OPERATION MANUAL

MULTIQUIP®

MODEL FX
VIBRATOR
(Used with FU162A High Frequency Inverter)

Revision #0 (05/12/22)

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www.multiquip.com

THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.


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

⚠ WARNING

SILICOSIS WARNING

Grinding/cutting/drilling of masonry, concrete, metal and other materials with silica in their composition may give off dust or mists containing crystalline silica. Silica is a basic component of sand, quartz, brick clay, granite and numerous other minerals and rocks. Repeated and/or substantial inhalation of airborne crystalline silica can cause serious or fatal respiratory diseases, including silicosis. In addition, California and some other authorities have listed respirable crystalline silica as a substance known to cause cancer. When cutting such materials, always follow the respiratory precautions mentioned above.

⚠ WARNING

RESPIRATORY HAZARDS

Grinding/cutting/drilling of masonry, concrete, metal and other materials can generate dust, mists and fumes containing chemicals known to cause serious or fatal injury or illness, such as respiratory disease, cancer, birth defects or other reproductive harm. If you are unfamiliar with the risks associated with the particular process and/or material being cut or the composition of the tool being used, review the material safety data sheet and/or consult your employer, the material manufacturer/supplier, governmental agencies such as OSHA and NIOSH and other sources on hazardous materials. California and some other authorities, for instance, have published lists of substances known to cause cancer, reproductive toxicity, or other harmful effects.

Control dust, mist and fumes at the source where possible. In this regard use good work practices and follow the recommendations of the manufacturers or suppliers, OSHA/NIOSH, and occupational and trade associations. Water should be used for dust suppression when wet cutting is feasible. When the hazards from inhalation of dust, mists and fumes cannot be eliminated, the operator and any bystanders should always wear a respirator approved by NIOSH/MSHA for the materials being used.

FX Series Vibrators

NOTICE

Specifications and part numbers are subject to change without notice.

NOTES

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.**

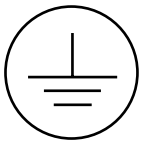
CAUTION

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
	Burn hazards
	Electric shock hazards
IPX-4	Protected against splashing water
	Earth Ground
	To reduce risk of injury user must read instruction manual

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.

- Avoid wearing jewelry or loose fitting clothes that may snag on the controls or moving parts as this can cause serious injury.
- **NEVER** operate this equipment when not feeling well due to fatigue, illness or when under medication.

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

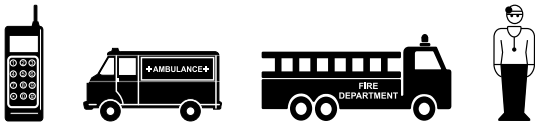
- **ALWAYS** clear the work area of any debris, tools, etc. that would constitute a hazard while the equipment is in operation.
- Keep work area well lit.
- No one other than the operator is to be in the working area when the equipment is in operation.
- **DO NOT** use the equipment for any purpose other than its intended purposes or applications.

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 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 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.



VIBRATOR MOTOR SAFETY

⚠ DANGER

- **ALWAYS** wear rubber insulated gloves and boots when holding the flexshaft during operation. The possibility of electrocution exists causing equipment damage and severe bodily harm even death!

⚠ DANGER

- If applicable, periodically check insulation resistance as referenced in maintenance section. The possibility of electrocution exists causing equipment damage and severe bodily harm even death!

⚠ WARNING

- **NEVER** attempt to run the core outside the casing assembly for any reason.

⚠ CAUTION

- **DO NOT** overreach. Keep proper footing and balance at all times.
- **DO NOT** carry plugged-in motor with finger on the switch.
- **NEVER** carry the motor by the cord. Use the carrying handle.
- **ALWAYS** check the vibrator motor for loosened hardware such as nuts and bolts before starting.
- Keep the cord from heat, oil, and sharp objects.
- **DO NOT** overload the motor. It will do a better and safer job at the rate for which it was designed.
- **DO NOT** expose vibrator motor to rain.
- **DO NOT** use vibrator motor in damp or wet locations without proper electrical circuits.
- **ALWAYS** keep clear of rotating or moving parts while operating the vibrator motor.
- **NEVER** leave the machine unattended while running..
- **ALWAYS** disconnect the motor from the power source when not in use, before servicing, and when changing flexible shafting and vibrator heads.
- Allow the vibrator motor to cool before servicing. Contact with hot components can cause serious burns.

