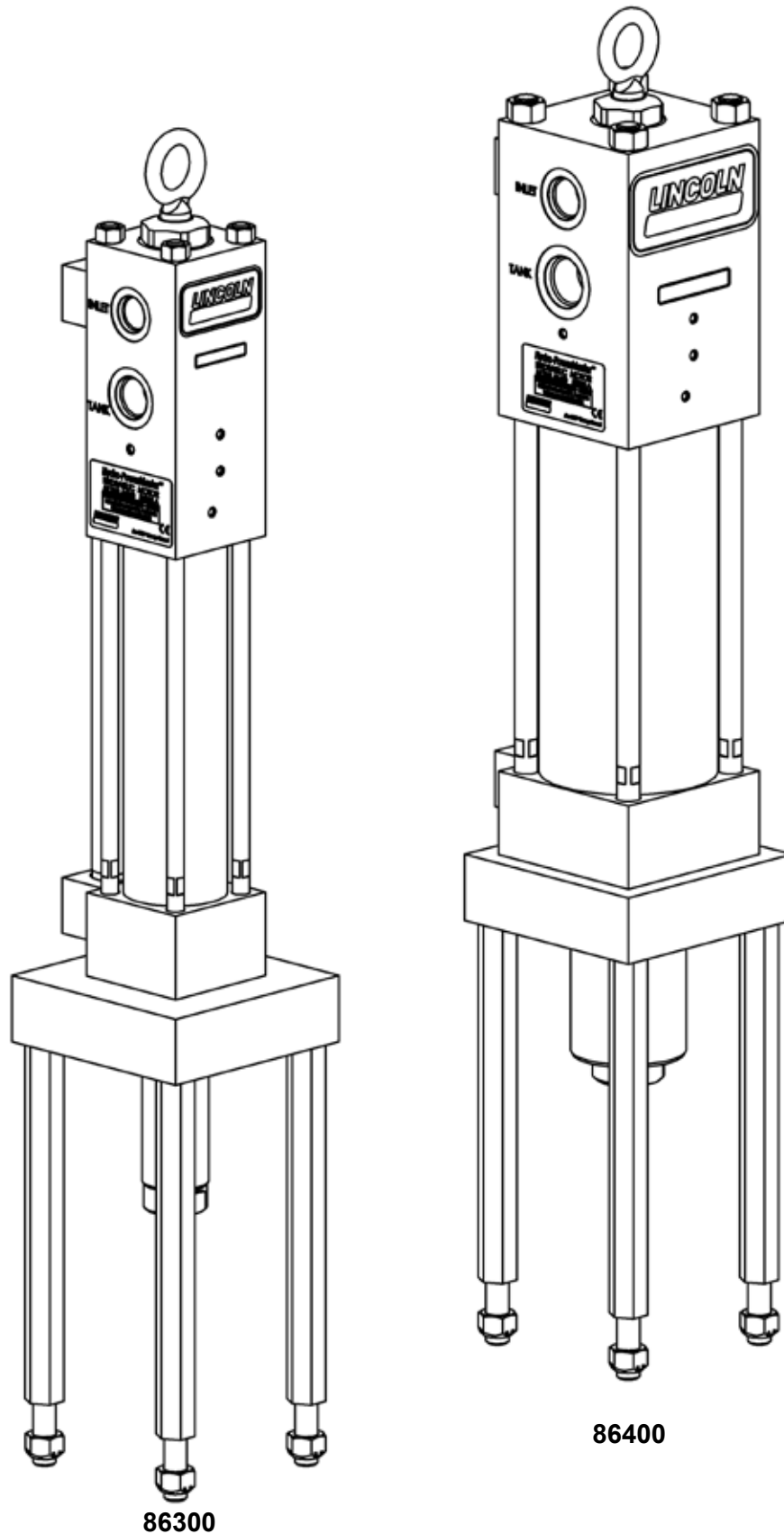




Models 86300 & 86400  
HYDRO-POWERMASTER™ HYDRAULIC MOTOR  
Series "A"



# Models 86300 & 86400 HYDRO-POWERMASTER™ HYDRAULIC MOTOR



It is the responsibility of the Owner/Operator to properly use and maintain this equipment.

The instructions and Warnings contained in this manual shall be read and understood by the Owner/Operator prior to operating this equipment.

It is the responsibility of the Owner/Operator to maintain the legibility of all Warning and Instruction labels.

The Owner/Operator shall retain this manual for future reference to important Warnings, Operating and Maintenance instructions.

