



# LR, LRV, LLR and LR-S Pumps

## MAINTENANCE CHECKLIST

# **! DANGER**

Read User Instructions **before** installing, operating or maintaining this pump.  
Copies available from Flowserve pump representative.

### Recommended Lubricants:

- Mineral Oil:** Quality mineral oil with foam inhibitors.  
BP Castrol Energol HLP-HM 46 ISO VG 46
- Synthetic Oil:** Some synthetic lubricants require Viton® O-rings.  
Royal Purple avoids this change.
- Grease:** Horizontal – Energrease LS-EP3 (or compatible)  
In-Line – Lithium Complex with mineral oil

### Amount of Oil Required

Pump Size	Approx. Oil Capacity, Both Bearings (fl. oz)	Pump Size	Approx. Oil Capacity, Both Bearings (fl. oz)
1.5LLR-7	0.16 (5.4)	6LR-10	0.16 (5.4)
1.5LLR-10		6LR-13	0.19 (6.4)
2LLR-9		6LR-16	
2LLR-11	0.19 (6.4)	6LR-18	0.21 (7.1)
3LLR-11		6LR-18S	0.47 (15.9)
4LLR-11		8LR-12	0.19 (6.4)
2.5LR10	0.16 (5.4)	8LR-14	0.47 (15.9)
2.5LR-13	0.17 (5.8)	8LR-18S	
3LR-9	0.16 (5.4)	8LR-20	0.21 (7.1)
3LR-12		8LR-23S	0.47 (15.9)
4LR-10		10LR-14	0.21 (7.1)
4LR-11	0.17 (5.8)	10LR-14S	0.47 (15.9)
4LR-12		10LR-16	0.21 (7.1)
4LR-14	0.16 (5.4)	10LR-17	0.28 (9.46)
5LR-10		10LR-18	
5LR-13	0.17 (5.8)	10LR-18S	0.47 (15.9)
5LR-15	0.19 (6.4)	12LR-14S	
5LR-19			

### Oil Viscosity Grades

Max Temp	ISO VG	Min. Visc. Index
Up to 65°C (149°F)	32	95
Up to 78°C (172°F)	46	95
Up to 80°C (176°F)	68	95

LR series pumps are manufactured in: Chesapeake, VA (USA), Coimbatore (India) and Newark (U.K.).

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## Recommended Lubricants Continued

### Relubrication Intervals

Lubricant	External Housing Temperature		
	Under 65°C	65-78°C	78-80°C
Mineral Oil	6 mo	3 mo	3 mo
Synthetic Oil	18 mo	18 mo	18 mo
Grease	6 mo	3 mo	3 mo

### Maximum Recommended External Housing Temperature

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

Assuming good maintenance and operation practices and no contamination.

### Temperature of Fluid Pumped

Pump Type Temperatures	
LR LRV LLR	-30°C - 125°C -20°F - 250°F
LR-S	-30°C - 150°C -20°F - 300°F

These are minimum and maximum temperatures and may vary with casing material and working pressure.

## Impeller Clearance Settings (Room Temperature)

Pump Size	Mean Radial Wear Ring Clearance mm (in)
1.5LLR-7	0.19 (0.007)
1.5LLR-10	
2LLR-9	0.22 (0.009)
2LLR-11	
3LLR-11	
4LLR-11	

Pump Size	Mean Radial Wear Ring Clearance mm (in)
2.5LR-10	0.19 (0.007)
2.5LR-13	0.22 (0.009)
3LR-9	
3LR-12	
4LR-10	
4LR-11	
4LR-12	
4LR-14	
5LR-10	
5LR-13	
5LR-15	
5LR-19	
6LR-10	
6LR-13	
6LR-16	
6LR-18	

Pump Size	Mean Radial Wear Ring Clearance mm (in)
6LR-18S	0.13 (0.005)
8LR-12	0.22 (0.009)
8LR-14	
8LR-18S	0.13 (0.005)
8LR-20	0.22 (0.009)
8LR-23S	0.13 (0.005)
10LR-14	0.22 (0.009)
10LR-14S	0.13 (0.005)
10LR-16	0.22 (0.009)
10LR-17	
10LR-18	
10LR-18S	0.13 (0.005)
12LR-14S	

### Shaft Data

Maximum shaft deflection at stuffing box face	0.051 mm (0.002 in)
Maximum shaft run out at stuffing box face	0.025 mm (0.001 in)

## Alignment

Recommended that pump and motor shaft be aligned to within 0.05 mm (0.002 in) TIR in parallel and 0.05 mm (0.002 in) per 100 mm (4 in) of coupling flange diameter as TIR angular misalignment.

## Vibration

Maximum vibration level 5.6 mm/s (0.22 in/s) RMS, measured at bearing housing.

## Impeller Balance Requirements

Single plane spin balance to G6.3 standard.

