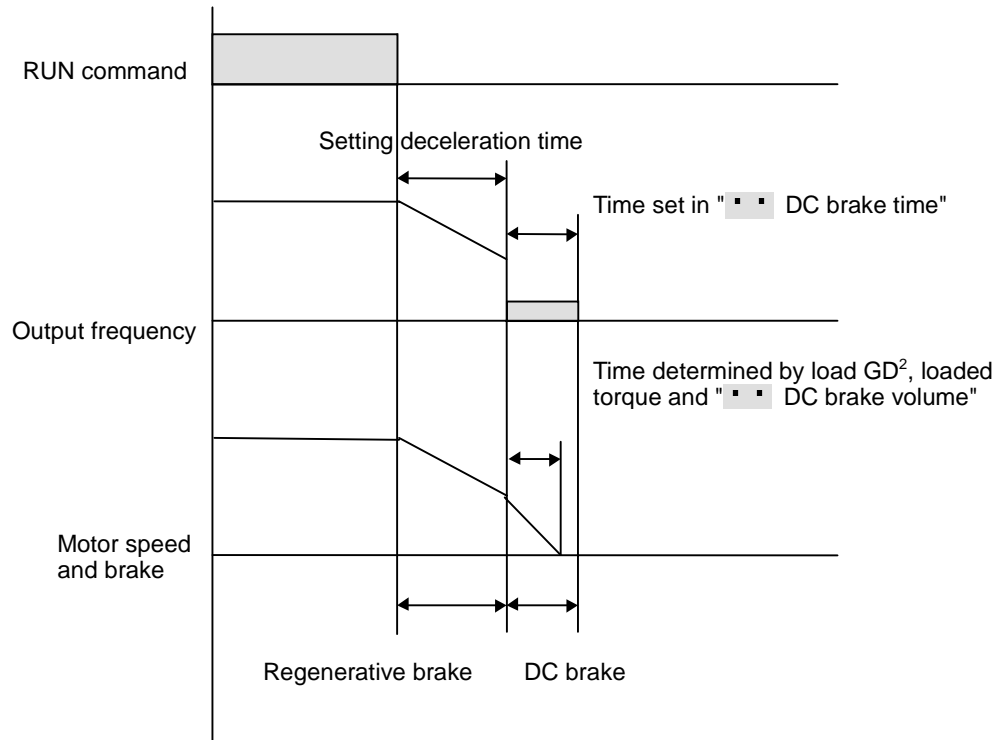
Operation function	Explanation
Normal operation	Operation function with acceleration/deceleration time setting. You can set acceleration time and deceleration time individually within the range of 0 to 3600 seconds. ^{*1}
JOG (Jogging) operation	Operation function with zero acceleration/deceleration time. This function is useful for positioning. When the "operation mode" is set to JOG (jogging) mode, the JOG (jogging) operation becomes valid. 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. JOG (jogging) frequency can be set within the range of 0 to 30 Hz. However, please note that when it is too high, a trip caused by an over-current may occur.
Free-run stop	This function trips the applied voltage to the motor, and sets the motor to a free-run. This is useful when braking mechanically. However, be very careful not to touch the output terminals of the motor (U, V, W) even if the motor is free-running, because you can receive a serious electric shock.
DC brake	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.
Positioning DC brake	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.) If the setting frequency is set to zero, braking is activated when output frequency becomes 1 Hz or lower. Braking strength (torque) and time can be set by the parameters.
Sudden stop (all regions) DC brake	If a stop command is given during normal operation, braking is activated immediately without soft-stop. Braking strength (torque) and time can be set by the parameters. Braking time will be twice the time of "positioning DC brake mode".

^{*1} Time that changes in 50 Hz

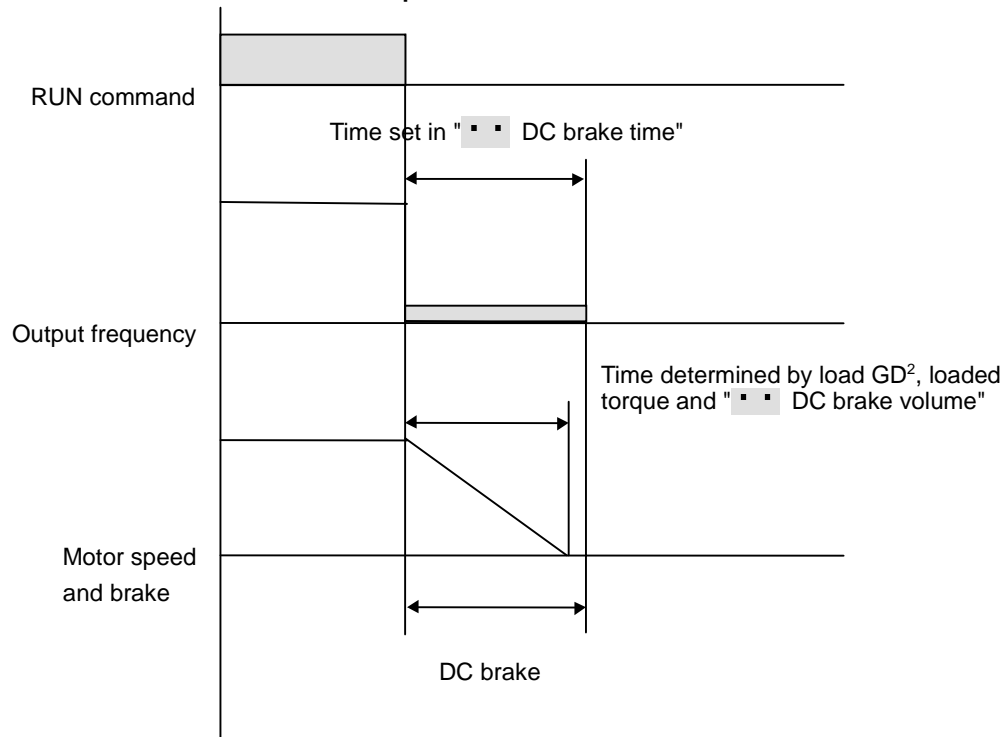
Operation Function

<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 " ■ ■ operation mode selection".

Operation mode	Function of terminal block					"Value on ■ ■ operation mode selection"
	I1	I2	I3	I4	I5 ^{*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"/>
4-speed operation mode	Forward	Reverse	Frequency setting selection		Free-run External forced trip No. 2 acceleration/deceleration time <u>Trip reset</u>	<input type="text"/> [Factory setting]
8-speed operation mode	Forward	Reverse	Frequency setting selection			<input type="text"/>

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

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

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 "14 Function Selection"

Operation Function

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

- (1) When "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	
OFF	OFF	OFF	No. 0 speed frequency
ON	x	x	No. 1 speed frequency
OFF	ON	x	No. 2 speed frequency
OFF	OFF	ON	No. 3 speed frequency

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

- (2) When "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 4-speed operation mode>

