OPERATION MANUAL

MULTIQUIP®

Mikasa

MODEL FU163
FREQUENCY INVERTER

Revision #0 (06/25/26)

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THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.


WARNING
CANCER &
REPRODUCTIVE HARM
www.P65Warnings.ca.gov
P/N 38707

FU163 Frequency Inverter

DISCLAIMER:

Product features, descriptions, and specifications are based on published information at the time of publication and are subject to change at any time without notice. Multiquip Inc. and its affiliates reserve the right to change specifications, features, design, and descriptions of products at any time without notice.

DO NOT operate or service the equipment before reading the entire manual. Safety precautions should be followed at all times when operating this equipment. Failure to read and understand the safety messages and operating instructions could result in injury to yourself and others.

SAFETY MESSAGES

The four safety messages shown below will inform you about potential hazards that could injure you or others. The safety messages specifically address the level of exposure to the operator and are preceded by one of four words: **DANGER**, **WARNING**, **CAUTION** or **NOTICE**.

SAFETY SYMBOLS

DANGER

Indicates a hazardous situation which, if not avoided, **WILL** result in **DEATH** or **SERIOUS INJURY**.

WARNING

Indicates a hazardous situation which, if not avoided, **COULD** result in **DEATH** or **SERIOUS INJURY**.

CAUTION

Indicates a hazardous situation which, if not avoided, **COULD** result in **MINOR** or **MODERATE INJURY**.

NOTICE

Addresses practices not related to personal injury.

Potential hazards associated with the operation of this equipment will be referenced with hazard symbols which may appear throughout this manual in conjunction with safety messages.

Symbol	Safety Hazard
	Lethal exhaust gas hazards
	Explosive fuel hazards
	Burn hazards
	Respiratory hazards
	Accidental starting hazards
	Eye and hearing hazards
	Rotating parts hazards

GENERAL SAFETY

⚠ CAUTION

- **NEVER** operate this equipment without proper protective clothing, shatterproof glasses, respiratory protection, hearing protection, steel-toed boots and other protective devices required by the job or city and state regulations.

- **NEVER** operate this equipment when not feeling well due to fatigue, illness or when on medication.

- **NEVER** operate this equipment under the influence of drugs or alcohol.

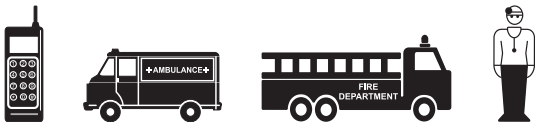
- **ALWAYS** check the equipment for loosened threads or bolts before starting.
- **DO NOT** use the equipment for any purpose other than its intended purposes or applications.
- **ALWAYS** clear the work area of any debris, tools, etc. that would constitute a hazard while the equipment is in operation.

NOTICE

- This equipment should only be operated by trained and qualified personnel 18 years of age and older.
- Whenever necessary, replace nameplate, operation and safety decals when they become difficult to read.
- Manufacturer does not assume responsibility for any accident due to equipment modifications. Unauthorized equipment modification will void all warranties.
- **NEVER** use accessories or attachments that are not recommended by Multiquip for this equipment. Damage to the equipment and/or injury to the user may result.
- **ALWAYS** know the location of the nearest **fire extinguisher**.

- **ALWAYS** know the location of the nearest **first aid kit**.

- **ALWAYS** know the location of the nearest phone or **keep a phone on the job site**. Also, know the phone numbers of the nearest **ambulance**, **doctor** and **fire department**. This information will be invaluable in the case of an emergency.



INVERTER SAFETY

⚠ DANGER

- **NEVER** operate the equipment in an explosive atmosphere or near combustible materials. An explosion or fire could result causing severe **bodily harm or even death**.

⚠ CAUTION

- **NEVER** attempt service on a running machine.

NOTICE

- **ALWAYS** keep the machine in proper running condition.
- Fix damage to the machine and replace any broken parts immediately.
- **ALWAYS** store equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of the reach of children and unauthorized personnel.
- **USE** the inverter away from direct sunlight, dust and rain. This product is of dust and water proof structure equivalent to JIS IP56, but if water is splashed during operation or equipment is used on a water puddle, damage might occur.
- **DO NOT** use more than the maximum number of vibrators determined and specified for the inverter. If this number is exceeded, malfunction of the inverter might occur.
- **DO NOT** use electronic devices such as a computer near the inverter. The noise from the inverter might interfere or damage such devices.
- **DO NOT** use with generators equipped with a ground fault circuit interrupter (GFCI). Replace with a generator not equipped with GFCI and use it. GFCI has very high sensitivity and high-speed ground-fault circuit characteristics (5 ± 1 mA, 0.25 seconds), so the inverter cannot be started.
- **NEVER** use an inverter that cannot be started or stopped with the circuit protector switch.

ELECTRICAL SAFETY

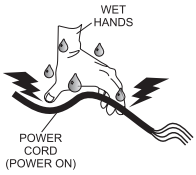
⚠ CAUTION

- Prevent body contact with grounded surfaces such as pipes, reinforcing bar, etc.
- When using the inverter, always use grounding wire to prevent electric shock.
- Operate the inverter only at the specified voltage indicated on the nameplate.
- **DO NOT** spray water on the machine.
- **DO NOT** yank the cord to disconnect it from the receptacle. Grasp the plug itself to disconnect it.
- **ALWAYS** make sure the circuit protector switch on the machine is in the OFF position when not in use and before inserting the power plug into an AC receptacle.

Power Cord/Cable Safety

⚠ DANGER

- **ALWAYS** use a grounded, 3-wire extension cord that has a 3-prong grounding plug, and a 3-pole receptacle that accepts the plug on the concrete vibrator motor. **DO NOT REMOVE THE GROUNDING PIN FROM THE PLUG!**
- **NEVER** let power cords or cables **lay in water**.
- **NEVER** use **damaged** or **worn** cables or cords when connecting equipment to a generator. Inspect for cuts in the insulation.
- **NEVER** grab or touch a live power cord or cable with wet hands. The possibility exists of **electrical shock**, **electrocution or death**.



- Make sure power cables are securely connected. Incorrect connections may cause electrical shock and damage to the vibrator motor.

⚠ CAUTION

- Ensure that cables and cords will not be tripped over.

NOTICE

- **ALWAYS** make certain that the proper power or extension cord has been selected for the job.
- Use only extension cords that are intended for outdoor use and are marked as such.
- Use only the gauge wire and length of cord recommended for the motor size. If in doubt, go to the next heavier gauge. (The smaller the gauge number, the heavier the cord.)

TRANSPORTING SAFETY

NOTICE

- Do not pull or lift the inverter by the cable only. Cable damage and short circuit might occur.
- Bundle the cable, then hold the middle handle of the inverter when transporting or moving. Make sure the inverter will not touch nearby objects such as iron frames or bars.

ENVIRONMENTAL SAFETY

NOTICE

- Dispose of hazardous waste properly. Examples of potentially hazardous waste are used motor oil, fuel, and fuel filters.

