

## PUMP START-UP PROCEDURE

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### Preparation Prior to Start-up

The reservoir and circuit should be clean and free of dirt and debris prior to filling with fluid.

### Circuit Cleanup

The reservoir should be charged with filtered hydraulic fluid. The fluid level should be sufficient to prevent vortexing at the suction connection to the pump inlet. It is good practice to clean the system by flushing and filtering, using an external slave pump.

### Filling Pump and Removing Air

If the pump is mounted above the fluid level, it should be filled with fluid through the outlet port.

If the pump is mounted below the fluid level, the pump outlet fitting (or other downstream fitting or plug) can be loosened to allow fluid to displace the air. It may be necessary to loosen the fill cap on the reservoir to allow the fluid to flow freely. When a solid stream of fluid with no observed air begins to drain through the loosened fitting, the fitting should be retightened.

An air bleed valve in the outlet circuit is also recommended to remove trapped air. If such a device is used, the pump should be filled with fluid before start-up.

In some cases, it may be possible to prime the pump by running the engine starter for five to ten seconds with the throttle and/or ignition switch in the "off" position. It will be necessary to loosen a fitting or plug in the pump outlet to allow air to escape.

### Pump Start-up

All controls should be placed in the neutral position so the pump is unloaded when started.

Start the engine and run at low idle.

Once the pump is started, it should prime and pump within a few seconds. If it does not, make sure there are no restrictions between the reservoir and the inlet to the pump, and that there are no air leaks in the inlet line and connections. Also, make sure that trapped air can escape from the outlet.

Run at low engine idle for approximately five minutes. Then, while observing the reservoir fluid level, operate the implements. Extend all actuators to maximum safe limits to completely fill the system with fluid.

Do not run with the fluid level below the "low" limit.

Add fluid to the reservoir to bring the fluid to the proper fill level.



## IDENTIFICATION

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Due to the difficulty in finding out spare cartridge references, either for the loss of the pump feature plate, or for the lack of the machine spare part catalogue, it is most convenient to include some sheets to identify the sample accurately and to give some advice for a correct assembly.

To identify properly cartridge and pump, use the 3 following pages as follows:

**- DIMENSIONS AND FLOW**

Find out pump type and flow in the dimensions chart, look at the figure engraved on the rings as shown (gallons/-min. at 1200 rpm).

**- SUPPORT BUSHING AND SHAFT ROTATION**

Locate support bushing to know whether the cartridge belongs to a single or double pump. On this page there are also some clues to identify shaft rotation.

