

ADVANCED AND EVER ADVANCING MITSUBISHI ELECTRIC

# MITSUBISHI

## General Purpose Inverter

### FREQROL-U<sub>120S</sub>-ER

*European version*

## Instruction Manual

Thank you for purchasing the Mitsubishi general purpose inverter FREQROL-U100.  
For safe operation, please read this manual thoroughly before using.

**Warning symbols** For your own safety please pay special attention to instructions containing these symbols :



This warning symbol indicates the presence of dangerous voltage. It informs you of high voltage conditions, situations and locations that may cause death or serious injury if you do not follow precautions.



This symbol indicates a general warning.

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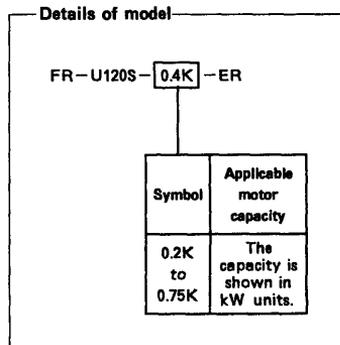
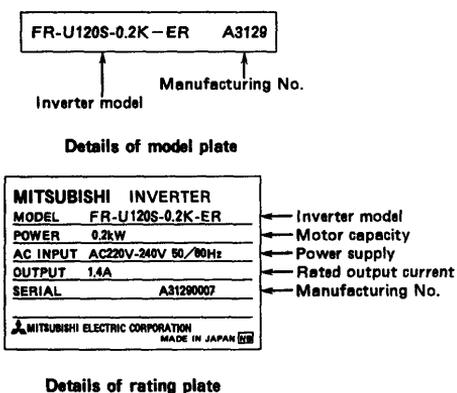
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# 1. Inspection at delivery

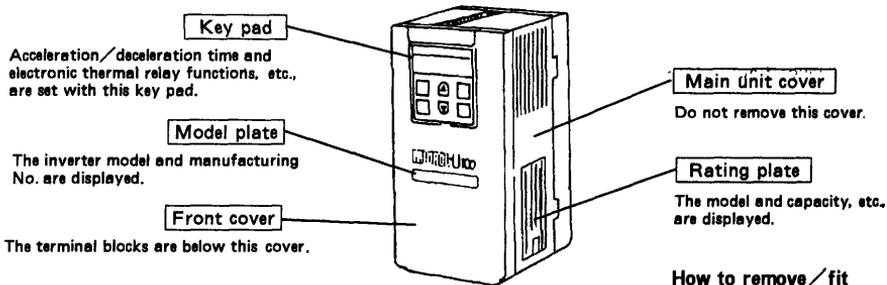
Confirm the following points when unpacking the device.

- (1) Check the model plate on the front of the inverter and the rating plate on the side and check that the delivered device is the same as that ordered.
- (2) Check for damage caused during shipment.

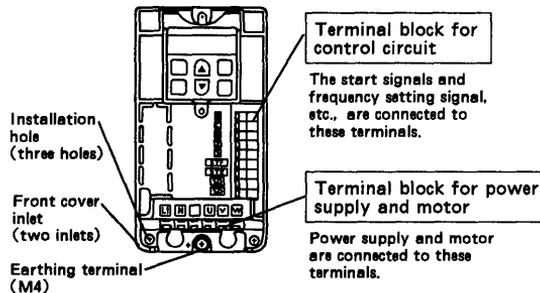
If there are any unclear points or damage is found in the device, please contact the place of purchase or your nearest Mitsubishi dealer.



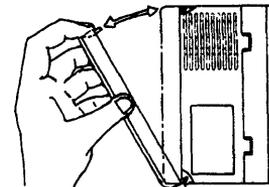
## 2. Names and functions of each part



View with front cover removed



How to remove / fit front cover



Installation clasps (two clasps)

The cover can be removed by pushing the top and pulling it forward. To mount the cover, insert the two installation clasps on the bottom of the cover into the inlets on the main unit cover, and press on the cover.

### 3. Installation

- **Install the inverter vertically.**

Non-vertical installation methods will cause the inverter's heat dissipating effect to decrease, and may cause unforeseen problems and breakdowns.



Right  
Vertical  
installation



Wrong  
Horizontal  
installation



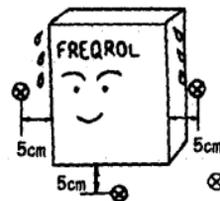
Wrong  
Sideways  
installation

- **Keep the ambient temperature within the permissible temperature range.**

If the inverter's ambient temperature rises due to installation near a heat generating object or installation in a panel will cause the inverter life to decrease remarkably.

Take cooling methods and panel dimensions into consideration when installing the inverter in a panel.

- Tolerable ambient temperature : -10 to 50°C
- Points for measuring ambient temperature

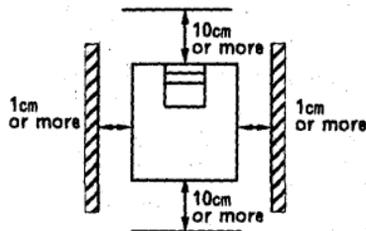


⊗ Measurement position

**Note :** The inverter was designed for use in separately earthed enclosure.

Precautions must therefore be taken at point of installation to minimise risk of hazard to users.

