

Flexi-Rooter 100[®] ***Operating Instructions***

**For 2" through 4"
(50mm—100mm)**



Your Flexi-Rooter 100 is designed to give you years of trouble-free, profitable service. However, no machine is better than its operator.

Read, understand and follow all safety warnings and instructions provided with the product. Failure to follow the warnings and instructions may result in electric shock and/or serious injury. Save all warnings and instructions for future reference.

SAVE THESE INSTRUCTIONS!

General
PIPE CLEANERS



WARNING

Read and understand operator's manual before using this machine. Failure to follow operating instructions could result in death or serious injury.

WARNING! Read and understand all instructions. Failure to follow all instructions listed below may result in electric shock, fire and/or serious personal injury. Replacement manuals are available upon request at no charge, or may be downloaded from our website, www.drainbrain.com. Instructional videos are available for download on our website, and may be ordered. If you have any questions or problems, please call General's customer service department at 412-771-6300.

SAVE THESE INSTRUCTIONS!

These instructions are intended to familiarize all personnel with the safe operation and maintenance procedures for the Flexi-Router 100.

SAFETY SYMBOLS



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazard with a low level of risk which, if not avoided, will result in minor or moderate injury.

WARNING



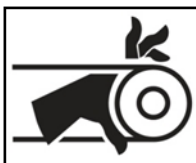
Electric shock resulting in death can occur if you plug this machine into an improperly wired outlet. If the ground wire is electrified, you can be electrocuted by just touching the machine, even when the power switch is off. A ground fault circuit interrupter will not protect you in this situation. Use a UL approved tester to determine if the outlet is safe.



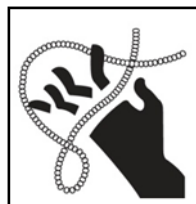
Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust. Power tools create sparks which may ignite the dust or fumes.



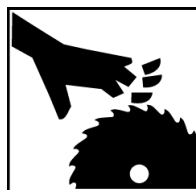
Always wear safety glasses and rubber soled, non-slip shoes. Use of this safety equipment may prevent serious injury.



Never operate machine with slip clutch removed. Fingers can get caught.



Do not overstress flexible shaft. Overstressing flexible shaft may cause twisting, kinking, or breaking of the flexible shaft and may result in serious injury.



Keep hands and fingers clear of spinning chains and cutters. Contact with spinning chains and cutters may result in serious injury.

WARNING

This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

GENERAL POWER TOOL SAFETY WARNINGS*



WARNING

Read all safety warnings, instructions, illustrations and specifications provided with this power tool. Failure to follow all instructions listed below may result in electric shock, fire, and/or serious injury.

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE.

*The text used in the general power tool safety warnings section of this manual is as required from the applicable UL/CSA standard. This section contains general safety practices for many different types of power tools. Not every precaution applies to every tool. And some do not apply to this tool.

Work Area Safety

1. **Keep work area clean and well lit.** Cluttered or dark areas invite accidents.
2. **Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases or dust.** Power tools create sparks which may ignite the dust or fumes.
3. **Keep children and bystanders away while operating a power tool.** Distractions can cause you to lose control.

Electrical Safety

1. **Power tool plugs must match the outlet.** Never modify the plug in any way. Do not use any adapter plugs with earthed (grounded) power tools. Unmodified plugs and matching outlets will reduce risk of electric shock.
2. **Avoid body contact with earthed or grounded surfaces, such as pipes, radiators, ranges and refrigerators.** There is an increased risk of electric shock if your body is earthed or grounded.
3. **Do not expose power tools to rain or wet conditions.** Water entering a power tool will increase the risk of electric shock.
4. **Do not abuse the cord.** Never use the cord for carrying, pulling or unplugging the power tool. Keep cord away from heat, oil, sharp edges or moving parts. Damaged or entangled cords increase the risk of electric shock.
5. **When operating a power tool outdoors, use an extension cord suitable for outdoor use.** Use of a cord suitable for outdoor use reduces the risk of electric shock.
6. **If operating a power tool in a damp location is unavoidable, use a ground fault circuit interrupter (GFCI) protected supply.** Use of a GFCI reduces the risk of electric shock.

Personal Safety

1. **Stay alert, watch what you are doing and use common sense when operating a power tool.** Do not use a power tool while you are tired or under the influence of drugs, alcohol or medication. A moment of inattention while operating power tools may result in serious personal injury.
2. **Use personal protective equipment. Always wear eye protection.** Protective equipment such as a dust mask, non-skid safety shoes, hard hat or hearing protection used for appropriate conditions will reduce personal injuries.

3. **Prevent unintentional starting.** Ensure the switch is in the off-position before connecting to power source and/or BATTERY pack, picking up or carrying the tool. Carrying power tools with your finger on the switch or energizing power tools that have the switch on invites accidents.
4. **Remove any adjusting key or wrench before turning the power tool ON.** A wrench or a key left attached to a rotating part of the power tool may result in personal injury.
5. **Do not overreach. Keep proper footing and balance at all times.** This enables better control of the power tool in unexpected situations.
6. **Dress properly. Do not wear loose clothing or jewelry. Keep your hair and clothing away from moving parts.** Loose clothes, jewelry or long hair can be caught in moving parts.
7. **If devices are provided for the connection of dust extraction and collection facilities, ensure these are connected and properly used.** Use of dust collection can reduce dust-related hazards.
8. **Do not let familiarity gained from frequent use of tools allow you to become complacent and ignore tool safety principles.** A careless action can cause severe injury within a fraction of a second.

