

Hydraulic Pumps - Overall Instructions T7 / T67 / T6 Carcass Assemblies Single, Double and Triple Units

Denison Vane Technology, fixed displacement

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



ENGINEERING YOUR SUCCESS.

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CARCASS PROGRAM

The assembler of pumps using components from carcass and cartridge program is solely responsible for making the selection and assembling of original components.

Assembler must ensure having the appropriate skills and tooling, and is processing activities under its sole responsibility in respect of applicable regulations.

Components are defined for specific combinations, appropriate to use in the limits of performances and conditions as specified in documentation. Conformity of components is guaranteed by Parker, final testing of complete product remains under sole responsibility of assembler.



WARNING - USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

Offer of Sale

Please contact your Parker representation for a detailed "Offer of Sale".

1.1. GENERAL :

All Parker vane pumps are individually tested to provide the best quality & reliability. Modifications, conversions & repairs can only be done by authorized dealers or OEM to avoid invalidation of the guarantee.

The pumps are to be used within the design limits indicated in all the sales bulletins. Please contact Parker when trespassing the catalogue limits.

Do not modify or work on the pump under pressure or when the electric motor (or any drive) is on.

Qualified personnel is required to assemble and set-up hydraulic devices.

Always conform yourself to the valid regulations (safety, electrical, environment...).

The following instructions are important to obtain a good service life time from the unit.

ROTATION & PORTS INDICATION

The rotation and ports orientation are viewed from the shaft end.

R = CW stands for clockwise = right-hand rotation.

L = CCW stands for counter-clockwise = left-hand rotation.

START-UP & CHECK-UP

Check that the assembly of the power unit is correct :

The distance between the suction pipe & the return lines in the tank should be at its maximum.

A bevel on both suction & return lines is recommended to increase the surface and so lower the velocity. We suggest a 45° minimum angle.

Velocities : inlet $0,5 < x < 1,9$ m/s (1,64 < x < 6,23 ft per sec.)
 : return $x < 6$ m/s (x < 19,7 ft per sec.)
 : Always insure that all return and suction lines are under the oil level to avoid forming aeration or vortex effect. This should be done under the most critical situation (all cylinders extended for example). Straight and short pipes are the best.

$$V = \frac{Q \text{ (Lpm)}}{6 \times \pi \times r^2 \text{ (cm)}} = \text{m/s} \quad V = \frac{Q \text{ (GPM)}}{3.12 \times \pi \times r^2 \text{ (in)}} = \text{ft/s}$$

The size of the air filter should be 3 times greater than the max. instant return flow (all cylinders in movement for example).

If the pump is in the tank, please choose the NOP option (no paint) and use a short inlet pipe.

Parker does not recommend inlet strainers. If needed, a 100 mesh (149 microns) is the finest mesh recommended.

A coaxial drive is recommended. For any other type of drives, please contact Parker.

Make sure that all protective plugs & covers have been removed.

Check the pump rotation versus the E-motor or engine rotation.

Start-up : The tank has been filled up with a clean fluid in proper conditions.

We recommend to flush the system with an external pump prior to the start-up.

It is important to bleed the air off the circuit and the pump itself.



The first valve on the circuit should be open to tank.

We recommend the use of air bleed off valves.

It is possible to bleed off the air by creating a leak in the P port of the pump. **Warning : this has to be done in a low pressure mode as it could create a dangerous fluid leak. Make sure that the pressure cannot rise (open center valve to tank, pressure relief valve unloaded ...).**

When oil free of air appears, tighten the connectors to the correct torque.

The pump should prime within a few seconds. If not, please consult our troubleshooting guide (page 33).

If the pump is noisy, please troubleshoot the system.

Never operate the pump at top speed and pressure without checking the completion of pump priming.

1.2. SHAFT & COUPLING DATA : COUPLINGS AND FEMALE SPLINES

- The mating female spline should be free to float and find its own center. If both members are rigidly supported, they must be aligned within 0,15 TIR (0.006" TIR) or less to reduce fretting. The angular alignment of two splines axes must be less than $\pm 0,05$ per 25,4 radius (± 0.002 " per 1" radius).
- The coupling spline must be lubricated with a lithium molydisulfide grease, disulfide of molybdenum or a similar lubricant.
- The coupling must be hardened to a hardness between 29 and 45 HRC.
- The female spline must be made to conform to the Class 1 fit as described in SAE-J498b (1971). This is described as a Flat Root Side Fit.

KEYED SHAFTS

Parker supplies the T7 series keyed shaft pumps with high strength heat-treated keys. Therefore, when installing or replacing these pumps, the heat-treated keys must be used in order to ensure maximum life in the application. If the key is replaced, it must be a heat-treated key between 27 and 34 R.C. hardness. The corners of the keys must be chamfered by 0,76 mm to 1,02 mm (0.03 to 0.04) at 45° to clear the radii in the key way.

The alignment of keyed shafts must be within tolerances given for splined shafts here above.

SHAFT LOADS

These products are primarily designed for coaxial drives which do not impose axial or side loading on the shaft. Contact Parker for specific applications.

1.3. SPECIFIC POINTS : MINIMUM INLET PRESSURE

Please read the charts in the sales leaflets as the minimum requested inlet pressure varies versus the displacement and the speed. Never go under 0,8 bar Absolute (-0,2 bar relative)
11.6 PSI Absolute (-2.9 PSI G).

MAXIMUM INLET PRESSURE

It is recommended to always have at least 1,5 bar (22 PSI) differential between inlet and outlet. Standard shaft seals are limited to 0,7 bar (10 PSI G) but some allow 7 bar (100 PSI G). Please contact Parker for more information.

MINIMUM OUTLET PRESSURE

It is recommended to always have at least 1,5 bar (22 PSI) differential between inlet and outlet.

VERTICAL MOUNT

When assembled vertically, always be careful to prevent any air from being trapped in the pump (behind the shaft seal for example).

Start-up instructions & recommendations

1.4. FLUIDS :

DENISON CLASSIFICATION

Type of fluids : For each type of fluids, Parker vane pumps will products have different pressures, speeds & temperature limits. Please refer to the sales leaflets.

- HF-0 = Anti-wear petroleum base.
- HF-1 = Non anti-wear petroleum base.
- HF-2 = Anti-wear petroleum base.
- HF-3 = Water-in-oil invert emulsions.
- HF-4 = Water glycol solutions.
- HF-5 = Synthetic fluids.

FILTRATION RECOMMENDATIONS

NAS 1638 class 8 or better.
 ISO 19/17/14 or better.

Inlet strainers : Parker does not recommend inlet strainers.

If requested, a 100 mesh (149 microns) is the finest mesh recommended.

RECOMMENDED FLUIDS

Petroleum based antiwear R & O fluids.

These fluids are the recommended fluids for pumps & motors. Maximum catalogue ratings and performance datas are based on operation with these fluids. These fluids are covered by Parker Denison HF-0 and HF-2 specifications.

ACCEPTABLE ALTERNATE FLUIDS

The use of fluids other than petroleum based antiwear R & O fluids requires that the maximum ratings of the pumps will be reduced. In some cases the minimum replenishment pressures must be increased. Consult specific sections for more details (page 4).

VISCOSITY

	Mobile	Industrial
Max. (cold start, low speed & pressure)	2000 cSt - 9400 SUS	860 cSt - 3900 SUS
Max. (full speed & pressure)	108 cSt - 500 SUS	108 cSt - 500 SUS
Optimum (max. life)	30 cSt - 140 SUS	30 cSt - 140 SUS
Min. (full speed & pressure for HF-1, HF-3, HF-4 & HF-5 fluids)	18 cSt - 90 SUS	18 cSt - 90 SUS
Min. (full speed & pressure for HF-0 & HF-2 fluids)	10 cSt - 60 SUS	10 cSt - 60 SUS

VISCOSITY INDEX

90 min. Higher values extend the range of operating temperatures.

TEMPERATURE

The usual limiting factor of temperature (low or high) comes from the obtained viscosity. The seals are sometimes the limit : standard seals range from -30° C to 90° C (-9.4° F to 194° F).

Maximum fluid temperature (θ)	° C	° F
HF-0, HF-1, HF-2	+ 100	+ 212
HF-3, HF-4	+ 50	+ 122
HF-5	+ 70	+ 158
Biodegradable fluids (esters & rapeseed base)	+ 65	+ 149
Minimum fluid temperature (θ) (also depend on max. viscosity)	° C	° F
HF-0, HF-1, HF-2, HF-5	- 18	- 0.4
HF-3, HF-4	+ 10	+ 50
Biodegradable fluids (esters & rapeseed base)	- 18	- 0.4

Over or under these values, please contact Parker.

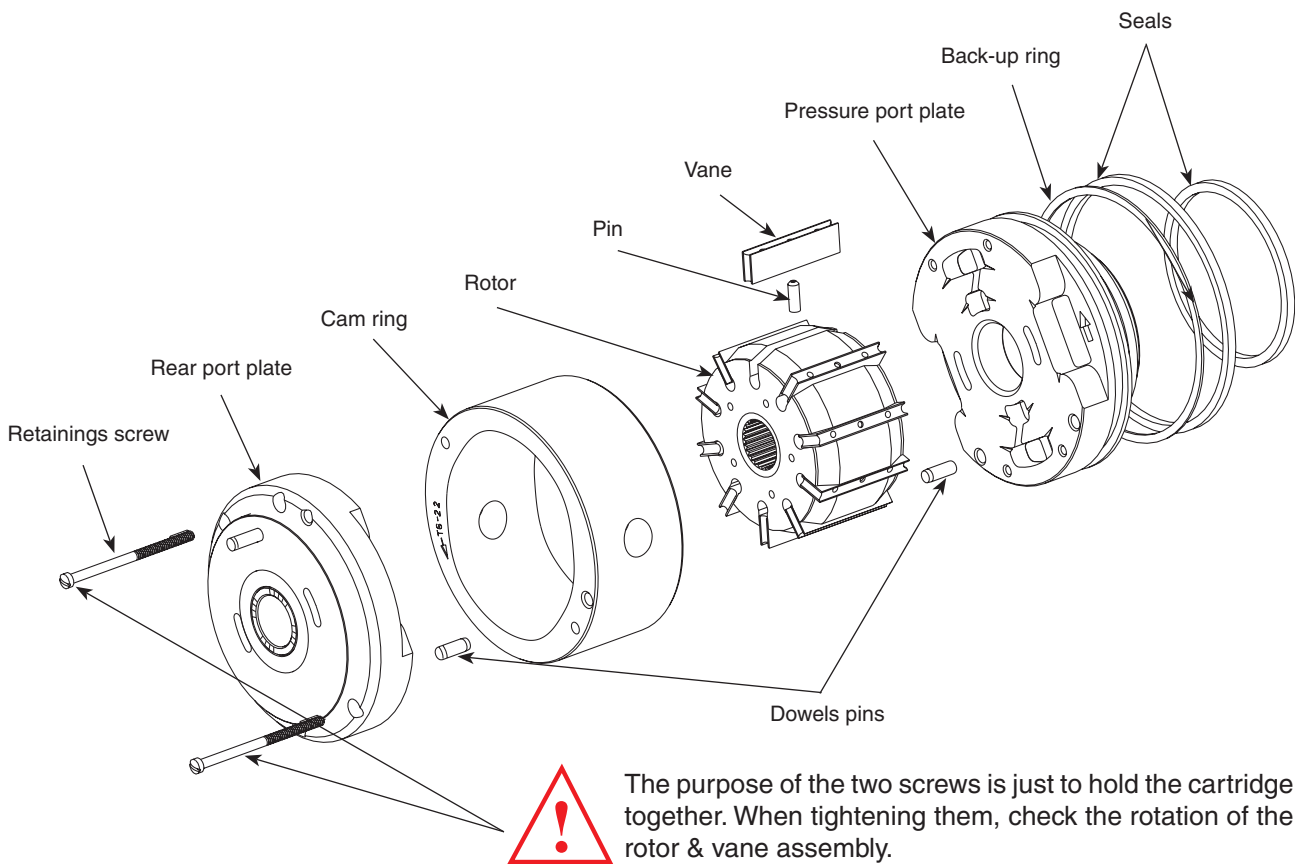
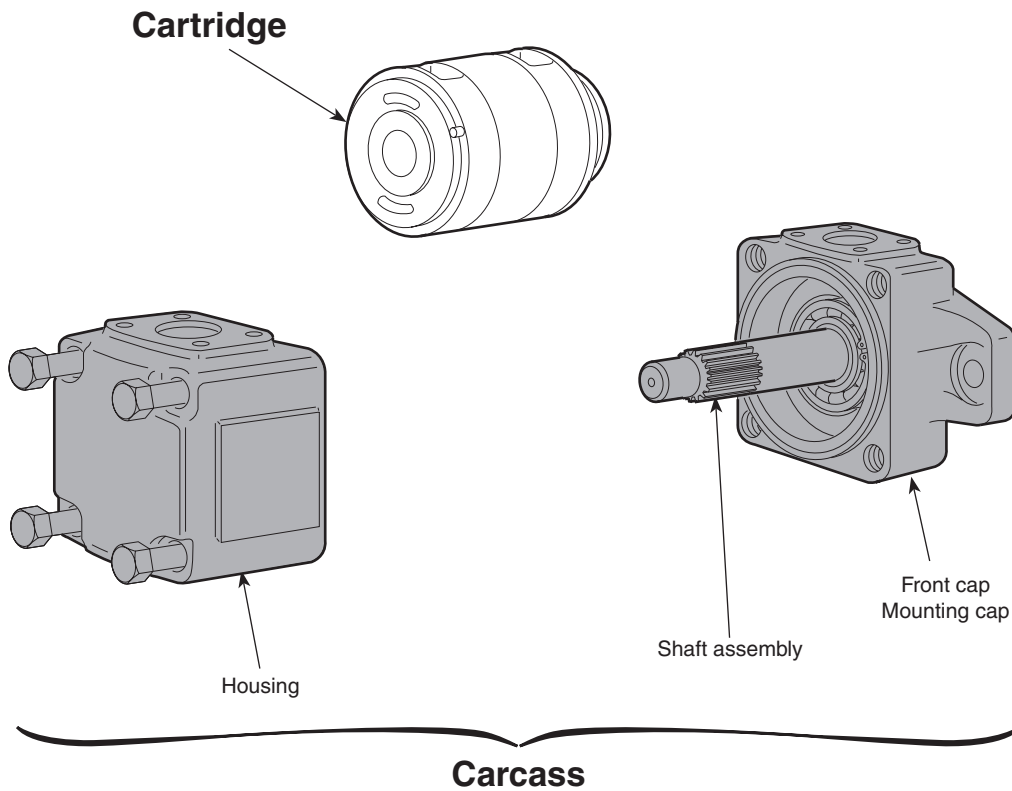
WATER CONTAMINATION IN THE FLUID

Maximum acceptable content of water :

- 0,10 % for mineral base fluids.
 - 0,05 % for synthetic fluids, crankcase oils, biodegradable fluids.
- If the amount of water is higher, then it must be drained off the circuit.