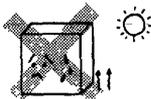
- **Ambient space**



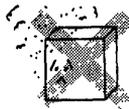
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● **Avoid installation in the following places**

- Where the inverter is subject to direct sunlight
- Humid places



- Places contaminated with oil mist, dust, lint or corrosive gases. Where the inverter is subject to wind containing salt.

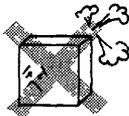


- Places that vibrate

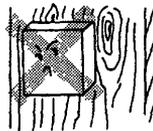


Avoid dollies and press machines, etc.

- Places where explosive gases exist.



- Installation on flammable material such as wood.



## 4. Wiring

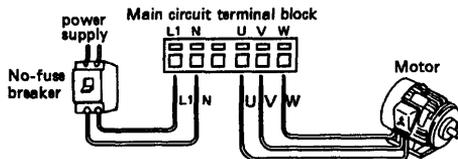
### ■ Precautions for wiring

Pay attention to the following items during wiring to prevent hazard to users, and current mistaken safety.

#### *Precautions for wiring*

- (1) If power is applied on the inverter output terminals(U, V and W), the inverter will be damaged. Never wire the power supply to these terminals.
- (2) Use a shield or twisted wire for the wiring to the control circuit terminal, and separate the wires from the main circuit or power distribution circuit (200V relay sequence circuit, etc.).
- (3) Cover the slits on the inverter so that the wire waste does not enter the inverter during wiring.
- (4) Confirm that the display lamp on the key pad has gone out before changing the wiring after operation, and wait at least two minutes before starting.
- (5) Use correctly rated control switches etc., according to IEC.

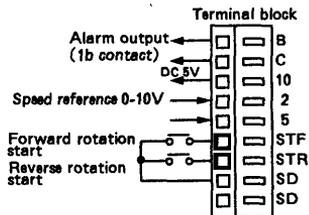
### ■ Connecting power supply and motor



Always connect the power supply wires to L1 and N. Never connect to U, V and W as the inverter will be damaged. (The phases do not need to be matched.)

Connect the motor to U, V and W. The motor rotation direction will be counterclockwise looking from the load shaft when the wires are connected as shown above and the forward rotation switch (signal) is turned on.

### ■ Connecting control signals



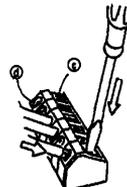
### Connection of main circuit terminals



Insert the flat-blade screwdriver into the upper hole ①, and insert the power supply wire into ② while pressing the screwdriver in the direction of the arrow. Remove the screwdriver when the wire has been inserted.

(Note) Use a small flat-blade screwdriver (blade width between 2.5 and 3mm).

### Connection of control circuit terminals



Insert the flat-blade screwdriver into the right hole ①, and insert the wire into ② while pressing the screwdriver in the direction of the arrow. Remove screwdriver when the wire has been inserted.

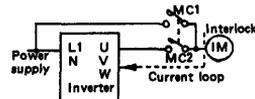
### ■ Wire size and stripping length

	Main circuit (Note 1)	Control circuit
Wire size	Solid wire : 2 mm <sup>2</sup> Strand : 2 mm <sup>2</sup>	Solid wire : $\phi$ 0.4 to $\phi$ 1.0 mm Strand : 0.3 to 0.75 mm <sup>2</sup>
Wire sheath peeling length	5 to 6 mm	8 to 10 mm

(Note) All wires are inserted into the terminal block excluding the grounding terminal.  
Connect with rod terminals or with only wire instead of using crimp terminals.  
(When using strands, make sure that the strands do not loosen; twist & solder.)  
Use a crimp terminal for only the grounding terminal.

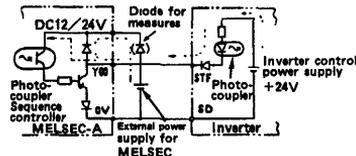
### *Details to be checked in wiring planning*

- (1) When the circuit has current loop in the power supply due to a bad connection as well as to a commercial bypass circuit as shown on the right, the inverter will be damaged. Always make an electrical and mechanical interlock for MC1 and MC2.
- (2) If a power failure occurs and the start signal (start switch) is retained, the inverter will automatically resume operation when the power is restored. If the machine must be prevented from restarting with power restoration, install a magnetic contactor MC on the primary side of the inverter, and make a sequence to prevent the start signal from turning ON.
- (3) Use two contacts in parallel or a twin contact to prevent an imperfect contact for the input signal of the control circuit.
- (4) Do not input a voltage on the contact input terminal (STF, etc.) of the control circuit.
- (5) Do not apply the voltage directly onto the alarm output signal terminal (B, C). Pass the voltage through a relay coil or ramp.
- (6) When directly connecting the open collector output such as that from a sequence controller into the inverter input terminal, make sure that a backflow current does not occur.