Power Tool Use and Care

1. **Do not force the power tool. Use the correct power tool for your application.** The correct power tool will do the job better and safer at the rate for which it was designed.
2. **Do not use the power tool if the switch does not turn it ON and OFF.** Any power tool that cannot be controlled with the switch is dangerous and must be repaired.
3. **Disconnect the plug from the power source and/or remove the BATTERY pack, if detachable, from the power tool before making any adjustments, changing accessories, or storing power tools.** Such preventive safety measures reduce the risk of starting the power tool accidentally.
4. **Store idle power tools out of the reach of children and do not allow persons unfamiliar with the power tool or these instructions to operate the power tool.** Power tools are dangerous in the hands of untrained users.
5. **Maintain power tools and accessories. Check for misalignment or binding of moving parts, breakage of parts and any other condition that may affect the power tool's operation. If damaged, have the power tool repaired before use.** Many accidents are caused by poorly maintained power tools.
6. **Keep cutting tools sharp and clean.** Properly maintained cutting tools with sharp cutting edges are less likely to bind and are easier to control.
7. **Use the power tool, accessories and tool bits etc. in accordance with these instructions, taking into account the working conditions and the work to be performed.** Use of the power tool for operations different from those intended could result in a hazardous situation.
8. **Keep handles and grasping surfaces dry, clean and free from oil and grease.** Slippery handles and grasping surfaces do not allow for safe handling and control of the tool in unexpected situations.

Service

1. Have your power tool serviced by a qualified repair person using only identical replacement parts. This will ensure that the safety of the power tool is maintained.

SPECIFIC SAFETY INFORMATION



WARNING

This section contains important safety information that is specific to this tool.

Read these precautions carefully before using this drain cleaning machine to reduce the risk of electrical shock or other serious injury.

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE.

Keep this manual with machine for use by operator.

Drain Cleaning Machine Safety

1. Before using the tool, test the ground fault circuit interrupter (GFCI) provided with the supply cord to insure it is operating correctly. A properly operating GFCI reduces the risk of electrical shock.
2. Only use extension cords that are protected by a GFCI. The GFCI on the machine power cord will not prevent electrical shock from the extension cords.
3. Only grasp the rotating cable with gloves recommended by the manufacturer. Latex or loose fitting gloves or rags can become wrapped around the cable and may result in serious personal injury.
4. Do not allow the cutter to stop turning while the cable is turning. This can overstress the cable and may cause twisting, kinking or breaking of the cable and may result in serious personal injury.
5. One person must control both the cable and the switch. If the cutter stops rotating, the operator must be able to turn the tool off to prevent the cable from twisting, kinking and breaking.
6. Use latex or rubber gloves inside the gloves recommended by the manufacturer, goggles, face shields, protective clothing, and respirator when chemicals, bacteria or other toxic or infectious substances are suspected to be in a drain line. Drains may contain chemicals, bacteria and other substances that may cause burns, be toxic or infectious or may result in other serious personal injury.
7. Practice good hygiene. Do not eat or smoke while handling or operating the tool. After handling or operating drain cleaning equipment, use hot, soapy water to wash hands and other body parts exposed to drain contents. This will help reduce the risk of health hazards due to exposure to toxic or infectious material.
8. Only use the drain cleaner for the recommended drain sizes. Using the wrong size drain cleaner can lead to twisting, kinking or breaking of the cable and may result in personal injury.

Specific Safety Information for Flexi-Router

1. Keep a glove covered hand on the flexible shaft whenever the machine is running. This provides better control of the shaft and helps prevent twisting, kinking, and breaking of the shaft and reduces the risk of injury.
2. Keep hands and fingers clear of spinning chains and cutters. May cause serious injury.
3. Never operate machine with slip clutch cover removed. Fingers can get caught.
4. Do not overstress cables. Keep a leather-gloved hand on the cable for control when machine is running. Overstressing the cables because of an obstruction may cause twisting, kinking, or breaking of the cable and may result in injury.
5. Place the machine at a distance not greater than three feet (1m) from the drain opening. Greater distances can result in cable twisting or kinking.
6. Before operating machine, insert cutter into pipe. Allowing the cutter to spin outside the pipe can be very dangerous.
7. Be careful when cleaning drains where cleaning chemicals have been used. Avoid direct contact with skin and eyes. Drain cleaning chemicals can cause serious burns as well as damage the cable.
8. Do not operate machine while standing in water. Will increase risk of electric shock.
9. Only use this tool in the application for which it was designed. Follow the instructions on the proper use of the machine. Other uses or modifying the drain cleaner for other applications may increase risk of injury.
10. Before starting each job, check that the cable in the drum is not broken or kinked by pulling the cable out and checking for wear or breakage. Always replace worn (kinked or broken) cables with genuine GENERAL replacement cables.
11. 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 electric shock or injury.

Ground Fault Circuit Interrupter (GFCI)

Your machine is equipped with a ground fault circuit interrupter, which protects you against shock if a short circuit should occur. Check that receptacle is properly grounded. Test the GFCI before each use.

1. Plug into 120-volt receptacle.
2. Push test button. Indicator light will go out and power to machine should cut off.
3. If light does not go out when test button is pushed, **DO NOT USE THE MACHINE** until proper repairs can be made.
4. To restore power after test, push reset button. With the reset button depressed, if the machine doesn't start, stops while running, or if the operator experiences a mild shock, **DO NOT USE THE MACHINE!** Tag the machine out of service and take it to a motor repair center or return it to the factory for repairs.



