INSTRUCTIONS
INSTALLATION - OPERATION - MAINTENANCE
LANCASTER CENTRIFUGAL PUMP TYPE M
CLOSED COUPLED, END SUCTION DESIGN

The Lancaster Centrifugal Pump, Type M, is a general service pump designed to pump fluids in a wide range of applications.

Inspect your unit. Occasionally, products are damaged during shipment. If the unit is damaged, contact the transportation company or your dealer. Save the units packing materials until the claim is settled.

Carefully read the literature provided. Familiarize yourself with the specific details regarding installation and use. These materials should be retained for future reference.

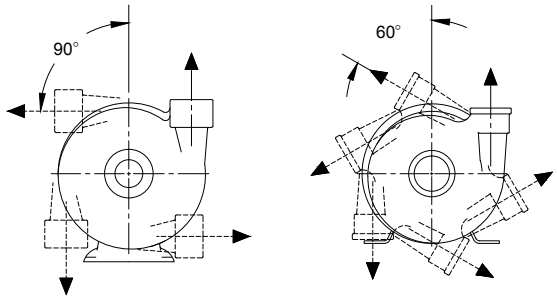
ACCEPTABLE FLUIDS
- Hot and cold water
- Clean, thin, non-aggressive and non-explosive fluids. For fluids other than water, a special mechanical seal other than the standard mechanical seal may be required. Consult factory.

TEMPERATURE AND PRESSURE LIMITATIONS
- Pumps must be located where **ambient temperatures** are not so excessive as to be detrimental to the operation of the motor, which is rated for operation at 104°F (40°C) continuous duty.
- The mechanical seal is cooled and lubricated by the fluid being pumped. The mechanical seals are supplied for fluid temperatures between -30°F (-35°C) and 211°F (99.5°C). The **maximum fluid temperature** is 180°F (82°C) continuous duty, and 211°F (99.5°C) intermittent duty. Avoid thermal shock, which can crack the ceramic seat of the mechanical seal. This can occur by a sudden drastic change in temperature on the ceramic seat.
- The maximum safe working pressure is the **maximum** pressure of the pumping **system** (fluid inlet pressure **plus** pressure developed by the pump). The maximum working pressure is determined by safe and reasonable life expectance limits of such items as the mechanical seal, gasket design, bolt strength, bursting strength of pump castings, etc. The **maximum working** pressure is 125 PSIG. Avoid water hammer conditions.

INSTALLATION

LOCATION
The pump should be located in an accessible area as close as possible to the source of liquid to be pumped. Location of the pump should allow for easy removal of drain/vent plugs as required for maintenance and priming the pump.

PIPING
Use pipe compound or Teflon® tape on all male threads. Wherever possible, avoid use of unnecessary elbows, valves or accessory items, especially near the pump suction and discharge openings. To avoid strain on the pump, all pipes should be aligned and supported independently before making any connections. When installing extra long pipe, provide a means to take care of expansion in pipes. To simplify pump connections, the pump body casting can be rotated to optional positions. To rotate the pump body casting, loosen and remove each of the cap screws that attach the pump body casting to the motor support casting. Carefully lift the pump body casting off the motor support casting and rotate it to the required position. Check the square “O” ring is properly seated on the motor support casting. Reinstall the cap screws and tighten diagonally and evenly.