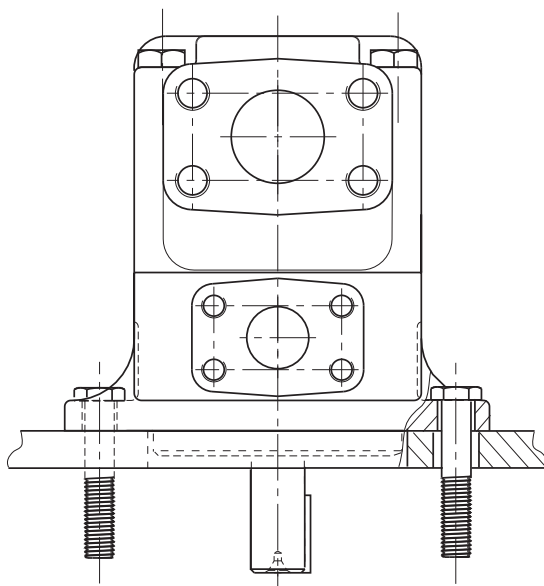
SINGLE PUMP



The purpose of the two screws is just to hold the cartridge together. When tightening them, check the rotation of the rotor & vane assembly.

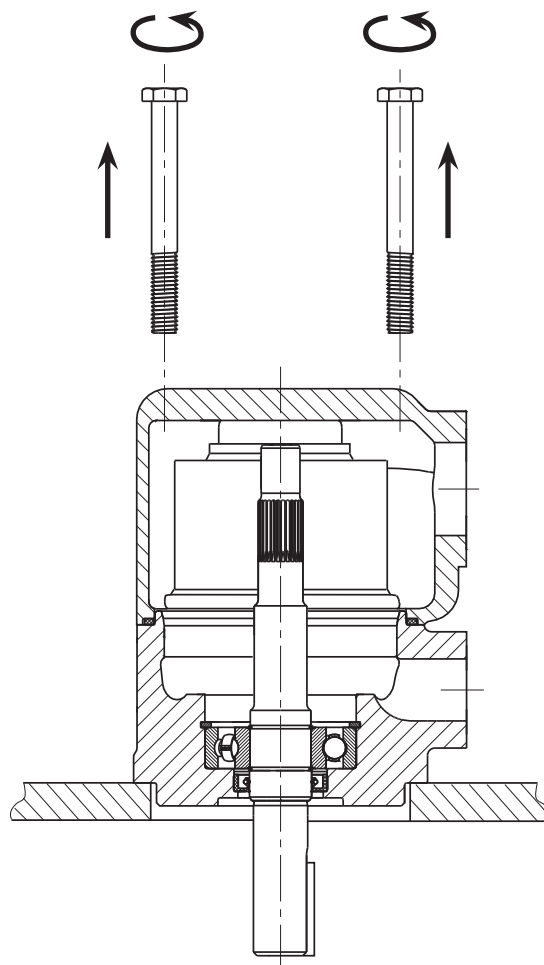
3 . 1 . COMPLETE DISASSEMBLY OF THE SINGLE PUMP CARCASS :

1 . Install the carcass on the table.



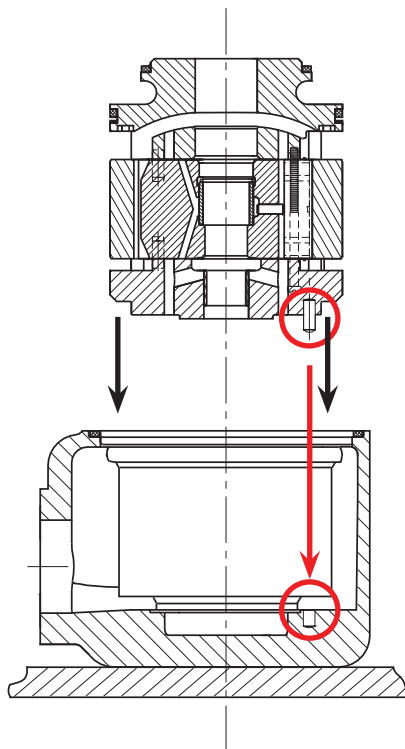
Two bolts will help to unscrew the 4 pumps bolts.

2 . Unbolt the 4 screws.

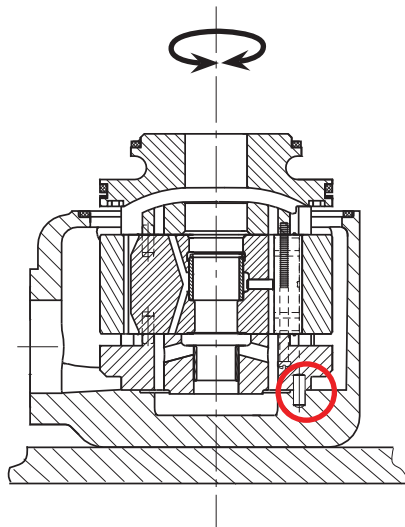


3.2 . COMPLETE REASSEMBLY OF THE SINGLE PUMP :

1 . Fit the cartridge into the housing.



2 . Check if the dowel pin is in its position in the housing by trying to rotate the cartridge.



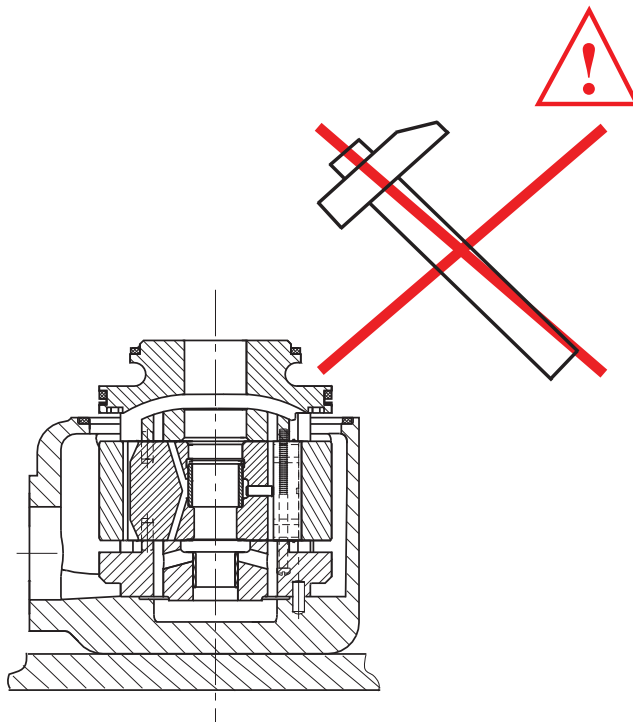
Put some grease on the seals to prevent them from moving.

If the cartridge does rotate, the dowel pin is not in the hole. Take the cartridge out and try again.

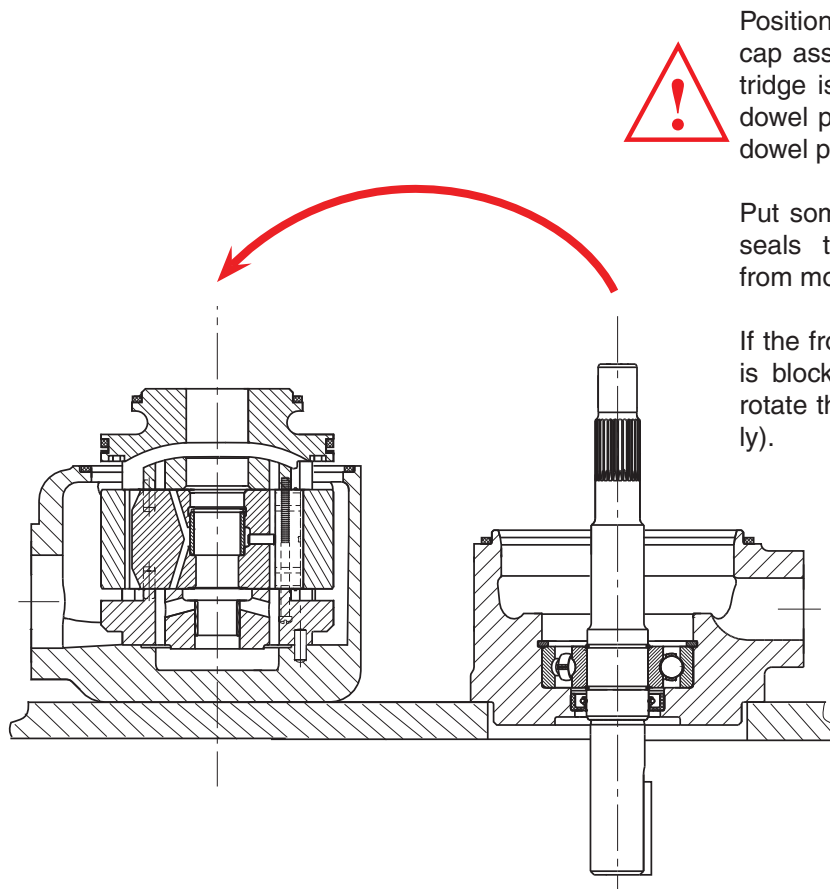
3.2. COMPLETE REASSEMBLY OF THE SINGLE PUMP :

If the cartridge does not fit in the housing correctly, check the concentricity of the three elements = port plates (rear & pressure) & cam ring (see page 31).

3. Assemble the front cap assy on the housing & cartridge assy.



Never use a hammer. The cartridge is to fit into the housing without any tools.



Position the shaft / front cap assy only if the cartridge is well positioned, dowel pin in the housing dowel pin hole.

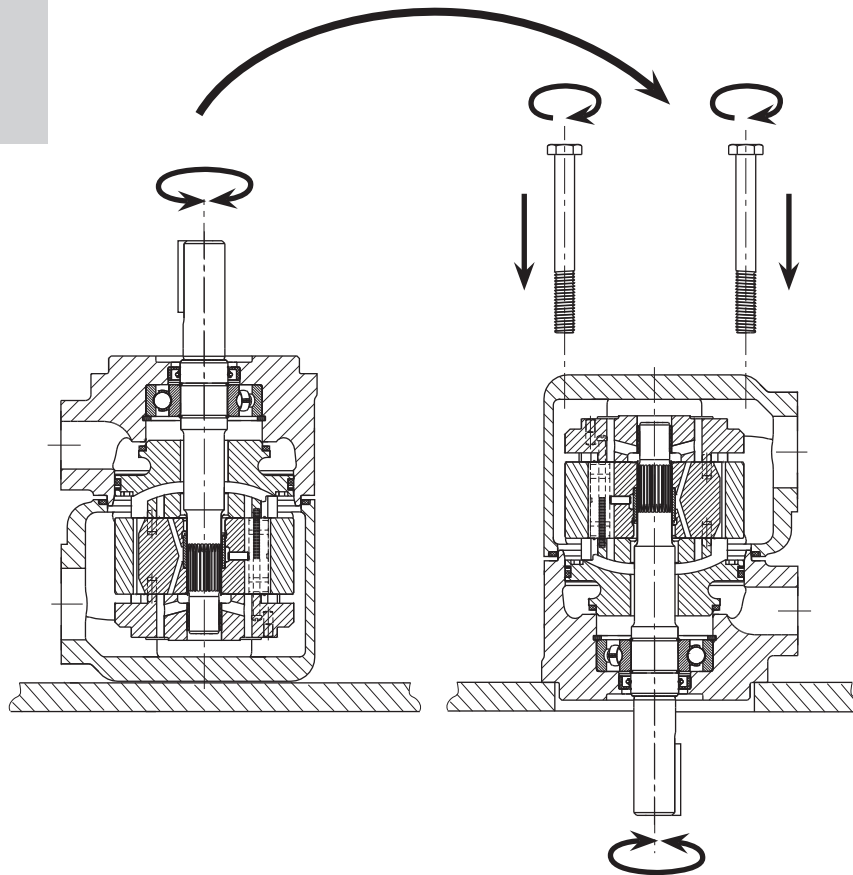
Put some grease on the seals to prevent them from moving.

If the front cap and shaft is blocked at "half way" rotate the shaft (manually).

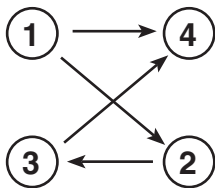
Assembly

3.2 . COMPLETE REASSEMBLY OF THE SINGLE PUMP :

4 . Final assy.



- a) Always check if the shaft rotates. (a slight torque due to the spring loaded resistance force). Otherwise, please go back to the previous step.
- b) Flip / rotate the pump to fit the 4 screws.
- c) Fix the pump to the table (as page 7) before tightening the pump's bolts.
- d) Check the porting configuration (see table page 33).
- e) Tighten the 4 screws step by step to avoid damaging the seals.

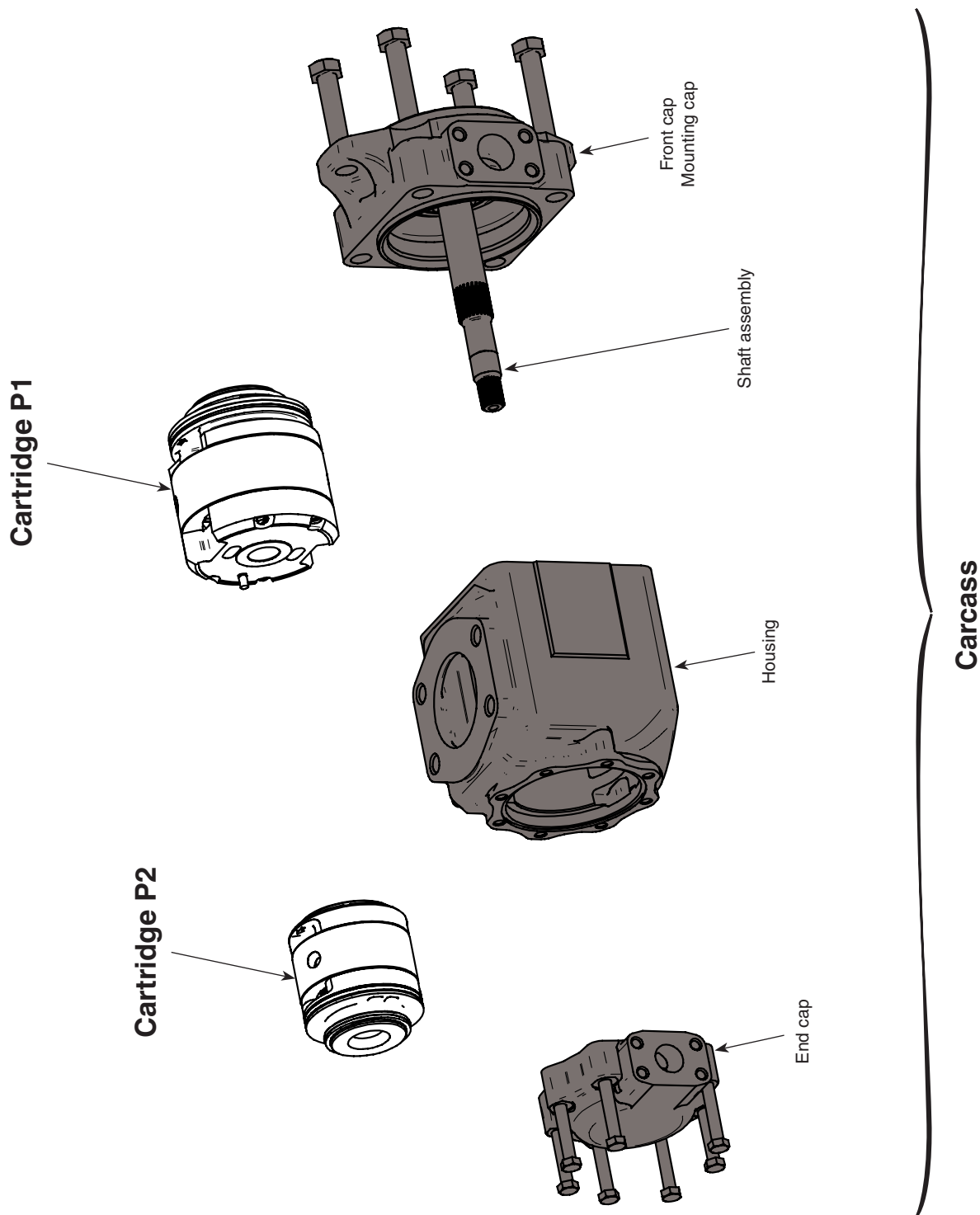


TORQUE REQUIREMENTS :

