CONCRETE VIBRATORS & DOWEL PIN DRILLS

Electric Flex Shaft Vibrator Operator/Service Manual

Hours of Operation
8:00AM to 4:30PM Mon. – Fri. Eastern Standard Time

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MINNICH MANUFACTURING CO.
WARRANTY AND SERVICE AGREEMENT

Minnich Manufacturing Co. warrants to the original purchaser that, if any part of the product proves defective in material or workmanship within one year from purchase, and is returned to Minnich Manufacturing Co. within 90 days after the defect is discovered, Minnich Manufacturing Co. will at its option repair or replace said part. Product shipped to Minnich Manufacturing Co. freight prepaid will be returned freight prepaid. Product shipped to Minnich Manufacturing Co. freight collect will be returned freight collect.

LIMITATIONS:

Warranty does not apply to repairs that are required because of normal wear or tear, parts or products that are damaged as a result of misuse, neglect, accident or fire, or of lightning, flooding or other acts of God, or by improper installation or maintenance, of which Minnich Manufacturing Co. will be the sole judge. Warranty does not apply to parts or products that have been modified by an unauthorized party that has in Minnich Manufacturing Co.'s judgment affected their performance or reliability. Warranty does not apply if the part or product substantially fulfills the performance specifications.

Minnich Manufacturing Co. shall not in any event be liable for the cost of any special, indirect, or consequential damages as a result of this product.

SERVICE:

Out of warranty service is available through Minnich Manufacturing Co.

GENERAL SAFETY RULES

This manual contains NOTES, CAUTIONS, and WARNINGS. These MUST be followed to prevent the possibility of improper use, incorrect servicing, damaging the equipment, or personal injury. Read and comply with all NOTES, CAUTIONS and WARNINGS included in these instructions.

NOTE: Notes contain additional information important to the operation of the equipment.

CAUTION: Cautions provide important information to prevent mistakes that could result in damage to the equipment.

 **WARNING:** Warnings alert one to practices or conditions that could lead to personal injury or death!

 **WARNING**

Read and understand all instructions.
Failure to follow all instructions listed below may result in one or all of the following; electric shock, fire, and serious injury.

 **WARNING**
DO NOT USE TOOL IF IT IS IN NEED OF SERVICE!

SAVE THESE INSTRUCTIONS

- WORK AREA –

Keep your work area clean and well lit.

Cluttered and dark areas invite accidents.

DO NOT operate power tools in explosive atmospheres, such as, in the presence of flammable liquids, gases, or dust.

Power tools create sparks that may ignite the dust or fumes.

Keep bystanders, children, and visitors away while operating a power tool.

Distractions can cause you to lose control.

- ELECTRICAL SAFETY -

Grounded tools must be plugged into an outlet properly installed and grounded in accordance with all codes and ordinances. Never remove the grounding prong or modify the plug in any way. DO NOT use any adapter plugs. Check with a qualified electrician if you are in doubt as to whether the outlet is properly grounded.

If the tools should electrically malfunction or break down, grounding provides a low resistance path to carry electricity away from the user.

Avoid body contact with grounded surfaces such as pipes, radiators, ranges and refrigerators.

There is an increased risk of electric shock if your body is grounded.

DO NOT expose power tools to rain or wet conditions.

Water entering a power tool will increase the risk of electric shock.

DO NOT abuse the cord. Never use the cord to carry the tools or pull the plug from an outlet. Keep cord away from heat, oil, sharp edges, or moving parts. Replace damaged cords immediately.

Damaged cords increase the risk of electric shock.

When operating a power tool outside, use outdoor extension cords marked "W-A or "W".

These cords are rated for outdoor use and reduce the risk of electric shock.

- PERSONAL SAFETY -

Stay alert, watch what you are doing and use common sense when operating a power tool. DO NOT use tool while tired or under influence of drugs, alcohol or medication.

A moment of inattention while operating power tools may result in serious personal injury.

Dress properly. DO NOT wear loose clothing, or jewelry. Tie up long hair. Keep your hair, clothing, and gloves away from moving parts.

Loose clothes, jewelry, or long hair can be caught in moving parts.

Avoid accidental starting. Be sure switch is off before plugging in.

Carrying tools with your finger on the switch or plugging in tools that have switches on invites accidents.

DO NOT overreach. Keep proper footing and balance at all times.

Proper footing and balance enables better control of the tool in unexpected situations.

Use safety equipment. Always wear eye protection.

Dust mask, non-skid safety shoes, hard hat, or hearing protection must be used for appropriate conditions.

- TOOL USE AND CARE -

DO NOT force tool. Use the correct tool for your application.

The correct tool will do the job better and safer at the rate for which it is designed.

DO NOT use tool if switch does not turn it on or off.

Any tool that cannot be controlled with the switch is dangerous and must be repaired.

Disconnect the plug from the power source before making any adjustments, changing accessories, or storing the tool.

Such preventive safety measures reduce the risk of starting the tool accidentally.

Store tools out of the reach of children and other untrained persons.

Tools are dangerous in the hands of untrained users.

Maintain tools with care. Keep tools clean.

Properly maintained tools are less likely to bind and are easier to control.

Check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the tools operation. If damaged, have the tool serviced before using.

Many accidents are caused by poorly maintained tools.

Use only accessories that are recommended by the manufacturer for your model.

Accessories that may be suitable for one tool may become hazardous when used on another tool.

- SERVICE -

Tool service must be performed only by qualified repair personnel.

Service or maintenance performed by unqualified personnel could result in a risk of injury.

When servicing a tool, use only identical replacement parts. Follow instructions in the maintenance section of this manual.

Use of unauthorized parts or failure to follow maintenance instructions may create a risk of injury.

GROUNDING INSTRUCTIONS

The electric vibrator motors must be grounded while in use to protect the operator from electric shock. The vibrator motors are equipped with a 3-conductor electric cord and a 3-prong grounding type plug to fit a properly grounded mating receptacle.

115 VOLT

Models 1500 and 2500 are fitted with a 15amp NEMA Type 5-15P plug as shown in **Fig. 1a**. It is to be used in conjunction with NEMA Type 5-15R grounded female receptacle as shown in **Fig. 1b**. Model 3500 is fitted with a 20amp NEMA Type 5-20P plug as shown in **Fig. 2a**. It is to be used in conjunction with a NEMA Type 5-20R grounded female receptacle as shown in **Fig. 2b**. It is also available with an optional 20amp NEMA Type L5-20P, as shown in **Fig. 3a**, which is to be used in conjunction with a NEMA Type L5-20R grounded female receptacle as shown in **Fig. 3b**.