- **DO NOT** use food or plastic containers to dispose of hazardous waste.
- **DO NOT** pour waste, oil, or fuel directly onto the ground, down a drain, or into any water source.

Table 1. Specifications			
Input	Phase	φ	1
	Voltage	V	80–130 / 180–250
	Current	A	20 / 14
	Input	kVA	2.0 / 2.8
	Frequency	Hz	50 / 60
Output	Phase	φ	3
	Voltage	V	48
	Current	A	19.2
	Input	kVA	1.6
	Frequency	Hz	100–240
Dimensions (L × W × H)		in. (mm)	12.76 × 9.45 × 9.76 (324 × 240 × 248)
Total Weight		lb. (kg)	19.2 (8.7)
Number of Outlets			2
Ambient Temperature Condition			14°F to 104°F (−10°C to +40°C)
Ambient Humidity Condition			80% or less (no condensation)
Overload Protection			Current control
Machine Cooling Method			Forced air cooling

Table 2. Extension Cord Sizing		
Size of Power Cord	**Length of Extension Cord (Between Inverter and Vibrator)**	
	Single phase (80–130 V)	Single phase (180–250 V)
14 AWG	46 ft. (14 m)	66 ft. (20 m)
12 AWG	82 ft. (25 m)	115 ft. (35 m)
10 AWG	125 ft. (38 m)	180 ft. (55 m)
8 AWG	184 ft. (56 m)	262 ft. (80 m)

Table 3. Maximum Allowable Number of Vibrators						
Frequency Inverter	**Vibrator**					
FU163	FX, FXS and FXB Series				FJH	
	30	40	50	60	550	750
	2	2	2	1	1	-

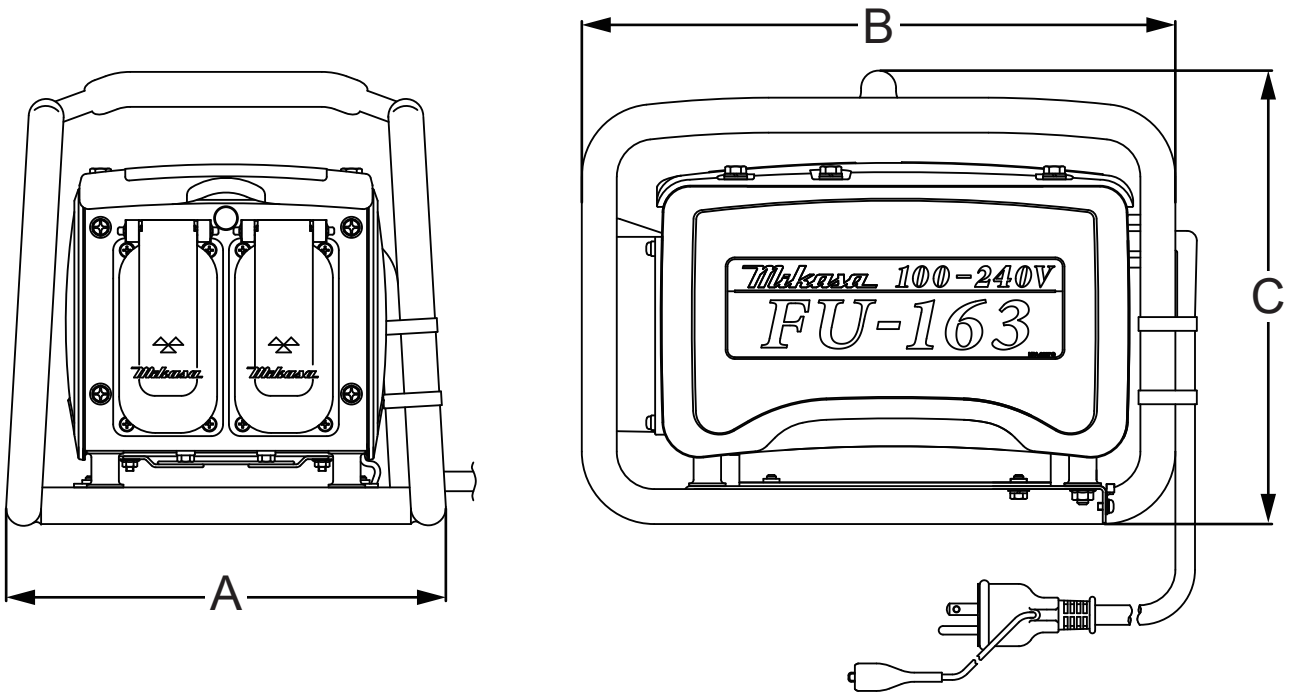


Figure 1. Dimensions

Table 4. Dimensions		
Reference	**Description**	**Measurement**
A	Width	9.45 in. (240 mm)
B	Length	12.76 in. (324 mm)
C	Height	9.76 in. (248 mm)

INTRODUCTION

The Mikasa FU163 is a special inverter which converts single-phase, 80–130 VAC and single-phase, 180–250 VAC power into the voltage and frequency suitable for use by a high-frequency concrete vibrator.

The output frequency is adjustable from 100 to 240 hertz. This small, lightweight inverter is portable and is suitable for use at any concrete casting site.

INVERTER COMPONENTS

Other than the external cooling fan, output outlet, and power cable, all electric components are located inside the dustproof and waterproof box. For protection of the box, a pipe frame is provided.

The power cable led inside the box is connected to the relay substrate. Via the relay substrate, the cable is connected to the circuit protector, then to the voltmeter. The output from the circuit protector is connected to the output outlet via the rectifier, smoother, inverter circuit, and control circuit.

POWER TRANSMISSION

The FU163 converts commercial power or single-phase AC power from a generator into direct current. The direct current is then converted again, by electronic control, to high-frequency AC power suitable for a high-frequency vibrator.

APPLICATION AND TECHNIQUES

A high-frequency vibrator can be connected to the FU163. This inverter should only be connected to the specified high-frequency vibrators.

As an input power source, use general commercial power or a power generator that is equivalent to general commercial power. **DO NOT** connect to other power sources. Also, **DO NOT** operate beyond the allowable input voltage of the inverter. Otherwise, the vibrator and the inverter will be damaged.

DO NOT try to connect to a vibrator which has a motor with different specification by altering the plug and the outlet for connection. This could cause electrical shock and/or damage to the vibrator and inverter.