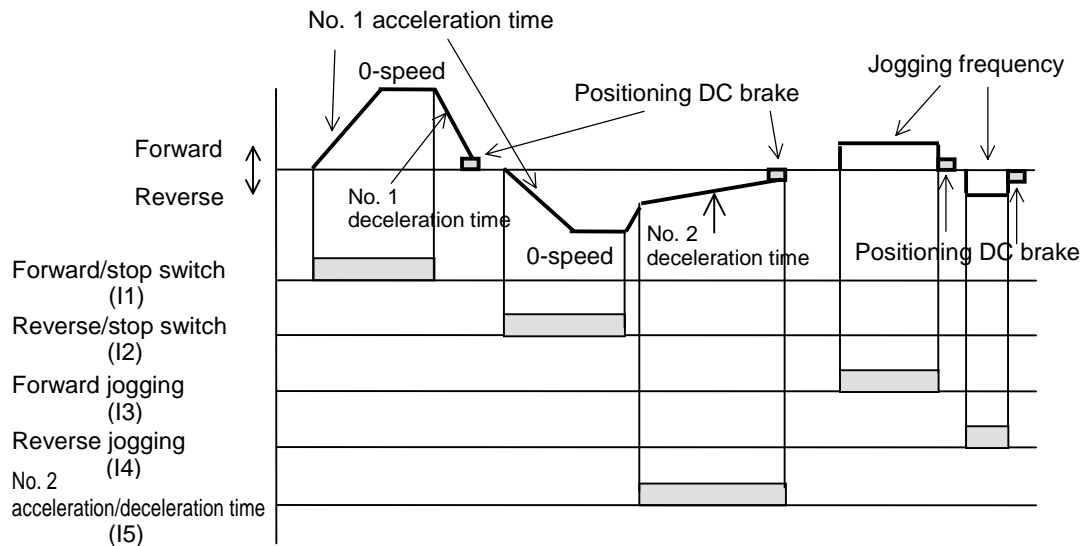
"I3"	"I4"	Frequency setting
OFF	OFF	No. 0 speed frequency
ON	OFF	No. 1 speed frequency
OFF	ON	No. 2 speed frequency
ON	ON	No. 3 speed frequency

<With 8-speed operation mode>

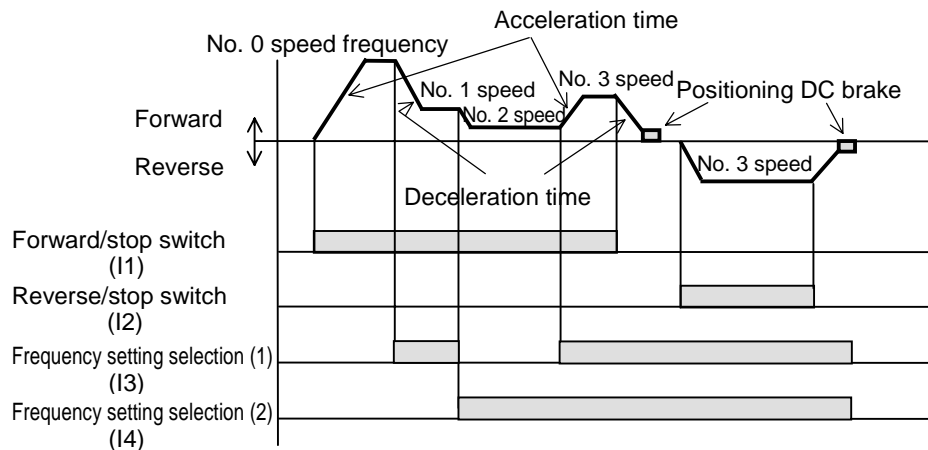
"I3"	"I4"	"I5"	Frequency setting
OFF	OFF	OFF	No. 0 speed frequency
ON	OFF	OFF	No. 1 speed frequency
OFF	ON	OFF	No. 2 speed frequency
ON	ON	OFF	No. 3 speed frequency
OFF	OFF	ON	No. 4 speed frequency
ON	OFF	ON	No. 5 speed frequency
OFF	ON	ON	No. 6 speed frequency
ON	ON	ON	No. 7 speed frequency

Operation pattern example in the 2-speed operation mode

When " ☐ ☐ I5 function selection" is set to ☐ - ☐ : 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.

Functions that display a warning.

Functions that do not display a warning, but act to avoid a tripping of the system.

Functions that display a warning and shut off inverter output.

Functions that trip the inverter. (Trip signal cannot be retained when the power is turned off.)



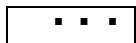

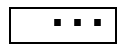

Classification	5-digit LED display	Description of protection	Countermeasures, etc.
	Electronic thermal relay operation <div>(Monitor) (Flashes)</div>	Monitor display flashes when output current reaches the electronic thermal relay level and the timer operates.	Electronic thermal relay trip. Be careful of the size of the load when using.
	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">• DC voltage of the converter exceeds approx. 375V.• Motor current exceeds inverter's current limit operation point.	Increase acceleration/ deceleration time or decrease inertia load.
	Insufficient voltage warning Instantaneous power failure protection <div> ■ </div>	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} <div> ■ ■ ■ ■ </div>	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} <div> ■ ■ </div>	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 "■ ■ restart prevention when power is restored" is selected for ■ ■ ■ .

^{*3} Effective only when "■ ■ reverse prevention" is selected for ■ ■ ■ .

Protective Function

Classification	5-digit LED display	Description of protection	Countermeasures, etc.
	Over-current trip 	Trips if inverter output current exceeds the rated current approx. by 200%.	Possible causes include drop in power source voltage, excessive GD ² load, acceleration/ deceleration time is set too short, load short, or grounding. Take the proper measures to determine the cause.
	Regenerative over-voltage trip 	Trips if DC voltage of the converter rises above approx. 400V.	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 	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.,  is displayed and output is shut off. The trip is automatically reset when DC voltage of the converter drops below approx. 400V, 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) 	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 	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 “ over-voltage trip retry when power is turned on” is selected for .

Classification	5-digit LED display	Description of protection	Countermeasures, etc.
	Self-diagnosis trip <div> <div></div> <div> <div></div> <div></div> <div></div> </div> </div>	Trips if parameter such as “ <div></div> ” is changed.	There is nothing wrong with the equipment. The results of the change become effective when the trip is reset.
	External forced trip <div> <div></div> <div></div> </div>	Trips when “ <div></div> 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 “ I1.I2 function selection” is set to I1: Run/stop or I2: Forward/reverse.

*² Effective only when “ 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">• Ambient temperature, humidity, dirt, dust, foreign objects, etc.• Is there abnormal vibration/noise?• Is main circuit voltage normal?• Is there strange odor?• Is there lint in the air holes?• Cleanliness of control unit• Is wiring damaged?• Are equipment connections loose or off center?• Are foreign objects lodged in at the load side?
Periodic inspections	1 year	<ul style="list-style-type: none">• Are fastened sections loose?• Is there evidence of overheating?• Are terminal blocks damaged?

< 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?	<div> <div></div> <div>lower limit frequency</div> </div> <div> <div></div> <div>upper limit frequency</div> </div>
	Has motor terminal voltage dropped excessively?	<div> <div></div> <div>base frequency</div> </div> <div> <div></div> <div>max. output voltage adjustment</div> </div> <div> <div></div> <div>V/F reduction characteristics</div> </div>
	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

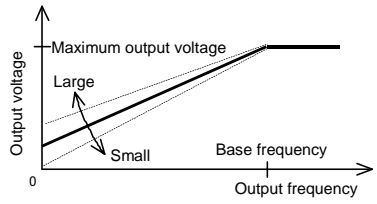
Parameter functions

No.	Parameter name	Explanation
<div><div><div></div><div></div></div></div>	Setting frequency (0 speed)	Sets the frequency with which you want to run the machine. Valid when “ <div><div><div></div><div></div></div></div> frequency command select” is <div><div><div></div><div></div><div></div></div></div> .
<div><div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div><div></div><div></div>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Values set at ex-factory.

