

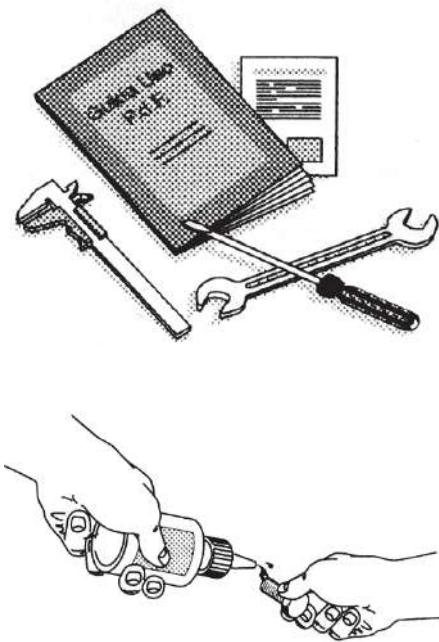
# Owner's Manuel For ALS.18.2000



For correct installation of PTOs and all related accessories, it is very important to follow these general rules.

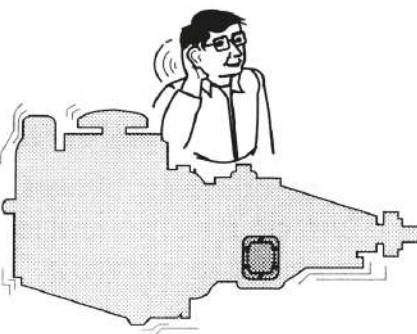
Always check the PTO instruction manual and any further specific instruction sheets included in the PTO package. Always operate taking into account the gearbox operating manual.

## 1. General Rules for PTO Installation



- Use the appropriate tools and instruments such as torque wrenches, gauges and thickness gauges.
- Use only gaskets supplied by the Manufacturer. Use paste gasket only if recommended.
- Mastic is forbidden if used together with paper gaskets.
- It is advisable to use medium thread locking fluid for locking bolts and studs.
- Perform all Installation operations with the vehicle standing on a level surface, otherwise oil levels cannot be checked.
- Operate with engine and gearbox at ambient temperature.
- Check that the PTO is equipped with the correct mounting kit.
- Check that clutch works properly, otherwise adjust it. The transmission should stop rotating within 5 to 6 seconds.
- Check that the gearbox has no unusual noises or vibrations.

## 2. Use of The PTO



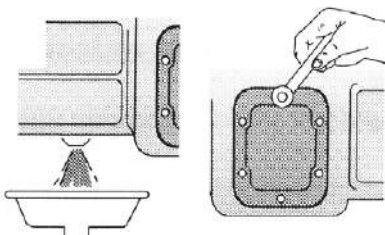
**IMPORTANT:** When engaging and disengaging the PTO, always press the clutch pedal!

Working temperature and load conditions;

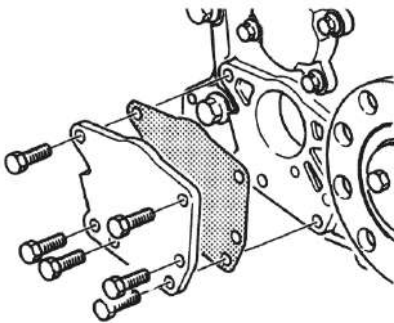
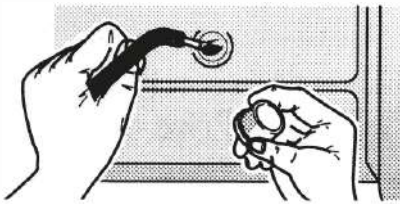
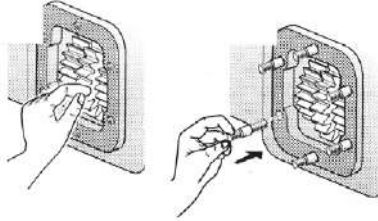
The temperature depends on the way the PTO is used and it is recommended to keep it between the following values Short duration (less than 15 minutes) max.120 °C, long duration (more than 15 minutes)max 100 °C.

