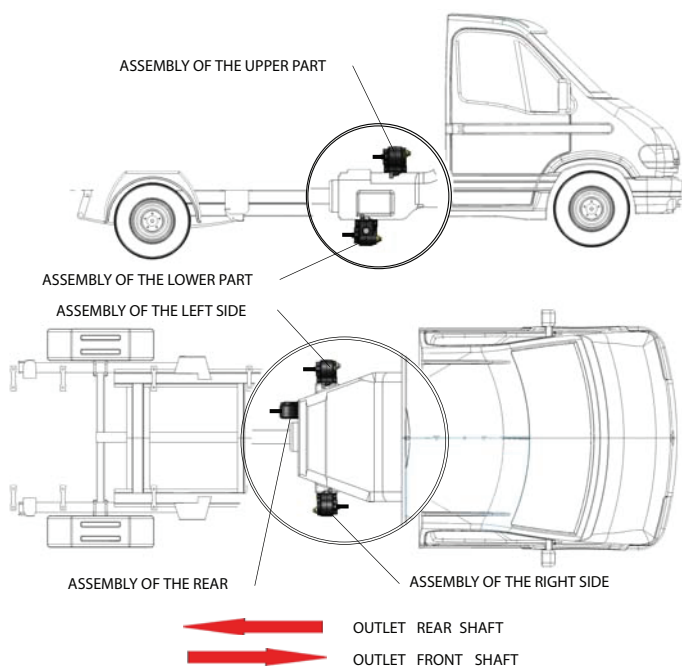




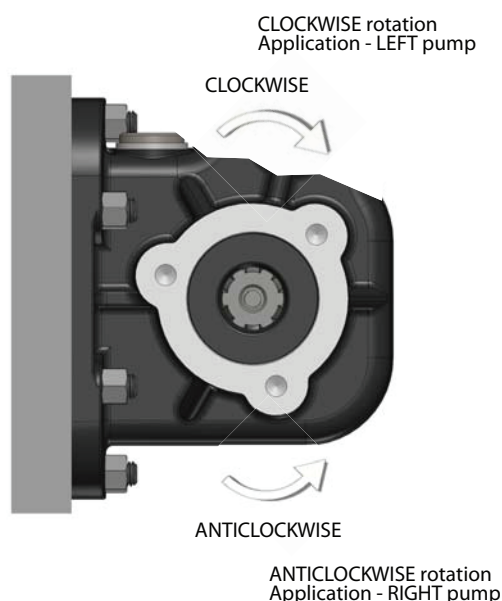
## 1 - ATTENTION: SAFETY INFORMATION

- The PTOs should be mounted by qualified personnel.
  - Use suitable tools and measurement instruments.
  - Use personal protection and precautions set out by current regulation on safety in the workplace.
  - Ensure the system or the PTO cannot involuntarily be 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.
  - The gearbox or the PTO may attain high very temperatures after prolonged use of the vehicle or the PTO. It is therefore necessary to take all the necessary precaution measure to prevent burns. 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 sys prevent crushing hazards, it may be necessary for two people to carry out the operation.
  - Any waste oil that has not been used should be processed according to the directives included in the current regulation on the disposal of special waste.