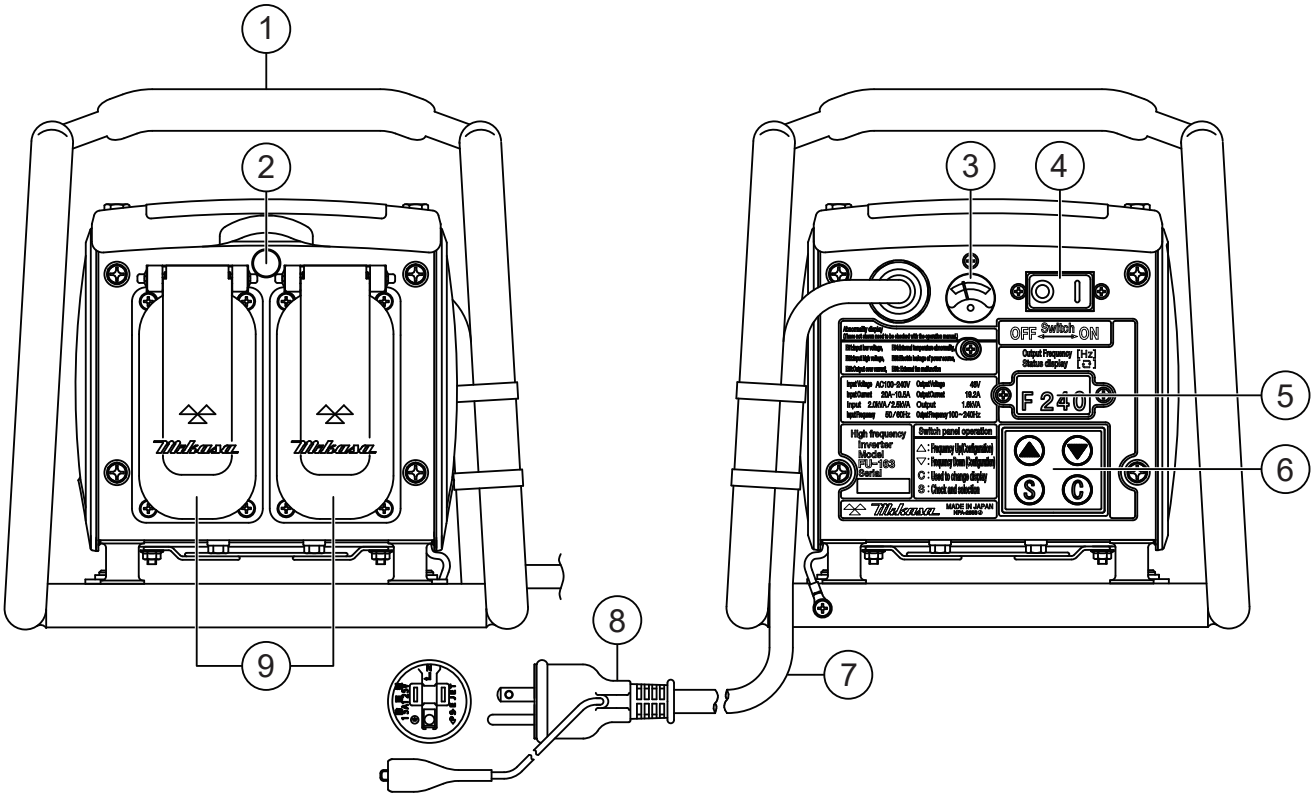


Figure 2. Components

Figure 2 shows the location of the basic components of the FU163 inverter. The function of each component is described below:

1. **Frame** — Protects the inverter components.
2. **LED** — Green LED lamp lights up when within normal voltage range. If the green or orange LED lamp is blinking or the red LED is ON, abnormality in power source is detected. Stop using immediately. See ***Troubleshooting*** section for more information.
3. **Voltmeter Input** — Indicates the input voltage. Make sure voltage is in the green zone.
4. **Circuit Protector Switch** — Always make sure that this switch is turned OFF when the machine is not in use. If the power plug is inserted into the power outlet while the switch is turned ON, the vibrator connected to the inverter might start suddenly, which could cause an accident resulting in injury.
5. **Frequency Adjustment / Abnormality Display** — The display indicates operation frequency, input voltage, output current, and input current in normal mode. When there is an abnormality, an error number is indicated.
6. **Display Switch Panel** — Press the Up and Down Arrow buttons (▲▼) to adjust output frequency (100–240 Hz) and to check the date/time of an error.

   Press the **C** button to change the display between input voltage, input current, and output current during normal operating conditions.

   The **S** button is used for checking and selecting numerical values and settings changes. There is normally no need to use this button.
7. **Power Cable** — Connects the inverter to the power plug.
8. **Power Plug** — Connects to the power source.
9. **Output Outlet (2)** — Connects the vibrator to the inverter.

BEFORE STARTING

1. Read all safety instructions at the beginning of this manual.
2. Inspect the power plug and contacts for dirt, rust, deformation and breakage.
3. Inspect the power cable for wear, crushing, cracks, etc.
4. Open the output outlet cover and check terminal parts inside for dirt, etc. Check all inverter bolts and nuts for looseness, deformation, etc. Also check the output outlet cover for smooth open/close movement.
5. Check the circuit protector switch to see if it properly switches ON and OFF, and that the green LED turns ON. After inspection, always place the switch in the OFF position.
6. Check the anti-vibration rubber for deformation and cracks.
7. Check conduction resistance between power plug contacts when circuit protector is OFF.

   For safety purpose, the input voltmeter needle moves when the power plug is inserted into the power source outlet, even if the circuit protector is turned OFF.

   Measure conduction resistance between power plug contacts. The tester needle will point to around 200–300 Ω. This is the impedance (resistance) of the voltmeter, not conduction trouble. This value indicated by the tester may vary slightly depending on the detection method and accuracy of the tester.

1. Make sure the power source matches the specification of this inverter and the voltage is within the normal voltage range of this product. When a generator is used, make sure it is at or above the rated output shown in Table 5.

Table 5. Power Source Specifications

Model	Frequency	Voltage	Current
FU163 Single Phase (AC)	50/60 Hz	100 V	20 A
		200 V	14 A

2. Connect the power plug to the power source, then check to see if the voltmeter on the inverter shows a value within the green zone (Table 6). Always connect the grounding wire. For single-phase 100-volt outlet of non-grounding type (without grounding wire), use the grounding clip attached to the power plug to connect to the grounding wire.

Table 6. Power Source Voltage

Model	Power Source Specifications	Voltage Range
FU163 Single Phase	50/60 Hz 100–120 V	80–130 V
	50/60 Hz 220–240 V	180–250 V

NOTICE

If used at a voltage exceeding the values shown in Table 6, the inverter board and parts may be damaged.

If the voltage used is low, the inverter output is reduced, and the performance of the concrete vibrator will also be reduced, making it difficult to do efficient concrete consolidation. Also, the inverter substrate and parts might be damaged.

3. Place the **circuit protector switch** (Figure 3) in the **ON** position. Make sure that the cooling fan starts and the green LED lamp lights up (normal voltage range). If the green or orange LED lamp is blinking or the red LED is lit, an abnormality has been detected in the power source. Stop using immediately and correct the cause of the abnormality before operation.

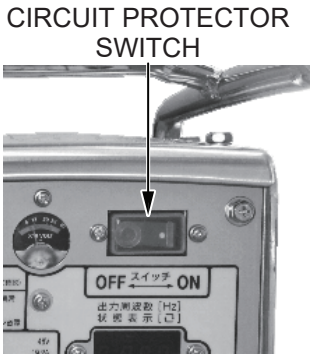


Figure 3. Circuit Protector Switch

NOTICE

Do not use the same power source used by the inverter for other electronic devices such as a computer. The noise from the inverter causes interference and damage might occur in the electronic device.