The PTO temperature is affected by various factors; it is possible to reduce overheating by:

- Changing the oil more often in case of heavy duty system
- When the PTO is side mounted, ensuring that the gear backlash is accurately checked.
- When the PTO is rear mounted, considering to provide the PTO with a supplementary lubrication kit.



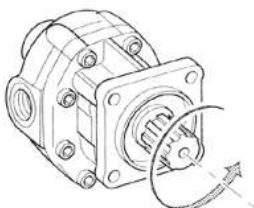
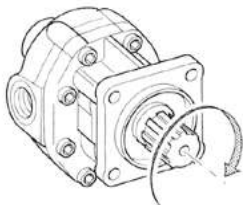
### 3. Side Mounted PTO Installation



- Empty or reduce the gearbox oil level, check cleanliness. If oil is dirty or contaminated it should be replaced.
  - Remove gearbox aperture cover and accurately clean the gearbox aperture surface.
  - Check gearbox gear teeth and the gear backlash.
  - Open the PTO package. Use PTO specific mounting kit and if necessary spacers.
  - Studs for mounting onto the gearbox: Accurately check that the holes in the gearbox are threaded. Be careful that studs do not interfere with gears.
  - Fit the studs. Picture no. 7 shows a typical mounting example.
  - Backlash check between gear tooth and spacer insertion: To get a backlash of 0,5mm or 1mm, fit spacers between PTO and gearbox as necessary.
- Backlash checking can be carried out in two ways:
- In order to avoid the seals sticking to each other, use grease. NEVER use adhesive fluid when the PTO mounting kit requires special gasket USE adhesive fluid only when the PTO mounting kit DOESN'T involve any gasket.

Notice: Once the nuts have been tightened, the backlash has to be rechecked and the necessary the shimming operation may be repeated. When the installation operation has been completed, fill the gearbox with oil.

### 4. General Guideline for Pumps Installation



Basic requirement;

- Pump shaft must be aligned with PTO (max. allowed concentricity 0.05 mm).
- Backlash: pump and PTO shaft must have a minimum radial backlash of 0.1 mm and a axial backlash of 1 to 2 mm.
- Clean the PTO-pump contact surfaces.
- Fit the pump with its suitable coupling kit, tightening the nuts with a torque spanner. (See tightening torque table par. 7). Notice: Always check that pump rotation matches PTO rotation.



## 5. Air Controls

The following recommendations only refer to the PTO engagement-disengagement control.

- Lamp and pressure switch: even though air controls are equipped with a pressure switch, this device doesn't signal that the PTO is engaged, just that the air line is pressurized. It is therefore recommended to use a PTO equipped with switch kit
- Air treatment: For efficient operation air controls require clean and dry air. Check the technical features of the air controls and the air treatment device available on the vehicle.
- Check that the air pressure in the PTO air connector is between 6/11 bar.
- Electro-pneumatic controls: are pneumatic controls operated by an electric solenoid. Follow procedures for general air and electric installations.

## 6. Electrical Controls And Devices

There is quite a wide range of electrical controls not included in the scope of this manual. Please refer to electric circuits manuals. Main recommendations concerning electrical controls are:

- Always protect the circuit with fuses (10 A).
- Clearly identify the controls; this is valid for those controls fitted on the dashboard in order to avoid unintentional operation.

## 7. After Installation Checks

Once the installation phase is complete, the following checks are recommended.

Engagement / disengagement:

Perform soon after engine start. If a clash is heard, this may be due to one of the following check.

- Clutch not working properly
- There's no or insufficient air pressure.

Oil Level Check: Carry out an oil check when the engine is still cold and top up if necessary. Check to be carried out after 15-20 minutes operation.

Oil Leak: Be sure that there are no leaks between gearbox aperture PTO mounting flange and PTO output. In the case of a leak, check tightness.

Noise check: To be carried out under all the working conditions, with PTO engaged, gearbox in neutral position. In case of a side mounted PTO, an excessive noise may mean a wrong backlash according the following:

- High pitched noise: backlash is too tight.
- Rattle noise: excessive backlash.