Pump	Nm	ft.lbs
T6C - T6CM - T6CP	159	117
T6D - T7D	187	138
T6E - T7E	187	138
T7B - T7BS	187	138

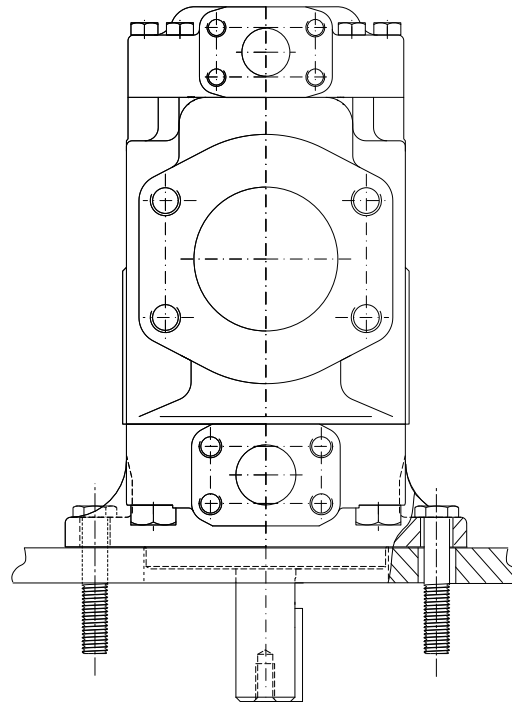
- f) Always check if the shaft rotates. If not, disassemble and go back to the previous step.

DOUBLE PUMP



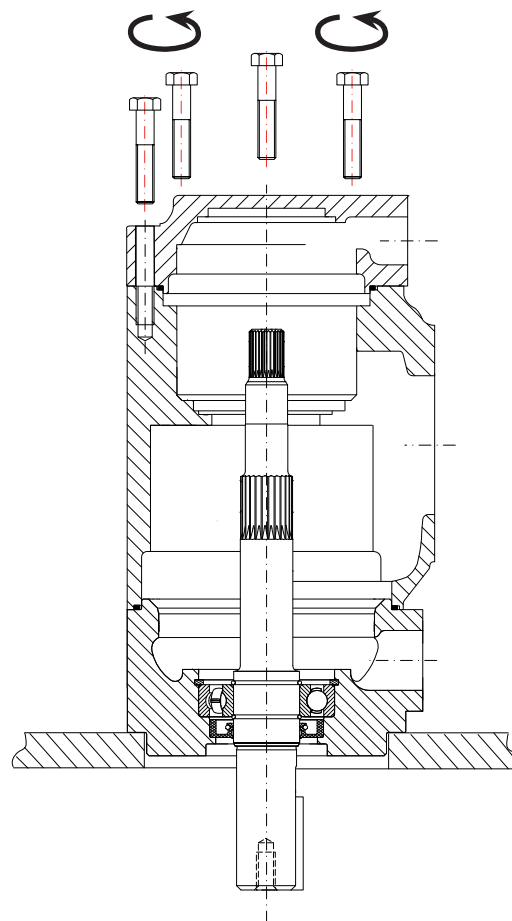
3.3 . COMPLETE DISASSEMBLY OF THE DOUBLE PUMP CARCASS :

1 . Install the carcass on the table.



Two bolts will help to unscrew the 4 pumps bolts.

2 . Unbolt the screws.

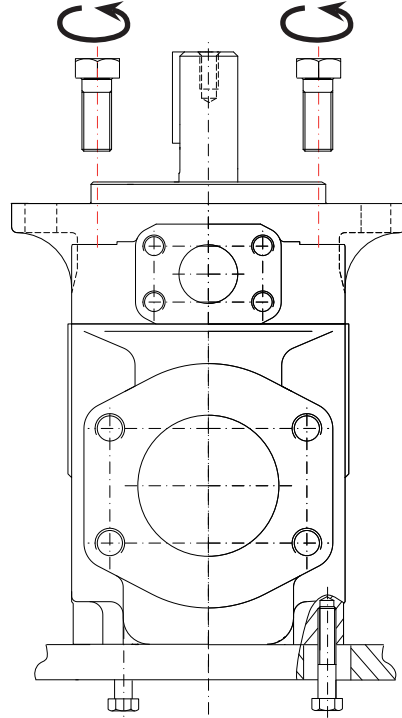


3.3. COMPLETE DISASSEMBLY OF THE DOUBLE PUMP CARCASS :

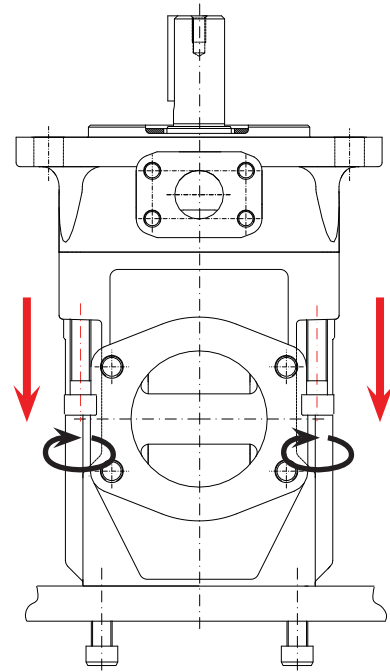
3 . Remove the screws.



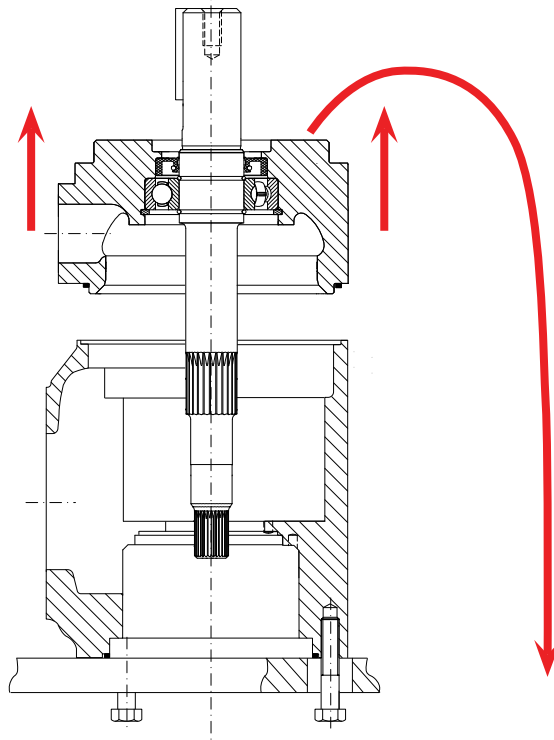
For all pumps except :
T6EES / T7EES
T6DDS / T7DDS



For pumps :
T6EES / T7EES
T6DDS / T7DDS

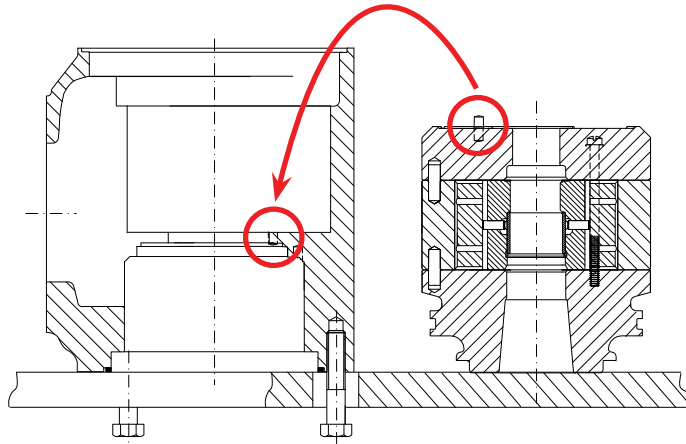


4 . Remove the front cap.

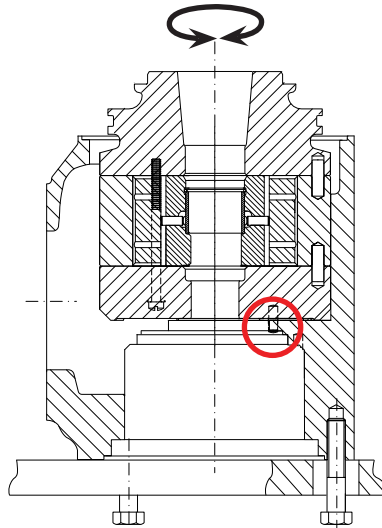


3.4 . COMPLETE REASSEMBLY OF THE DOUBLE PUMP :

1 . Fit the cartridge **P1** into the housing.

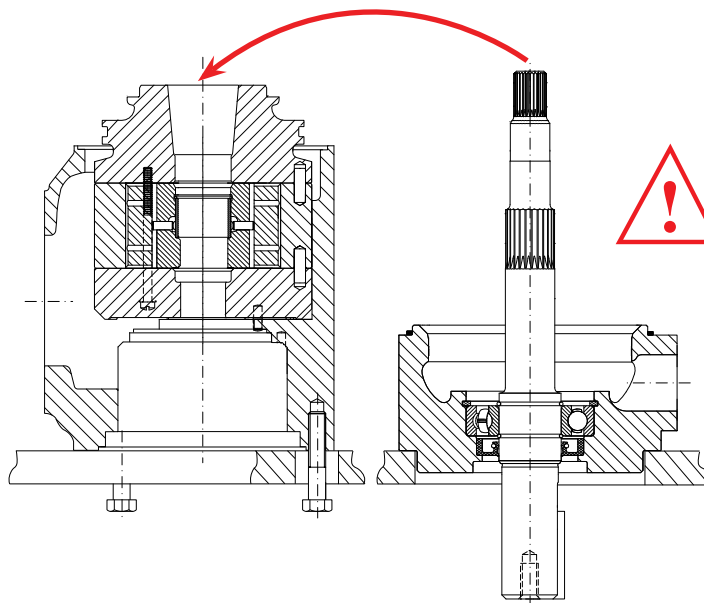


2 . Check if the dowel pin is in its position in the housing by trying to rotate the cartridge.



If the cartridge does rotate, the dowel pin is not in the hole. Take the cartridge out and try again.

3 . Assemble the front cap assy on the housing & cartridge assy.

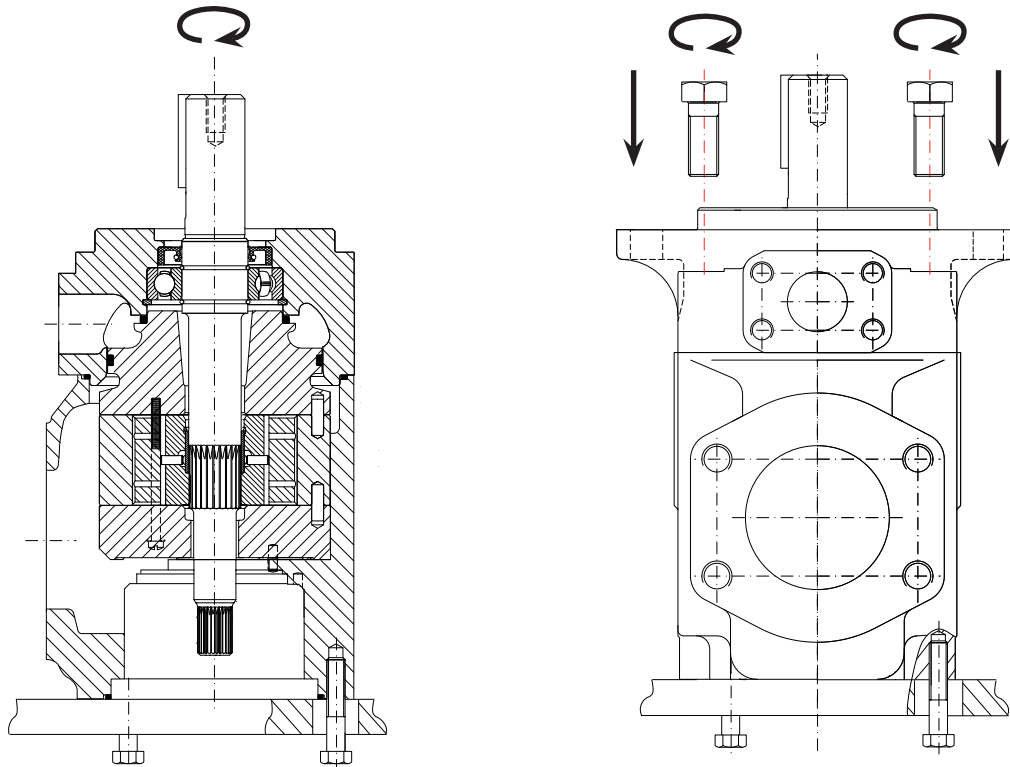


Position the shaft / front cap assy only if the cartridge is well positioned, dowel pin in the housing dowel pin hole.

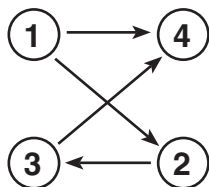
Put some grease on the seals to prevent them from moving.

If the front cap and shaft is blocked at "half way" rotate the shaft (manually).

3.4. COMPLETE REASSEMBLY OF THE DOUBLE PUMP :



- a) Always check if the shaft rotates. (a slight torque due to the spring loaded resistance force). Otherwise, please go back to the previous step.
- b) Check the porting configuration (see table page 33).
- c) Tighten the 4 screws step by step to avoid damaging the seals.