Fig. 1a

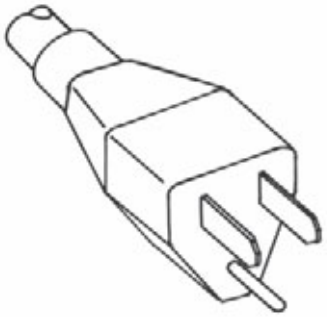


Fig. 1b

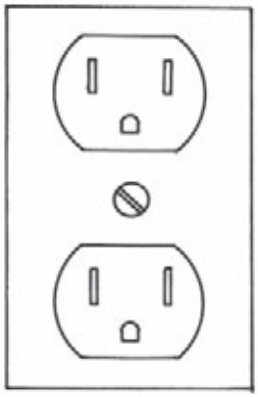


Fig. 2a

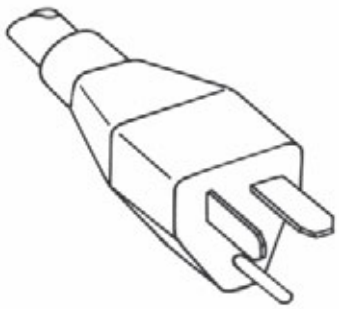


Fig. 2b

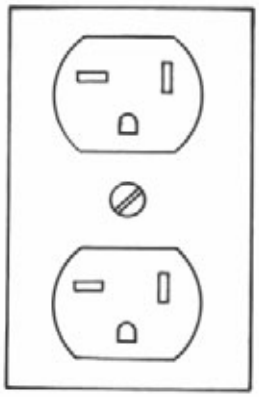


Fig. 3a

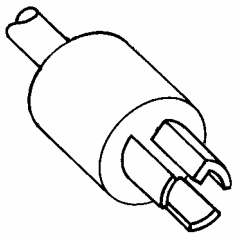
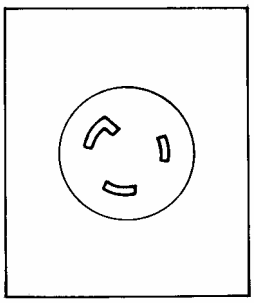


Fig. 3b



FUNCTIONAL DESCRIPTION

The MINNICH line of Flex Shaft vibrators is a system of fully interchangeable components that fulfill the requirements of any job.

The electric motors are available in three (3) sizes – 1500, 2500 and 3500 series all in 115 volts. They are designed to be splash-proof as designated by the following symbol on the switch plate cover. 

The flexible shafts are available in two (2) diameters - 7/8" and 1 3/16" and six (6) lengths – 2', 5', 7', 10', 14' and 21'. Couplings are available to join several lengths together.

The vibrating heads are available in six (6) sizes - 3/4", 1", 1 3/8", 1 3/4", 2" and 2 3/8" diameters.

RECOMMENDED MOTOR / SHAFT/ HEAD COMBINATIONS			
MOTOR	**1500 SERIES**	**2500 SERIES**	**3500 SERIES**
SHAFT	2', 5', 7'	2', 5', 7', 10', 14', 21'	2', 5', 7', 10', 14', 21'
HEADS (DIA.)	3/4" 1" 1 3/8"	1 3/8" 1 3/4" 2" 2 3/8"	1 3/8" 1 3/4" 2" 2 3/8"

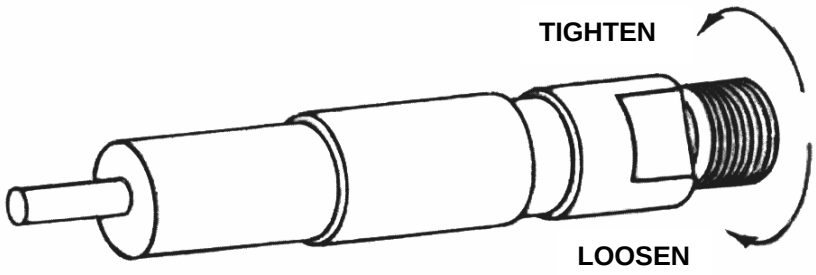
RECOMMENDED HEAD / SHAFT (CASING) COMBINATIONS			
7/8" DIA. CASING		**1 3/16" DIA. CASING**	
LENGTH	**HEAD SIZE**	**LENGTH**	**HEAD SIZE**
2'	3/4", 1", 1 3/8", 1 3/4"	2'	1 3/8", 1 3/4", 2", 2 3/8"
5'	3/4", 1", 1 3/8", 1 3/4"	5'	1 3/8", 1 3/4", 2", 2 3/8"
7'	3/4", 1", 1 3/8", 1 3/4"	7'	1 3/8", 1 3/4", 2", 2 3/8"
10'	3/4", 1", 1 3/8"	10'	1 3/8", 1 3/4", 2", 2 3/8"
		14'	1 3/8", 1 3/4", 2", 2 3/8"
		21'	1 3/8", 1 3/4", 2", 2 3/8"

ASSEMBLY

CAUTION: Turn the switch off and unplug the motor before performing any maintenance or fitting any components to the motor.

ASSEMBLING SHAFT TO MOTOR

1. The end of casing with the strain relief spring goes into the motor casing adapter.
2. Insert inner core of the shaft into the core adapter on motor. Make sure the core is fully inserted.
3. Coat threads on casing coupler with Permatex Form-A-Gasket #1.
4. Thread casing coupler counterclockwise into adapter on power unit and tighten securely using open end wrenches on the flats. NOTE – These are Left-Hand Threads.



ASSEMBLING VIBRATOR HEAD TO SHAFT.

1. Coat threads on casing coupler with Permatex Form-A-Gasket #1.
2. Push core toward motor end to make certain it is still engaged in the motor. Insert exposed end of core into head core adapter.
3. Holding casing coupler with an open end wrench on the flats, thread the head on counterclockwise and securely tighten with a pipe wrench.
   CAUTION: Put pipe wrench only on the very end of the head to which the flexible shaft is being attached.

OPERATION

Match vibrator motor, shaft and head assembly to the job. Select the shortest shaft possible to do the job to assure maximum power at the head.

Avoid sharp bends in the flexible shaft for greatest efficiency and shaft life. This is true both in operation and storage. **DO NOT** allow the flexible shaft to hang or be dragged over sharp edges of the forms during operation.
DO NOT use shaft or cord to pull motor.

To vibrate concrete, dip vibrating head vertically into the mix. Allow to vibrate until the surface around the head becomes glossy and no large air bubbles break the surface – usually 10-20 seconds. Withdraw the head slowly, then move and immerse vibrator head in new location.
CAUTION: Over – vibration will cause a separation of the aggregates and will weaken the concrete.

DO NOT operate the vibrating head out of the mix for more than two minutes to prevent overheating and permanent damage to bearings and seals. Wet concrete keeps the head at safe operating temperature.
NOTE: A new head will run slightly warmer for a short time than a broken in head. Once the seals seat the temperature of the head will drop.

The electric motors work in 115volt single phase current. They are universally wound and can be operated on either AC or DC. The current must not exceed 60 cycles when operating on AC. 50 cycle AC current is acceptable.
DO NOT operate motors on voltages that vary more than 5% from the specified.

 **WARNING:** Use only 3-conductor extension cords, that are equipped with 3-prong grounded plugs and 3-pole receptacles that accept the tools plug.

