Perform the blade position calibration as per the WKI

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**
  IN THE Nacelle:

  Perform the blade calibration. Original calibration may be altered during any components replacement. Like position sensors (Balluf), cables, proportional valves and hub computer.

  Refer to documents during manual pitching in the Nacelle Mode.

Relevant documentation	
Description	**DMS No.**
Blade Position Calibration - section 5.10.9	0000-9925
Blade pitch system test	0002-0467

Bosch-Rexroth Check orifice Pos.: 450 at Hydraulic Manifold Pump Unit

Does this solve the problem?

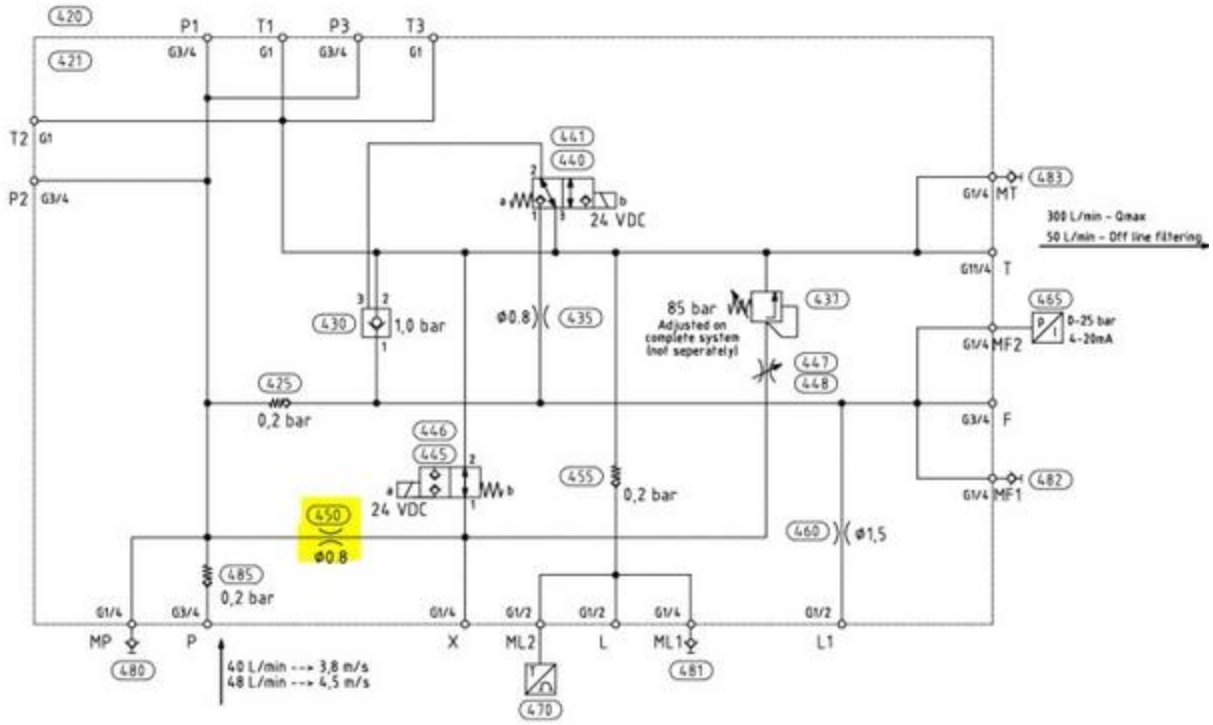
1] Yes

2] No

3] I don't know

- **Explanation**
  Bosch-Rexroth:

  Check if dirt or part of an old seal block the orifice pos.: 450 at the hydraulic manifold (Pump unit).


420
421
P1
G3/4
T1
G1
P3
G3/4
T3
G1
T2 G1
P2 G3/4
441
440
24 VDC
G1/4 MT
483
300 L/min – Qmax
50 L/min – Off line filtering
G1/4 T
430
1,0 bar
Ø0.8
435
85 bar
Adjusted on complete system (not seperately)
437
465
0-25 bar
4-20mA
G1/4 MF2
447
448
425
0,2 bar
G3/4 F
446
445
24 VDC
455
0,2 bar
G1/4 MF1
482
450
Ø0.8
460
Ø1,5
485
0,2 bar
G1/4
G3/4
G1/4
G1/2
G1/2
G1/4
G1/2
MP
P
X
ML2
L
ML1
L1
480
481
470
40 L/min ---> 3,8 m/s
48 L/min ---> 4,5 m/s


Rexroth
447
450
MT
488
460


M11

If a part of an old seal or other parts block the orifice, it is not possible for the pump to build up the working pressure.

It is only running at an idle pressure of ca 14bar

Clean the orifice

Note: There is a screw with 8 mm Allen Key before you can screw out the orifice.

You need a 7 mm Allen Key to screw out the orifice Pos.: 450 !!!! (Rexroth Hydraulic)

If needed change the orifice

Bosch-Rexroth number: R900153865

SAP Number: ?(please update when found)

Check the hub inlet pressure

Does this solve the problem?

1] Yes

2] No

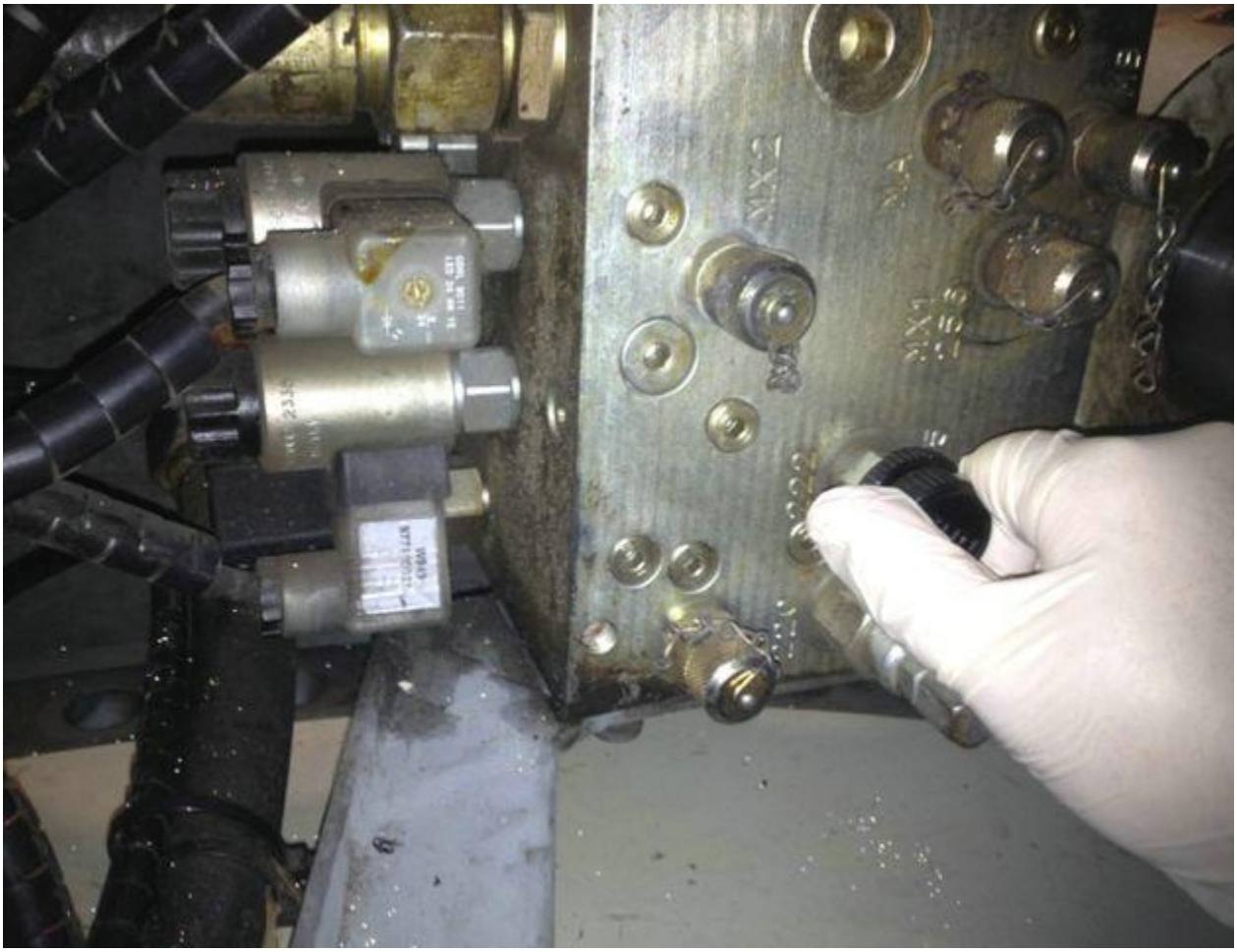
3] I don't know

- **Explanation**

IN THE NACELLE

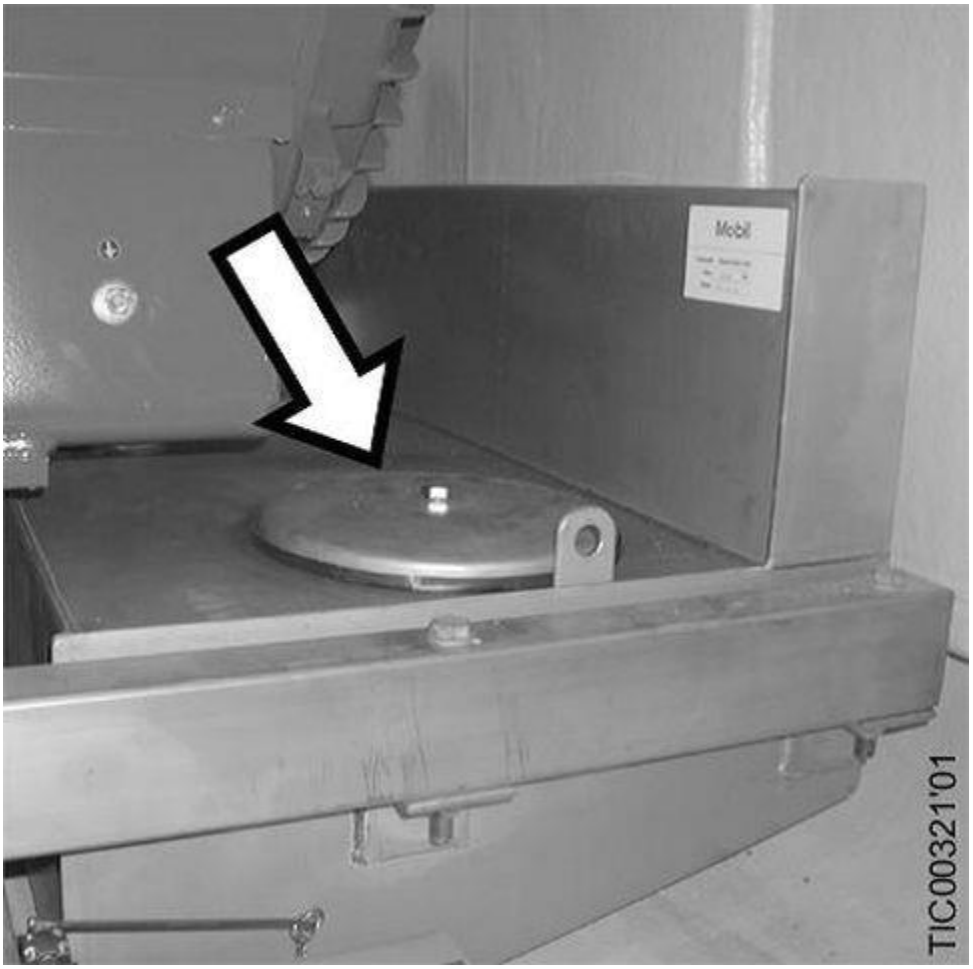
Check the hub inlet pressure at TACII with the pump running. If it is below 0.8bar (normal 0.8~2.2 bar), check the oil level in the hydraulic tank. ***Check the level after opening 222 needle valves on blade manifolds in hub.***

Note: open valves slowly to prevent hydraulic oil from being trapped in accumulators.



Mk3-5 turbines: Ensure the oil level is between the marks on the dip stick:

Mk1-2 turbines: Ensure the oil level is ~5cm from the lip on the tank.



Also check the hydraulic pump, suction hose, coupling and motor for any defect and replace if anything is damaged or failed.

If the pump is found to be defective replace the pump.

Relevant spare parts	
Description	**Item No.**
GEAR WHEEL PUMP 52CCM 3SPA-52D	60073428

If the coupling is found to be defective or shows signs of excessive wear, replace the coupling:

Relevant spare parts	
Description	**Item No.**
Coupling ND 86	60120016

Relevant spare parts	
Description	**Item No.**
Coupling ND 86 Pump side	60120013
Coupling Rubber	60120014
Coupling ND 86 Motor Side	60120015
MOTOR El. 4AP112M-6S-B5-4/6 2.	60073425

If the Motor is found to be defective replace the Motor

Relevant documentation	
Description	**DMS No.**
Replacement of Pitch motor	0001-8482

Check the compensator valve setting and replace the defective valve

Does this solve the problem?