Tightening bolts check: Normally bolts tend to loosen because of the seal setting. It is recommended that all bolts and nuts are checked after a few hours of work checking the tightening by means of a torque wrench. With side mounted PTO's, recheck the Cardan shafts generate torsional and axial vibrations. The higher the cardan angle is, the higher are the potential vibrations. Vibrations may adversely affect the bearings of the components connected by the shaft and may reduce the bearings life. To correctly install the drive shaft the following instructions should be followed:

## 8. Drive Shafts Installation

Cardan shafts generate torsional and axial vibrations.

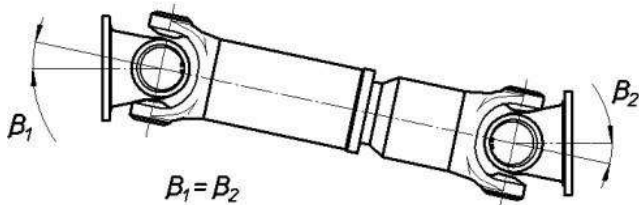
The higher the cardan angle is, the higher are the potential vibrations. Vibrations may adversely affect the bearings of the components connected by the shaft and may reduce the bearings life. To correctly install the drive shaft the following instructions should be followed:

1. Transmission must be square and in line. The two connecting flanges should be parallel and both angular inclinations should be the same.
2. Total angle of the universal joints must be between 3° and 7°.
3. Drive shaft must be dynamically balanced.

Do not remove counterweights and do not change the single components of the shaft to avoid creating new unbalance. In case of loss or replacement of single components, the shaft must be balanced again.

4. Accurately check that the drive shaft full extension is sufficient and doesn't cause end stroke bumps in the application.
5. In case of heavy duty "applications contact our technical department and always follow the shaft manufacturer instruction leaflet.

NOTICE: With the cardan shaft use only pumps equipped with ISO flange. Do not exceed an 7° angle.



Max. Speed (rpm)	Max. True Joint Angle
3.500*	5°
3.000*	5°
2.500	7°
2.000	8°
1.500	11°
1.000	12°

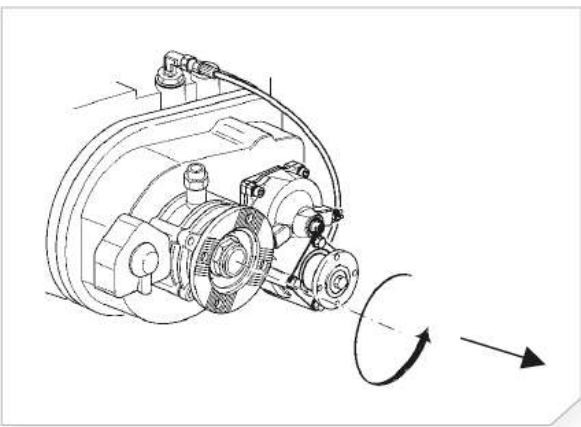
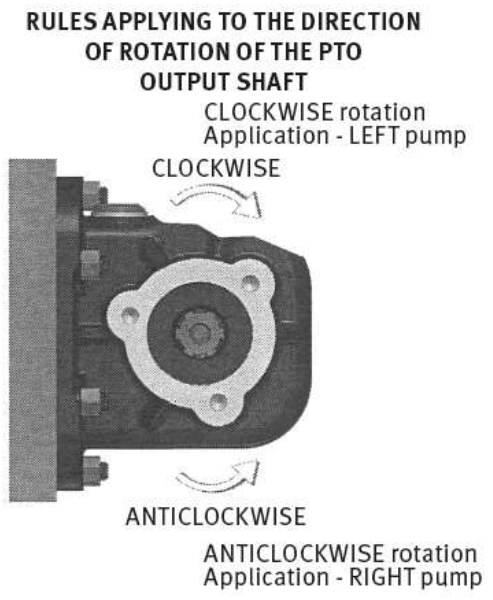
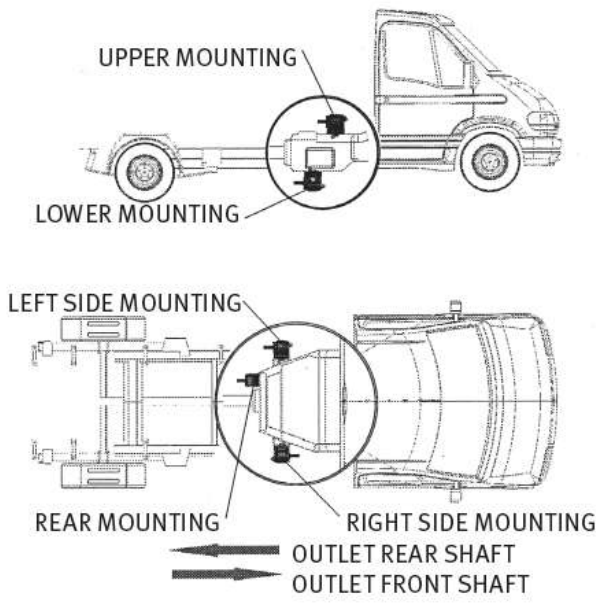
*\*For speeds over 2500 rpm please contact us*

