

Kifco-Caprari PTO Pumps Kifco Slurry Pumps

Operator Manual

© Kifco, Inc. December 1995.

Owner is advised to read this manual in its entirety prior to initial operation



Irrigation

KIFCO

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1. Introduction

General Notes:

1. The following operating procedures are set out for your guidance to ensure efficient and safe operation of the pump. You are advised to read them and familiarize yourself with the pump and its equipment before attempting to use it.
2. Regular maintenance procedures are outlined in this manual. By following them you will minimize repairs, reduce the risk of critical 'in-season' breakdown, and obtain optimum life.

Important

3. The pump is supplied without lubricating oil. **Do not start the pump** without completing all of the maintenance procedures specified in Section 5. of this manual.
4. This manual applies to both water and slurry pumps. The liquid to be pumped is always referred to as water, it should be read as slurry when applicable.
5. Kifco/Caprari pumps are designed to be used with fresh water. The pumps are fitted with a packed gland and have very little capacity to pass solid material.

Kifco Slurry pumps are designed to handle waste water and are fitted with a mechanical seal. These pumps are available in two different configurations, with either a closed or open vane impeller.

1. The closed impeller is wider than a regular water impeller and can pass solid material up to a maximum of 3/4 ins.
2. The open impeller is much more aggressive and will pump most animal waste slurries. This pump is fitted with a stationary knife that will slice through materials that ball up at the eye of the impeller.

Warranty Card: At the time of delivery, complete in full, the warranty card enclosed with this manual and mail it to Kifco Inc. This card is important as its receipt by Kifco activates the warranty on the pump and establishes the effective date.

2. Safety Precautions

The following list is a guide for the safe operation of the pump. These points address both personal and equipment safety and do not preclude common sense which should always prevail.

1. **Learn to be a safe operator.** Do not operate the pump until you have read the instruction manual. Know the controls and how to stop the pump. Do not allow anyone to operate the pump without proper instruction.
2. **Protect Children.** Keep children away when you operate the pump. Do not allow children to operate the tractor or power unit.
3. **Keep all guards and shields in place.** Safety shields are provided with the pump and PTO drive shaft. These shields **must be in place** during operation. Always ensure that loose clothes and fingers are kept well clear of moving parts.
4. **Use caution when towing.** Do not tow the pump cart at high speed. The recommended maximum speed is 10 mph on smooth surfaces.
5. **Never service or make adjustments to the pump while it is running.** Stop the engine first. For PTO driven pumps, ensure the shaft is disengaged from the tractor.
6. **Never operate the pump against a closed valve.** A closed valve anywhere down stream of the pump may create pressure surges or the water in the pump to become scalding hot. See Section '4. Operation' paragraph 11.
7. **Use caution around pressurized lines.** Ensure all lines are securely latched. Do not work on lines or fittings that are pressurized.
8. Do not operate the pump without **oil in the gearbox and water in the pump.**
9. When a PTO drive shaft is used be sure it is the correct length. See the Installation Section for more information.
10. Support long lengths of suction and discharge piping to avoid undue stresses on the pump flanges.
11. Do not operate pumps at speeds above the recommended speed. Maximum input speed of 540, 1000 or 2000 rpm is specified for each pump depending on the gearbox ratio. Ensure the tractor or engine is adequately matched to the pump HP requirements. If you are unsure of the maximum speed or horse power requirements of your pump check with your dealer or Kifco, Inc. 309/543-4425
12. Do not operate PTO shafts at excessive angles. See the Installation Section Figure 1.

3. Installation

The first six points apply to PTO pumps. The remaining points are applicable to all installations.