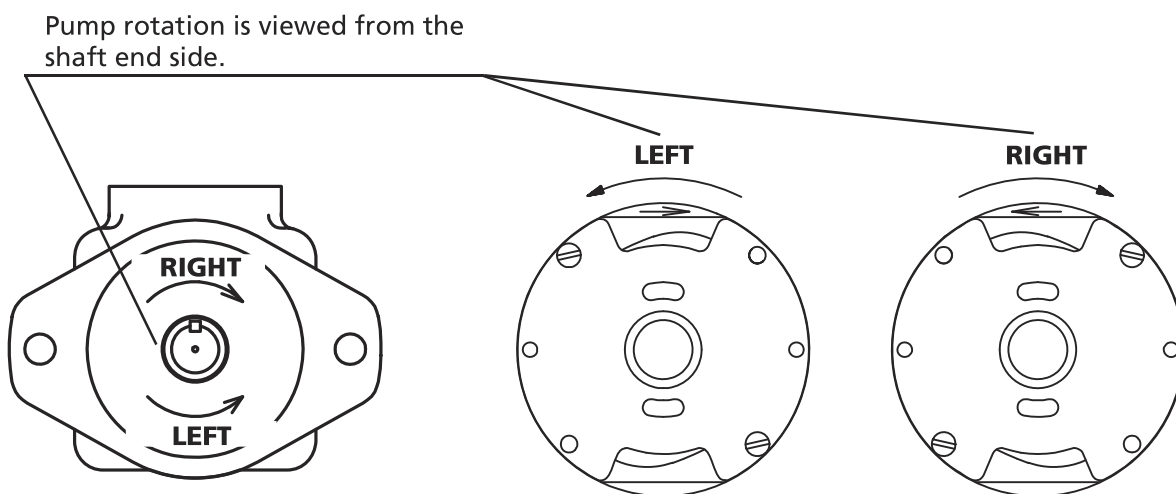
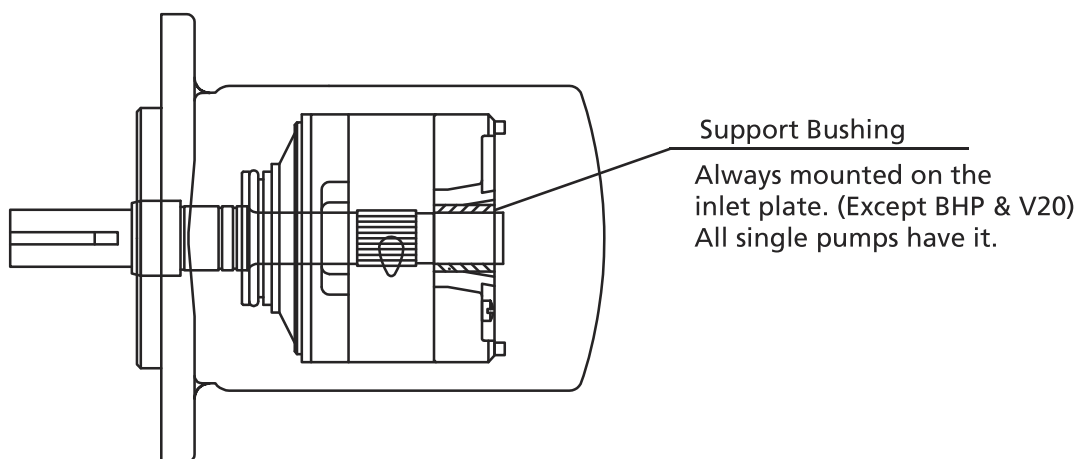
**- PUMP MODEL, SHAFT TYPE AND PORT POSITION (SEE OUR TECHNICAL CATALOGUE)**

## IDENTIFICATION

### PUMP ROTATION Single Pumps

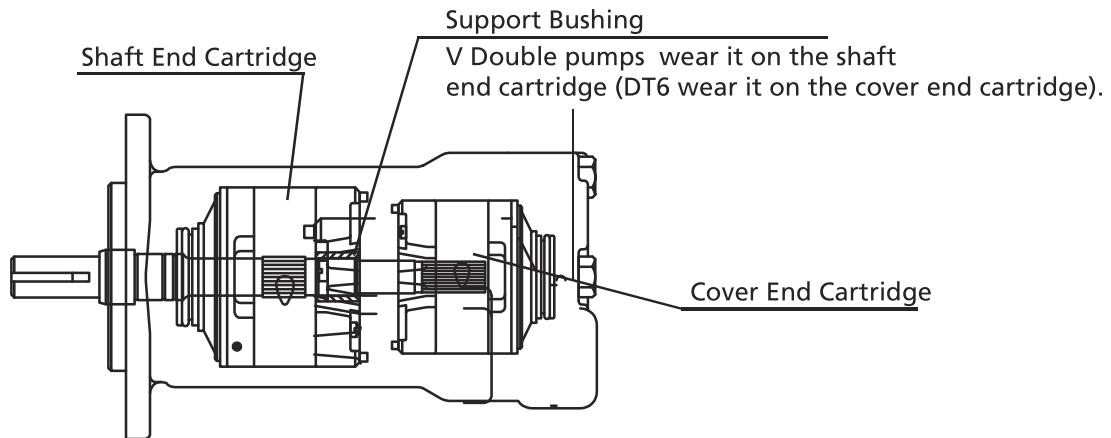
To determine pump rotation look at it from the shaft end side. If clockwise it is right hand rotation, on the contrary, it is left hand rotation.

When taking out cartridge and putting it on to the outlet plate take into account that rotation is seen the other way round; anyway, an arrow engraved in the ring or cam ring shows the real turning sense. (See pictures.)