#### \*Countermeasures

- (1) Insert a diode to prevent the backflow current.
- (2) Use an all-point isolated type output unit. (Ex. AY40A, etc.)
- (3) The external power supply voltage must be higher than the inverter's control power supply.

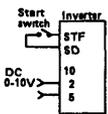


**⚠ CAUTION :** Removal of cover when unit is powered gives access to high voltages.  
Please isolate inverter from power before performing any adjustments to wiring, etc.  
Wait at least 3 minutes after isolation before removing front cover.

## 5. Operation

### ■ Operation methods

The following operation methods can be used. Select the method according to the application and operation specifications.

Operation method	Details	Remarks
Operation with key pad	Starting/stopping with key pad, direct setting of operation frequency with key pad.	The device is set for this operation when the power is turned on after initial installation. (Factory setting)
Operation with external input signal	Start with external switch and operation frequency is adjusted with the external frequency setter connected to the inverter control terminal.	
Combined use of Operation with external input signals and key pad. (Refer to Pr.79)	Start with external switch and setting of operation frequency with key pad.	The external frequency setter and key pad RUN and STOP keys are not accepted.
	Setting of operation frequency with external frequency setter, starting/stopping with key pad.	The external start switch does not function.

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### Operation with key pad

The key pad operation (parameter No. 79 "1" ) is selected as the factory setting.

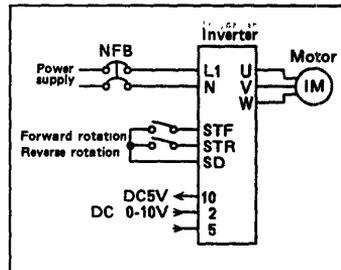
-  ..... Frequency setting mode is entered.
-   ..... Set frequency is changed.
-  ..... Set frequency is fixed.
-  ..... Motor starts (forward rotation) (Note).
-  ..... Motor stops.

**(Note)**

To drive the motor in the reverse direction with the  key, short-circuit between STR and SD on the terminal block, or set parameter No.78 to "2".

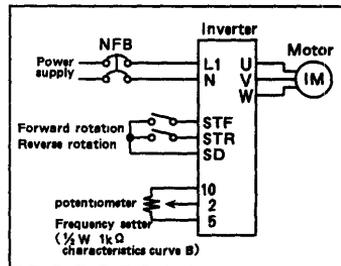
### Operation with external input signal

- Set external operation (parameter No.79 "2").  
(Refer to the following explanation for the setting method.)  
The start signals and frequency is input from an external device. The motor will operate when a signal is input into STF (forward rotation) or STR (reverse rotation) and the frequency setter is operated.

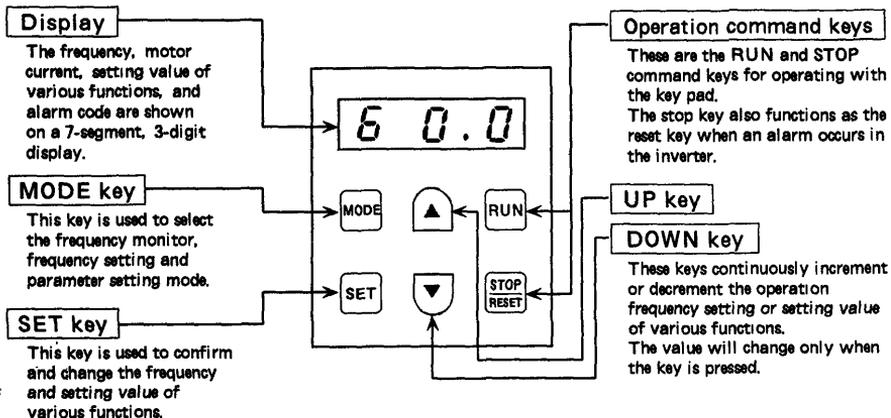


OR

- Set external operation (parameter No.79 "2").  
(Refer to the following explanation for the setting method.)  
Set a value "100" on parameter No.22 to get 50Hz output at maximum setting of potentiometer. The start signal and frequency is input from an external device. The motor will operate when a signal is input into STF (forward rotation) or STR (reverse rotation) and turn the potentiometer connected on terminal 10, 2 and 5.

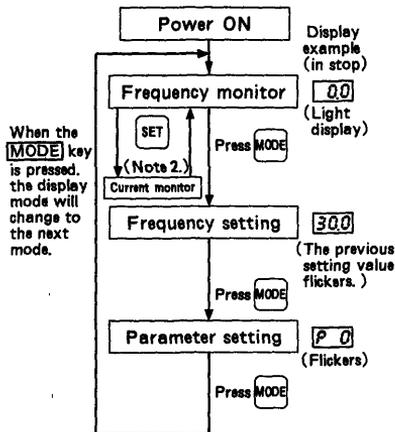


## ■ How to use the key pad



**⚠ CAUTION :** Never use any sharp or pointed object to depress the keys of the key pad.  
This has been designed only for use with human fingers.