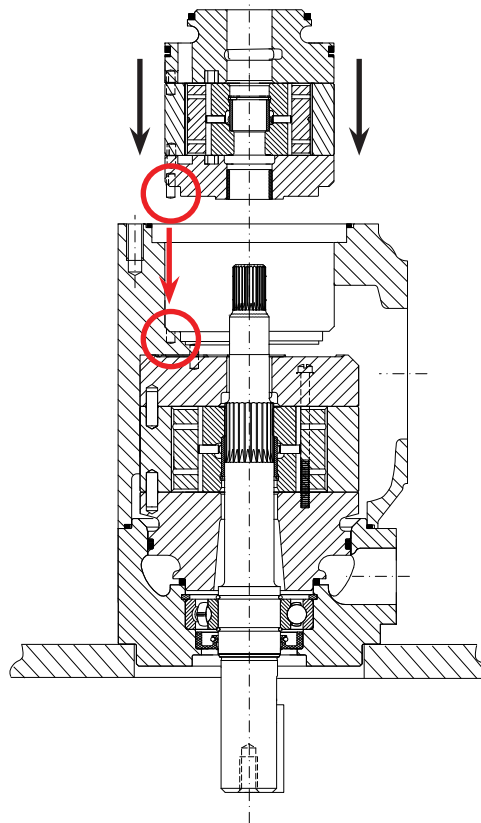
TORQUE REQUIREMENTS :

Pump		Nm	ft.lbs
T7BB/S	Housing	187	138
	End cap	61	45
T6CC/M/P - T67CB	Mounting cap	159	117
	End cap	61	45
T7DB/S - T6DC/M/P T67DC - T7EB/S T6EC/M/P - T67EC/M/P	Mounting cap	187	138
	End cap	68	50
T6DD/S - T7DD/S	Housing & End cap	190	140
T6ED/M/P - T7ED/S	Mounting cap & End cap	187	138
T6EE/S - T7EE/S	Cover	88	65
	End cap & Housing	300	221

- d) Always check if the shaft rotates.
 If not, disassemble and go back to the previous step.

3.4. COMPLETE REASSEMBLY OF THE DOUBLE PUMP :

4 . Fit the cartridge **P2** into the housing.

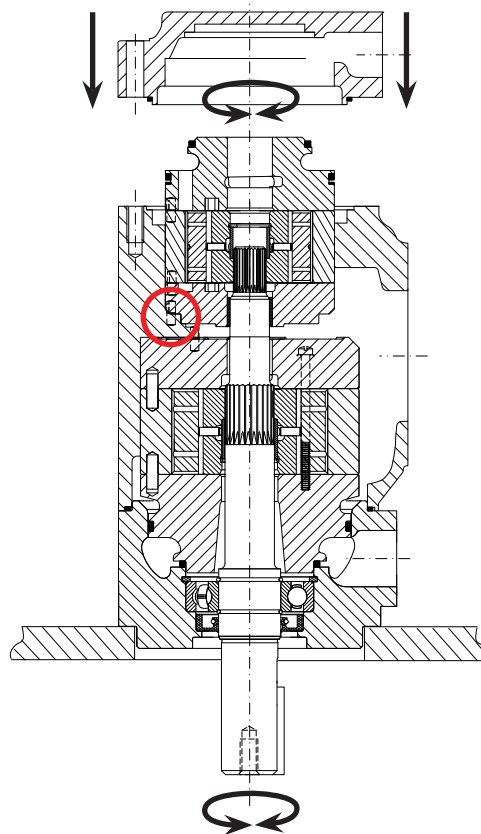


5 . Check if the dowel pin is in its position in the housing by trying to rotate the cartridge.



If the cartridge does rotate, the dowel pin is not in the hole. Take the cartridge out and try again.

6 . Assemble the end cap on the housing assy.



Position the shaft / front cap assy only if the cartridge is well positioned, dowel pin in the housing dowel pin hole.



Put some grease on the seals to prevent them from moving.

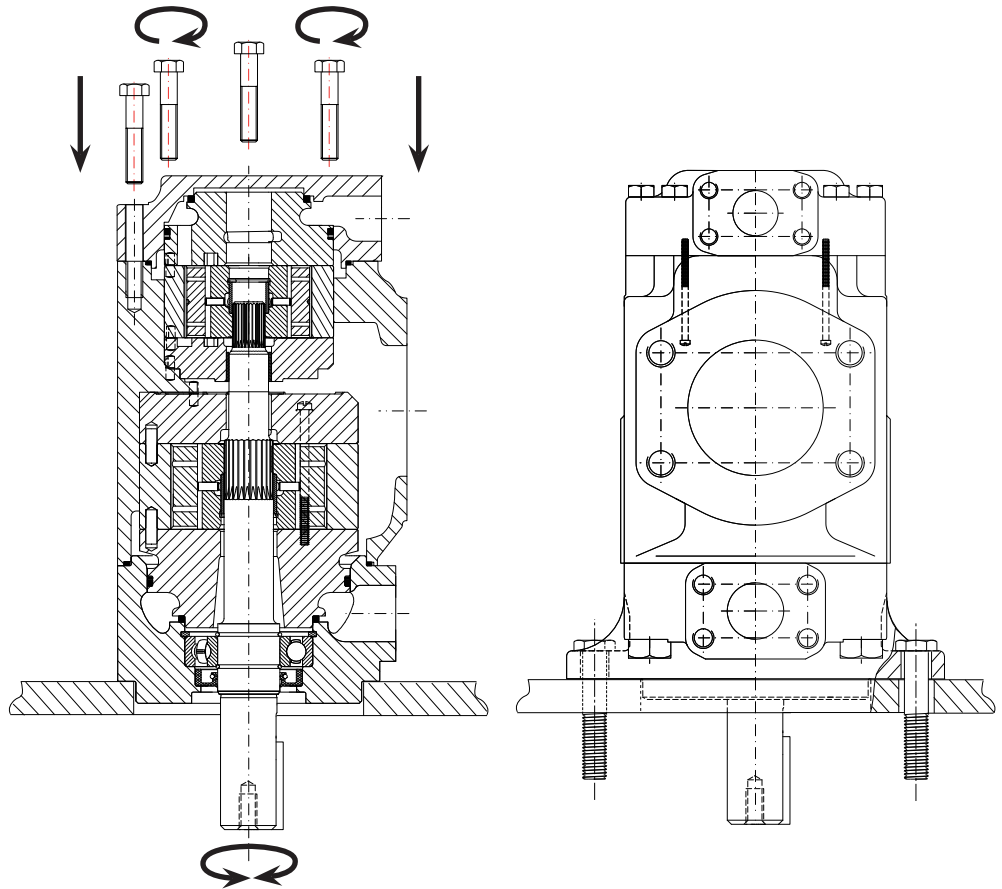
If the cartridge is blocked at "half way", rotate the shaft.



Always check if the shaft rotates freely. If not, disassemble and go back to the previous step.

3.4. COMPLETE REASSEMBLY OF THE DOUBLE PUMP :

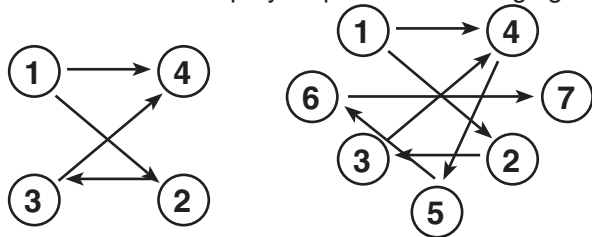
7. Final assy.



a) Always check if the shaft rotates. (a slight torque due to the spring loaded resistance force). Otherwise, please go back to the previous step.

b) Check the porting configuration (see table pages 33).

c) Tighten the 4 or 7 screws step by step to avoid damaging the seals.

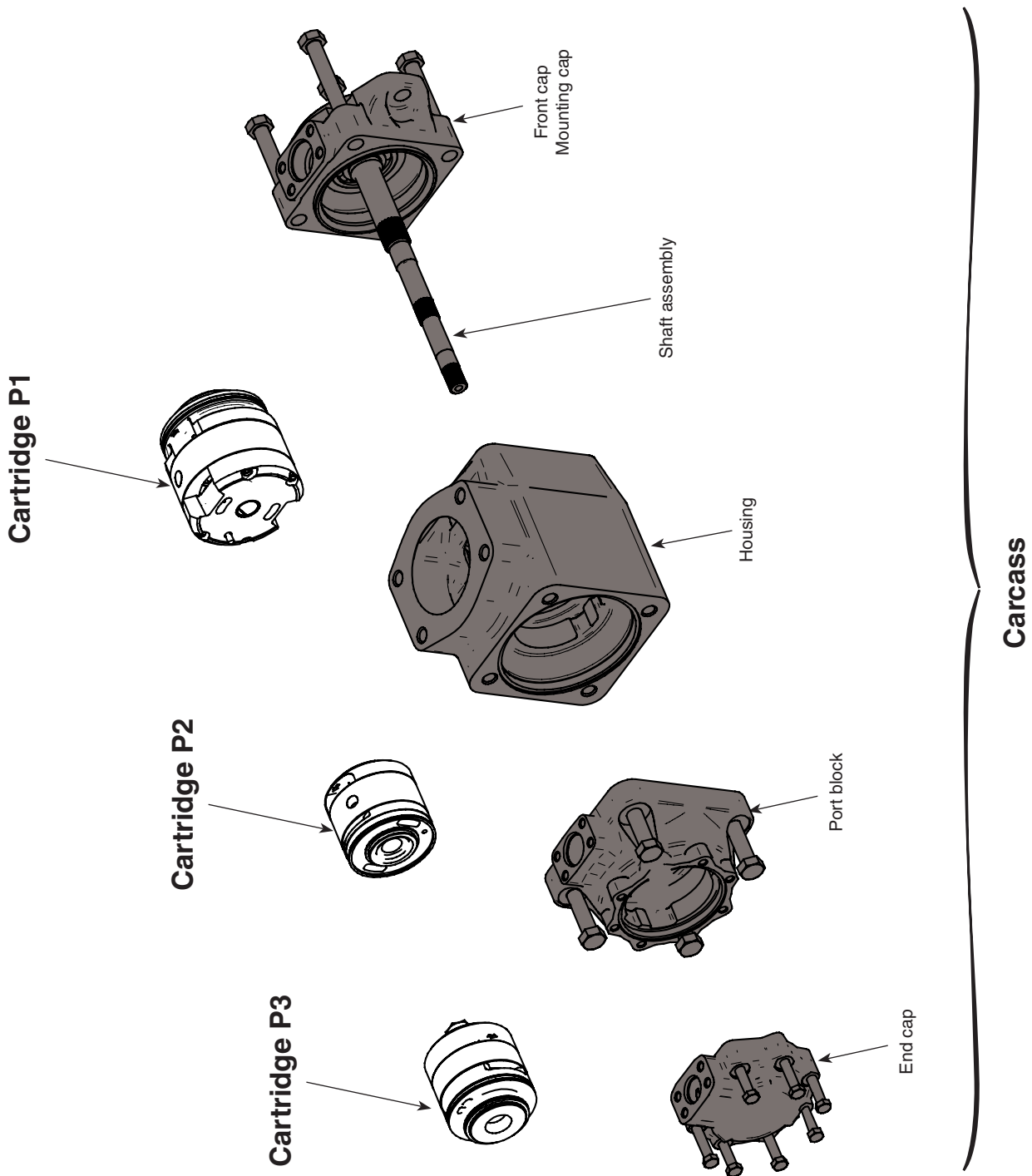


d) Always check if the shaft rotates. If not, disassemble and go back to the previous step.

TORQUE REQUIREMENTS :

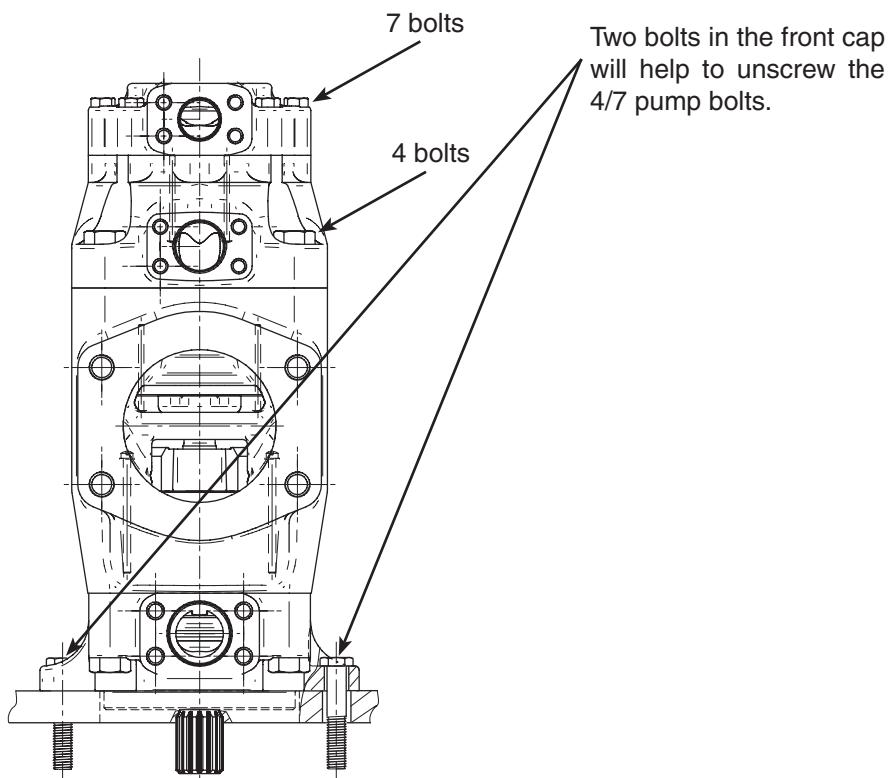
Pump		Nm	ft.lbs
T7BB/S	Housing	187	138
	End cap	61	45
T6CC/M/P - T67CB	Mounting cap	159	117
	End cap	61	45
T7DB/S - T6DC/M/P T67DC - T7EB/S T6EC/M/P - T67EC/M/P	Mounting cap	187	138
	End cap	68	50
T6DD/S - T7DD/S	Housing & End cap	190	140
T6ED/M/P - T7ED/S	Mounting cap & End cap	187	138
T6EE/S - T7EE/S	Cover	88	65
	End cap & Housing	300	221

TRIPLE PUMP

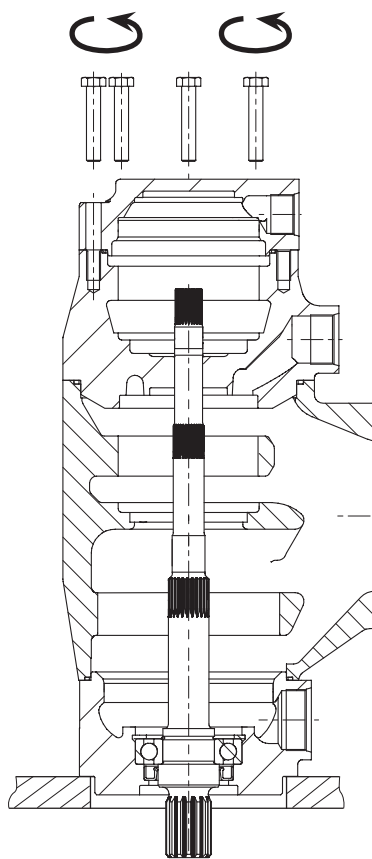


3.5. COMPLETE DISASSEMBLY OF THE TRIPLE PUMP CARCASS :

1 . Install the carcass on the table.