## © APPROPRIATE USE

These hydraulic motors are exclusively approved for use with Lincoln PowerMaster III and PileDriver III pumptubes in automated lube systems and fluid transfer applications. They are not approved for use in wireline applications.

### WARNING

- **DO NOT** exceed the stated maximum working pressure of the hydraulic motor or of the lowest rated component in your system.
- **DO NOT** alter or modify any part of this equipment.
- **DO NOT** operate this equipment with combustible fluids.
- **DO NOT** attempt to repair or disassemble the equipment while the system is pressurized.
- **TIGHTEN** all fluid connections securely before using this equipment.
- **ALWAYS** read and follow the fluid manufacturer's recommendations regarding fluid compatibility, and the use of protective clothing and equipment.
- **CHECK** all equipment regularly and repair or replace worn or damaged parts immediately.

**IMPORTANT:** Failure to heed these warnings including misuse, over pressurizing, modifying parts, using incompatible chemicals and fluids, or using worn or damaged parts, may result in equipment damage and/or serious personal injury, fire, explosion, or property damage.

### WARNING

Always check equipment for proper operation before each use, making sure safety devices are in place and Operating properly. **DO NOT** alter or modify any part of the equipment as this may cause a malfunction and result in serious bodily injury

## ATTACHING HYDRAULIC MOTOR TO PUMPTUBE

1. Tightly attach Tie Rod (Item 31) to the Mounting Plate (Item 30) (Use short threaded end of tie rods).
2. Mount hydraulic motor on top of pumptube outlet body and tightly connect pumptube coupling nut to piston Rod (Item 23).
3. Hand tighten tie rods to the pumptube with law Nuts (Item 32) supplied with hydraulic motor.

4. Connect hydraulic supply and return lines and slowly cycle pump several times, using only enough pressure to operate the pump without stalling. NOTE: Air in the hydraulic motor may cause slow or erratic shifting during the first few cycles after connecting the hydraulic lines.
5. Stop the pump on an "up" stroke and tighten the four nuts to securely fasten the hydraulic motor to the pumptube

### WARNING

To reduce the risk of serious bodily Injury or property damage. NEVER exceed the maximum fluid working pressure of the lowest rated system component

## OPERATING PRECAUTIONS

- Use Lincoln replacement parts to assure compatible pressure rating.
- **HEED ALL WARNINGS.**
- Be sure material hoses and other components are able to withstand hydraulic pressures.
- Do not operate hydraulic motor continuously at speeds in excess of the maximum recommended speed.
- Disconnect hydraulic line from hydraulic motor when system is idle for long periods of time.
- **SERVICING.** Before servicing hydraulic motor be sure to carefully bleed pressure off of the system and disconnect the hydraulic supply lines.

## 86300 SPECIFICATIONS

Cylinder dia. – 2 in.

Piston rod dia. – 1-7/16 in.

Stroke length – 6 in.

Operating pressure range – 300 psi to 1500 psi\*

Operating temperature range – -30°F to 200°F

Fluid consumption – 18.8 cu. in./cycle or 1 gal./12 cycles

Hydraulic fluid inlet – SAE 8 (female)

Hydraulic fluid outlet – SAE 10 (female)

Max. recommended speed (continuous) – 75 cycles/min.

Wetted part materials – Steel, Bronze, Polyurethane, Nitrile

\*Refer to Pump Chart for maximum operating pressure with specific pumptubes.

## 86400 SPECIFICATIONS

Cylinder dia. – 3-1/2 in.

Piston rod dia. – 2-1/2 in.

Stroke length – 6 in.

Operating pressure range – 300 psi to 1500 psi\*

Operating temperature range – -30°F to 200°F

Fluid consumption – 57.7 cu. in./cycle or 1 gal./4 cycles

Hydraulic fluid inlet – SAE 10 (female)

Hydraulic fluid outlet – SAE 12 (female)

Max. recommended speed (continuous) – 55 cycles/min.

Wetted part materials – Steel, Bronze, Polyurethane, Nitrile

\*Refer to Pump Chart for maximum operating pressure with specific pumptubes.