Kifco PTO pumps are mounted on a two wheeled cart. When connecting the pump to the tractor, follow the instructions listed below:

1. Ensure the towing hitch is securely connected to the tractor.
2. Check the PTO shaft for length. Ensure there is at least 6 ins of engagement in the telescoping section of the shaft. If the shaft is too short it must be replaced with a longer shaft. If the shaft is too long, shorten the shaft assembly by cutting equal amounts from both halves. Maintain the maximum possible overlap.
3. Lubricate the PTO drive shaft universal joints and telescoping tubes. Check the pump gearbox oil level. See Lubrication in the Maintenance Section.
4. Check the PTO drive shaft shields. Be sure they are in good condition and rotate freely on the inner portion of the shaft.
5. Position the pump as close to the water source as possible. For **safety** park the pump parallel to the water source and use a 90 degree bend on the pump suction. This configuration will reduce the risk of the pump rolling toward the water in the event of brake failure for example. See Figure 3.
6. The PTO drive shaft should be as straight as possible to ensure maximum life. **Do not** operate at angles exceeding 15 degrees. See Figure 1.

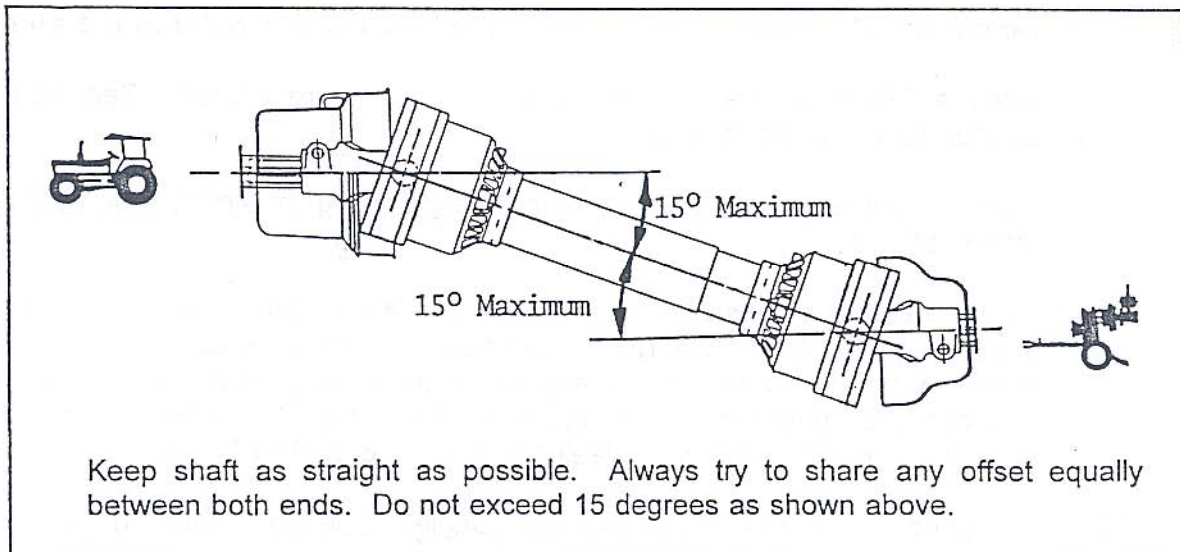


Figure 1. P.T.O. Drive Shaft Alignment.

7. Assemble the suction pipe, keeping it as short as possible. Install it with a constant downward slope to the water source. Any rise will create a high spot that may entrap air causing loss of pump efficiency or prime. See Figure 2. It is also extremely important to ensure that all connections in the suction line are absolutely air tight.