1] Yes

2] No

3] I don't know

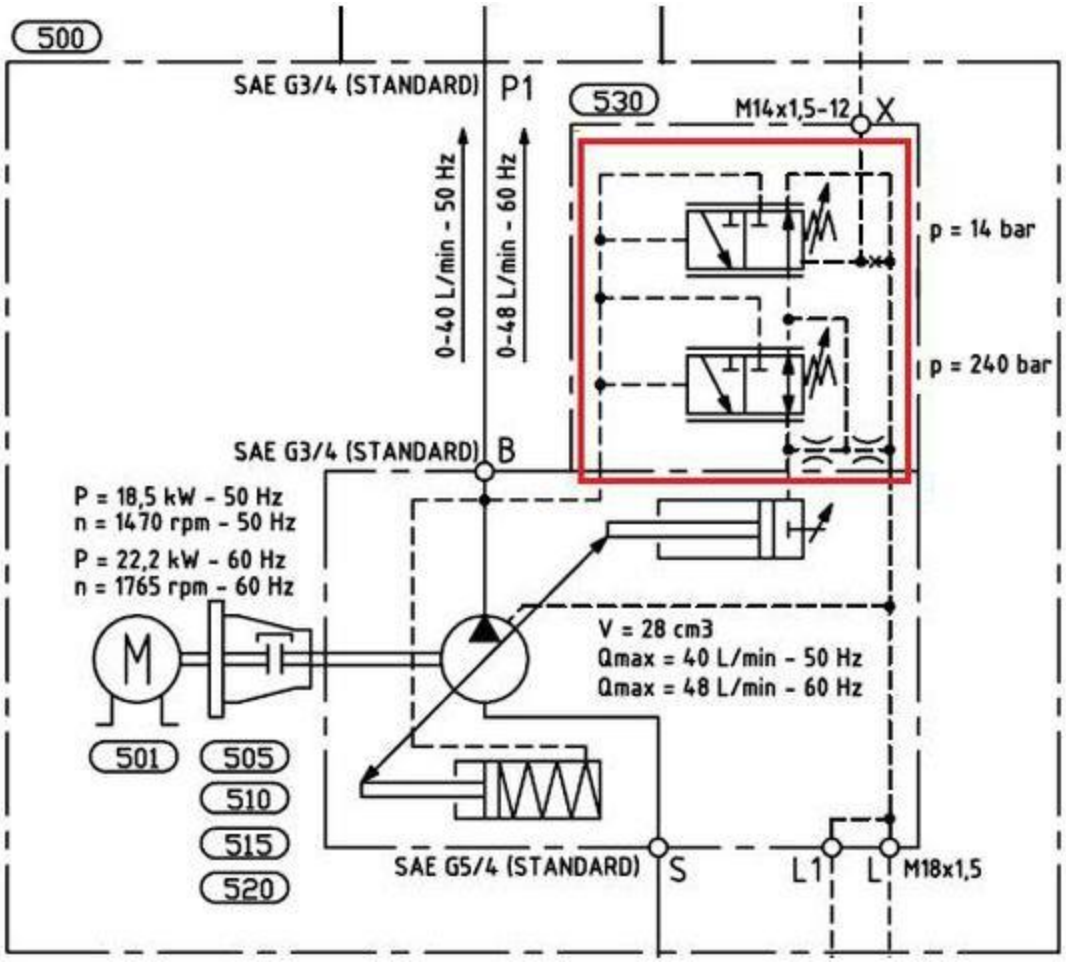
- **Explanation**

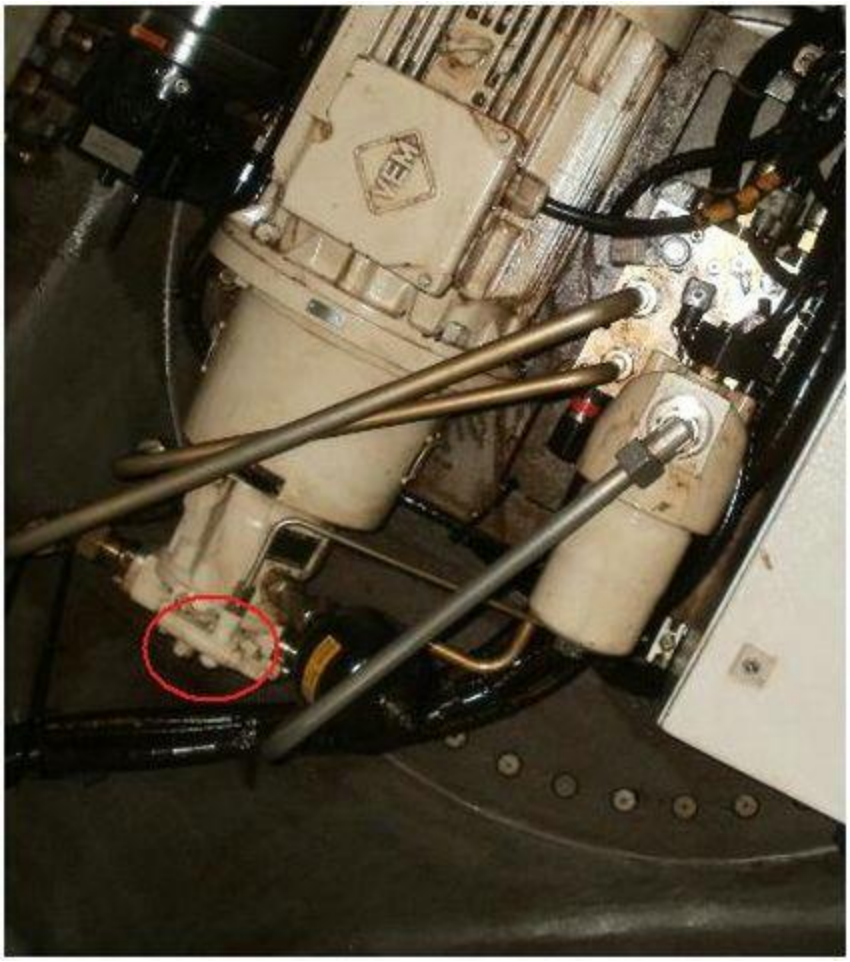
IN THE HUB:

Check the compensator valve (relief valve) setting in the hydraulic pitch pump.

Relevant documentation	
Description	**DMS No.**
Pressure Relief Valve Setting	0006-8149

REXROTH SYSTEM:


500
SAE G3/4 (STANDARD)
P1
530
M14x1,5-12
X
0-40 L/min - 50 Hz
0-48 L/min - 60 Hz
p = 14 bar
p = 240 bar
SAE G3/4 (STANDARD)
B
P = 18,5 kW - 50 Hz
n = 1470 rpm - 50 Hz
P = 22,2 kW - 60 Hz
n = 1765 rpm - 60 Hz
M
V = 28 cm3
Qmax = 40 L/min - 50 Hz
Qmax = 48 L/min - 60 Hz
501
505
510
515
520
SAE G5/4 (STANDARD)
S
L1
L
M18x1,5

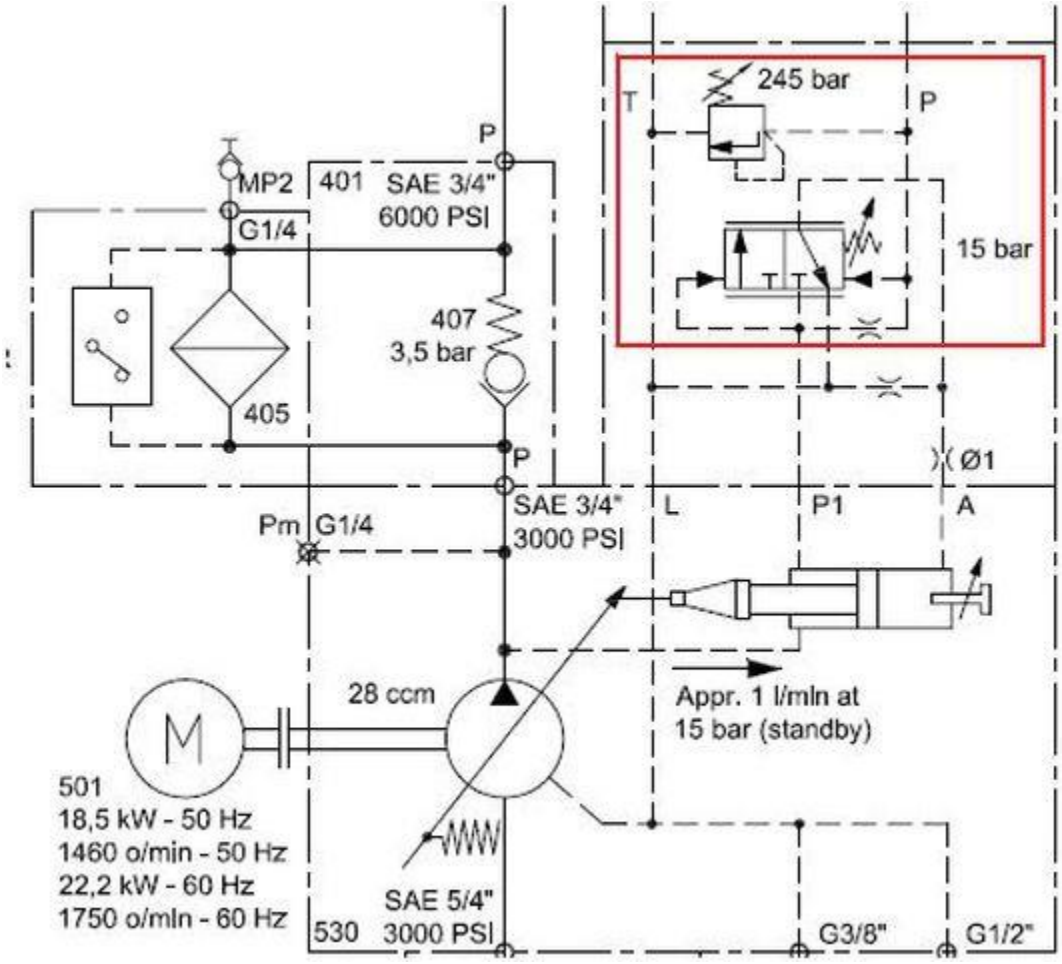


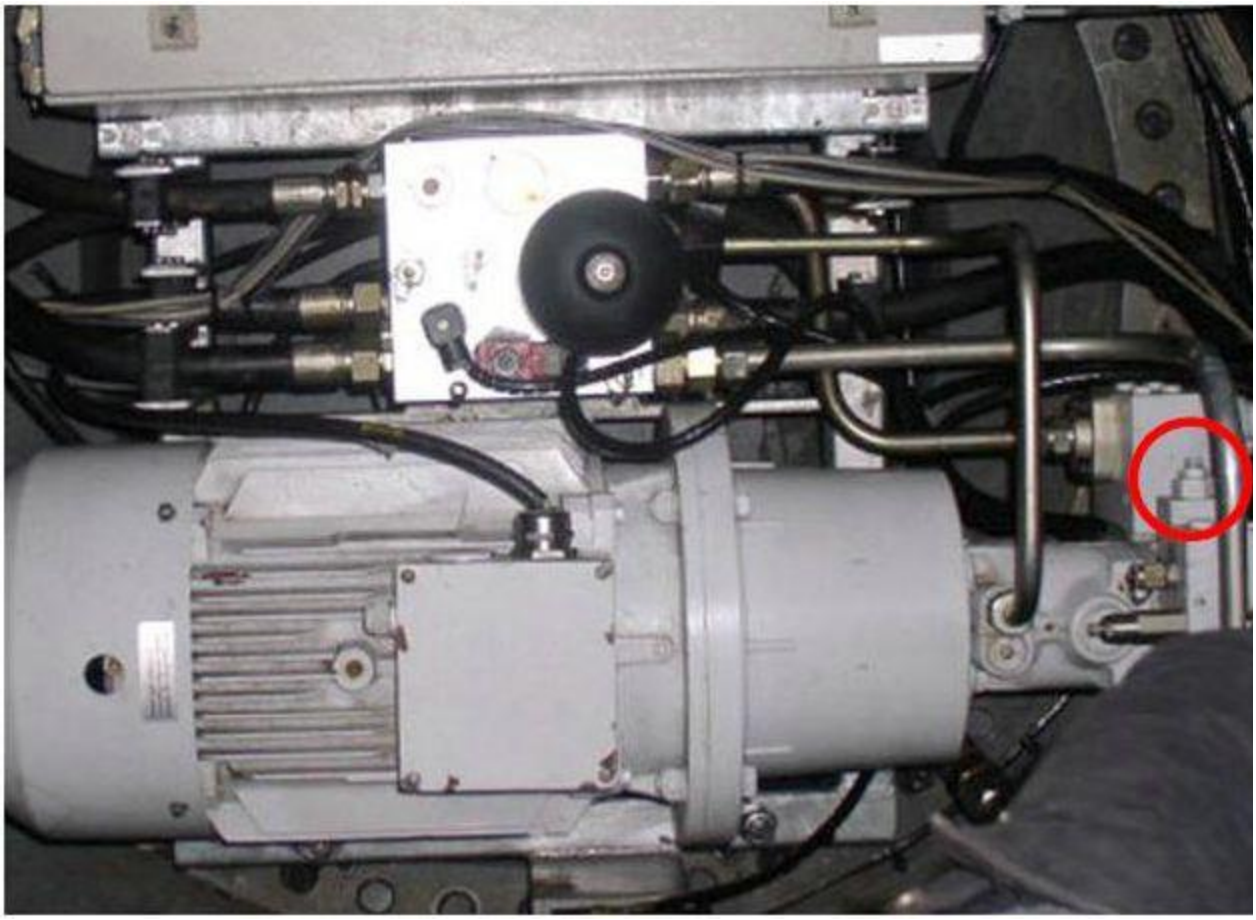
Compensator valve picture

Part number for Rexroth compensator valve:

Relevant spare parts	
Description	**Item No.**
VALVE DFR1 RAL7032 240/14 BAR	60113742

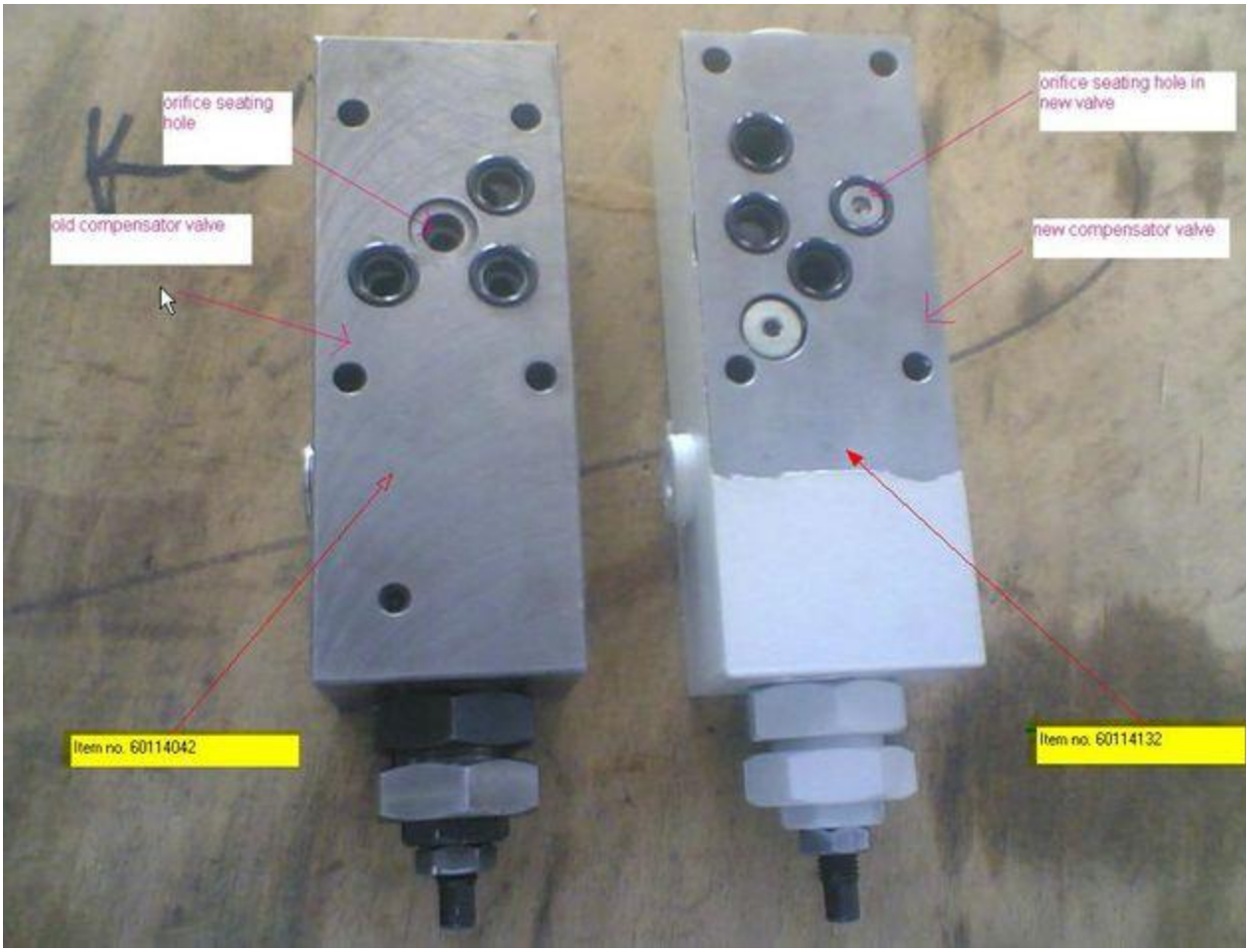
PARKER SYSTEM:





The parker hydraulic system has two different types of compensator valves.