Recommended AWG Wire Size For Extension Cords						
Motor	**Rated Amps**	**25' [7.6m]**	**50' [15.3m]**	**100' [30.5m]**	**150' [45.8m]**	**200' [61.0m]**
1500	9	18	14	12	10	8
2500	15	16	12	10	8	6
3500	20	14	12	8	6	6

Always use the proper size extension cord. Undersize cords will result in loss of power due to voltage drop.

 WARNING: Running the motor on reduced voltage may result in burning up the motor.

MAINTENANCE

CAUTION: Turn the switch off and unplug the motor before performing any maintenance or fitting any components to the motor. When servicing use only identical replacement parts.

PERIODIC MAINTENANCE SCHEDULE

BEFORE OPERATING

1. Inspect air inlet filter and outlet vent holes. Clean or replace dirty or clogged filter.
2. Inspect electrical cords for undue wear or damage. Replace damaged cords. DO NOT use damaged cords.

EVERY 50 HOURS

Clean and lubricate the core in the flexible shaft.

EVERY 100 HOURS

1. Inspect commutator and brushes in motor.
2. Change oil in vibrator head.

MOTORS

Wipe off motor with damp rag after each use to prevent concrete build-up.
CAUTION: Never spray with or dip electric motor in water. This will increase the risk of electric shock.

Clean intake and exhaust areas to insure unrestricted air flow. Restricted air flow could cause motor to overheat.

Remove end cover over air filter and clean air filter element as often as required by working conditions. To clean filter, remove and wash in warm, soapy water. Make sure filter is completely dry before reinstalling.

Check brushes periodically for wear. As a safety feature to protect the motor, the brushes are of such design that the motor will shutdown if they wear and become too short. To avoid unnecessary arcing and an unexpected shutdown, inspect the brushes every 100 hours and replace them when necessary. Always replace both brushes at the same time.

TO INSPECT OR REPLACE MOTOR BRUSHES:

1. Remove plastic brush housing covers and brush holder caps from both sides of the motor.
2. Pull out the brushes and measure the length of the graphite block portion of the brush. If the dimension is 3/8” or less, replace with new brushes. If brushes are long enough, replace them in the same position in the motor to avoid undue arcing.
3. Break in new brushes by running the motor less flexible shaft for about five (5) minutes or until the arcing stops.

Inspect commutator through access port in bottom of motor after every 100 hours of use. With motor running, check for excessive arcing. If present, clean commutator with an industrially rated commutator cleaner which is available at most motor repair establishments.

FLEXIBLE SHAFTS

LUBRICATION – After every 50 hours of operation, remove the inner core and wipe it clean. Coat core with a 1/16" layer of MINNICH #002120-00000 high temperature grease.
CAUTION: DO NOT use solvents. Solvents trapped in the core or casing will breakdown the new grease and risk premature failure.

Reverse the core in the casing at every lubrication to even the wear and extend service life.

Replace worn or broken casing to prevent damage to core and head.

To insure long life of flexible shafts, avoid putting undue bends in them. Whenever a casing becomes kinked, or worn to extreme, replace with original equipment.

Never install a new core in a kinked casing or a kinked core in a new casing. This will cause the new parts to fail prematurely.

Core and casing assemblies are shipped from the factory pre-lubricated. However, separate cores and casings are shipped without lubrication and must be lubricated with MINNICH #002120-00000 high temperature grease at assembly as noted above.

Always apply Permatex Form-A-Gasket #1 to the threads of the casing adapter when reassembling the core and casing assembly to the vibrator head and motor.

Break in a newly lubricated core and casing assembly before putting it to work. During this break-in the core will turn slower than normal, could rattle a little bit and draw the motor speed down, causing the motor to draw more current. After this break-in period, the unit will run smoothly.

VIBRATOR HEADS

The vibrator heads require very little maintenance since they are lubricated with oil and sealed at the factory.

Wash concrete and dirt from heads after each job or at the end of a workday – whichever occurs first.

To extend the bearing life in the head, change the oil in the head after every 100 hours of operation.

TO CHANGE OIL IN HEADS:

1. Secure tip of vibrator head in vise and use a chain or pipe wrench on the casing adapter, rotating adapter counterclockwise for a right hand thread. Remove head from vise and drain out old oil in a container and dispose properly.

2. Insert open end of head into the appropriate size bump tube. With open end facing down, strike bottom end of bump tube on a block of wood until eccentric weight assembly drops out.

3. Flush eccentric weight assembly and housing with clean solvent and wipe all parts clean.

4. Inspect bearings, core adapter and seals for signs of wear. If parts pass inspection, reassemble eccentric weight assembly into the housing. Clamp head vertically in a vise and refill with proper amount of MINNICH #002119-00000 long life oil (see chart on page 19).
   NOTE: If there are signs of wear (grooving) from the seals on the core adapter, worn seals or looseness in the bearings see the service portion of the manual for further instructions.

5. Put oil on core adapter for ease of assembly of casing adapter containing the two (2) seals. Start thread of adapter into housing for a turn or two. Stop and apply a generous coating of Permatex Form-A-Gasket #1 all around the threads on the casing adapter.
   NOTE: It is very important that the casing adapter fits tightly against the housing. In order to guarantee a waterproof seal, allow 15 minutes for sealant to set up.

SERVICE

ELECTRIC MOTORS

CAUTION: Turn the switch off and unplug the motor before performing any maintenance to the motor. When servicing use only identical replacement parts.

TO REPLACE BRUSHES #19

TO REMOVE:

1. Disconnect electric cable #24 from power source.
2. Remove plastic brush housing covers #21 from both sides of motor housing #13.
3. Using a blade point screwdriver, unthread brush holder caps #20 from brush holders #18.
4. Remove brushes #19. In most cases, the brush #19 will automatically partially eject from brush holder #18.

TO REPLACE:

1. Align the carbon portion of the new brush #19 with brush holder #18 and insert.
   NOTE: Be careful not to chip the edges of the brush.
2. Feed spring end of brush #19 into brush holder #18 until the round stop at the end of the spring is flush with the brush holder #18.
3. Hold stop in place and slide brush holder cap #20 into opening of motor housing #13.
4. Using a blade point screwdriver, thread and tighten brush holder cap #20 into brush holder #18.
5. Replace plastic brush housing cover #21 onto motor housing #13.
6. Break in new brushes by running the motor less flexible shaft for about 5 minutes or until the arcing stops.

TO REPLACE FILTER #28

TO REMOVE:

1. Set motor in upright position and secure with end cover #30 up.
2. Using a blade point screwdriver, remove end cover #30 by removing four (4) screws #31 and four (4) lockwashers #3.
3. Remove filter #28 leaving end cover spacer #29 in the middle.

TO REPLACE:

1. Place filter #28 over centered end cover spacer #29.
2. Place end cover #30 on spacer #29 so as to align the four (4) holes with tapped holes in motor housing #13.
3. Using a blade point screwdriver, replace the four (4) lockwashers #3 and four (4) screws #31. Tighten into motor housing #13.