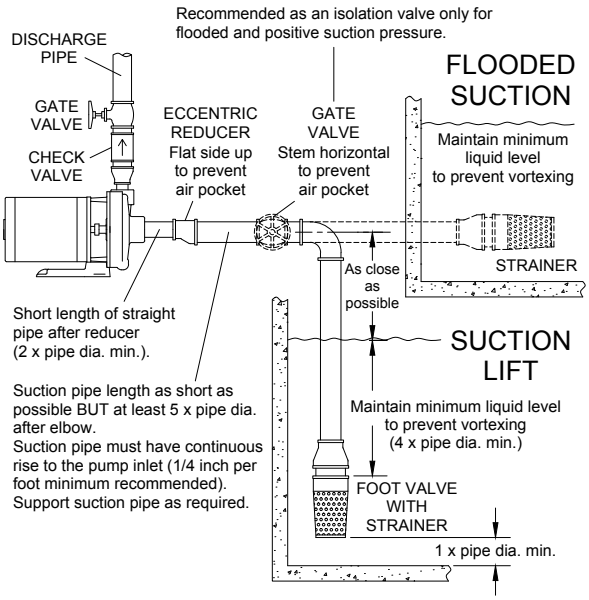


MODELS 902B, 903B, 904B, 905B, 906B, 907B, 908B, 917B, 918B

MODELS 909B, 910B

The **suction pipe** should never be smaller than the suction tapping of the pump, and should be larger if the suction piping is long. The suction pipe should run as straight and short and with as few elbows as possible to keep friction losses to a minimum. If necessary, install a strainer at the open end of the suction line to prevent foreign matter from entering the pump. To maintain prime for pumps operating under suction lift, a foot valve must be installed at the opening of the suction line. The strainer and foot valve must be at least as large as the suction tapping of the pump, preferably larger so as not to restrict flow. Use extreme care in making up suction pipe fittings, since air leaks will cause the pump to lose prime. Also, if the pump is operating under suction lift, horizontal suction piping must rise gradually from the source to the pump and contain no high spots which allow air pockets to form. If the pump is operating under flooded or positive pressure conditions, a gate valve installed in the suction line as a means of isolating the pump is recommended.

The **discharge pipe** should have a check valve installed to prevent back flow which could damage the pump on shut down. A gate valve should also be installed as a means of isolating the pump for maintenance purposes. Pipe, valves and fittings should be at least the same size as the discharge tapping of the pump, to keep friction losses to a minimum. A **bypass** or pressure relief valve should be installed in the discharge line if there is any possibility that the pump may operate against a closed valve in the discharge line. Flow through the pump is required to keep the mechanical seal cooled and lubricated. Damage to the pump may result if the liquid becomes hot enough to vaporize.



WIRING THE MOTOR
Wire the electric motor in accordance with the latest edition of the National Electric Code and local codes and regulations. A qualified electrician is recommended.

Wiring instructions are given on the motor nameplate.

OPERATION

PRIMING THE PUMP

The pump and suction piping must be completely filled with the liquid being pumped **before starting**. If the liquid source is above the pump, prime the pump by removing the topmost hex head vent plug from the front of the pump body casting, allowing liquid to replace the air trapped in the pump. Replace the plug when a steady stream of airless liquid runs out the hole. If the liquid source is below the pump, prime the pump by pouring liquid through the pump body casting discharge opening or an opening in the discharge piping at a level above the pump body casting. The topmost hex head vent plug from the front of the pump body casting must be removed to allow trapped air to escape from the pump. Any high spots in the suction line must be purged while the system is being filled. Replace the vent plug and connect/seal the discharge piping. **Remember, to maintain prime** where the liquid source is below the pump, a foot valve must be installed in a vertical position at the open end of the suction line.

CHECK MOTOR ROTATION

After the pump and suction piping have been filled and vented, the motor rotation can be checked. **Remember never operate the pump dry.** Rotate pump shaft by hand to be certain it turns freely. Direction of rotation should be checked by observation of the pump shaft through the openings in the motor support casting. Briefly switch the power on and observe the direction of rotation. Direction of rotation should be as shown by the arrow on the pump casting. In the event that the rotation is incorrect, refer to the motor nameplate instructions for single phase motors and change the wiring as required. For three phase motors, interchange any two power leads on the load side of the starter.

STARTING THE PUMP

Now that the **pump is primed** and the motor **rotation is correct**, the pump is almost ready to be started. **Before starting,** make sure the gate valve in the suction line (if installed) is completely open. When starting the pump for the first time, and when there is no pressure in the discharge line,leave the gate valve in the discharge line closed or partially open. **Start the pump.** Gradually open the gate valve in the discharge line. Opening this valve too fast may cause water hammer in the discharge line. Unless the discharge valve is being used as a flow throttling device, make sure the valve is completely open. A discharge pressure gauge is the best way to check whether or not liquid is being pumped. If at any time, the gauge should drop to zero or register abnormal pressure, shut down the pump and determine the cause.