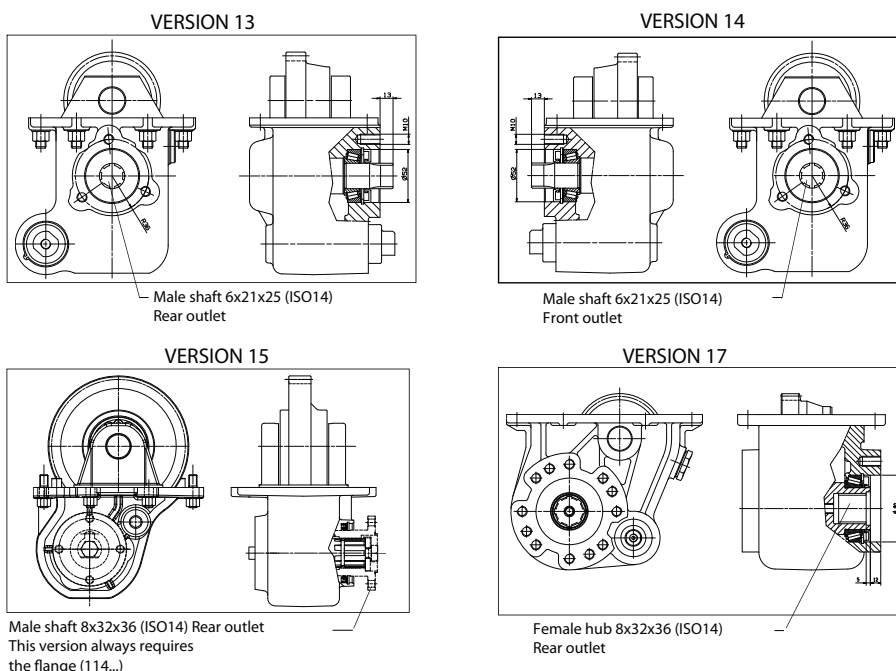
## 2 - INDICATIVE ASSEMBLY POSITIONS OF THE PTOs



## RULES APPLYING TO THE DIRECTION OF ROTATION OF THE PTO OUTPUT SHAFT



## MOST COMMON PTO SHAFT OUTLET VERSION



Technical specifications are subject to change without notice.

## 3 - GENERAL INFORMATION TO MOUNT POWER TAKE-OFFS

- Carefully follow these general assembly instructions, 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 gearbox.
- Install the PTO 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).
- Only use gaskets 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.
- Before assembling the PTO, check that the vehicles clutch and transmission work correctly and that the gearbox does not produce any anomalous noises or issues in selecting gears.

TIGHTENING TORQUE (see note)

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

TABLE 3



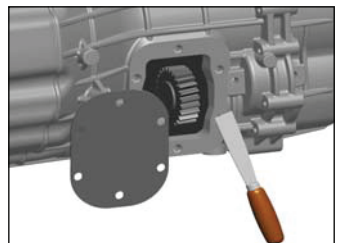
For some aluminium gearboxes the tightening torque needs to be reduced by 30%.  
 Note on the tightening torque: the tightening torques reported are only means as a guide and do not replace the indications given by the vehicle's manufacturer of the gearbox manufacturer.

## 4 - INSTALLATION OF SIDE MOUNT PTOs



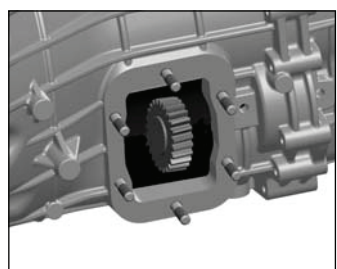
4.1 - Unscrew the drain plug and remove the oil from the gearbox. Screw the drain plug back with the tightening torque indicated in the gearbox's operating manual.

4.2 - Identify the suitable gearbox opening to mount the PTO and remove the cover with the related gasket.

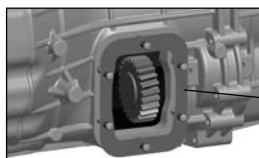


4.3 - Check that the gearing is compatible with the PTO's gearing in terms of position, inclination of the tooth and teeth size. This needs to be carried out as an additional check that the right PTO has been selected for the specified gearbox.

4.4 - Clean the surface of the opening, make sure no foreign matter is introduced in the gearbox.



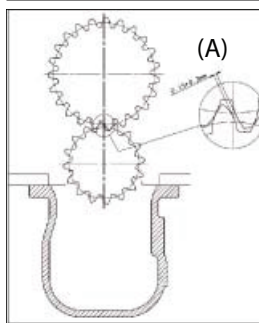
4.5 - If the PTO needs to be mounted with studs, insert them (with the short thread side) in the threaded holes of the gearbox, using a medium-strength threadlocker (LOCTITE 243, LOXEAL 55-03 or similar). Tighten the studs using a torque like the one indicated in TABLE 3 Chap.3. If the gearbox has feed-through threaded holes, the threadlocker should also have a sealing action and it is necessary to check that the studs do not interfere with the gearing of with parts inside the gearbox.