TO REPLACE MOTOR SWITCH #32

TO REMOVE:

1. Disconnect electric cable #24 from power source.

2. Using a wrench, remove motor switch weather cap #36 and motor switch nut #35 from barrel of motor switch #32. **NOTE:** The vertical groove in the threaded barrel of the switch is toward the electric cable #24.

3. Using a blade point screwdriver, remove the four (4) screws #2 and four (4) lockwashers #3 that hold the switch cover plate #34 onto motor housing #13 and remove. Remove #33 switch sleeve.

4. Using a blade point screwdriver, disconnect the two (2) lead wires from the electric cable #24 and two (2) from the field #12 from the motor switch #32.

5. Remove switch.

TO REPLACE:

1. Before beginning, refer to "TO REPLACE FILTER #28" and remove end cover #30 and filter #28. This is done to see the lead wires of field #12 and lead wires of electric cable #24 after they are connected to motor switch #32, to insure they are not coming in contact with the commutator bars on armature #8.
   NOTE: Once you remove end cover #30 be certain to clean and inspect filter #28.

2. With the vertical groove on threaded barrel of motor switch #32 facing toward electric cable #24, to insure "ON/OFF" will agree with markings on motor switch cover plate #34, connect two (2) lead wires from electric cable #24 and two (2) lead wires from field #12 to motor switch #30. Install switch sleeve #33 around switch.

3. When pushing motor switch #32 into motor switch opening in the motor housing #13, position lead wires to allow motor switch #32 to lie flat.

4. Position motor switch cover plate #34 on motor switch #32 by inserting the key in the center hole into the vertical groove in the threaded barrel of the switch. This will locate the "OFF" position on motor switch cover plate #34 toward the electric cable #24. Secure switch cover plate with four (4) screws #2 and four (4) lockwashers #3 onto motor housing #13.

5. Replace motor switch nut #35 and motor switch weather cap #36 onto the barrel of motor switch #32 and tighten securely. **NOTE:** A small amount of silicone dielectric compound placed inside motor switch weather cap #36 will ease installation of it and provide additional sealing.

6. Install filter #28 and end cover spacer #29.

7. Replace end cover #30 and secure with four (4) screws #31 and four (4) lockwashers #3.

TO REPLACE ELECTRIC CABLE #24

TO REMOVE:

1. Disconnect electric cable #24 from power source.

2. Using a wrench, remove motor switch weather cap #36 and motor switch nut #35.

3. Using a blade point screwdriver, remove four (4) screws #2 and four (4) lockwashers #3 from motor switch cover plate #34. Remove cover plate.

4. Refer to “TO REPLACE FILTER #28” and remove end cover #30 and filter #28.

5. Remove switch sleeve #33.

6. Using a blade point screwdriver, disconnect the two (2) lead wires from electric cable #24 from motor switch #32. Disconnect ground wire (green) from motor housing #13 by unthreading screw #26 with lockwasher #25 from motor housing #13.

7. Using a wrench, unscrew the spiral flex nut (part of strain relief #23) from the strain relief body.

8. Turn the electric cable #24 until it becomes free and pull it out.

TO REPLACE:

1. Take electric cable #24 and install and crimp terminal #22 on all three (3) wires.

2. Slip spiral flex nut (round end first) onto electrical cable #24.

3. Slip electric cable #24 through the rubber sleeve in the strain relief body so that ¼” of outside covering extends inside the motor housing #13 with the ground wire (green) facing in the down position toward opening for brush holders in motor housing #13.

4. While holding the electric cable #24 in position, screw the spiral flex nut onto the strain relief body and tighten with wrench.

5. Feed ground wire (green) through vent hole and secure to motor housing #13 with screw #26 and lockwasher #25. Make sure ground wire does not interfere with commutator on the armature #8.

6. Connect the two (2) shorter lead wires of electric cable #24 to motor switch #32 and tighten screws.

7. Install switch sleeve #33 over the switch terminals.

8. Refer to steps “3” through “5” of “TO REPLACE MOTOR SWITCH #32” to finish installation.

TO REPLACE ARMATURE #8 AND FIELD #12

TO REMOVE ARMATURE #8

1. Refer to steps “1” through “4” in “TO REMOVE” section of “TO REPLACE BRUSHES #19.”

2. Using a blade point screwdriver, remove four (4) screws #2 and four (4) lockwashers #3 from end cap #4.

3. With plastic mallet, tap casing adapter #1 on alternating sides until end cap #4 becomes loose from motor housing #13. It may be necessary to use a blade point screwdriver to pry end cap #4 away from motor housing #13.

4. Because of tight tolerances in bearing seat of end cap #4, armature #8 will be removed with end cap #4.

5. To remove armature #8 from end cap #4, hold laminations of armature #8 with end cap #4 facing in down position. Tap inner face of end cap #4 with plastic mallet on alternating sides until it becomes free of armature #8. **NOTE:** When armature #8 is free from end cap #4 be certain not to lose spring washer #5.

TO REMOVE FIELD #12

1. Using a blade point screwdriver, remove the four (4) screws #2 and four (4) lockwashers #3 that hold the switch cover plate #34 onto motor housing #13 and remove out of the way. Remove switch sleeve #33. Remove the two (2) field leads from motor switch #32.

2. With motor housing #13 standing in upright position, field leads will become visible. With blade point screwdriver, pry the two (2) field leads that are inserted in sides of brush holders #18 free. When lead wires are free, notice that the two (2) terminals on the lead wires are flag shaped. This allows them to slide into sides of brush holders #18.

3. Using a Phillips screwdriver or 1/4” socket, remove the two (2) field screws #9 and lockwashers #10.

4. Turn motor housing #13 upside down and tap on hard surface until field #12 becomes free of motor housing #13, being careful not to damage field windings.

TO REPLACE FIELD #12

1. Take field #12 and install and crimp terminal #22 on the two (2) wires without terminals.

2. With switch opening on motor housing #13 facing away from you, stand motor housing #13 in an upright position.

3. Examine field #12. **NOTE:** A section of one of the lead wires will be over or very near to one of the field holes that the field screws #9 will pass through. Position field #12 so this is on the right side as you look down on field #12 for models 2500 and 3500 (2 and 3 HP) and on left for model 1500 (1 HP) with single field lead facing away from you. **CAUTION:** Position this wire so it is clear of the boss for hole in field #12. A screwdriver may be used to hold the wire out of the way when installing field #12 into motor housing #13.

4. Place alignment tool into right-hand threaded hole in motor housing #13. **NOTE:** Threaded holes are located in bosses near the bottom of motor housing #13 and accept the field screws #9.

5. Position the wire connection end of the field down with the right hand field hole over alignment tool and slide into motor housing #13. **CAUTION:** While sliding field #12 into motor housing #13, be sure all field wires are clear and will not be in the way of the field #12 seating itself on flange in motor housing #13.

6. Remove alignment tool and insert field screws #9 and lockwashers #10. Tighten securely.

7. Insert two (2) field leads with flag shaped terminals into sides of brush holders #18, being sure they are tightly in place. **NOTE:** you will feel a slight snap when this is accomplished. It is quite apparent which flag shaped terminal goes to the right brush holder #18 and which to the left brush holder #18.