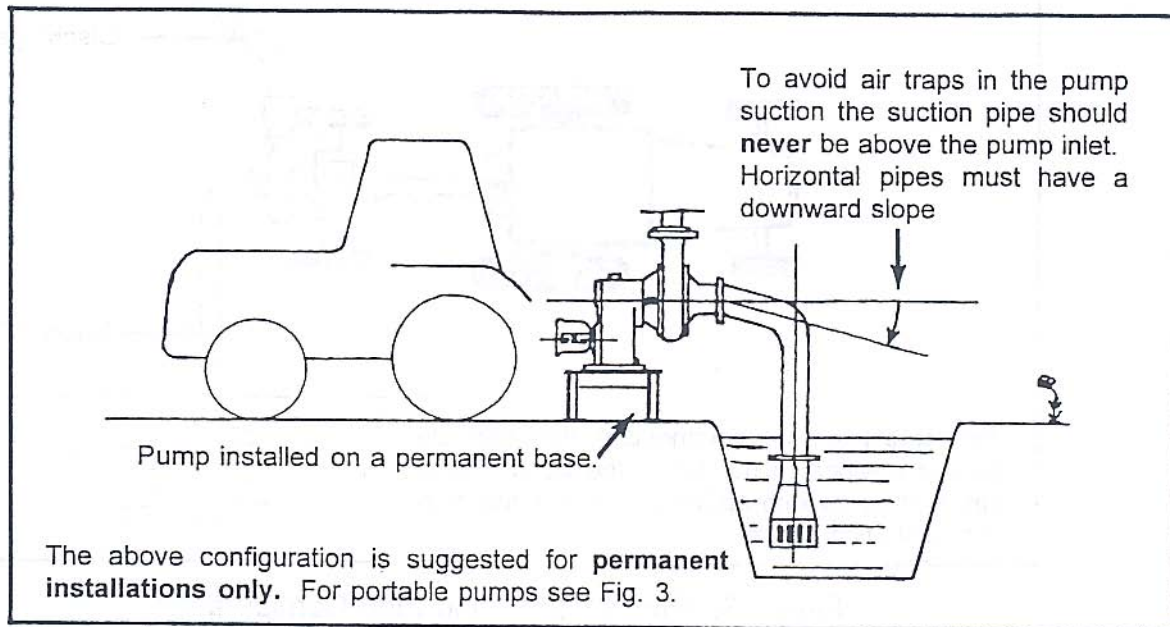


Figure 2. Suction Pipework

8. Support long lengths of suction pipe, unsupported pipe may cause unnecessary stresses to be imposed on the pump suction flange or the connection fittings. Some fittings have a tendency to leak air if they are subjected to vertical loads such as a suction pipe which becomes heavy when it is full of water. This problem is most apparent when the fitting is a quick connector type with the locking tabs on the horizontal rather than the vertical centerline.
9. Do not permit the foot valve, strainer or open ended pipe to sit directly on the bed of the water source without means to prevent the entrance of mud, sand, rotted vegetation or other solid materials. Also, ensure adequate submergence (at least 12" below the surface). If during operation a whirlpool effect is seen above the suction, a vortex action has started and the suction is too shallow.
10. Assemble the discharge pipework. Avoid long unsupported lengths that will place excessive loads on the pump flange. Do not install more than one length of pipe directly in line with the discharge without installing at least a 45 degree bend. Thrust loads generated by the pipe can cause serious damage to the pump body or gearbox casing. The use of a short flex line from the pump discharge to the system pipework will eliminate any potential thrust problems. See Figure 3.

