



**TRANSISTORIZED INVERTER
INSTRUCTION MANUAL**

**REMOTE SPEED SETTER
FR-FK**

Thank you for choosing this Mitsubishi transistorized Inverter option.
This instruction manual gives handling information and precautions for use of this equipment.

Incorrect handling might cause an unexpected fault. Before using the equipment, please read this manual carefully to use the equipment to its optimum.

Please forward this manual to the end user.

This section is specifically about safety matters

Do not attempt to install, operate, maintain or inspect this product until you have read through this instruction manual and appended documents carefully and can use the equipment correctly.

Do not use this product until you have a full knowledge of the equipment, safety information and instructions.

In this instruction manual, the safety instruction levels are classified into "WARNING" and "CAUTION".



WARNING

Assumes that incorrect handling may cause hazardous conditions, resulting in death or severe injury.



CAUTION

Assumes that incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause physical damage only.

Note that the CAUTION level may lead to a serious consequence according to conditions. Please follow the instructions of both levels because they are important to personnel safety.

SAFETY INSTRUCTIONS

1. Electric Shock Prevention

WARNING

- While power is on or when the inverter is running, do not open the front cover. You may get an electric shock.
- Do not run the inverter with the front cover removed. Otherwise, you may access the exposed high-voltage terminals or the charging part of the circuitry and get an electric shock.
- If power is off, do not remove the front cover except for wiring or periodic inspection. You may access the charged inverter circuits and get an electric shock.
- Before starting wiring or inspection, switch power off, wait for more at least 10 minutes and check for the presence of any residual voltage with a meter etc.
- Earth the option unit.
- Any person who is involved in the wiring or inspection of this equipment should be fully competent to do the work.
- Always install the inverter before wiring. Otherwise, you may get an electric shock or be injured.
- Operate the switches with dry hands to prevent an electric shock.
- Do not subject the cables to scratches, excessive stress, heavy loads or pinching. Otherwise, you may get an electric shock.

2. Fire Prevention

CAUTION

- Mount the option unit on an incombustible surface. Installing the inverter or option unit directly on or near a combustible surface could lead to a fire.
- If the inverter has become faulty, switch off the inverter power. A continuous flow of large current could cause a fire.

3. Injury Prevention

CAUTION

- Apply only the voltage specified in the instruction manual to each terminal to prevent damage etc.
- Ensure that the cables are connected to the correct terminals. Otherwise, damage etc. may occur.
- Always make sure that polarity is correct to prevent damage etc.
- While power is on and for some time after power-off, do not touch the option unit as they are hot and you may get burnt.

4. Additional instructions

Also note the following points to prevent an accidental failure, injury, electric shock, etc.:

(1) Transportation and installation

 **CAUTION**

- When carrying products, use correct lifting gear to prevent injury.
- Do not stack the inverter boxes higher than the number recommended.
- Ensure that installation position and material can withstand the weight of the option unit. Install according to the information in the Instruction Manual.
- Do not operate if the option unit is damaged or has parts missing.
- Do not stand or rest heavy objects on the option unit.
- Check the option unit mounting orientation is correct.
- Prevent screws, wire fragments, conductive bodies, oil or other flammable substances from entering the option unit.
- Do not drop the option unit, or subject it to impact.
- Use the inverter under the following environmental conditions:

Environment	Ambient temperature	-10°C to +50°C (non-freezing)
	Ambient humidity	90%RH or less (non-condensing)
	Storage temperature	-20°C to +65°C*
	Ambience	Indoors (free from corrosive gas, flammable gas, oil mist, dust and dirt)
	Altitude, vibration	Maximum 1000m above sea level for standard operation. 5.9 m/s ² or less (conforming to JIS C0911)

*Temperatures applicable for a short time, e.g. in transit.

(2) Trial run

 **CAUTION**

- Check all parameters, and ensure that the machine will not be damaged by a sudden start-up.

(3) Operation

 **CAUTION**

- Do not modify the equipment.

(4) Emergency stop

 **CAUTION**

- Provide a safety backup such as an emergency brake which will prevent the machine and equipment from hazardous conditions if the inverter or option fails.