Ensure the valve type before replacing with a new valve.



Part number for Parker compensator valve:

Relevant spare parts	
Description	**Item No.**
HYDR PRES. COMP. VALVE 245/15	60114132 - New type
HYDR PUMP PRESSURE CONT. VALVE	60114042 - Old type

Check and Replace the level switch

Does this solve the problem?

1] Yes

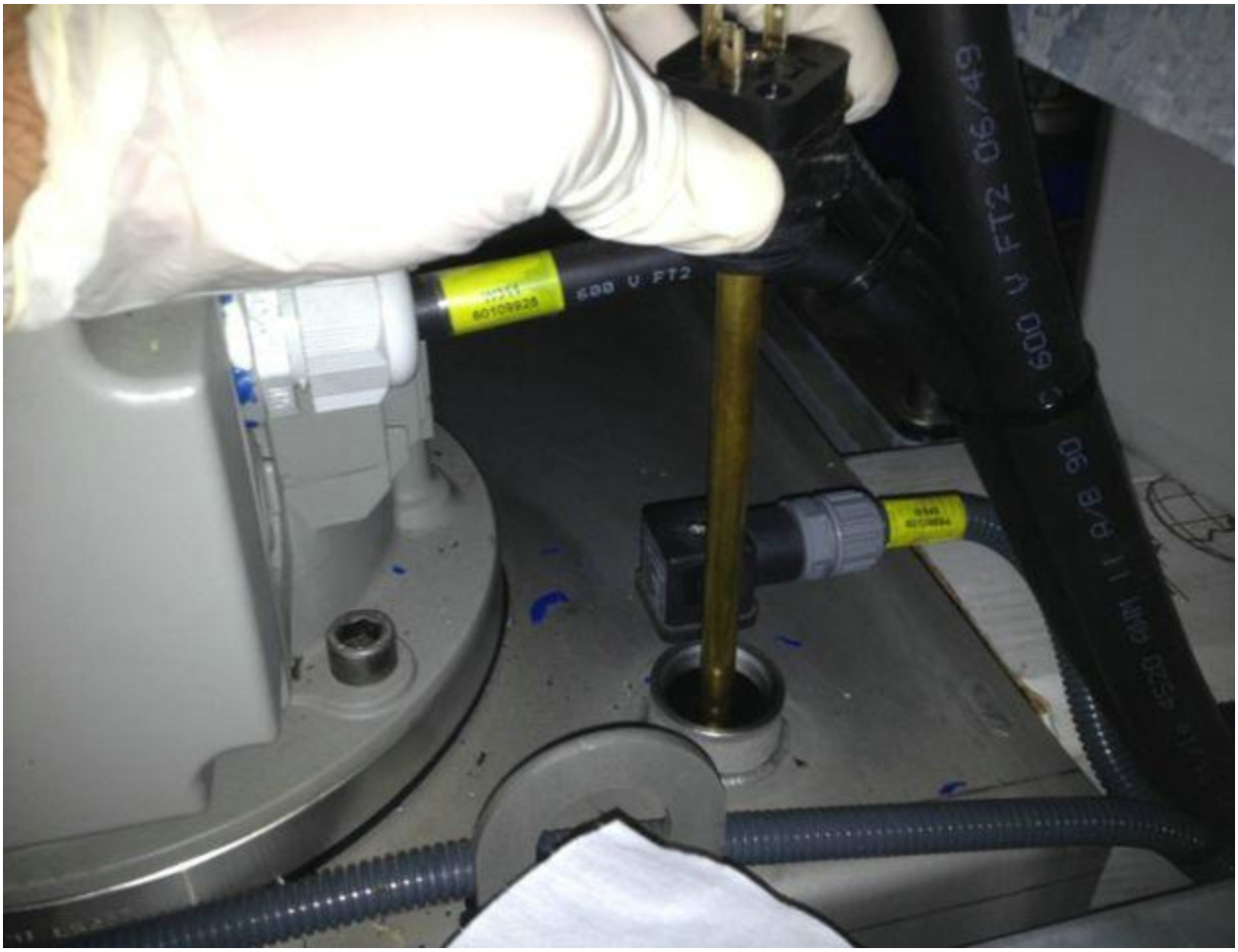
2] No

3] I don't know

- **Explanation**

  If the oil level is low and level switch is not working then error 323 will occur, check cable to level sensor and the level sensor itself. Remove level sensor from tank by disconnecting the electrical plug and turning the sensor counter clockwise

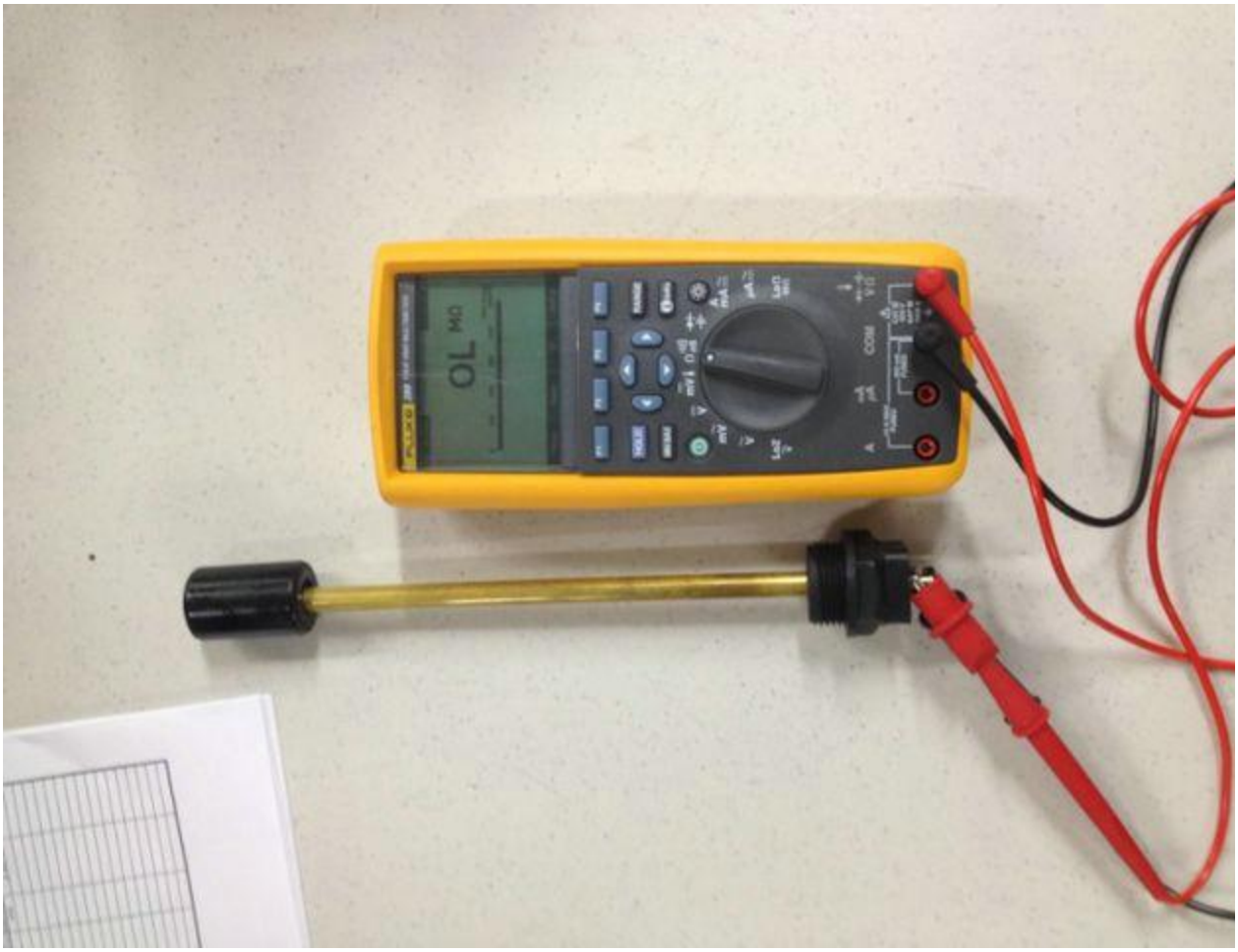
(OLD STYLE FLOAT SENSOR):


600 V FT2
600 V FT2 06/49

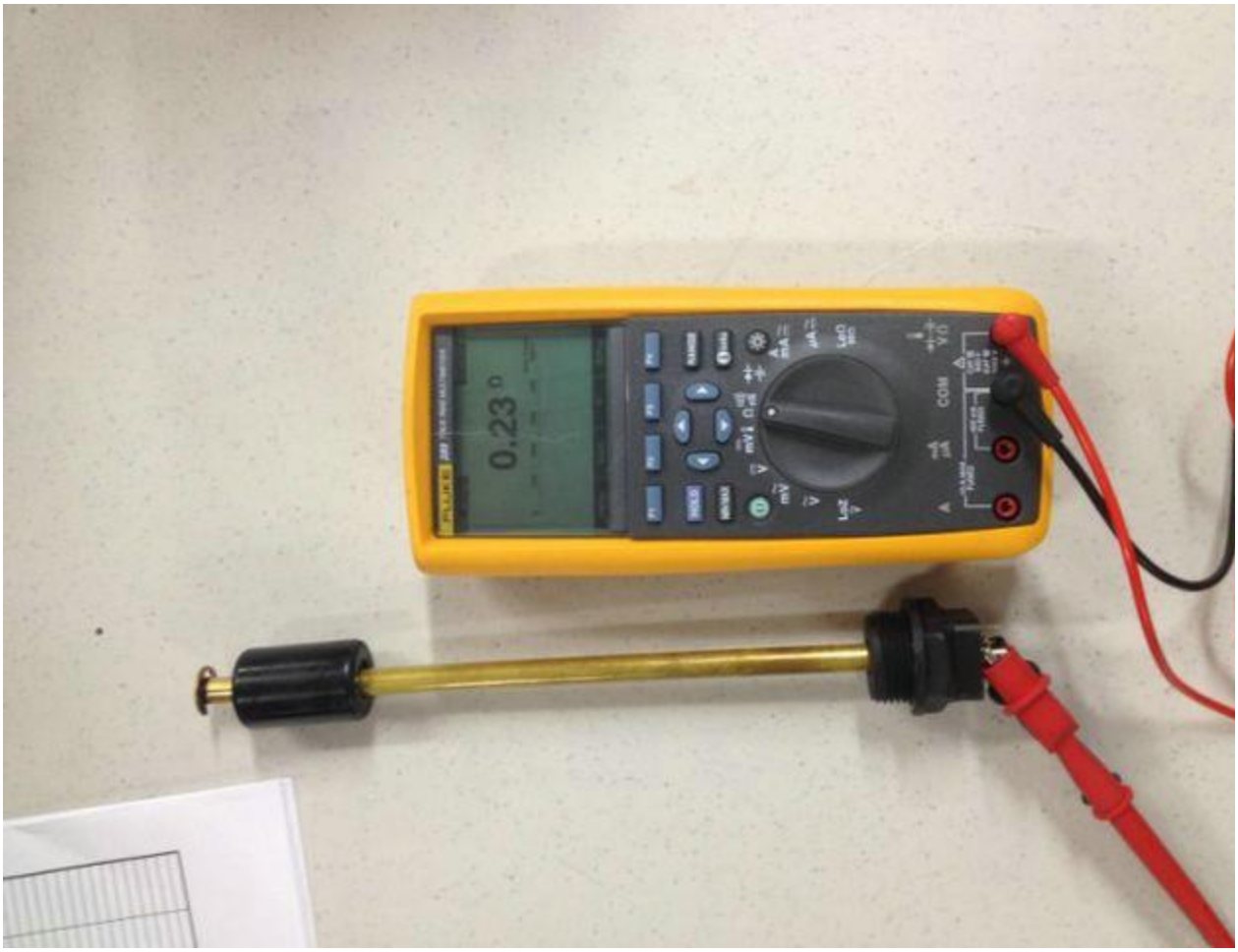
NEW STYLE FLOAT SENSOR:

NOTE: Older plastic versions of the sensor should be replaced with the new version whenever removed from the tank as the old sensor floats are susceptible to deterioration and can come off into the tank when attempting to remove.

Test the level sensor using a multi-meter (unless you have three hands, use alligator clip probes on the multi-meter). Set the multi-meter to read Ω.



Slide the float up the sensor shaft a few centimetres



Watch the resistance value on the multi-meter.

The value should change from OL to a low Ohm value when the float is in the position pictured.

If the value does not changed or is unrealistic, replace the float sensor.

Relevant spare parts	
Description	**Item No.**

LEVEL CONTROL LM1CTPA260 NA	60112817

Replace the defective needle valve

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**

IN THE HUB:

Check the three blade pitch pressures through the controller for any drop while the turbine is in operation.

