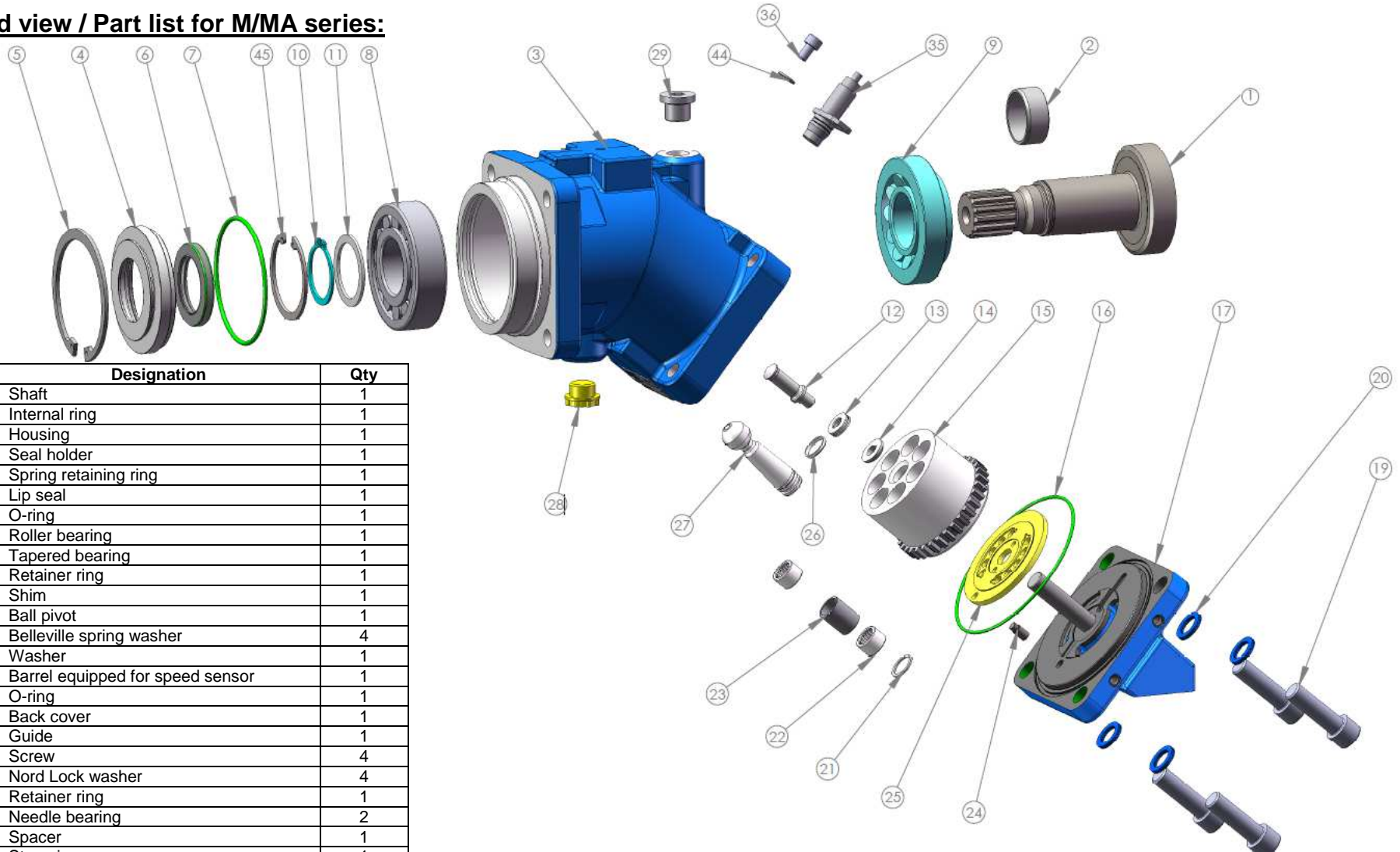


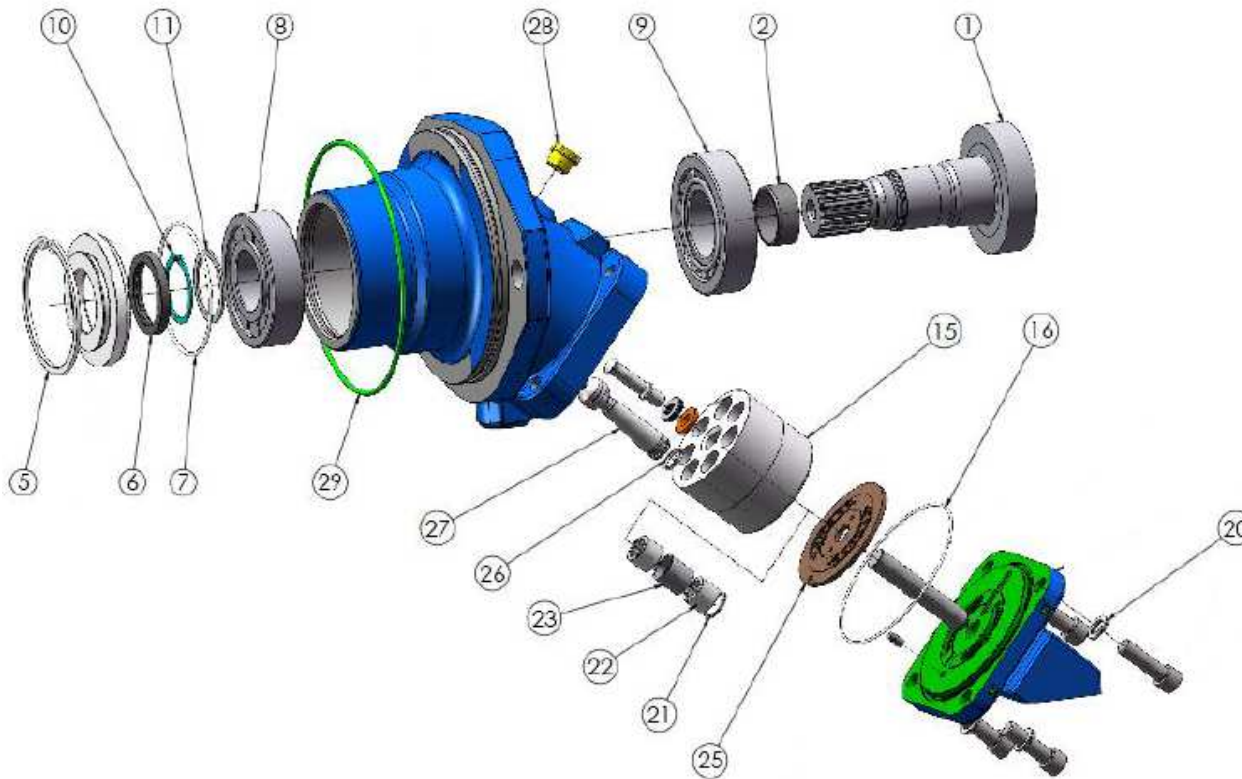


1: Exploded view / Part list for M/MA series:



Part number	Designation	Qty
1	Shaft	1
2	Internal ring	1
3	Housing	1
4	Seal holder	1
5	Spring retaining ring	1
6	Lip seal	1
7	O-ring	1
8	Roller bearing	1
9	Tapered bearing	1
10	Retainer ring	1
11	Shim	1
12	Ball pivot	1
13	Belleville spring washer	4
14	Washer	1
15	Barrel equipped for speed sensor	1
16	O-ring	1
17	Back cover	1
18	Guide	1
19	Screw	4
20	Nord Lock washer	4
21	Retainer ring	1
22	Needle bearing	2
23	Spacer	1
24	Stop pin	1
25	Distribution plate	1
26	Piston ring	7
27	Piston	7
28	Plastic plug	1
29	Steel plug	1
35	Speed sensor	1
45	Retainer ring	1

Exploded view / Part list for MSI series:



Part number	Designation	Qty / motor
1	Shaft	1
2	Internal ring	1
5	Circlips	1
6	Lip seal	1
7	O-ring	1
8	Roller bearing	1
9	Tapered bearing	1
10	Retainer ring	1
11	Washer	1
15	Barrel	1
16	O-ring	1
20	Nord Lock washer	4
21	Retainer ring	1
22	Needle bearing	2
23	Shim	1
25	Distribution plate	1
26	Piston ring	7
27	Piston	7
29	O-ring	1

2: Changing seals:

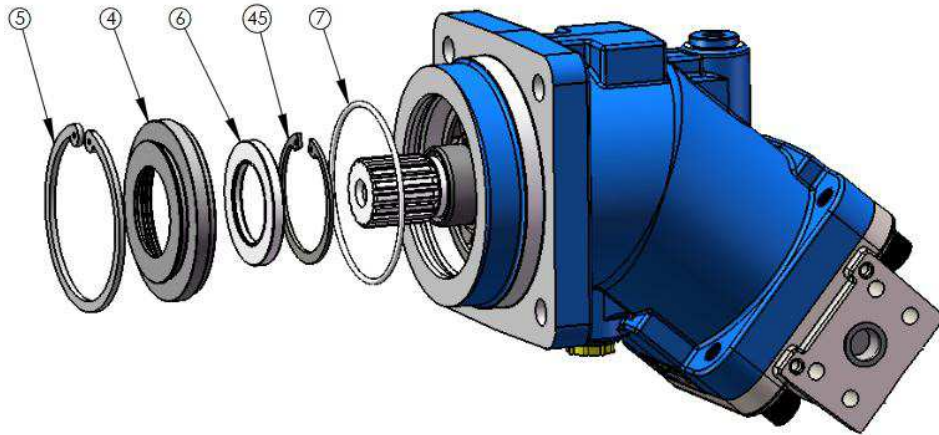
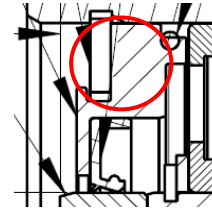


Figure n°1

Front seals 6&7:

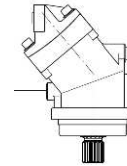
- 1/ Remove the spring retaining ring 5.
- 2/ Remove the seal holder 4. Use 2 levers or screwdrivers inside the groove (in red) to remove it. (if your motor is a keyed shaft motor take care to remove the key first). Then remove the retainer ring 45.



- 3/ Replace the seals 6 and 7 with new ones. Apply grease on the seals before assembly.
- 4/ Install the retainer ring 45. Then install the seal holder on the motor. Be careful the seal 7 has to pass over the spring retaining groove without being damaged.
- 5/ Lock the system with a new spring retaining ring.

Back seal 16:

- 1/ Unscrew the 4 bolts 19. Be careful: the cover has to be reassembled in the same position.
- 2/ Remove the cover. It is preferable to do this operation with the motor in vertical position.



- 3/ Replace the seal 16 with a new one. Put grease in the groove to keep the seal in position.
- 4/ Change the 4 NORD LOCK rings 20 and close the motor with the 4 bolts 19 respecting the following torques:

5 to 18cc :	3 da.Nm (22 lb.ft)
25 to 125cc :	10 da.Nm (74 lb.ft)
160 to 180cc :	28 da.Nm (206 lb.ft)

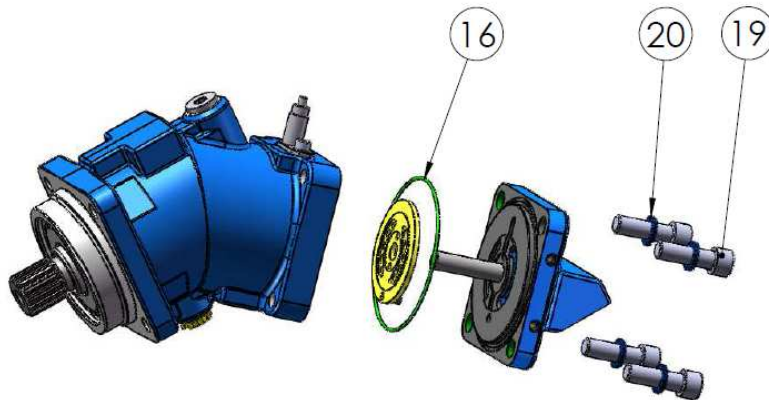


Figure n°2

3: Replacing distribution plate:

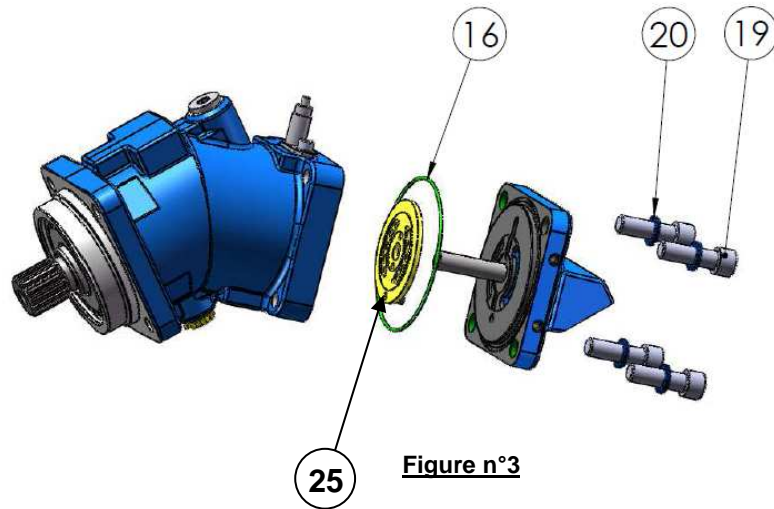


Figure n°3

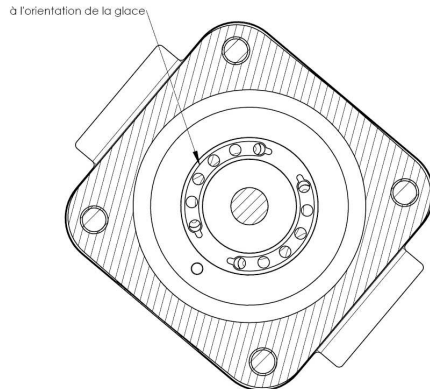


Figure n°4

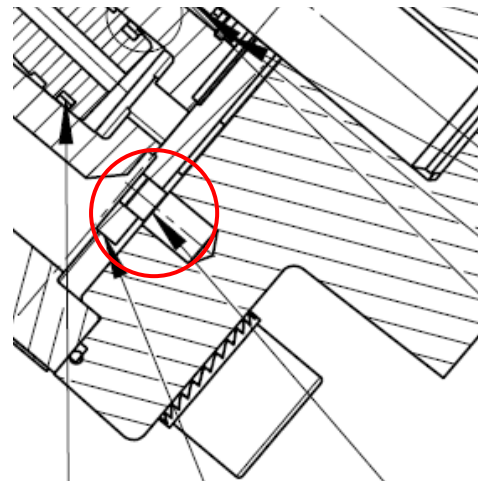
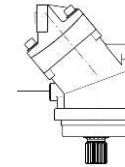


Figure n°5

- 1/ Unscrew the 4 bolts **19**. Be careful: the cover has to be reassembled in the same position.
- 2/ Remove the cover. It is preferable to do this operation with the motor in vertical position.