(5) Maintenance, inspection and parts replacement

 **CAUTION**

- Do not carry out a megger (insulation resistance) test on the control circuit of the option unit.

(6) Disposing of the inverter

 **CAUTION**

- Treat as industrial waste.

(7) General instructions

Many of the diagrams and drawings in this instruction manual show the inverter without a cover, or partially open. Never run the inverter like this. Always replace the cover and follow this instruction manual when operating the inverter.

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FR-FK REMOTE SPEED SETTER

The remote speed setter is used to set the inverter frequency at remote locations. You can make the speed change and start/stop a motor at two or more remote locations.

1. STRUCTURE

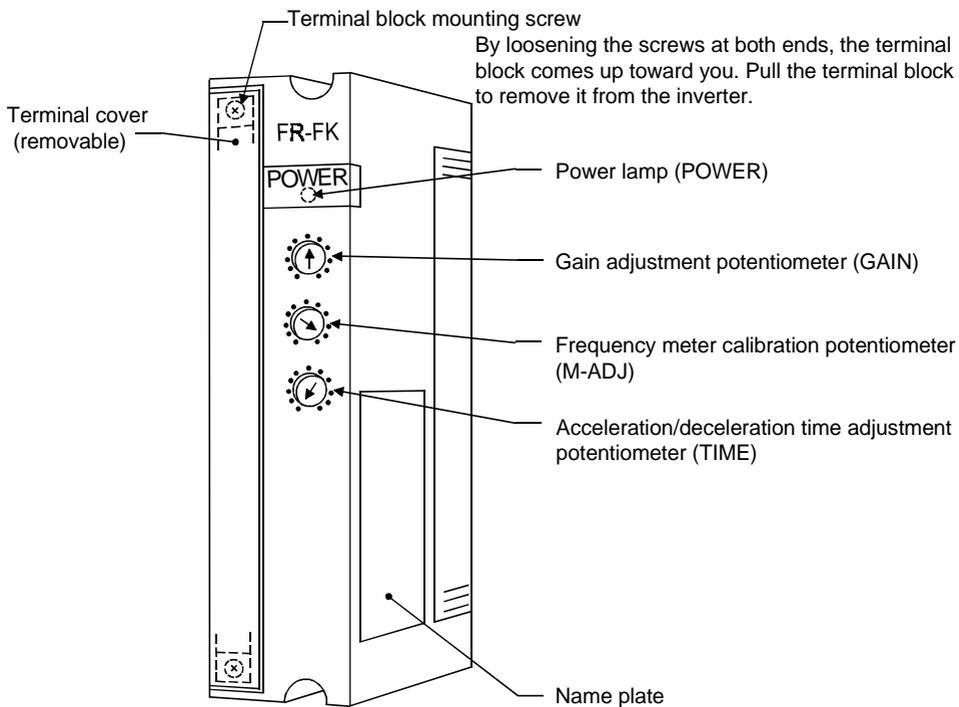


Fig. 1 Structure

2. INSTALLATION

- (1) Avoid direct sunlight, high temperature, high humidity, much dust and much gas, and select a clean, dry place to install. (The unit is not a totally enclosed type.)
- (2) Select a place of installation where heat will not build up, and install the unit with the minimal wiring distance from the inverter (e.g. install the unit within the control box where the inverter is installed).
- (3) When wiring, take the wiring space of the cables into consideration as the cables will come out on the left side.

3. WIRING

- (1) Remove the terminal cover. The terminal cover comes off by pulling the left-hand side recesses toward you as shown in Fig. 2.
- (2) You can use a power supply of either single-phase 200V or 115V. When using a 200V power supply, wire it across terminals 200V-0. When using a 115V power supply, wire it across terminals 115V-0. Note that wrong wiring may burn the internal transformer. (Refer to Fig. 3 Wiring Diagram.)
- (3) When relay contacts are required in the signal line, connect two micro-current switching relay contacts in parallel (or a twin contact) to prevent a contact fault.
- (4) Use twisted or shielded cables as signal cables and run them away from the power cables.