© Indicates change



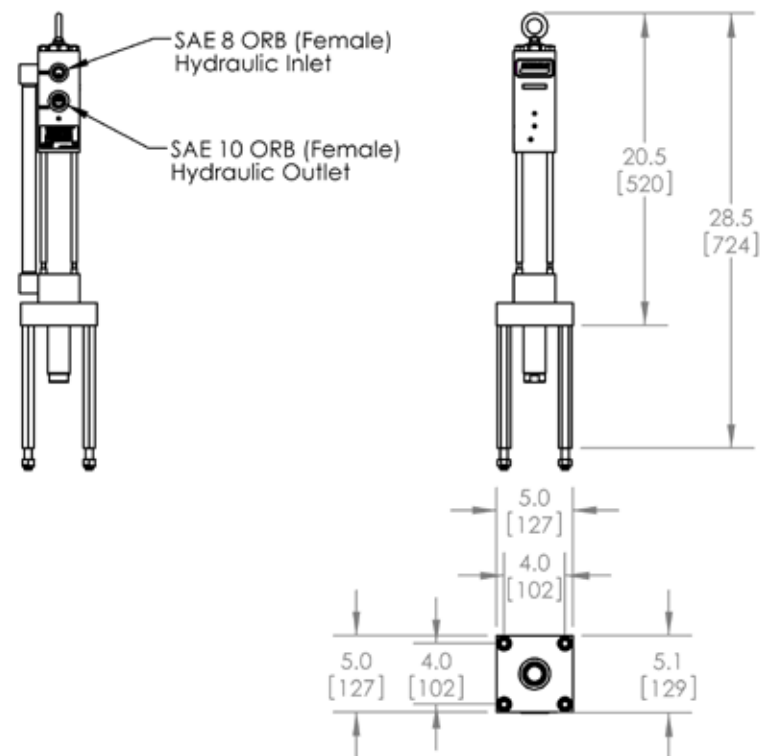
# Models 86300 & 86400 HYDRO-POWERMASTER™ HYDRAULIC MOTOR

PUMP CHART©

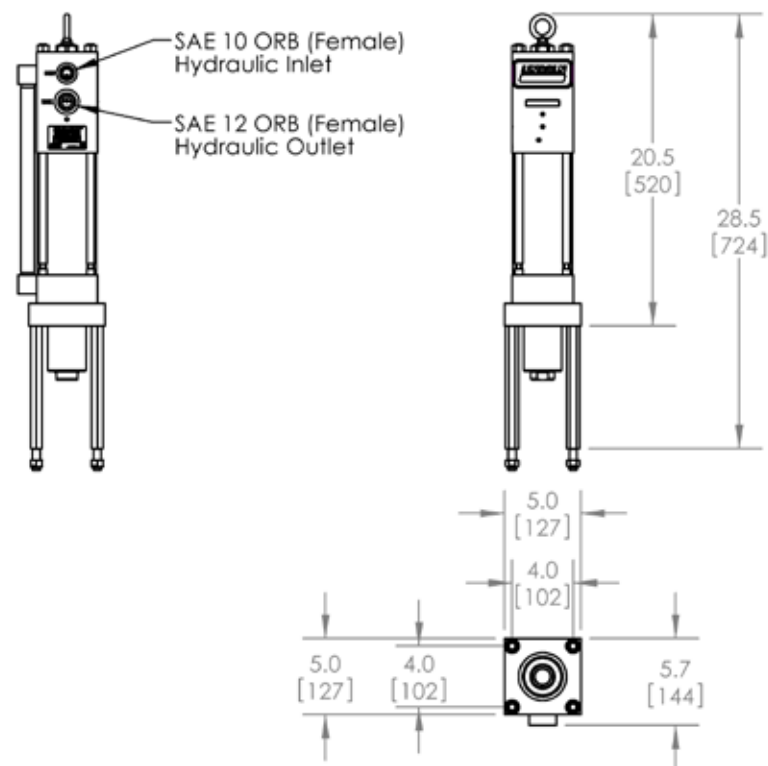
Hydraulic Motor	Pump Type	Pump Tube	Ratio	Maximum Delivery Pressure	Maximum Hydraulic Inlet Pressure	
Model 86300	PowerMaster III	84981	1.5:1	2250 psi (155 bar)	1500 psi (103 bar)	
		84982				
		84983				
		84984				
		84985				
		84986				
		84987				
		84976	2.5:1	3750 psi (258 bar)		
		84977				
		84978	3.6:1	5400 psi (372 bar)		
		84979				
		84991	2.7:1	4000 psi (276 bar)		
		84992				
		84993	4.5:1	6750 psi (465 bar)		
	84994					
	84995	5.5:1	7500 psi (517 bar)	1300 psi (90 bar)		
	84996					
	84997	8:1	7200 psi (496 bar)	900 psi (62 bar)		
	84998					
PileDriver III	84900	0.8:1	1200 psi (83 bar)	1500 psi (103 bar)		
	84901	1:1	1500 psi (103 bar)			
	84902	1.4:1	2100 psi (145 bar)			
	84904	0.9:1	1350 psi (93 bar)			
	84921	0.4:1	600 psi (41 bar)			
	84922					
84923	0.2:1	300 psi (21 bar)				
Model 86400	PowerMaster III	84981	4:1	4000 psi (276 bar)	1000 psi (69 bar)	
		84982				
		84983				
		84984				
		84985				
		84986				
		84987				
		84976	7.5:1	7500 psi (517 bar)		
		84977				
		84978	11:1	7700 psi (531 bar)		700 psi (48 bar)
		84979				
		84991	8:1	7200 psi (496 bar)		900 psi (62 bar)
		84992				
		84993	14:1	7000 psi (483 bar)		500 psi (35 bar)
	84994					
	84995	17:1	7650 psi (527 bar)	450 psi (31 bar)		
	84996					
	84997	23:1	6900 psi (476 bar)	300 psi (21 bar)		
	84998					
PileDriver III	84900	2.3:1	3450 psi (238 bar)	1500 psi (103 bar)		
	84901	3:1	4500 psi (310 bar)			
	84902	4:1	6000 psi (414 bar)			
	84904	2.7:1	4050 psi (279 bar)			
	84921	1.2:1	1800 psi (124 bar)			
	84922					
84923	0.6:1	900 psi (62 bar)				