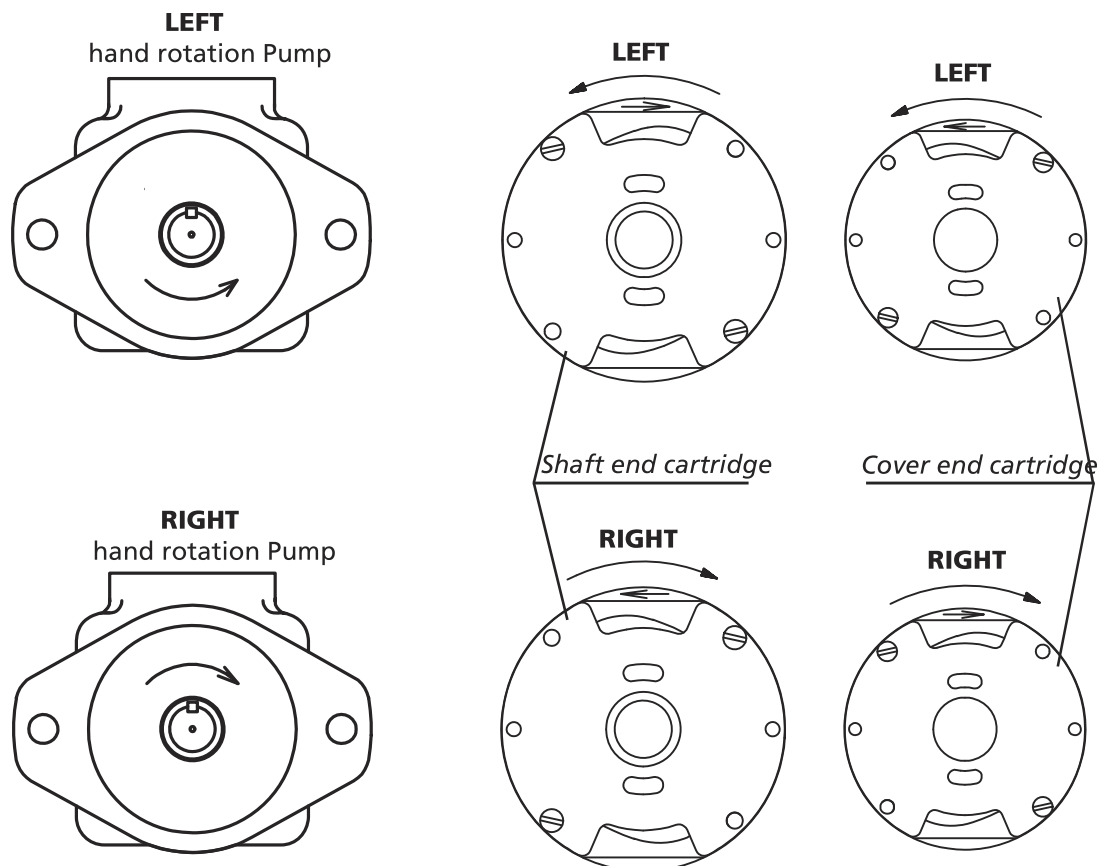


## IDENTIFICATION

### PUMP ROTATION Double Pumps

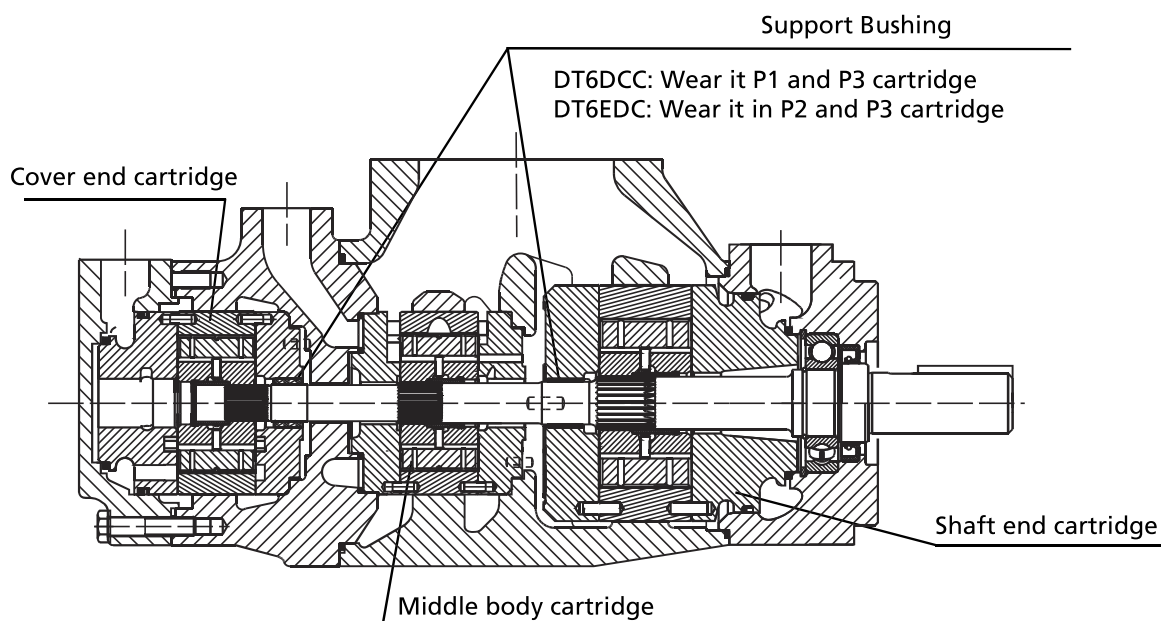


Double pump special feature is that their 2 cartridges are opposite each other, therefore when putting them on the outlet plate, they will apparently have opposite turning sense. Anyway, the arrow in the ring shows the correct