- Before each use, **ALWAYS** check the motor to make certain that there are no damaged parts and that all parts function properly (such as switch, cord housing). If any damage or malfunctioning parts are found, have them repaired or replaced by an authorized service facility.

NOTICE

- Secure forms. Make sure the form work is well made and braced to withstand the stresses made by vibration.
- Keep vibrator motor clean for better and safer operation.
- **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 only factory-authorized replacement parts.
- Store idle vibrator motor. When not in use, motor should be stored in a dry, safe storage area.

ELECTRICAL SAFETY

⚠ CAUTION

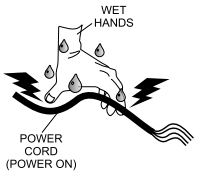
- Prevent body contact with grounded surfaces such as pipes, reinforcing bar, etc.
- When applicable, use a protection wiring device, such as a Ground Fault Circuit Interrupter, for the protection of personnel.
- Operate electric motor only at the specified voltage indicated on the nameplate.
- **DO NOT** spray water onto electric motor.
- **DO NOT** yank the cord to disconnect it from the receptacle. Grasp the plug itself to disconnect it.
- **ALWAYS** make sure the ON/OFF switch on the electric motor is in the OFF position when not in use and before inserting the power plug into an AC receptacle.

- Before plugging the motor into a power source, **ALWAYS** remove any wrenches or other tools from the motor, shaft, and head that were used for assembly.

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 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

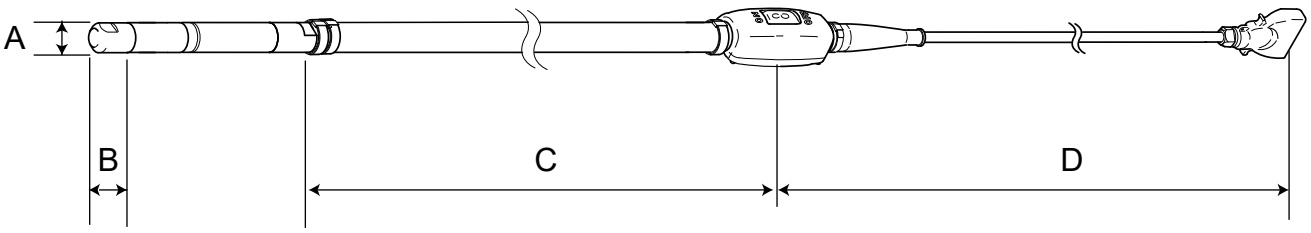
- **ALWAYS** make certain that proper power or extension cord has been selected for the job.
- Use only extension cords that are intended for outdoor use and so marked.
- Use only the gauge wire and length of cord recommended for the motor size. If in doubt, go to the next heavier gauge. (The smaller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

ENVIRONMENTAL SAFETY/DECOMMISSIONING

NOTICE

- **DO NOT** pour waste or oil directly onto the ground, down a drain or into any water source.
- Contact your country's Department of Public Works or recyling agency in your area and arrange for proper disposal of any electrical components, waste or oil associated with this equipment.
- When the life-cycle of this equipment is over it is recommended that the head casing and all other metal parts be sent to a recycling center.