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

Detailed Explanation of Parameters

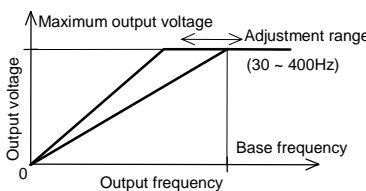
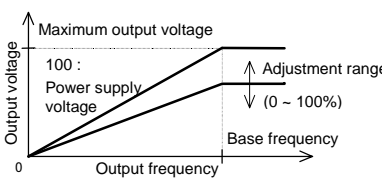
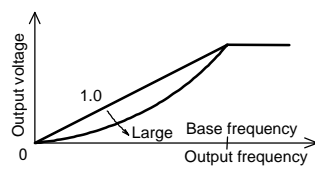
No.	Parameter name	Explanation
■ ■	Operation mode selection	<p>These are the parameters that select the operation mode.</p> <div> <div>■</div> 2nd Speed mode </div> <div> <div>■</div> 4th Speed mode </div> <div> <div>■</div> 8th Speed mode </div>
■ ■	Torque control	<div> <div>■</div> ~ <div>■ ■ ■</div> : Manual torque boost </div> <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>  <div> <div>■ ■ ■ ■</div> : Auto-boost Controls for the optimum auto-torque for the inverter and motor with the same capacity. </div> <div> <div>■ ■ ■ ■</div> : Controls slip frequency compensation. </div> <p>Controls compensation of the slip frequency for the motor selected by “ ■ ■ motor selection.”</p> <p><Precautions regarding the selection of Auto-boost and slip frequency compensation></p> <ul style="list-style-type: none"> • Select parameters when the motor is stopped. • Do not use when running in serial. • 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. • When running at a high power supply voltage, adjust to lower the output voltage of the inverter using “ ■ ■ Base frequency” or “ ■ ■ Maximum output voltage adjustment.”
■ ■	Jogging frequency	This sets the frequency for operating in the jogging mode.
■ ■	Acceleration time	<p>This determines the rate of change of the output frequency during acceleration.</p> <ul style="list-style-type: none"> • <u>Sets the time that changes in 50 Hz.</u> • When set to 0 seconds, acceleration is at its optimum speed and deceleration will be 0.01 second. • When less than 3 seconds set to 0.01 sec intervals; When 3 to 9 seconds set to 0.1 sec intervals; When 10 seconds or more set to 1 sec intervals.
■ ■	No. 2 Acceleration time	<p>This sets the acceleration time of the No. 2 Acceleration.</p> <p>This is valid when you select “ ■ ■ I5 Function Selection” in the <div>■ ■ ■</div></p> <p>No. 2 Acceleration.</p>

■ Values set at ex-factory.

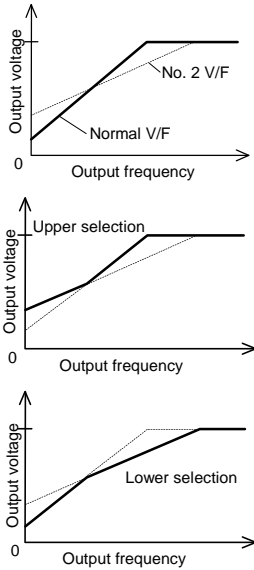
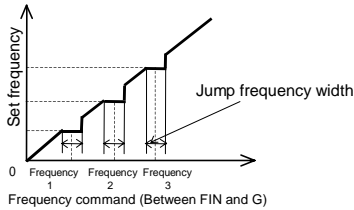
No.	Parameter name	Explanation																				
■ ■	Not used																					
■ ■	Not used																					
■ ■ ■ ■	DC brake volume DC brake time	<p>This adjusts the DC brake time and the DC brake volume when shifting from inverter drive to a stopped state.</p> <p>- The machine will enter a free-run when either or both the time and volume are set to 0 (zero).</p> <p>The DC brake time when you select a sudden brake (all regions) will be twice the time of the positioning brake.</p>																				
■ ■	DC braking time	<p>This selects the type of DC brake.</p> <div><div>■ ■ ■</div> : Position<div>■ ■ ■ ■</div> : Sudden stop (all regions)</div>																				
■ ■	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> <p>• The strength (torque) of the DC brake (torque) is the “<div>■ ■</div> DC brake volume” but be careful because it does not operate when set to 0.</p>																				
■ ■	Brake start frequency	<p>This adjusts the frequency for starting to apply the positioning DC brake.</p> <p>• 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.</p> <p>• 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.</p>																				
■ ■	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																					
0	1.2kHz																					
1	2.6kHz																					
2	3.9kHz																					
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Setting value	Carrier frequency																					
4	8.0kHz																					
5	10.1kHz																					
6	12.0kHz																					
7	14.9kHz																					

■ Values set at ex-factory.

Detailed Explanation of Parameters

No.	Parameter name	Explanation
■ ■	Deceleration time	<p>This determines the rate of change of the output frequency when decelerating.</p> <ul style="list-style-type: none"> • <u>Sets the time that changes in 50 Hz.</u> • When set to 0 seconds, acceleration is at its optimum speed and deceleration will be 0.01 second. • When less than 3 seconds set to 0.01 sec intervals; When 3 to 9 seconds set to 0.1 sec intervals; When 10 or more seconds set to 1 sec intervals.
■ ■	No. 2 deceleration time	<p>This sets the deceleration time of the No. 2 Deceleration.</p> <p>This is valid when you select “ ■ ■ I5 Function Selection” in the ■ ■ ■ No. 2 Acceleration.</p>
■ ■	Not used	
■ ■	Not used	
■ ■	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 output voltage on the y-axis and output frequency on the x-axis. A line rises linearly from the origin to a point labeled 'Base frequency'. From this point, the line continues horizontally to the right. A double-headed arrow indicates the 'Adjustment range (30 ~ 400Hz)' for the horizontal portion of the line.</p>
■ ■	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 output voltage on the y-axis and output frequency on the x-axis. A line rises linearly from the origin to a point labeled 'Base frequency'. From this point, the line continues horizontally. A label '100 : Power supply voltage' points to the horizontal line. A double-headed arrow indicates the 'Adjustment range (0 ~ 100%)' for the horizontal portion of the line.</p>
■ ■	V/F reduction characteristics	<p>This adjusts the V/F characteristics to match the load characteristics.</p> <p>Rated torque load</p> <p>Reduction torque load</p>  <p>The graph shows output voltage on the y-axis and output frequency on the x-axis. A line rises linearly from the origin to a point labeled 'Base frequency'. From this point, the line continues horizontally. A label '1.0' points to the horizontal line. A label 'Large' points to the curve below the horizontal line.</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>

■: Values set at ex-factory.

No.	Parameter name	Explanation																			
<div><div><div>■ ■</div><div>■ ■</div><div>■ ■</div></div></div>	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 <div>■ ■</div> or the lower pattern <div>■ ■</div> set using the normal V/F and “No. 2 V/F base frequency” and “No. 2 V/F boost.”</p> <div><div><div>■ ■</div>Normal pattern</div><div><div>■ ■</div>Upper pattern</div><div><div>■ ■</div>Lower pattern</div></div> <div></div> <p>Note: This is valid only when you have selected “torque control” in the manual boost <div>■ ■</div>.</p>																			
<div><div><div>■ ■</div><div>■ ■</div><div>■ ■</div><div>■ ■</div><div>■ ■</div></div></div>	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 “<div>■ ■</div> Jump frequency width” above and below as the center of the frequency set by “<div>■ ■</div> Jump frequency 1” to “<div>■ ■</div> Jump frequency 4” in order to avoid mechanical resonance.</p> <div></div> <ul style="list-style-type: none">Acceleration time outputs the frequency even in the jump region.If jump frequency ranges are overlapped, it jumps all overlapping ranges.																			
<div><div><div>■ ■</div></div></div>	I1/I2 function selection	<p>This switches the input terminals “I1” and “I2” in the following manner.</p> <table><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><tr><td>■ ■ ■ ■</td><td>Forward Operation</td><td>Stop</td><td>Reverse Operation</td><td>Stop</td></tr><tr><td>■ ■ ■ ■</td><td>Operation</td><td>Stop</td><td>Reverse</td><td>Forward</td></tr></table> <p>(■ ■ ■ ■ : Fwd-Stop / Rev-Stop ■ ■ ■ ■ : Run-Stop / Fwd-Rev)</p>	Input terminal	Between “I1” and “G”		Between “I2” and “G”		Short	Open	Short	Open	■ ■ ■ ■	Forward Operation	Stop	Reverse Operation	Stop	■ ■ ■ ■	Operation	Stop	Reverse	Forward
Input terminal	Between “I1” and “G”			Between “I2” and “G”																	
	Short	Open	Short	Open																	
■ ■ ■ ■	Forward Operation	Stop	Reverse Operation	Stop																	
■ ■ ■ ■	Operation	Stop	Reverse	Forward																	

■: Values set at ex-factory.