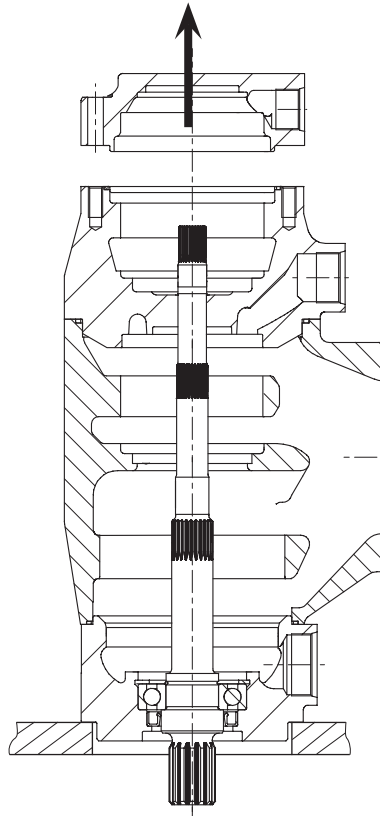


2 . Unbolt the 7 screws.

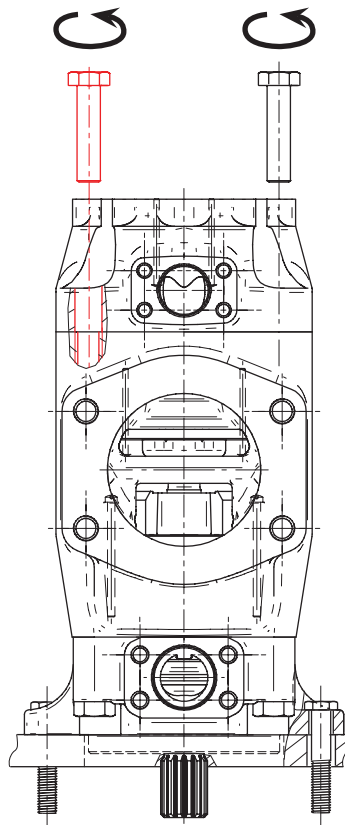


3.5 . COMPLETE DISASSEMBLY OF THE TRIPLE PUMP CARCASS :

3 . Remove the end cap.

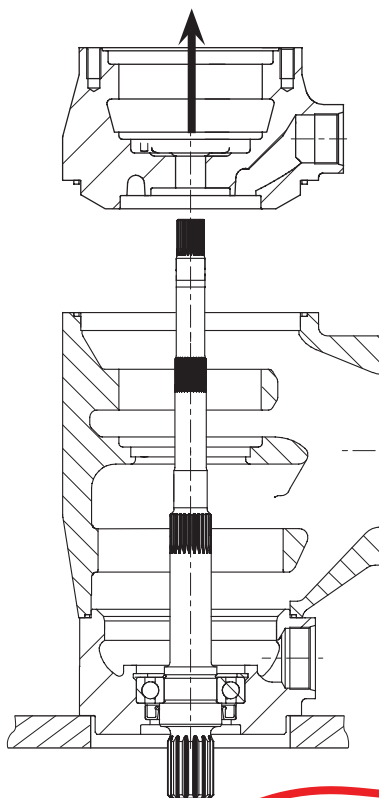


4 . Unbolt the 4 screws.



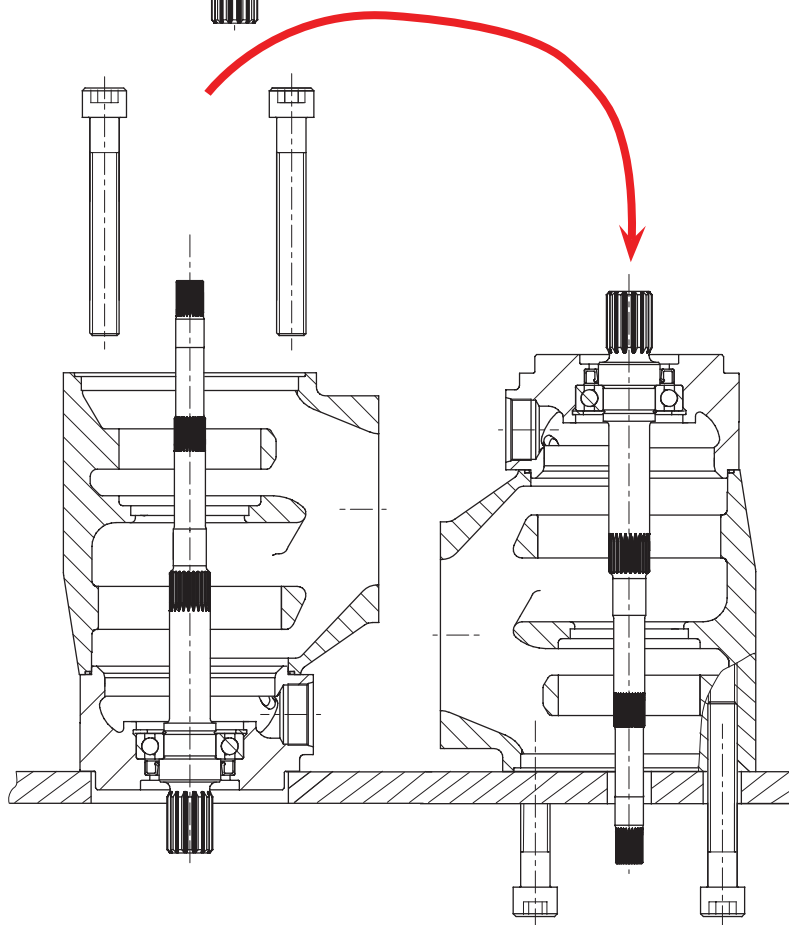
3 . 5 . COMPLETE DISASSEMBLY OF THE TRIPLE PUMP CARCASS :

5 . Remove the port block.



6 . Flip the pump and put two screws in the housing.

For all pumps except :
T7DDB/S - T67DDCS
T7EDB/S - T67EDC/S
T7EEC/S



Assembly

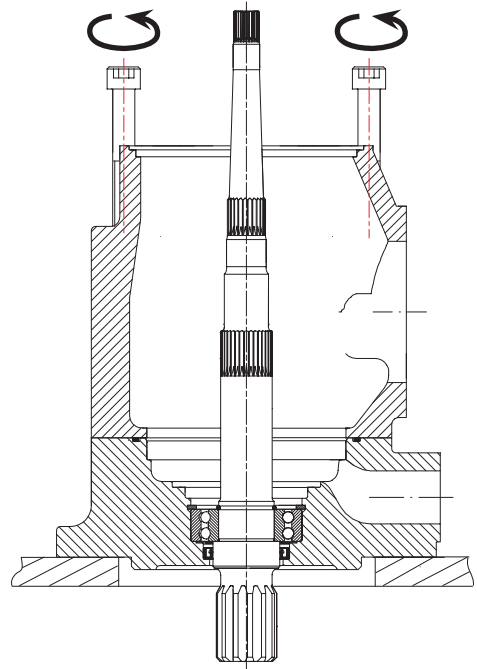
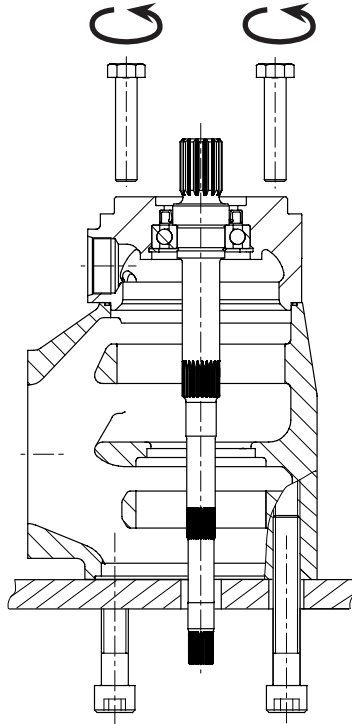
3.5. COMPLETE DISASSEMBLY OF THE TRIPLE PUMP CARCASS :

7 . Remove the 4 front bolts.

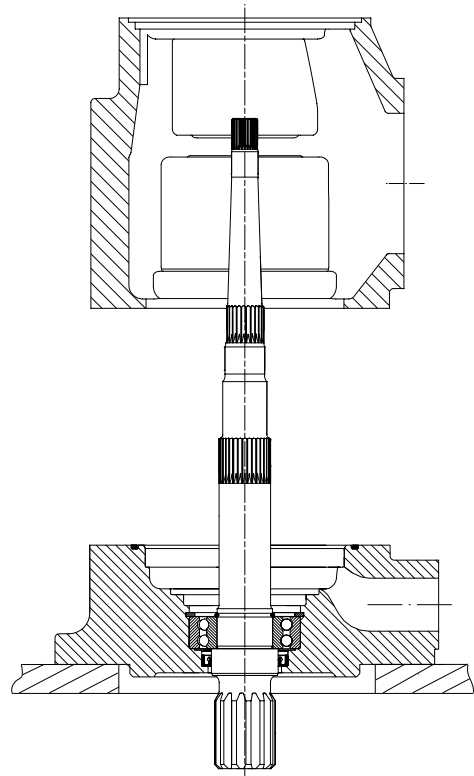
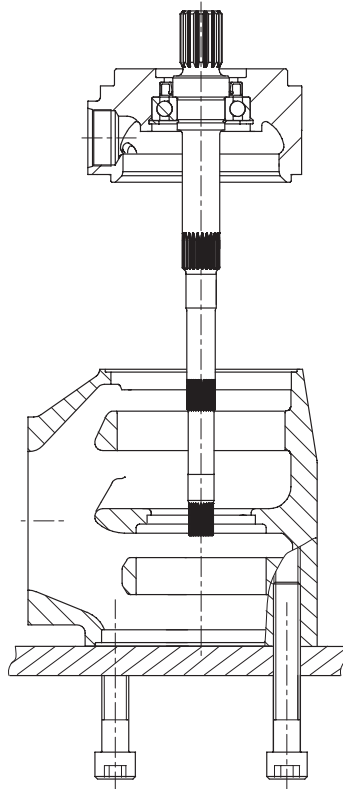


For all pumps except :
 T7DDB/S - T67DDCS
 T7EDB/S - T67EDC/S
 T7EEC/S

For pumps :
 T7DDB/S - T67DDCS
 T7EDB/S - T67EDC/S
 T7EEC/S

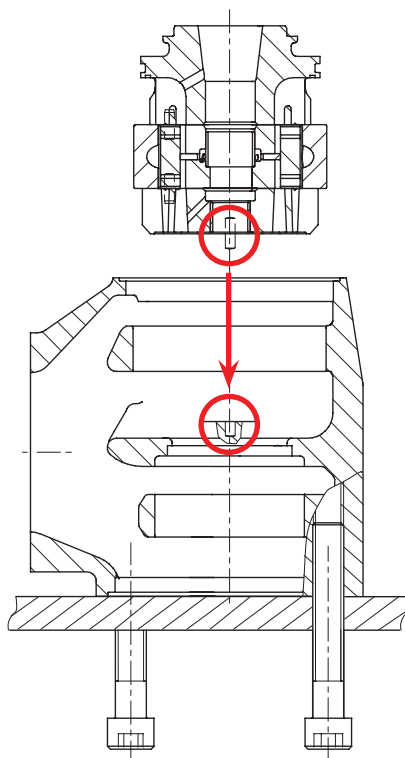


8 . Remove the front cap.



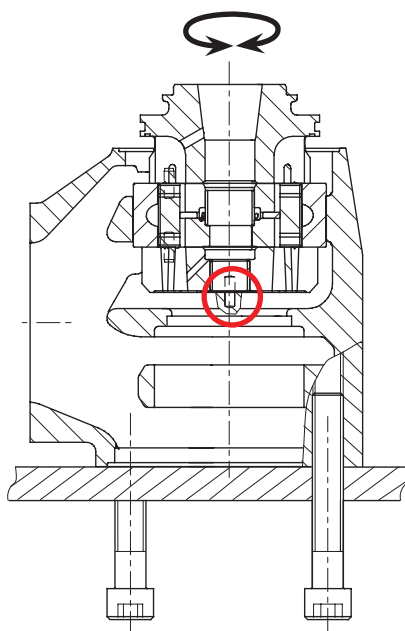
3.6. COMPLETE REASSEMBLY OF THE TRIPLE PUMP :

1 . Fit the cartridge P1 into the housing.



Check if the seals are correctly placed, (and put same grease on).

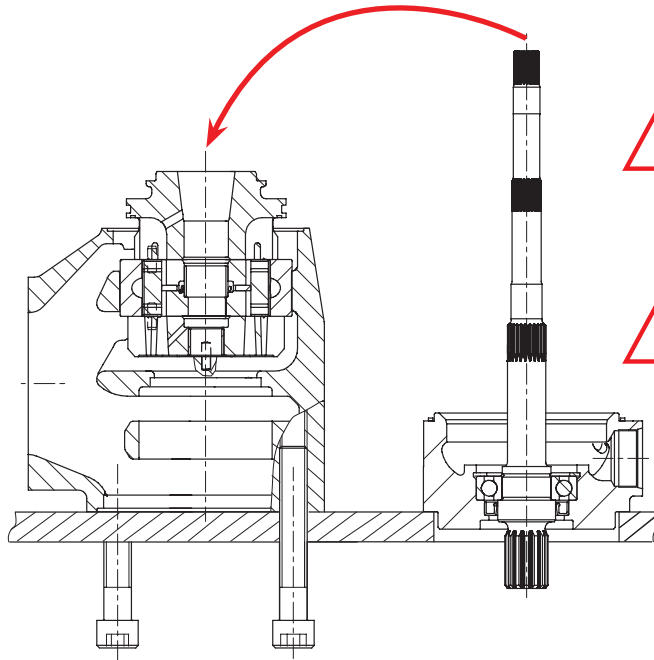
2 . Check if the dowel pin is in its position in the housing by trying to rotate the cartridge.



If the cartridge does rotate, the dowel pin is not in the hole. Take the cartridge out and try again.

3.6 . COMPLETE REASSEMBLY OF THE TRIPLE PUMP :

3 . Assemble the front cap assy on the housing & cartridge assy.



For all pumps except :
T7DDB/S - T67DDC/S -
T6DDC T7EDB/S
T67EDC/S - T6EDC.
T7EEC/S



Position the shaft / front cap assy only if the cartridge is well positioned, dowel pin in the housing dowel pin hole.

Put some grease on the seals to prevent them from moving.

If the front cap and shaft is blocked at "half way" rotate the shaft (manually).