If all three pitch pressures drop – check the main distribution block hydraulic system.- Needle valve

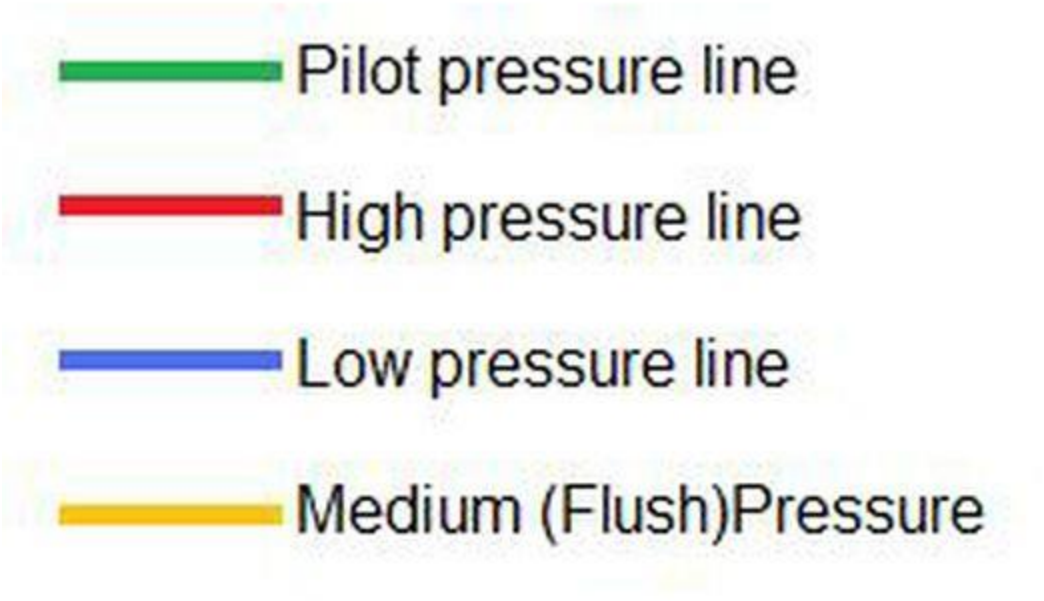
If any single blade pitch pressure drops –check the affected blade pitch hydraulic system.- Needle valve

Ensure the Needle valves are closed properly.

Swap the needle valve to check for needle valve failure.

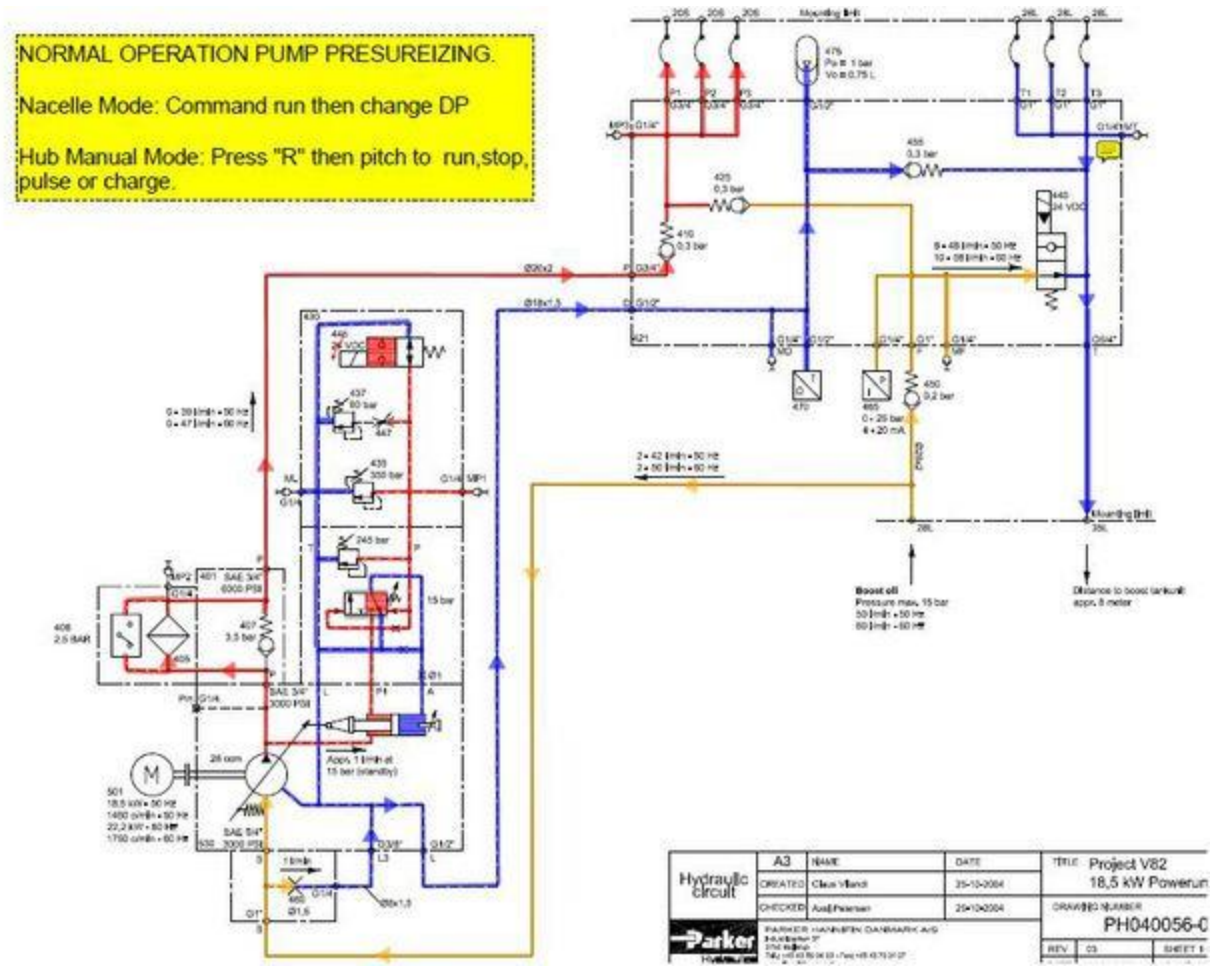
If the valve is defective, replace with new.

Circuit pressure line reference:

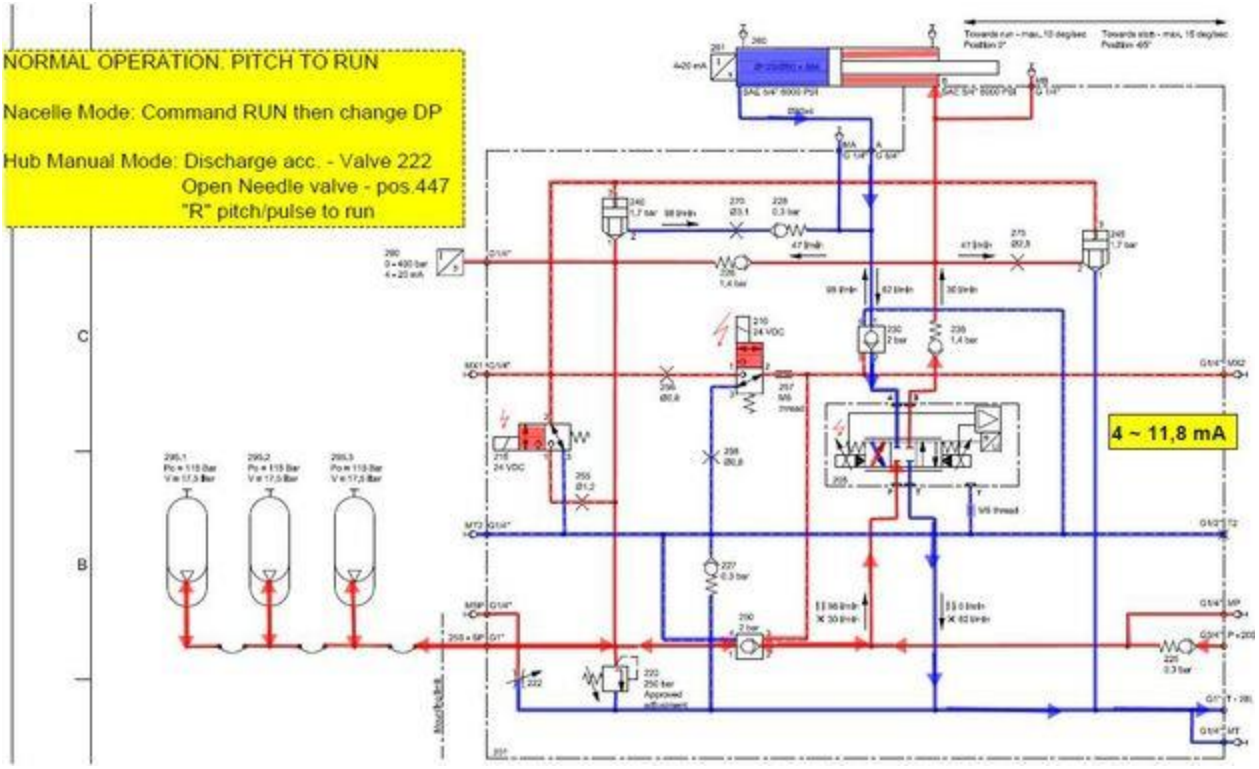


PARKER SYSTEM:

Main distribution block when pump pressurizing mode:

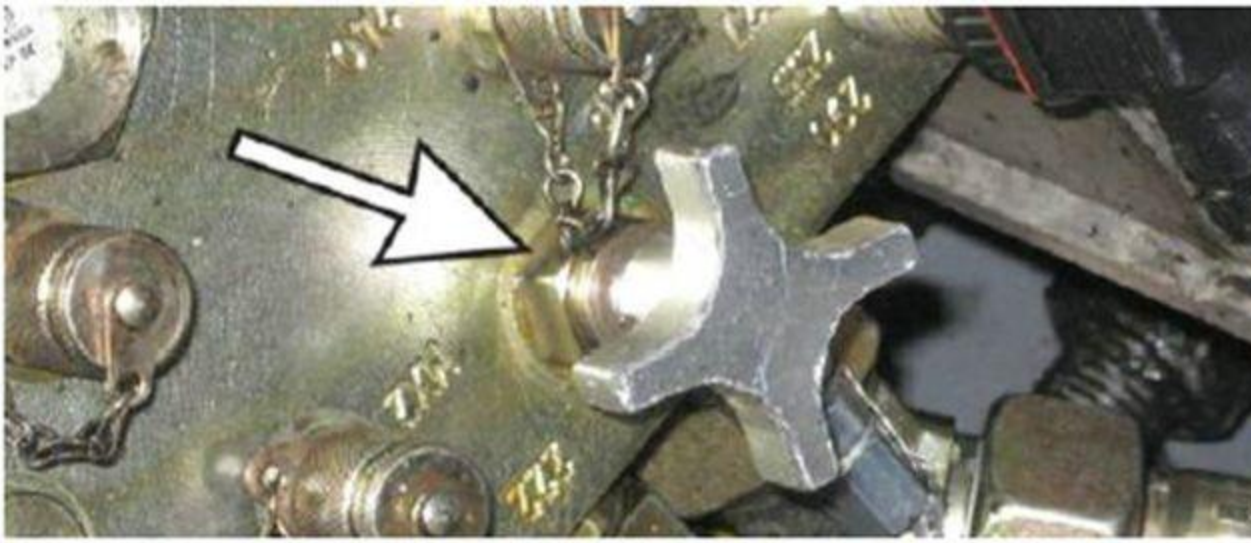


Pitch distribution block when turbine in ready for operation mode:



Needle valve part number for PARKER System: (POS: 447, 222)

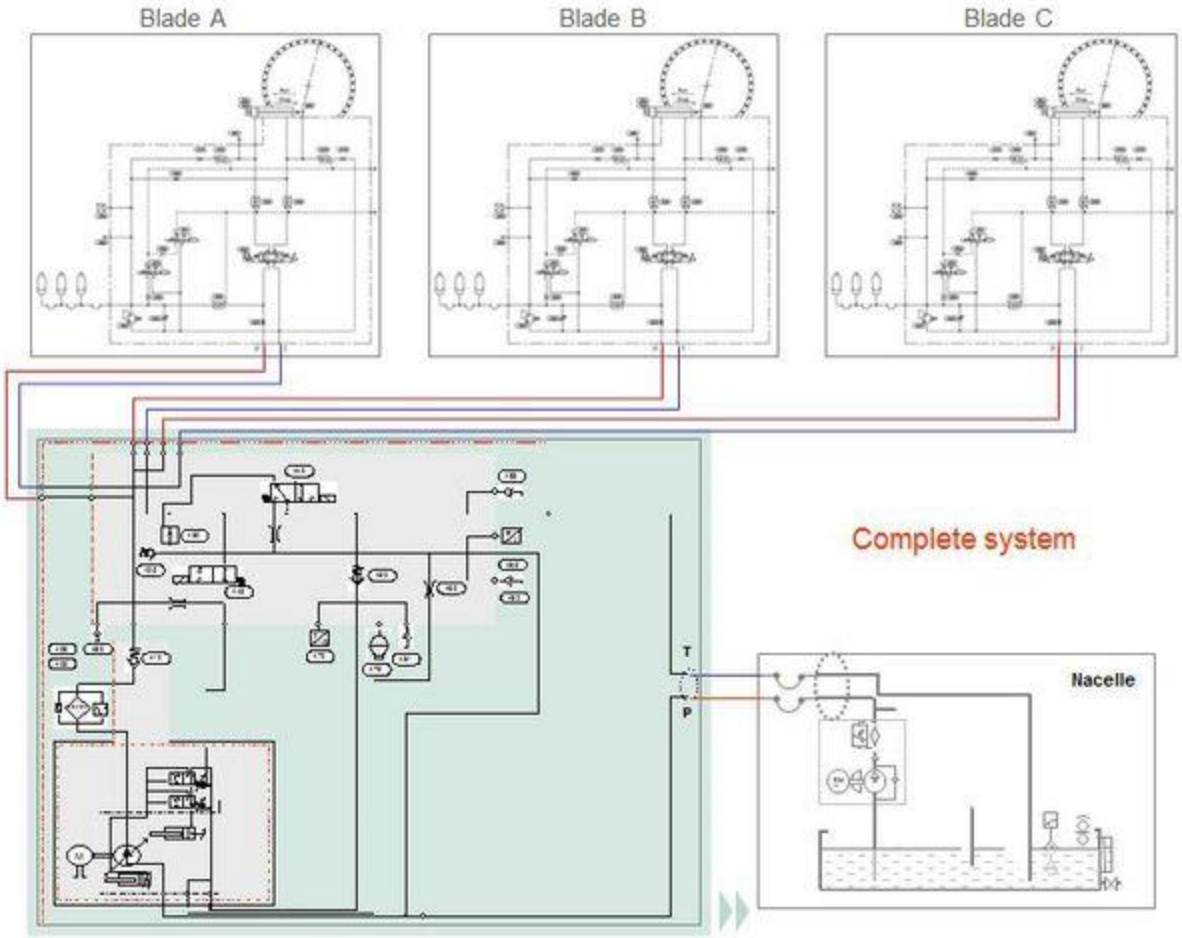
Relevant spare parts	
Description	**Item No.**
NEEDLE VALVE, NVH-2201	60104032
KNOB FOR NEEDLE VALVE	60112623