8. Connect the remaining two (2) lead wires to motor switch #32.

9. Install switch sleeve #33 over the switch #32 terminals.

10. Refer to steps “3” and “4” on “TO REPLACE MOTOR SWITCH #32” for replacing motor switch over plate #34.

TO REPLACE ARMATURE #8

1. Before replacing armature #8 into motor housing #13, be sure core adapter #6 is securely threaded onto the armature shaft at fan end.

2. With motor housing #13 standing in an upright position, hold armature #8 with commutator bars facing down and insert through field #12 into bearing seat of motor housing #13. **NOTE:** It may be necessary to tap the core adapter #6 with plastic mallet in order to properly seat armature bearing #11 into bearing seat of motor housing #13.

3. With the tabs of spring washer #5 facing down, place it on upper armature bearing #7.

4. With five (5) screws #2 in casing adapter #1 facing switch opening of motor housing #13, place end cap #4 over spring washer #5 and armature bearing #7 and press into place. **NOTE:** It may be necessary using a blade point screwdriver to tighten four (4) screws #2 and four (4) lockwashers #3 before end cap #4 is seated properly in place.

5. Refer to steps “1” through “5” of “OF REPLACE BRUSHES #19” to finish installation.

TO REPLACE BRUSH HOLDER #18

TO REMOVE:

1. Disconnect electric cable #24 from power source.

2. Remove four (4) bolts #16 and four (4) lockwashers #15 disconnecting motor frame #39 from motor assembly. Remove motor assembly from frame.

3. Remove two (2) isolators #15 located under brush holders from motor housing #13.

4. Refer to steps “2” through “4” of “TO REMOVE BRUSHES #19” for brush removal

5. Refer to steps “2” through “5” of “TO REMOVE ARMATURE #8” for armature removal.

6. Using an Allen wrench loosen set screws #17 in motor housing #13 to release brush holders #18. Remove brush holders #18.

TO REPLACE:

1. Set motor housing #13 down on appropriate brush holder spacing fixture.

2. Install brush holders #18 into motor housing #13. Slide alignment bar through both brush holders #18 and slot in fixture. **NOTE:** Some brush holders #18 have only one (1) slot to receive the terminal from the field #12. Make certain these brush holders are installed with this slot towards the bottom of the motor housing #13 and not up towards the switch opening.

3. Hold right amount of pressure on each brush holder #18 when tightening the cup point set screw #17. Seat the set screw #17 lightly, back out a partial turn and reseat making sure the set screw cup point seats in, but not so tight that it would crack the brush holder #18.

4. Refer to steps “1” through “5” of “TO REPLACE ARMATURE #8” for armature #8 and brush #19 replacement.

5. Install the two (2) isolators #14 previously removed.

6. Reinstall motor assembly into motor frame #39. Install four (4) bolts #16 and four (4) lockwashers #15 securing motor frame #39 to isolators #14.

VIBRATOR HEADS

All vibrator heads are equipped with seals in the casing adapter to keep the grease from the flexible shaft out of the vibrator head and to retain the oil in the vibrator head.

TO DISASSEMBLE HEADS:

1. Secure tip of vibrator head in vise and use a chain or pipe wrench on the casing adapter #51, rotating adapter counterclockwise for a right hand thread. Remove head from vise and drain out old oil in a container and dispose of properly.

2. Insert open end of head into the appropriate size bump tube. With open end facing down, strike bottom end of bump tube on a block of wood until the eccentric weight assembly drops out.

3. Flush eccentric weight assembly, casing adapter #51 and housing #44 with clean solvent and wipe all parts clean.

Inspect bearings #46, core adapter #48, and seals #50 for any signs of wear. If there are signs of wear on the polished part of the core adapter #48, both core adapter #48 and seals #50 must be replaced. If the bearings #46 show any signs of looseness, they must be replaced. Replace both pairs.

TO DISASSEMBLE ECCENTRIC WEIGHT ASSEMBLY:

1. Place eccentric weight assembly in vise. If you have a 1/4" drive ratchet, place square driver inside the female end of core adapter #48, and turn counterclockwise for a right hand thread. If a 1/4" drive ratchet is not available, place vise grips or locking pliers on the back end of core adapter #48 (next to the bearing), where the material is the heaviest and remove, being very careful not to damage or mar the polished portion of the core adapter #48.

2. On opposite end use a wrench or spanner wrench (vise grips or locking pliers if spanner is not available) to remove bearing locknut #45.

3. Slip bearings #46 off eccentric weight #47.

TO REPLACE OIL SEALS #50:

NOTE: To replace the oil and grease seals #50 in the casing adapter #51, an arbor press is ideal for this operation. If a press is not available, a properly sized socket wrench will work. The casing adapters #51 are machined with a step inside the I.D. to insure the seals #50 are properly seated when installed.

CAUTION: In all cases the oil and grease seals #50 are inserted into the casing adapter #51 **back to back**. Also, it is advisable to press one seal #50 into place, then the other. Apply a light coating of grease to the outside diameter of seal #50 before pressing into casing adapter #51. Some plastic sealing material may be shaved off the outside diameter of seal #50 as it is pressed into place. Remove this after pressing **each** seal to avoid any chance of this residue entering into the seal area or the bearings and resulting in a premature failure.

1. On the 3/4 in. (19mm) and 1 in. (25mm) heads, the oil and grease seals #50a and #50b are removed by pushing them out of the female end of the casing adapter #51 and replaced by pushing oil seal #50a in first (lip down) 1 9/16 in. deep for the 3/4 in. head and 1 1/2 in. deep for the 1 in. head followed by the grease seal #50b (lip up) through the female end of the adapter.

2. On the 1 3/8 in. (35mm), 1 3/4 in. (45mm) and the 2 in. (50mm) heads, the oil and grease seals #50 are removed by pushing them out of the male end of the casing adapter #51 and replaced by pushing them in through the male end of the adapter, being sure they have been properly seated against the step described earlier.

3. On the 2 3/8 in. (59mm) head, the oil and grease seals #50 are removed by pushing them out through the female end that the head housing threads into, and replaced through the same end, being sure they have been properly seated against the step described earlier.

TO ASSEMBLE ECCENTRIC WEIGHT ASSEMBLY:

1. Place eccentric weight #47 in vise.

2. Install two (2) bearings #46 on one end and secure with locknut #45 using either a wrench or spanner wrench (depending on type of locknut used).

3. Install two (2) bearings #46 on other end and secure with core adapter #48. If you have a 1/4" drive ratchet, place square driver inside the female end of core adapter #48 and tighten turning clockwise for a right hand thread. If a 1/4" drive ratchet is not available, place vise grips or locking pliers on the back end of core adapter #48 (next to the bearing), where the material is the heaviest and remove, being very careful not to damage or mar the polished portion of the core adapter #48.

