

OWNERS GUIDE TO INSTALLATION AND OPERATION

END SUCTION CENTRIFUGAL PUMPS

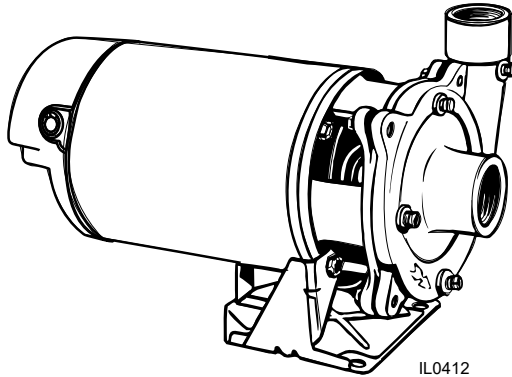


Figure 1 - CJ103 Series

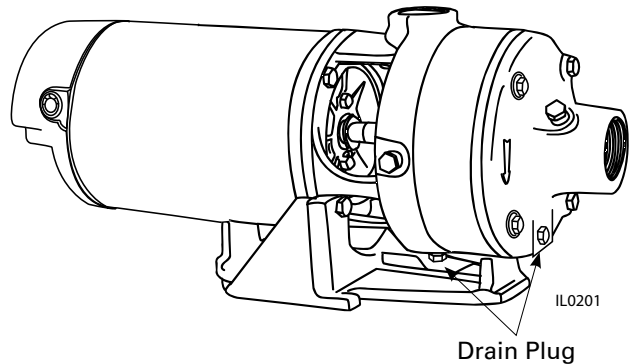


Figure 2 - CJ101 Series

READ THESE INSTRUCTIONS CAREFULLY

Read these installation instructions in detail before installing your pump. Be sure to check the following:

1. Be certain the motor is connected for the correct line voltage being used (check motor nameplate).
 2. Be certain the pump is completely primed before starting. Otherwise damage may occur to the seal.
- Every pump is tested before leaving the factory, and its performance depends largely on the installation.

GENERAL SAFETY INFORMATION

1. Follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).
2. Replace damaged or worn wiring cord immediately.
3. Do not kink power cable and never allow the cable to come in contact with oil, grease, hot surfaces or chemicals.
4. Protect the power cable from coming in contact with sharp objects.
5. Be careful when touching the exterior of an operating motor - it may be hot enough to be painful or cause injury.
6. Make certain that the power source conforms to the requirements of your equipment.
7. Always disconnect power source before performing any work on or near the motor or its connected load. If the power disconnect point is out-of-sight, lock it in the open position and tag it to prevent unexpected application of power. Failure to do so could result in fatal electrical shock.
8. Do not handle the pump with wet hands or when standing in water as fatal electrical shock could occur. Disconnect main power before handling unit for ANY REASON!
9. Unit must be securely and adequately electrically grounded. This can be accomplished by wiring the unit to a ground metal-clad raceway system or by using a separate ground wire connected to the bare metal of the motor frame or other suitable means.
10. **▲ WARNING** Risk of electric shock. This pump has not been investigated for use in swimming pool areas.
11. **▲ WARNING** This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

NOTE: Pumps with the "CSA" mark are tested to UL standard UL778 and certified to CSA standard C22.2 No. 108.

CJ103 SERIES

CHART A

| | HP | A | B | C | D | E | F | G | H | J | K | L |
|---------|-------|---|-------|---------|---|-------|-------|-------|-------|--------|-------|--------|
| | 1/3 | 4 | 4-5/8 | 3-11/16 | 5 | 9-1/2 | 2-1/8 | 8-1/4 | 8-1/8 | 13-1/4 | 3-7/8 | - |
| | 1/2 | 4 | 4-5/8 | 3-11/16 | 5 | 9-1/2 | 2-1/8 | 8-1/4 | 8-1/8 | 13-1/2 | 3-7/8 | - |
| | 3/4 | 4 | 4-5/8 | 3-11/16 | 5 | 9-1/2 | 2-1/8 | 8-1/4 | 8-1/8 | 14 | 3-7/8 | - |
| | 1 | 4 | 4-5/8 | 3-11/16 | 5 | 9-1/2 | 2-1/8 | 8-1/4 | 8-1/8 | 14-1/2 | 3-7/8 | 10-1/4 |
| | 1-1/2 | 4 | 4-5/8 | 3-11/16 | 5 | 9-1/2 | 2-1/8 | 8-1/4 | 8-1/8 | 15-1/8 | 3-7/8 | 10-1/4 |
| 1 Phase | 3 | 4 | 4-5/8 | 3-11/16 | 5 | 9-1/2 | 2-1/8 | 8-1/4 | 8-1/8 | 15-5/8 | 3-7/8 | 10-1/4 |
| 3 Phase | 2 | 4 | 4-5/8 | 3-11/16 | 5 | 9-1/2 | 2-1/8 | 8-1/4 | 8-1/8 | 15-5/8 | 3-7/8 | - |