### ATTENTION: SAFETY INFORMATION

- The PTOs should be mounted by qualified personnel.
- Use suitable tools and measurement instruments.
- Use personal protections and precautions set out by the current regulation on safety in the workplace.
- Avoid assembling or disassembling the PTOs on your own.
- Ensure the system or the PTO cannot involuntarily started up.
- Do not assemble the PTO or parts of the PTO or conduct maintenance work when the engine is on.
- Ensure all the components have been assembled properly and the level of oil in the gear box has been topped up before starting up the vehicle: incorrect assembly of the PTO may cause the PTO and/or the gearbox to break and damage other parts of the vehicle.

- The splined shaft (male or female) protruding from the PTO rotates with no protection when the pump has not been assembled. Avoid any contact between the shaft and any object and, more importantly, protect the working area to prevent contact with body parts or clothing.
- Install the pump or the cardan shaft only when the engine is off and the PTO has been disconnected.
- For the assembly of the cardan shaft, it is necessary to use all precautions and protections set out by the current regulation on safety in the workplace.
- The gearbox or the PTO may attain high very temperatures after prolonged use of the vehicle or the PTO. It therefore necessary to take all the necessary measure to prevent burns or wait for the mechanical parts to cool down to temperatures appropriate for skin contact.
- Some pTOs are considerably heavy and to assemble and disassemble them it is necessary to use adequate lifting or resting systems to prevent crushing hazards.
- Any aste oil or that has not been used should not be discarded in the environment, but should be processed according to the directives included in current regulation on the disposal of special waste.
- All metal or rubber parts discarded assembly or disassembly of the PTOs should be disposed of in compliance with current regulation on the disposal of special waste.

## INDICATIVE ASSEMBLY POSITIONS OF THE PTOS



**PTO's**

Available high range of PTO's for all gear boxes. In order to identify the correct PTO, here are enclosed some instruction to follow and the related form to fill and send to our Export Department that will give the relevant quotation.



## GENERAL INFORMATION TO MOUNT POWER TAKE-OFFS

- Carefully follow these general assembly indications, both as far as the safety precautions and the assembly stages of the PTOs are concerned.
- The general indications do not replace specific instructions contained in the PTOs, in the assembly kit or in the various assembly accessories (adapters, auxiliary shafts, etc).
- It is necessary to also follow any instructions related to the vehicle's gearbox.
- Install the PTO's With the vehicle placed on a flat surface, so that oil levels in the gearbox can be checked correctly.
- Only use the components contained in the PTO packaging and related accessories (assembly kit, auxiliary shafts, adapters).
- Please remove PTO output seal before assemble SAE-B or any other adapter in order to provide better oiling for adapter bearing.
- Only use gasgets supplied.
- Do not use sealing paste, unless explicitly indicated in the specific instructions.
- It is advisable to use a medium-strength threadlocker to tighten the studs and screws o prevent any loosen on body and oil leakage.
- Please apply grease to Pump connection shaft (ISO 8T, UNI 6T, SAE-B 13T, SAE-BB 15T).
- Before assembling the PTO, check that the vehicles clutch and transmission work correctly and that the gearbox does no produce any anomalous noises or issues in inserting some gears.