- 3/ Replace the distribution plate **25**. Take care to:

- Position the distribution plate correctly with the stop pin (in red figure 5).
- Position the distribution plate as in figure 4 (side with the long slot against the barrel).

- 4/ Change the 4 NORD LOCK rings **20** and close the motor with the 4 bolts **19** respecting the following torques:

5 to 18cc :	3 da.Nm (22 lb.ft)
25 to 125cc :	10 da.Nm (74 lb.ft)
160 to 180cc :	28 da.Nm (206 lb.ft)

4: Disassembly / Assembly:

Disassembly process:

- 1 - Clean the motor and mark the rear cover 17 and the housing 3 (**Pay attention: the cover has to be reassembled in the same position**). Then remove the plug or protection on the port of the motor + bleed the motor of the hydraulic oil.
- 2 - Put the motor in a bench clamp with the drive shaft in front of you. Look at Fig.1.
- 3 - Remove the keyed on the drive shaft (only for keyed shaft version) + protect the drive shaft (with tape for example). Look at Fig.2.
- 4 - Remove the retainer ring 5 with an internal plier. Look at Fig.3.
- 5 - Remove slowly the lip seal holder 4 by using two flat screw drivers. Look at Fig.4.



Fig.1



Fig.2.



Fig.3

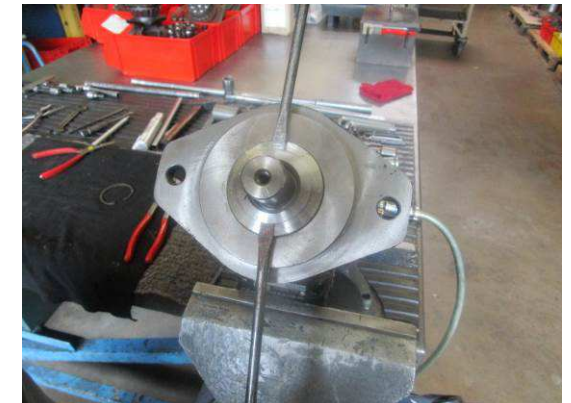


Fig.4

6 - Remove the retainer ring **10** with an external plier + remove the shim **11** located behind the retainer ring. Look at Fig.5.

7 - Return the motor on the bench clamp, remove the warranty screw plug and loosen the four fixing screws **19**. Look at Fig.6.

Warning: Removing the warranty plug will void any warranty!

8 - Lift off the back cover **17** from the housing + take care of the locating pin. Look at Fig.7.

9 - Remove the distribution plate and make a visual inspection of the plate and back cover. Look at Fig.8.



Fig.5.



Fig.6.



Fig.7.



Fig.8.

- 10 - Pull slowly the cylinder barrel **15**.
Look at Fig.9.
- 11 - Lift off the central ball joint with its 4 Belleville washers **13** and ring **14**.
Look at Fig.10.

Be sure you pulled the complete ball joint assembly (6 pieces assy') as below:

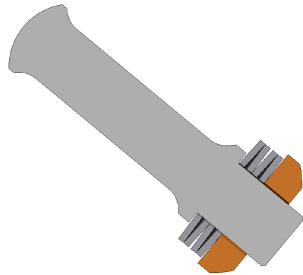


Fig.9.



Fig.10.

- 12 - Remove the seven pistons **27** from the shaft. You may have to turn the shaft to be able to align the piston and the shaft for an easy extraction
Look at Fig.11.
- 13 - Check for any scratches or damages on the piston rings **26** and pistons heads.
Look at Fig.12.

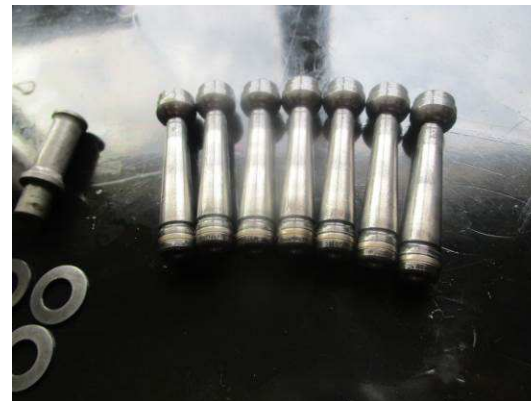


Fig.11.



Fig.12.

- 14 - Using an hydraulic press, remove the drive shaft from the housing.
Look at Fig.13.

Be Sure the shaft is properly aligned with the press.

- 15 - Reverse the inner ring of the roller bearing **8**, we will use it to remove this roller bearing.
Look at Fig.14.

- 16 - Tap down the outer ring of the roller bearing **8** with a soft rod tool.
Look at Fig.15.

- 17 - Tap down the outer ring of the tapered bearing **9** with a soft rod tool.
Look at Fig.16.



Fig.13.



Fig.14.



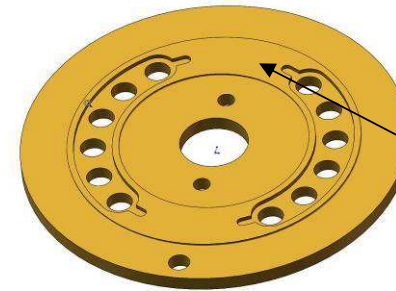
Fig.15.



Fig.16.

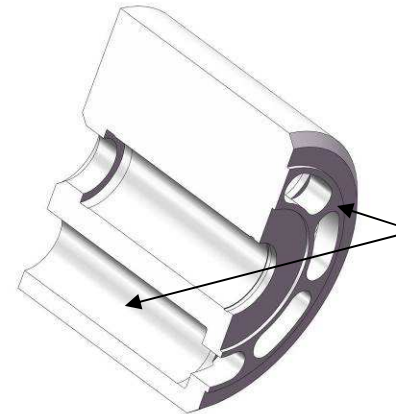
18 - Make a complete inspection of all components:

- Inspect all sealing surfaces.