rotation. (Pump and cover end cartridge rotation always coincide.)

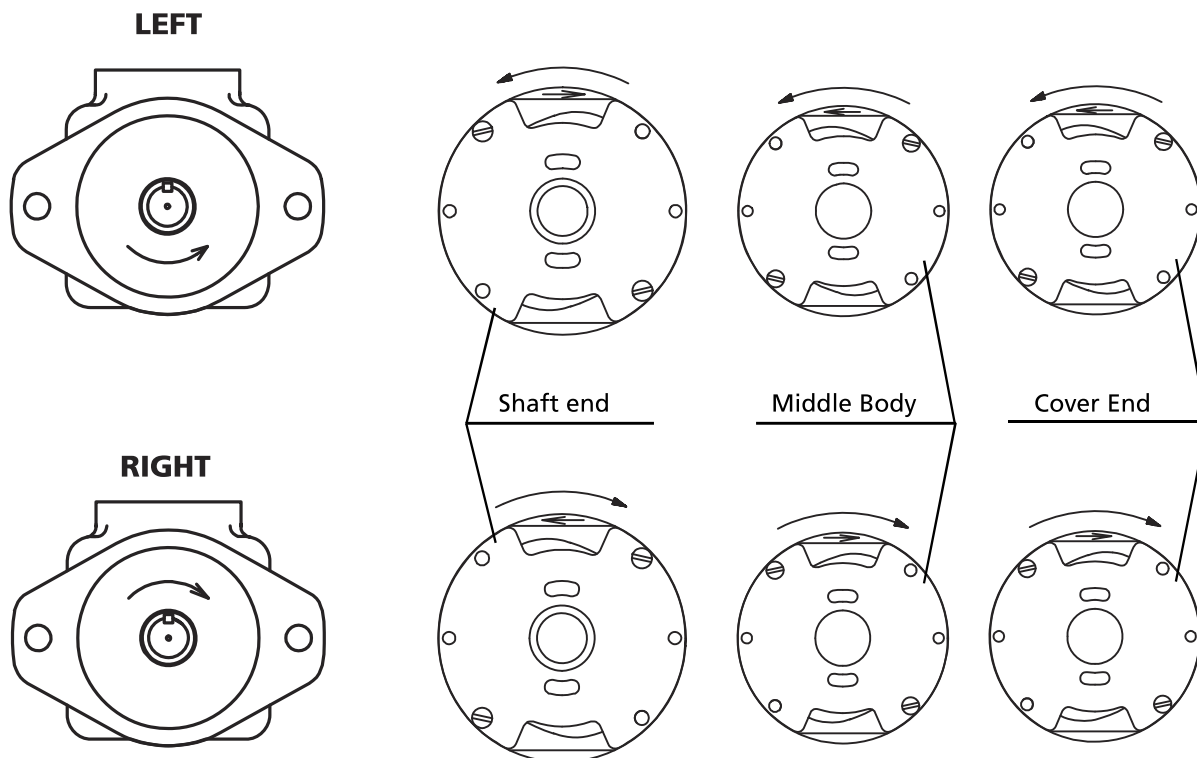


## IDENTIFICATION

### PUMP ROTATION - TRIPLE PUMPS



Triple vane pump special feature is that shaft end cartridge is mounted opposite to the middle and cover end kits. Pump, middle cartridge and cover end cartridge rotation always coincide.