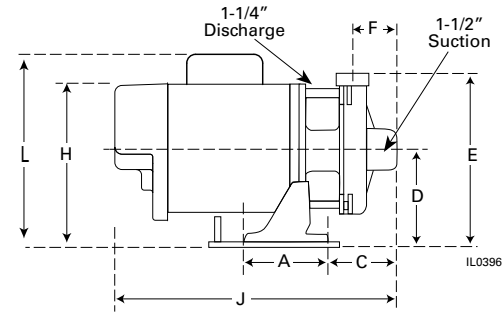


Figure 3 - CJ103 Single Stage Booster Pump

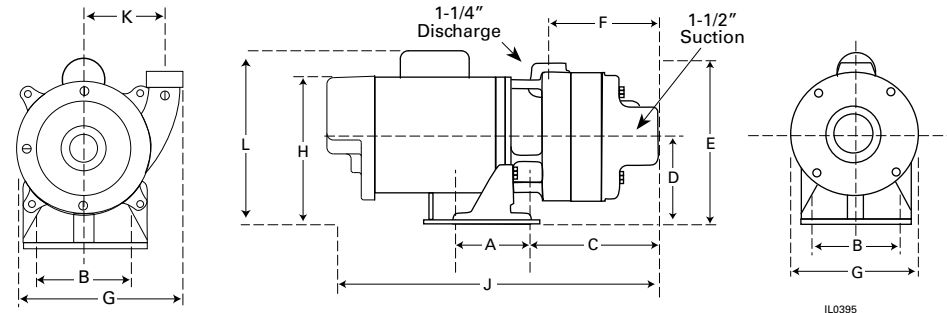


Figure 4 - CJ101B Two and Three Stage Booster Pump

CJ101 SERIES

CHART B

| HP | STAGE | A | B | C | D | E | F | G | H | J | L |
|-------|-------|---|-------|--------|-------|-------|-------|---|-------|--------|--------|
| 3/4 | 2 | 4 | 4-5/8 | 7-9/16 | 5-1/4 | 9-1/4 | 6-1/4 | 7 | 8-1/2 | 17-7/8 | - |
| 1 | 2 | 4 | 4-5/8 | 7-9/16 | 5-1/4 | 9-1/4 | 6-1/4 | 7 | 8-1/2 | 18-3/8 | - |
| 1-1/2 | 2 | 4 | 4-5/8 | 7-9/16 | 5-1/4 | 9-1/4 | 6-1/4 | 7 | 8-1/2 | 19 | - |
| 2 | 2 | 4 | 4-5/8 | 7-9/16 | 5-1/4 | 9-1/4 | 6-1/4 | 7 | 8-1/2 | 19-1/2 | - |
| 2 | 3 | 4 | 4-5/8 | 9-7/16 | 5-1/4 | 9-1/4 | 8-1/8 | 7 | 8-1/2 | 21-3/8 | - |
| 3 | 3 | 4 | 4-5/8 | 9-7/16 | 5-1/4 | 9-1/4 | 8-1/8 | 7 | 8-1/2 | 21-3/8 | 10-5/8 |