TIGHTENING TORQUE					
Thread diameter - Screw (mm)	M8	M10	M12	UNC 3/8	UNC 7/16
Screws and nuts torque (Nm)	25	50	80	25	60
Studs torque (Nm)	6	10	18	10	20

For some aluminium gearboxes the tightening torque needs to be reduced by 30%.

Note on the tightening torque: the tightening torques reported are only means as a guide and do not replace the indications given by the vehicle's manufacturer of the gearbox manufacturer.



\* Place the correct number of gaskets over studs. Do not use paste between because you may want to add or subtract gasket to obtain proper backlash.

\* Do not use more than 3 gaskets together, Usually one gaskets 0.020" (0.5 mm) will be required.

\*Install the lubrication and engagement hoses

Lubrication hose is connected to point coming from cooler.

\*Install the PTO to the transmission by means of the bolts and remaining nuts. Torque to 30-35 lb-ft (41-47Nm).



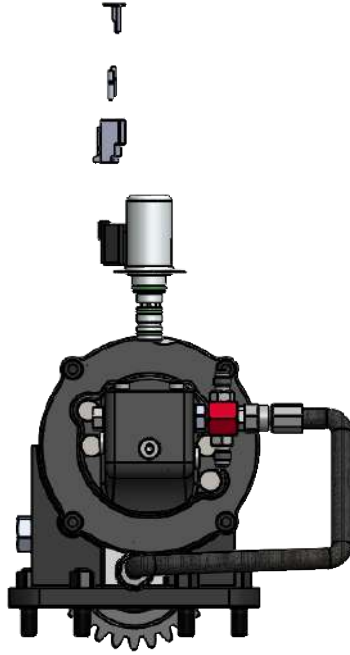
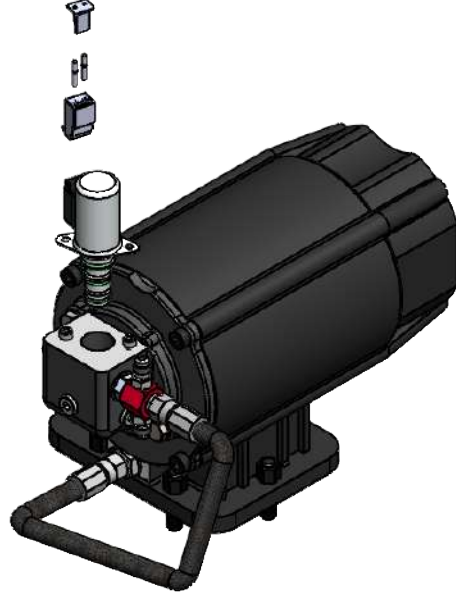
\*After fastening the high pressure line to the transmission, circuit need to be checked for proper oil level and signs of oil leakage. The best check is conducted with the transmission at operating temperature.