Table 1. FX Vibrator Specifications				
Model	FX30E6	FX40G6	FX50G6	FX60E6
Voltage	48 V	48 V	48 V	48 V
Amperage	4 A	6 A	9.5 A	18 A
Hz	200/240	200/240	200/240	200/240
Vibration	12,000/14,000 VPM	12,000/14,000 VPM	12,000/14,000 VPM	12,000/14,000 VPM
Shipping Weight	23 lb (10.3 kg)	30 lb (13.7 kg)	36 lb (16.5 kg)	44 lb (19.9 kg)



(FX30E6 shown)

Figure 1. Vibrator Dimensions

Table 2. FX Vibrator Dimensions				
Model	FX30E6	FX40G6	FX50G6	FX60E6
Head Diameter (A)	1.25 in (32 mm)	1.70 in (43 mm)	2 in (52 mm)	2.4 in (61 mm)
Head Length (B)	15.6 in (396 mm)	15.6 in (396 mm)	16.3 in (413 mm)	19.1 in (485 mm)
Hose Length (C)	20 ft (6 m)	20 ft (6 m)	20 ft (6 m)	20 ft (6 m)
Cord Length (D)	50 ft (15 m)	50 ft (15 m)	50 ft (15 m)	50 ft (15 m)

The FX high-frequency vibrator is a bar type vibrator that is inserted directly into fresh concrete (freshly-mixed concrete) to provide vibration for concrete consolidation.

For consolidation of fresh concrete, the end of the machine, after being inserted in the concrete, gives appropriate vibration directly to the concrete. This helps the concrete fill in the form without any gap and discharges air bubbles contained in the concrete, resulting in finely consolidated beautiful finish of concrete with high strength.

If the power cord is extended, the machine can be used easily for concrete casting at deep areas or any location far from the power outlet. Its light weight allows long hours of operation and handling such as moving of the machine easily and safely.

The FX vibrator is widely used for general concrete casting in civil engineering and construction, and is offered in several types with four different vibration head diameters ranging from 1.25 to 2.4 inches, hose length of 20 feet, and a standard cord length of 50 feet.

⚠ CAUTION

When operating the FX vibrator, **ALWAYS** wear rubber insulated gloves and boots. Safety glasses and ear protection are also recommended.

STRUCTURE

THE FX vibrator has a vibration head that generates strong vibration at the end. Inside the vibration head, high frequency motor is directly connected to the eccentric weight that generates vibration by rotation.

This high-frequency motor is a three phase induction motor with high frequency power source specification (low voltage: 48V and high frequency: 240Hz).

The wire to run the high frequency motor is connected to the hose that is connected to the vibration head and the pipe, then via the power cord to the power plug. The switch box for turning on/off the high frequency motor is inside the switch box between the hose and power cord.

TIPS

- Keep the bending radius of the flexible hose to a minimum during use.
- Avoid starting the unit with the vibrator head immersed in the concrete mix. After the engine has started, immerse the vibrator head into concrete mix.
- Excessive wear to the vibrating head can result from misuse. **DO NOT** allow the head to vibrate against already hardened concrete or steel used for reinforcement.
- **NEVER** drop or knock the vibrator head against any hard objects. This can damage the eccentric end bell assembly or bearings contained within the head.
- **ALWAYS** rinse or wipe off any wet concrete before it dries or hardens on any part of the unit (shaft, or head).

⚠ WARNING

Before operating this vibrator, the operator must **read** and **understand** the contents of the operation manual. Failure to read this manual may result in severe bodily harm and damage to the equipment.

EXTENSION CORDS

When extension cords are used, refer to Table 3 for the correct size and lengths needed. Using an extension cord with a wire gauge smaller than or longer than the recommended size could result in reduced motor performance and/or damage to the motor or extension cord due to overheating.

Table 3. Extension Cord Sizes (AWG)

Ampere Rating Range	Volts	Length of Cord in Feet					
	115V	25 ft.	50 ft.	100 ft.	150 ft.	200 ft.	250 ft.
	230V	50 ft.	100 ft.	200 ft.	300 ft.	400 ft.	500 ft.
0 - 2		18	18	18	16	16	14
2 - 3		18	18	16	14	14	12
3 - 4		18	18	16	14	12	12
4 - 5		18	18	14	12	12	10
5 - 6		18	16	14	12	10	10
6 - 8		18	16	12	10	10	8
8 - 10		18	14	12	10	8	8
10 - 12		16	14	10	8	8	6
12 - 14		16	12	10	8	6	6
14 - 16		16	12	10	8	6	6
16 - 18		14	12	8	8	6	4
18 - 20		14	12	8	6	6	4

