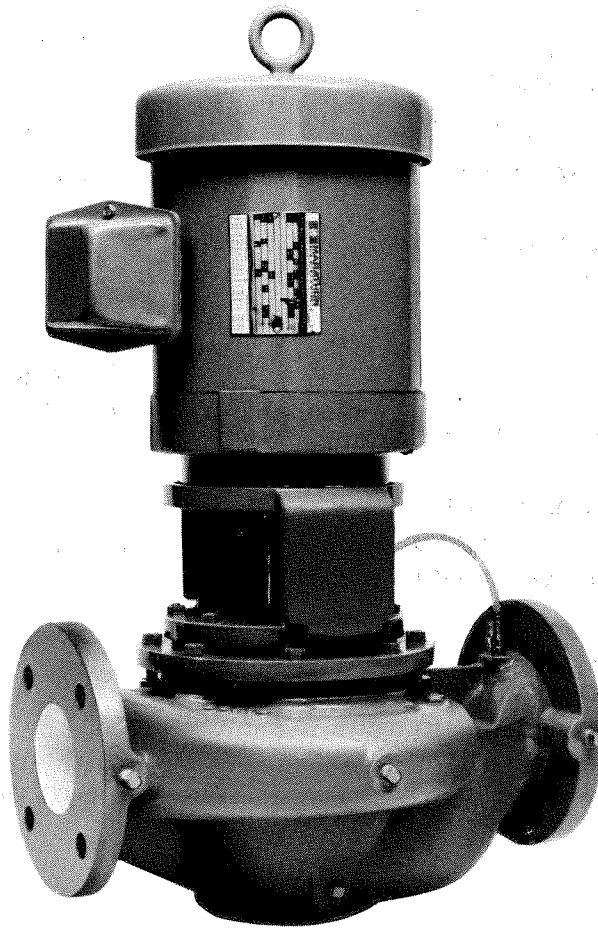




302-006

# "VL" VERTICAL IN-LINE PUMP

## INSTALLATION OPERATION & MAINTENANCE MANUAL



**COMPARE. YOU'LL TAKE TACO.**

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# APPLICATION

1. Working Pressure: 175 psig
2. Temperature: 250°F Standard  
300°F Hi Temp.

# INSTALLATION

## A. LOCATION

1. Install vertically with motor up.
2. Pump should be accessible for inspection and repair work, head room must be provided for the use of hoist or tackle as necessary.
3. Lift pump by slinging through motor eye bolts securing through pump adapter.
4. In no case should any part of motor be covered with insulation.

## B. FOUNDATION

1. The pump must always be supported.
2. Pumps with smaller motors may be suspended in the piping, provided the piping is supported adjacent to the pump.
3. For pumps with larger motors the pump should be attached to a support utilizing the tapped hole in the bottom of the pump casing.

# OPERATION

## A. BEFORE OPERATING FOR THE FIRST TIME CHECK THE FOLLOWING:

1. Is motor correctly wired for voltage available.
2. Has pump been primed. Pump should never be run dry.
3. All rotating parts turn freely.

## B. STARTING PUMP

1. Start pump with discharge valve closed.
2. When correct pressure has been reached, open discharge valve slowly.
3. Do not operate pump for prolonged periods with discharge valve closed, so as to avoid overheating.
4. Pump should be stopped if any of the following occur:
  - A. No discharge.
  - B. Insufficient discharge.
  - C. Insufficient pressure.
  - D. Loss of suction.
  - E. Excessive Power Consumption.
  - F. Vibration.

Check problem analysis further in this manual.

# MAINTENANCE

## A. ROUTINE INSPECTIONS

Routine inspections should be made on a regular basis. Inspections made while pump is running should reveal potential failures.

1. Inspect motor bearings for any sign of temperature rise. Temperature should not exceed 160°F. Temperature rise may indicate the early stages of bearing problems.
2. Listen for any unusual noise.
  - A. Air trapped in pump.
  - B. Hydraulic noise.
3. Check suction gauge reading and confirm that it is normal.
4. Check discharge gauge reading and confirm that is normal.
  - A. If gauge readings are abnormal find out why.