MOTOR DATA

CHART C

| HP | PH | VOLTS | HZ | RPM | MOTOR VOLTAGE (FACTORY) CONNECT. | SERVICE FACTOR MOTOR AMPS | | | | LOCKED ROTOR AMPS | | | | KVA |
|-------------------|-------|-------------|-------|-----------|----------------------------------|---------------------------|------|-------------|------|-------------------|------|-------------|------|-----|
| | | | | | | SINGLE PHASE | | THREE PHASE | | SINGLE PHASE | | THREE PHASE | | |
| | | | | | | 115V | 230V | 230V | 460V | 115V | 230V | 230V | 460V | |
| 1/3 | 1 | 115/230 | 60 | 3450 | 115V | 8.6 | 4.3 | - | - | 26 | 13 | - | - | K |
| 1/2 | 1 | 115/230 | 60 | 3450 | 115V | 13 | 6.5 | - | - | 36 | 18 | - | - | K |
| 3/4 | 1 | 115/230 | 60 | 3450 | 230V | 14 | 7 | - | - | 52 | 26 | - | - | K |
| 1 | 1 | 115/230 | 60 | 3450 | 230V | 18 | 9 | - | - | 70 | 39 | - | - | L |
| 1 1/2 | 1 | 115/230 | 60 | 3450 | 230V | 21 | 10.5 | - | - | 98 | 49 | - | - | J |
| 2 | 1 | 115/230 | 60 | 3450 | 230V | 25 | 12.5 | - | - | 116 | 58 | - | - | H |
| 3 | 1 | 230 | 60 | 3450 | 230V | - | 13.5 | - | - | 53 | - | - | - | D |
| CJ103 models only | 1 | 230 | 60 | 3450 | 230V | - | 8.1 | - | - | 39 | - | - | - | L |
| | 1 1/2 | 230 | 60 | 3450 | 230V | - | 10.2 | - | - | 49 | - | - | - | J |
| | 3/4 | 208-230/460 | 60/50 | 3450/2850 | 230V | - | - | 3.5 | 1.75 | - | - | 19 | 9.5 | K |
| | 1 | 208-230/460 | 60/50 | 3450/2850 | 230V | - | - | 4.5 | 2.25 | - | - | 26.9 | 13.5 | K |
| | 1 1/2 | 208-230/460 | 60/50 | 3450/2850 | 230V | - | - | 5.7 | 2.85 | - | - | 33.5 | 16.8 | K |
| | 2 | 208-230/460 | 60/50 | 3450/2850 | 230V | - | - | 7.4 | 3 | - | - | 44 | 22 | K |
| | 3 | 208-230/460 | 60 | 3450 | 230V | - | - | 9.8 | 4.9 | - | - | 48 | 24 | D |



All CJ101 and CJ103 single phase (with ODP motors) pumps feature Flint & Walling's Service Plus 56 frame NEMA J, single or dual voltage ODP motors with permanently lubricated double ball bearing.
 NOTE: CJ103 1 HP and above 3 PH and pumps with TEFC motors feature purchased motors.
 Single or three phase options
 TEFC motors available on select models.

Open Drip Proof (ODP) motor voltage

CJ101 Single Phase: 1/3 through 2 HP - 115/230V;
 3 HP - 230V, 60HZ

CJ103 Single Phase: 1/3 through 3/4 HP - 115/230V, 60/50HZ;
 1 through 3 HP, 230V, 60HZ

Three Phase:
 1/2 through 2 HP - 208-230V/460V, 50/60HZ
 3 HP - 208-230/460V; 60HZ

Totally Enclosed Fan Cooled (TEFC) motor voltage

Single Phase: 1/2 through 3 HP - 115/230V 60/50HZ
 Three Phase: 1/2 through 3 HP - 208-230/460V 60/50HZ