4.6 - Position the sealing gasket.



4.7 - Install the PTO and tighten the nuts with lower torque compared to the find fixing torque.



4.8 - Check, through the inspection hole (indicated by the arrow) the clearance between the gears. The clearance should be between 0.15 and 0.3 mm (A). The clearance is controlled manually and therefore it cannot be precise. This is why it is necessary to proceed by attempts until the optimal clearance is achieved.



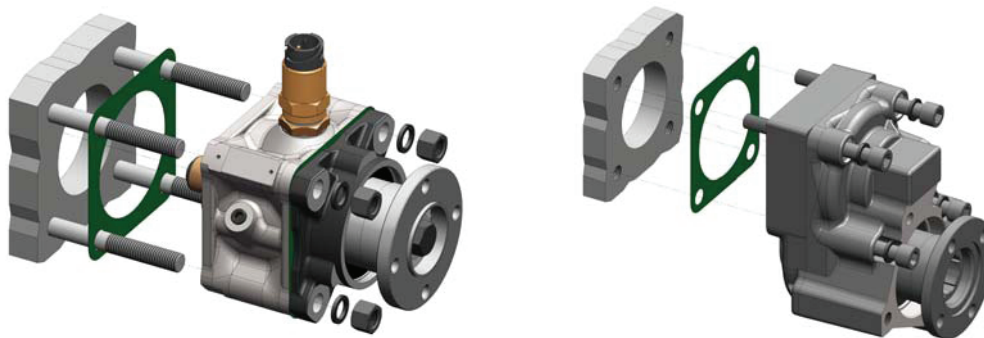
4.9 - Once the optimal clearance has been defined tighten the nuts or the screws of the PTO fully home with the tightening torque shown in TABLE 3 Chap.3

4.10 - Top up the oil in the gearbox bearing in mind that usually a side mount PTO uses up approximately 0.5-0.8 litres of oil. Install the control system. Start up the vehicle and engage the PTO. Conduct the checks as illustrated in the paragraphs below.

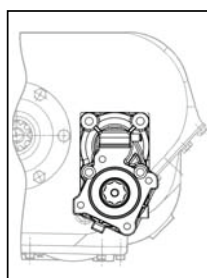
## 5 - INSTALLATION OF REAR MOUNT PTOS

It is necessary to check and follow the specific instructions contained in the adapters and the auxiliary shafts. tions contained in the adapters and the auxiliary shafts. The indications below are meant as a guide.

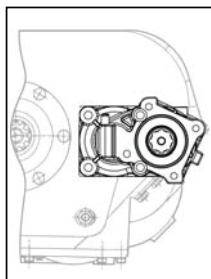
- 5.1 - Empty the oil of the gearbox (for some gearboxes there is no need to empty the oil as the level does not reach the rear aperture (check the gear box's operating manual)
- 5.2 - Identify the rear opening and remove its cover and gasket. The gasket removed should not be used to assemble the PTO.
- 5.3 - Clean the surface of the aperture, make sure no foreign matter is introduced in the gearbox
- 5.4 - If necessary, install the auxiliary shaft and/or adapters following the specific instructions with special care for cases where it is necessary to adjust the bearings with cone-shaped rollers.
- 5.5 - If the PTO needs to be assembled with studs, insert them (from the short thread side) in the threaded holes using a medium-strength threadlocker (LOCTITE 243, LOXEAL 55-03 or similar). Tighten the studs using a torque as indicated in TABLE 3  
If the gearbox has feed-through threaded holes, the threadlocker should also have a sealing action.