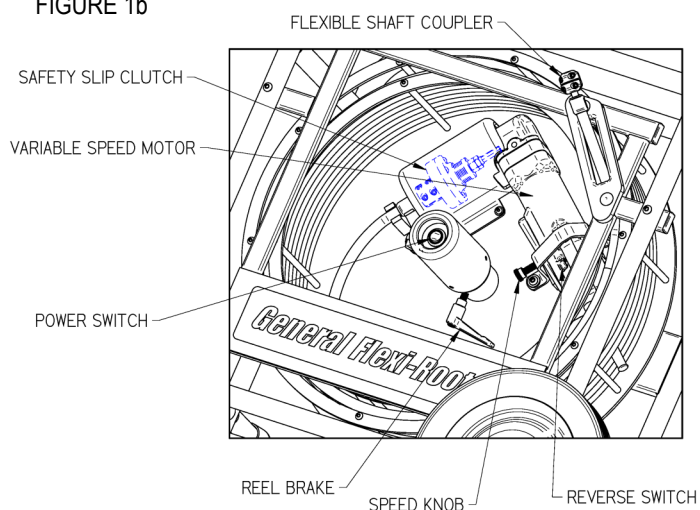
THE SECTION OF CORD BETWEEN THE WALL PLUG AND THE GFCI IS NOT IN THE PROTECTED CIRCUIT.

FEATURES (FIGURE 1a & 1b)

FIGURE 1a



FIGURE 1b



CAUTION: Do not operate machine if warning labels are missing or illegible.

What is Flexible Shaft Technology?

Flexible shaft technology is faster and more thorough than traditional drain cleaners. Flexible shaft spins more than 10 times faster than drum machines. At speeds of 2000 RPM or more, the cutters quickly grind up stoppages and scour the walls of the pipe. The flexible shaft is safely protected inside a sheath so it's easy to handle – no spinning drums.

Integral Variable Speed Motor

The integral variable speed motor lets you adjust the speed from 0 - 2400 rpm. With the foot pedal you have both hands free to safely guide the flexible shaft into the line.

Stronger, Stiffer Flexible Shaft

General's shaft is flexible enough to get through 2 inch lines, yet tough strong enough to cut roots in 4 inch drain lines up to 75 feet down the line.

Field Repairable Flexible Shaft

Free cutting flexible shaft is easily field repairable using an abrasive cutoff wheel or band saw.

Non-Marring Flexible Shaft Coupler

General's unique non-marring flexible shaft coupler securely clamps onto the flexible shaft without causing damage to the shaft. Patent pending.

Safety Slip Clutch

When properly adjusted, the safety slip clutch protects you from injury and the shaft from damage. It will slip if the cutter is caught or being forced into the stoppage too quickly.

Easily Maneuverable Frame

Durable metal frame includes 10" wheels and folding handle, and easily fits through narrow doorways.

Two-Part Cutter Array

General's Innovative, cutter system combines the unique ClogChopper® with Carbide-Tipped Chain Cutters to make a formidable combination. Together, they are capable of boring through tough stoppages and scale, shredding obstructions and scouring pipe walls clean.

Flexible Shaft Application Chart - 5/16" (8mm) (Table 1)

Catalog #	Shaft Length	For Pipe Size	Typical Applications
50FR1A	50 ft. (15.2 m)	2" to 4" (50 – 100mm)	Medium and large lines. For clearing roots, descaling pipes, and clearing grease and soft blockages.
25FR1A	25 ft. (7.6m)	2" to 4" (50 – 100mm)	Flexible shaft extension. Can be added to 50 ft. shaft to clear lines up to 75 ft. long.

Cutter Application Chart for 5/16" (8mm) Flexible Shaft (Table 2)

Catalog #	Description	Leader Length	Typical Applications
FR-1-1/2CG*	1-1/2" ClogChopper Cutter	1-1/4"	Penetrating cutter. Allows chain cutter to get through clogged lines.
FR-2CK*	2" Chain Cutter - Double Chain - Adjustable	3-7/8"	For PVC and Soft stoppages
FR-2CCK	2" Carbide Tipped Chain Cutter - Double Chain - Adjustable	3-7/8"	Removing Roots and Descaling. (Do not use in PVC)
FR-3-4CK	3" – 4" Chain Cutter - Triple Chain - Adjustable	7-3/8"	For PVC and Soft stoppages
FR-3-4CCK*	3" – 4" Carbide Tipped Chain Cutter - Triple Chain - Adjustable	7-3/8"	Removing Roots and Descaling. (Do not use in PVC)
FR-3TAZ	3" Circular Carbide Tipped Chain	1-1/4"	For Descaling (Do not use in PVC)
FR-4TAZ	4" Circular Carbide Tipped Chain	1-1/4"	For Descaling (Do not use in PVC)

*Included in FR100-CS Cutter Set

ATTACHING CUTTERS TO A LEADER

Note: See the Cutter Application Chart to select the appropriate leader to use with each cutter.

Caution: Carbide tipped chains can damage plastic. Use caution if the clay pipe is broken or fragile. Use carbide tipped chain only in metal pipes.