TO ASSEMBLE HEADS:

1. Place housing #44 in vise vertically with open end up.

2. Take eccentric weight assembly and put a light coating of head lubricating oil MINNICH #002119-00000 and lubricate the bearing #46 outer races.

3. With core adapter #48 pointing up, take the eccentric assembly and slide into the housing #44. You may have to tap the core adapter #48 to properly seat the bearings into the housing #44.

4. Refill vibrator with the proper amount of MINNICH #002119-00000 long life oil (see chart on page 19).

5. Put a light coat of oil or grease on polished surface of core adapter #48 for ease of assembly of casing adapter #51 containing the two seals #50. Start thread of adapter into the housing for a turn or two. Stop and apply a generous coating of Permatex Form-A-Gasket #1 all around the threads on the casing adapter #51. Tighten adapter with a chain or pipe wrench and remove excess sealant. **NOTE:** It is very important that the casing adapter #51 fits tightly against the vibrator housing #44. In order to guarantee a water proof seal, allow 15 minutes for sealant to set up.

When threading vibrator head back on to the flexible shaft casing, always put Permatex Form-A-Gasket #1 on casing end to insure a water tight seal. Thread head on and tighten with a chain or pipe wrench on head and open end wrench on flats on casing.

PARTS AND SERVICE NOTES

Part numbers shown in BOLD type are recommended spare parts. These parts are subject to wear under normal operating conditions and may need periodic replacement. It's suggested that these items be stocked to satisfy the expected service needs of this model. The actual stocking quantities of these and other service parts used in more extensive repairs will be dependent upon the service practices of each customer.

Grease - Flexible Shaft----------Part No. 002120-00000
Oil - Lubricating ----------Part No. 002119-00000

Lubricating Oil Capacities

Head Dia.	Oil Capacity
3/4"	1/4 oz.
1"	1/2 oz.
1 3/8"	1/2 oz.
1 3/4"	3/4 oz.
2"	1 oz.
2 3/8"	1 oz.

Electric Motor Parts Sheet

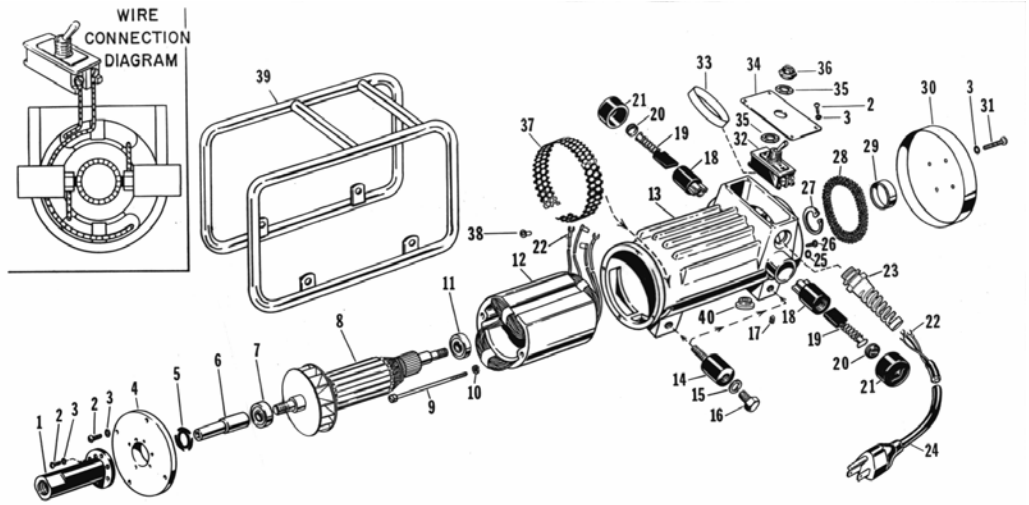
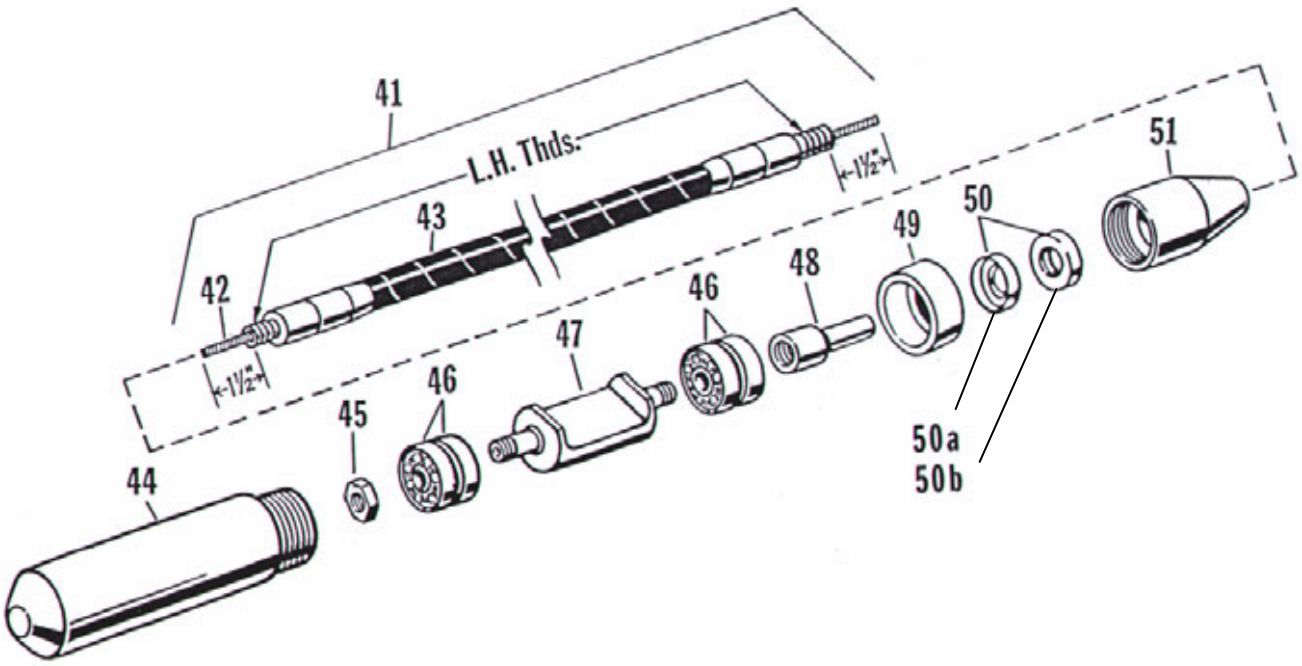