## ASSEMBLY & DISASSEMBLY - PORTS CONFIGURATION CHANGE

Vane pumps have a different external configuration, depending on the position of the suction flange (located on the pump cover) in relation to the pressure flange (located on the coupling flange or shaft side).

The suction flange may be in line with the pressure flange, (0°), 90° to the right, 90° to the left or totally opposite it (180° in relation to the pressure flange).

The steps to modify the position of the suction flange in relation to the pressure flange are as follows:

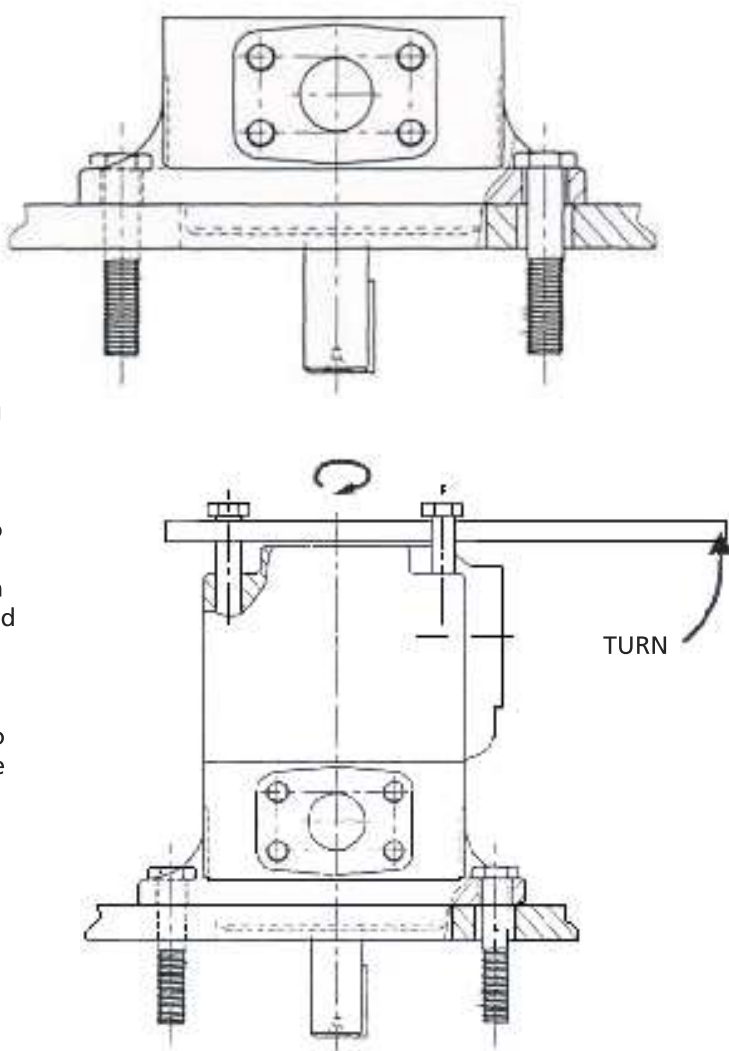
**1-** Secure the pump to a workbench and loosen the four bolts joining the pump cover to the front body (or shaft-side body).

**2-** Do not fully remove the bolts. Remove approximately half their total length for the pump body.

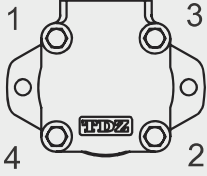
**3-** Remove the front body cover just 1 mm - 2mm, (maximum) by slightly turning the cover and pushing it outwards.

**4-** Using a sufficiently long, resistant metal bar, support it obliquely on two diagonally opposite screws and lever, making the cover turn until the suction flange is in one of the four aforementioned positions.