© Indicates change

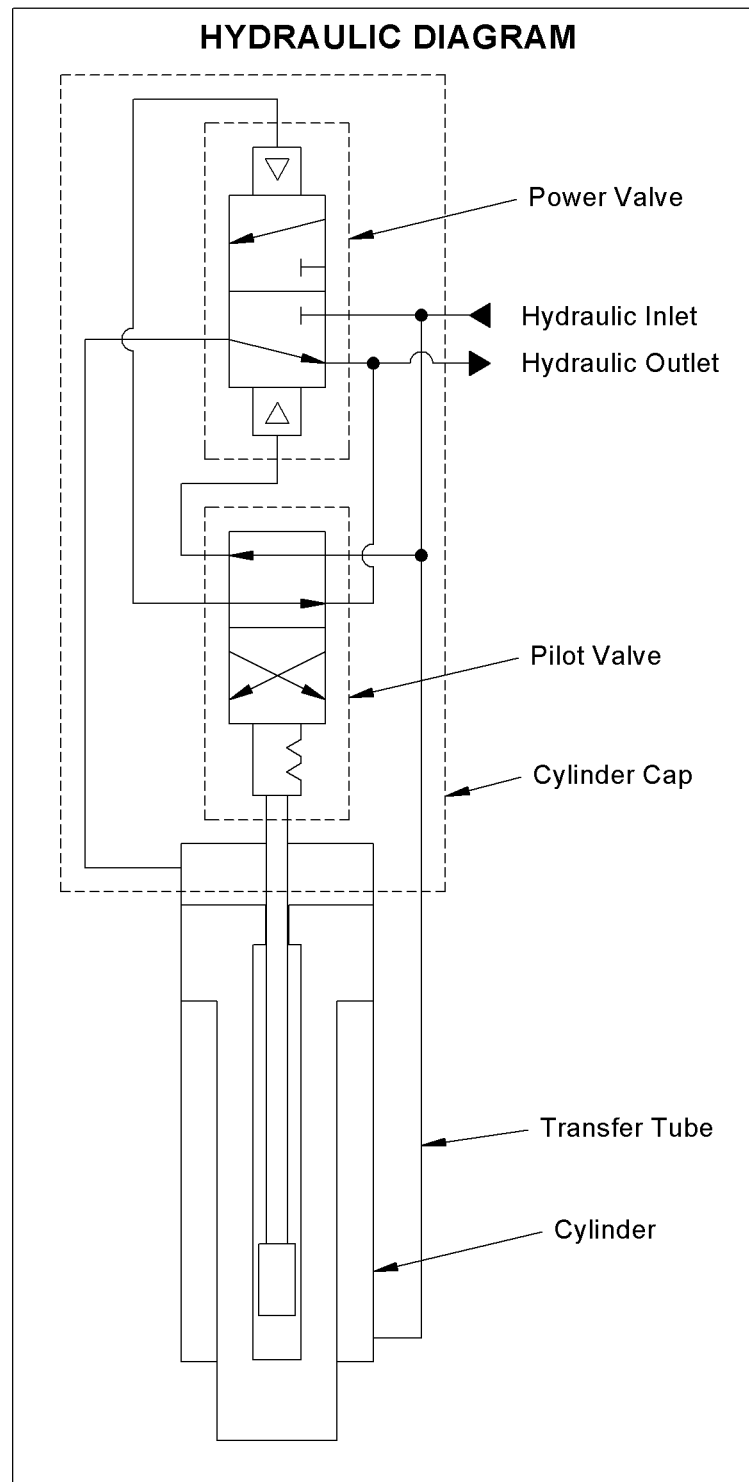
Models 86300 & 86400  
HYDRO-POWERMASTER™ HYDRAULIC MOTOR