## B. CLOSE COUPLED PUMPS

The pump section is attached directly to the motor shaft and does not contain bearings.

## C. CLOSE COUPLED MOTORS

The motor must be lubricated in accordance with the manufacturers recommendations.

## D. MECHANICAL SEAL

The mechanical seal is the "John Crane" Type 21 General Purpose Seal. For the application of other seal types, consult your representative.

# DIS-ASSEMBLY AND RE-ASSEMBLY

## A. GENERAL

If the pump has been maintained and serviced properly, breakdowns which necessitate the pump being disassembled should not occur often.

1. If a problem occurs, the cause should be determined, if possible, before disassembling. (See "Problem Analysis")
2. If the pump is being disassembled, all parts must be carefully handled, avoid heavy blows and shocks.
3. All parts must be carefully cleaned and inspected for wear. Recondition or replace parts where necessary.
4. The following pump sizes come with clamped casing cover units.

1506	2006	2506	3006	
1507	2007	2507	3007	4007

5. The following pump sizes come with bolted casing cover units.

*1507	2007	2507	2008	3007
4007	2508	3008		

\* Bolted casing cover unit used only with motor frame sizes 143, 145, 182 & 184.

## B. DIS-ASSEMBLY

1. Drain liquid from casing by removing drain plug.
2. If fitted with re-circulating lines, please disconnect.
3. Remove nuts from casing studs, remove casing cover and adapter complete with motor.
4. Remove impeller bolt, in a counter clockwise direction, impeller and impeller key.
5. In all cases of mechanical seal arrangement, after removing the cover and its seal assembly, the rotating element may be drawn off the shaft sleeve. The stationary element removed from the cover.
6. All parts must be cleaned and inspected for wear. Replace parts where necessary.

## C. RE-ASSEMBLY

1. Be certain that all parts to be replaced are free from burrs, with screw threads and connecting faces clear and free from damage.
2. Insert stationary element of seal into casing cover, assemble over shoulder of adapter.
3. Place spring and spring holder on shaft sleeve to abut against sleeve shoulder. Slide rotary seal on sleeve until it contacts spring.
4. Slide shaft sleeve on shaft. Larger bore first. Be certain that "O" ring is correctly seated in groove.
5. Assemble impeller key and impeller on shaft. Refit with new impeller washer on impeller bolt and tighten carefully, then be certain that impeller rotates freely by hand.
6. Assemble cover and adapter complete with motor into casing. Insure that gasket is seated correctly, screw on nuts and tighten uniformly.
7. Reconnect recirculating line, if fitted and drain plug.

## D. PROBLEM ANALYSIS

- A. NO DISCHARGE
1. Pump not primed.
  2. Speed too low.
  3. System head too high.
  4. Suction lift higher than pump is designed.
  5. Impeller completely clogged.
  6. Incorrect direction of rotation.
  7. Air leak in suction line.
- B. INSUFFICIENT DISCHARGE FLOW
1. Air leak in suction line.
  2. Speed too low.
  3. System head higher than anticipated.
  4. Insufficient NPSH: Suction lift too high. Check gauges, also check for clogged suction line or screen.
  5. Impeller partially plugged.
  6. Mechanical defects.
    - A. Worn wear rings.
    - B. Impeller damaged.
    - C. Incorrect direction of rotation.
- C. INSUFFICIENT DISCHARGE PRESSURE
1. Speed too low.
  2. System head less than anticipated.
  3. Air in system.
  4. Mechanical defects.
    - A. Worn wear rings.
    - B. Impeller damaged.
    - C. Impeller diameter too small.
    - D. Incorrect direction of rotation.
- D. LOSS OF SUCTION
1. Leak in suction line.
  2. Suction lift too high.
  3. Insufficient NPSH.
  4. Air in system.
  5. Casing gasket defective.