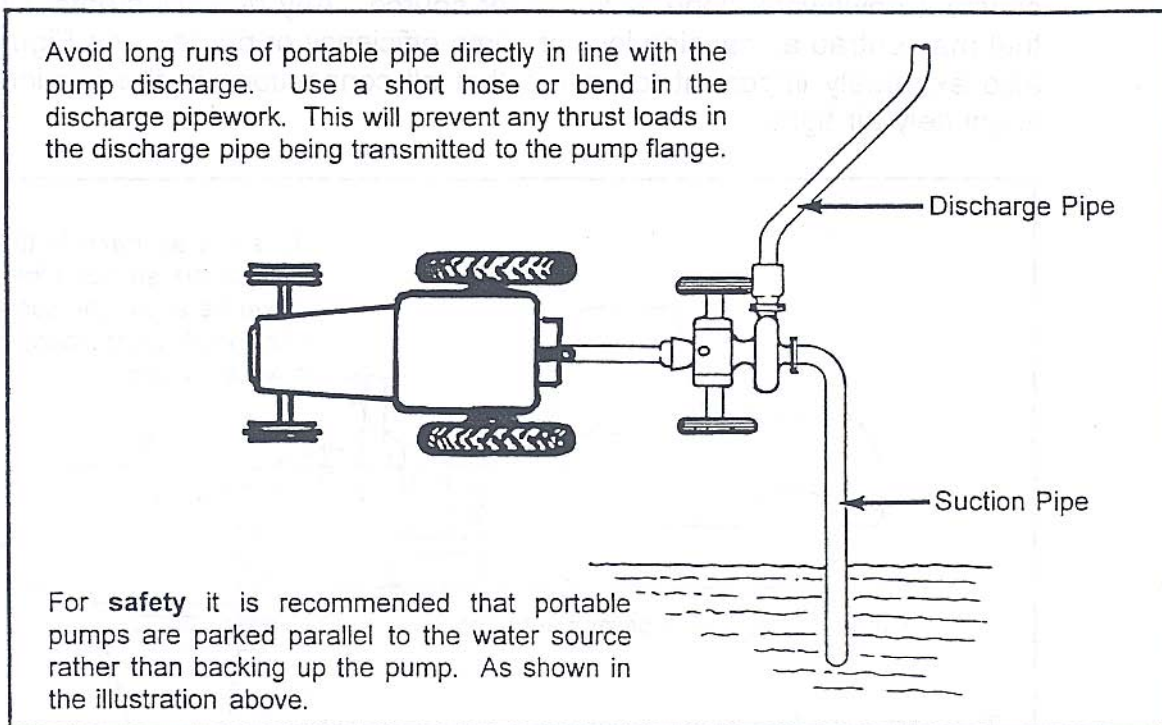


Figure 3. Pump Set-up and Pipe Configuration

11. When long mainlines or static lifts are encountered, a non-return valve should be fitted to the pump discharge. However, ensure there is a way to drain the discharge line(s) when the check valve is closed.
12. If an engine protection system is fitted, ensure that all necessary connections are made between the engine/tractor and pump.

4. Operation

Before starting the pump use the following check list and ensure:

1. The pump set or tractor and pump are correctly and securely positioned.
2. All safety shields are in place.
3. All lubrication has been completed.
4. All suction and discharge fittings are securely fastened.
5. The tractor/engine has adequate fuel, oil and water.
6. Any engine protection equipment is ready to use and that the switch gauges are correctly set.
7. The discharge valve is closed.
8. If the pump is fitted with a stuffing box, the gland is snug but not tight. For adjustment information see the Maintenance Section and Figure 4.
9. The priming pump drain cock is closed. Primers fitted to the pump pressure side must have an isolating valve which must be open for priming.
10. The field equipment is ready for operation with all supply line and fittings securely connected.
11. **Important:** any valves down stream of the pump are open to allow the water to flow through the system. A closed line may result in trapped air being compressed creating pressure surges many times greater than the normal operating pressure. The pump must **never** operate against a dead head (No flow of water through the pump casing) otherwise the water in the pump will become scalding hot. If this happens stay away from the pump and **do not** attempt to work on the pump or fittings until the water has cooled to a safe level.

Starting Up:

1. Prime the system with the priming pump until all the air is exhausted and replaced by water. If an isolating valve is fitted, it must be closed before starting pump.
2. If an Engine protection system is fitted, depress the reset switch to permit the engine to started.

Start the engine. Engage the clutch if one is fitted. If a tractor is used, engage the PTO shaft. Open the throttle **slowly** to approximately half speed. The pump should now begin to build pressure. Never attempt to hurry the start up procedure. Fill the system with water **slowly**.

If a gate valve is fitted to the pump discharge, it should be opened very **slowly**, do not allow the pump pressure to fall to zero. Opening valves too quickly will cause the pump to lose pressure and dump the prime.

If a priming valve is fitted, the external spring loaded handle should move as the valve slowly opens.

Important if the pump fails to prime or pump water

If the pump fails to pick up the prime, **stop the engine immediately**. Running the pump dry will damage the gland packing or mechanical seal. Re-prime the pump and try again. Priming pumps connected to the suction side may be operated while the pump is still running. If after **15 seconds**, it still fails to discharge water **stop the pump**. Priming pumps connected to the pressure side **must not** be operated while the pump is running.

Note a pump needs back pressure to operate. **Do not** attempt to test a pump with a open discharge, the pump will not pick up the prime, air will enter through the open discharge and the prime will be lost.