**5-** Readjust the cover and the 4 bolts with the appropriate torque. Make sure that no particles of paint or other material are between the body and the cover and that the o-ring housed between these two parts is not pinched when tightened.



## ASSEMBLY & DISASSEMBLY

TIGHTEN TORQUE FOR SINGLE PUMP SCREWS		
SINGLE PUMPS	Reference	Tighten torque in Kp.m.
	VC10	5,5
	VC20	11
	20V	6,5
	25V	10,5
	35V	22,5
	45V	35
	BHP1	1
	BHP2	2,5
	BHP3	5
	BHP4	10,5
	BHP6	22,5
	BHP7	35
	DT6C	16
	DT6D	19
	DT6E	19
Tighten the screws with a torque no bigger than 0,5 to 1 Kp.m before beginning the last or final tighten. Follow the order shown in the picture.		

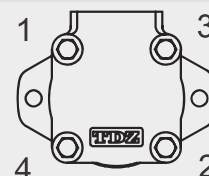
## ASSEMBLY & DISASSEMBLY

### TIGHTEN TORQUE FOR DOUBLE PUMP SCREWS

DOUBLE PUMPS	Reference	Inlet body	Cover
	V*43	10,5	6,5
	V*63	22,5	6,5
	V*64	22,5	10,5
	V*73	35	6,5
	V*74	35	10,5
	V*76	35	35
	VC2010	11	5,5
	VC2020	11	11
	DT6CC	16	6
	DT6DC	19	7
	DT6EC	19	7
	DT6ED	19	19

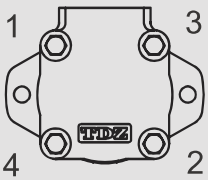
Rear flange mountings of the V\*\*T\* thru drive pumps.  
 Tighten torque for pump screws: 6,5 K.p.m.

Tighten the screws with a torque no bigger than 0,5 to 1 Kp.m before beggining the last or final tighten.  
 Follow the order shown in the picture.





## ASSEMBLY & DISASSEMBLY

TIGHTEN TORQUE FOR TRIPLE PUMP SCREWS				
TRIPLE PUMPS	Reference	Inlet body	Cover 1	Cover 2
	DT6DCC	19	19	7
	DT6EDC	30	19	6
<p>Tighten the screws with a torque no bigger than 0,5 to 1 Kp.m before beggining the last or final tighten. Follow the order shown in the picture.</p>				

## CHANGE OF CARTRIDGE ROTATION

The cartridges on this type of pump available worldwide can be unidirectional or bidirectional. Rotation on unidirectional cartridges cannot be modified, except where the cartridge pressure plates are replaced for others with an opposite turning direction or for bidirectional plates.

TDZ cartridges are bidirectional. This means that rotation can be modified by means of a simple operation using exactly the same cartridge components that are to be modified.

The steps to follow are as indicated:

1.- Remove the 2 set screws from the cartridge.

2.- Remove the cartridge suction cover. Of the two cartridge covers, the suction cover is the flattest and may be fitted with a bronze bearing, depending on the position of the cartridge on the pump (P1, P2 or P3). Next to the cover there are 1 or 2 position pin that should also be removed.

3.- Remove the cam ring or stator and turn 180° so that side "A" of the stator that was previously in contact with the surface of the suction cover is now touching the pressure cover and side "B" of the stator that was previously in contact with the pressure cover is now touching the suction cover.

Above mentioned instructions are valid for DT6 series only. V\* series change of rotation should follow the same procedure but cam ring, rotor and vanes should turn 180° As a complete package (V\* series rotor and vanes are not simetric)

4.- Change the positioning or (2 pins in V series) pin on the pressure cover from hole "A" to hole "B" and re-insert the stator so that the stator hole matches the new position of the pin.

Length and quantity of pins (1 or 2) depends of cartridge series (DT6, VS or VQ).