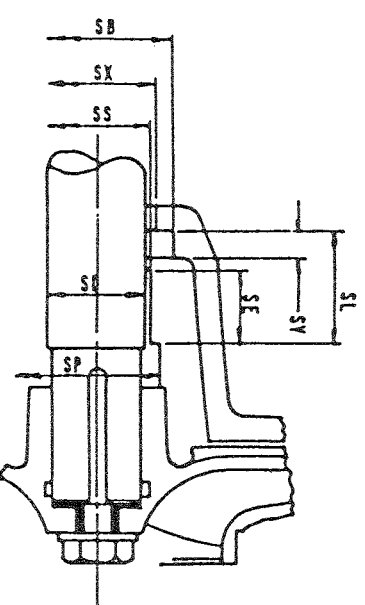
## E. EXCESSIVE POWER CONSUMPTION

1. Speed too high.
  2. System head lower than rating.
  3. Specific gravity of liquid too high.
  4. Mechanical defects.
    - A. Shaft bent.
    - B. Rotating elements binds.
    - C. Worn wear ring.
- F. VIBRATION
1. Air leak in suction line.
  2. Air in system.
  3. Impeller partially plugged.
  4. Foundation not rigid.

## 5. Mechanical defects.

- A. Damaged impeller.
  - B. Motor bearings worn.
  - C. Rotor out of balance.
  - D. Shaft bent.
- G. MOTOR RUNS HOT
1. Speed too high.
  2. Specific gravity of liquid too high.
  3. Mechanical defects.
    - A. Shaft bent.
    - B. Rotating elements binds.
    - C. Defective motor.
    - D. Voltage lower than rating.

## MECHANICAL SEAL DIMENSIONS

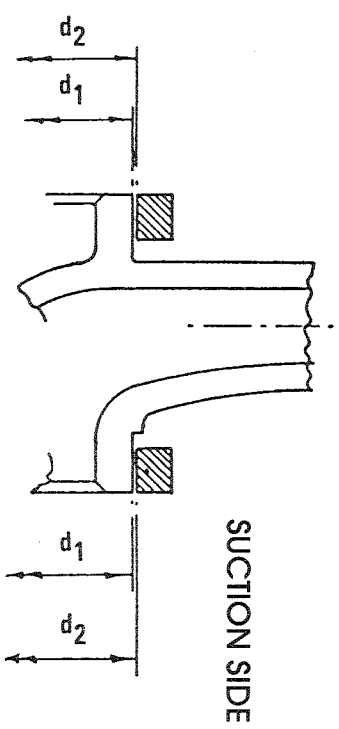


## ALL DIMENSIONS IN INCHES

MOTOR SIZE	SEAL SIZE SS	SB	SD	SE	SL	SP	SX	SY
143 JP	1.125	1.750	1.000	1.063	1.500	1.375	1.312	0.375
145 JP	±0.002	±0.001						
182 JP								
184 JP								
213 JP								
215 JP								
254 JP	1.500	2.125	1.375	1.1000	1.563	1.750	1.688	0.375
256 JP	±0.002	±0.001						
284 JP								
286 JP								
324 JP								
326 JP								

Mechanical seal pumps have 'John Crane' Type 21 seals as standard.

# CASING/IMPELLER WEAR RING CLEARANCES



PUMP SIZE	WEAR RING SUCTION SIDE				CLEARANCE	
	Dia $d_1$		Dia $d_2$		Max.	Min.
	Max.	Min.	Max.	Min.		
1506	2.744	2.740	2.759	2.757	0.019	0.012
1507						
2006						
2007	3.128	3.134	3.153	3.151	0.019	0.012
2008						
2506						
2507	3.728	3.724	3.744	3.742	0.020	0.012
2508						
3006						
3007						
3008	4.516	4.512	4.531	4.520	0.019	0.012
25-10						
4007						
30-10	5.102	5.098	5.122	5.620	0.024	0.012

NOTE: CASING WEAR RING FITTED TO SUCTION SIDE ONLY