Pumps failing to discharge water after a second attempt should be stopped immediately and investigated. If you are wearing yourself out by extensive use of the priming pump, something is wrong. The fault is probably not in the pump which you are trying to prime. The number one cause of priming problems are air leaks on the suction side of the system. A tiny air leak may allow the pump to be primed but it will not hold the prime. A large air leak will not allow any priming of the suction pipe or pump. If the pump primes but will not pump it may be starved of water due to a blocked or partially blocked suction line, a partially plugged impeller or the suction lift could be too high.

After the pump begins to discharge water, control the engine speed and the gate valve (if fitted) so that the system **slowly** fills with water. Pressure should register on the gauge and be maintained as much as 50 percent below the designed operating pressure until a solid stream of water is seen emerging from the distribution system.

Filling the system slowly ensures:

- The pump does not lose it's prime

- The tractor/engine does not become overloaded

- The system will not be damaged due to pressure surges. (Water hammer)

5. When the system is full of water, increase the engine speed and if necessary open the gate valve until the full operating pressure is reached.
6. **For pumps with a stuffing box.** During operation, water **must** leak from the stuffing box at a steady drip. **Never over tighten.** If water flows continuously, adjust the gland as described in section '5. Maintenance'.

Stopping the Pump:

Manual:

Decrease the engine/PTO to about half speed and follow one of the following steps:-

1. If the pump does not have a check valve. Continue to **slowly** close the discharge valve. **Immediately after the valve is fully closed shut-off the engine.** This procedure will prevent back flow. The pump must **never** be allowed to operate against a dead head. Read the important note under 'Booster Pump' paragraph 2.
2. If the pump is equipped with a check valve. Slowly continue to reduce the speed to idle. If a PTO pump is being used, disengage the PTO drive. Shut-off the engine.

Automatic:

Bearing in mind the length of time an engine or tractor may be unattended during irrigation work, the use of an engine protection system is recommended to automatically shut down the engine in the event of a system failure such as:

Loss of engine oil pressure.
Engine overheating.

Loss of prime.
Pump pressure too high.

Booster Pump:

If the pump is used as a booster pump or is supplying water to a booster pump be aware of some potential hazards.

1. Do not shut down the primary pump first unless the booster pump has a reliable protection system to ensure it also shuts down when the water supply is stopped.
2. If the booster pump is shut down first **do not** close any valves that would prevent water from flowing through the primary pump.
Important: If a pump operates against a dead head (no flow of water through the pump casing), the water in the pump will become scalding hot. If this happens, stay away from the pump and **do not** attempt to work on the pump and fittings until the water has cooled to a safe level.

5. Maintenance

**Regular Maintenance is strongly recommended.
Prevention is better than cure.**

Mechanical

1. If the pump is new or has been in storage, turn it over by hand to ensure that it rotates freely.
2. Periodically check the pump mounting bolts for tightness.

Wheels and Tires (Kifco PTO Pump Trailers) **Maximum highway speed 10 mph**

1. Periodically check the wheels. See that they rotate freely and grease the wheel bearings with a good quality general purpose grease.
2. Periodically check tires and pressure.

4.80/4.00-8 (15.5" o/d)	=	20 psi.
6.70-15SL (28" o/d)	=	32 psi.

Lubrication

1. Gearbox: Fill the gearbox with a good quality SAE 90 Gear Oil to the level plug or the level on the dipstick. Drain and flush the gearbox after the first 50 hours of operation and repeat after every subsequent 600 operating hours.

Check the oil frequently. Note; too much, too little or too heavy an oil will cause the gearbox to overheat.

2. Discharge Valves.
Priming Valve: Oil the pivots on valves with external handles every 200 operating hours and check valve seat.

Gate Valve: Oil the valve stem regularly.

3. Priming Pump: Grease or oil the handle pivots every week during the use period.

Mechanical Seal

Kifco Slurry Pumps are fitted with a mechanical seal and may also be equipped with a lubricator. The lubricant container must be kept full of Glycol (windshield washing liquid). **Never** run the pump with a dry seal. If the pump does not have a lubricator it must **never** be run unless the pump body is full of water.