Model 86300



Model 86400



# Models 86300 & 86400

## HYDRO-POWERMASTER™ HYDRAULIC MOTOR



### DISASSEMBLY



#### WARNING

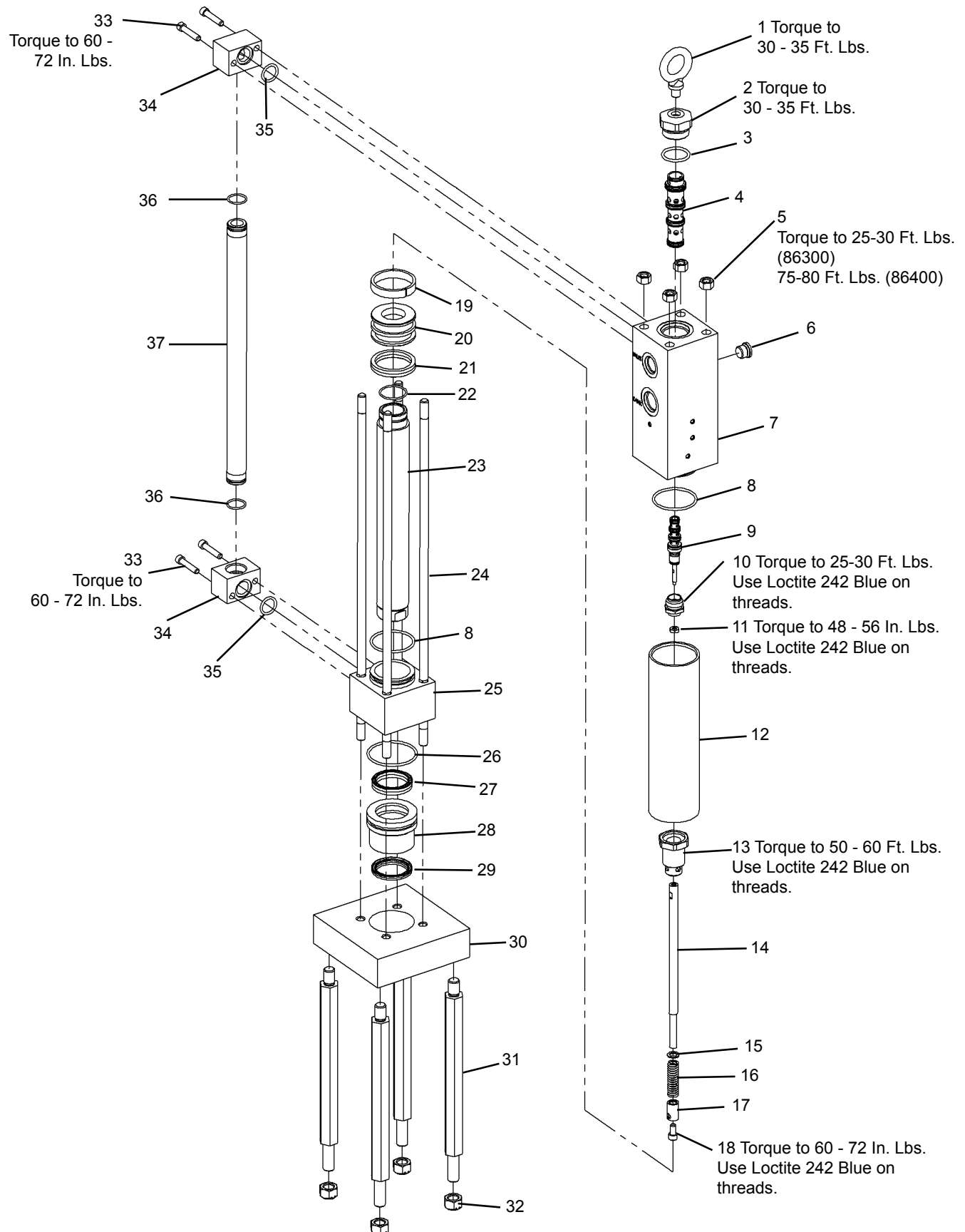
Always disconnect hydraulic supply and relieve pressure before beginning disassembly.