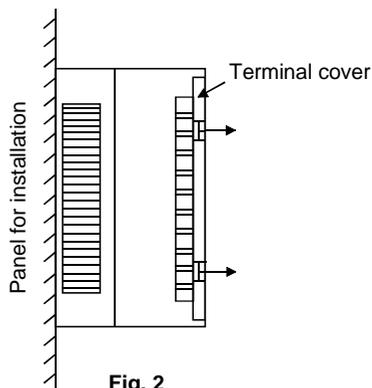


Fig. 2

4. CIRCUIT STRUCTURE

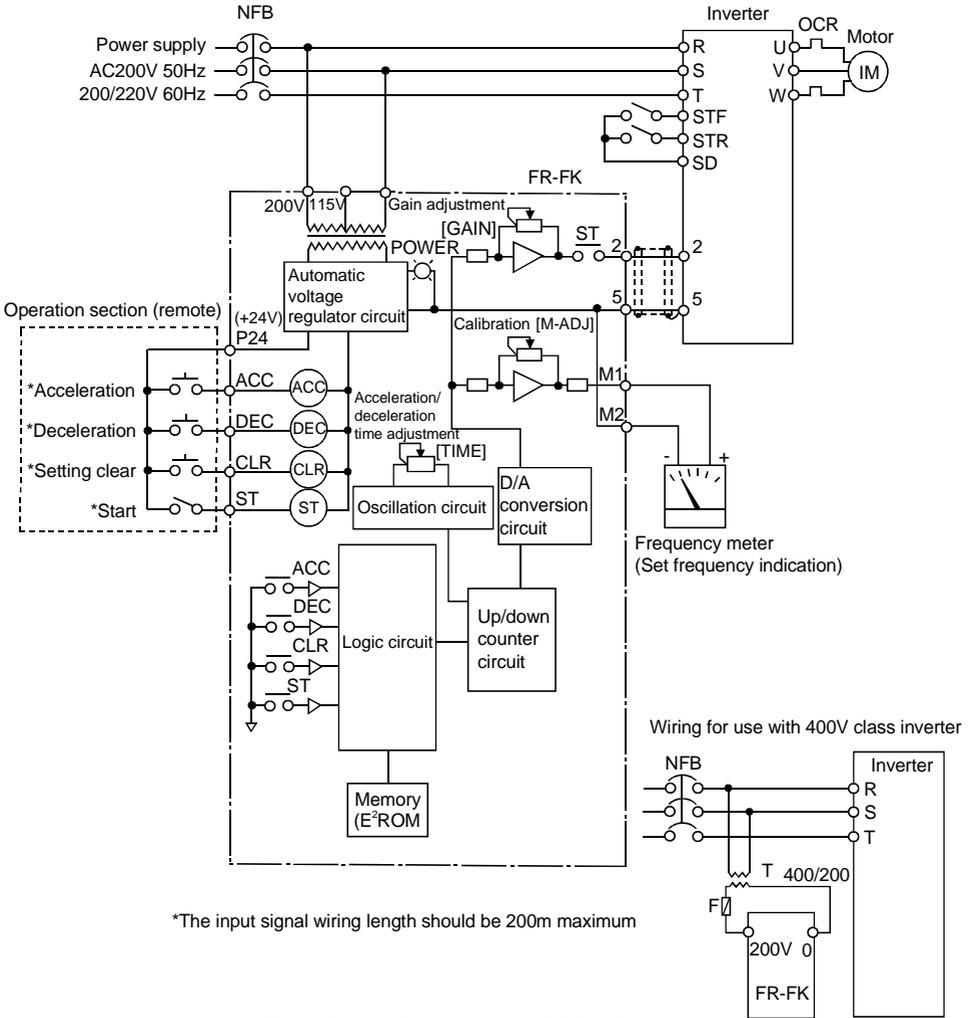


Fig. 3 Circuit Structure and Wiring Example

5. OPERATION EXPLANATION ---

(1) Establishment and output of frequency setting signal

The frequency set value (factory-set to 0Hz) stored in memory (E²ROM) is read and preset to the counter, and the output from the counter is converted into the frequency setting signal (voltage) by the D/A converter.

Inputting the start signal (turning it on across terminals ST-P24) energizes the relay ST to output this signal (voltage) to across terminals 2-5. Turning it off changes the output voltage to 0V.