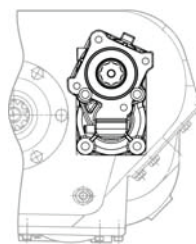
- 5.6 - Install the PTO on the gearbox and tighten the nuts or screws with the tightening torque indicated in the table.
  - 5.7 - Top up the oil in the gearbox bearing in mind the oil required by the PTO.
  - 5.8 - Install the fitting and the air coupling pipe.
- For rear PTO with 2 wheel it is recommended, to optimise the lubrication of internal parts, to suit the assembly positions indicated.



PTO Vertical ASSEMBLY  
-Low outlet



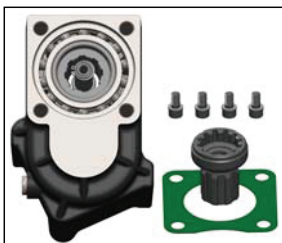
PTO Horizontal ASSEMBLY



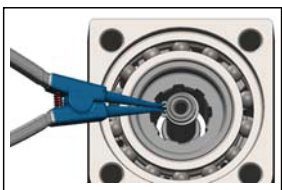
PTO Vertical ASSEMBLY  
-High outlet



## 6 - PREPARATION OF REAR PTOS



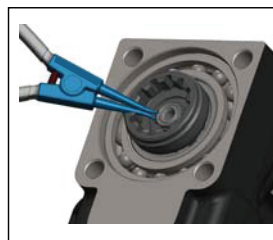
Some PTOs feature an engaging coupling separated from the PTO and which changes according to the gearboxes where it needs to be installed.



6.1 - Use the circlip pliers to remove the circlip from the seat of the central pin. Attention: DO NOT EXPAND THE CIRCLIP MORE THAN IT NEEDS TO BE TO AVOID PERMANENT WARPING.



6.2 - Insert the coupling in the seat of the PTO



6.3 - Use the pliers to reposition the circlip in the seat of the pin, checking that this is secure. Attention: DO NOT EXPAND THE CIRCLIP MORE THAN IT NEEDS TO BE TO AVOID PERMANENT WARPING



ATTENTION: incorrect positioning of the circlip or warping of the circlip during assembly may cause the PTO to fail to disengage.



6.4 - Proceed to install the PTO, as illustrated in the previous paragraph.

## 7 - CHECKS

### 7.1 - 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 gears 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 gears to stop.

### 7.2 - 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.

### 7.3 - 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.

### 7.4 - Clamping check

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

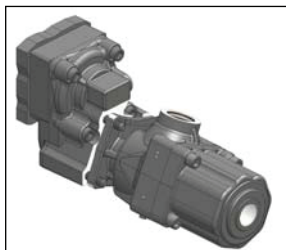
Checks related to noise levels, leaks and clamping should also be conducted when the vehicle is hot.

## 8 - PTO FOR DIRECT ASSEMBLY ON THE PUMP

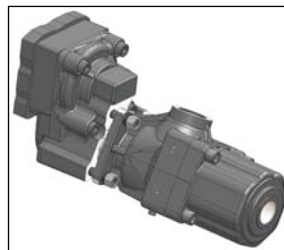
To prevent splines from wear please grease pump shafts and / or couplings.



1 - Install the pump on the PTO with the sealing gasket supplied with the assembly kit



2 - Move the pump away from the PTO by 10mm.



3 - Screw the nuts a few mm.



4 - Push the pump against the PTO and tighten the nuts fully home. The tightening torque shown in TABLE 3

## MOUNTING INSTRUCTIONS FOR ISO PUMPS ON ISO PTO'S WITHOUT BEARING



1 - Mount loose gear and circlip on the pump's shaft



2 - After mounting PTO on the gearbox, screw the studs (pos.A) onto the PTO. Place the intermediate gasket and then fit the PTO assembly (fig 1) onto the PTO. Fix the pump applying the tightening torque indicated in TABLE 3.

## 9 - 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.

### 9.1 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.



### 9.2 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.