Fig. No.	1500	2500	3500	Description
1	002189-00000	002189-00000	002189-00000	Casing Adapter
2	006703-00.62	006703-00.62	006703-00.62	Screw, 10-24x5/8" Long Pan Hd. Th'd. Cutting (14)
3	006145-00000	006145-00000	006145-00000	Lockwasher #10 (18)
4	002088-00000	002014-00000	002081-00000	End Cap
5	002061-00000	002061-00000	002061-00000	Spring Washer
6	002678-00000	002678-00000	002678-00000	Core Adapter
7	**002037-00000**	**002037-00000**	**002037-00000**	**Bearing**
8	002089-00000	020121-00000	002082-00000	Armature, 115 Volt
9	002092-00000			Screw, 8-32x2 3/4" Long Th'd. Forming (2)
9		020123-00000		Screw, 8-32x3 1/2" Long Th'd. Forming (2)
9			002086-00000	Screw, 8-32x4" Long Th'd. Forming (2)
10	006144-00000	006144-00000	006144-00000	Lockwasher #8 (2)
11	**002101-00000**	**002037-00000**	**002037-00000**	**Bearing**
12	002091-00000	020122-00000	002084-00000	Field, 115 Volt
13	0A2087-00001	0A2015-00001	0A2080-00001	Housing, Motor
14	002042-00000	002042-00000	002042-00000	Isolator (4)
15	006148-00000	006148-00000	006148-00000	Lockwasher 5/16" (4)
16	006037-00.62	006037-00.62	006037-00.62	Bolt, 5/16"-18x5/8" Long (4)
17	006320-00.38	006320-00.38	006320-00.38	Set Screw, 10-24 x 3/8" Long (2)
18	002093-00000	002030-00000	002030-00000	Brush Holder (2)
19	**002094-00000**	**020291-00000**	**002029-00000**	**Brush (2)**
20	002095-00000	002031-00000	002031-00000	Brush Holder Cap (2)
21	002049-00000	002049-00000	002049-00000	Brush Housing Cover (2)
22	020352-00000	020352-00000	020352-00000	Terminal - Electric Cable (3)
22	020352-00000	020352-00000	020352-00000	Terminal - Field (2)
23	A10210-00001	A10210-00001	A10212-00001	Strain Relief
24	002035-00001	002035-00001	010073-00000	Electric Cable, 115 Volt
24			010906-00000	Electric Cable 115 Volt Opt Twist-Lock Plug
25	006143-00000	006143-00000	006143-00000	Lockwasher #6
26	002067-00000	002067-00000	002067-00000	Screw, 6-32 x 1/2" Long Pan Hd. Th'd Cutting
27	002033-00000	002034-00000	002034-00000	Retaining Ring
28	**008150-00000**	**008150-00000**	**008150-00000**	**Filter**
29	002109-00000	002109-00000	002109-00000	Spacer, End Cover
30	002106-00000	002103-00000	002104-00000	End Cover
31	002108-00000	002108-00000	002108-00000	Screw, 10-24 x 1" Long Stainless Steel Pan Hd. (4)
32	020361-00000	020361-00000	020361-00000	Motor Switch
32-1	A20361-00001	A20361-00001	A20361-00001	Motor Switch (Includes Part No. 33, 35 & 36)
33	020364-00000	020364-00000	020364-00000	Motor Switch Sleeve
34	002050-00000	002050-00004	002050-00000	Motor Switch Cover Plate, 115 Volt
35	020362-00000	020362-00000	020362-00000	Motor Switch Nut (2)
36	020363-00000	020363-00000	020363-00000	Motor Switch Weather Cap
37	002098-00000	002059-00000	002085-00000	Air Vent Cover
38	002048-00000	002048-00000	002048-00000	Pop Rivet, Air Vent Cover
39	0A7596-00000	0A7595-00000	0A7914-00000	Motor Frame
40	010214-00000	010214-00000	010214-00000	Plug-Inspection

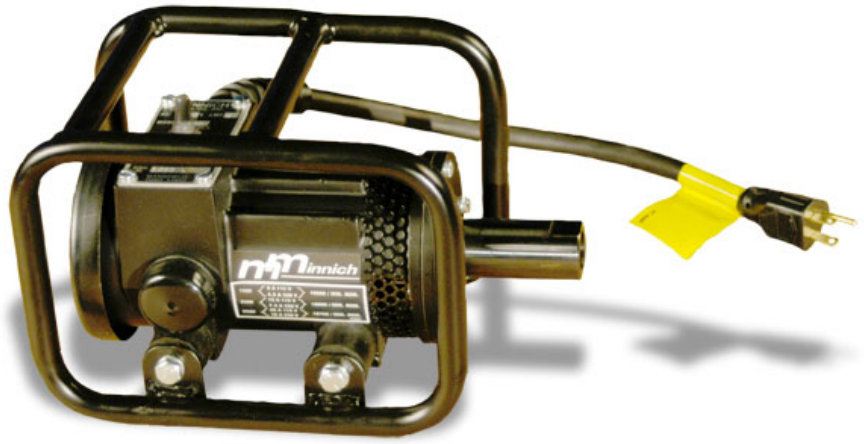
VIBRATOR HEADS AND SHAFTS PARTS SHEET



FLEXIBLE SHAFT (order 1 Core & 1 Casing for Complete Assembly)							
Fig. No.	2' Long	5' Long	7' Long	10' Long	14' Long	21' Long	Description
41	0A2216-00000	0A2217-00000	0A2218-00000	0A2244-00000	0A2245-00000	0A8148-00000	7/8" Core & Casing
41	0A8163-00000	0A8164-00000	0A8165-00000	0A8166-00000	0A8167-00000	0A8168-00000	1 3/16 Core & Casing
42	008151-00000	008152-00000	008153-00000	008154-00000	008155-00000	008156-00000	5/16 Core
43	0A2211-00000	0A2212-00000	0A2213-00000	0A2220-00000	0A2229-00000	0A8149-00000	7/8" Dia. Casing
43	0A8157-00000	0A8158-00000	0A8159-00000	0A8160-00000	0A8161-00000	0A8162-00000	1 3/16 Dia. Casing

HEADS							
	A2231	A2232	A2233	A2234	A2235	A2236	
Fig. No.	3/4" Dia	1" Dia	1 3/8" Dia	1 3/4" Dia	2" Dia	2 3/8" Dia	Complete Head Assy.
44	0A2158-00000	0A2026-00000	0A2046-00000	0A2018-00000	0A2146-00000	00A745-00000	Housing
45	006362-00000	002023-00000	002023-00000	001244-00000	000651-00000	000651-00000	Lock nut, Bearing
46	**002156-00000**	**002038-00001**	**002039-00000**	**002040-00000**	**002041-00000**	**002041-00000**	**Bearing (4)**
47	002153-00000	002025-00000	002032-00000	001241-00000	002142-00000	006542-00000	Weight, Eccentric
48	0A2679-00000	002676-00000	002021-00000	002024-00000	002028-00000	002028-00000	Core Adapter
49						000655-00001	Housing Bearing
50			020451-00000	020221-00000	020221-00000	020221-00000	Seal (2)
50a	002681-00000	002681-00000					Seal (Oil)
50b	002677-00000	002677-00000					Seal (Grease)
51	002192-00000	002193-00000	002194-00000	002195-00000	002196-00000	002197-00000	Casing Adapter

1500 Flex Shaft Specifications



Weight	14lbs. (6.4kg)
Amperage	9(115V), 4.5(230V)
Shafts	2', 5', 7'
Heads	3/4" thru 1-3/8"