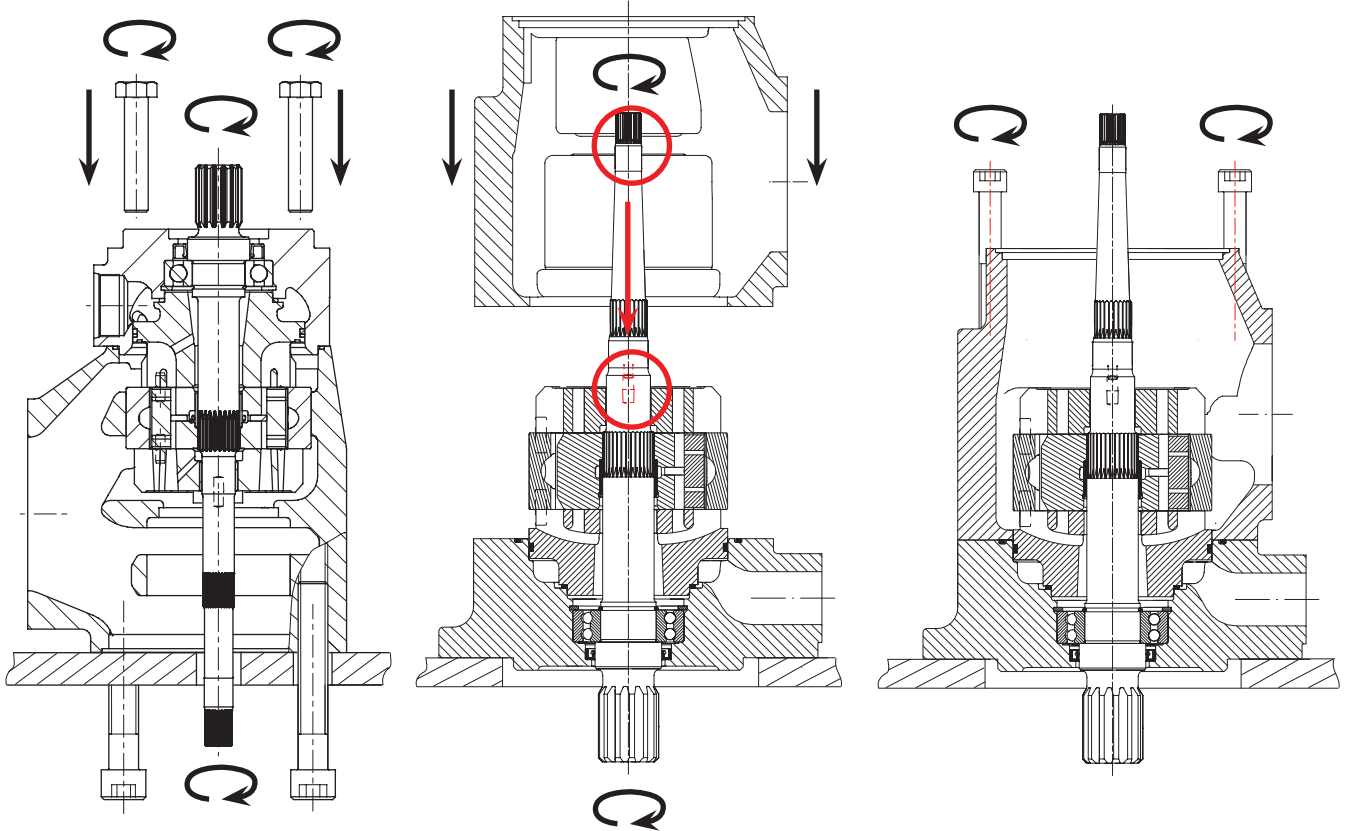
Assembly

3.6 . COMPLETE REASSEMBLY OF THE TRIPLE PUMP :

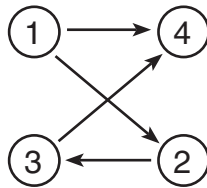


For all pumps except :
 T7DDB/S - T67DDCS
 T7EDB/S - T67EDC/S
 T7EEC/S

For pumps :
 T7DDB/S - T67DDCS
 T7EDB/S - T67EDC/S
 T7EEC/S



- a) Always check if the shaft rotates. (a slight torque due to the spring loaded resistance force). Otherwise, please go back to the previous step.
- b) Check the porting configuration (see table pages 34).
- c) Tighten the 4 screws step by step to avoid damaging the seals.



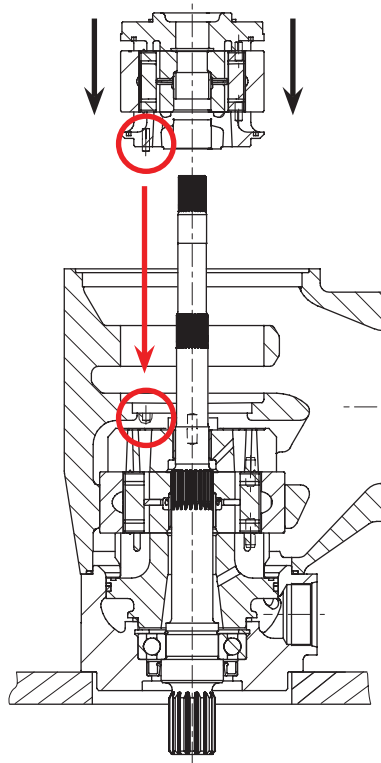
TORQUE REQUIREMENTS :

Pump		Nm	ft.lbs	Pump		Nm	ft.lbs
T7DBB/S T7DCB/S T7DCC/S	Mounting cap	187	138	T7EEC/S	Housing	300	221
	Port block	187	138		Port block	300	221
	End cap	68	50		End cap	68	50
T7DDB/S T67DDCS	Housing	190	140	T7EDB/S T67EDC/S	Housing	300	221
	Port block	190	140		Port block	190	140
	End cap	80	59		End cap	54	40

- d) Always check if the shaft rotates.
 If not, disassemble and go back to the previous step.

3.6. COMPLETE REASSEMBLY OF THE TRIPLE PUMP :

4 . Fit the cartridge **P2** into the housing.

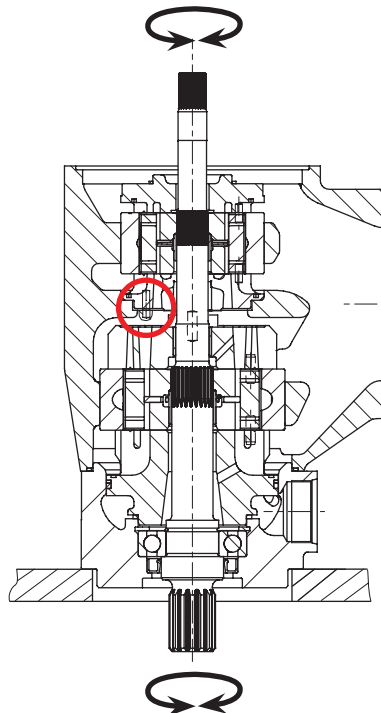


Put some grease on the seals to prevent them from moving.



If the cartridge is blocked at "half way", rotate the shaft.

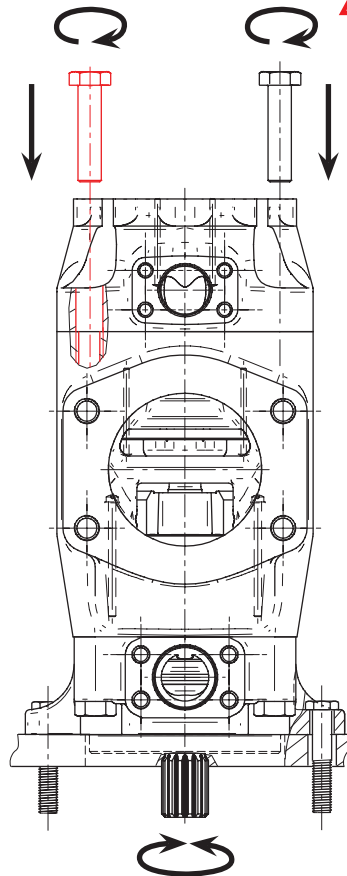
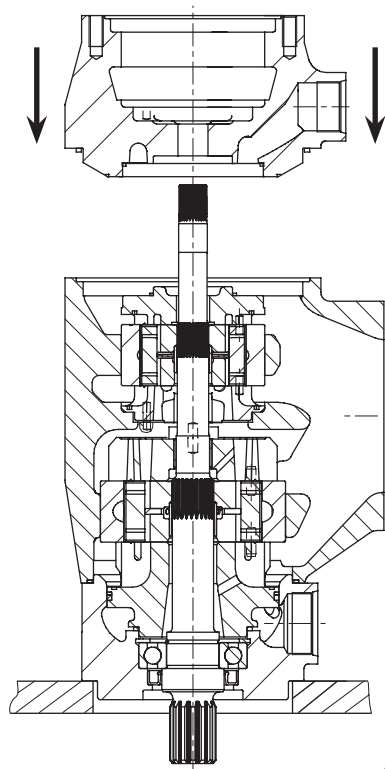
5 . Check if the dowel pin is in its position in the housing by trying to rotate the cartridge.



Always check if the shaft rotates freely.
If not, disassemble and go back to the previous step.

3.6. COMPLETE REASSEMBLY OF THE PUMP :

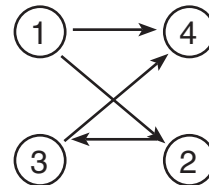
6 . Assemble the port block on the housing assy.



a) Always check if the shaft rotates. (a slight torque due to the spring loaded resistance force). Otherwise, please go back to the previous step.

b) Check the porting configuration (see table pages 34).

c) Tighten the 4 screws step by step to avoid damaging the seals.



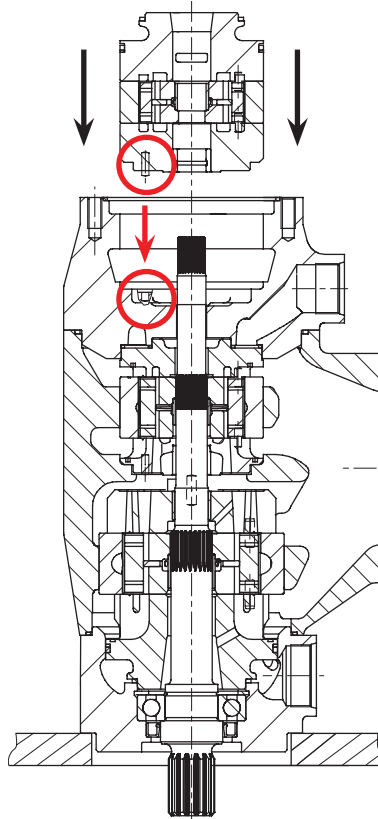
TORQUE REQUIREMENTS :

Pump		Nm	ft.lbs
T7DBB/S T7DCB/S T7DCC/S	Mounting cap	187	138
	Port block	187	138
	End cap	68	50
T7DDB/S T67DDCS	Housing	190	140
	Port block	190	140
	End cap	80	59
T7EEC/S	Housing	300	221
	Port block	300	221
	End cap	68	50
T7EDB/S T67EDC/S	Housing	300	221
	Port block	190	140
	End cap	54	40

d) Always check if the shaft rotates. If not, disassemble and go back to the previous step.

3.6. COMPLETE REASSEMBLY OF THE TRIPLE PUMP :

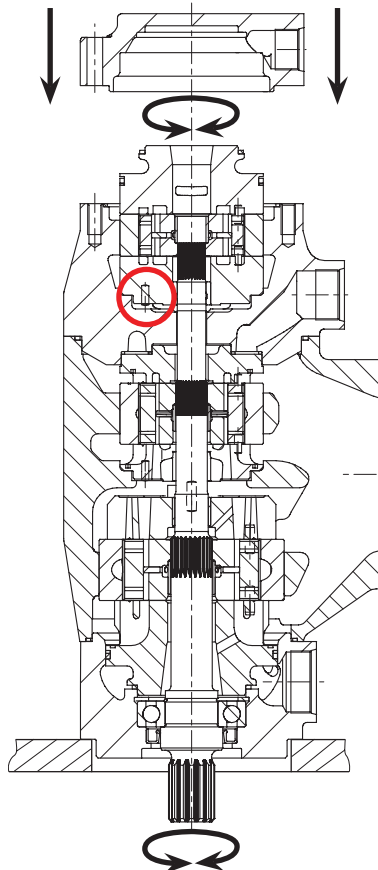
7 . Fit the cartridge **P3** into the port block.



Check if the cartridge seals are correctly placed and put same grease on.

If the cartridge is blocked at "half way", try to rotate the shaft.

8 . Check if the dowel pin is in its position in the housing by trying to rotate the cartridge.



Check if the rear cap seal is correctly placed and put same grease on.

9 . Assemble the end cap on the port block.

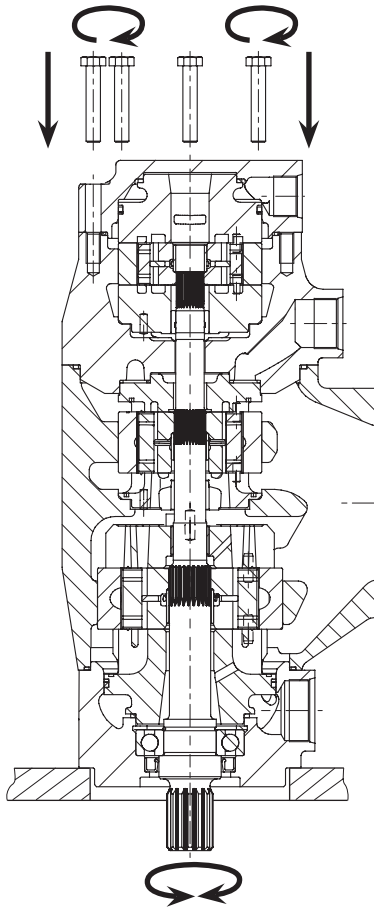


If the cartridge does rotate, the dowel pin is not in the hole. Take the cartridge out and try again.

Always check if the shaft rotates freely.
 If not, disassemble and go back to the previous step.

3.6 . COMPLETE REASSEMBLY OF THE TRIPLE PUMP :

10 . Final assembly.

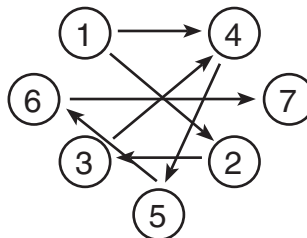


a) Always check if the shaft rotates. (a slight torque due to the spring loaded resistance force).

Otherwise, please go back to the previous step.

b) Check the porting configuration (see table pages 34).

c) Tighten the 4 screws step by step to avoid damaging the seals.



TORQUE REQUIREMENTS :

Pump		Nm	ft.lbs	Pump		Nm	ft.lbs
T7DBB/S T7DCB/S T7DCC/S	Mounting cap	187	138	T7EEC/S	Housing	300	221
	Port block	187	138		Port block	300	221
	End cap	68	50		End cap	68	50
T7DDB/S T67DDCS	Housing	190	140	T7EDB/S T67EDC/S	Housing	300	221
	Port block	190	140		Port block	190	140
	End cap	80	59		End cap	54	40

d) Always check if the shaft rotates.