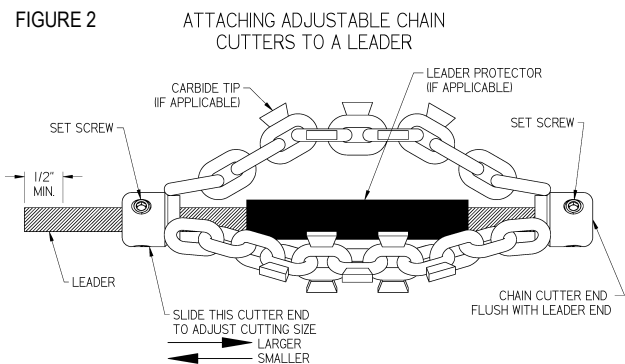
Note: Use the supplied Loctite® any time the set screws in a cutter are tightened onto a leader. Never use permanent thread locker. See manufacturer's website for proper use.

1. Before attaching leaders, chains or cutters, always be sure the machine is turned OFF and unplugged.
2. Inspect the leader for damage. DO NOT use a leader it is damaged.
3. Loosen the set screws in the cutter so that the leader will pass through.
4. Proceed to the appropriate section for the cutter you are attaching.

ATTACHING CUTTERS TO A LEADER CONT.

For Adjustable Chain Cutters (FIGURE 2)

1. Slide the chain cutter and leader protector (when applicable) onto the leader.
2. Slide one end of the chain cutter until it is flush with the end of the leader and tighten the set screws.
3. While keeping the chains from twisting, slide the opposite end of the chain cutter closer to or further away from the other end in order to achieve the desired cutting size and tighten the set screws.
4. Ensure that at least 1/2" of shaft is exposed beyond the end of the chain cutter.



For ClogChoppers (FIGURES 3a & 3b)

1. Insert the appropriate leader into the ClogChopper until it stops and tighten the set screws.
2. Ensure that at least 1/2" of shaft is exposed.

ATTACHING CLOGCHOPPER TO A LEADER

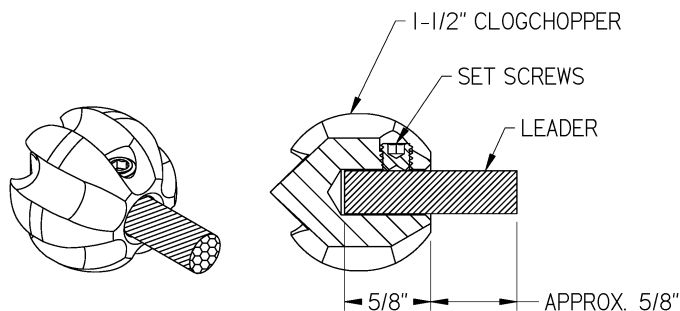


FIGURE 3a

FIGURE 3b

For Circular Chain Cutters

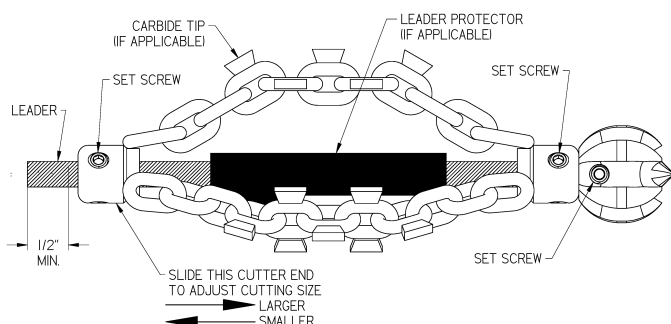
1. Insert the appropriate leader into the fitting until it is flush with the end of the fitting and tighten the set screws.
2. Ensure that at least 1/2" of shaft is exposed.

For Adjustable Chain Cutters and ClogChopper Combination (FIGURE 4)

1. Insert the appropriate leader into the ClogChopper until it stops and tighten the set screws.
2. Slide the chain cutter and leader protector (when applicable) onto the leader.
3. Slide one end of the chain cutter against the ClogChopper and tighten the set screws.
4. While keeping the chains from twisting, slide the opposite end of the chain cutter closer to or further away from the first end in order to achieve the desired cutting size and tighten the set screws.
5. Ensure that at least 1/2" of shaft is exposed beyond the end of the chain cutter.

FIGURE 4

ATTACHING ADJUSTABLE CHAIN CUTTERS & CLOGCHOPPER COMBINATION TO A LEADER



ATTACHING CUTTER/LEADER ASSEMBLIES (FIGURE 5)

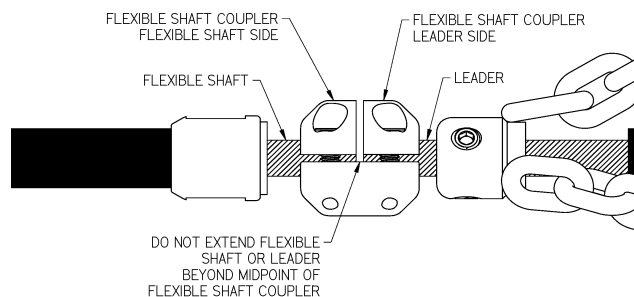
Note: See the Cutter Application chart to select the appropriate cutter for the job.

1. Make sure the machine is turned off and unplugged before attaching any accessories.
2. If the cutter is attached to a leader, please proceed to the next step. If not, go to the Attaching Cutters to a Leader section above.
3. Inspect the shaft and leader for damage and make any necessary repairs. **DO NOT** use a damaged shaft or leader.
4. Loosen the screws on the leader side of the shaft coupler so that the leader can be inserted.
5. Insert the leader into the flexible shaft coupler, making sure it extends to the midpoint of the coupler and tighten the screws to approximately 41 lb.-in. of torque.