Valve plate :

- No scratch
- No wear
- No shock
- No cavitation traces



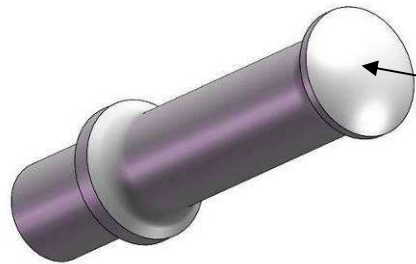
Cylinder barrel

- No scratch
- No wear
- No shock



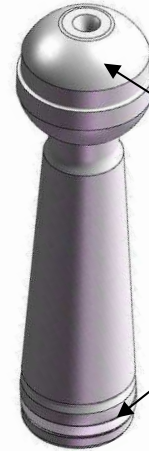
Back cover :

- No scratch
- No wear
- No shock
- No cavitation traces



Ball joint

- No wear
- No shock

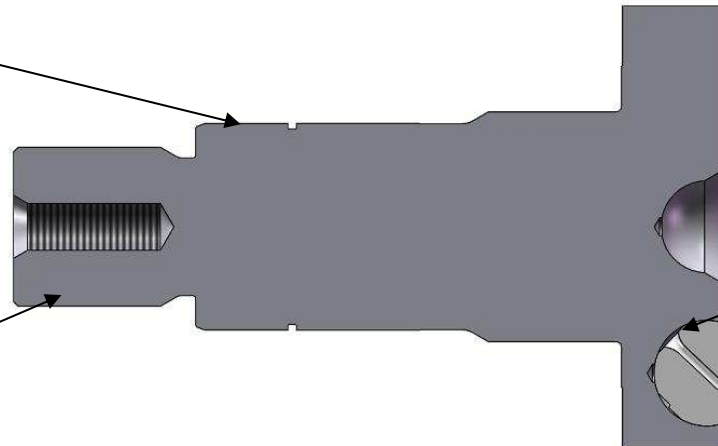


Pistons :

- No scratches
- No wear
- Piston ring not damaged

Drive shaft (lip seal)

- No wear
- No scratch

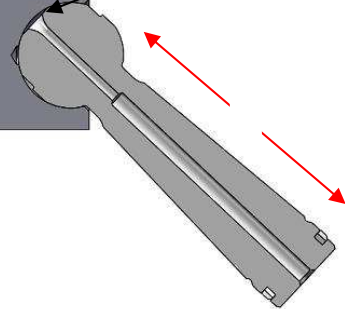


Piston/drive shaft :

- Axial play limited

Drive shaft end :

- No fretting
- No wear



Reassembly process:

- 1 - **Shaft.** If you use the same shaft, remove all remaining trace of glue and apply new glue (LOCTITE® 603 or equivalent) on the red section of the shaft (figure n°1). Heat the bearing (80-90°C) and assemble without strain.
Look at Fig 1.
- 2 - **Housing.** If you use the same housing, remove all remaining trace of glue and apply new glue (LOCTITE® 603 or equivalent) on the red part (figure n°2). Heat the housing (80-90°C) and assemble the bearing without strain.
Look at Fig 2.
- 3 - Install the O-ring **11** and apply some grease on it.
Look at Fig.3.
- 4 - Put the valve plate **10** and the locking pin **24** in the correct position.
Look at Fig.3.
- 5 - Put some oil onto the valve plate and then mount the cylinder barrel on the rear cover.
Look at Fig.4.

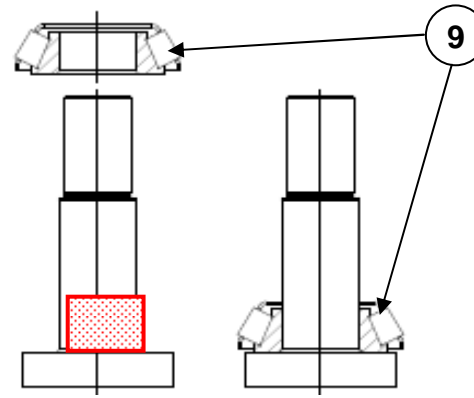


Fig.1.

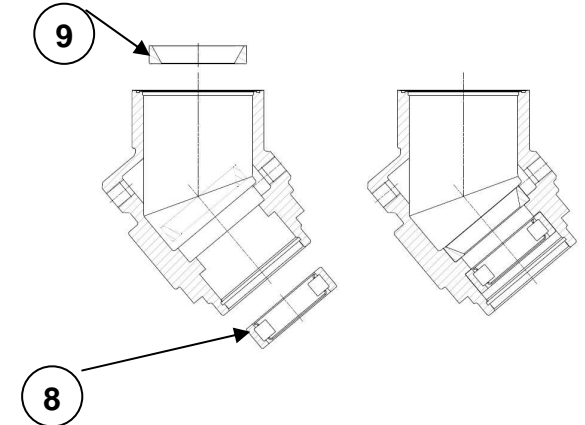


Fig.2.

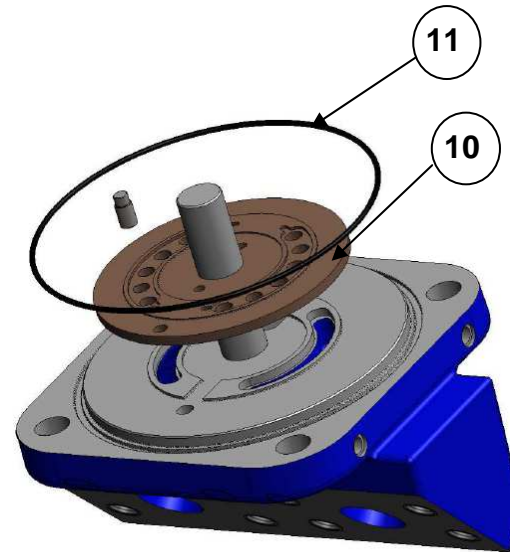


Fig.3.

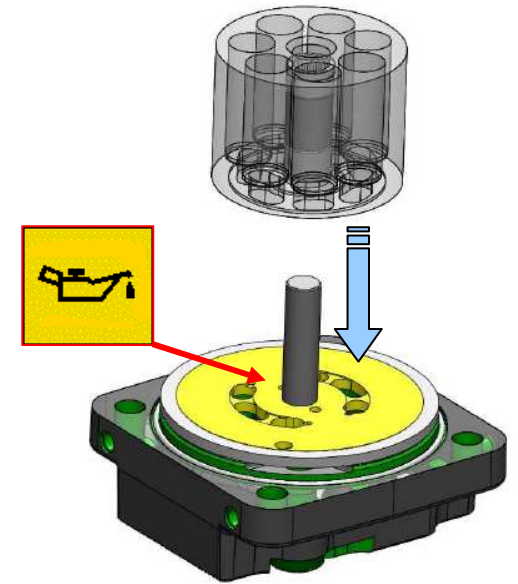


Fig.4.

- 6 - Install the ball joint assembly with the 4 spring washer onto the cylinder barrel.
Pay attention: at the position of the spring washer, look at the Fig.5.
- 7 - Put some hydraulic oil into the piston head seats and install the 7 pistons on the drive shaft. Insure a smooth rotation for each piston. Look at Fig.6.
- 8 - Install the drive shaft equipped with the pistons into the cylinder barrel. Fig.7.
Pay attention: that the pivot ball 7 has to be mounted properly.
- 9 - Mount the housing like Fig.8.
Pay attention: Use the sign made during disassembling (step 1 of the disassembling process) to reassemble the housing and rear cover in the exact same position.

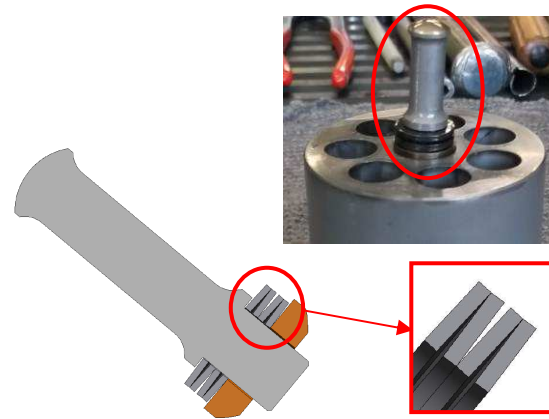


Fig.5.