If not, disassemble and go back to the previous step.

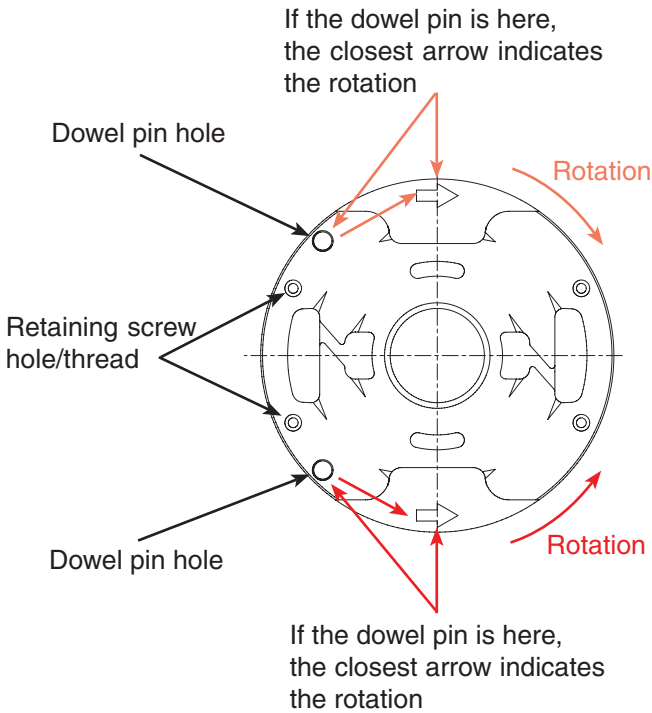
Cartridge conversion

4.1. CHANGING ROTATION :

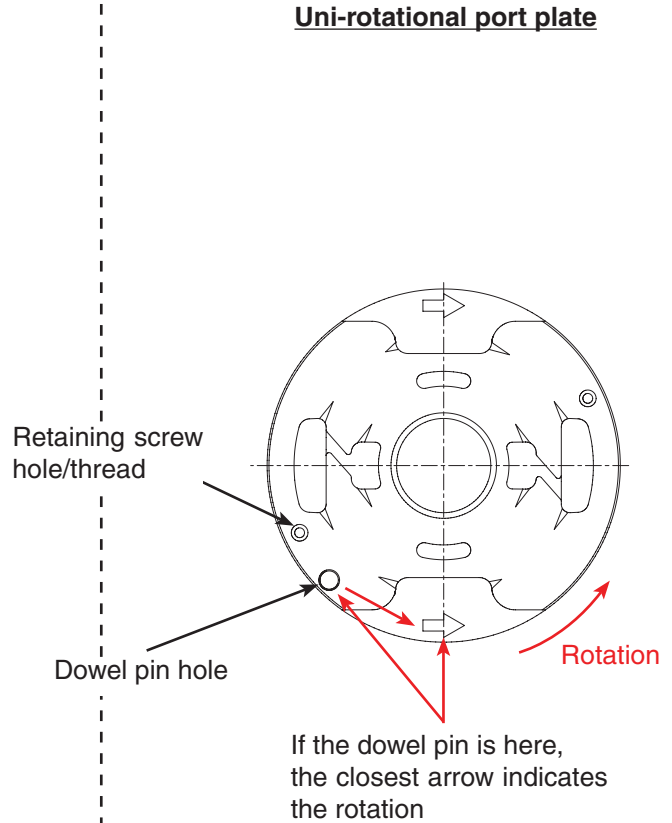
1. Explanations :

Bi & uni-rotational port plates.

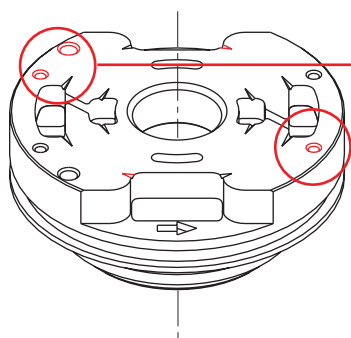
Bi-rotational port plate



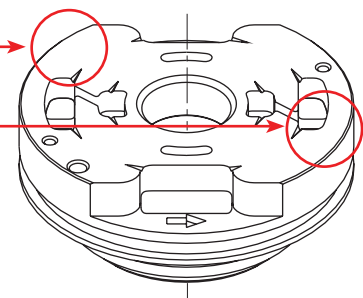
Uni-rotational port plate



Bi-rotational port plate



Uni-rotational port plate



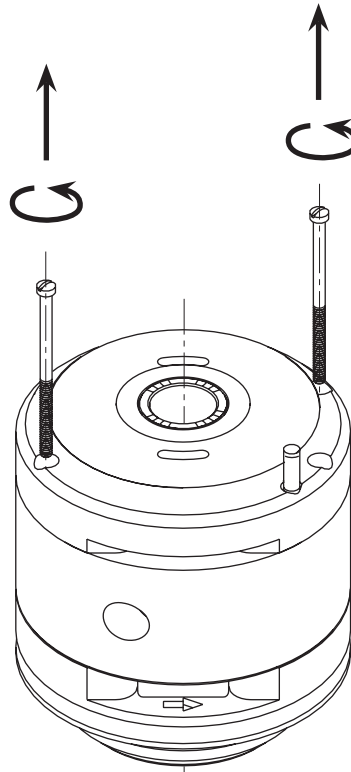
4.1. CHANGING ROTATION :



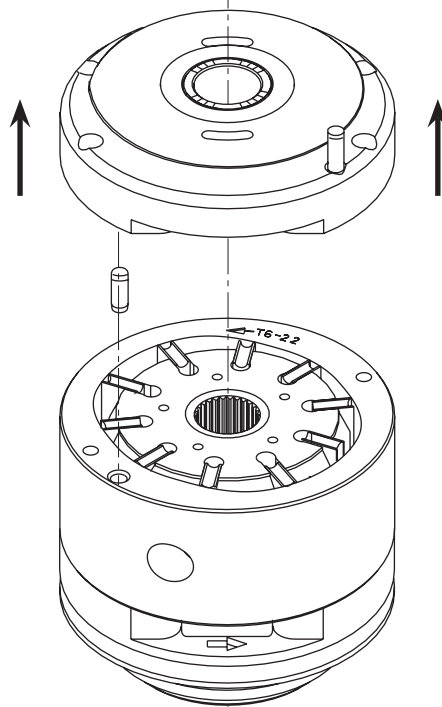
It is possible to change the rotation if the port plates are bi-rotational.

If uni-rotational, change the port plates to change the rotation.

2 . Remove the two retaining screws.



3 . Remove the rear port plate.



Rear port plate with or without bushing, it depends :
P2 position = no bushing.
P3 position = with bushing.



Same parts could sticks to the port plate.

Cartridge conversion

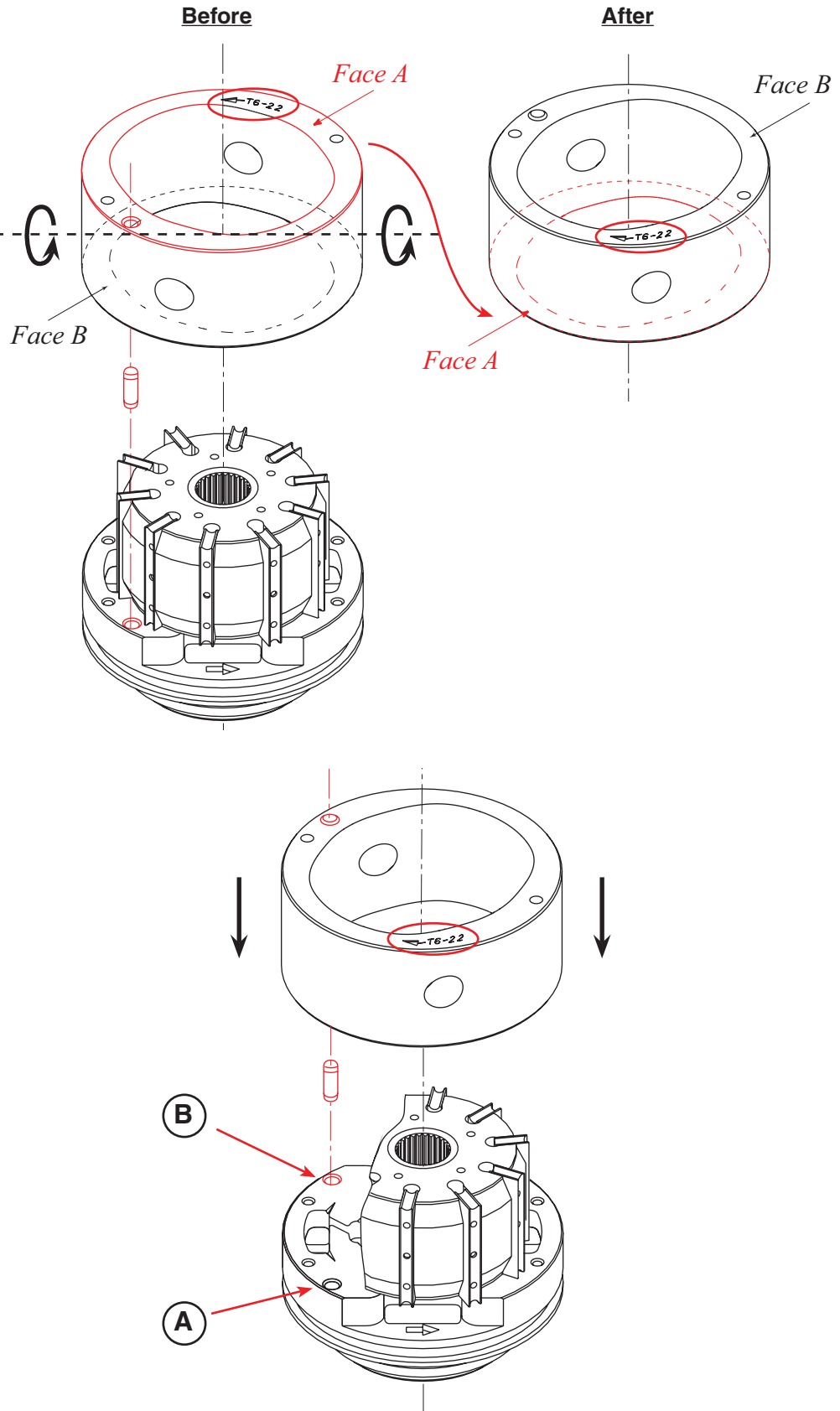
4.1. CHANGING ROTATION :

4. Take the cam ring out, flip it around the horizontal axis.

Push all the vanes inside the rotor to avoid any damage of it.

5. Change the dowel pin from A to B.

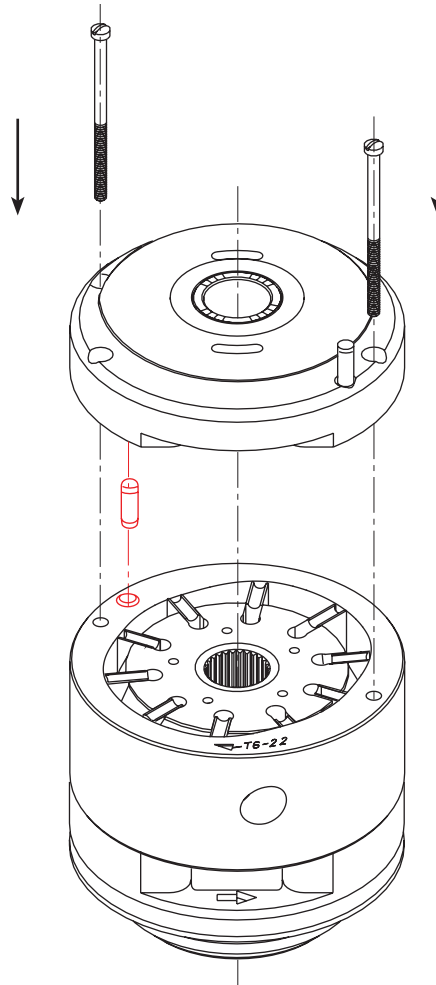
Position the cam ring.



4.1. CHANGING ROTATION :

6 . Position the dowel pin.

7 . Position the port plate & screws.



Before tightening the screws, rotate the rotor/vane.

Retaining screws = assembly purpose & concentricity of the elements.

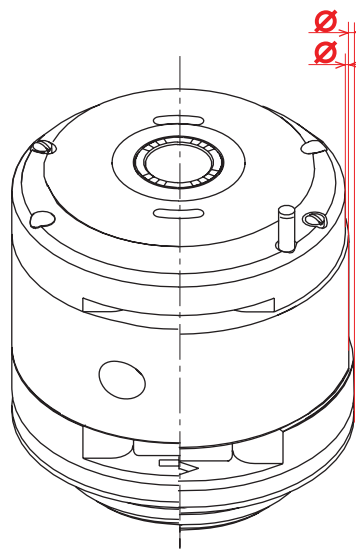
Rotate rotor after cartridge assembly.

The screws should only be loosely tightened.

Try to assemble all the elements as cylindrically as possible.

**GOOD
 CONCENTRICITY**

**BAD
 CONCENTRICITY**



If the elements are not properly assembled together (bad concentricity), the cartridge will not fit correctly into the housing.

Key sheet - Torques

5.1. KEY SHEET :

Model No.

T67DC W - B42 - 010 - 1 R 00 - A 1 M1 - ..

Series - SAE C 2 bolts
J744 mounting flange

Severe duty shaft option

Displacement P1

Volumetric displacement (ml/rev.)

B14 = 44,0 B24 = 81,1 B38 = 120,6
B17 = 55,0 B28 = 90,0 B42 = 137,5
B20 = 66,0 B31 = 99,2 045 = 145,7
B22 = 70,3 B35 = 113,4 050 = 158,0

Displacement P2

Volumetric displacement (ml/rev.)