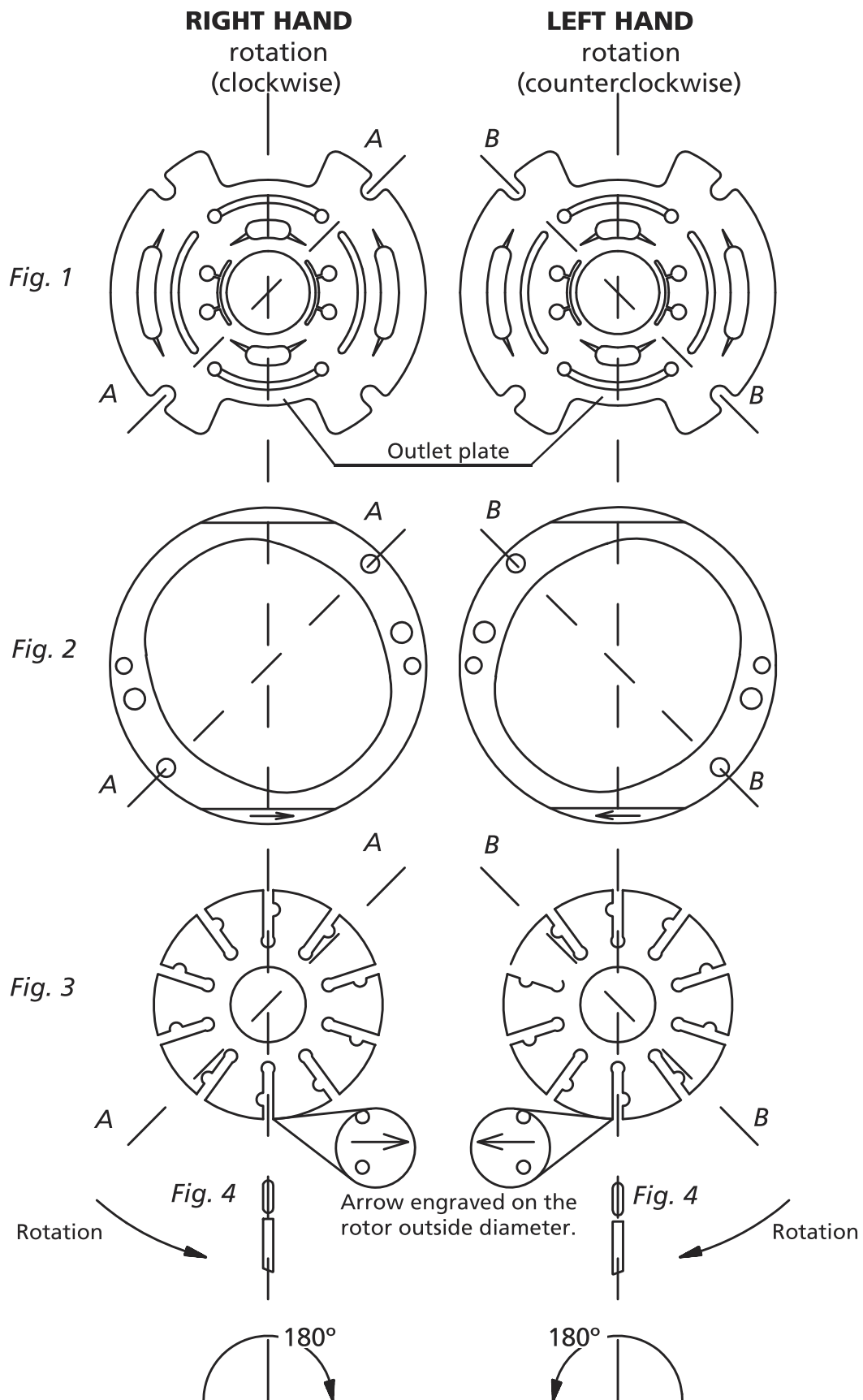
5.- Also change the position pin on the suction cover and readjust the cover using the two screws. Turn the rotor and the blades manually before tightening the screws.

Attentions: The screws are basically for alignment purposes. They must not be too tight. If the three parts of the cartridge (stator, suction cover and pressure cover) are not perfectly concentric, it will be impossible to insert the cartridge into the pump housing.

In this case, loosen the screws slightly and insert the entire cartridge into the body of the pump. When it is fully inserted is when the cartridge parts are fully aligned and the screws can be readjusted.



## CHANGE OF CARTRIDGE ROTATION (EXAMPLE VQ SERIES)



## RECOMMENDATIONS FOR PUMP AND CARTRIDGE MANIPULATIONS

Since this is a high precision kit (mechanized in tolerances within thousandth of millimeter), any abrasive impurity can damage it in a few minutes or damage it to shorten its performance, before disassembling it is necessary that working place, tools and worker hands are completely clean and neat.