### Tools Required

3/16" Hex Key  
1/4" Hex Key  
5/32" Open End Wrench  
5/16" Open End Wrench  
3/8" Open End Wrench  
7/16" Open End Wrench [86400 only]  
9/16" Open End Wrench [86300 only]  
3/4" Open End Wrench  
1-1/4" Open End Wrench [86300 only]  
1-3/8" Open End Wrench [86400 only]  
13/16" Hex Deep Socket Wrench  
1-1/4" Hex Socket Wrench  
1-3/8" Hex Socket Wrench  
Screwdriver

### Procedure

1. Remove four Tie Rods (Item 31).
2. Remove O-ring Plug (Item 6) from Cylinder Cap (Item 7).
3. Place container under Cylinder Cap (Item 7) to collect hydraulic fluid.
4. Push Piston Rod (Item 23) into bottom of cylinder. Most of the hydraulic fluid in the motor will be pushed out of the open ports of the Cylinder Cap (Item 7) and into the container.
5. Remove Eyebolt (Item 1) from Eyebolt Adapter (Item 2).
6. Remove Eyebolt Adapter (Item 2) from Cylinder Cap (Item 7).
7. Remove four Socket Head Cap Screws (Item 33) from two Transfer Tube Adapters (Item 34).
8. Remove Transfer Tube Assembly (Items 34, 35, 36 and 37) as a complete assembly from the hydraulic motor.
9. Remove Transfer Tube Adapters (Item 34) from ends of Transfer Tube (Item 37).
10. Remove O-rings (Item 35) from Transfer Tube Adapter (Item 34).
11. Remove O-rings (Item 36) from Transfer Tube (Item 37).
12. Remove four Hex Nuts (Item 5) from Tie Rods (Item 23).
13. Place container under Cylinder Cap (Item 7) to collect hydraulic fluid.
14. Tap on Cylinder Cap (Item 7) to separate it from Cylinder (Item 12) but do not try to remove it completely from Tie Rods (Item 23). Remainder of hydraulic fluid in cylinder will drain into container.
15. With Cylinder Cap (Item 7) supported by Tie Rods (Item 23) slide it far enough away from the Cylinder (Item 12) to be able to access the Pilot Valve (Item 9) stem and Trip Rod (Item 14).
16. Loosen Hex Nut (Item 11) from Trip Rod (Item 14).
17. Unthread Trip Rod (Item 14) from stem of Pilot Valve (Item 9).
18. Remove Cylinder Cap (Item 7) from Tie Rods (Item 24).
19. Remove Retaining Nut (Item 10) from Cylinder Cap (Item 7) with deep well socket to keep from bending valve stem.
20. Pry the Pilot Valve Assembly (Item 9) from Cylinder Cap (Item 7).
21. Pry the Power Valve Assembly (Item 4) from Cylinder Cap (Item 7).
22. Remove Mounting Plate (Item 30) and Tie Rods (Item 24) from Cylinder Head (Item 25).
23. Pry Cylinder (Item 12) to separate from Cylinder Head (Item 25).
24. Remove Piston Rod (Item 23) and Cylinder (Item 12) from Cylinder Head (Item 25).
25. Remove Bushing (Item 28) from Cylinder Head (Item 25).
26. Remove O-ring (Item 26), U-cup (Item 27) and Rod Scraper (Item 29) from Bushing (Item 28).
27. Remove Cylinder (Item 12) from Piston Rod Assembly.
28. Remove Piston Nut (Item 13) from Piston Rod (Item 23).
29. Remove Piston Assembly (Items 19, 20, 21 and 22) from Piston Rod (Item 23).
30. Remove Wear Ring (Item 19), U-cup (Item 21) and O-ring (Item 22) from Piston (Item 20).
31. Remove Trip Rod Assembly (Items 14, 15, 16, 17 and 18) from Piston Rod (Item 23).
32. Remove Socket Head Cap Screw (Item 18), Guide Sleeve (Item 17), Spring (Item 16) and Washer (Item 15) from Trip Rod (Item 14).
33. To re-assemble hydraulic motor reverse disassembly procedure. (Refer to exploded view for torque specifications.)