4. When the circuit protector switch is turned ON, frequency (when normal) is displayed at the **Frequency Adjustment / Abnormality display** (Figure 4).

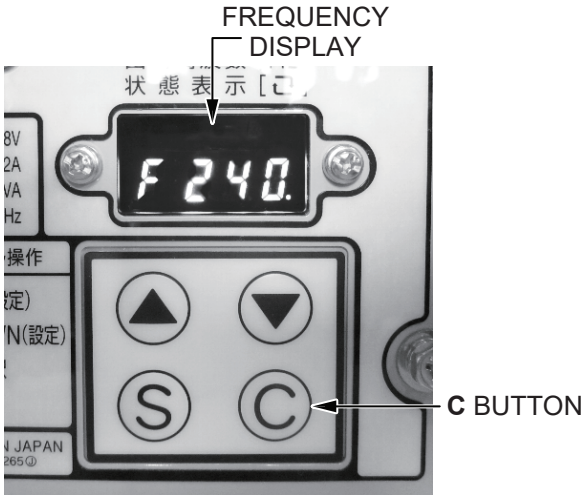


Figure 4. Frequency Adjustment / Abnormality Display (Frequency)

⚠ CAUTION

When using the FX Series of high-frequency vibrators, **ALWAYS** use the frequency of 240 Hz. **DO NOT** set the frequency to anything other than 240 Hz.

NOTICE

If an error code is indicated on the Frequency Adjustment / Abnormality display instead of the frequency, refer to the ***Troubleshooting*** section.

5. Once the frequency is displayed, check the power source condition and output current by pressing the **C button** (Figure 4). Refer to Figure 5 for the display sequence.

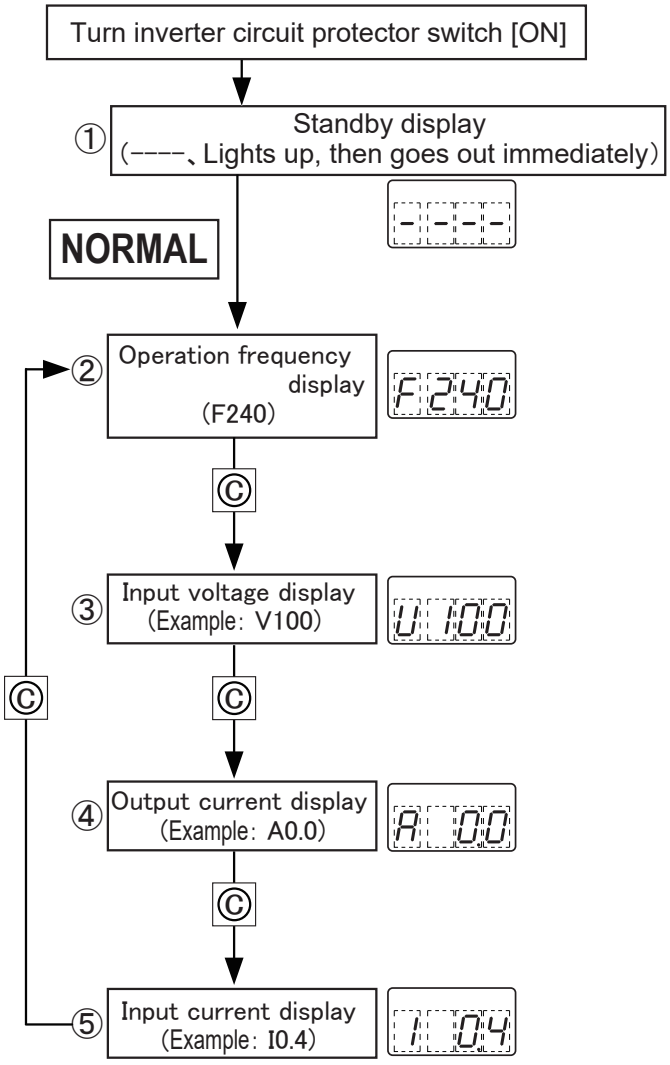


Figure 5. Power Source Condition And Output Current Check

6. Make sure that the ON/OFF switch of the work machine (vibrator) is placed in the **OFF** position.

7. Raise the **output outlet cover** and insert the **male plug** of the work machine (vibrator) securely into the **output outlet** (Figure 6).

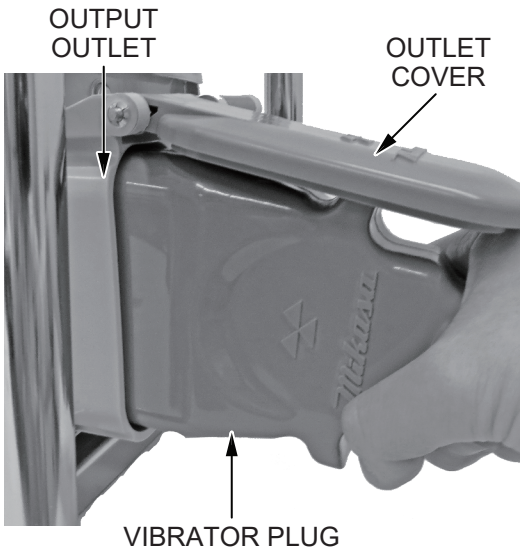


Figure 6. Connect Work Machine To Inverter

8. Make sure the **output outlet cover claw** (Figure 7) is properly engaged with the male plug, and does not come off when pulled lightly.

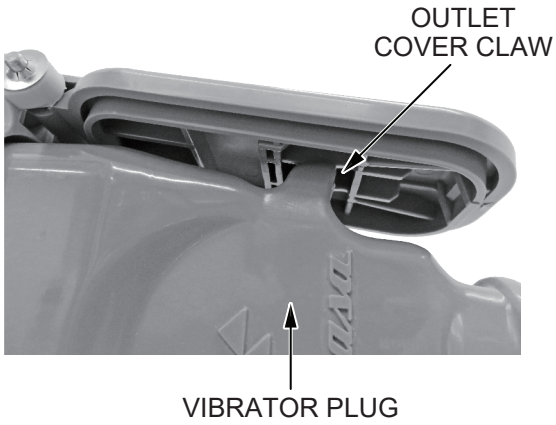


Figure 7. Output Outlet Cover Claw

9. Hold the hose and hang the vibration head (vibrator end portion) of the vibrator. When doing so, make sure there is no person or obstacle nearby and it is safe to operate.

10. If using more than one vibrator, repeat steps 6–9 for the second vibrator.

11. Confirm that the inverter input side power voltage is still within the normal voltage range and the green LED lamp is lit. Then place the vibrator ON/OFF switch(es) in the **ON** position one after another to start casting.
12. During your work, if a vibrator starts to pulsate and the green LED lamp starts to blink or the red LED lights up, an abnormality may have occurred in the power source or in the machine. Stop using immediately and correct the cause of the problem before resuming work.
13. After the casting work is finished, place the vibrator ON/OFF switch(es) in the **OFF** position one at a time.
14. Raise the **output outlet cover** as shown in Figure 8 to disengage the **cover claw** from the **vibrator male plug**. Then unplug the vibrator from the **output outlet**.