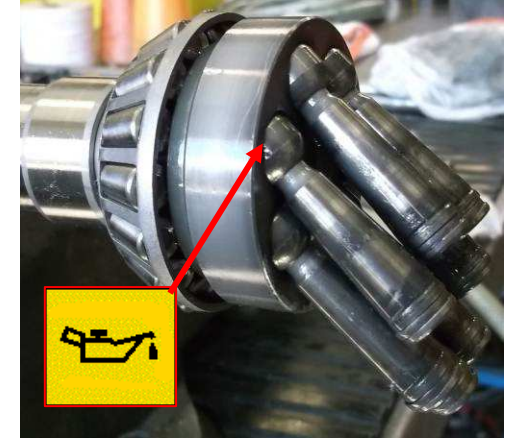


Fig.6.

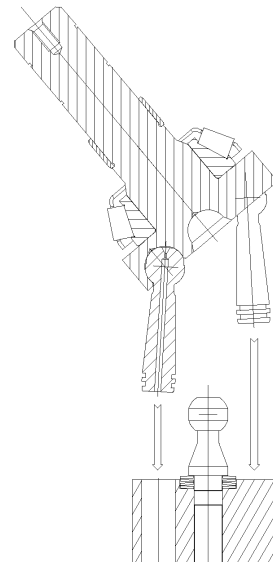


Fig.7.

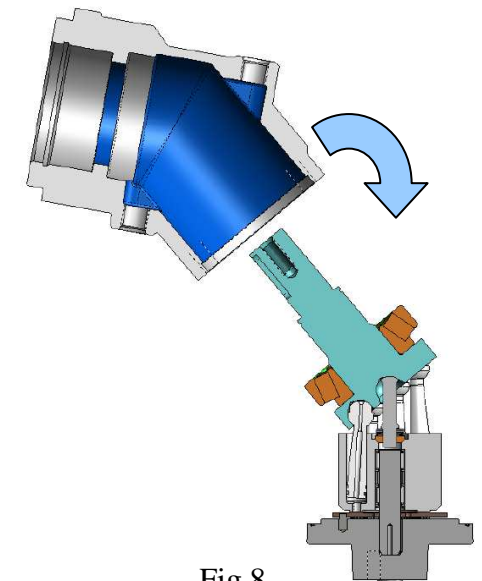


Fig.8.

10 - Close the motor with the four fixing screws; replace the four Nord-Lock washers if necessary. Then tighten in cross respecting the following torque:
Look at Fig.9.

- 5 to 18cc : 3 da.Nm (22 lb.ft)
- 25 to 125cc : 10 da.Nm (74 lb.ft)
- 160 to 180cc : 28 da.Nm (206 lb.ft)

11 - Heat the inner ring of the roller **8** bearing and assemble it on the shaft without stress. (It is important not to apply any axial stress on the shaft during this operation).
Look at Fig.10.

12 - If the bearings or the shaft have been replaced, you will have to adjust axial play of the motor with a new shim **11**.

To do So:

- Measure the distance "a" (figure n°11)
Measure the thickness of the retainer ring **10** named "b".
Machine a spacer with a thickness = (a-b) +/-0.05 mm
- Mount the shim **11** on the drive shaft and then the retainer ring **10** with an external plier. Fig.12.

If the shaft or the bearing are original, you can use the existing shim **11**.

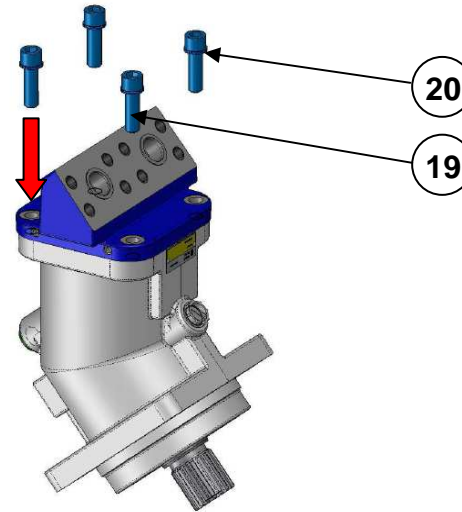


Fig.9.

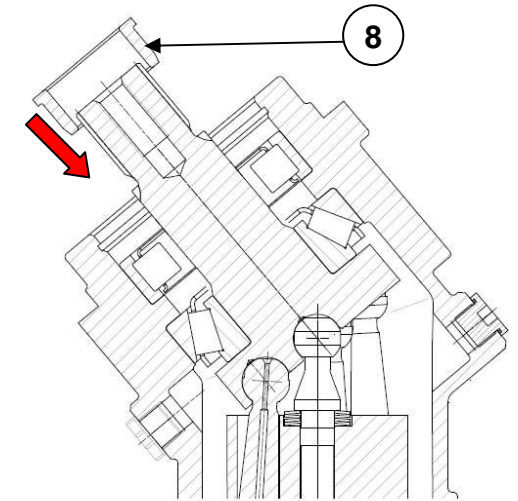


Fig.10.

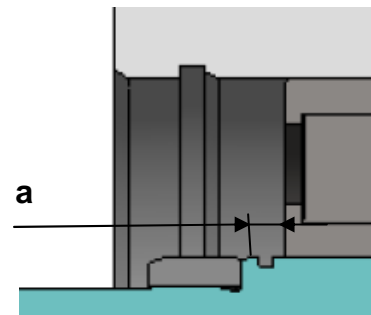


Fig.11.

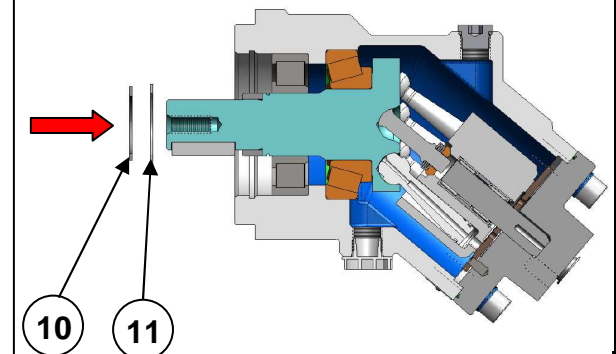


Fig.12.

- 15 - Replace the seals **6** and **7** with new ones. Apply grease on the O-ring as well as the lip of the shaft seal before assembly.
Look at Fig.13.
- 16 - Install the retainer ring **45**. Then install the lip seal holder on the motor.
Be careful: the seal **7** has to pass over the spring retaining groove without being damaged.
Look at Fig.13.
- 17- Lock the system with a new retainer ring **5**.
Look at Fig.13.