CHECK THAT THE FLEXIBLE SHAFT COUPLER SCREWS ARE TIGHT BEFORE EACH USE. USE THE SUPPLIED LOCTITE® ANY TIME SCREWS ARE TIGHTENED ONTO A LEADER. NEVER USE PERMANENT THREAD LOCKER. SEE MANUFACTURER'S WEBSITE FOR PROPER USE.

FIGURE 5 ATTACHING CUTTER/LEADER ASSEMBLIES



OPERATION

SET-UP



MAKE SURE THE MOTOR SWITCH IS IN THE 'OFF' POSITION!

1. Place the machine as close to the drain opening as possible to help prevent the shaft from whipping and kinking.
2. Always lay the machine down horizontally on the floor during operation.
3. Position the air foot pedal for easy accessibility. The machine is designed for one person operation. Be sure you can quickly remove your foot from the pedal in an emergency.
4. Be sure the power switch is in the OFF position.
5. Select the proper cutter for your application and secure it to the shaft. See Cutter Application Chart and appropriate attachment section.



OPERATION

Note: It is helpful to use your sewer inspection camera as the same time to help position the cutter at the stoppage and to monitor the progress of the operation. Be sure to keep the camera at least 18" (.5m) back from the cutter to prevent damage to the camera inspection system.

Note: The machine should always be operated with the motor set to **FORWARD** rotation. If necessary, the motor can be put into reverse by turning the speed knob to release the trigger switch and pushing the motor direction button toward the reel plate.



BEFORE OPERATING THE MACHINE, INSERT THE CUTTER INTO THE PIPE. ALLOWING THE CUTTER TO SPIN OUTSIDE THE PIPE CAN BE VERY DANGEROUS.

1. Release the brake at the center of the reel.
2. Before stepping on the foot pedal, pull the flexible shaft and cutter from the reel and slide it into the drain at least 12" down the line. Allowing the cutter to spin outside the pipe can be very dangerous.
3. Make sure the motor is set to FORWARD rotation. Set the motor rotation speed by adjusting the speed knob on the motor clamp. The no load speed range is from 0 - 2400 rpm.
4. Turn the power switch ON. The switch will light up.
5. While firmly holding the flexible shaft with both gloved hands, guide the shaft manually down the line.

Note: It is not recommended to continuously run the machine. Step on the foot pedal only when you encounter an obstruction and when trying to navigate bends and seams in the pipe.

6. Guide the flexible shaft into the line with a firm even pressure. Do not force the flexible shaft. Let the cutter do the work. You won't get the job done any faster and you could damage the shaft.

7. For the best cleaning operation, the rotation speed should be between 1000 and 2200 rpm depending on the resistance in the line and type of stoppage. It is recommended to slow the rotation speed down to help the cutter get around tight bends. Adjust the speed to the level that works best for you.



OPERATING THE MACHINE AT EXCESSIVE SPEEDS FOR LONG PERIODS OF TIME WILL PREMATURELY WEAR DOWN TOOLING AND POSSIBLY DAMAGE THE PIPE

8. If you are having trouble getting around a tight bend, push and rotate the shaft at the same time at low speed. The shaft is flexible enough to negotiate several 90 degree bends.
9. It is helpful to push and release the foot pedal to help the chain cutter navigate bends and seams in the pipe.
10. Use the ClogChopper penetrating head on its own or in combination with the chain cutters to punch through a complete blockage. Then push and pull the spinning chain cutter through the area to thoroughly clean the line. Use a sewer camera to monitor and inspect your work.
11. If descaling the pipe, push the chain cutter past the area to be cleaned, then pull the flexible shaft back through the area as you flush the line with water for a more thorough cleaning job.



MOVE THE SHAFT AND CUTTER BACK AND FORTH CONTINUOUSLY WHILE IN OPERATION. LEAVING THE SHAFT TO SPIN IN THE SAME PLACE FOR LONG PERIODS OF TIME COULD DAMAGE THE OUTER SHEATH.

12. After the job is complete, pull the flexible shaft out of the pipe and wipe off the sheath as you guide it into the reel. A disinfectant spray can be applied to the cloth or sprayed directly onto the sheath to help reduce contaminants. Be sure to inspect the flexible shaft and sheath for wear and damage as you are returned to the reel. Then use the reel brake to lock the reel and keep it from rotating.

Hint: Running water into the line while cleaning will help to flush away debris and keep the shaft and tooling cooler by reducing heat generated by friction.



THE SAFETY SLIP CLUTCH IS THERE TO PROTECT YOU FROM INJURY AND THE SHAFT FROM DAMAGE. IT WILL SLIP IF THE CUTTER IS CAUGHT OR BEING FORCED INTO THE STOPPAGE TOO QUICKLY. GO SLOWLY AND LET THE CUTTER DO THE WORK. IF THE FLEXIBLE SHAFT BEGINS TO BUCK OR TWIST, STOP BY TAKING YOUR FOOT OFF OF THE PEDAL. SEE THE CLUTCH ADJUSTMENT SECTION IN MAINTENANCE SECTION TO MAKE ANY NECESSARY ADJUSTMENTS TO THE CLUTCH.