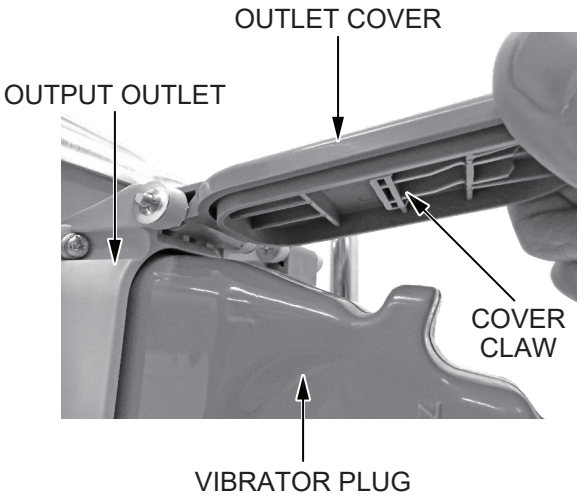


Figure 8. Disconnect Work Machine From Inverter

15. Repeat step 14 if necessary to disconnect all vibrators from the inverter.
16. Place the inverter circuit protector switch in the **OFF** position and disconnect the **power plug** (Figure 9) from the power source.

NOTICE

To prevent damage to the power cable, **DO NOT** hold the cable when unplugging the inverter. **ALWAYS** hold the power plug when disconnecting the plug from the power source.

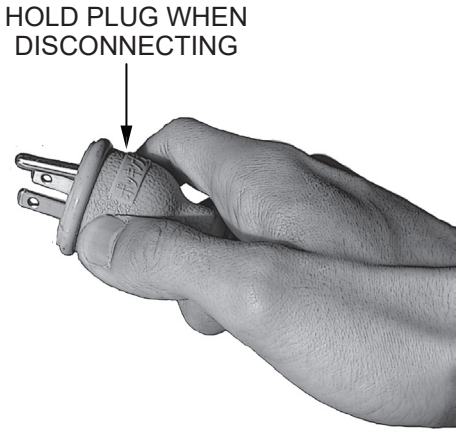


Figure 9. Inverter Power Plug

Soft Start (Protection) Function

This machine is equipped with a soft start function which reduces inrush current immediately after the work equipment is switched on, thereby minimizing stress on the power supply, inverter, and motor. The soft start function operates not only when starting the first vibrator, but also when starting the second vibrator.

MAINTENANCE INSPECTION

Check the following items before and after use.

1. Inspect the power plug and contacts for dirt, rust, deformation and breakage.
2. Inspect the power cable for wear, crushing, cracks, etc.
3. Open the output outlet cover and check inside for dirt.
4. Check terminal parts for dirt.
5. Check all bolts and nuts for looseness or deformation. Also check the output outlet cover for smooth open/close movement.
6. Check the circuit protector switch to see if it properly switches ON and OFF, and that the green LED turns ON. After inspection, always place the switch in the OFF position.
7. Connect to a vibrator and make sure the vibrator operates normally.
8. Check the anti-vibration rubber for deformation and cracks.
9. Clean the output outlet terminal insertion holes. If mortar is adhered, conduction trouble that causes single-phase run or terminal disturbance due to spark might occur, and malfunction of the inverter protection function and burning of the vibrator might result.

PRE-WASH INSPECTION

While doing concrete consolidation, promptly remove any concrete that splashes on the inverter. When washing the inverter with water, pay attention to the following points. **DO NOT** wash with water if there is deformation or breakage on the inverter, or when the female panel outlet cover does not close securely.

1. Check the bolts, screws, switches, and input cable of the inverter for looseness.
2. Check the parts of the inverter (front panel, switch panel, top surface cover, side surface cover) for deformation or cracks. If there is deformation or breakage, dust and water proofing performance will be reduced and water might enter inside during washing, causing damage to electronic components.
3. Check the output side outlet cover to make sure it closes. If it does not close properly, water might enter inside through the terminal part. **MAKE SURE** the output side outlet cover is **closed** when washing.
4. When washing, keep the inverter in the upright position while splashing water from the top. If the inverter is washed while set on its side or placed upside down, the cooling fan will be immersed in water, leading to malfunction of the fan. **DO NOT** put a water nozzle directly into the intake/exhaust holes at the bottom.
5. Pay attention to the amount and pressure of the water used for washing. Maintain these levels as specified by JIS standard IP56. See following Notice.

NOTICE

The first number “5 (IP5X)” indicates class 5 of dustproof structure protection class (no effect on machine when exposed in talc dust for 8 hours), and the ending number “6 (IPX6)” indicates class 6 of waterproof performance protection class (no abnormality in the machine when the machine body installed normally is injected with water from outside from every direction for more than 3 minutes at a rate of 100 liters per surface area of 1 m^2 per minute with a water spray nozzle having a diameter of 12.5 mm positioned 2.5 to 3.0 m away from the machine body).

⚠ CAUTION

After washing, wipe off the water and let the inverter dry. Also wipe off water from the inside of the output side outlet cover and the terminal holes. If there is water remaining, electrical shock or electrical leakage might occur.

ABNORMALITY INDICATION DISPLAY FUNCTION

When the inverter circuit protector switch is turned **ON** and an error occurs, the error code is displayed on the Frequency Adjustment / Abnormality display. When this occurs, check the description of the error and correct the cause of abnormality. See Figure 10 for the error display sequence.