Detailed Explanation of Parameters

No.	Parameter name	Explanation																							
<div><div><div></div><div></div></div><div></div></div>	I5 function selection Not used	<p>This selects the input terminals “I5” functions in the following manner.</p> <div><div><div></div><div></div><div></div><div></div></div> (FREE) : “Terminal” – “G” Short Free-run Stop</div> <div><div><div></div><div></div><div></div></div> (THeRmal) : “Terminal” – “G” External forced trip command</div> <div><div><div></div><div></div><div></div></div> (Up-Down) : “Terminal” – “G” short No. 2 acceleration and deceleration time selection</div> <div><div><div></div><div></div><div></div></div> (ReSeT) “Terminal” – “G” short Trip reset command</div> <p>Set the status of the short “Terminal” – “G” before selecting “ <div><div></div><div></div><div></div></div> .” When open, a trip occurs.</p>																							
<div><div><div></div><div></div></div><div></div></div>	Multi-speed input selection	<p>This selects the type of frequency setting for multi-speed operation.</p> <div><div><div></div><div></div><div></div><div></div></div> (1bit) : 1 bit input</div> <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>x</td><td>x</td><td>No. 1 speed frequency</td></tr><tr><td>Open</td><td>Short</td><td>x</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> <div><div><div></div><div></div><div></div></div> (Binary) : Binary input</div> <p>This selects the frequency by setting “Frequency setting selection terminals” in binary.</p> <div><ul style="list-style-type: none">• Open and short are related to “G” and terminals.• x means there is no relationship between short and open.</div>	Input terminals			Frequency setting	I3	I4	I5	Open	Open	Open	No. 0 speed frequency	Short	x	x	No. 1 speed frequency	Open	Short	x	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	x	x	No. 1 speed frequency																						
Open	Short	x	No. 2 speed frequency																						
Open	Open	Short	No. 3 speed frequency																						
<div><div><div></div><div></div></div><div></div></div>	Not used																								

■: Values set at ex-factory.

No.	Parameter name	Explanation																											
<div> <div> <div></div> <div></div> </div> <div> <div></div> <div></div> </div> </div>	Output signal 1 selection Not used	<p>This selects the output signal between output terminals “O1” to “O2” in the following manner.</p> <div> <div> <div></div> <div></div> <div></div> <div></div> </div> (TRIP) : Trip output signal (When trip: ON*) </div> <div> <div> <div></div> <div></div> <div></div> <div></div> </div> (STaBLe) : Arrival signal (When arrival: ON*) </div> <div> <div> <div></div> <div></div> <div></div> </div> (RUN) : Run/Stop signal (When run: ON*) </div> <div> <div> <div></div> <div></div> <div></div> <div></div> </div> (FREE) : Free-run signal (While Free-run: ON*) </div> <div> <div> <div></div> </div> (Fwd) : Forward operation signal (While forward operation: ON*) </div> <div> <div> <div></div> </div> (Rev) : Reverse operation signal (While reverse operation: ON*) </div> <div> <div> <div></div> <div></div> <div></div> <div></div> </div> (Check-F) : Output frequency detection signal Refer to: <div><div></div><div></div></div> Compare frequency A” and “<div><div></div><div></div></div> Compare frequency B” </div> <div> <div> <div></div> <div></div> <div></div> <div></div> </div> (Check-C) : Motor current detection signal Refer to “<div><div></div><div></div></div> Motor current detection level”* </div> <div> <div> <div></div> <div></div> <div></div> <div></div> </div> (DC-Brake) : DC brake signal (While DC brake: ON*) </div> <div> <div> <div></div> <div></div> <div></div> <div></div> </div> (CAUS) : Trip cause detection signal </div> <p>The following signals are output when a trip occurs.*</p> <table> <tr> <th>Trip contents</th><th>ON time</th><th>OFF time</th></tr> <tr> <td><div><div></div><div></div></div> Normal over-current</td><td>Continuous</td><td></td></tr> <tr> <td><div><div></div><div></div><div></div><div></div></div> Acceleration over-current</td><td>3 seconds</td><td>1 second</td></tr> <tr> <td><div><div></div><div></div><div></div><div></div></div> Deceleration over-current</td><td>1 second</td><td>3 seconds</td></tr> <tr> <td><div><div></div><div></div></div> Over-voltage</td><td>1 second</td><td>1 second</td></tr> <tr> <td><div><div></div><div></div></div> External forced trip</td><td>0.25 second</td><td>0.25 second</td></tr> <tr> <td><div><div></div><div></div><div></div></div> Electronic thermal</td><td>0.9 second</td><td>0.1 second</td></tr> <tr> <td><div><div></div><div></div><div></div></div> CPU error</td><td>0.1 second</td><td>0.4 second</td></tr> <tr> <td><div><div></div><div></div><div></div></div> Self-diagnosis</td><td>0.5 second</td><td>0.5 second</td></tr> </table> <p>* “<div><div></div><div></div></div> output signal 1 selection” can invert “<div><div></div><div></div></div> output signal 1 polarity selection.”</p>	Trip contents	ON time	OFF time	<div><div></div><div></div></div> Normal over-current	Continuous		<div><div></div><div></div><div></div><div></div></div> Acceleration over-current	3 seconds	1 second	<div><div></div><div></div><div></div><div></div></div> Deceleration over-current	1 second	3 seconds	<div><div></div><div></div></div> Over-voltage	1 second	1 second	<div><div></div><div></div></div> External forced trip	0.25 second	0.25 second	<div><div></div><div></div><div></div></div> Electronic thermal	0.9 second	0.1 second	<div><div></div><div></div><div></div></div> CPU error	0.1 second	0.4 second	<div><div></div><div></div><div></div></div> Self-diagnosis	0.5 second	0.5 second
Trip contents	ON time	OFF time																											
<div><div></div><div></div></div> Normal over-current	Continuous																												
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<div><div></div><div></div><div></div></div> Self-diagnosis	0.5 second	0.5 second																											

■: Values set at ex-factory.