Stuffing Box:

1. Adjustment: During operation, water must be allowed to leak from the stuffing box at a steady drip. (Approximately 30 drips per minute) The gland packing relies upon water for cooling and lubrication. **Never over tighten** the gland. Operating without water, even for a few minutes, will cause serious damage to the pump shaft.

If water flows continuously, the gland should be tightened by an even adjustment of the two gland nuts. See Figure 3.

2. Replacing Packing: If the stuffing box leaks excessively and cannot be reduced by tightening the two gland nuts, a new packing ring may be added. If there is insufficient room to add a new ring, the whole packing should be replaced. A new set of packing normally consists of 5 rings. Each ring is split. The splits should be positioned alternately at 180 degrees. Adjust the gland as in number 1. above. Some pumps also have a lantern ring installed in the packing area. This ring should be positioned immediately after the first packing ring is installed.

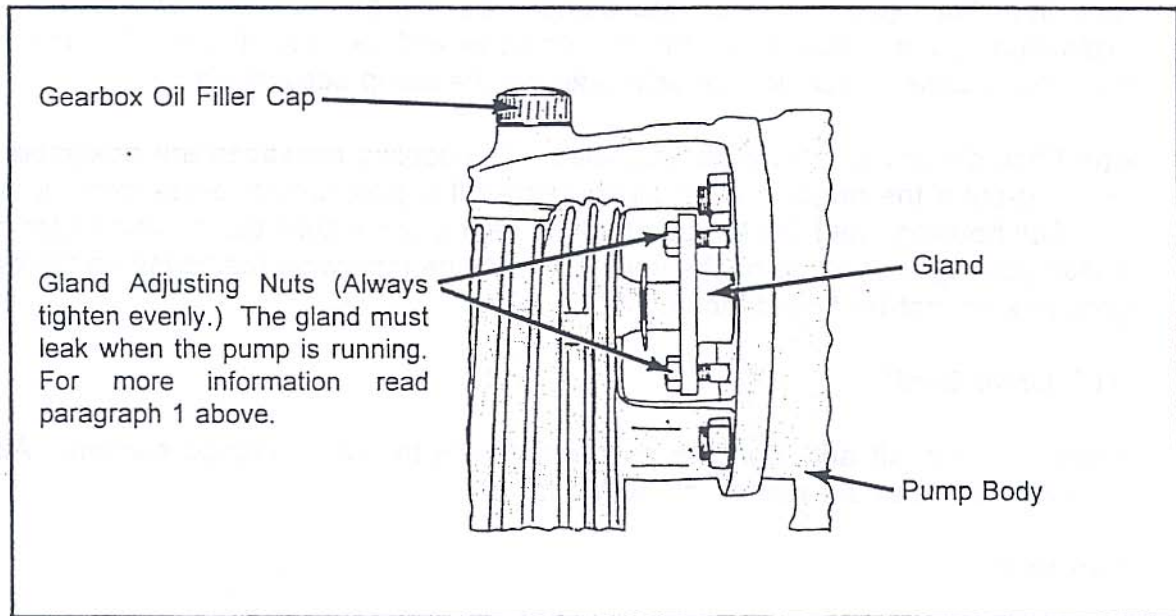


Figure 4. Stuffing Box

PTO Drive Shaft:

Grease the universal joints before putting the shaft into service. Apply grease or a few drops of oil at each end of the plastic shield to lubricate the shield bearings. Oil the yoke push pins or the twist lock quick connectors. Separate and grease the two halves of the shaft.

6. Winterizing

Pump Body

Remove the plug from the base of the pump body. If the pump has a bottom discharge open the valve to drain all water. Rotate the impeller shaft slowly a couple of times to release trapped water. If the pump is water cooled drain the cooling lines. See the instructions below.

Before replacing the plug, spray the inside of the pump casing with a good quality penetrating oil. Rotate the impeller a few times to coat it with oil. Direct some of the spray to the wear ring areas. (Pumps can be difficult to turn after the winter storage period. The impeller may be temporarily held by corrosion in the wear ring area). Replace the plug.