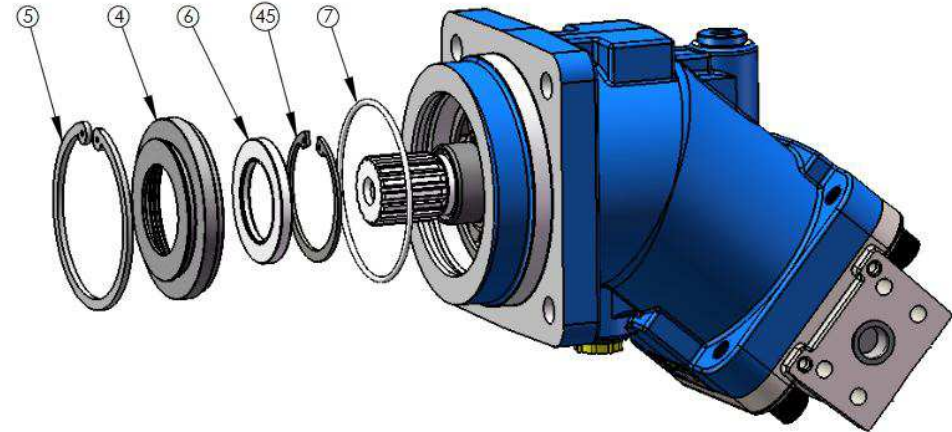


Fig.13.

5: Motor testing:

CW direction			CCW direction		
Speed (rpm)	Pressure (psi)	Measurement	Speed (rpm)	Pressure (psi)	Measurement
1000	0	Drain flow (Qd0) Inlet flow (Qi0)	1000	0	Drain flow (Qd0) Inlet flow (Qi0)
1000	4350	Drain flow (Qd300) Inlet flow (Qi300)	1000	4350	Drain flow (Qd300) Inlet flow (Qi300)

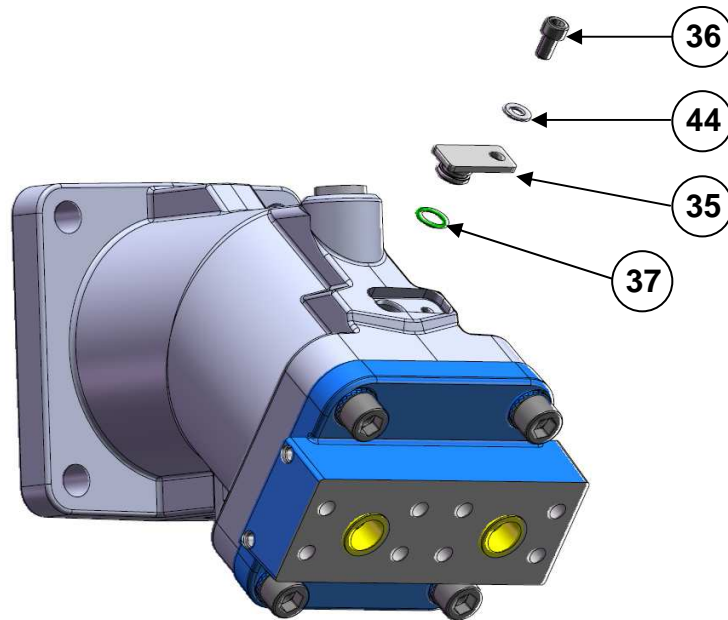
The motor conforms if the volumetric efficiency is minimum 95%, that is:

$$\frac{Q_{i300} - Q_{d300}}{Q_{i0} - Q_{d0}} > 0.95 \text{ minimum}$$

Note: In normal cases, $Q_{d0} \cong 0$ and Q_{i0} = motor displacement at 1000 rpm

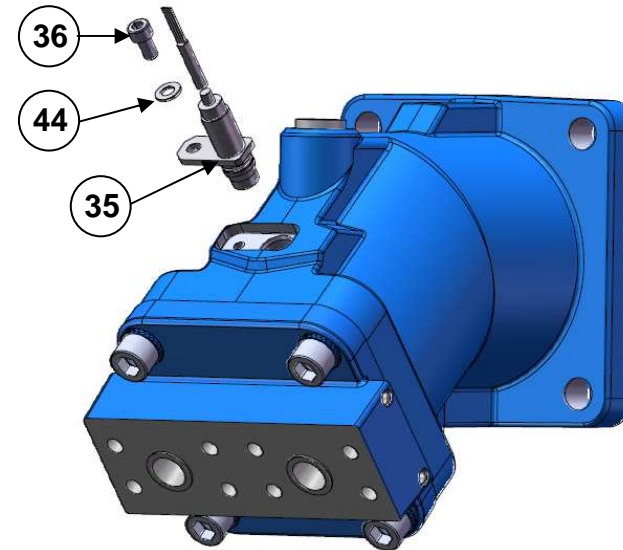
6: Speed sensor option:

If hydraulic motor equipped with pre-disposition only:



Part number	Reference	Designation
35	093459	Plug for speed sensor
36	120602	Screw M6
37	1411120	O-ring FKM
44	173576	Washer

If hydraulic motor equipped with speed sensor:



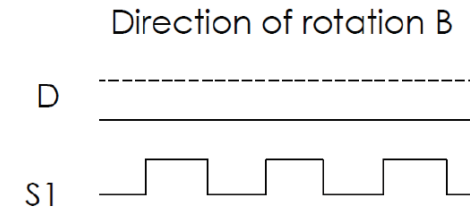
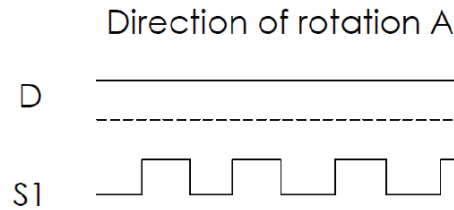
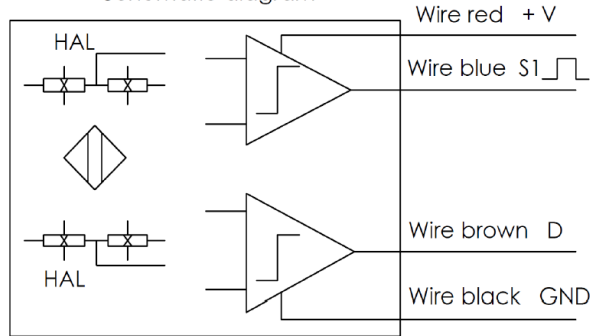
Part number	Reference	Designation
35	093327	Speed sensor
36	122035	Screw M6
44	173576	Washer

The screw **36** is tightened at 3 da.Nm (2.23 lb.ft)

- Datasheet for the speed sensor 093327:

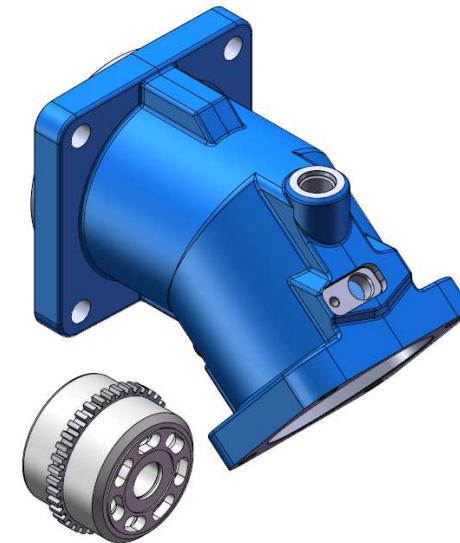
The Hydro Leduc speed sensors ref 093327 are suitable, in conjunction with a pole wheel, for generating a square wave signal proportional to rotary speed and a direction indicating signal. They have a static behavior, so that pulse generation is guaranteed down to a speed corresponding to a frequency of 0 Hz. The sensing element is a magnetically biased differential Hall Effect semiconductor. The differential structure requires that the sensor must be oriented. The sensor has a flange for proper installation.