Detailed Explanation of Parameters

No.	Parameter name	Explanation
<div> <div></div> <div></div> </div>	Relay output selection	<p>This selects the output signal when the relay output between “NC,” “C2” and “NO” is used. Trip output signal</p> <div> <div> <div></div> <div></div> <div></div> <div></div> </div> <div>(TRIP):Trip output signal (When trip: Between “NC” and “C2”: Open, Between “NO” and “C2”:Closed)</div> </div> <div> <div> <div></div> <div></div> <div></div> <div></div> </div> <div>(STaBLe):Arrival signal (When arrival: Between “NC” and “C2”: Open, Between “NO” and “C2”: Closed)</div> </div> <div> <div> <div></div> <div></div> <div></div> </div> <div>(RUN):Run/stop signal (When run: Between “NC” and “C2”: Open Between “NO” and “C2”: Closed)</div> </div> <div> <div> <div></div> <div></div> <div></div> <div></div> </div> <div>(FREE):Free-run signal (When free-run: Between “NC” and “C2”: Open, Between “NO” and “C2”: Closed)</div> </div> <div> <div> <div></div> </div> <div>(Fwd):Forward operation signal (When forward operation: Between “NC” and “C2”: Open, Between “NO” and “C2”: Closed)</div> </div> <div> <div> <div></div> </div> <div>(Rev):Reverse operation signal (When reverse operation: Between “NC” and “C2”: Open, Between “NO” and “C2”: Closed)</div> </div> <div> <div> <div></div> <div></div> <div></div> <div></div> </div> <div>(Check-F):Output frequency detection signal " <div></div> Compare frequency A," and Refer to " <div></div> Compare frequency B."</div> </div> <div> <div> <div></div> <div></div> <div></div> <div></div> </div> <div>(Check - C):Motor current detection signal Refer to " <div></div> Motor current detection level."</div> </div>
<div> <div></div> <div></div> </div>	Motor current detection level	<p>Set the current level you want to detect using a percentage for the rated current of the inverter when you selected " <div></div> Output signal 1 selection" and " <div></div> Relay output selection" in <div></div> . The output terminal will operate when the motor current exceeds the detection level you set and it will turn “OFF” when it is below.</p>
<div> <div></div> <div></div> </div>	Output signal 1 polarity selection	<p>This function inverts the polarity of the output signal between output terminals “O1” and “C1.”</p> <div> <div> <div></div> <div></div> <div></div> </div> <div>(NORmal): When operation: transistor “ON”</div> </div> <div> <div> <div></div> <div></div> <div></div> </div> <div>(REVerse): When operation: transistor “OFF”</div> </div>
<div> <div></div> <div></div> </div>	Current limit operating point	<p>This limits the operating point for the motor current that was set. Numbers are percentages for the inverter rated current.</p>

Values set at ex-factory.

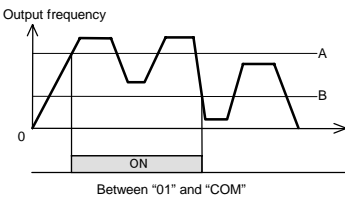
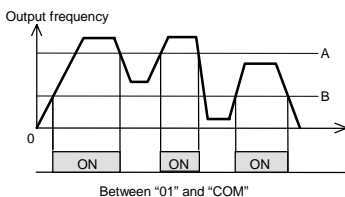
No.	Parameter name	Explanation
<div> <div></div> <div></div> </div>	Stall deceleration magnification	<p>This adjusts the deceleration time when the stall prevention function of the deceleration is operating.</p> <ul style="list-style-type: none"> Set in percentages for the deceleration time of the normal setting.
<div> <div></div> <div></div> </div>	Acceleration mode switch Deceleration mode switch	<p>This selects the straight line acceleration/deceleration or curved line (S) acceleration/deceleration independently.</p> <div> <div> <div></div> <div></div> <div></div> </div> Straight line </div> <div> <div> <div></div> <div></div> <div></div> </div> S Shape 1 </div> <div> <div> <div></div> <div></div> <div></div> </div> S Shape 2 </div>



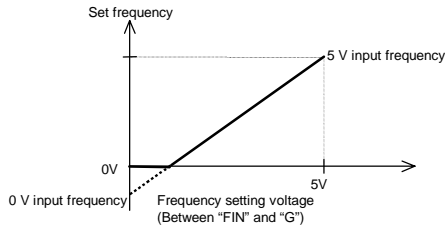


Values set at ex-factory.

Detailed Explanation of Parameters

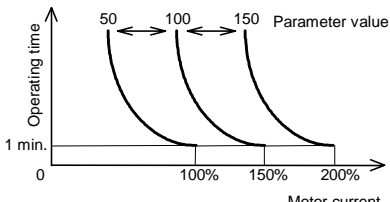
No.	Parameter name	Explanation
▪ ▪	Frequency meter adjustment	This calibrates the frequency meter. Adjust using the <input type="text"/> <input type="text"/> switches so that the needle on the frequency meter points at the full scale.
▪ ▪	Frequency meter full scale indication	This indicates the frequency 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.
▪ ▪	"FOUT" switch	This selects the frequency signal to output to the frequency output terminal "FOUT." <div style="margin-left: 40px;"> <input type="text"/> Frequency analog output <input type="text"/> Frequency digital output <input type="text"/> Current analog output </div>
▪ ▪ ▪ ▪	Compare frequency A Compare frequency B	<p>This sets the frequency to detect when you selected "▪ ▪ output signal 1 selection" and "▪ ▪ relay output selection" in the output frequency detection signal <input type="text"/>.</p> <ul style="list-style-type: none"> - The output signal is ON when the output frequency exceeds*1 "compare frequency A" and is OFF when it is less*1 than "compare frequency B." <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Between "01" and "COM"</p> <p>When A > B</p> </div> <div style="text-align: center;">  <p>Between "01" and "COM"</p> <p>When A < B</p> </div> </div> <p>* It does not turn ON or OFF if the difference of the output frequency and compare frequency does not exceed 1 Hz.</p>
▪ ▪	Match detection width	<p>This adjusts the timing to output the arrival signal during acceleration and deceleration when you selected "▪ ▪ output signal 1 selection" and "▪ ▪ relay output selection" in the <input type="text"/> arrival signal.</p> <ul style="list-style-type: none"> - 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 "▪ ▪ brake start frequency" < "match detection width."

Values set at ex-factory.

No.	Parameter name	Explanation
■ ■	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"> - This starts the output from the value that subtracted “Instantaneous drop frequency” from the output frequency of the instantaneous detection when power was restored. - 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.
■ ■	Instantaneous free-run time	This adjusts the free-run time after instantaneous stop or restoring power.
■ ■	Restart prevention when power is restored	This prevents restarting after an instantaneous stop or after power was restored by setting <input type="text"/> .
■ ■ ■ ■	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> <p><input type="text"/> (NO): Does not retry</p> <p><input type="text"/> ~ <input type="text"/> :Retries the set number of times</p> <ul style="list-style-type: none"> • Outputs a trip signal and stops when the set number of retries is reached but does not output the trip signal (when trip is “■ ■ output signal 1 selection” and “■ ■ relay output selection”) during a retry. <p>* The retry function is invalid when Restart prevention when power is restored is set to <input type="text"/>.</p>
■ ■	Frequency setting bias	<p>This sets the “0 V input frequency” of the frequency setting input terminal “FI.”</p> 
■ ■	Lower limit frequency	This sets the lower limit of the inverter output frequency.
■ ■	Upper limit frequency	This sets the upper limit of the inverter output frequency.
■ ■	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
▪ ▪	Over-voltage trip retry when power is turned on	<p>This displays the <input type="text" value="▪ ▪ ▪"/> and trips when an over-voltage trip occurs when turning on the power when you set to <input type="text" value="▪ ▪ ▪"/>.</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="▪ ▪ ▪"/> to <input type="text" value="▪ ▪"/> 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>
▪ ▪	Reverse prevention	This prevents the trouble caused by reversing when you set to <input type="text" value="▪ ▪ ▪"/> .
▪ ▪	Electronic thermal relay	<p>This adjusts the amount that the electronic thermal relay functions.</p> <ul style="list-style-type: none"> Set the percentage for the inverter's rated current. The operation panel display unit will flash when the motor current exceeds the set value. <p>It is necessary to check the ambient temperature when the setting is higher than the ex-factory setting.</p> 
▪ ▪	Trip cause clear	<p>This clears the cause of the trip.</p> <p><How to clear></p> <p>Use the <input type="text" value=""/> switch to switch the power supply with the setting <input type="text" value="▪ ▪ ▪"/> as it is.</p> <p>After the display extinguishes, it will be cleared when the power is turned back on. <input type="text" value="▪ ▪ ▪"/> will be displayed in the 4 digit LED.</p> <p>Switch the power supply again if the inverter does not operate in this state and use after turning on the power again.</p>
▪ ▪ ▪ ▪ ▪ ▪ ▪ ▪ ▪ ▪	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>
▪ ▪	Parameter initialization	<p>This initializes and returns all parameters to our standard ex-factory settings.</p> <p><How to initialize></p> <p>Use the <input type="text" value=""/> switch to switch the power supply with the setting <input type="text" value="▪ ▪ ▪"/> as it is.</p> <p>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.</p> <p>Switch the power supply again if the inverter does not operate in this state and use after turning on the power again.</p>