ATTACHING FLEXIBLE SHAFT EXTENSIONS

1. Make sure the machine is turned off and unplugged before attaching any accessories.
2. Inspect the extension for damage and make any necessary repairs. DO NOT use a damaged shaft, leader or extension.
3. Loosen the screws on the leader side of the shaft coupler so that the leader can be inserted.
4. Insert the flexible shaft extension into the flexible shaft coupler making sure it extends to the midpoint of the coupler and tighten the screws to approximately 41 lb.-in. of torque.



CHECK THAT THE FLEXIBLE SHAFT COUPLER SCREWS ARE TIGHT BEFORE EACH USE. USE THE SUPPLIED LOCTITE® ANY TIME SCREWS ARE TIGHTENED ONTO A LEADER. NEVER USE PERMANENT THREAD LOCKER. SEE MANUFACTURER'S WEBSITE FOR PROPER USE.

MAINTENANCE

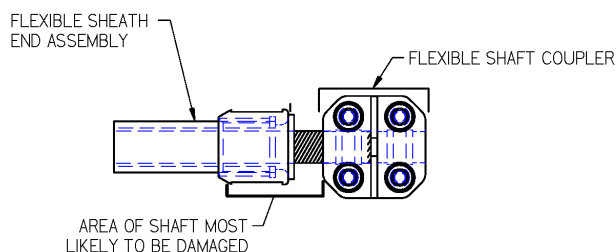


DISCONNECT MACHINE FROM POWER SOURCE BEFORE PERFORMING MAINTENANCE!

Flexible Shaft Inspection

Carefully inspect the flexible shaft and sheath before each use to ensure that there are no signs of wear or damage. Take special note to inspect the area shown in Figure 5B for damaged wires. If the shaft or sheath is damaged or worn, repair the shaft before attaching a cutter (See How to Repair Flexible Shaft), or replace the entire shaft as needed. Inspect the shaft more frequently when used in tight bends.

FIGURE 5B



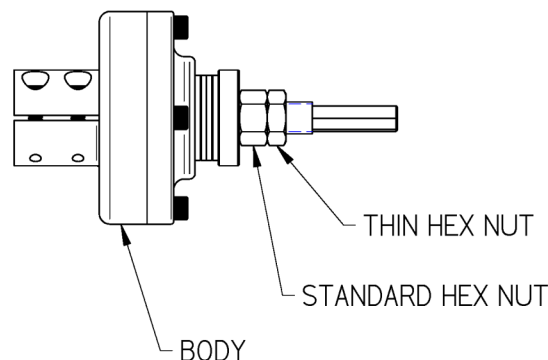
Slip Clutch Adjustment

The Safety Slip Clutch is factory set for optimum performance. If you need to adjust the clutch, follow these steps:

1. Make sure the machine is turning off and unplugged before making any adjustments.
2. Remove the slip clutch cover with the machine in the upright position. Set aside the 4 screws, washers, and lock nuts to be reinstalled later.
3. Lay the machine down and locate the standard hex nut and thin hex nut on the slip clutch stem.
4. While holding the standard hex nut in place, loosen the thin hex nut.

5. Hold the body of the slip clutch in place and tighten the standard nut to increase the torque at which the clutch will slip and loosen the standard nut to decrease the torque at which the clutch will slip. The slip clutch should be set at a maximum of 65 lb.-in. of torque.
6. Once the desired torque is achieved, hold the standard nut in place and tighten the thin nut to lock it in place.
7. Stand the machine upright and reinstall the slip clutch cover.

FIGURE 6

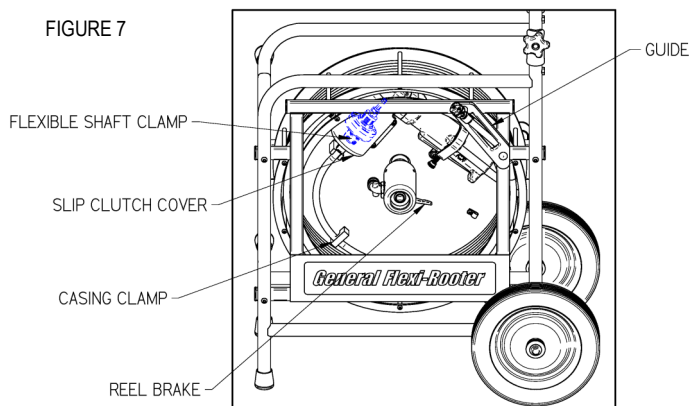


Removing Flexible Shaft from the Reel

1. Make sure the machine is turned off and unplugged before removing the flexible shaft from the reel.
2. Remove the slip clutch cover with the machine in the upright position. Set aside the 4 screws, washers, and lock nuts to be reinstalled later.
3. Remove the casing clamp. Set aside the 2 screws to be reinstalled later.
4. Remove the flexible shaft clamp from the slip clutch body. Set aside the 4 screws to be reinstalled later.
5. Lay the machine down and pull the flexible shaft and sheath assembly through the guide and out of the reel.
6. Reverse the procedure to load the flexible shaft back into the reel. Tighten the 4 flexible shaft clamp screws to approximately 41 lb.-in. of torque.

Note: Use the supplied Loctite® when the clutch cable clamp screws are reinstalled. Never use permanent thread locker. See manufacturer's website for proper use.