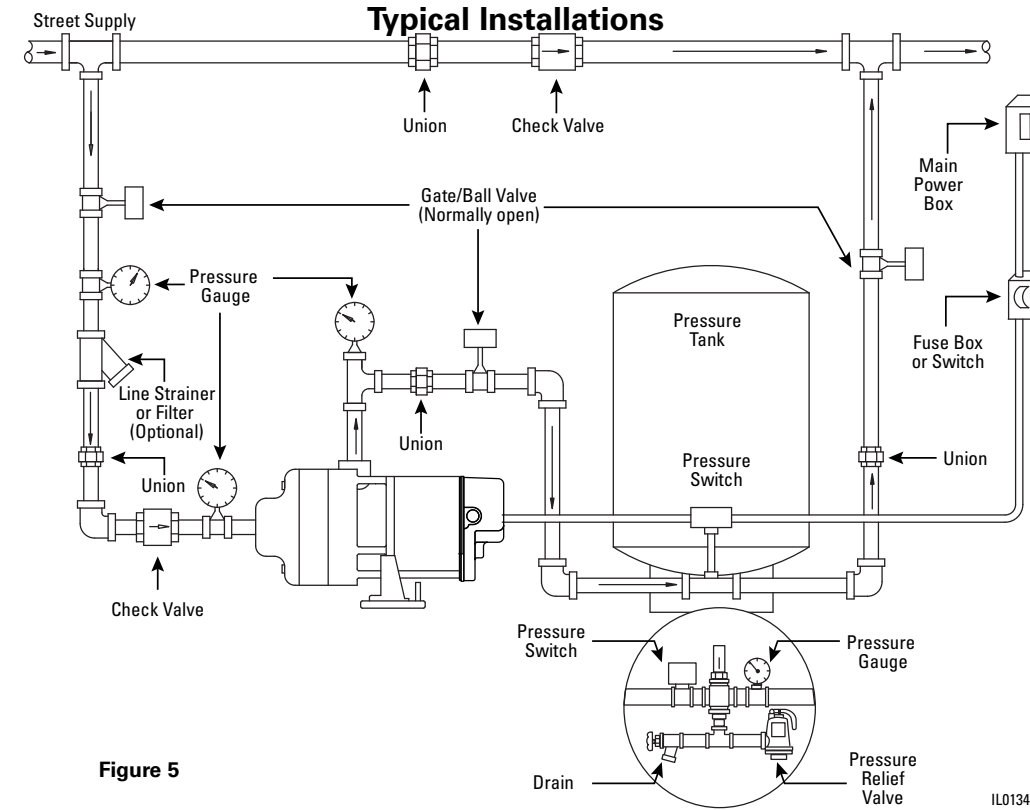


Figure 5

To size pressure tank properly, match the drawdown of the tank to the capacity of the pump.

(*) For manual operation, omit the pressure tank and pressure switch. Wire motor direct to fuse box.

WARNING Install a pressure relief valve on any installation where pump pressure can exceed the pressure tank's maximum working pressure or on systems where the discharge line can be shut off or obstructed. Extreme over pressure can result in personal injury or property damage.

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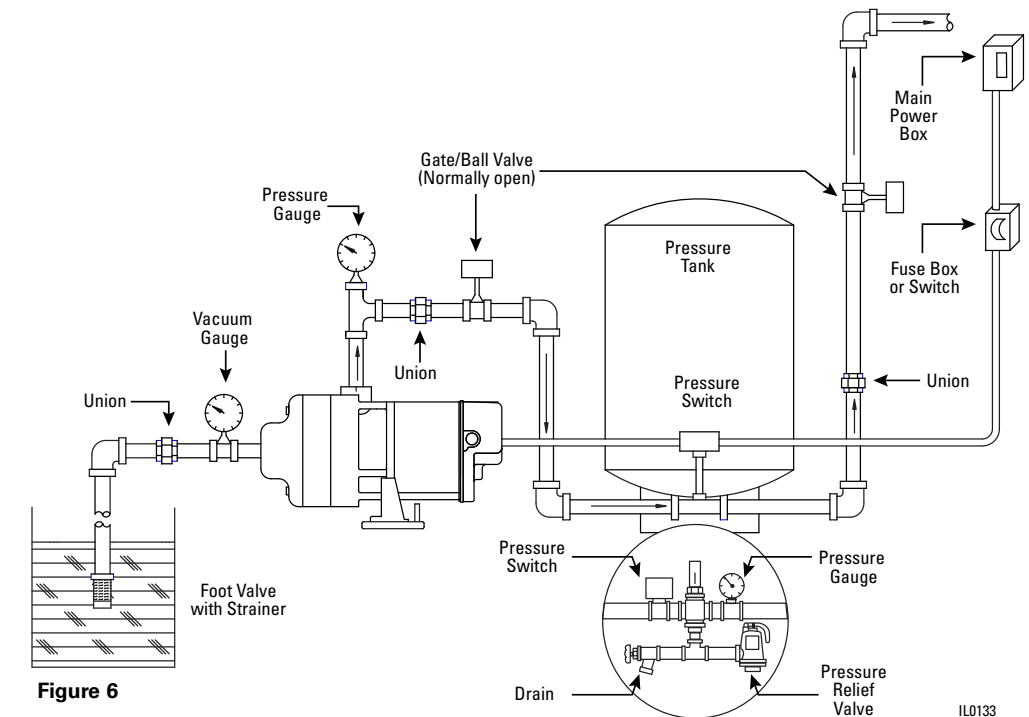