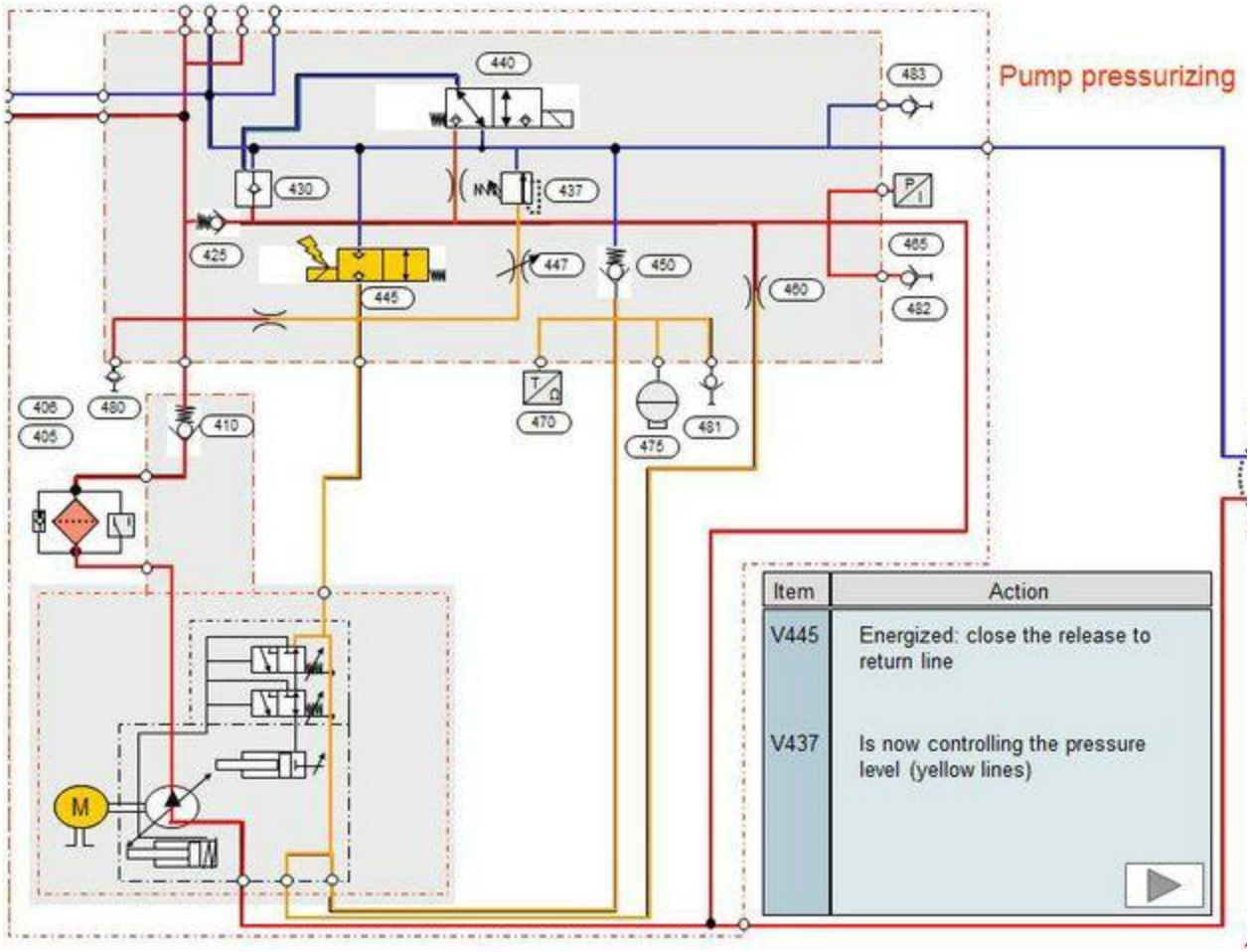
Relevant documentation	
Description	**DMS No.**
Hydraulic Pitch Control System	0001-3199

REXROTH SYSTEM:

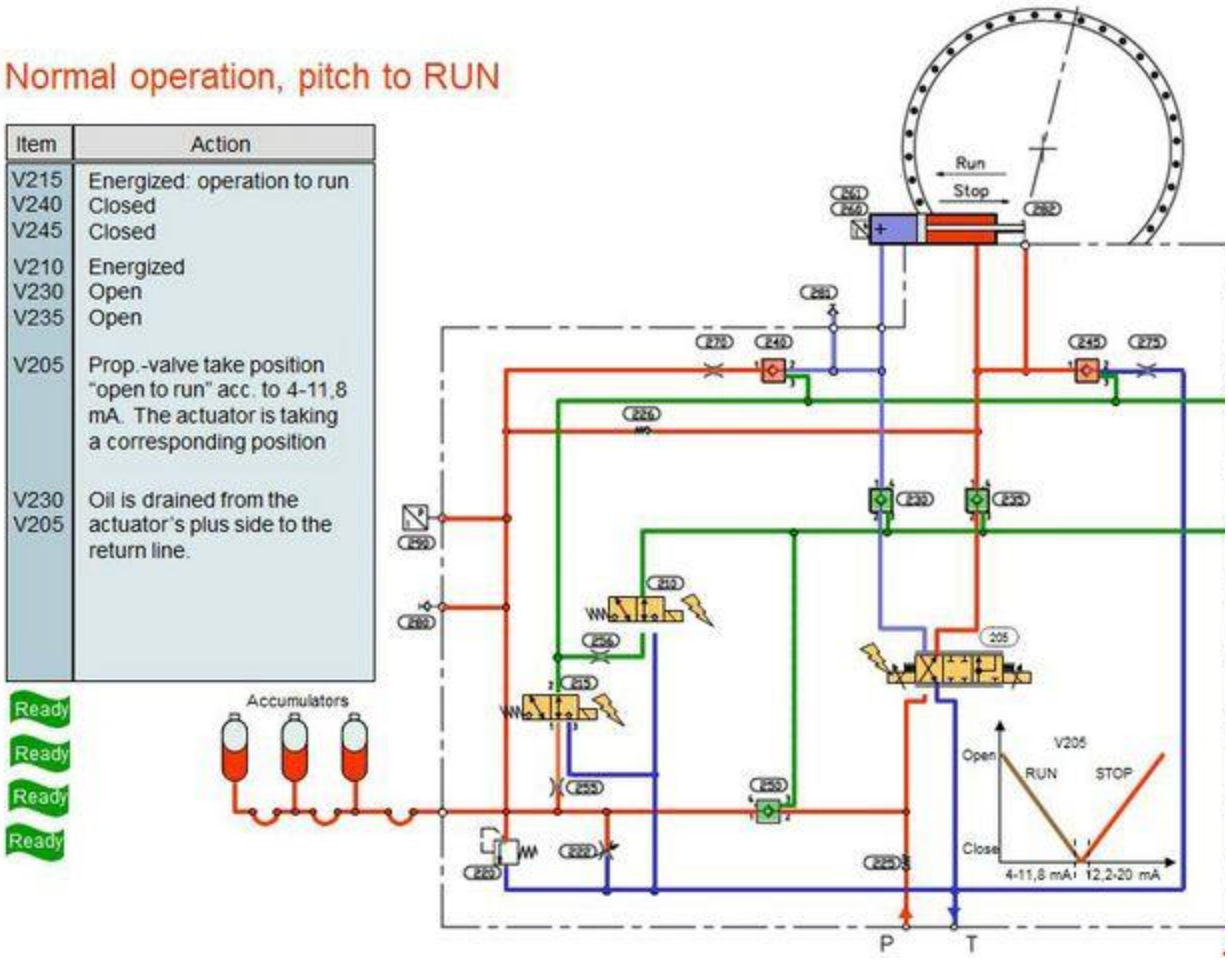
Overview hydraulic circuit:



Main distribution block when pump pressurizing mode:



Pitch distribution block when turbine in ready for operation mode:



Ensure the Rexroth hydraulic system needle valve type before replacing.

Needle valve part number for REXROTH System –TYPE-1: (POS: 447, 222)

Relevant spare parts	
Description	**Item No.**

THROTTLE VALVE: NFBC-KCN A3031	60096478
HANDLE FOR NFBC-KCN A30316JG01	60109005

Needle valve part number for REXROTH System –TYPE-2:

Relevant spare parts	
Description	**Item No.**
THROTTEL VAVLE NFCC-LCN A40122	105103
HANDLE FOR THROTTLE VALVE NFCC	60112482

Relevant documentation	
Description	**DMS No.**
Fast Active Stall Hydraulics Valve replacement SWI	1000778
Fast Active Stall System SWI	0001-1672

Perform a visual inspection of the back of the pitch cylinder bore.

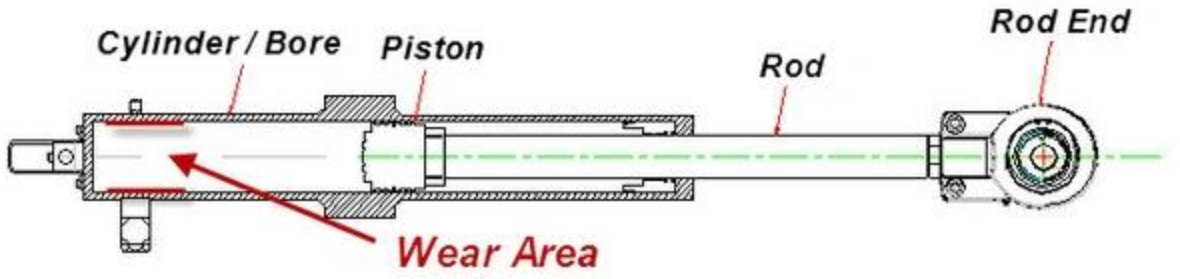
Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**



The back 250 mm of the pitch cylinder bore may be susceptible to excessive wear. This area of the cylinder is where the piston operates during production. When excessive wear occurs in the cylinder barrel, the piston seals are also subjected to accelerated wear, and internal leakage will occur in both run and stop positions. The effect of this leakage is excessive pump run time during operation as well as during stop. In the event of a pump failure, grid outage or certain turbine faults, pressure within the accumulators will bleed off, and blades may be at risk of being pushed into the run position under high wind conditions. Check the back of the bore for abnormal wear.

Actions:

Refer to DMS doc 0059-1574 for inspection instructions and criteria for running the turbine if wear is found.

Relevant documentation	
Description	**DMS No.**
V-82 Pitch Ram Bore inspections	0059-1574
V82 Rexroth pitch ram installation on a Parker pitch system	0059-7339

Relevant CIM case

CIM case	Task list	Service Message
3699	23210	0059-3323 Evo2 Pitch Cylinder Wear

Replace the defective valves

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**

Check the three blade pitch pressures through the TACII controller for any pressure drop while the turbine is in operation.

If all three pitch pressures drop – check the main distribution block hydraulic system.

Relevant documentation	
Description	**DMS No.**
Pitch Hydraulic circuit (Rexroth) Main manifold Diagram	5003347
Pitch Hydraulic circuit (Parker) Main manifold Diagram	5003018

REXROTH SYSTEM - MAIN MANIFOLD:

Check the 440 and 445 valves solenoid coil, cable and hub computer.

Defective electrical component need to be replaced.

Relevant spare parts	
Description	**Item No.**
Cable W952 Idle valve Y445.0	60021541
Cable W954 Flushing valve Y440.0	60021543
SIF HUB COMPUTER CABINET EVOII	51701801

If valves are defect replace with new.

Part number for valves:

Relevant spare parts		
Description	**Item No.**	**Valve Nos.**
ACCUM HYDR 0BAR 0.7L 1/2" BS	103805	475
CHECK VALVE: M-SR 15 KE02-1X/	60096479	410, 425
PRESSURE CONTROL VALVE: KBD2HO	60096503	437
VLV SOLENOI KSDER1PA/HG24N9K4M	60098803 (Phased out)	**445**
CHECK VALVE COFA-XBN	60099554	430

The part No. 60098803 is phased out. It is replaced by 780430.

Relevant spare parts

Description	Item No.	Status
VLV SOLENOI KSDER1PA/HG24N9K4M	60098803	Phased out
KSDER1PB/HN9V F BRAKE UNIT 3MW	780430	Available

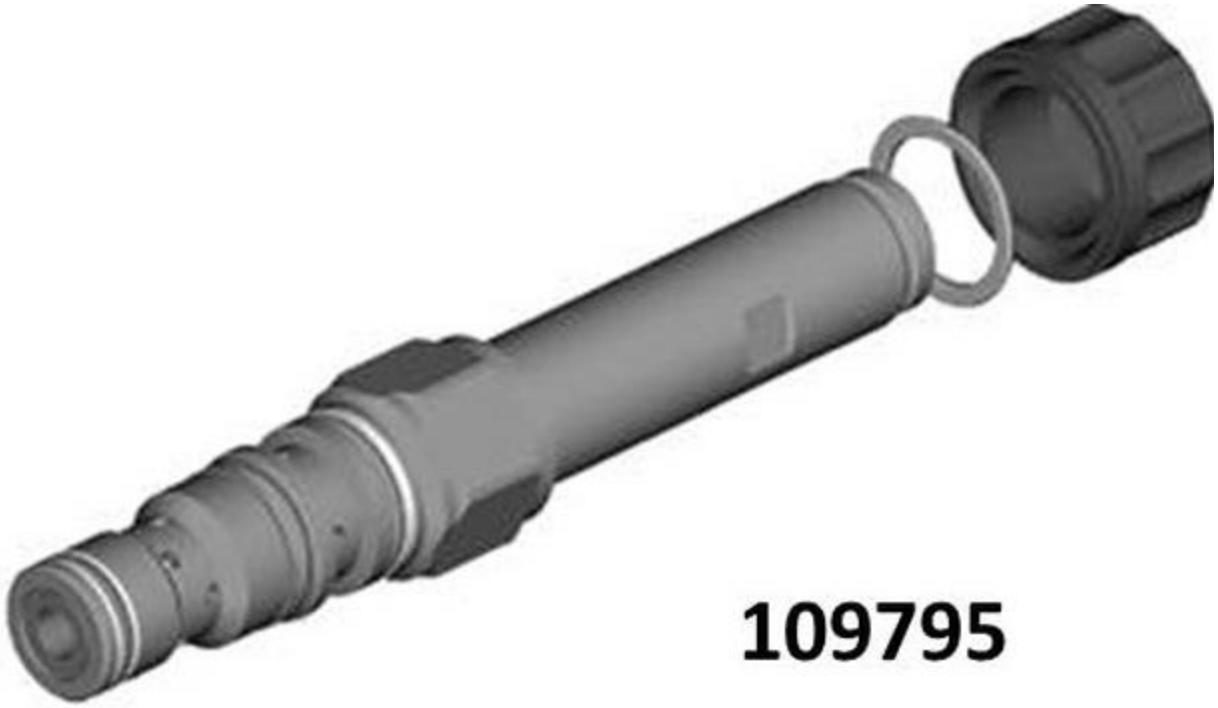
The part No.60096475 is phased out and henceforth replaced by 109795 & 60106201.