(2) Indication of set frequency

The frequency meter (1mA full-scale) connected across terminals M1-M2 indicates the set frequency explained in (1). This indication is always the output of the D/A converter and is independent of the start signal input (across ST-P24).

(3) Acceleration

Inputting the acceleration signal (turning it on across terminals ACC-P24) applies clock pulses to the counter, starting the counter counting up. Hence, only while the acceleration signal is on, the frequency setting output signal (voltage) keeps increasing. When the acceleration signal is turned off, the increase of the frequency setting signal stops and the value at a stop is held.

(4) Deceleration

Inputting the deceleration signal (turning it on across terminals DEC-P24) starts the counter counting down, decreasing the frequency setting output signal (voltage). When the deceleration signal is turned off, the decrease of the frequency setting signal stops and the value at a stop is held.

(Note) When both the acceleration and deceleration signals are input, acceleration (or deceleration) stops.

(5) Acceleration/deceleration time

Turning the potentiometer "TIME" changes the clock pulse period, varying the acceleration/deceleration of the frequency setting output signal at the input of the acceleration/deceleration signal.

(6) Clearing of frequency set value

Inputting the clear signal (turning it on across terminals CLR-P24) resets the counter output to 0, clearing the frequency setting signal to 0 instantaneously.

(7) Holding of frequency set value (at power-off)

When power is switched off, the counter output value is stored in memory (E²ROM). When power is switched on again, this stored value is output.

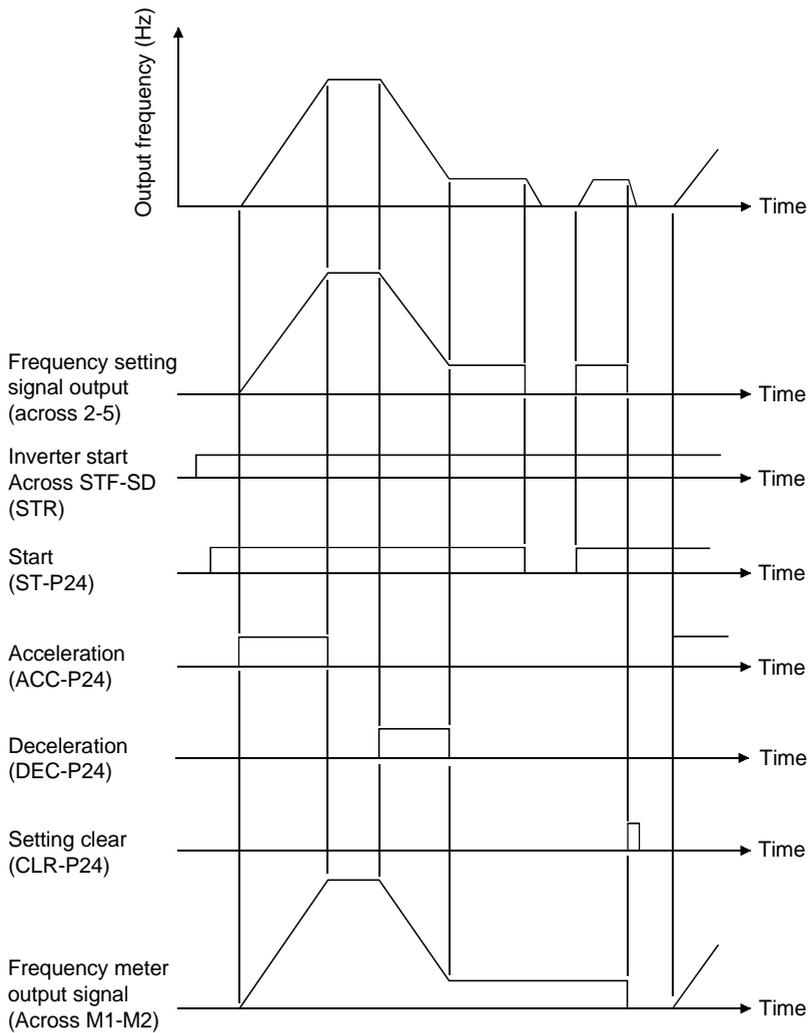


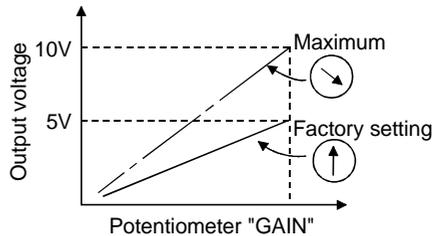
Fig. 4 Operation Timing Chart

6. ADJUSTMENT

(1) Gain adjustment of frequency setting output signal

Gain adjustment potentiometer (GAIN)