Troubleshooting Chart

A. No liquid delivered:

1. Pump not completely primed.
2. Speed too low - check for low voltage.
3. Air or gas in liquid. Air leaks in suction line.
4. Impeller clogged.
5. Pump body or discharge line clogged.
6. Foot valve strainer clogged.
7. Wrong direction of rotation.
8. Discharge valve closed; check valve installed backwards (or stuck).
9. Not enough NPSH available. For cool water, suction lift more than 20 feet (at sea level).
10. Discharge head too high (check system head).
11. Pump body air or vapor bound.

B. Not enough liquid delivered; Not enough pressure:

1. Liquid level in source too low (air vortexing into suction).
2. Speed too low - check for low voltage.
3. Air or gas in liquid. Air leaks in suction line, or high spots.
4. Impeller partially clogged or damaged.
5. Pump body or discharge line partially clogged.
6. Foot valve strainer partially clogged.
7. Wrong direction of rotation.
8. Discharge valve partially closed.
9. Not enough NPSH available. Suction lift excessive. On hot water, pump must have a positive head on the suction, according to the water temperature.
10. Discharge head too high.
11. Excessive impeller running clearance.
12. Impeller vanes worn.

C. Pump uses too much power; Fuses blow or circuit breakers or heaters trip:

1. Voltage low.
2. Head lower than pump rating (allows pump to handle too much liquid, pumping too much capacity.)
3. Liquid heavier and more viscous than water.
4. Rotor binding.
5. Seal binding.
6. Impeller dragging inside pump casting.
7. Bent shaft.
8. Wrong direction of rotation.
9. Motor defects, motor shorted or grounded, defective capacitor (single phase).
10. Wiring or connections faulty.

D. Excessive vibration:

1. Air or gas in liquid.
2. Badly worn bearings.
3. Bent shaft.
4. Wrong direction of rotation.
5. Impeller plugged or damaged.
6. Pump foundation not rigid.
7. Liquid level in source too low (air vortexing into suction).
8. Not enough NPSH available.

E. Pump loses prime while running:

1. Suction line has air leaks.
2. Air or gas in liquid.
3. Suction lift excessive.
4. If hot water, has pump adequate positive suction head?

F. Pump loses prime standing still:

1. Foot valve leaking.
2. Suction pipe or pump housing leaking.
3. Mechanical seal leaking.

G. Mechanical Seal Leaks:

1. Improper Assembly.
2. Worn Seal Faces.
   a. Corrosion due to character of liquid pumped.
   b. Excessive amount of abrasive material in liquid causing an accumulation around the rotating assembly which results in faces opening up and allowing grit between them.
   c. Seal running dry.

H. Pump cycles too much:

1. Pressure switch is not properly adjusted or is defective.
2. Liquid level control is not properly set or is defective.
3. Insufficient air charging or leaking tank or piping.
4. Tank is too small.
5. Pump is oversized.

MAINTENANCE

FREEZE PROTECTION

If the pump is installed in an area where freezing could occur, the pump and system should be drained during freezing temperatures to avoid damage. To drain the pump, close the gate valves on the suction and discharge lines, and remove the hex head drain/vent plugs at both top and bottom of the pump body casting. DO NOT replace the plugs until the pump is to be used again.

MOTOR REPLACEMENT

If the motor is damaged as a result of bearing failure, burning, or electrical failure, the following instructions detail how to remove the motor for replacement. **Replacement motors must be of the same NEMA C frame size and have the same horsepower and service factor.**

Disassembly...

1. Using the proper allen wrench, loosen the set screw(s) in the pump shaft.
2. With the correct size wrench, loosen and remove the four cap screws which hold the motor to the motor support casting.
3. Move the motor straight back until the motor shaft is free of the pump shaft. Use two screwdrivers between motor and motor support casting to pry back the motor if needed.

Assembly...