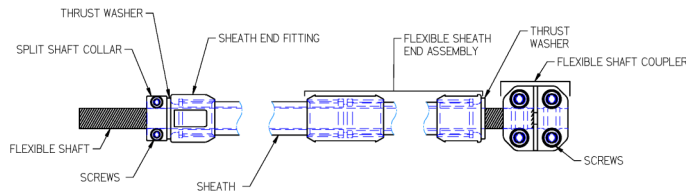
FIGURE 7



Lubricating the Flexible Shaft (Figures 8, 9a, 9b, 9c)

1. Remove the flexible shaft and sheath from the reel. (See Removing Flexible Shaft from the Reel.)
2. Remove the flexible shaft coupler, split shaft collar, and both thrust washers and set them aside to be reinstalled. See FIGURE 8.

FIGURE 8



3. Wearing gloves, use one hand to scoop a workable amount of Flexi-Router Lube out of the tub. Approximately 2 oz. of grease is required to lubricate the entire 50' shaft. Use ONLY General's Flexi-Router Lube™.
4. Pull the flexible shaft from one end of the sheath and insert it into the opposite end while simultaneously applying grease to the flexible shaft.

Hint: Lay the flexible shaft and sheath out with as few loops as possible and avoid any tight bends. This will make it much easier to pull the flexible shaft from the sheath.

5. Scoop additional grease from the tub as necessary.
6. Layout the lubricated flexible shaft and sheath in a straight line.
7. Reinstall the flexible shaft coupler, split shaft collar, and both thrust washers. See Figures 9a & 9c for flexible shaft attached to the machine. See Figures 9b & 9c for flexible shaft extensions.
8. Tighten the screws in the split shaft collar to approximately 12 lb.-in. of torque.
9. Make sure the flexible shaft extends to the midpoint of the coupler and tighten the screws in the flexible shaft coupler clamping onto the flexible shaft to approximately 41 lb.-in. of torque.
10. If the flexible shaft is to be reinstalled into the reel, follow the Removing Flexible Shaft from the Reel instructions in reverse order.

Note: Use the supplied Loctite any time the split shaft collar and flexible shaft coupler screws are tightened onto a leader. Never use permanent thread locker. See manufacturer's website for proper use.

FIGURE 9b

CLUTCH END OF FLEXIBLE SHAFT EXTENSION

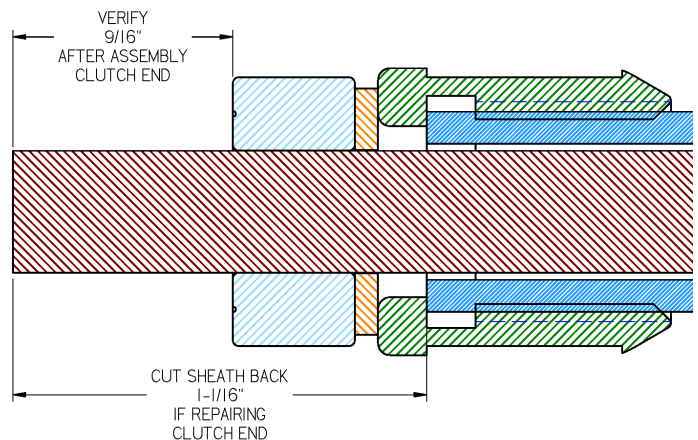


FIGURE 9c

CUTTER END FOR 50 FT. FLEXIBLE SHAFT & 25 FT. FLEXIBLE SHAFT EXTENSION

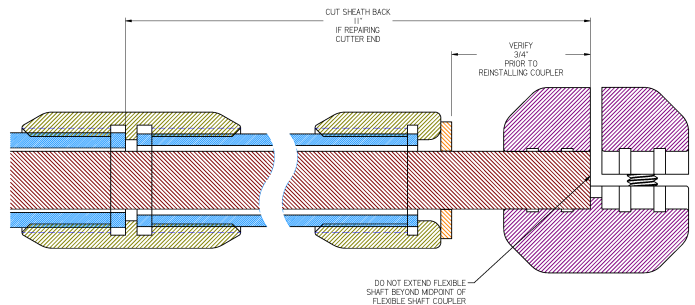
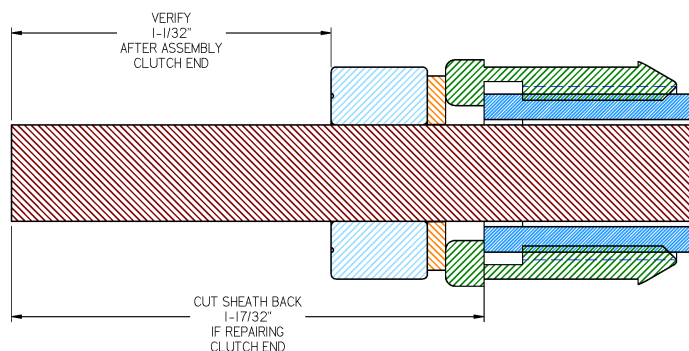


FIGURE 9a

CLUTCH END OF FLEXIBLE SHAFT ATTACHED TO THE MACHINE



Repairing Flexible Shaft (Figures 8, 9a, 9b, 9c)