003 = 10,8 012 = 37,1 022 = 70,3
005 = 17,2 014 = 46,0 025 = 79,3
006 = 21,3 017 = 58,3 028 = 88,8
008 = 26,4 020 = 63,8 031 = 100,0
010 = 34,1

Type of shaft

1 = keyed (SAE C) 3 = splined (SAE C) 14 teeth
2 = keyed (non SAE) 4 = splined (spec. SAE C)

Type of shaft - Severe duty (T67DCW only)

5 = keyed (non SAE)

Modifications

Mounting w/connection variables

4 bolts SAE flanges J518

	Metric thread		UNC thread	
	M0	M1	00	01
P1	1.1/4"	1.1/4"	1.1/4"	1.1/4"
P2	1"	3/4"	1"	3/4"
S	3"	3"	3"	3"

Seal class

1 = S1 BUNA N - 0,7 bar max. (for mineral oil)
4 = S4 EPDM - 7 bar max. (for fire resistant fluids)
5 = S5 VITON® - 7 bar max. (for mineral oil and fire resistant fluids)

Design letter

Porting combination

00 = standard

Direction of rotation (shaft end view)

R = Clockwise
L = Counter-clockwise

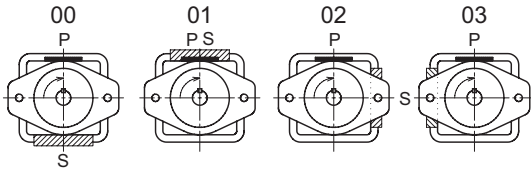
5.2. TORQUE REQUIREMENTS :

Single Pump		Nm	ft.lbs
T7B		187	138
T6C		159	117
T6D - T7D		187	138
T6E - T7E		187	138
Double Pump			
T7BB/S	Housing	187	138
	End cap	61	45
T6CC/M/P - T67CB	Mounting cap	159	117
	End cap	61	45
T7DB/S - T6DC/M/P T67DC - T7EB/S T6EC/M/P - T67EC/M/P	Mounting cap	187	138
	End cap	68	50
T6DD/S - T7DD/S	Housing & End cap	190	140
T6ED/M/P - T7ED/S	Mounting cap & End cap	187	138
T6EE/S - T7EE/S	Cover	88	65
	End cap & Housing	300	221
Triple Pump			
T7DBB/S T7DCB/S T7DCC/S	Mounting cap	187	138
	Port block	187	138
	End cap	68	50
T7DDB/S T67DDCS	Housing	190	140
	Port block	190	140
	End cap	80	59
T7EEC/S	Housing	300	221
	Port block	300	221
	End cap	68	50
T7EDB/S T67EDC/S	Housing	300	221
	Port block	190	140
	End cap	54	40

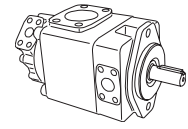
Porting tables

5.3. PORTING TABLES :

SINGLE PUMP



P = Pressure port
 S = Suction port



DOUBLE PUMP

T7BB/T7BBS	00 P1-P2	01 P1-P2	02 S-P1-P2	03 P1-P2	04 P1	05 P1	06 P1	07 P1-S
T6CC								
T67CB								
T7DB/T7DBS	08 P1-S	09 P1-S	10 P1	11 P1	12 P1	13 P1	14 P1	15 P1
T67DC								
T7EB/T7EBS	16 P1	17 P1	18 P1	19 P1	20 P1	21 P1	22 P1	23 P1
T67EC								
	24 P1-S	25 P1-S	26 P1-S	27 P1-S	28 P1	29 P1	30 P1	31 P1
T7DD/T7DDS	00 P1-P2	01 P1-P2	02 S-P1-P2	03 P1-P2	04 P1	05 P1	06 P1	07 P1-S
T7ED/T7EDS								
T7EE/T7EES								
	08 P1-S	09 P1-S	10 P1	11 P1	12 P1	13 P1	14 P1	15 P1

TRIPLE PUMP

00 P1-P2-P3 	01 P1-P2-P3 	02 S-P1-P2-P3 	03 P1-P2-P3 	04 P1 S P2 P3 	05 P1 S P2 P3 	06 P1 S P2 P3 	07 P1-S P2-P3
08 P1-S P2-P3 	09 P1-S P2-P3 	10 P1 P2-P3 	11 P1-P2 S-P3 	12 P1-P2 S-P3 	13 P1-P3 S-P2 	14 P1 P2-P3 	15 P1-P3 S-P2
16 S-P1-P2 P3 	17 S-P1-P2 P3 	18 S-P1-P2 P3 	19 S-P1-P3 P2 	20 S-P1-P3 P2 	21 S-P1-P3 P2 	22 P1-P2 S P3 	23 P1 P2-P3 S
24 P1 P2 P3 S 	25 P1 P2 P3 S 	26 P1 P2 P3 S 	27 P1-P3 S-P2 	28 P1-S P2 P3 	29 P1-S P2 P3 	30 P1-S P2 P3 	31 P1-S P2 P3
32 P1-S P2-P3 P3 	33 P1-S P2-P3 P3 	34 P1-P2 S P3 	35 P1-P2 S P3 	36 P1-P2 S P3 	37 P1-P2 S P3 	38 P1-P2 S P3 	39 P1-P2 S P3
40 P1-P3 S P2 P3 	41 P1-P3 S P2 P3 	42 P1-P3 S P2 P3 	43 P1-P3 S P2 P3 	44 P1-P3 S P2 P3 	45 P1-P3 S P2 P3 	46 P1 S P2 P3 	47 P1 S P2 P3
48 P1 S P2 P3 	49 P1 S P2 P3 	50 P1 S P2 P3 	51 P1 S P2 P3 	52 P1 S P2 P3 	53 P1 S P2 P3 	54 P1 S P2 P3 	55 P1 S P2 P3
56 P1 S P2 P3 	57 P1 S P2 P3 	58 P1 S P2 P3 	59 P1 S P2 P3 	60 P1 S P2 P3 	61 P1 S P2 P3 	62 P1 S P2 P3 	63 P1 S P2 P3
64 P3 P1 P2 S 	65 P1 P3 P2 S 	66 P1 P3 P2 S 	67 P1 P3 P2 S 	68 P3 P1 S-P2 	69 P1 P3 S-P2 	70 P1 P3 S-P2 	71 P1 P3 S-P2
72 P3 P1 P2 S 	73 P1 P3 P2 S 	74 P1 P3 P2 S 	75 P1 P3 P2 S 	76 P3 P1 P2-P3 S 	77 P1-P2 P3 S 	78 P1-P2 P3 S 	79 P1-P2 P3 S
80 P3 P1 P2 S 	81 P1 P3 P2 S 	82 P1 P3 P2 S 	83 P1 P3 P2 S 	84 P3 P1 P2 S 	85 P1 P3 P2 S 	86 P1 P3 P2 S 	87 P1 P3 P2 S
88 P3 P1 P2 S 	89 P1 P3 P2 S 	90 P1 P3 P2 S 	91 P1 P3 P2 S 	92 P3 P1-P2 P2 S 	93 P1-P2 P3 S 	94 P1-P2 P3 S 	95 P1-P2 P3 S
96 P3 P1-S P2 P3 	97 P1-S P3 P2 P3 	98 P1-S P3 P2 P3 	99 P1-S P3 P2 P3 	1A P3 P1-S-P2 P2 	1B P1-S P3 P2 	1C P1-S P3 P2 	1D P1-S P3 P2
1E P3 P1-S P2 P3 	1F P1-S P3 P2 P3 	1G P1-S P3 P2 P3 	1H P1-S P3 P2 P3 	1J P3 P1-S-P2 P2 	1K P1-S P3 P2 	1L P1-S P3 P2 	1M P1-S P3 P2
1N P3 P1 S P2 P3 	1P P1 P3 S P2 P3 	1R P1 P3 S P2 P3 	1S P1 P3 S P2 P3 	1T P3 P1 S P2 P3 	1U P1 P3 S P2 P3 	1V P1 P3 S P2 P3 	1W P1 P3 S P2 P3
1X P3 P1 S P2 P3 	1Y P1 P3 S P2 P3 	1Z P1 P3 S P2 P3 	2A P1 P3 S P2 P3 	2B P3 P1-P2 P2 S 	2C P1-P2 P3 S 	2D P1-P2 P3 S 	2E P1-P2 P3 S



S	P2	P3				P2	P3			
		02	16	17	18		20	30	08	31
		19	07	28	32		21	33	29	09
		01	22	34	38		40	48	10	58
		13	04	46	47		45	49	59	23
		00	36	11	37		27	51	05	50
		42	24	53	60		43	62	52	25
		03	39	35	12		41	63	14	57
		44	26	61	56		15	54	55	06



6 . VANE TROUBLESHOOTING GUIDE :

1 . No flow, no pressure	a) Is the pump rotating ?	a-1) Check if the coupling is rotating. If not, check the rotation of the electric motor. a-2) Check the keys of the pump and E motor shaft. a-3) Check if the shaft is not broken.
	b) Is the rotation in the correct direction?	b-1) Check if the rotation of the pump corresponds to the arrow on the name plate. b-2) Check if the wiring of the electric motor is correct.
	c) Is the air bleed-off done?	c-1) Check that no air is still located in the pressure line. Loosen a connector.
	d) What are the inlet conditions?	d-1) Check if the inlet gate valve is not closed. d-2) Check the oil level. d-3) Check if the inlet hose in the tank is under the oil tank level. d-4) Check if an air intake is not disturbing the inlet (missing inlet flange seal, air trapped in suction line as examples). d-5) Check if the pump is not located too high above the oil level. d-6) Check if the tank is not completely sealed. Then the lack of atmospheric pressure will not allow the pump to prime. d-7) Check if all connections and seals are air-tight.
	e) Is the Viscosity not too high?	e-1) Check if the oil characteristics are not incompatible with the temperature and the pumps requirements. Too high Viscosity will "stick" the vein fluid and enable the pump to suck the oil correctly.
	f) Is the pump flow not going somewhere else?	f-1) Check the hydraulic circuit and the main sequences. Doing so, you will check if all the valves are set or work properly. f-2) Check if the main relief valve is not set at an extremely low pressure and therefore bringing all the flow back to the tank. f-3) Check if in the directional valves the spools are not sticking in a position that brings the flow back to the tank. f-4) check if the check valve is not mounted «upside down».
	g) Is the receptor working correctly?	g-1) Check if the motor does not let all the flow leak internally. g-2) Check if the cylinder inner seals are not ruined.
	h) Is the speed high enough?	h-1) Check if the minimum speed is reached. Mobile pumps require 400 rpm and industrial pumps require 600 rpm.
2 . Flow below rated	a) Are the components OK?	a-1) Check the displacement of the pump. a-2) Check if the speed of the pump is not too low or too high (E motor or thermic engine sized too small so dropping the speed too low...). a-3) Check if the main relief valve is not set at an extremely low pressure and therefore venting some flow back to the tank.

6 . VANE TROUBLESHOOTING GUIDE :

2 . Not enough flow (or not the flow required) (continuation)	<p>a) Are the components OK ? (continuation)</p> <p>b) Is the connection from the tank to the pump correct ?</p> <p>c) Is the tank design correct ?</p> <p>d) Is the oil convenient ?</p>	<p>a-4) Check if in the directional valves the spools are not sticking in a position that brings part of the flow back to the tank.</p> <p>a-5) Check if the hydraulic motor is not leaking internally due to a bad efficiency, low viscosity...</p> <p>a-6) Check if the cylinder inner seals are not ruined and therefore allow internal leakage.</p> <p>b-1) Check if there is no air intake between the pump and the inlet pipe (bad seals for example).</p> <p>b-2) Check if the inlet hose is convenient for the required velocity ($0,5 < V < 1,9$ m/s).</p> <p>b-3) Check if the pump is not too high compared to the oil level or if the pump is not too far from the tank (check the inlet absolute pressure with the catalog values).</p> <p>b-4) Check if the gate valve is not semi-open.</p> <p>b-5) Check if the inlet strainer is sized correctly (250 m mesh mini.) or not clogged.</p> <p>c-1) Check if the oil level is correct.</p> <p>c-2) Check if the suction pipe is under the oil level during the complete cycle of the machine.</p> <p>c-3) Check if the inlet hose fitted in the tank is cut with an angle wider than 45°.</p> <p>c-4) Check if this inlet hose is not too close to the tank wall or to the bottom of the tank and therefore limits the "vein flow".</p> <p>c-5) Check if the suction hose is not located near the return line and therefore sucking a lot of air coming from these turbulences.</p> <p>c-6) Check if baffles are required to allow correct deareation of the fluid.</p> <p>c-7) Check if the air filter is not clogged or undersized (not well dimensioned).</p> <p>c-8) Check if the tank is not fully tight, not allowing the atmospheric pressure to apply.</p> <p>d-1) Check if the oil characteristics are not incompatible with the pumps requirements.</p> <p>d-2) Check if the viscosity is not too high, therefore «sticking» some vanes in the rotor or blocking the vein fluid.</p> <p>d-3) Check if the high temperature does not destroy the viscosity of the fluid. Doing so, the internal leakage will «consume» the flow.</p>
3 . No pressure	<p>a) Is the hydraulic circuit correctly designed ?</p> <p>b) Is the circuit correctly piped ?</p>	<p>a-1) Check the hydraulic circuit schematic.</p> <p>b-1) Compare the schematic to the piped circuit.</p>

6 . VANE TROUBLESHOOTING GUIDE :

6 . Unusual heat level	<p>a) Does the heat rise occur when the pump is running without pressure?</p> <p>b) Does the heat rise occur when the pump is running with pressure?</p>	<p>a-1) Check the oil level and the suction pipe. Is the oil coming to the pump (check the length of the pipe, its internal diameter, all that could influence the inlet pressure)?</p> <p>a-2) Check if the air bleed has been done correctly.</p> <p>a-3) Check if the flow versus the volume of oil in the tank is correct to obtain a good cooling effect.</p> <p>a-4) Check if a cooler is required or, if there is one, if it is well dimensioned.</p> <p>a-5) If there is a cooler, check if it is working (example for water cooler: is the water flow open or sufficient).</p> <p>a-6) Check if the hydraulic circuit is not bringing back the flow directly to the inlet port. Doing so, it would create a very small closed circuit not able to cool down the fluid.</p> <p>a-7) Check the quality of the fluid.</p> <p>a-8) Check the velocity of the fluid.</p> <p>a-9) Check the filtration unit, its capacity and if the heat does not come from the open by-pass valve or if it is under-dimensioned (bigger delta P).</p> <p>b-1) Check the viscosity.</p> <p>b-2) Check the pressure rating.</p> <p>b-3) Check if the cooler is working correctly or well dimensioned.</p> <p>b-4) Check if the relief valve is not creating this heat because always open.</p> <p>b-5) Check if any other component in the system is not creating this heat due to an internal defect.</p> <p>b-6) Check if there is a big temperature differential between the inlet and the outlet.</p>
7 . Shaft seal leakage	<p>a) Is the seal leaking?</p> <p>b) Is the seal destroyed?</p>	<p>a-1) Check the alignment of the front shaft and check if there is not any radial load.</p> <p>a-2) Check if seal lip has not been cut during a maintenance operation.</p> <p>a-3) Check if the inlet pressure is not over or under the catalog values. This has to be done for the whole cycle because the inlet pressure can vary from time to time.</p> <p>a-4) Check if the seal material has not been modified because of a too warm environment. The seal can vulcanize and stop sealing correctly.</p> <p>a-5) Check the acidity of the oil that can «burn» the seals material. It will therefore destroy the elasticity of the sealing.</p> <p>a-6) Check if the chosen seal (high pressure seal for example) is not too stiff for the use. If the environment requires some elasticity due to a gentle misalignment, a high pressure seal will not be able to follow the movement and therefore leak.</p> <p>b-1) Check the alignment and the correct power transmission (non homokinetic movement, high radial force as examples).</p> <p>b-2) Check the inlet pressure and compare it to the catalog values.</p> <p>b-3) Check if the bad suction conditions do not create a vacuum that could even reverse the seal lip.</p> <p>b-4) Check if the external environment is not too dirty and therefore ruining the seal.</p>

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