# Models 86300 & 86400

## HYDRO-POWERMASTER™ HYDRAULIC MOTOR



### PARTS LIST

Item Number	Description	Qty.	Part Number	
			Model 86300	Model 86400
1	Eyebolt	1	68531	68531
2	Eyebolt Adapter	1	276831	276831
3	O-ring (nitrile) *	1	270719	270719
4	Power Valve Assembly	1	277317	277317
5	Hex Nut	4	51005	51007
6	O-ring Plug	1	244752	244752
7	Cylinder Cap	1	276841	276842
8	O-ring (nitrile) *	2	244760	34351
9	Pilot Valve Assembly	1	277318	277318
10	Retaining Nut	1	276846	276846
11	Nut (10-32)	1	51043	51043
12	Cylinder	1	244817	277319
13	Piston Nut	1	276824	276824
14	Trip Rod	1	276829	276829
15	Washer	1	48436	48436
16	Spring *	1	276830	276830
17	Guide Sleeve	1	276843	276843
18	Socket Head Cap Screw (1/4-28 x 1/2)	1	276813	276813
19	Wear Ring (glass-filled nylon) *	1	276818	276819
20	Piston	1	276810	276811
21	U-cup (polyurethane) *	1	244762	276815
22	O-ring (nitrile) *	1	34431	34469
23	Piston Rod	1	277320	277321
24	Tie Rod	4	276832	276833
25	Cylinder Head	1	276804	276805
26	O-ring (nitrile) *	1	244761	34720
27	U-cup (polyurethane) *	1	237125	276814
28	Bushing	1	277322	277323
29	Rod Scraper (polyurethane) *	1	276816	276817
30	Mounting Plate	1	244767	276806
31	Tie Rod	4	241023	241023
32	Locknut	4	236203	236203
33	Socket Head Cap Screw (1/4-20 x 1-1/4)	4	50553	50553
34	Transfer Tube Adapter	2	276812	276812
35	O-ring (nitrile) *	2	34210	34210
36	O-ring (nitrile) *	2	34432	34432
37	Transfer Tube	1	276826	276826
	Soft Parts Kit	1	277324	277325

\* Indicates items included in Soft Parts Kits





# Models 86300 & 86400 HYDRO-POWERMASTER™ HYDRAULIC MOTOR

## TROUBLESHOOTING

Problem	Possible Cause	Solution
Hydraulic motor does not operate.	Restricted or inadequate hydraulic supply.	Check that hydraulic supply has sufficient pressure and flow to operate motor.
	Restricted hydraulic return to tank.	Check return line for restrictions.
Piston moves to top of stroke and does not shift.	Worn or damaged pilot valve assembly.	Replace pilot valve assembly (Item 9).
	Worn or damaged power valve assembly.	Replace power valve assembly (Item 4).
Piston moves to bottom of stroke and does not shift.	Worn or damaged pilot valve assembly.	Replace pilot valve assembly (Item 9).
	Worn or damaged power valve assembly.	Replace power valve assembly (Item 4).
	Broken trip rod or pilot valve stem.	Check Trip Rod (Item 14) and Pilot Valve (Item 9) and replace damaged items.
Piston short strokes or chatters at top of stroke.	Hydraulic system is compensating for pressure spikes by reducing flow rate.	These hydraulic motors will not function properly in compensating type systems.
	Worn or damaged pilot valve assembly.	Replace pilot valve assembly (Item 9).
Piston short strokes or chatters at bottom of stroke.	Restricted hydraulic return to tank.	Check return line for restrictions.
	Worn or damaged pilot valve assembly.	Replace pilot valve assembly (Item 9).

### Declaration by the manufacturer as defined by Machinery Directive 89/392EEC Annex IIB

Herewith we declare that the supplied model of Hydro-PowerMaster™ 86300 or 86400 is intended to be incorporated into machinery covered by this directive and must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the directive 91/386/EEC.

#### Applied harmonized standards in particular:

EN 292            Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications

EN 982            Safety of machinery - Safety requirements for fluid power systems and their components - Hydraulics

EN ISO 14121-1   Safety of machinery - Principles for risk assessment

  
Paul Conley, Chief Engineer      12/12/11

# Models 86300 & 86400 HYDRO-POWERMASTER™ HYDRAULIC MOTOR



## Lincoln Industrial Standard Warranty

### LIMITED WARRANTY

Lincoln warrants the equipment manufactured and supplied by Lincoln to be free from defects in material and workmanship for a period of one (1) year following the date of purchase, excluding there from any special, extended, or limited warranty published by Lincoln. If equipment is determined to be defective during this warranty period, it will be repaired or replaced, within Lincoln's sole discretion, without charge.

This warranty is conditioned upon the determination of a Lincoln authorized representative that the equipment is defective. To obtain repair or replacement, you must ship the equipment, transportation charges prepaid, with proof of purchase to a Lincoln Authorized Warranty and Service Center within the warranty period.