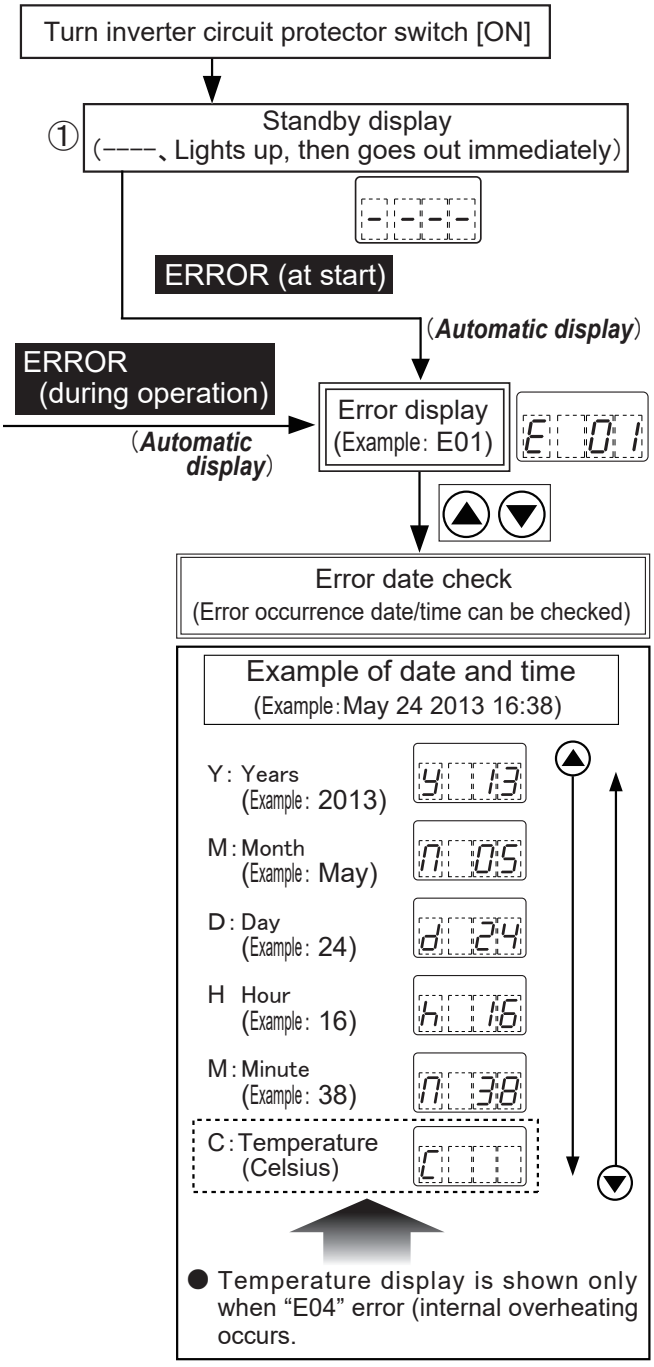


Figure 10. Error Display

For error display details and countermeasures, refer to Table 7.

After the cause of the error is corrected or removed, the regular display (frequency) will appear automatically.

Table 7. Error Countermeasures					
Error (LED Display)	**Description**	**LED Status**	**Machine Behavior**	**Countermeasure**	**Inverter Restart Method and Required Action**
E01 Blinking	Input low voltage	Red light ON	Output stop	Power source inspection/ replacement	Auto reset
E02 Lights up and immediately goes out	Input high voltage	Red light ON and immediately goes off	Inverter stop and circuit protector OFF	Power source inspection/ replacement	Circuit protector ON again
E03 Blinking	Output overcurrent	Red light ON	Output stop	Machine body inspection/repair and replacement	Circuit protector OFF then ON again
E04 Blinking	Internal overheating	Red light ON	Output stop	External fan and other inspection	After machine body cools down, circuit protector OFF then ON again
E05 Lights up and immediately goes out	Power source electrical leak	Red light ON and immediately goes off	Inverter stop and circuit protector OFF	Electrical leakage location, inspection and repair, or power source change	Circuit protector ON again
E08 Blinking	External fan malfunction	Red light ON	Output stop	External fan inspection/change	Circuit protector OFF then ON again
E14 Blinking	Battery charging capacity insufficient	Green light ON	———	Installed battery change	———
E15–E26 Blinking	Abnormality of machine body	Red light ON	Inverter stop and circuit protector OFF	Immediately stop using, machine body inspection and repair	Inspection or repair without restarting

INPUT POWER VOLTAGE CONDITION AND ABNORMALITY INDICATION FUNCTION

Input Power Voltage Condition Display Function

In addition to the abnormality indication display function (Figure 10), the FU163 is equipped with a three-color, high-intensity LED lamp located on the outlet panel side of the unit. This LED indicates the input power voltage condition and inverter abnormality in four different modes. See Table 8.

NOTICE

When the power source is a generator and there is a waveform feed or damage/wear problem with the the generator, you might not be able to get a proper reading of the display functions. This is an issue of the generator and not the inverter.

Table 8. Input Power Voltage Condition

Input Voltage Condition	LED Status	Operating Voltage	
		Single Phase 80–130 V	Single Phase 180–250 V
Normal voltage	Green light ON	About 80–130 V	About 180–250 V
Warning voltage	Green blinking	About 70–80 V and about 130–140 V	About 160–180 V and about 250–260 V
Abnormal voltage	Orange blinking	About 60–70 V* and about 140–160 V	About 140–160 V and about 260–270 V
Stop voltage	Red light ON	About 60 V or less and about 270 V or more (Error display: E01, E02)	

* High-frequency vibrator pulsates.

In addition to the flashing of the LED lamp, any connected vibrator will be pulsated by the inverter control to warn the user of abnormality by sound and vibration when the power source voltage is abnormally low.

Table 9. Abnormality Indication Display Function

Abnormal Condition	LED Status	Description	Error Display
Load side abnormality or machine body abnormality	Red light ON	Input voltage drop	E01
		Input overvoltage	E02
		Load short	E03 or E13
		Internal overheating	E04
		Power source electrical leak	E05*
		External fan malfunction	E08
		Abnormality (substrate trouble, etc.)	E15–E26
	Green light ON	Battery error	E14

* If earth leakage has already occurred on the power supply side, the E05 error memory may not be retained sufficiently, depending on the duration of power supply.

Troubleshooting (Frequency Inverter)		
Symptom	**Possible Problem**	**Solution**
The inverter does not run even when the circuit protector switch is ON. (No power)	Input plug is not connected to the power source?	Connect to the power source that matches the rating of the equipment.
	Main power is cut? (Main breaker is OFF)?	Turn on the main power [main breaker ON].
	Power cable of this equipment is broken [open phase] or short circuit inside the input plug mold?	Replace or repair power plug or power cable. Depending on the failure condition, replace or repair the substrate assembly. LED lamp does not light up, with no error display.
The inverter does not run even when the circuit protector switch is ON. (Power is ON and circuit protector is ON.)	Power cable of this equipment is broken [open phase] or short circuit inside the input plug mold?	Replace or repair power plug or power cable. Depending on the failure condition, replace or repair the substrate assembly. LED lamp does not light up, with no error display.
	Voltmeter does not give normal display?	Change the voltmeter.
	Circuit protector switch breakage?	Immediately stop using and inspect the wiring and control board. Replace the circuit protector. The control board may need to be replaced depending on the extent of the damage.
	External cooling fan malfunction?	Replace the cooling fan assembly. (Red LED lamp ON, abnormality description [error display: E08, external cooling fan] is displayed, output of the equipment stops.)
	Frequency display substrate trouble (breakage, damage)?	Immediately stop using, replace the frequency display substrate assembly. (LED lamp OFF, no error display)
	Power source and control substrate trouble (mounted parts and circuit breakage, etc.)?	Immediately stop using, inspect and repair the equipment. (Red LED lamp ON, abnormality description [error display: E15–E26] is displayed to indicate trouble situation, output of the equipment stops. However, depending on the trouble condition of the substrate, LED lamp and error indications may not be displayed.)