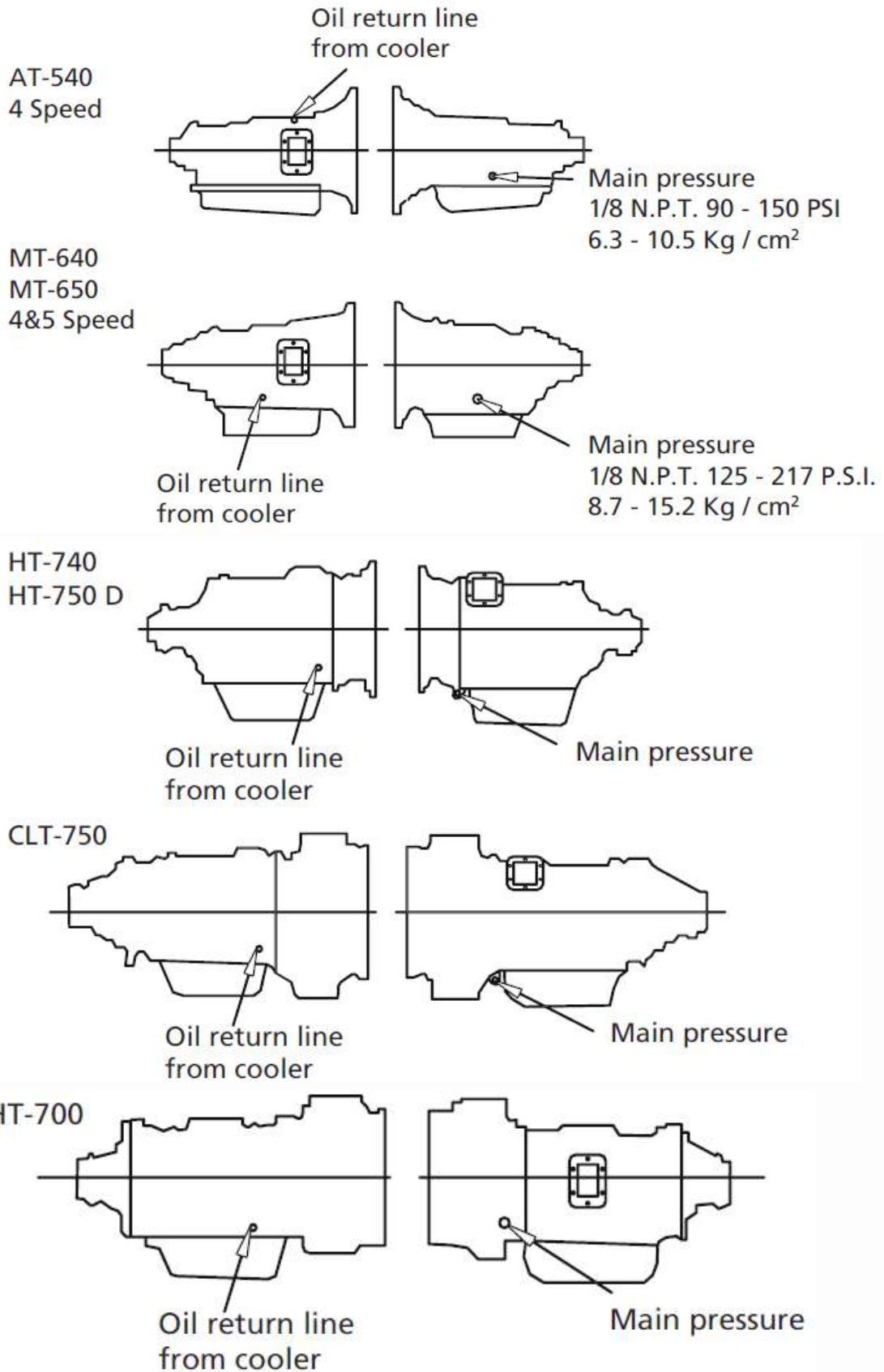
\*Finally install the electrical circuit.