This warranty is extended to the original retail purchaser only. This warranty does not apply to equipment damaged from accident, overload, abuse, misuse, negligence, faulty installation or abrasive or corrosive material, equipment that has been altered, or equipment repaired by anyone not authorized by Lincoln. This warranty applies only to equipment installed, operated and maintained in strict accordance with the written specifications and recommendations provided by Lincoln or its authorized field personnel.

**THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. WARRANTY ON ITEMS SOLD BY LINCOLN, BUT NOT MANUFACTURED BY LINCOLN ARE SUBJECT TO THE WARRANTY CONSIDERATION, IF ANY, OF THEIR MANUFACTURER (SUCH AS HOSES, HYDRAULIC AND ELECTRIC MOTORS, ELECTRICAL CONTROLLERS, ETC.) ASSISTANCE IN MAKING SUCH WARRANTY CLAIMS CAN BE OFFERED AS REQUIRED.**

In no event shall Lincoln be liable for incidental or consequential damages. Lincoln's liability for any claim for loss or damages arising out of the sale, resale or use of any Lincoln equipment shall in no event exceed the purchase price. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, therefore the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights. You may also have other rights that vary by jurisdiction.

Customers not located in the Western Hemisphere or East Asia: Please contact Lincoln GmbH & Co. KG, Walldorf, Germany, for your warranty rights.

### Lincoln Industrial Special Limited Warranties

**SPECIAL LIMITED 2 YEAR WARRANTY- SL-V Series, Single Injectors-85772, 85782, and Replacement Injectors-85771, 85781** -Lincoln warrants the SL-V Injector series to be free from defects in material and workmanship for two (2) years following the date of purchase. If an injector model (single or replacement) is determined to be defective by Lincoln, in its sole discretion, during this warranty period, it will be repaired or replaced, at Lincoln's discretion, without charge.

**SPECIAL LIMITED 5 YEAR WARRANTY- Series 20, 25, 40 Bare Pumps, PMV Bare Pumps, Heavy Duty and 94000 Series Bare Reels** -Lincoln warrants series 20, 25, 40 bare pumps, PMV bare pumps, Heavy Duty (82206), Mini Bench (81133, 81323), and all 94000 LFR series (single arm and dual arm) bare reels to be free from defects in material and workmanship for five (5) years following the date of purchase. If equipment is determined by Lincoln, in its sole discretion, to be defective during the first year of the warranty period, it will be repaired or replaced at Lincoln's discretion, without charge. In years two (2) and three (3), the warranty on this equipment is limited to repair with Lincoln paying parts and labor only. In years four (4) and five (5), the warranty on this equipment is limited to repair with Lincoln paying for parts only.

**SPECIAL LIMITED 5 YEAR WARRANTY- Limited Oil Meters, Limited Fluid Control Valves, AOD (Air-Operated Diaphragm Pumps)**-Lincoln warrants the 712 series Control Valves, 912 series Lube Meters, Electronic Lube Meters (980, 981, 982 series), our Universal Inline Digital Meters (812/813 series), and our AOD Pump offering to be free from defects in material and workmanship for five (5) years following the date of purchase. If either is determined to be defective by Lincoln, in its sole discretion, during the warranty period, they will be repaired or replaced, at Lincoln's discretion, without charge.

**Special DEF (Diesel Exhaust Fluid) Limited Warranty-** DEF products are warranted to be free from defects in material and workmanship for a period of one (1) year following the date of purchase. The following exceptions to the standard warranty period are in effect- -85700-30/85700-50 DEF hose reels (bare reel only), 277251/277252 AC DEF pumps, and 277256 and 277257

DEF meters are warranted for two (2) years from date of purchase,

-85623 DEF AOD (air operated diaphragm) pumps are covered under the standard five (5) year AOD pump warranty.

If either is determined to be defective by Lincoln, in its sole discretion, during the warranty period, they will be repaired or replaced, at Lincoln's discretion, without charge.

### Lincoln Industrial Contact Information

To find Lincoln Industrial's Nearest Service Center call one of the following numbers, you may also use our website

Customer Service 314-679-4200

Website [lincolnindustrial.com](http://lincolnindustrial.com)

Americas:  
One Lincoln Way  
St. Louis, MO 63120-1578  
USA  
Phone +1.314.679.4200  
Fax +1.800.424.5359

Europe /Africa/Middle East  
Lincoln GmbH  
Heinrich-Hertz-Str. 2-8  
69190 Walldorf - Germany  
Phone/Fax +49.6227.33-0/-259  
[www.lincolnindustrial.de](http://www.lincolnindustrial.de)

Asia/Pacific:  
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