Please avoid any blow, however insignificant, taking special care with all edge sides, ring seat points and inlet and outlet plates.

All these preventive measures taken, proceed as follows:

- 1°** Lean the cartridge, holding it tightly, at the work bench on the outlet plate. Loosen the 2 screws which fix the kit, take them out as well as the pins (if there are any).  
Take out inlet plate shifting it laterally, as due to the protective oil it may be gummed up. Place it at the bench on a clean paper, white preferably.
- 2°** Do the same with vanes, rotor and ring.  
Place the rotor, once disassembled, onto the outlet plate with arrow showing the required turning sense (see detail in the circle, fig. 3), afterwards, put inserts into vanes (fig. 4), and finally, introduce them in the slots, well at the bottom, with vane closing edge in forward rotation, as arrow shows in the corresponding picture. (V\* Series only)
- 3°** Be sure there is no small dirty particles on the leaning surface, put ring on to the outlet plate, placing it in the required turning sense. Make chamfer edge coincide, in which flow and arrow are engraved, with inlet or admission port.
- 4°** Set inlet plate, pins and the 2 screws as shown in the pictures, taking into account that the lattes must be in opposite position to the ones they had before disassembling. (To do so, just turn ring, rotor and vanes 180°). Fasten the screws moderately and dip the whole cartridge kit into clean hydraulic oil for a while. After these steps it is ready to be assembled.

Please pay good attention to the cartridge and pump rotation, as they do not always coincide. Be very careful to identify them properly. (See previous pages.)

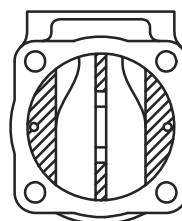


## RECOMMENDATIONS FOR PUMP AND CARTRIDGE REPAIRS

### CARTRIDGE REPLACEMENT

To successfully replace cartridge, be sure to follow these warnings:

1° - Check if due to use there is tread on the cartridge seat zone (dark area in the picture).  
If so, deepness must not be higher than 0,01 mm. (This could be observed even with a fingernail), being most convenient in such cases grinding or changing the pump body with this fault, as otherwise noise and performance values will not be the right ones. (In case you can not grind the seat, TDZ has -available for sale- a simple machine specially designed for this purpose).



2° - Look at the cartridge to be replaced, if wear is normal just change oil in tank circuit and change or clean filters.

3° - Should the used cartridge shows seizure in rotor, outlet & inlet plates, disassemble the pump completely. Check that the key is in good condition (it could be cut out). Then, put the shaft between points to make sure it is not twisted or crooked. Change it in case of any fault. Take all the oil out of the circuit and other parts. Clean the tank carefully. If there is available any used cartridge mount it and start the machine for at least 15 minutes, driving all controls. To do so, spend the least possible amount of oil, since it will have to be replaced after this operation, although it could be reused again, after being filtrated in a filter no bigger than 5 microns, as it still keeps additives).  
Replace or clean all filters, mount the new cartridge and fill the tank to the level with new oil. Follow all start-up indications in this manual.

## RECOMMENDATIONS FOR PUMP AND CARTRIDGE REPAIRS

CARTRIDGE REPAIRS MINIMAL CLEARANCE BETWEEN CAM RING AND ROTOR		
MODEL	Inches	Millimetres
20VE	0.0007	0,018
20VA	0.0007	0,018
25V	0.0012	0,030
30V	0.0014	0,035
35V	0.0015	0,038
45V	0.0016	0,040
BHP1	0.0001	0,004
BHP2	0.0001	0,004
BHP3E	0.0005	0,015
BHP3A	0.0007	0,018
BHP4	0.0012	0,030
BHP6	0.0015	0,038
BHP7	0.0016	0,040
DT6C	0.0011	0,030
DT6D	0.0014	0,038
DT6E	0.0017	0,044
*Vane length must be from 0,005 to 0,010mm. (0,0002 to 0,0004 inches) less than rotor thickness.		
To rebuild cartridges it is necessary to use grinding & lapping machines, as well as measurement tools able to work in microns.		