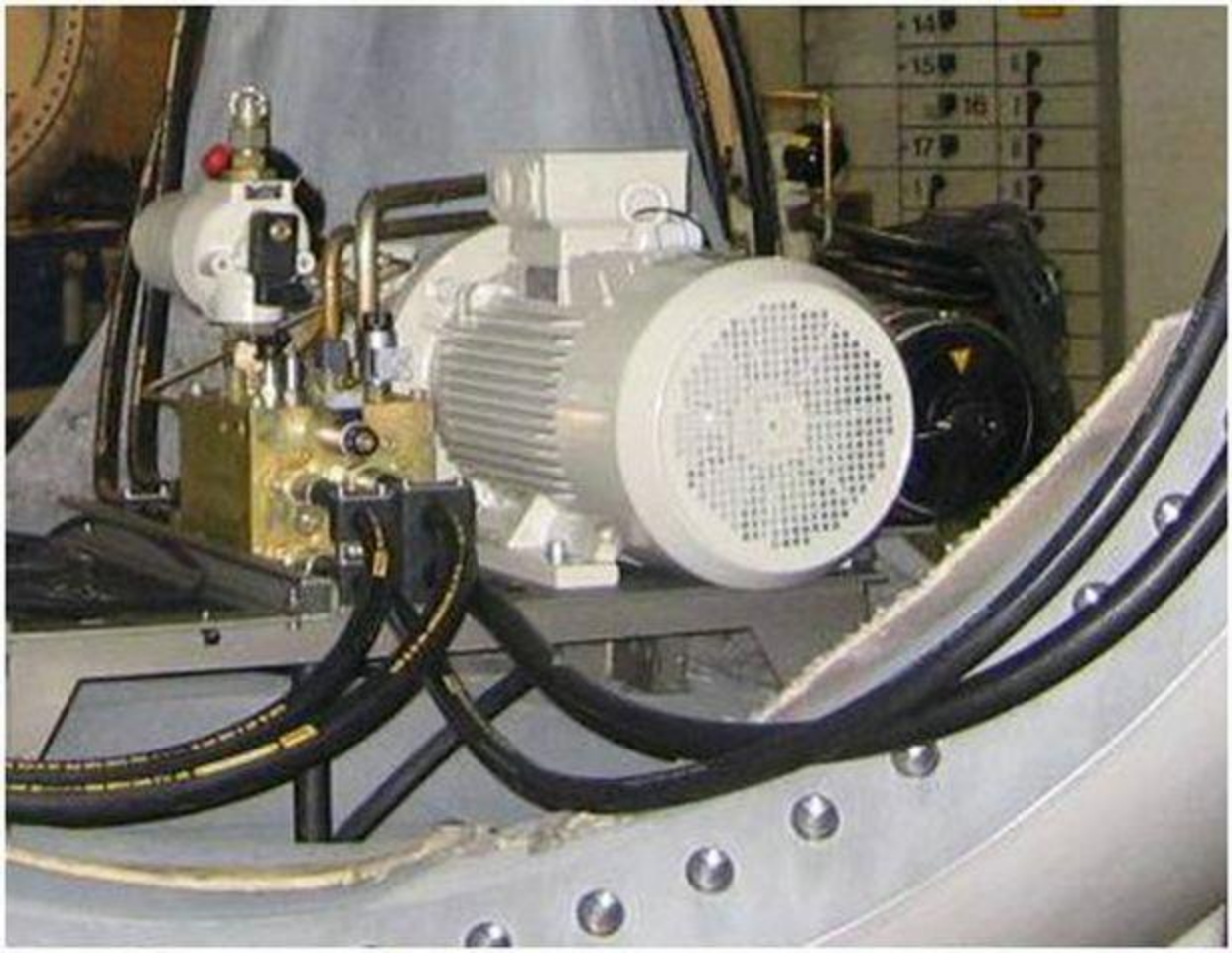
(Rexroth) Valve/Solenoid- Pos. 210 & 215

Relevant spare parts		
Description	**Item No.**	**Status**
SOL VAL KSDEU1CA/HCG24N0K4M	60096475	Phased out
ELECTRIC SEAT VALVE	109795	Available
COIL GZ37-4 24VDC 19W	60106201	Available


6002154


60106201

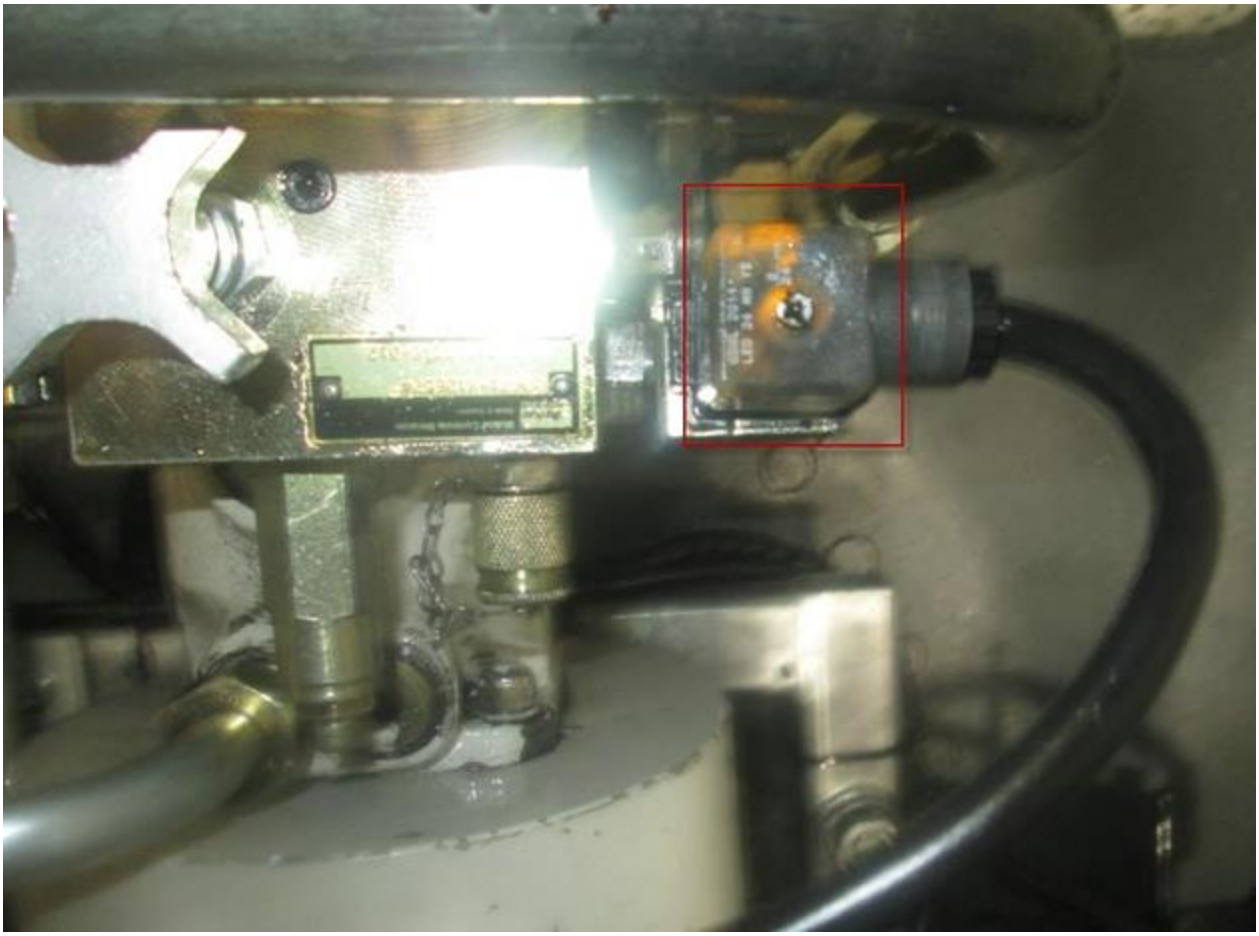

109795



PARKER SYSTEM -MAIN MANIFOLD:

Check the 440 and 445 valves solenoid coil, cable and hub computer.

NOTE: Check the valve for proper functioning of magnetisation using screw driver while coil energised condition. Do not conclude with the lights ‘ON’ condition for confirming proper coil functioning. Sometimes, LED will be in ‘ON’ condition as shown below, but it is not necessary that coil is in good condition.



Defective electrical components need to be replaced.

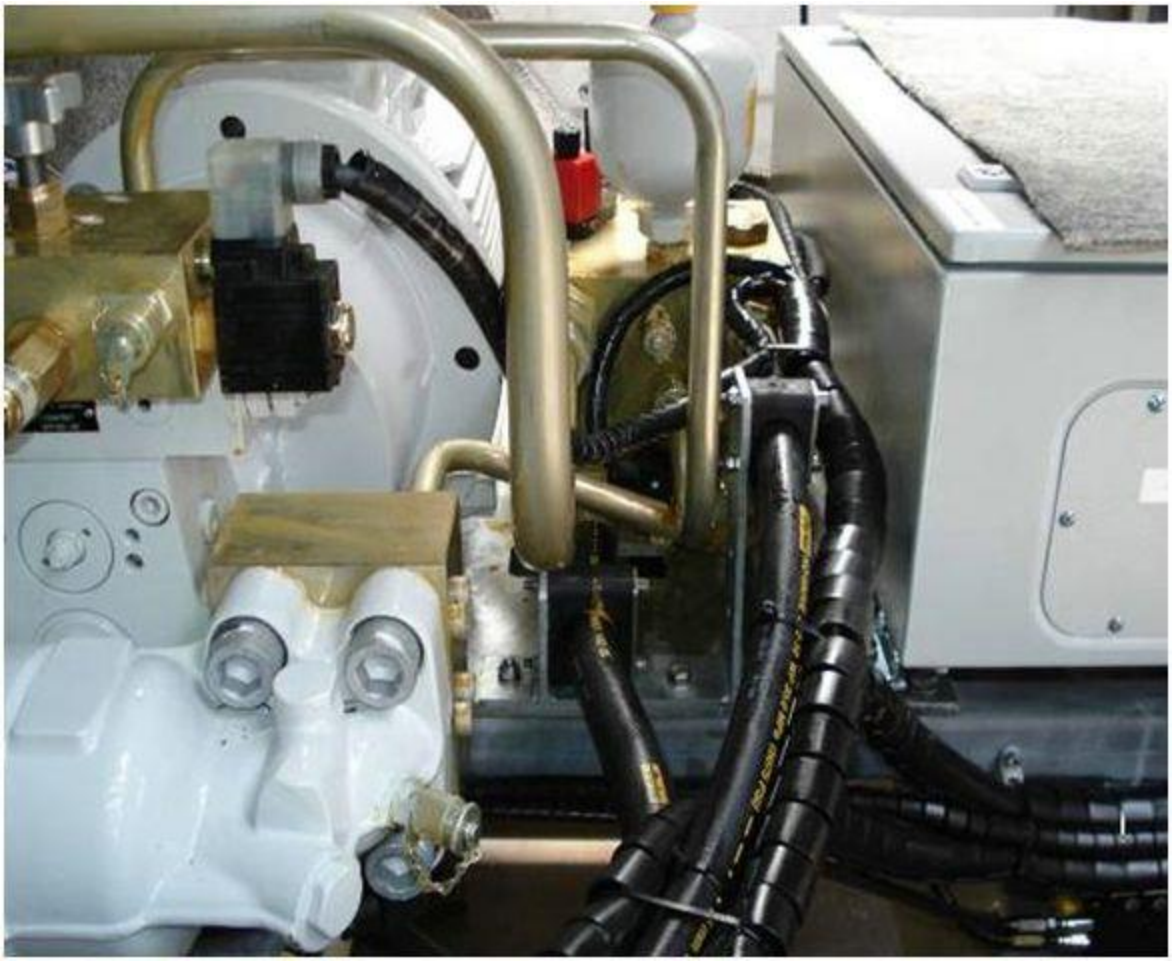
Relevant spare parts	
Description	**Item No.**
Cable W952 Idle valve Y445.0	60021541
Cable W954 Flushing valve Y440.0	60021543

SIF HUB COMPUTER CABINET EVOII	51701801

If valves are defective, replace with new.

Part number for valves:

Relevant spare parts		
Description	**Item No.**	**Valve Nos.**
CHECK VALVE, 0,3 BAR, 375L	60111616	410
CHECK VALVE, 0,3 BAR, 82L	60111613	425, 455
SOL. VALVE NO, DS201 NR	60112645	**440**
COIL, 30 WATT 24 VDC DIN PLUG	60112646	
RELIEF VALVE, RDH-08-2-S-50, 138 - 345 BAR	60112643	435
RELIEF VALVE, RDH-08-2-S-30, 69 - 207 BAR	60104030	437
SOL. VALVE NO, DSH081 NL	60112647	**445**
COIL 24VDC DIN PLUG S8LDD024	60104025	**445A**



Relevant documentation	
Description	**DMS No.**
Change of Valve in Parker Pitch Manifold	0002-4365
Distribution Manifold Replacement	0021-3758

If any one blade pitch pressure drops – check the affected blade pitch hydraulic system.

Refer the hydraulic diagrams

Relevant documentation	
Description	**DMS No.**
Pitch Hydraulic circuit (Rexroth) Pitch manifold Diagram	5003025
Pitch Hydraulic circuit (Rexroth) Filter manifold Diagram	5002046
Pitch Hydraulic circuit (Parker) Pitch manifold Diagram	5003013

REXROTH SYSTEM -PITCH MANIFOLD:

Check the below valve positions.

Swap the valves one by one in to other manifolds and check valve operation.

If the fault shifts to other blades the valve is likely defective. If not continue to check the other valves.