With the start signal (across terminals ST-P24) input, keep entering the acceleration signal (across terminals ACC-P24). When the change (increase) of the output voltage across terminals 2-5 has stopped, adjust the voltage across terminals 2-5 with the potentiometer "GAIN".



Factory setting

5V

(2) Calibration of frequency meter: Calibration potentiometer "M-ADJ"

Connect the frequency meter (1mA full-scale) across terminals M1-M2 and input the start signal (ST) and acceleration signal (ACC).

Turn the calibration potentiometer "M-ADJ" and make adjustment until the meter deflects to full-scale.

Factory setting

Already adjusted so that the meter deflects to full-scale at the frequency setting signal of 5V.

(3) Adjustment of acceleration/deceleration time

Time adjustment potentiometer (TIME)

The acceleration/deceleration time is the time until the maximum value (value set in above (1)) of the frequency setting signal is reached. The same time applies to acceleration and deceleration.

Setting range

4 to 100 seconds (Refer to Fig. 5 for the set time and scale)

Factory setting

10 seconds

(Note) When the slope of the acceleration/deceleration time is smaller than that of the inverter acceleration/deceleration time, the acceleration/deceleration time of the inverter has precedence.

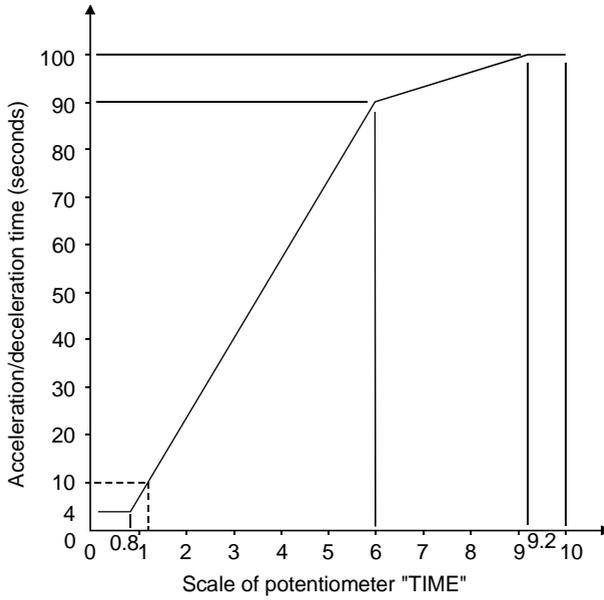


Fig. 5 Acceleration/deceleration Time Setting versus Scale

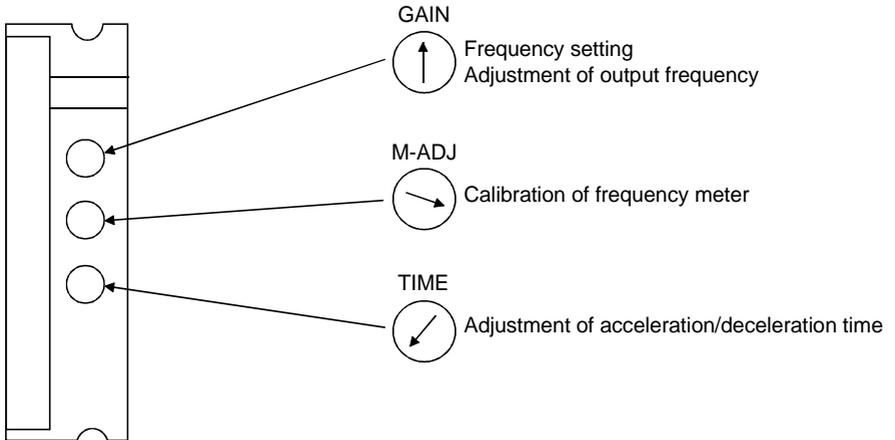
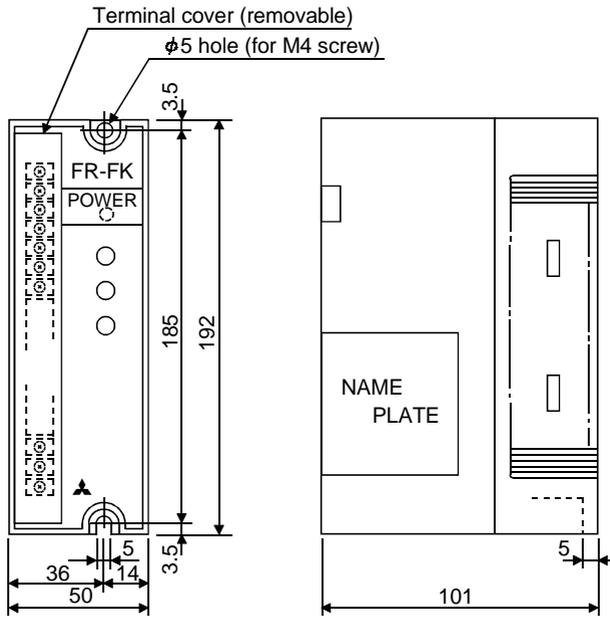


Fig. 6 Factory-Set Positions

7. SPECIFICATIONS

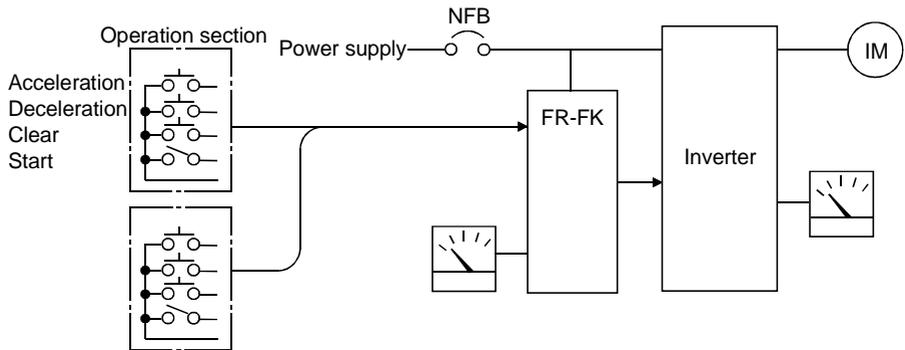