## ■ Monitor and parameter settings



### Monitoring method

**50.0** ..... The output frequency is displayed.  
 ↓ ↓ Hold down **SET**.  
 The output current will display only  
**1.7** ..... while the **SET** key is pressed.  
 (The display shows 1.7A)

### Frequency setting method

(To change set frequency from 30Hz to 60Hz)

**30.0** ..... Display the set frequency. (When set to 30Hz)  
 ↓ : Change the setting with the UP or DOWN key.  
**60.0** ..... Adjust the frequency. (To set to 60Hz)  
 ↓ **SET** (The display will flicker until the setting is completed.)  
**F 60.0** ..... Complete the frequency setting.  
 Flickers alternately.

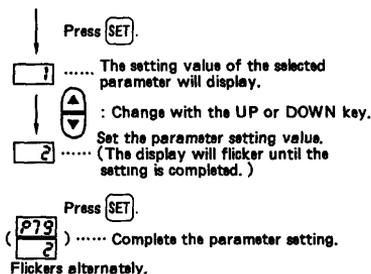
### Parameter setting method

(To change operation mode to external operation)

Display the parameter setting mode with the **MODE** key.  
**P 0** ..... Parameter number  
 ↓ : Change with the UP or DOWN key. (Note 1.)  
**P 9** ..... Set the parameter number.  
 (To set to operation mode)

(Note)

- 1) The parameter numbers will display in order with each press of the UP or DOWN keys.  
(PO will display if the UP key is pressed when CLr is displayed.)
- 2) The current monitor displays only when the SET key is pressed in the frequency monitor mode.



● When alarm (Er 1 to 3) is displayed

(The alarm can be canceled by pressing the mode key. The error will not be canceled when RESET is pressed.)

Alarm display	Type	Details
Er1	Write prohibit alarm	Writing was attempted during the pr.77 "1" state (write prohibit)
Er2	Write alarm during operation	Pr.79 was rewritten or all clear was executed during operation.
Er3	Calibration error	The calibration value for C-2 and C-3 was too close. *

\* The calibration error will occur if the difference of the input voltage for the C-2 to C-3 calibration value is approximately 0.5V or less.

## 6. Functions

### ■ List of functions

Function No. (parameter)	Function name	Setting range	Setting unit	Default setting	Factory setting
0	Torque boost (manual)	0 to 15%	1 %	6 %	6 %
1	Upper limit frequency	0 to 120 Hz	1 Hz	120 Hz	120%
2	Lower limit frequency	0 to 80 Hz	1 Hz	0 Hz	0 %
3	V/F (base frequency)	50 to 120 Hz	1 Hz	80 Hz	50 Hz
7	Acceleration time	0, 0.1 to 999 sec.	0.1 sec.	5.0 sec	5.0 sec
8	Deceleration time	0, 0.1 to 999 sec.	0.1 sec.	5.0 sec	5.0 sec
9	Electronic thermal relay	0 to 15A	0.1 A	Rated current	Rated current
10	PWM mode	0 to 15	1	3	3
11	DC injection braking operation time	0 to 10 sec.	0.1 sec.	0.5 sec.	0.5 sec
12	DC injection braking voltage	0 to 15%	1 %	8 %	8 %
20	Acceleration/deceleration reference frequency	1 to 120 Hz	1 Hz	80 Hz	50 Hz
21	Frequency setting voltage bias	0 to 80 Hz	1 Hz	0 Hz	0 Hz
22	Frequency setting voltage gain	0 to 120 Hz	1 Hz	80 Hz	50 Hz
23	Stall prevention operation level	0 to 10	1	5	5
77	Parameter write prohibit selection	0, 1	1	0	0
78	Reverse rotation prevention selection	0, 1, 2	1	0	0
79	Operation mode selection	1, 2, 3, 4	1	1	1
CLr	Parameter clear/correction	0, 1, 2	1	0	0

## ■ Detailed Explanation of functions

### ● Torque boost (manual) 0

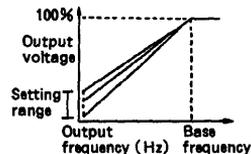
The low speed motor torque can be adjusted to suit the load.

(Note)

If the setting value is too large the electronic thermal relay may operate.

\* Factory setting

Torque boost (manual) ..... 6 %



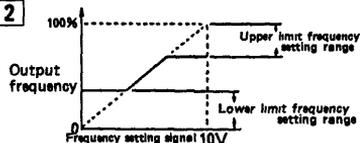
### ● Upper limit frequency 1 ● Lower limit frequency 2

The upper and lower limit clamps of the output frequency can be set.

\* Factory setting

Upper limit frequency ..... 120Hz

Lower limit frequency ..... 0 Hz

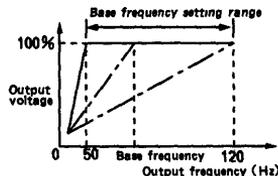


### ● V/F (base frequency) 3

The base frequency (reference frequency during motor rated torque) can be set between 50 and 120Hz according to the motor rating.