Part number for valves:

Relevant spare parts		
Description	**Item No.**	**Valve Nos.**
THROTTEL VAVLE NFCC-LCN A40122	105103	222
PROP VAL 4WREE 10R75-2X/G24K31	60078979	205
PRESSURE CONTROLVALVE:RDDT-QWN	60096477	220
CHECK VALVE: M-SR 15 KE02-1X/	60096479	225

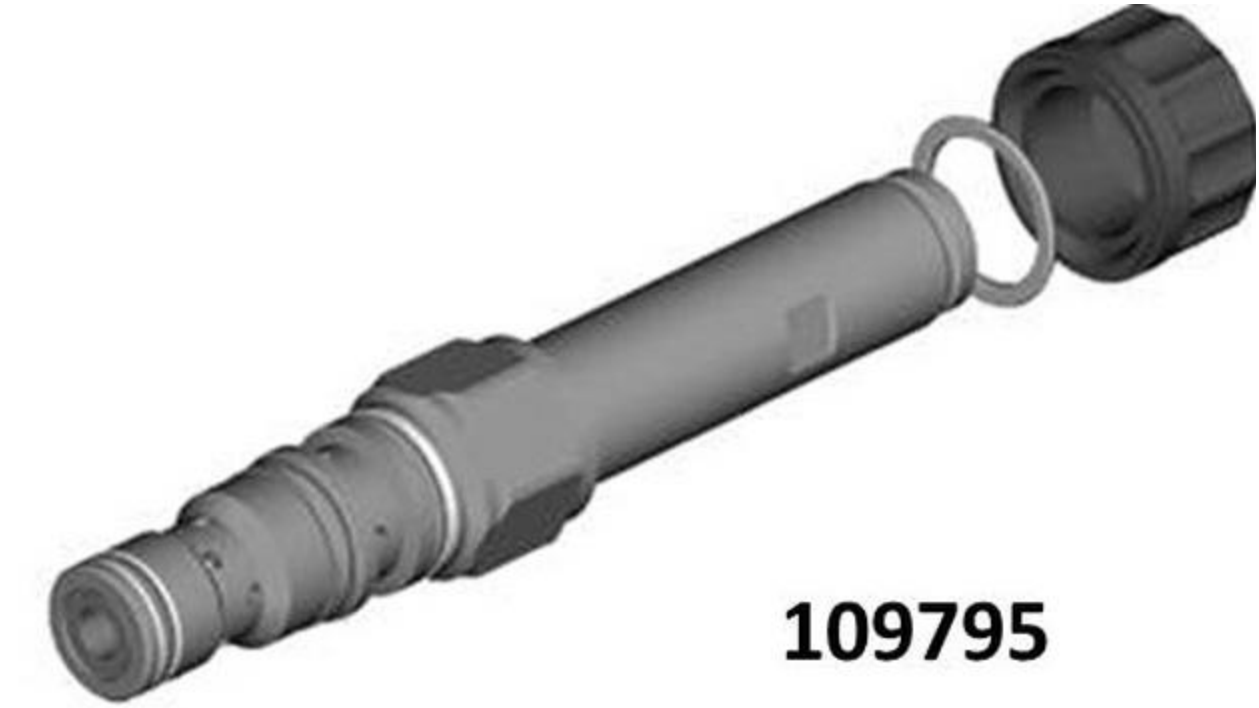
CHECK VALVE: CXFA-XFN A30314JG	60096480	226
CHECK VALVE PILOT:CVEV-XCN A30	60096481	230, 235, 250
VALVE CHECK PILOT COFA-XAN A30	60096493	240, 245

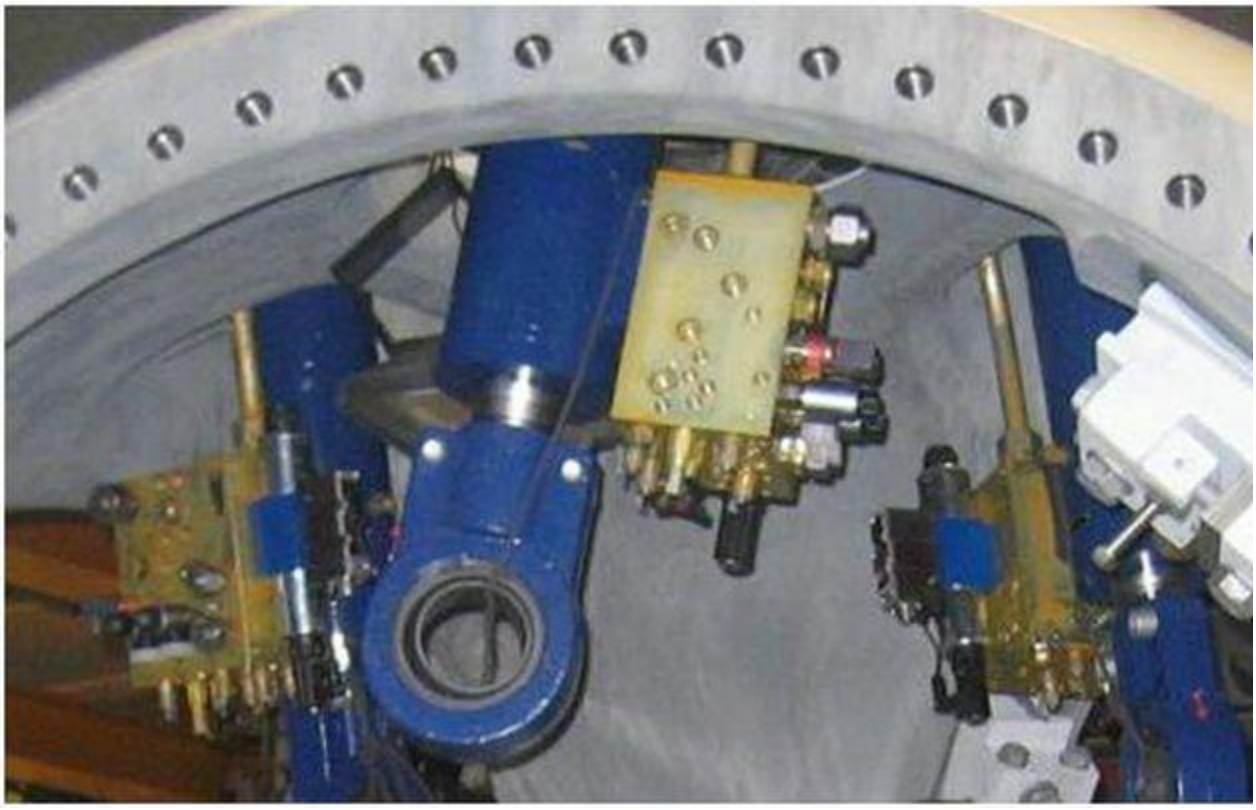
The part No.60096475 is phased out and henceforth replaced by 109795 & 60106201.

(Rexroth) Valve/Solenoid- Pos. 210 & 215

Relevant spare parts		
Description	**Item No.**	**Status**
SOL VAL KSDEU1CA/HCG24N0K4M	60096475	Phased out
ELECTRIC SEAT VALVE	109795	Available
COIL GZ37-4 24VDC 19W	60106201	Available


60106201


109795



PARKER SYSTEM -PITCH MANIFOLD:

Check the below position valves,

Swap the valves one by one in to other manifolds and check valve operation.

If fault shifted to other blades the valve likely defect. If not, check the other valves.

Part number for valves:

Relevant spare parts		
Description	**Item No.**	**Valve Nos.**
CHECK VALVE PILOT:CVEV-XCN A30	60096481	230 , 250
3/2 DIRECTIONAL VALVE	60111617	210, 215
LOGIC ELEMENT PIL. OPERATED	60111630	240, 245
PRESSURE CONTROLVALVE:RDDT-QWN	60096477	220
CHECK VALVE CVH103P20	60112628	235
PROP. VALVE D31FHE01C	60112621	205

Check the cable W949 for loose connection and damage

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**
  Check the cable W949 for loose connection and damage, replace if found damage or no continuity.

Relevant spare parts	
Description	**Item No.**
CABLE W949 SHOT DOWN VALVE	60021539

Check the coupling and spider

Does this solve the problem?

1] Yes

2] No

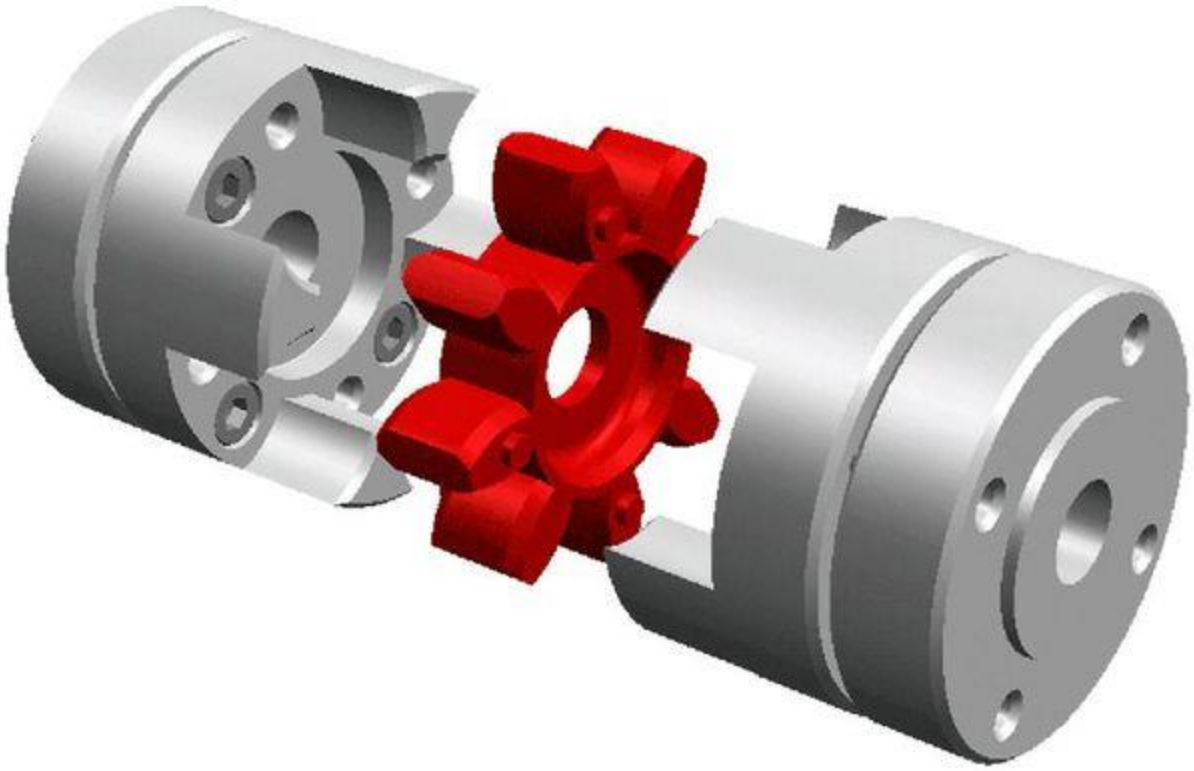
3] I don't know

- **Explanation**

IN THE HUB

Check the coupling between the pitch main pump and electric motor.

Any defect noticed in the coupling or spider must be replaced.



Rexroth

Relevant spare parts	
Description	**Item No.**
COUPLING COMPLETE AB33-22/KD 4	60098814

Parker

Relevant spare parts	
Description	**Item No.**
COUPL. MOTOR SPIDEX GG A38/45	60112652
COUPL. PUMP SPIDEX GG A38.22H7	60112653
SPIDER, SP380232 ZK 38	60112654

CIM 3410

Does this solve the problem?

1] Yes

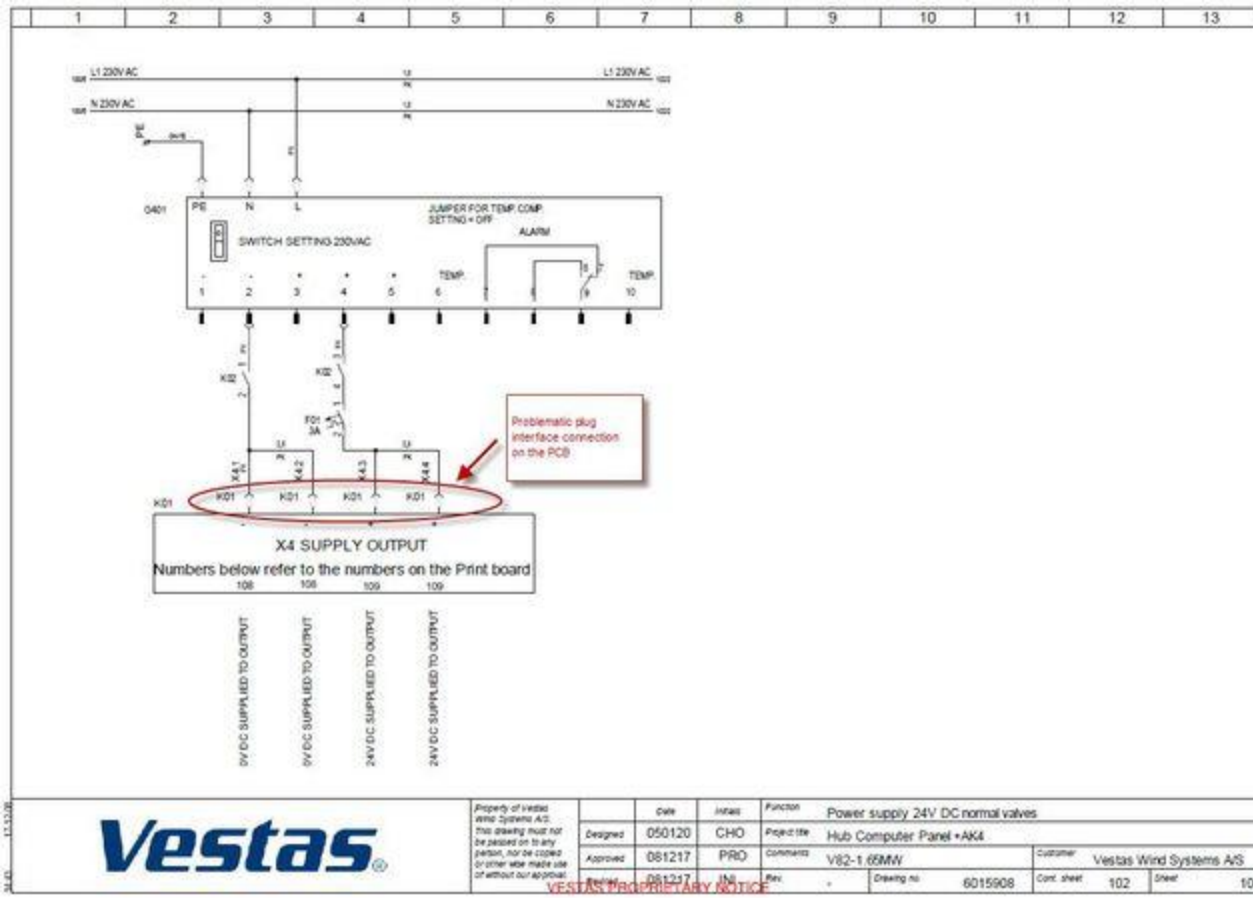
2] No

3] I don't know

- **Explanation**
  CIM3410

Check 24V DC Power supply plug

The problem is relating to the X4 plug connection where the 24VDC is supplied to the HUB Controller.

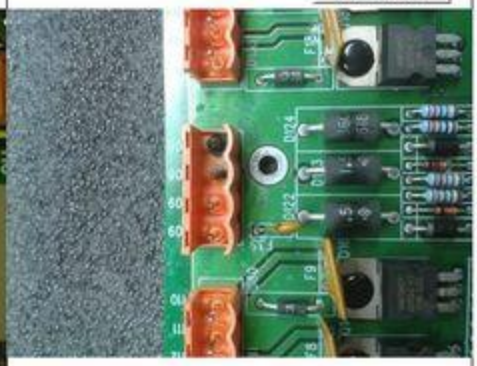


It has in many cases been seen that the plug connection have been overheated and burned as indicated on the below pictures.