Schematic diagram



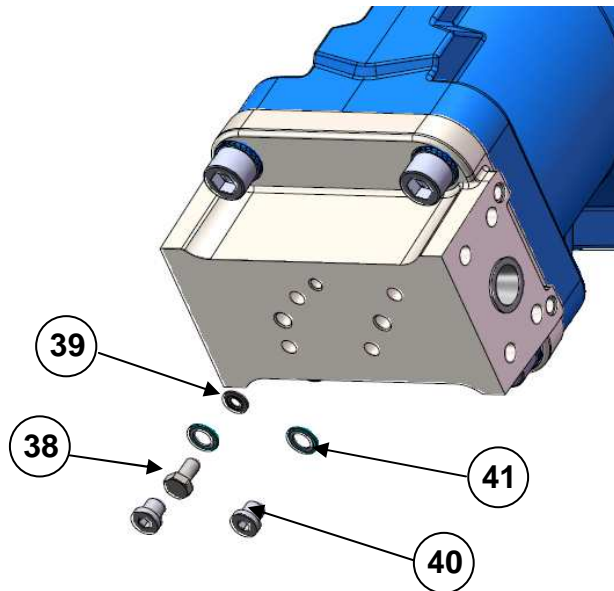
- Number of teeth on the gear wheel of the barrel for each displacement and model of motor:

M series motor models:	MA series motor models:	MSI series motor models:	Number of teeth
M5			26
M 12 - 18	MA 10 - 12 - 18		30
M 25 - 28 - 32 - 41			33
	MA 25 - 32 - 41	MSI 28 - 32 - 41	35
M 45 - 50 - 63	MA 45 - 50 - 63	MSI 50 - 63	39
M 80 - 90 - 108	MA 80 - 90	MSI 80 - 90 - 108	44
M 108R - 125	MA 108R - 125	MSI108 R - MSI 125	64
M 160 - 180	MA 160 - 180		68



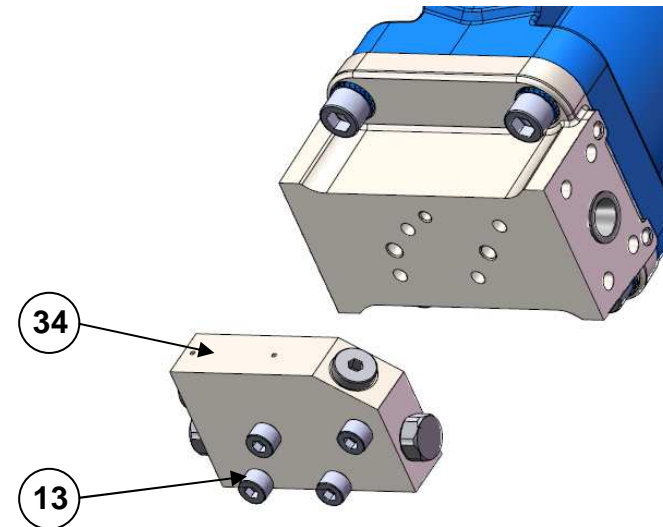
7: Flushing valve option:

Kit to plug the back cover if you remove the flushing valve:



Part number	Reference	Designation
38	120602	Screw M6
39	130303	Bonded seal
40	181035	Plug M8
41	1303311	Bonded seal

Standard flushing valve:



Part number	Reference	Designation
34	VBS_091180	Flushing valve
13	120805	Screw M8

The screws **13** and **40** are tightened at 3 da.Nm (22 lb.ft)

The screw **38** is tightened at 1.5 da.Nm (11 lb.ft)

- Functioning of the flushing valve VBS_091180:

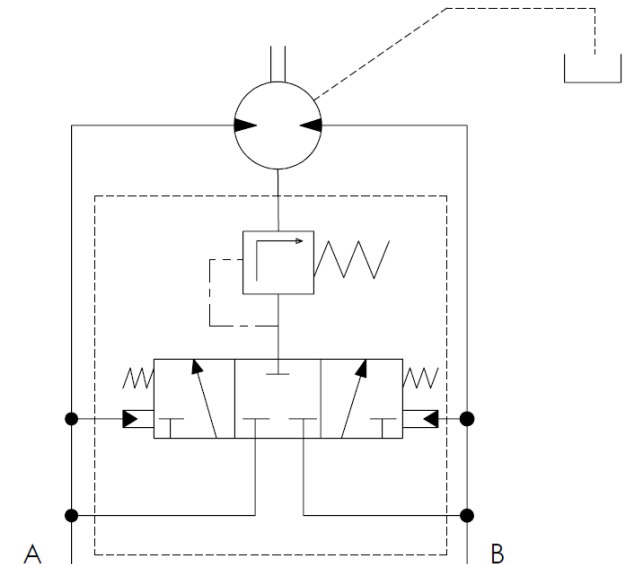
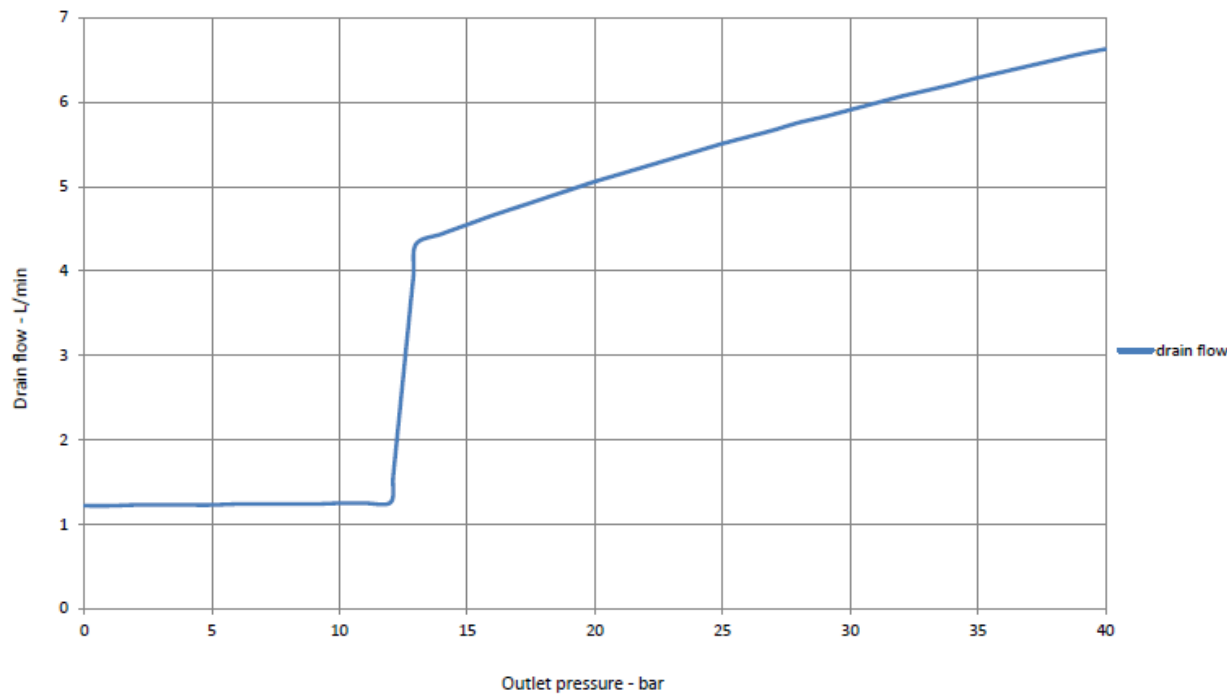
The flushing valve is used to remove an oil flow from the circuit and to ensure that a minimum boost pressure is present (opening pressure 12 bar is fixed) for the application of hydrostatic transmission.