\* Factory setting

V/F (base frequency) ..... 50Hz



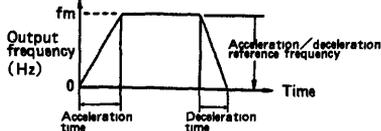
- Acceleration time **7**
- Deceleration time **8**

- Acceleration/deceleration reference frequency **20**

These can be set between 0.1 and 999 seconds.

The time (ratio) is shown until the frequency (fm) set in "Acceleration/deceleration reference frequency" **20** is reached.

If the acceleration/deceleration time is set to 0, the time will be 0.04 seconds.



\* Factory setting

Acceleration time .....	5.0 sec.
Deceleration time .....	5.0 sec.
Acceleration/deceleration reference frequency .....	50Hz

- Electronic thermal relay **9**

The setting value can be set as a current value (A) for the motor's overheating protection. Optimum protection characteristics, including a drop in the motor cooling performance at low speed operation, are automatic. The motor protection function will not operate when set to 0 (A). (The output transistor protection function will operate.) Set the motor rating current at 50Hz for the setting value.

\* Factory setting ..... (Inverter rated output current)

- PWM mode **10**

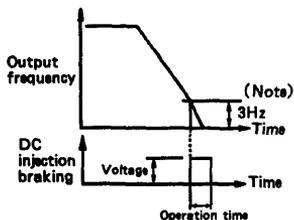
The motor tone can be selected and the vibration caused by oscillation can be decreased by changing the carrier frequency. Available in sixteen settings.

\* Factory setting ..... 3

(Note 1) The motor tone will increase in pitch when the setting value is increased.

● DC injection braking operation time **11**

By setting the DC injection braking torque (voltage) during stopping and the operation time, the stopping precision for positioning operation, etc., can be adjusted to the load.



● Frequency setting voltage bias **21**

● Frequency setting voltage gain **22**

The output frequency (ratio) for the reference signal (DC 0 to 10V) can be set freely.

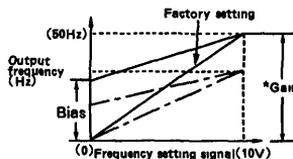
(Note)

The DC injection braking operation frequency is fixed to 3Hz. Set the operation time to "0" to prevent the DC injection braking.

\* Factory setting

(DC injection braking voltage) ..... 8 %

(DC injection braking operation time) ... 0.5 sec.



\* When setting the bias and gain, the reference signal is not necessary.

● Stall prevention operation level **23**

An overload (excessive torque) can be prevented when driving a motor with a capacity smaller than the inverter by changing the stall prevention operation current level. This will also function during acceleration/deceleration. The operation current level is set with codes.

Setting value	Operation level	Setting value	Operation level	Setting value	Operation level
1	110%	5	150%	9	190%
2	120%	6	160%	10	200%
3	130%	7	170%	0	Stall prevention is not activated.
4	140%	8	180%		

\* Factory setting ..... 5 (150%)

• The operation level % indicates the ratio to the inverter rated output current

● Parameter write prohibit selection **77**

Writing-in of every function with the key pad can be prohibited.

Setting value	Write prohibition function
0	Parameter writing permitted (during operation and stop)
1	Parameter write prohibited (Note)

\* Factory setting ..... 0

(Note)

Parameter No. 77 can be written in. Er1 will display when writing of other parameters is attempted.

● **Reverse rotation prevention selection** 78

This is set to prevent reverse operation from trouble caused by mistaken input of the start signal.

Setting value	Rotation direction
0	Both forward/reverse rotation
1	Reverse rotation prohibited
2	Forward rotation prohibited (Note)

(Note)

The inverter will drive the motor in reverse with the RUN key when set to "2".  
\* Factory setting ..... 0

Both key pad operation and external operation are valid.

● **Operation mode selection** 79

The inverter operation modes include operation with external signals and operation with key pad operation. Operation can be limited to one mode or can be carried out with both modes.

Setting value 1	Operation only with key pad
Setting value 2	Operation only with external signals
Setting value 3	Operation frequency ... Set with key pad (direct setting or ▲▼ keys) Start signal ... External signal input (STF, STR terminals)
Setting value 4	Operation frequency...External signal input (DC0 to 10V between terminals2-5) Start signal ... Input with key pad (RUN key)

(Note)

\* Factory setting ..... 1

1. This parameter cannot be rewritten during operation. Er2 will display if writing is attempted.
2. Setting values 3 and 4 are set to use the external signals and key pad operation for the operation frequency setting and start signals.
3. When set to 3, the frequency set with the key pad will be applied and will not be an analog signal.
4. When set to 4, the operating frequency will be an analog signal.

● Parameter clear/calibration **CLR**

The parameter-all-clear or frequency setting signal calibration mode can be selected. The parameters cannot be cleared during operation, and Er2 will display.

Setting value	Details
0	Not executed.
1	Parameters are all cleared (initialized). *
2	Frequency setting signal calibration mode is selected.

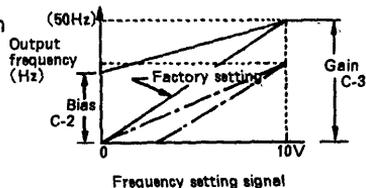
\* Parameter No. 21, 22, 77 cannot be cleared.