No.	Parameter name	Explanation
<div> <div></div> <div></div> </div>	Motor selection	Set the motor volume and polarity to use when you selected <div> <div></div> <div></div> <div></div> <div></div> </div> (slip frequency compensation control) using “ <div> <div></div> <div></div> </div> torque control.” * Select the motor when it is stopped.
<div> <div></div> <div></div> </div>	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.
<div> <div></div> <div></div> </div>	Automatic voltage regulation reference voltage	This selects the motor's rated voltage when using automatic voltage regulation.
<div> <div></div> <div></div> </div>	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.
<div> <div></div> <div></div> </div>	Parameter extraction	This extracts the parameter. Refer to “How to Extract Parameters” for details.
<div> <div></div> <div></div> </div>	Parameter lock	This locks the parameters that you set. <div> <div></div> <div></div> </div> Does not lock parameters <div> <div></div> <div></div> <div></div> </div> Locks all parameters. <div> <div></div> <div></div> <div></div> <div></div> </div> Locks parameters for which setting is unnecessary. • Setting to <div> <div></div> <div></div> <div></div> </div> locks all parameters and the <div> <div>MODE</div> <div></div> <div></div> </div> switches become invalid. None of the parameters can then be set. (<div> <div>RUN</div> </div> and <div> <div>STOP</div> </div> switches are valid) • Setting to <div> <div></div> <div></div> <div></div> <div></div> </div> allows setting of only the parameters selected by the “ <div> <div></div> <div></div> </div> parameter extraction.”
<div> <div></div> <div></div> </div>	Parameter copy	This copies parameters. <div> <div></div> <div></div> </div> Does not copy parameters. <div> <div></div> <div></div> <div></div> <div></div> </div> Reads parameters to panel. <div> <div></div> <div></div> <div></div> <div></div> </div> Writes parameters to main unit. <div> <div></div> <div></div> <div></div> <div></div> </div> Checks the content of parameters.
<div> <div></div> <div></div> </div>	Motor rated current	This sets the motor rated current when using the slip frequency compensation control. *1
<div> <div></div> <div></div> </div>	Motor current without load	This sets the motor current without load when using the slip frequency compensation control. *1

No.	Parameter name	Explanation
▪ ▪	Motor 1 primary resistance	Sets the motor 1 primary resistance when using slip frequency compensation control. ^{*1}
▪ ▪	Slip correction gain	Adjusts the slip correction gain when using slip frequency compensation control.
▪ ▪	Slip correction response time	Sets the slip correction response time when using slip frequency compensation control.

^{*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		M1S02 $\frac{2}{3}$ ***	M1S04 $\frac{2}{3}$ ***	M1S08 $\frac{2}{3}$ ***
Rated output	Applicable motor (kW) * ¹	0.2	0.4	0.75
	Output capacity (kVA) * ²	0.6	1.2	1.6
	Rated output current (A)	1.4 * ³	2.5 * ³	4.0 * ³
	Rated output voltage * ⁴	For 3-phase power source: 3-phase AC 200 to 230 V Single phase power source: Single 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: Single phase AC 200 to 240 V		
	Frequency	50/60Hz		
	Allowable voltage fluctuation	-15%, +10%		
	Allowable frequency fluctuation	± 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 accuracy	± 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 signal	DC0 to +5V, 0 to +10V		
	Voltage/Frequency characteristics	Base frequency: 30 to 400 Hz (1 Hz step), with reduced torque pattern		
	Rated overload current	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)		0.7	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.

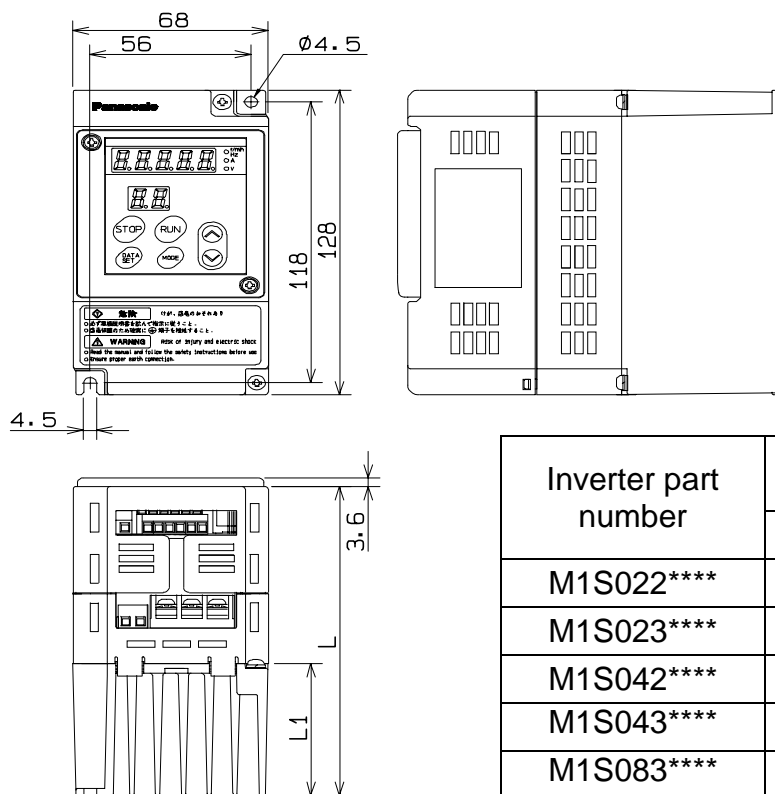
*³ Rated current is 90% if carrier frequency of 3 or 4 is selected.

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

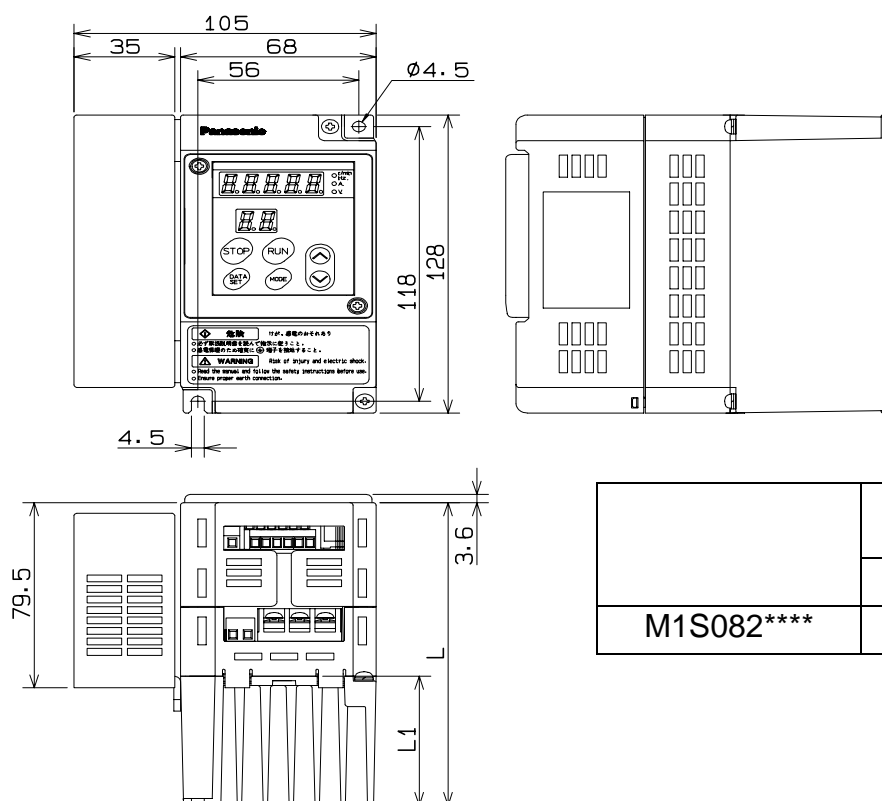
*⁴ Output voltage does not become higher than the power source voltage.