Power supply voltage	200VAC 50Hz, 200/220VAC 60Hz 115VAC 60Hz
Power consumption	5VA
Frequency setting output signal [Terminal 2]	Adjustable in the range 0 to 10VDC (5mA) (Across terminals 2-5) Resolution 0.04V (8 bit)
Start input signal [Terminal ST]	Frequency setting signal is output when the signal across terminals ST-P24 turns on. Frequency setting signal is shut off when the signal across terminals ST-P24 turns off.
Acceleration input signal [Terminal ACC]	Frequency setting signal increases while the signal across terminals ACC-P24 is on.
Deceleration input signal [Terminal DEC]	Frequency setting signal decreases while the signal across terminals DEC-P24 is on.
Setting clear input signal [Terminal CLR]	Frequency setting signal is cleared (to zero) when the signal across terminals CLR-P24 turns on.
Acceleration/deceleration time (TIME)	Adjustable in the range 4 to 100 seconds. (Same time is set to acceleration and deceleration)
Frequency meter output signal [Terminals M1, M2]	1mA, maximum 5m wiring length Frequency meter 1mA full-scale DC ammeter (internal resistance 300Ω maximum)
Adjustment functions (Adjustment potentiometers)	<ul style="list-style-type: none">• Frequency setting output signal gain adjustment (GAIN)• Frequency meter calibration (M-ADJ)• Acceleration/deceleration time adjustment (TIME)

8. OUTLINE DRAWING



9. APPLICATION EXAMPLE

Remote operation can be performed from more than one location.



REVISIONS

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

Print Date	*Manual Number	Revision
Jul., 2000	IB(NA)-060043-A	First edition