The flushing valve is equipped with a nozzle to control the oil flow to remove (the flow rate will depend of ΔP). Below is an example of the flushing for a M63 in function of the pressure in the return line.

Currently we have three models of VBS with different setting:

- o VBS_091180 : Flushing flow of 4,25l/min with ΔP of 25 bar
- o VBS_095230 : Flushing flow of 17l/min with ΔP of 25 bar
- o VBS_095425 : Flushing flow of 10l/min with ΔP of 25 bar

Drain flow according to the outlet pressure of M63 motor with flushing valve VBS_091180 at 1000rpm and inlet pressure 100Bar. Oil ISO32 at 25°C



- The procedure to modify the flushing flow:

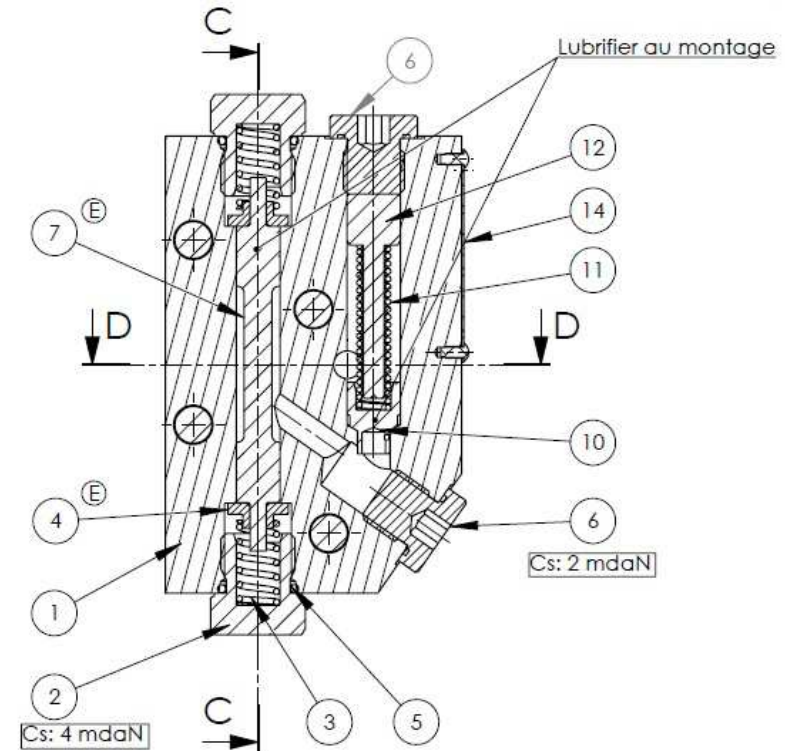
- Remove the plug #6.
- Extract the guide #12 & the spring #11.
- Extract the part to modify #10
- This part has a radial hole ID 1.3mm (0.05")
This hole allow a flow about 4.25l/min (1.12GPM) with a 25b (360 psi) differential pressure.
- To increase the flow, this hole needs to be enlarged:

Ex: for 10l/min / 2.5GPM, the hole has to be 2mm diameter.

Warning: maximum flow 17l/min / 4.5GPM with 25 bar / 360 psi delta P.

Please contact Hydro Leduc technical department for any flow.

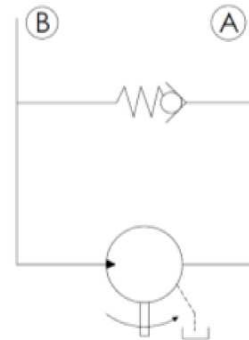
- Clean the part #10 after modification and lubricate it before assembling.
- Install the spring #11 & the guide #12.
- Screw & tighten the plug #6 with 2 m.daN torque (14 lb.ft).



8: Anti-cavitation valve option:

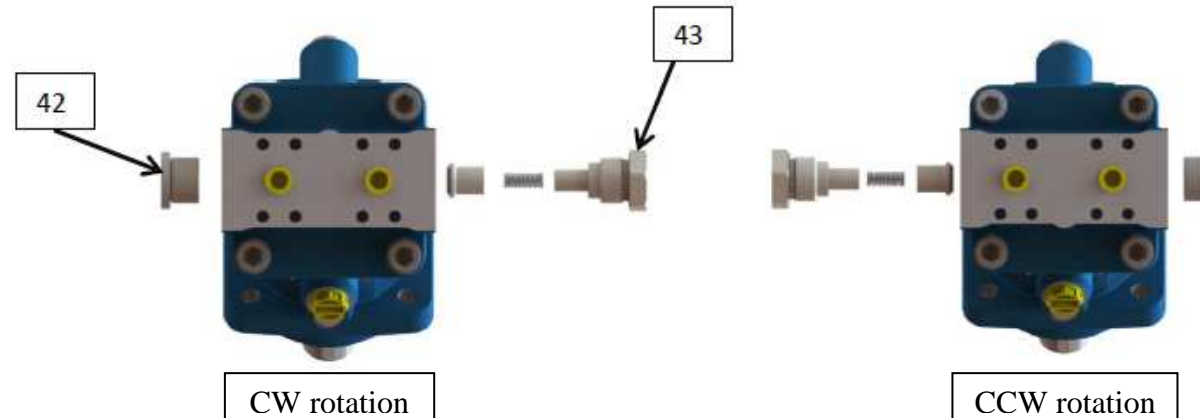
This valve integrated inside the back cover has been developed mainly for fan application, to avoid cavitation when the motor become pump.
This valve can be used for CW or CCW rotation.

Hydraulic schematic:



- The procedure to change of rotation the anti-cavitation valve:
 - For the motor with displacement 25-32 and 41:

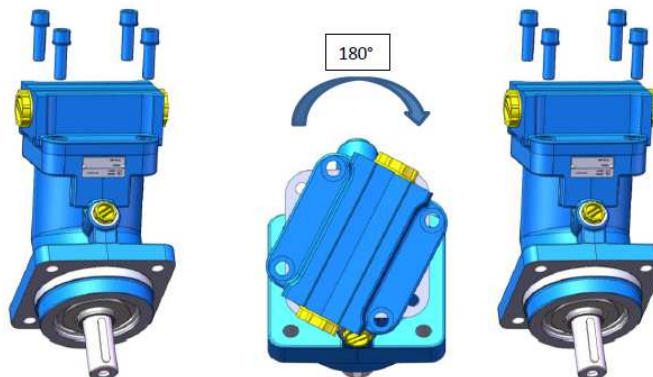
To change the direction of rotation, you must swap the check valve of side (see below the position of the check valve in function of the direction of rotation wished)



The plug **42** is tightened at 5 da.Nm (36 lb.ft)
The plug **43** is tightened at 8 da.Nm (59 lb.ft)

- For the motor with displacement 45-50- 63-80:

To change the direction of rotation, you must turn the back cover. Remove the four screws and turn the back cover about half a turn while making sure it stays in contact with the cylinder barrel and valve plate. Re-fit the four screws and torque to 100Nm.



The four screws are tightened at 10 da.Nm (74 lb.ft)