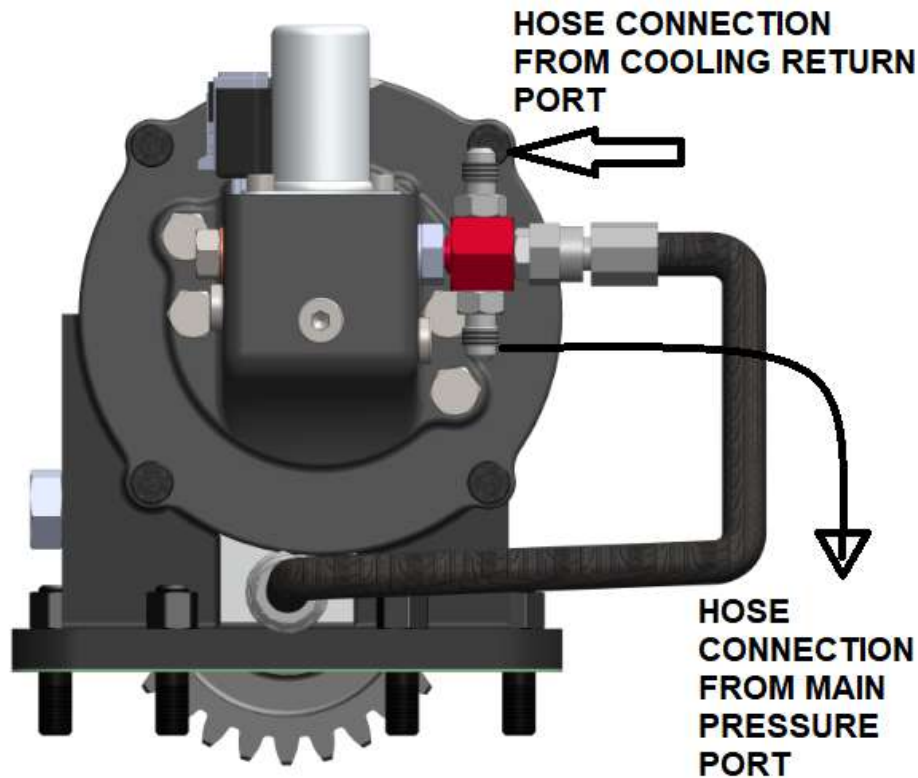


Ürün Kodu / Product Code

Revizyon No-Tarih / Revision No- Date







3 different fittings was sent with product. Here are their dimensions;

- \* 3/4" - 16 UNF
- \* 7/8" - 14 UNF
- \* 1 1/16" - 12 UNF

Please check main pressure port of your tranmsission and use correct fitting for your hose installation.



## CHECK

### – Checking the Coupling

Connect and disconnect the pTO a few times (follow the paragraph HOW TO USE THE PTO) to check the coupling system is working properly.

Any anomalous noise produced during coupling is only due to the fact that the pTO's gearings are not completely still and therefore to the fact that the vehicle's clutch is not working properly. Either the clutch pedal has not been fully pressed or one has not waited the time necessary for the gearbox's gearings to stop.

### – Checking Noise Levels for Lateral PTOs

- If the PTO does not produce anomalous noises or noises that are not that different from those of the clutch, this means that the assembly and the teeth clearance are correct;
- If the PTO produces a screeching noise (whistle) this means that the PTO has been assembled with insufficient clearance between the teeth. In this case it is necessary to disassemble the PTO and add a gasket between the surface of the PTO and that of the gear box;
- If the PTO produces a beating, this means that the PTO has been assembled with excessive clearance between the teeth. In this case it is necessary to disassemble the PTO and remove a gasket or use a thinner gasket.

For the purposes of the durability of the PTO it is generally preferable to have a slightly higher clearance between the teeth rather than a low one.

### – Leak Check

After it has been operating for a few minutes, stop the vehicle and check there are no oil leaks from the surface connecting the gearbox to the PTO or from other parts of the PTO.

### – Clamping Check

After a few minutes of operation, check that the threaded parts have been tightened.

Checks related to noise levels, leaks and clamping should also be conducted when the vehicle is hot.

## HOW TO USE THE PTO

The procedure applies to PTOs installed on NON-automatic gearboxes.

For PTOs installed on automatic gearboxes, please refer to the related instructions.

PTO engagement procedure must be always carried with vehicle stationary and parking brake applied.

### – CONNECTING THE PTO

- Press the clutch pedal and keep it pressed for a few seconds to stop the gears from turning.
- Activate the PTO control.
- The PTO engages (the actual coupling is confirmed when the related PTO CONNECTION indicator, if any, turns on).
- SLOWLY release the clutch pedal.

**– DISCONNECTING THE PTO**

- Press the clutch pedal and keep it pressed for a few seconds.
- Bring the PTO control back to the off position.
- The PTO disengages (the actual coupling is confirmed when the related PTO CONNECTION indicator, if any, turns off).
- Release the clutch pedal.