- The following adjustment can be performed by selecting the calibration mode (setting value 2).

**C-2** Display: Frequency setting voltage bias  
(Pr.21 will be rewritten automatically.)

**C-3** Display: Frequency setting voltage gain  
(Pr.22 will be rewritten automatically.)

If the gain and bias values are close, a write alarm will occur (Er3 displays)



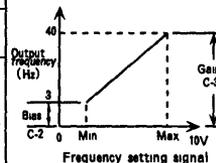
○ Example of parameter-all-clear/calibration operation

- (1) To clear all Parameters  
 (2) To change calibration mode [C-2], [C-3]

	Selection of display mode	Selection of function number	Read out of current value
Key operation	MODE → MODE	→ ▾ →	SET
Display	500 P 0	[C-2]	0

(1) To clear all Parameters

Change to 1	Write in
▲	SET
!	[C-2]
	↑ Displays alternately ↓
	!



(2) To change [C-2] from 0Hz to 3Hz

Change to 2	Write in (Select calibration mode)	Read out of current value	Change to 3Hz	Write in
▲▲	SET	SET	▲ Changes while held down	SET
2	[C-2]	0	3 * 1	[C-2]
				↑ Displays alternately ↓
				3

\* 1 Turn potentiometer to minimum



To change [C-3] from 50Hz to 40Hz

Write in (Select calibration mode)	Read out of current value	Change to 40Hz	Write in
SET	SET	▾ Changes while held down	SET
[C-3]	50.0	40.0 * 2	[C-3]
			↑ Displays alternately ↓
			40.0

\* 2 Turn potentiometer to maximum



## 7. Specifications

### ■ Standard specifications

Model FR-U120S-□-ER		0.2K	0.4K	0.75K
Applicable motor capacity (kW) *1		0.2	0.4	0.75
Output	Rated capacity (kVA) *2	0.6	1.0	1.7
	Rated output current (A)	1.4	2.4	4.1
	Overload current rating *3	150% 60 sec. 200% 0.5 sec. (reverse time characteristic)		
	Rated output voltage *4	3-phase 220 to 240V		
Power supply	Rated input AC voltage	Single-phase 220 to 240V 50/60Hz		
	Tolerable AC voltage fluctuation	198 to 264V 50/60Hz		
	Tolerable frequency fluctuation	± 5 %		
	Power supply capacity (kVA) *5	0.9	1.5	2.5
Protective structure		Semi-closed type (IP20)		
Cooling method		Self-cooling		
Weight (kg)		0.7	0.9	1.7

#### (Note)

- \*1. The maximum applicable capacity is for a Mitsubishi standard 4P motor. 6P motors drawn high current, so check the current rating carefully.
- \*2. The rated capacity is shown for an output voltage of 240V.
- \*3. The overload current value % shows the ratio to the inverter's rated output current.
- \*4. The output voltage cannot exceed the power supply voltage.
- \*5. The power capacity will differ according to the impedance on the power supply side (including reactor and power wires on input side). Prepare a power supply capacity higher than the noted value.

### ■ Common specifications

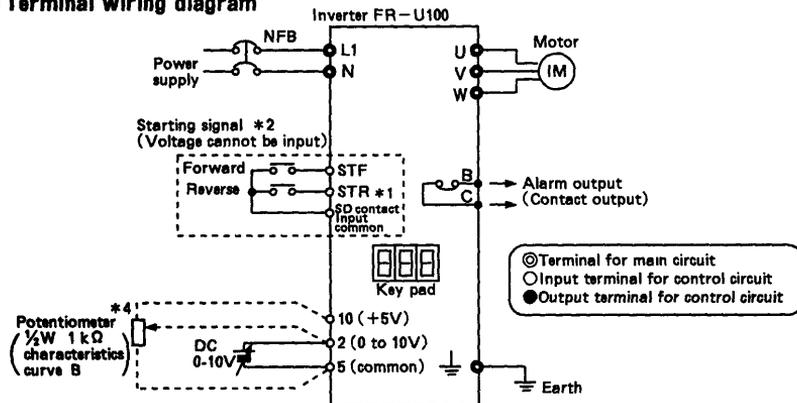
Control specifications	Control method		Sinusoidal wave PWM control
	Output frequency range		0.5 to 120Hz (start frequency fixed at 0.5Hz)
	Frequency setting resolution	Digital input	0.1Hz (less than 100Hz), 1Hz (100Hz and more) with key pad operations
		Analog input	1/500 of maximum setting frequency
	Frequency precision	Digital input	Within 0.5% of set output frequency (−10 to +50°C) with key pad operations
		Analog input	Within ±1% of maximum output frequency (25°C±10°C)
	Voltage/frequency characteristics		Free setting of base frequency between 50 and 120Hz
	Torque boost		Manual torque boost 0 to 15%
	Acceleration/deceleration characteristics		0, 0.1 to 999 sec. setting (acceleration/deceleration set separately)
	Braking torque	Regenerative *6	0.2K...150% or more, 0.4K, 0.75K...100% or more
DC		3Hz or less Operation time/voltage can be adjustable	
Operation specifications	Frequency setting signal		DC 0 to 10V
	Input signal	Starting signal	Forward/reverse rotation commanded separately
	Output signal	Alarm	1b contact output
Display	Key pad	Operation status	Output frequency
		Alarm	Display of details during protection function operation