1. If repairing the clutch end of the flexible shaft, first remove the flexible shaft from the reel per the instructions. (See Removing Flexible Shaft from the Reel.)
2. If repairing the cutter end of the shaft:
 - a. Remove the flexible shaft coupler (including any attached cutters) and the thrust washer from the shaft.
 - b. Unscrew the flexible sheath end assembly from the main portion of the sheath.
3. If repairing the clutch end of the shaft:
 - a. Remove the split shaft collar and thrust washer from the shaft.
 - b. Unscrew the sheath end fitting from the sheath. Save for reuse.
4. Cut off the damaged portion of the flexible shaft using an abrasive cutoff wheel. If the damaged portion is inside of the sheath, cut through both the sheath and flexible shaft. Be careful NOT bend the remaining end of the flexible shaft until repair is complete.
5. Cut the sheath back using a tubing cutter or utility knife. Be careful to not cut into the flexible shaft. For proper dimensions, see Figures 9a & 9c for flexible shafts, or Figures 9b & 9c for flexible shaft extensions.
6. Deburr the cut-off end of the flexible shaft.
7. Reinstall the parts removed in step 2 and 3. See Figures 9a & 9c for flexible shafts attached to the machine or Figures 9b & 9c for flexible shaft extensions.
8. Tightened the screws in the split shaft collar with approximately 12 lb.-in. of torque. The screws in the flexible shaft coupler should be tightened to approximately 41 lb.-in. of torque.

Note: Use the supplied Loctite any time the spit shaft collar and flexible shaft coupler screws are tightened onto a leader. Never use permanent thread locker. See manufacturer's website for proper use.

FIGURE 9a

CLUTCH END OF FLEXIBLE SHAFT ATTACHED TO THE MACHINE

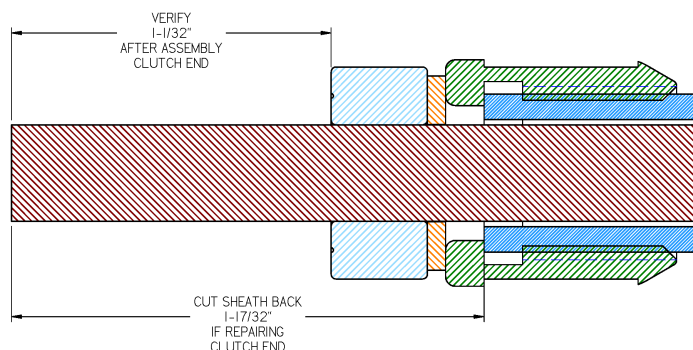


FIGURE 9b

CLUTCH END OF FLEXIBLE SHAFT EXTENSION

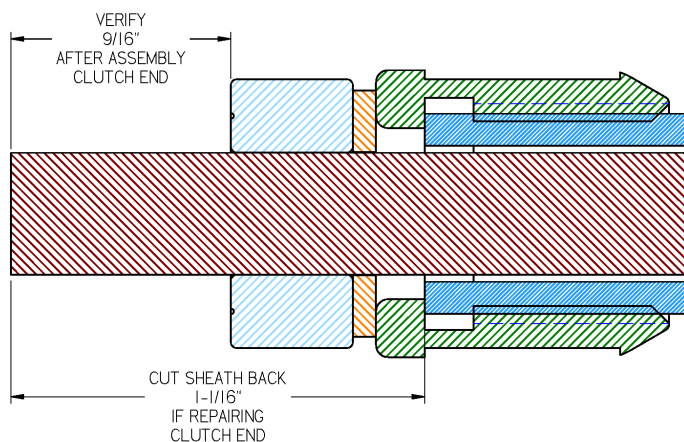
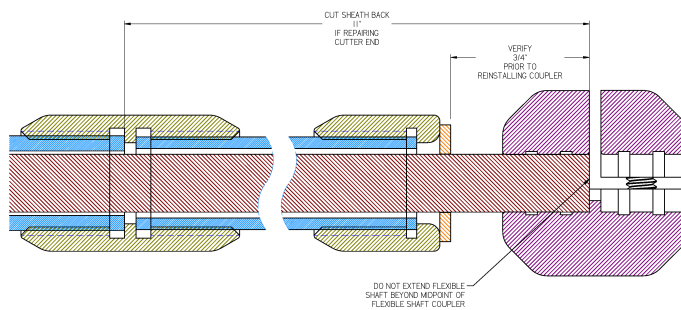


FIGURE 9c

CUTTER END FOR 50 FT. FLEXIBLE SHAFT & 25 FT. FLEXIBLE SHAFT EXTENSION



TROUBLE SHOOTING GUIDE

Problem	Probable Cause	Solution
Flexible Shaft kinks or breaks.	Operator forcing the flexible shaft.	Do not force the flexible shaft. Let the cutter do the work.
	Too much slack between machine and drain opening.	Allow no more than two feet between the machine and drain.
	Flexible Shaft used in wrong size drain line.	Consult Flexible Shaft Application Chart.
	Shaft exposed to acid.	Clean and lubricate flexible shaft regularly.
	Slip Clutch set improperly.	Consult Adjusting Slip Clutch section.
Motor stops while foot pedal is depressed.	Hole in pedal or hose.	Replace as required.
	Hole in diaphragm switch.	If no hole in pedal or hose, replace diaphragm switch.
Ground Fault Circuit Interrupter trips and will not reset.	Damaged power cord or extension cord.	Replace cords.
	Short circuit in motor.	Take motor to authorized repair center.
	Faulty Ground Fault Circuit Interrupter.	Replace ground fault circuit interrupter.
Motor turns but flexible shaft does not.	Safety Slip Clutch engaged.	Do not force the flexible shaft.

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