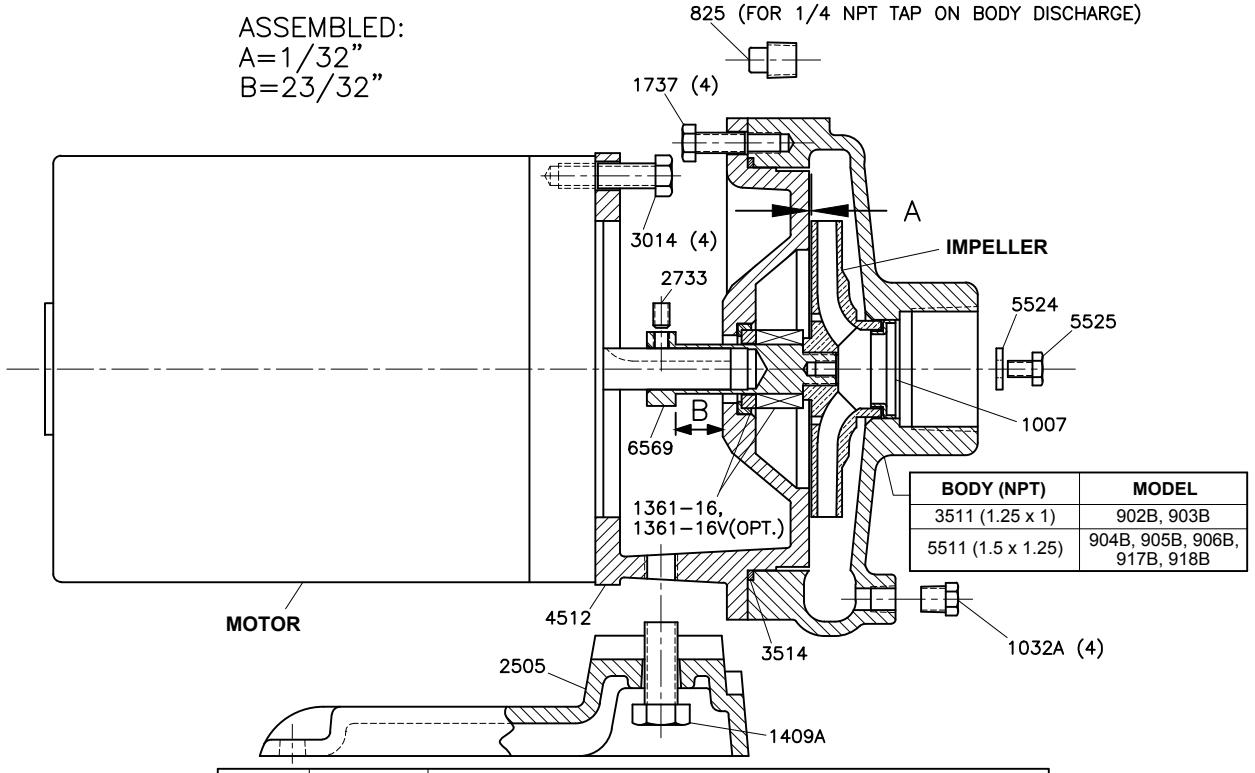
1. Clean the mounting surfaces of the motor and motor support casting.
2. Set the motor on the pump end.
3. Motor should be rotated so that any open cooling vents are positioned downward, to avoid the possibility of liquid splashing into the motor from above.

4. Insert the four cap screws, then tighten diagonally and evenly.
5. Using a large screwdriver, raise the pump shaft by placing the tip of the screwdriver under the collar of the pump shaft. Carefully move the pump shaft toward the motor until the impeller contacts the motor support casting and will move no further.
6. Place a spacing tool (we suggest using a piece of square cross section key stock, cut to length according to dimension "B" shown on the parts assembly drawing) between the motor support casting and pump shaft collar and allow the pump shaft to move back into the pump end until the collar bottoms on the spacing tool. Tighten the set screw(s) in the motor keyway. This will position the impeller in the correct axial location.
7. Make sure the pump shaft can be rotated by hand. If the shaft cannot be rotated or it binds, repeat steps 5 and 6.

MECHANICAL SEAL

When the mechanical shaft seal leaks, abrasives may have been drawn from the liquid source or the pump may have run dry. If so, installation of a new seal will be necessary. When installing a new seal, the carbon ring should be handled carefully and seated properly to avoid breakage. Wash out sand from the pump castings, impeller and shaft, as sand will damage the new seal in a matter of minutes. To prevent burning out the seal in the pump, do not start the motor until the pump has been primed. If the pump is leaking near the shaft, this can many times be corrected by loosening the set screw(s) in the pump shaft and moving the pump shaft toward the motor slightly so that more tension is placed on the seal spring.
To prevent the impeller rubbing on the motor support casting care should be taken that the pump shaft is not moved too far.