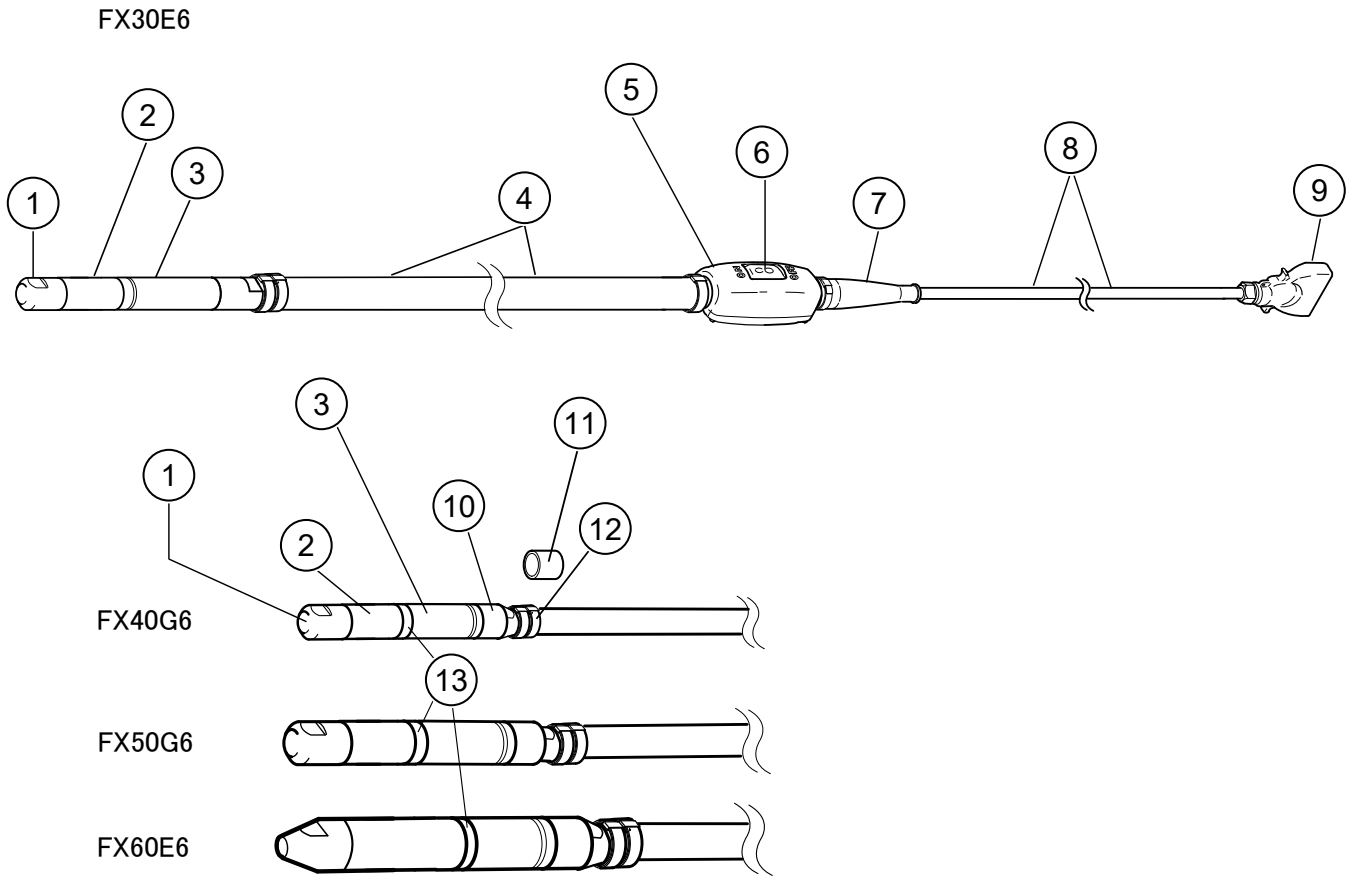


Figure 2. Vibrator Components

1. **Vibrating Head** — Generates vibration via an eccentric rotator that consolidates the concrete by removing air pockets. Different sizes for different models depending on vibrating need.
2. **Eccentric Case** — Holds eccentric weight and together with head, comprise the vibrating head assembly.
3. **Motor Case** — Holds the motor than runs the vibrator.
4. **Hose** — Holds the electrical wire that connects the high frequency motor to the power plug via the power cord.
5. **Switch box** — Holds switch to turn vibrator on and off.
6. **Push Cover** — Covers the switch box.
7. **Cord Armor** — Protects power cord connection to the switch box.
8. **Power Cord** — Connects vibrator to power source (high-frequency inverter).
9. **Plug** — Used to connect power cord to power source.
10. **Hose Coupling** — Attaches the hose/head assembly to the motor.
11. **Hose Clamp (original)** — Clamps hose securely to motor.
12. **Hose Clamp (repaired)** — Replacement. Clamps hose securely to motor.
13. **Case Joint** — Secures eccentric case to motor case.

SELECTION OF VIBRATOR

Select the vibrator model to be used and the number of vibrators needed for the work based on the size of slump and rough aggregate (gravels) of the (freshly mixed) concrete as well as the cast amount and the casting method at the construction and civil engineering site. See Table 4.

Table 4. Vibrator Selection

Type of Work	Size of Coarse Aggregate	Slump	Vibrator Head Diameter
CONSTRUCTION	0.79 - 0.98 in (20 - 25 mm)	7.0 - 8.7 in (18 - 22 cm)	1.18 - 1.57 in (30 - 40 mm)
CIVIL ENGINEERING	1.57 - 2.36 in (40 - 60 mm)	3.15 - 5.9 in (8-15 cm)	1.57 - 2.36 in (40 - 60 mm)

For a pump truck generally used to transport fresh concrete at construction work site, prepare two to three sets of vibrators. With one set placed after the pump tube outlet of construction site floor (slab), the second set to fill and compact the discharged fresh concrete into the form, and the third set of small diameter for finish of wall surface with lots of rebar. Normally three sets of vibrators are used at one pump truck tube location.