ATTENTION: Incorrect connection or disconnection causes premature damaging to the internal organs of the PTO. Therefore CAREFULLY follow the indicated instructions.



WARNING: WHEN THE VEHICLE IS ON THE MOVE THE PTO MUST BE ALWAYS OFF.

**MAINTENANCE**

In order to get a longer PTO life, it is necessary to execute regularly the following controls:

- LEAKAGE: Make sure there leakage from the surface connecting the gearbox the PTO or from any other parts of the PTO itself.

Check the gearbox oil level.

- TIGHTENING: Verify that the tightening of the bolt/nuts/screws is correct and, eventually, set it at the recommended value (see TABLE 3).

- SHAFT GREASING: In order to prevent early wearing, it is recommend to grease the shaft at each maintenance operation.

The frequency of the maintenance services depends by the way the PTO is used.

The first check-up should be performed after 10 days from the installation, then every 40 to 50 days.

PTO TROUBLESHOOTING GUIDE			
PROBLEM	POSSIBLE CAUSE	REMEDY	PREVENTION
<b>Cable Shift PTOs</b>			
Hard Shifting	Cable inner member frozen	Thaw in garage	Route cable away from road spray and seal end from moisture
	Sharp bend in cable	Straighten inner member or replace cable	Keep bends larger than the minimum bend radius. Avoid short cable runs
	Improper shifting	Make sure vehicle clutch is adjusted to allow the PTO drive gear to stop before shifting or that the proper shift procedure is followed	Always check the PTO instruction manual and any further specific instruction sheets included in the PTO package.
	Worn or damaged shift control	Repair or replace components	Do not connect lever rods to cable shifters
Delayed or partial engagement	Loose linkage or attachment. Loose or missing cable clamps	Repair or replace	Routine maintenance

**Cable Shift PTOs**

PTO doesn't engage	Contaminated air lines	Remove contaminants from air cylinder	Bleed air system more often
	Air pressure not high enough	Wait until system pressure is above 65 psi before engaging PTO	Systems are designed with a pressure protection valve which does not allow air to the PTO until the system pressure exceeds 65 psi
	Improper method of shifting causing damage to the PTO shift collar	Make sure vehicle clutch is adjusted to allow the PTO drive gear to stop before shifting or that the proper shift procedure is followed	Always check the PTO instruction manual and any further specific instruction sheets included in the PTO package.
	Worn or damaged shift control	Repair or replace components	
	Shift fork is out of shift collar	Reassemble onto PTO correctly	
PTO doesn't disengage	Faulty air valve	Repair or replace	Usually a result of contamination or dirty valve. Keep air system bled and valves free of dirt
	Worn or damaged shift control	Repair or replace components	
	Shift fork is out of shift collar	Reassemble onto PTO correctly	



## UNDERSTAND THIS PAGE BEFORE USING POWER TAKE-OFF (PTO)



### WARNING

NEVER GET UNDER THIS TRUCK  
IF THE ENGINE IS RUNNING !



Hands, clothes hair, etc. can  
get caught on spinning  
shafts and U-joints.  
**YOU MAY BE HURT  
OR KILLED.**



### HOW TO USE THE POWER TAKE-OFF (PTO)

#### STATIONARY APPLICATIONS:

CHOCK WHEELS BEFORE ENGAGING PTO.

#### Manual Shift PTOs (including Air Shift) Manual Transmissions

1. Push in clutch pedal,
2. Shift transmission into neutral.
3. Engage PTO.
4. Let clutch pedal out.

#### Manual Shift PTOs (including AirShift) Automatic Transmissions

1. Let engine idle.
2. Apply brakes, while seated in driver's seat.
3. Place shift selector in any drive range.
4. Engage PTO.
5. Shift transmission to neutral or park.

#### Power Shift PTOs Manual or Automatic Transmissions

1. Let engine idle.
2. Engage PTO with switch,
3. Resume operating speed.