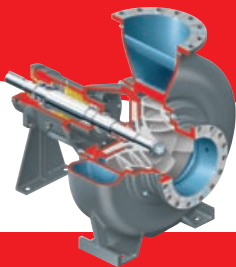


FRBH Heavy-Duty Paper Stock and Process Pump

MAINTENANCE CHECKLIST



! DANGER

Read User Instructions **before** installing or maintaining this pump.
Copies available on www.flowserve.com

Recommended Oil Lubricants

Specification/ Brand	Splash / Force Feed / Purge Oil Mist Lubrication			Pure Oil Mist
	32	46	68	
Viscosity cSt @ 40°C (104°F)	32	46	68	100
Oil Temperature Range ¹	-5 to 65°C (23 to 149°F)	-5 to 78°C (23 to 172°F)	-5°C and above (23°F and above)	-30°C and above (-22°F and above)
Designation to ISO 3448 and DIN51502	ISO VG 32 32 HL/HLP	ISO VG 46 46 HL/HLP	ISO VG 68 68 HL/HLP	ISO VG 100 -
BP	BP Energol HL32	BP Energol HL46	BP Energol HL68	-
	BP Energol HLP32	BP Energol HLP46	BP Energol HLP68	
Castrol	Perfecto T32	Perfecto T46	Perfecto T68	-
Esso	TERESSO 32	TERESSO 46	TERESSO 68	-
	NUTO H32	NUTO H46	NUTO H68	
LSC (for oil mist)	LSO 32	LSO 46	LSO 68	LSO 100
	Synthetic Oil	Synthetic Oil	Synthetic Oil	Synthetic Oil
Mobil	Mobil DTE Oil Light	Mobil DTE Oil Medium	Mobil DTE Oil Heavy Medium	-
	Mobil DTE13M	Mobil DTE15M	Mobil DTE26	
	Mobil DTE24	Mobil DTE25		
Shell	Shell Tellus 32	Shell Tellus 01 C 46	Shell Tellus 01 C68	-
	Shell Tellus 37	Shell Tellus 01 46	Shell Tellus 01 68	
	Shell Turbo T32	Shell Turbo T46	Shell Turbo T68	
Texaco	Rando Oil HD 32	Rando Oil 46	Rando Oil 68	-
	Rando Oil HD-AZ-32	Rando Oil HD B-46	Rando Oil HD C-68	
Total	Azolla ZS32	Azolla ZS46	Azolla ZS68	-

1. Note: Allow two hours for bearing temperature to stabilize. The final temperature will depend on the ambient, r/min, pumpage temperature and pump size. Some oils have a greater Viscosity Index than the minimum acceptable of 95 (e.g., Mobil DTE13M) which may extend the minimum temperature capability of the oil. Always check the grade capability where the ambient is less than -5°C (23°F).

Oil and Grease Quantities

Bearing Frame Size No.	Oil Sump Capacity		Initial Grease Capacities					
			Thrust Bearing			Line Bearing		
	Liters	U.S. Gal.	Cu. Cm.	Cu. In.	Oz.	Cu. Cm.	Cu. In.	Oz.
1	1.5	0.4	120	7.3	6	200	12.1	10
2	3.5	0.9	361	22.0	18	380	23.2	19
3	5.0	1.3	680	41.5	34	559	34.1	28
4	6.0	1.5	917	56.1	36	620	37.8	31

Oil lubrication is standard.

Vibration

Maximum level: 6.4 mm/s (0.25 in/s) RMS (measured on bearing housing surface)

Alignment

Align pump and motor shaft to within 0.08 mm (0.003 in) parallel T.I.R. and 0.0005 mm/mm (0.0005 in/in) angular T.I.R.

Relubrication Intervals²

Lubricant	<71°C (160°F)	71 to 79°C (160 to 175°F)	79 to 93°C (175 to 200°F)
Grease	6 mo	3 mo	1.5 mo
Mineral Oil	6 mo	3 mo	1.5 mo
Synthetic Oil	18 mo	18 mo	18 mo

2. Assuming good maintenance and operation practices and no contamination.

Seal Flush Requirements

- Pressure: 0.7-1.0 bar (10-15 psi) min. differential across seal faces
- Flow rate: 0.7-1.4 m³/h (3-6 gpm)

Impeller Axial Clearance

- 0.38-0.51 mm (0.015-0.020 in)

Impeller Balance Requirement

- Single plane spin balance:
- For 1180 rpm: 0.034 oz in/lb
 - For 1800 rpm: 0.022 oz in/lb

Recommended Grease Lubricants

Grease	Grease Nipples	
	NLGI 2 ³	NLGI 3 ⁴
Temp. Range	-20 to 100°C (-4 to 212°F)	-20 to 100°C (-4 to 212°F)
DIN	K2K-20	K2K 30
BP	Energrease LS2	Energrease LS3
DEA	Glissando 20	Glissando 30
Elf	Elfmulti 2	Elfmulti 3
Esso	Beacon 2	Beacon 3
Mobil	Mobilux 2	Mobilux 3
Q8	Rembrandt 2	Rembrandt 3
Shell	Alvania Fett G2	Alvania R3
	Alvania Fett R2	
Texaco	Multilak 20	Multilak 30
	Multilak EP2	Multilak EP3
Wintershall (BASF Group)	Wiolub LFK 2	-
SKF	LGMT 2	LGMT 3
Silkolene	G55/T	G56/T

- NLGI 2 is an alternative grease and is not to be mixed with other grades.
- Factory packed bearings for the temperature range with grease nipples.

Maximum Recommended External Housing Temperature

Lubrication	Temperature
Oil Bath/Oil Mist	82°C (180°F)
Grease	95°C (204°F)

Maximum Temperature of Fluid Pumped

Without Cooling	120°C (250°F)
With Cooling	176°C (350°F)

Minimum Impeller Nut Tightening Torque

Frame	Nm	Ft Lbs
1	140	100
2	400	300
3	400	300
4	750	550

Shaft Data

Max Shaft Deflection at Seal Chamber	0.051 mm (0.002 in)
Max Shaft Runout at Seal Chamber	
Max Shaft End Play (Axial Movement)	

Recommended Bolt Torques

Bolt Size	Torque Nm (lbf • ft)	
	Pump Feet Fasteners	All Other Fasteners
5/8 in	170 (125)	84 (62)
3/4 in	340 (250)	165 (120)
7/8 in	590 (435)	285 (210)
1 in	770 (570)	375 (275)
1 1/8 in	1100 (810)	540 (400)
1 3/8 in	1840 (1350)	900 (660)
1 5/8 in	2000 (1475)	1410 (1040)
1 7/8 in	2240 (1650)	2060 (1500)

Tightening Torque for Stainless Steel Studs with Lubricated Threads

Thread Size	Tightening Torque Nm (lbf • ft)
3/8-16UNC	13 (10)
1/2-13UNC	27 (20)
5/8-11UNC	60 (45)
3/4-10UNC	100 (75)

Bearing Size (SKF)

Frame #		Line Bearing	Thrust Bearing (Paired Back-to-Back)
1		6311	7309BUA
2		6316	7314BUA
3		6320	7318BUA
4	12FRBH234 14FRBH244 16FRBH244 18FRBH224	22222C	7322BUA
	18FRBH274 20FRBH304 24FRBH304	22226C	

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