There are various applications for civil engineering projects, and each case varies from one another, but construction procedures are established, such that more than three sets of vibrators are required for bridge work and other public work projects.

The above is just a guideline, and for various jobs ranging from construction work to civil engineering projects, a combination of vibrators with necessary diameter must be evaluated based on the scale of fresh concrete casting to be done on each job site.

POWER SOURCE

The FX Vibrators use the FU162A high-frequency inverter as the power source. Refer to the FU162A Operation Manual for more information.

EXTENSION CORDS

When using extension cords between the high-frequency inverter and vibrator, or between commercial power source (single phase 100V and three phase 200V) and the high-frequency inverter, if the size of the cord is too small, voltage is lowered, resulting in burnout of vibrator motor or weakening of vibration. Refer to Table 3 for extension cord sizes.

INSPECTION

1. The high frequency vibrator gets cooled after being inserted inside the fresh concrete. Do not run the vibrator in the air needlessly.
2. If used with the commercial power source within the work site, make sure the outlet is compatible with the plug. If incorrectly connected, it could cause the motor to burn out. Danger of death or injury by electrocution might occur.
3. Check the form to be used with the high frequency vibrator. Make sure it is well tightened and strong before casting the fresh concrete.

OPERATION

⚠ WARNING

DO NOT attempt to operate the vibrator until the ***Safety***, ***General Information***, and ***Inspection*** sections of this manual have been **read thoroughly and understood**.

1. Under colder climate, warm up the motor for 2 to 3 minutes before use.
2. Plug the vibrator to the power source and turn on motor switch properly and quickly.
3. Insert the vibrator head into the concrete.
4. Immerse the head for 5 to 10 seconds, until air stops rising, then withdraw the head **slowly** to let the concrete fill the void left by the vibrator head.