## Seal Flush Requirements

Flush liquid pressure  
0.7-1.0 bar (10-15 psi)  
Minimum differential across seal faces  
Flush liquid flow rate  
4 - 8 lpm (1-2 US gpm)

## Bearing Size (SKF)

Pump Size	Outboard	Inboard
1.5LLR-7	7305BECB x 2	6305
1.5LLR-10		
2LLR-9		
2LLR-11	7406BECB x 2	6308
3LLR-11		
4LLR-11		

Pump Size	Outboard	Inboard
2.5LR-10	3305C3	6305
2.5.5LR-13	6306	6306
3LR-9	6305	6305
3LR-12		
4LR-10		
4LR-11	6306	6306
4LR-12	6305	6305
4LR-14	6306	6306
5LR-10	6305	6305
5LR-13	6306	6306
5LR-15	6406	6308
5LR-19		
6LR-10	6305	6305
6LR-13	6406	6308
6LR-16		

## Recommended Bolt Torques (size – torque)

Description	Thread Size	Torque	
		Nm	lb • ft
Bearing Cover Bolts	1/4" UNC	5	4
	3/8" UNC	19	15
Bearing Bracket Bolts	1/2" UNC	49	36
Split Casing Bolts	1/2" UNC	49	36
	5/8" UNC	97	72
	3/4" UNC	178	131
Mounting Foot Bolts	7/8" UNC	279	206
	M16	170	125
	M20	340	250
	M24	590	435

Values given are for lubricated or PTFE coated threads. For non-lubricated threads, increase values by 25%.

Pump Size	Outboard	Inboard
6LR-18	6309	6211
6LR-18S	6211	6211
8LR-12	6406	6308
8LR-14		
8LR-18S	6213	6213
8LR-20	6309	6211
8LR-23S	6213	6213
10LR-14	6309	6211
10LR-14S	6211	6211
10LR-16	6309	6211
10LR-17	6213	6213
10LR-18		
10LR-18S		
12LR-14S	6211	6211

## Bearing Fits (mm)

Outboard Bearing						
Pump Size	Brg	Shaft	Fit	Brg	Housing	Fit
<b>1.5LLR-7, 1.5LLR-10, 2LLR-9, 2.5LR-10, 3LR-9, 3LR-12, 4LR-10, 4LR-12, 5LR-10, 6LR-10</b>						
	25.0000	25.0088	-0.0168	62.0000	62.0166	0.0276
	24.9920	24.9987	0.0013	61.9890	62.0039	0.0039
<b>2LLR-11, 3LLR-11, 4LLR-11, 2.5LR-13, 4LR-11, 4LR-14, 5LR-13, 5LR-15, 5LR-19, 6LR-13, 6LR-16, 8LR-12, 8LR-14</b>						
	30.0000	30.0076	-0.0176	90.0000	90.0227	0.0357
	29.9900	29.9974	0.0026	89.9870	90.0100	0.0100
<b>6LR-18, 8LR-20, 10LR-14, 10LR-16</b>						
	45.0000	45.0088	-0.0188	100.0000	100.0176	0.0306
	44.9900	44.9986	0.0014	99.9870	100.0049	0.0049
<b>6LR-18S, 10LR-14S, 12LR-14S</b>						
	55.0000	55.0088	-0.0208	100.0000	100.0176	0.0306
	54.9880	54.9986	0.0014	99.9870	100.0049	0.0049
<b>8LR-18S, 8LR-23S, 10LR-17, 10LR-18</b>						
	65.0000	65.0088	-0.0208	120.0000	120.0175	0.0325
	64.9880	64.9961	0.0039	119.9850	120.0023	0.0023
Inboard Bearing						
Pump Size	Brg	Shaft	Fit	Brg	Housing	Fit
<b>1.5LLR-7, 1.5LLR-10, 2LLR-9, 2.5LR-10, 3LR-9, 3LR-12, 4LR-10, 4LR-12, 5LR-10, 6LR-10</b>						
	25.0000	25.0088	-0.0168	62.0000	62.0166	0.0276
	24.9920	24.9987	0.0013	61.9890	62.0039	0.0039
<b>2LLR-11, 3LLR-11, 4LLR-11, 2.5LR-13, 4LR-11, 4LR-14, 5LR-13, 5LR-15, 5LR-19, 6LR-13, 6LR-16, 8LR-12, 8LR-14</b>						
	40.0000	40.0075	-0.0175	90.0000	90.0227	0.0357
	39.9900	39.9974	0.0026	89.9870	90.0100	0.0100
<b>6LR-18, 8LR-20, 10LR-14, 10LR-16</b>						
	55.0000	55.0088	-0.0208	100.0000	100.0176	0.0306
	54.9880	54.9986	0.0014	99.9870	100.0049	0.0049
<b>6LR-18S, 10LR-14S, 12LR-14S</b>						
	55.0000	55.0088	-0.0208	100.0000	100.0176	0.0306
	54.9880	54.9986	0.0014	99.9870	100.0049	0.0049
<b>8LR-18S, 8LR-23S, 10LR-17, 10LR-18</b>						
	65.0000	65.0088	-0.0208	120.0000	120.0175	0.03254
	64.9880	64.9961	0.0039	119.9850	120.0023	0.0023