1. Insert Picture

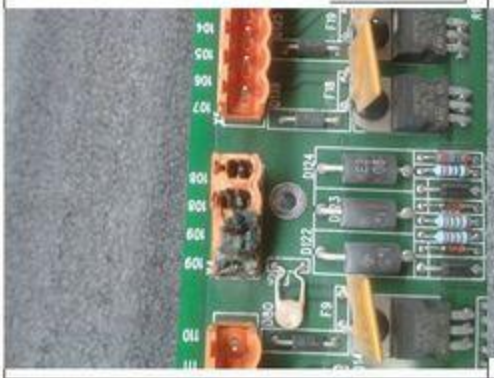
Picture 1 Hub computer shows burnt 108/109 connectors

2. Insert Picture



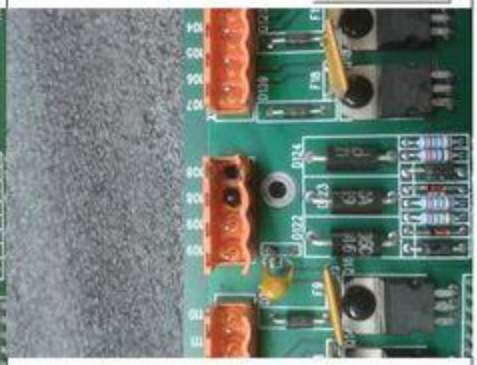
Picture 2 Hub computer shows burnt 108/109 connectors

3. Insert Picture



Picture 3 Hub computer shows burnt 108/109 connectors

4. Insert Picture



Picture 4 Hub computer shows burnt 108/109 connectors

The Minor Component Repair Team, has been requested to implement an improved interface on the PCB, so that the overheated connections could avoided.

Case creator have proposes a simple fix to mitigate the problem. Namely to install a screw terminal versus the existing pin plug connector.

Picture 5 Existing Plugin type connector

Picture 6 Proposed screw type connector

The proposed solution by case creator have been forwarded to the Minor Component repair Program, awaiting approval from technology responsible.

Description of action until a solution is in place.

If a HUB Computer fails in the field please replaced it with a new part and return the defective part for repair.

Relevant spare parts	
Description	**Item No.**
SIF HUB COMPUTER CABINET EVOII	51701801 REN

The CIM1594 is raised to address the issues with the Hub Computer, and any replacement cost should therefore go

to that case.

This case is only to have the proposed repair solution implemented.

Relevant CIM case		
CIM case	**Task list**	**SWI**
3410	N/A	N/A
1594	N/A	N/A

Check the hydraulic pump

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**

Check the operation of the pump and observe for any abnormal noise.

Change the hydraulic pump.

Rexroth

Relevant spare parts	
Description	**Item No.**
HYDR. PUMP A10VSO 28 DFR1/31R-	60098815

Parker:

Type 1

Relevant spare parts	
Description	**Item No.**
PUMP HYDR PVM 028R1K1T1NM1X5	60112677


ROTATION
Parker
PMD-Chemnitz
Made in Germany
Typ:PV028R1K1T1NMM1
Ser.-Nr.: 11638173/ 009
Vg 28 ccm/rev Code GW Serie 4545
Vg max 28 ccm/rev n max 3000 rpm
pd max 280 bar p max 350 bar
10/06/2013 15:53

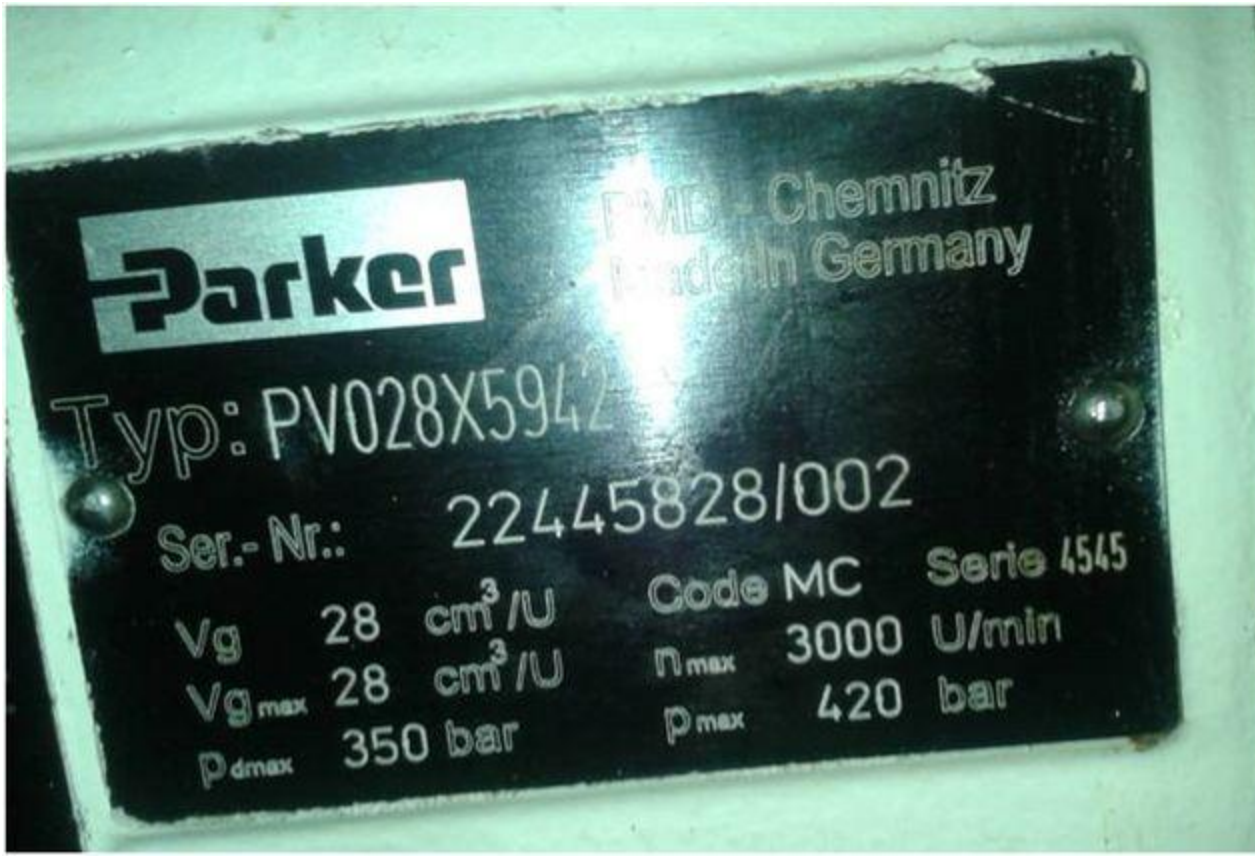

Parker
PMD - Chemnitz
Made in Germany
M
132
PVCMAM1N1
21952609

Type 2

Relevant spare parts	
Description	**Item No.**
HYDR. PUMP, V82 0-series	60112676

Type 3

Relevant spare parts	
Description	**Item No.**
HYDR PUMP PV028X5942	60112675



Replace electrical motor

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**

Check the motor for operation and any abnormal noise.

If any abnormal noise is observed from the bearing, the bearing must be replaced.

Relevant documentation	
Description	**DMS No.**
Replacement of Pitch Pump Motor- WKI	0001-3425

Relevant spare parts	
Description	**Item No.**
Rexroth -ELEC. MOTOR ABZEK-B35-160M-4-	60098813

Parker -Elec. motor FCMP-160LC-4	60112650

Replace the damaged actuator or replace the defective seal

Does this solve the problem?

1] Yes

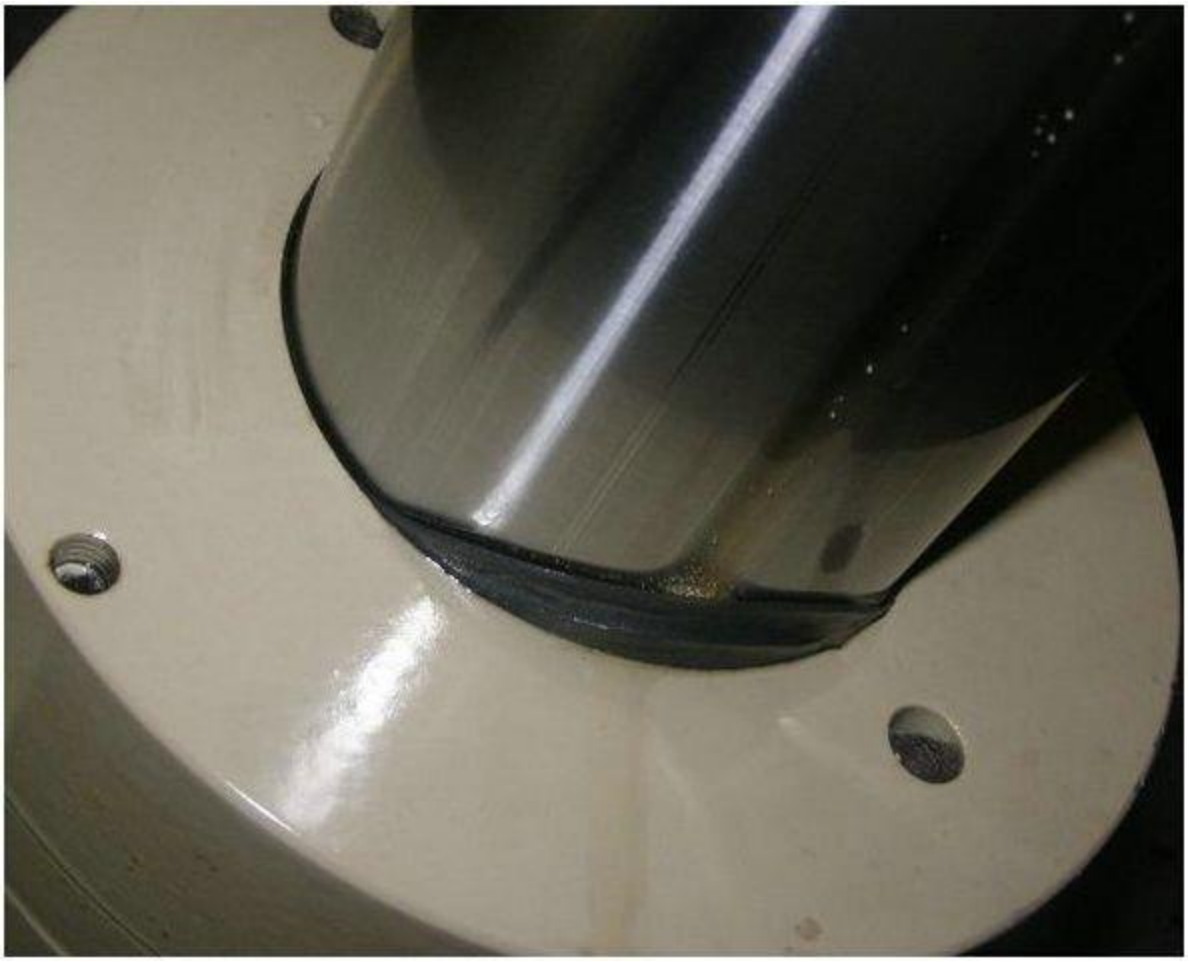
2] No

3] I don't know

- **Explanation**
  IN THE HUB:

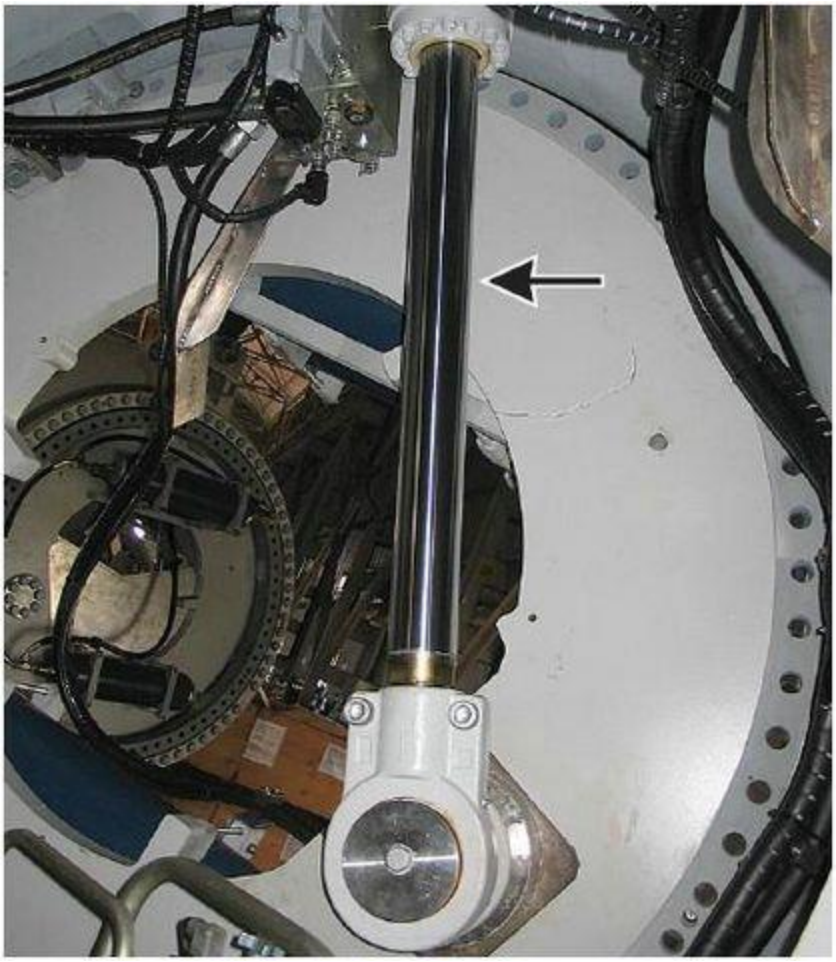
Check the Actuator rod surface thoroughly for any indentations, marks or damage.

Check the actuator seal for any damage or wiper seal protruding from the bushing.



Check for any oil leak when the actuator is in operation with system pressure.

If there are any leaks found, replace with new seal kit.



PARKER System:

Relevant spare parts	
Description	**Item No.**
HYDR CYL 125/90x884 COMPLETE (Actuator with manifold)	60120439
HYDR CYL BUSHING W. SEALS ø90 (Seal with Bush)	60114033

REXROTH System:

Relevant spare parts	
Description	**Item No.**
ACTUATOR Ø140 WITH Ø100 TRUN.((Actuator with manifold)	60096442

ACTUATOR SEAL KIT (Seal kit alone)	60110956

Relevant documentation	
Description	**DMS No.**
V82 Pitch Actuator Exchange	0021-4366
Pitch Actuator Piston Rod Replacement	0023-2047