Protection/warning function		Overcurrent shut down (during acceleration/deceleration/constant speed), regenerative overvoltage shut off, electronic thermal, speed loss prevention
Environment	Ambient temperature	-10 to +50°C (with no freezing)
	Ambient humidity	90% RH or less (with no condensation)
	Storage temperature *7	-20 to +65°C
	Atmosphere	Indoors with no corrosive or flammable gases, oil mist or dust
	Altitude/vibration	Less than 1000m above sea level, 5.9m/S <sup>2</sup> (0.6G) or less

**(Note)**

- \*6. The braking torque shows the short time average deceleration torque when the motor without load is decelerated in the shortest time from 60Hz (changes due to motor's loss), and is not the continuous regenerative torque. During deceleration from a frequency that exceeds the base frequency, the average deceleration torque value will decrease.  
A brake resister is not built-in and cannot be externally installed.
- \*7. This is a short time temperature for during transportation, etc.

## Terminal wiring diagram



- \* 1. Short-circuit between terminals STR-SD to perform reverse rotation with key pad operation. When Pr.78 is set to "2" (forward rotation not prohibited), the motor will rotate in the reverse direction with the key pad operation even if STR-SD are not short circuited. (When Pr.79 is 1 or 4)
- \* 2. Valid when parameter No. 79 is set to "2" or "3" with key pad operations.
- \* 3. Valid when parameter No. 79 is set to "2" or "4" with key pad operations.
- \* 4. If the potentiometer is used for the frequency setting input signal, frequency setting voltage gain must be adjust by Pr.22.

See Section see 5 (page 10) or Section 6 (page 20, 21)

## ■ Explanation of terminal specifications

Terminal symbol	Terminal name	Details
Main circuit	L1, N	Inverter input terminal Connect to a commercial voltage of 220 to 240V 50/60Hz.
	U, V, W	Inverter output terminal Connect a 3-phase motor.
		Grounding terminal Ground for inverter body.
Control circuit (input signal)	STF	Forward rotation starting terminal Contact input terminal for the forward run command. The motor will forward rotate when STF-SD are short circuited, and will stop when released.
	STR	Reverse rotation starting terminal Contact input terminal for the reverse run command. The motor will reverse rotate when STR-SD are short circuited, and will stop when released.
	SD	Contact input common terminal Common terminal for the contact input signal. This is not insulated from the frequency setting input common terminal 5.
	10	Power supply terminal for frequency setting DC5V. Tolerable load current 10mA.
	2	Frequency setting terminal (Voltage signal) Output frequency will be the maximum at DC 10V, and the input/output will be in proportion. Input resistance : 10kΩ Max. tolerable input voltage : 10V
5	Frequency setting input common terminal Common terminal for the frequency setting signal. This is not insulated from the contact input common SD.	
Control circuit (output signal)	B, C	Alarm output terminal 1b contact output that indicates that the inverter protection circuit has functioned and output has stopped. B-C opened during alarm. B-C closed during normal operation Contact capacity AC230V 0.3A, DC30V 0.3A

An insertion type structure is used for the terminals, so prepare a small flat-bladed screwdriver (tip width 2.5 to 3mm) before wiring.

### ■ Protective function

The following protection functions are designed to protect the inverter. If the protective circuit functions, the inverter output will stop, and alarm will display, and an alarm signal will be output. The motor will coast to a stop. The inverter must be reset to resume operations.

Function name		Details	Display (Key pad)	
Overcurrent shut down		The protective circuit functions during acceleration, deceleration or constant speed when the motor output current exceeded approximately 200% of the rated current, and the inverter output stops.	During acceleration	OC1 (OC1)
			During constant speed	OC2 (OC2)
			During deceleration	OC3 (OC3)
Regenerative overvoltage shut down		The protective circuit functions when the DC voltage in the main circuit of the inverter exceeds the rated value with the regenerative energy during braking, and the inverter output stops.	OVT (OVT)	
Overload shut down (Electronic thermal relay)	Motor	The electronic thermal relay in the inverter detects overheating of the motor caused by overload or the additional heating at low speeds due to fan action, and stops the inverter output. Install a thermal relay on the output side of the inverter when using a 6 or more pole motor or when groups of motors are connected to one drive.	THM (THM)	
	Inverter	The electronic thermal relay functions with the reverse time characteristic to protect the output transistor when a current that is 150% or more of the rated output current flows and the overload shut down does not occur (200% or less). The inverter output will stop.	THI (THI)	

Function name	Details	Display (Key pad)
EEPROM breakage	The output will stop when the EEPROM used for saving parameter value is damaged.	PE (PE)
Stall prevention	Operation of the overcurrent shut down to prevent the rise in the frequency (to lower the frequency) from when the inverter's rated current exceeds 150% (*2) to when it decreases during acceleration (or during constant speed). When the current drops to below 150%, the original operation will be restored and operation will continue. The drop of the frequency will be stopped when the rated value is exceeded during deceleration to prevent regenerative overvoltage shut down. When the regenerative energy drops, deceleration will resume.	— OLT (OLT) When stopped after a long period of constant speed operation.