Troubleshooting (Frequency Inverter)		
Symptom	**Possible Problem**	**Solution**
The inverter does not run even when the circuit protector switch is ON. (Power is ON and circuit protector is OFF.)	Circuit protector switch is not ON?	Circuit protector switch ON.
	Circuit protector switch is not functioning?	Immediately stop using, inspect the wiring and control substrate, replace the circuit protector switch assembly. (Depending on the condition of breakage, the substrate may be replaced.)
	Power source and control substrate trouble (mounted parts and circuit breakage, etc.)?	Immediately stop using, inspect and repair this equipment. (When the circuit protector switch is OFF due to a board malfunction, the LED lamp and error indications will not be displayed.)
The inverter does not run even when the circuit protector switch is ON. (Power is ON and circuit protector trips.)	Equipment dropped or strong impact applied?	Before turning on the input power, check outside and inside of this equipment for damage and breakage. Turn on power after safety is checked. If abnormality is detected, immediately stop using, then inspect and repair.
	Circuit protector failure?	Immediately stop using, inspect the wiring and control substrate. Replace the breaker switch assembly. (Depending on the condition of breakage, the substrate may be replaced.)
	Power source electrical leakage (inside the equipment or vibrator side)?	Immediately stop using, check the area of electrical leakage and replace or repair this equipment. (After LED lamp lights up, it immediately goes out. Abnormality description [error display: E05] is saved, and circuit protector switch is automatically turned OFF, this equipment stops. If leakage has already begun, there are times when E05 error memory is insufficient depending on the duration of power supply.)
	Input power high voltage?	Stop your work. After checking the power source voltage, correct the situation that has caused power source voltage drop or replace power source. (After the red LED lamp lights up, it goes out immediately. Abnormality description [error display: E02] is saved, and the circuit protector switch is turned off automatically, then the equipment output stops.)
	Power source and control substrate trouble (mounted parts and circuit breakage, etc.)?	Immediately stop using. Inspect and repair this equipment. (When the circuit protector switch is turned OFF by the failure of the substrate, LED lamp does not light up and no error display is shown.)

Troubleshooting (Frequency Inverter)		
Symptom	**Possible Problem**	**Solution**
Water (liquid) and/or dust gets inside the machine.	Immersion in water due to mud flow, mud water and dirty water by natural disaster and accident?	Never turn on the power. Danger of electrical shock and electrical leakage. With the power off, contact our parts/service center for inspection and repair.
Damage, deformation, breakage of the inverter	Breakage and deformation of output panel outlet and housing?	Never turn on the power. Danger of electrical shock and electrical leakage. With the power off, contact our parts/service center for inspection and repair.
	Deterioration and breakage of waterproof packing and seal of each part?	
	Insufficient tightening or non-tightening of fastening bolts on the top and side covers during repair or inspection?	
Cooling fan malfunction (Power is not on.)	Power plug is not connected to the power source?	After making sure the vibrator's switch is OFF, connect to the power source. (If the switch is ON, always turn it OFF.)
Cooling fan malfunction (Power is on, inverter starts, revolution of external cooling fan fluctuates.)	Fan revolution fluctuates from high speed to low speed?	Cut the power source, then check the fan rotation part for foreign (string-like) object that might be trapped there. If trouble is found, immediately stop using and replace the fan.
Cooling fan malfunction (Power is on, external cooling fan does not run.)	Cooling fan power relay connector is not connected?	Check the relay power connector for breakage and damage. If there is no abnormality, reconnect. (LED lamp is OFF. Reconnect. If the cooling fan does not run, inspect and repair. If continuously used with the fan stopped condition, with the increase in the internal temperature, the red LED lamp will turn ON. Abnormality is displayed [error display: E04 or E08] to show the condition. Output of this equipment stops.)
	Cooling fan wiring is broken or short circuited?	Repair the broken part, paying sufficient attention to waterproofing, or replace the cooling fan assembly and wiring assembly with relay connector. (Red LED lamp turns ON. Abnormality description [error display: E08] is displayed to show the condition of breakage. Output of this equipment stops.)
	Cooling fan power relay connector is broken, damaged or dirty?	Replace the wiring assembly having relay connector and cooling fan assembly.

Troubleshooting (Frequency Inverter)		
Symptom	**Possible Problem**	**Solution**
Cooling fan malfunction (Power is on, external cooling fan does not run)	Cooling fan rotation lock or abnormal decrease in rotation due to foreign objects entering the rotating parts, or damage caused by dropping the unit or strong impact?	Replace cooling fan assembly.
	Burning of cooling fan motor and fan substrate breakage? (Shortening of cooling fan life included.)	
	Damage caused by water (sewage water, washing water, etc.) and/or mortar entering into cooling fan?	
Equipment operation malfunction (Power is not on.)	Power plug is not connected to the power source?	After making sure the vibrator switch is OFF, connect to the power source. (If the switch is ON, always turn it OFF.)
Equipment operation malfunction (Power is on but vibrator does not operate.)	Output plug is not connected?	After turning the vibrator switch OFF, connect the output plug.
Equipment operation malfunction (Power is on but vibrator does not operate, vibrator plug is connected to the output outlet.)	Vibrator switch is not turned ON?	Turn the vibrator switch ON.
	Output overcurrent (vibrator failure, wrong connection or contact problem of male plug and output outlet)?	Inspect the vibrator and replace or repair the damaged vibrator. Check the male plug and output outlet terminal contact for damage. Replace or repair. (Red LED lamp turns ON. Abnormality description [error display: E03 or E13] is displayed. Output of this equipment stops.)
	Input power low voltage?	After checking the power source voltage, increase or correct the voltage or replace the power source. (Red LED lamp turns ON. Abnormality description [error display: E01] is displayed, output of this equipment stops. After the power source voltage increases, this machine automatically resumes its operation.)
	Input power high voltage?	Stop operation and, after checking the power source voltage, lower the voltage or replace the power source. (Red LED lamp turns ON then goes out immediately. Abnormality description [error code: E02] is saved. Breaker switch is turned OFF automatically. This equipment stops.)
	Power source and control substrate trouble (mounted parts and circuit breakage)?	Immediately stop using. Inspect and repair this equipment.

Troubleshooting (Frequency Inverter)		
Symptom	**Possible Problem**	**Solution**
Power is turned on but operation of the vibrator is not stable and vibration is low. (Power is on but vibrator does not operate, vibrator plug is connected to the output outlet.)	Input power voltage low?	After checking the power source voltage, increase or correct the voltage or replace the power source. (Green or orange LED lamp flashes. When the orange lamp is flashing, the vibrator pulsates.)
	Power source and equipment extension cable [primary side] are not connected by a cable of appropriate length and size?	Check the operation section of this manual. Make sure the length and size of the extension cable are appropriate, and if not appropriate, replace the cable. (When power source voltage is low only at the primary side, the green or orange LED lamp flashes and the vibrator starts to pulsate. If it is at the secondary side, LED lamp does not flash and the vibrator does not pulsate.)
	This equipment and vibrator side extension cable [secondary side] are not connected by a cable of appropriate length and size?	
	The number of vibrators connected to this equipment exceeds the allowable number of vibrators that can be operated with this equipment?	Check the number of vibrators that can be connected by reading the Specifications section of this manual or the vibrator list decal on the top surface of this equipment. Adjust the number of vibrators being used with this equipment accordingly.
	Circuit protector switch malfunction?	Immediately stop using. Inspect the wiring and control substrate. Replace the breaker switch assembly. (Depending on the condition of breakage, the substrate may be replaced.)
	Power source and control substrate trouble (mounted parts and circuit breakage, etc.)?	Immediately stop using. Inspect and repair this equipment. (Depending on the condition of the trouble of the substrate, red LED lamp turns ON. Output of this equipment stops. However, depending on the condition of the substrate trouble, LED lamp does not turn ON.)
Power is turned on, but the vibrator stops during operation. (Sudden loss of main power source)	Main power is cut (circuit protector switch is turned OFF)?	Check the power source voltage and inspect for electrical leakage. Also inspect the equipment and vibrator using the same power source. If there is no problem, turn on the main power (circuit protector switch is turned ON.) If power source abnormality is found, replace the power source.
	Power source electrical leakage (inside this equipment or vibrator side)?	Immediately stop using. Check the area of electrical leakage and replace or repair.
	Power source and control substrate trouble (mounted parts and circuit breakage, etc.)?	Immediately stop using. Inspect and repair this equipment.