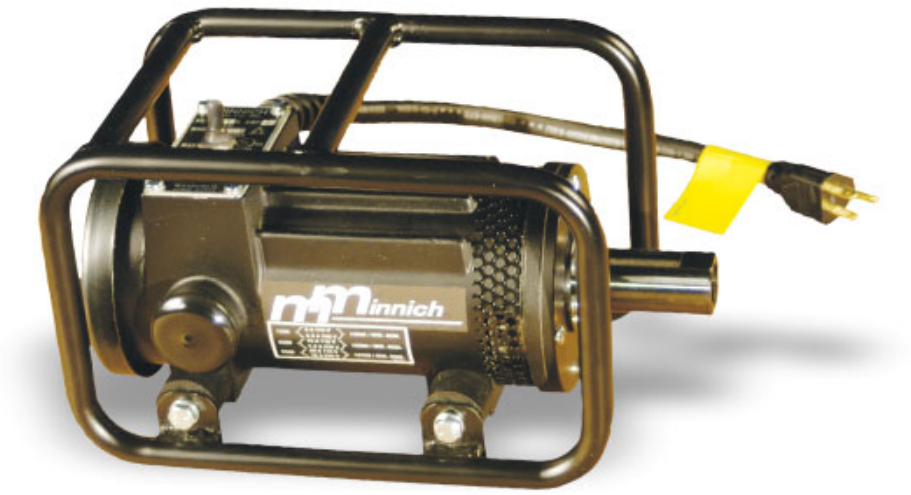
Recommended AWG Wire Size for Extension Cords		
Rated Amps		9 Amps
Extension Cord Lengths	25' (7.6m)	18ga
	50' (15.3m)	14ga
	100' (30.5m)	12ga
	150' (45.8m)	10ga
	200' (61.0m)	8ga

Shaft Length	2' (.6m)	5' (1.5m)	7' (2.1m)
7/8" (22.2mm) OD Casing Recommended Head Sizes	3/4", 1", 1-3/8"	3/4", 1", 1-3/8"	3/4", 1", 1-3/8"
1-3/16" (30.1mm) OD Casing Recommended Head Sizes	1-3/8"	1-3/8"	1-3/8"

Head Diameter	Centrifugal Force	Amplitude	Diameter of Influence
3/4" (19mm)	105lbs. (467N)	.050" (1.27mm)	4"-6" (101mm-152mm)
1" (25mm)	151lbs. (671N)	.056" (1.42mm)	5"-7" (127mm-177mm)
1-3/8" (35mm)	424lbs. (1886N)	.070" (1.77mm)	8"-14" (203mm-355mm)

Specifications are nominal values and will vary depending on the size and range of aggregate, and the slump of the concrete. Specifications taken at 10,500VPM.

2500 Flex Shaft Specifications



Weight	17lbs. (7.7kg)
Amperage	15(115V), 7.5(230V)
Shafts	2', 5', 7', 10', 14', 21'
Heads	1-3/8" thru 2-3/8"

Recommended AWG Wire Size for Extension Cords		
Rated Amps		15 Amps
Extension Cord Lengths	25' (7.6m)	16ga
	50' (15.3m)	12ga
	100' (30.5m)	10ga
	150' (45.8m)	8ga
	200' (61.0m)	6ga

Shaft Length	2' (.6m)	5' (1.5m)	7' (2.1m)	10' (3.0m)	14' (4.3m)	21' (6.4m)
7/8" (22.2mm) OD Casing Recommended Head Sizes	1-3/8", 1-3/4"	1-3/8", 1-3/4"	1-3/8", 1-3/4"	1-3/8"	NA	NA
1-3/16" (30.1mm) OD Casing Recommended Head Sizes	1-3/8", 1-3/4", 2", 2-3/8"	1-3/8", 1-3/4", 2", 2-3/8"	1-3/8", 1-3/4", 2", 2-3/8"	1-3/8", 1-3/4", 2", 2-3/8"	1-3/8", 1-3/4", 2", 2-3/8"	1-3/8", 1-3/4", 2", 2-3/8"

Head Diameter	Centrifugal Force	Amplitude	Diameter of Influence
1-3/8" (35mm)	424lbs. (1886N)	.070" (1.77mm)	8"-14" (203mm-355mm)
1-3/4" (45mm)	795lbs. (3536N)	.102" (2.59mm)	16"-20" (406mm-508mm)
2" (50mm)	1000lbs. (4448N)	.090" (2.28mm)	20"-124" (2508mm-609mm)
2-3/8" (60mm)	1186lbs. (5275N)	.092" (2.33mm)	23"-27" (584mm-685mm)

Specifications are nominal values and will vary depending on the size and range of aggregate, and the slump of the concrete.

Specifications taken at 10,500VPM.

3500 Flex Shaft Specifications

Weight	**21lbs. (10kg)**
Amperage	**20(115V), 10(230V)**
Shafts	**2', 5', 7', 10', 14', 21'**
Heads	**1-3/8" thru 2-3/8"**

Recommended AWG Wire Size for Extension Cords		
Rated Amps		**20 Amps**
Extension Cord Lengths	**25' (7.6m)**	**14ga**
	50' (15.3m)	**12ga**
	100' (30.5m)	**8ga**
	150' (45.8m)	**6ga**
	200' (61.0m)	**6ga**

Shaft Length	**2' (.6m)**	**5' (1.5m)**	**7' (2.1m)**	**10' (3.0m)**	**14' (4.3m)**	**21' (6.4m)**
7/8" (22.2mm) OD Casing Recommended Head Sizes	**1-3/8", 1-3/4"**	**1-3/8", 1-3/4"**	**1-3/8", 1-3/4"**	**1-3/8"**	**NA**	**NA**
1-3/16" (30.1mm) OD Casing Recommended Head Sizes	**1-3/8", 1-3/4", 2", 2-3/8"**	**1-3/8", 1-3/4", 2", 2-3/8"**	**1-3/8", 1-3/4", 2", 2-3/8"**	**1-3/8", 1-3/4", 2", 2-3/8"**	**1-3/8", 1-3/4", 2", 2-3/8"**	**1-3/8", 1-3/4", 2", 2-3/8"**

Head Diameter	**Centrifugal Force**	**Amplitude**	**Diameter of Influence**
1-3/8" (35mm)	**424lbs. (1886N)**	**.070" (1.77mm)**	**8"-14" (203mm-355mm)**
1-3/4" (45mm)	**795lbs. (3536N)**	**.102" (2.59mm)**	**16"-20" (406mm-508mm)**
2" (50mm)	**1000lbs. (4448N)**	**.090" (2.28mm)**	**20"-124" (2508mm-609mm)**
2-3/8" (60mm)	**1186lbs. (5275N)**	**.092" (2.33mm)**	**23"-27" (584mm-685mm)**

Specifications are nominal values and will vary depending on the size and range of aggregate, and the slump of the concrete. Specifications taken at 10,500VPM.

SERVICE RECORD

DATE	SERVICE PERFORMED