NOTICE

To keep the vibrator head cool, make sure it is kept completely below the concrete surface while vibrating.

5. The vibrator should be inserted at an interval of 11.8 to 19.7 inches (30 to 50 cm) for about 30 seconds.

NOTICE

The vibrator head is cooled by the concrete. Operation of the vibrator head in the air (instead of concrete) for longer than two minutes will cause overheating of the bearings and premature head failure.

SHUTDOWN

Normal Shutdown

1. Take out the vibration head from the fresh concrete.
2. Turn off the motor switch.

CHECKING SWITCH AND LEAD WIRE

1. Open the switch box to make sure there is no water or mortar inside.
2. Check for looseness of bolt at the switch terminal.
3. Check conduction of power cord between the plug and the switch. Check for any short circuits (with the switch turned off.)
4. Turn the switch on and off.
5. Turn the switch on and check conduction between terminals using a mega-ohmmeter (Figure 3).

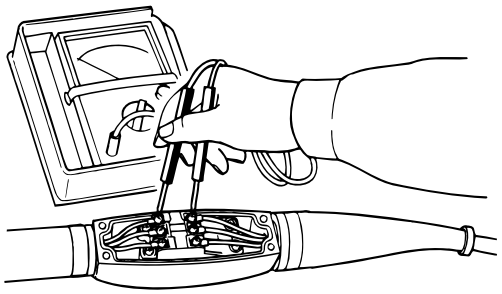


Figure 3. Switch Conduction Check

6. Turn the switch off and check the insulation resistance between the terminals.

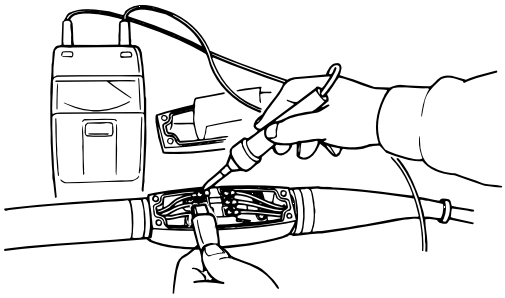


Figure 4. Switch Insulation Resistance Check

7. Check conduction and short circuit of lead wire from the switch to the motor side (with switch turned off). See Figure 5.

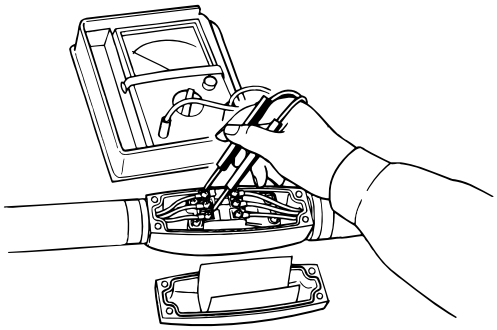


Figure 5. Conduction and Short Circuit of Lead Wire (Switch to Motor Side)

8. If any abnormalities are detected in the tests above, repair unit promptly.

VIBRATOR HEAD CHECK

1. Check the insulation of the motor with a mega-ohmmeter.
2. The allowable insulation resistance is greater than 20 MΩ.

VIBRATOR HEADS BEARINGS

1. The bearings on the vibrator heads should be checked and serviced every 200 hours of operation.

CHECKING WORKING PARTS

1. Put wet waste over the motor case of the vibration head and run for 15 to 30 seconds.
2. After trial run, measure the current with no load. See Table 5 for acceptable readings.

Table 5. Current Measurements

MODEL	FX30E6	FX40G6	FX50G6	FX60E6
CURRENT	4 - 4.5 A or less	6 - 7 A or less	9 - 10 A or less	17A or less

3. Check vibration and noise to make sure they are normal.
4. With the switch turned on, use a mega-ohmmeter to check for conduction between R-S, S-T, and T-R at the plug terminal (Figure 6).
5. With the switch turned off, check non-conduction between R-S, S-T, and T-R at the plug terminal.