(Note) \*1. The heat cumulative data in the electronic thermal relay will be initialized when the inverter is reset.

\*2. The stall prevent operation current can be set freely. The default setting is 150%.

● **Retention of alarm output signal** ...

If the magnetic contactor (MC) on the inverter power supply side is opened when the protective function operates, the control power in the inverter will be lost and the alarm output will not be retained. Create a sequence to retain the alarm output signal externally, if the signal must be retained.

● **Alarm display**

The display on the key pad will automatically change when the protective function operates. (Only during monitoring.)

● **Resetting methods**

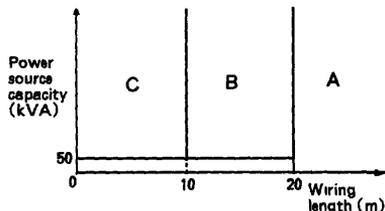
The inverter output stop state will be retained if the protective function operates, and the inverter will not restart unless it is reset. Turn the power off and on once or press the RESET key on the key pad.

## ■ Selection of peripheral devices

Motor output (kW)	Applicable inverter model	No-fuse breaker (NFB) or Leakage breaker (NV)	Magnetic contactor (MC)			Wiring (mm <sup>2</sup> ) (Note) 4		EMC FILTER REF.	
			A area	B area	C area	R, S, T	U, V, W	UK	CONTINENTAL EUROPE
0.2	FR-U120S-0.2K-ER	NF30 model, NV30 model 10A	S-K18	S-K21	S-K21	2	2	FR-LP06A	37519
0.4	FR-U120S-0.4K-ER	NF30 model, NV30 model 10A	S-K21	S-K25	S-K50	2	2	FR-LP06A	37519
0.75	FR-U120S-0.75K-ER	NF30 model, NV30 model 15A	S-K21	S-K25	S-K50	2	2	FR-LP08A	38126

### (Note)

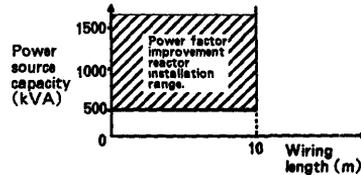
1. Select the NFB model according to the power supply capacity.
2. The wiring sizes are shown for a 20m length.
3. When installing an MC on the inverter power supply, select the applicable range A, B, or C shown on the right according to the power source capacity and wiring length.
4. Use a  $\phi$  0.4 to  $\phi$  1.0 solid wire or 0.3 to 0.75mm<sup>2</sup> stranded wire for the control line.



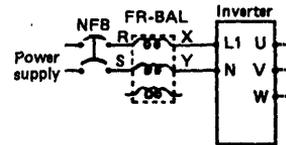
### (Note)

Use the wire sizes recommended above.

- An excessive peak current will flow to the power supply input circuit when the inverter is directly connected to a large capacity power supply transformer (500kVA or more, wiring 10m or less), and the inverter may be damaged. Always install the optional power factor improvement reactor FR-BAL in this case. (Use the one rank large size.)



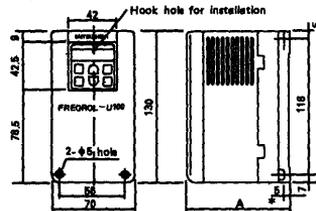
- The wiring length between the inverter and motor must be less than 100m. The control line must be 30m or less and must be separated from the main power line. Use a twisted pair wire when inputting the frequency signal from an external source.



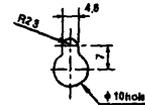
■ Dimensional Outline Drawing

0.2 to 0.4K

Installation screw M4 (3 screws)



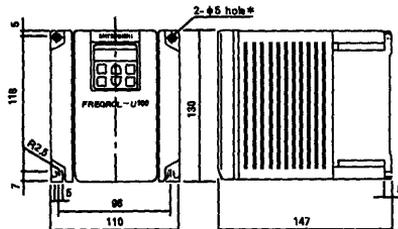
Hook hole dimensions



Capacity	A
0.2K	101
0.4K	141

0.75K

Installation screw M4 (4 screws)



## Revision

The manual number is given on the bottom of the back cover.

Publication date	Instruction manual No.	Details of revision
AUG. 1993	IB(NA)•66449-A	First edition
NOV. 1993	IB(NA)•66449-B	Addition : Single phase power supply version Low-acoustic noise version Fully closed Version
DEC. 1993	IB(NA)•66449-C	Addition : Page 5, 12, 14
JAN. 1994	IB(NA)•66449-D	Elimination : Page 16
DEC. 1994	IB(NA)•66449-E	Partly revised : (A5 size → A6 size)

 **mitsubishi ELECTRIC CORPORATION**  
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Specifications are subject to change without notice.

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