Troubleshooting (Frequency Inverter)		
Symptom	**Possible Problem**	**Solution**
Power is turned on, but the vibrator stops during operation. (Damage or breakage of equipment and main vibrator)	Contact trouble inside the male plug of the vibrator or power cable [15 m or 20 m] during operation? Contact trouble of male plug and output plug, and failure of vibrator itself?	Inspect and identify the breakage of stopped vibrator and the area of trouble. Replace or repair. (Depending on the condition of trouble, the red LED turns ON, and the output stops.)
	Trouble of control substrate (mounted parts and circuit breakage, etc.)?	Immediately stop using. Inspect and repair this equipment.
	Circuit protector switch trouble?	Immediately stop using. Inspect the wiring and control substrate. Replace circuit protector. (Depending on the condition of breakage, the substrate may be replaced.)
Power is turned on, but the vibrator stops during operation. (Input plug of this equipment came off from the power source.)	Power plug not securely connected to main power source?	After turning OFF the circuit protector of this equipment and the switch of the vibrator, connect the male plug to the main power source securely.
Power is turned on, but the vibrator stops during operation. (Male plug of vibrator came off from the output outlet.)	Male plug of the vibrator is not securely connected to the output outlet?	After turning the vibrator switch OFF, securely connect the male plug.
	The plug cover of output outlet is not properly engaged to the claw of the male plug of vibrator, or the male plug claw is worn or damaged?	After turning the vibrator switch OFF, connect the male plug securely, then make sure the claw is properly engaged. If the claw is worn or damaged, replace the male plug.
Power is turned on, but the vibrator stops during operation. (Dropping of this equipment, etc.)	This equipment was dropped or a strong impact was applied?	Before turning on the input power again, check inside and outside of this equipment for damage and breakage. If abnormality is detected, immediately stop using and repair.
Operation frequency (LED display) is not shown. (No power)	Power plug is not connected to the power source?	After making sure the switch of this equipment is turned OFF, connect to the power source, then check the display. (If the switch is ON, turn it OFF.)
Operation frequency (LED display) is not shown. (Power is present.)	Relay power connector on frequency display substrate is disconnected?	Check the relay power connector for breakage and damage, then reconnect.
	Relay power connector on frequency display substrate is damaged, broken or dirty?	Replace frequency display substrate assembly and Frequency Adjustment / Abnormality display.
	LED letters are missing?	
Operation of frequency adjustment switch (▲▼) is disabled. (No power)	Power plug is not connected to the power source?	After making sure the switch of this equipment is turned OFF, connect to the power source. (If the switch is ON, turn it OFF.)

Troubleshooting (Frequency Inverter)		
Symptom	**Possible Problem**	**Solution**
Operation of frequency adjustment switch (▲▼) is disabled. (Power is present.)	Frequency Adjustment / Abnormality display switch wiring is disconnected?	Check the wiring for damage and breakage, then reconnect.
	Frequency Adjustment / Abnormality display switch trouble?	Replace Frequency Adjustment / Abnormality display switch.
	Frequency display substrate, power source and control substrate trouble (mounted parts and circuit breakage, etc.)?	Immediately stop using. Inspect and repair this equipment.
Operation of frequency adjustment switch (▲▼) is disabled. (Unable to adjust frequency, only upward or only downward adjustment is possible.)	Frequency Adjustment / Abnormality display switch trouble?	Replace Frequency Adjustment / Abnormality display switch.
	Frequency display substrate, power source and control substrate trouble (mounted parts and circuit breakage, etc.)?	Immediately stop using. Inspect and repair this equipment.
Display item Selection/Check/ Confirmation switch (Ⓒ Ⓢ) is not working. (No power)	Power plug is not connected to the power source?	After making sure the switch of this equipment is turned OFF, connect to the power source. (If the switch is ON, turn it OFF.)
Display item Selection/Check/ Confirmation switch (Ⓒ Ⓢ) is not working. (Power is present.)	Wiring of Frequency Adjustment / Abnormality display switch is disconnected?	Check the wiring for breakage and damage, then reconnect.
	Frequency Adjustment / Abnormality display switch trouble?	Replace Frequency Adjustment / Abnormality display switch.
	Frequency display substrate, power source and control substrate trouble (mounted parts and circuit breakage, etc.)?	Immediately stop using. Inspect and repair this equipment.
Anti-vibration rubber trouble (Anti-vibration rubber is broken.)	Breakage and separation of anti-vibration rubber due to strong impact applied and falling of the equipment during transportation and handling?	Replace anti-vibration rubber.
Anti-vibration rubber trouble (External cooling fan is damaged due to broken anti-vibration rubber.)	Due to breakage and separation of anti-vibration rubber, external cooling fan and internal cooling fan are damaged, unable to operate?	Replace anti-vibration rubber and inspect/ replace broken or damaged external cooling fan. (Depending on the condition of the breakage of external cooling fan, the red LED lamp turns ON. Abnormality description [error display: E08] is displayed. Output of this equipment stops.)
Damage is found on pipe frame and/or housing.	Damage, breakage and failure that hinders the use of the product?	Replace or repair the damaged or broken part before use.

OPERATION MANUAL

HERE'S HOW TO GET HELP

PLEASE HAVE THE MODEL AND SERIAL NUMBER ON-HAND WHEN CALLING

UNITED STATES

Multiquip Inc.

(310) 537- 3700
6141 Katella Avenue Suite 200
Cypress, CA 90630
E-MAIL: mq@multiquip.com
WEBSITE: www.multiquip.com

CANADA

Multiquip

(450) 625-2244
4110 Industriel Boul.
Laval, Quebec, Canada H7L 6V3
E-MAIL: infocanada@multiquip.com

UNITED KINGDOM

Multiquip (UK) Limited Head Office

0161 339 2223
Unit 2, Northpoint Industrial Estate, Globe Lane,
Dukinfield, Cheshire SK16 4UJ
E-MAIL: sales@multiquip.co.uk

This manual MUST accompany the equipment at all times. This manual is considered a permanent part of the equipment and should remain with the unit if resold.

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