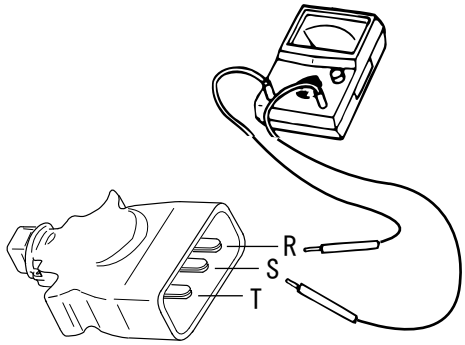


Figure 6. Conduction Test of Plug Terminals

6. With the switch turned on, check the insulation resistance between the plug terminal and vibration head assembly (Figure 7).
7. With the switch turned on, check the insulation resistance between the plug terminal and vibration switch box.
8. With the switch turned off, check the insulation resistance between R-S, S-T, and T-R at the plug terminal.
9. Refer to Table 6 for acceptable resistance readings.

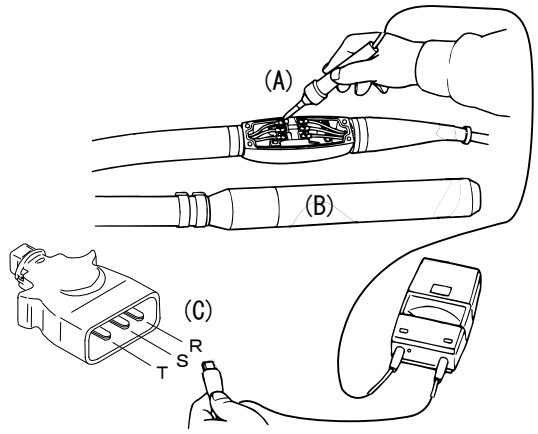


Figure 7. Insulation Resistance Test

Table 6. Coil Resistance

MODEL	FX30E6	FX40G6	FX50G6	FX60E6
RESISTANCE	3.5 ohms	0.88 ohms	0.422 ohms	0.189 ohms

Troubleshooting (Vibrator)		
Symptom	**Possible Problem**	**Solution**
Plug not working properly.	Moisture on plug?	Wipe and dry plug.
	Mortar attached?	Clean or replace plug.
	Terminal broken or bended?	Correct or replace.
	Groove of terminal is closed?	Use screwdriver or other tool to open.
Power cord problems.	Power cord deteriorated?	Cut off bad portion and reconnect.
	Power cord broken?	Replace.
	Power cord armor broken?	Replace.
Switch box not working.	Push covers deterioratedor broken?	Replace.
	Switch box broken?	Replace.
Hose problems.	Broken or worn?	Replace.
	Front or back of hose worn?	Replace.
Problems with pendulum case and head cap.	Worn?	Replace.
Not vibrating	Wire contact problem?	Repair.
	Plug problem?	Repair or replace.
	Power cord wire broken or short circuit?	Repair.
	Lead wire breakage or short circuit?	Repair.
	Switch problem?	Repair or replace.
	Bearing breakage?	Replace.
	Wear at pendulum and rotor joint?	Replace.
	Stator burnout?	Replace.
	Power source problem?	Replace.
Week vibration or elevated temperature of vibration head.	Plug problem?	Replace.
	Extension cord voltage drop?	Adjust.
	Power source voltage low?	Adjust.
	Use of commercial bearing causing grease lying out in short time or insufficient clearance?	Replace.
	Stator half burn?	Replace.
	Insulation problem (stator, switch, etc.) and single phase operation?	Repair or replace.
	Power source overload (vibrator used more than specified)?	Adjustment.
	Low temperature?	Warm up.
	Bearing problem?	Replace.
	Contact with rotor and stator?	Replace.
High noise level.	Bearing wear?	Replace.
	Deformation of vibration head?	Replace.
	Wear of pendulum and rotor joint part?	Replace.
	Wear of motor case bearing mating surface?	Replace.
	Wear of case joint bearing mating surface?	Replace.

NOTES

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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