Water Cooled Pumps:

The cooling lines must be clear of water to prevent frost damage. Disconnect the copper tube from the highest point on the pump body and blow out any water. For additional protection, put anti-freeze into the cooling pipes and re-connect them. It is recommended that this is done in conjunction with draining the pump body above.

The Kifco slurry pumps are water cooled. The cooling passages are designed to be self draining but if the pump is ever disassembled it is possible to re-assemble it incorrectly. The Bell housing that joins the pump to the gear box contains the cooling water passages. These passages must be on the vertical centerline otherwise the cavity on the back of the gear box cannot be fully drained.

PTO Drive Shaft:

Remove the shaft and lubricate as described in the Maintenance section. Also smear grease or oil onto the splines of each end yoke.

Gearbox:

Drain the oil and renew as described under lubrication in the Maintenance Section. Rotate the gearbox input shaft a few times to coat the gears with oil.

General:

1. Smear grease or oil on the gearbox input shaft.
2. Smear oil around the stuffing box.
3. Check tire pressures. Add air if required.
4. Grease wheel bearings.
5. Lubricate the discharge valve or priming valve, wipe excess oil off the rubber seat.
6. Open priming pump drain valve.
7. Lubricate priming pump pivot points.
8. Remove pressure gauge and store safely.
9. Protect pump ports against entry of debris or vermin.
10. Store under cover.



WARRANTY

KIFCO products are warranted to the original user for a period of one year from the date of his purchase invoice, that the equipment will be free from defects in material and workmanship subject to the following conditions:

Satisfaction of this warranty will be limited to the replacement or repair or modification of the equipment involved at the manufacturer's option. The manufacturer's obligation under this warranty shall be limited to a credit to the dealer or customer in the amount of the current list price of the parts or materials required for replacement, repair, or modification of the equipment.

Freight costs shall be paid by the dealer/customer.

This warranty extends only to the original user of **KIFCO** equipment purchased from an authorized **KIFCO** dealership.

This warranty does not apply to certain component parts used on **KIFCO** equipment. Such component parts are warranted by the original manufacturer and **KIFCO'S** responsibility is limited to communicating the need for warranty service to each manufacturer. Such component parts include, but are not limited to tires and tubes, batteries, engines, transmissions, PTO drive shafts and valves.

This warranty shall be available only if:

- A) **KIFCO** has received a properly executed delivery record and
- B) **KIFCO** is notified in writing within 30 days upon discovery of an alleged defect and
- C) **KIFCO'S** examination of the equipment discloses, to its satisfaction, that such alleged defect has not been caused by misuse; neglect; improper installation; improper operation; improper maintenance; repair or alteration; accident; or unusual or extraordinary use demands.

THE FOREGOING WARRANTY SUPERSEDES AND IS IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESSED, IMPLIED OR STATUTORY, AND ALL OTHER LIABILITIES OR OBLIGATIONS ON THE PART OF **KIFCO** INC.

- A) **KIFCO** MAKES NO WARRANTY OF MERCHANTABILITY IN RESPECT TO THE EQUIPMENT.
- B) **KIFCO** MAKES NO WARRANTY THAT THE EQUIPMENT IS FIT FOR ANY PARTICULAR PURPOSE.

LIMITATION OF LIABILITY

KIFCO SHALL IN NO EVENT BE LIABLE FOR ANY CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR INJURY TO THE PERSON OR PROPERTY OR LOST PROFITS) OR ANY INCIDENTAL OR SPECIAL DAMAGES AND/OR EXPENSES, OR CLAIMS FOR INDEMNIFICATION, BY REASON OF ANY DEFECT IN THE EQUIPMENT OR ITS MANUFACTURE, DESIGN OR FUNCTIONING, OR ANY INSTRUCTIONS CONCERNING THE EQUIPMENT.

No agent or representative of **KIFCO** or any of its dealerships has authority to waive, alter or add to the printed provisions of this warranty and limitations of liability.

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