FOR MODELS: 902B, 903B, 904B, 905B, 906B STARTING WITH SERIAL NO. 1ZZ7
FOR MODELS: 917B, 918B STARTING WITH SERIAL NO. 2Y0



BODY (NPT)	MODEL
3511 (1.25 x 1)	902B, 903B
5511 (1.5 x 1.25)	904B, 905B, 906B, 917B, 918B

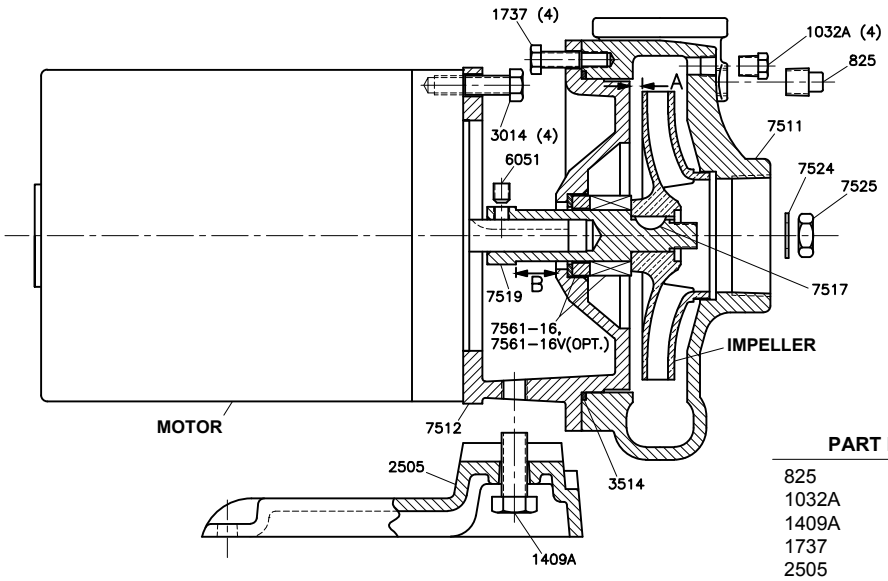
MODEL	IMPELLER	MOTOR			
		ODP		TEFC	
		HP (SF)	PART NO. - PHASE	HP (SF)	PART NO. - PHASE
902B	2554G	1/3 (1.75)	6-JK2059 -1 or -3	1/2 (1.15)	6-JKT3059 -1 or -3
903B	3554	1/2 (1.6)	6-JK3059 -1 or -3	3/4 (1.15)	6-JKT4059 -1 or -3
904B	4554	3/4 (1.5)	6-JK4059 -1 or -3	1 (1.15)	6-JKT5059 -1 or -3
905B	3054G	1 (1.4)	6-JK5059 -1 or -3	1.5 (1.15)	6-JKT6059 -1 or -3
906B	5554	1.5 (1.3)	6-JK6059 -1 or -3	2 (1.15)	6-JKT7059 -1 or -3
917B	5054	2 (1.2)	6-JK7059 -1 or -3	2 (1.15)	6-JKT7059 -1 or -3
918B	7054	3 (1.15)	6-JK8059 -1 or -3	3 (1.15)	6-JKT8059 -3

PART NO.	REQ'D.	DESCRIPTION
825	1	1/4 NPT Pipe Plug
1007	1	Hydro-lok
1032A	4	1/8 NPT Pipe Plugs
1361-16	1	3/4" Mechanical Seal, Buna-N
1361-16V (Optional)	1	3/4" Mechanical Seal, Viton
1409A	1	1/2-13 x 1-1/4" Cap Screw
1737	4	5/16-18 x 3/4" Cap Screws
2505	1	Pump Base

PART NO.	REQ'D.	DESCRIPTION
2733	1	1/4-20 x 3/8" Set Screw
3014	4	3/8-16 x 7/8" Cap Screws
3514	1	Square O-Ring
4512	1	Motor Support
5524	1	Washer, SS
5525	1	Cap Screw, SS
6569	1	Pump Shaft, SS