Outer Dimensions (Unit: mm) Dimensional tolerances: ± 2 mm

No. 1 frame



No. 2 frame



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}
▪ ▪	Setting frequency (0 speed)	0、 0.50 ~ upper limit frequency	0.01Hz ^{*2}	0Hz	
▪ ▪	1 st speed frequency	0、 0.50 ~ upper limit frequency	0.01Hz ^{*2}	50Hz	
▪ ▪	2 nd speed frequency	0、 0.50 ~ upper limit frequency	0.01Hz ^{*2}	30Hz	
▪ ▪	3 rd speed frequency	0、 0.50 ~ upper limit frequency	0.01Hz ^{*2}	15Hz	
▪ ▪	4 th speed frequency	0、 0.50 ~ upper limit frequency	0.01Hz ^{*2}	0Hz	
▪ ▪	5 th speed frequency	0、 0.50 ~ upper limit frequency	0.01Hz ^{*2}	0Hz	
▪ ▪	6 th speed frequency	0、 0.50 ~ upper limit frequency	0.01Hz ^{*2}	0Hz	
▪ ▪	7 th speed frequency	0、 0.50 ~ upper limit frequency	0.01Hz ^{*2}	0Hz	
▪ ▪	Not used			▪ ▪ - ▪	
▪ ▪	Not used			▪ ▪ - ▪	
▪ ▪	Not used			▪ ▪ - ▪	
▪ ▪	Not used			▪ ▪ - ▪	
▪ ▪	Not used			▪ ▪ - ▪	
▪ ▪	Not used			▪ ▪ - ▪	
▪ ▪	Not used			▪ ▪ - ▪	
▪ ▪	Not used			▪ ▪ - ▪	
▪ ▪	Run command selection	<div>▪ ▪ ▪</div> Operation panel <div>▪ ▪ ▪</div> Terminal block, <div>▪ ▪ ▪</div> Both		▪ ▪ ▪ ▪	
▪ ▪	Frequency command selection	<div>▪ ▪ ▪</div> Operation panel <div>▪ ▪ ▪</div> Volume <div>▪ - ▪</div> 0 ~ 5V <div>▪ - ▪ ▪</div> 0 ~ 10V		▪ ▪ ▪	
▪ ▪	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}
	Torque control	0 ~ 100	2	40	
		<input type="checkbox"/> Automatic boost (standard)			
		<input type="checkbox"/> Slip correction control			
	Jogging frequency	0, 0.5 ~ 30 Hz	0.01 Hz	7 Hz	
	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	
	No. 2 acceleration time			5 sec	
	Not used			<input type="checkbox"/> - <input type="checkbox"/>	
	Not used			<input type="checkbox"/> - <input type="checkbox"/>	
	DC brake volume	0 ~ 100%	2	94	
	DC brake time	Case of <input type="checkbox"/> : 0 ~ 3 sec	0.05 sec	0.5 sec	
		Case of <input type="checkbox"/> : 0 ~ 6 sec	0.1 sec	1.0 sec	
	DC brake selection	<input type="checkbox"/> Positioning		<input type="checkbox"/>	
		<input type="checkbox"/> Sudden stop			
	Starting brake time	0 ~ 3 sec	0.05 sec	0 (non-operational)	
	Brake start frequency	0.50 ~ 400 Hz	0.01 Hz ^{*2}	3 Hz	
	Carrier frequency variable	0,1,2,3,4,5,6,7 ^{*2}		2	
	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	
	Not used			5 sec	
	Not used			<input type="checkbox"/> - <input type="checkbox"/>	
	No. 4 deceleration time			<input type="checkbox"/> - <input type="checkbox"/>	
	Base cycle	30 ~ 400 Hz	1 Hz	60 Hz	
	Max. output voltage adjustment	0 ~ 100%	1	100	
	V/F reduction characteristics	1.0 ~ 2.0 squared	0.1	1.0	
	No. 2 V/F selection	<input type="checkbox"/> No selected (usually V/F pattern)		<input type="checkbox"/>	
		<input type="checkbox"/> Upper selection			
		<input type="checkbox"/> Lower selection			
	No. 2 V/F base frequency	30 ~ 400 Hz	1 Hz	60 Hz	
	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.

^{*2} 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}
■ ■	Jump frequency width	0、0.50 ~ 400 Hz	0.01 Hz ^{*2}	0 Hz	
■ ■	Jump frequency	0、0.50 ~ 400 Hz	0.01 Hz ^{*2}	0 Hz	
■ ■	Jump frequency	0、0.50 ~ 400 Hz	0.01 Hz ^{*2}	0 Hz	
■ ■	Jump frequency	0、0.50 ~ 400 Hz	0.01 Hz ^{*2}	0 Hz	
■ ■	Jump frequency	0、0.50 ~ 400 Hz	0.01 Hz ^{*2}	0 Hz	
■ ■	I1/I2 function selection	<div>■ ■ ■ ■</div> I1: Forward/Stop, I2: Reverse/Stop <div>■ ■ ■ ■</div> I1: Run/Stop, I2: Forward/Reverse		■ ■ ■ ■	
■ ■	I5 function selection	<div>■ ■ ■ ■</div> Free-run, <div>■ ■ ■ ■</div> External forced		■ ■ ■ ■	
■ ■	Not used	<div>■ - ■</div> No. 2 acceleration/deceleration <div>■ ■ ■ ■</div> Trip reset			
■ ■	Multi-speed input selection	<div>■ ■ ■ ■</div> 1 bit <div>■ ■ ■ ■</div> Binary		■ ■ ■ ■	
■ ■	Not used				
■ ■	Output signal selection	<div>■ ■ ■ ■</div> Trip、 <div>■ ■ ■ ■</div> Arrival <div>■ ■ ■ ■</div> Running <div>■ ■ ■ ■</div> Free-run <div>■ ■ ■ ■</div> Forward、 <div>■ ■ ■ ■</div> Reverse		■ ■ ■ ■	
■ ■	Not used	<div>■ ■ ■ ■</div> Output frequency detection <div>■ ■ ■ ■</div> Motor current detection <div>■ ■ ■ ■</div> Trip cause <div>■ ■ ■ ■</div> DC brake		■ ■ ■ ■	
■ ■	Relay output signal selection *Effective only when relay output terminals NC, C2 or NO are used.	<div>■ ■ ■ ■</div> Trip、 <div>■ ■ ■ ■</div> Arrival <div>■ ■ ■ ■</div> Running <div>■ ■ ■ ■</div> Free-run <div>■ ■ ■ ■</div> Forward、 <div>■ ■ ■ ■</div> Reverse <div>■ ■ ■ ■</div> Output frequency detection <div>■ ■ ■ ■</div> Motor current detection		■ ■ ■ ■	
■ ■	Motor current detection level	50 ~ 150%	5%	100%	
■ ■	Output signal polarity selection	<div>■ ■ ■ ■</div> Forward polarity, <div>■ ■ ■ ■</div> Reverse polarity		■ ■ ■ ■	

^{*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}
■ ■	Current limit operation point	50 ~ 200%	10%	180%	
■ ■	Stall time deceleration power	1, 2, 4, 8, 16		8	
■ ■	Acceleration mode switching	<input type="text"/> Straight line	<input type="text"/> S-curve	<input type="text"/>	
■ ■	Deceleration mode switching	<input type="text"/> S-curve		<input type="text"/>	
■ ■	Monitor mode switching	<input type="text"/> Set frequency <input type="text"/> Output frequency <input type="text"/> DC voltage <input type="text"/> Output current		<input type="text"/>	
■ ■	Display power	0.1 ~ 60.0	0.1	1.0	
■ ■	Frequency meter adjustment	-	-	-	
■ ■	Frequency meter full scale indication	0 ~ 400 Hz	1 Hz	60 Hz	
■ ■	FOUT switching	<input type="text"/> Digital <input type="text"/> Analog		<input type="text"/>	
■ ■	Comparison frequency A	0, 0.50 ~ 400 Hz	0.01 Hz ^{*2}	0 Hz	
■ ■	Comparison frequency B	0, 0.50 ~ 400 Hz	0.01 Hz ^{*2}	0 Hz	
■ ■	Agreement detection width	0, 0.50 ~ 400 Hz	0.01 Hz ^{*2}	3 Hz	
■ ■	Reduced frequency at instantaneous stop	0, 0.50 ~ 400 Hz	0.01 Hz ^{*2}	3 Hz	
■ ■	Instantaneous stop free-run time	1, 2, 3, 4, 5	1	1	
■ ■	Restart prevention when power is restored	<input type="text"/> Restart <input type="text"/> Restart prevention		<input type="text"/>	
■ ■	Retry selection	<input type="text"/> No retry <input type="text"/> ~ <input type="text"/> Retry No. of set times		<input type="text"/>	
■ ■	Retry start time	0 ~ 120 sec	2 sec	4 sec	
■ ■	Frequency setting bias	0 ~ -50 Hz	0.01 Hz	0 Hz	
■ ■	Lower limit frequency	0, 0.5 ~ 400 Hz	0.1 Hz	0 Hz	
■ ■	Upper limit frequency	0, 0.5 ~ 400 Hz	0.1 Hz	60 Hz	
■ ■	Constant for input filter	1, 2, 3, 4, 5		1	
■ ■	Over-current trip retry when power is turned on	<input type="text"/> No retry <input type="text"/> Retry		<input type="text"/>	
■ ■	Reverse prevention	<input type="text"/> Reverse <input type="text"/> Reverse prevention		<input type="text"/>	
■ ■	Electronic thermal relay	30 ~ 150%, <input type="text"/>	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}
▪ ▪	Trip cause clear	▪ ▪	▪ ▪ ▪	▪ ▪	
▪ ▪	Trip cause	-	-	-	
▪ ▪	Trip cause	-	-	-	
▪ ▪	Trip cause	-	-	-	
▪ ▪	Trip cause	-	-	-	
▪ ▪	Trip cause	-	-	-	
▪ ▪	Parameter initialization	▪ ▪	▪ ▪ ▪	▪ ▪	
▪ ▪	Motor selection	▪ ▪ ▪ ▪ Motor capacity ^{*2} No. of motor poles		4 poles, inverter capacity ^{*3}	
▪ ▪	Start-up starting frequency	0.50 ~ 10 Hz	0.01 Hz	1	
▪ ▪	Automatic voltage adjustment reference voltage	200,220,230,240V		200	
▪ ▪	Automatic voltage adjustment selection	▪ ▪ No automatic voltage adjustment ▪ ▪ ▪ ▪ Automatic voltage adjustment ▪ ▪ ▪ ▪ - No automatic voltage adjustment only when decelerating		▪ ▪	
▪ ▪	Parameter lock	▪ ▪ No parameter lock ▪ ▪ ▪ All parameters locked ▪ ▪ ▪ ▪ Parameters that don't need to be set locked		▪ ▪	
▪ ▪	Parameter copy	▪ ▪ Parameters not copied ▪ ▪ ▪ ▪ Parameters read-out to panel side ▪ ▪ ▪ ▪ ▪ Parameters written in inverter side ▪ ▪ ▪ ▪ ▪ Parameter contents checked		▪ ▪	
▪ ▪	Motor rated current	0 ~ 100A	0.1	*	
▪ ▪	Motor current without load	0 ~ 100A	0.1	*	
▪ ▪	Motor primary resistance	0 ~ 100	0.01	*	
▪ ▪	Slip correction gain	0, 1, 2, 3, 4, 5, 6, 7		4	
▪ ▪	Slip correction response time	0, 1, 2, 3, 4, 5, 6, 7		1	
▪ ▪	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.

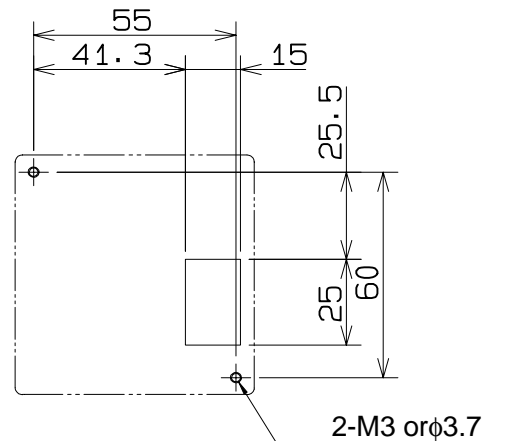
Optional Parts

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

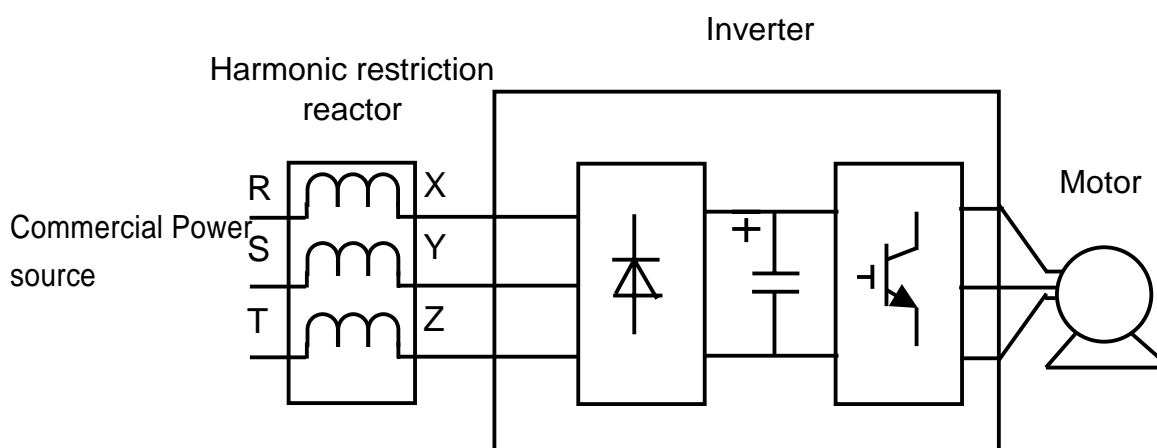
Optional part number	Specifications	Power source voltage
DV0P23501	60 W/200 Ω	200 V
DV0P23502	60 W/50 Ω	100 V

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)

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		

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