FOR MODELS: 907B, 908B

STARTING WITH SERIAL NO. 1ZZ7



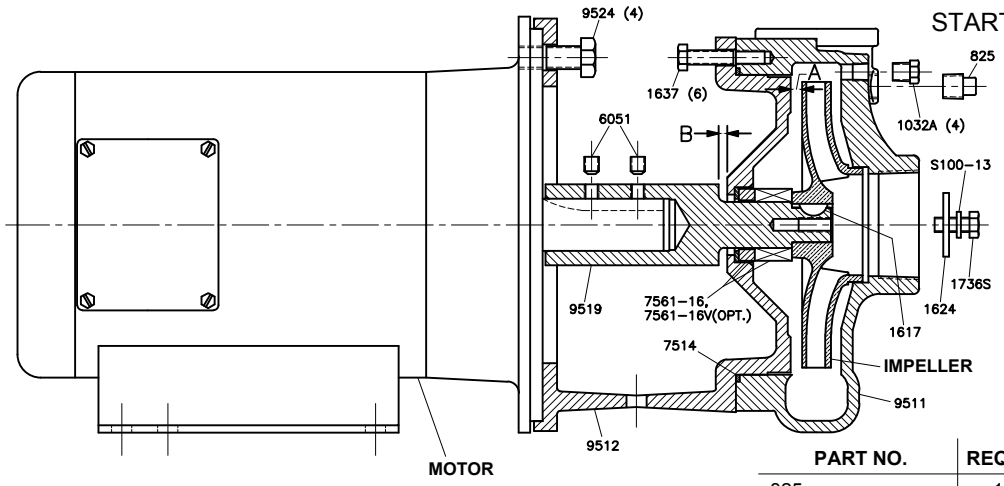
ASSEMBLED:
A=1/4"
B=25/32"

MODEL	IMPELLER	MOTOR			
		ODP		TEFC	
		HP (SF)	PART NO. - PHASE	HP (SF)	PART NO. - PHASE
907B	7504	2 (1.2)	6-JK7059 -1 or -3	2 (1.15)	6-JKT7059 -1 or -3
908B	8504G	3 (1.15)	6-JK8059 -1 or -3	3 (1.15)	6-JKT8059 -1 or -3

PART NO.	REQ'D.	DESCRIPTION
825	1	1/4 NPT Pipe Plug
1032A	4	1/8 NPT Pipe Plugs
1409A	1	1/2-13 x 1-1/4" Cap Screw
1737	4	5/16-18 x 3/4" Cap Screws
2505	1	Pump Base
3014	4	3/8-16 x 7/8" Cap Screws
3514	1	Square O-Ring
6051	1	5/16-18 x 3/8" Set Screw
7511	1	Pump Body, 2 NPT x 1.5 NPT
7512	1	Motor Support
7517	1	Woodruff Key, SS
7519	1	Pump Shaft, SS
7524	1	Impeller Washer, SS
7525	1	Impeller Nut, SS
7561-16	1	1" Mechanical Seal, Buna-N
7561-16V (Optional)	1	1" Mechanical Seal, Viton

FOR MODELS: 909B, 910B

STARTING WITH SERIAL NO. 1ZZ2



ASSEMBLED:
A=1/4"
B=3/16"

MODEL	IMPELLER	MOTOR			
		ODP		TEFC	
		HP (SF)	PART NO. - PHASE	HP (SF)	PART NO. - PHASE
909B	9504	5 (1.15)	6-JK9059 -1 or -3	5 (1.15)	6-JKT9059 -3
910B	10504	7.5 (1.15)	6-JK10059 -3	7.5 (1.15)	6-JKT10059 -3

PART NO.	REQ'D.	DESCRIPTION
825	1	1/4 NPT Pipe Plug
1032A	4	1/8 NPT Pipe Plugs
1617	1	Woodruff Key, SS
1624	1	Washer, SS
1637	6	5/16-18 x 1" Cap Screws
1736S	1	5/16-18 x 3/4" Cap Screw, SS
6051	2	5/16-18 x 3/8" Set Screws
7514	1	Square O-Ring
7561-16	1	1" Mechanical Seal, Buna-N
7561-16V (Optional)	1	1" Mechanical Seal, Viton
9511	1	Pump Body, 2 NPT x 1.5 NPT
9512	1	Motor Support
9519	1	Pump Shaft, SS
9524	4	1/2-13 x 3/4" Cap Screws
S100-13	1	5/16" Lock Washer, SS

LANCASTER PUMP A DIVISION OF C-B TOOL COMPANY

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