Figure 6

Chart D

| DISTANCE FROM MOTOR TO FUSE BOX METER, OR ELECTRICAL OUTLET | MINIMUM COPPER WIRE SIZE CHART (GAUGE) | | | | | | | | | | | | | | | | | | | | | |
|---|--|--------|--------|------|----------|------|--------------------|--------|------|----------|------|------|----|----|----|----|----|----|----|----|----|----|
| | SINGLE PHASE MOTORS | | | | | | THREE PHASE MOTORS | | | | | | | | | | | | | | | |
| | 1/3 HP | 1/2 HP | 3/4 HP | 1 HP | 1-1/2 HP | 2 HP | 3 HP | 3/4 HP | 1 HP | 1-1/2 HP | 2 HP | 3 HP | | | | | | | | | | |
| 0-50' | 14 | 14 | 12 | 14 | 12 | 14 | 10 | 14 | 10 | 12 | 10 | 12 | 10 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 50-100' | 14 | 14 | 12 | 14 | 12 | 14 | 10 | 14 | 8 | 12 | 8 | 12 | 10 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 100-150' | 14 | 14 | 12 | 14 | 10 | 14 | 10 | 12 | 6 | 12 | 6 | 12 | 10 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 150-200' | 12 | 14 | 12 | 14 | 10 | 12 | 8 | 12 | * | 10 | * | 10 | 10 | 14 | 14 | 14 | 14 | 14 | 12 | 14 | 12 | 14 |
| 200-300' | 12 | 14 | 10 | 14 | 8 | 12 | 6 | 10 | * | 10 | * | 10 | 8 | 14 | 14 | 12 | 14 | 12 | 14 | 10 | 12 | 10 |
| Breaker Size (Amps) | 15 | 15 | 20 | 15 | 20 | 15 | 30 | 15 | 30 | 20 | 30 | 20 | 30 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |

(*) Not economical to run in 115 volt, use 230 volts

PUMP PERFORMANCE

CJ101 SERIES CENTRIFUGAL PUMPS, LOW LEAD BRASS IMPELLERS

| MODEL NO. | | | HP | STAGES | LIFT FT. | Discharge Pressure PSI | | | | | | | | | | MAX. PRESS. PSI | *MAX. CASE PRESS. | *MAX. LIQUID TEMP. | | | | | | | | | |
|-----------------------------|-------------------------------|--------------|-------|--------|---------------|------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----|-------------------|-----------------|-------------------|--------------------|--|--|--|--|--|--|--|--|--|
| 1 PHASE | 3 PHASE | LESS MOTOR | | | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | CAPACITY U.S. GPM | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CJ101B071AB CJ101B071TAB | CJ101B073AB CJ101B073TAB | CJ101B0710AB | 3/4 | 2 | 5 15 25 | 39 38 31 | 34 33 29 | 29 26 23 | 21 18 12 | 5 | | | | | | 54 | 160psig | 200° F | | | | | | | | | |
| CJ101B101AB CJ101B101TAB | CJ101B103AB CJ101B103TAB | CJ101B1010AB | 1 | 2 | 5 15 25 | 42 40 32 | 38 36 31 | 33 31 28 | 26 24 21 | 18 14 | | | | | | 62 | 160psig | 200° F | | | | | | | | | |
| CJ101B151AB CJ101B151TAB | CJ101B153AB CJ101B153TAB | CJ101B1510AB | 1 1/2 | 2 | 5 15 25 | 48 44 34 | 44 42 33 | 39 37 32 | 34 31 29 | 27 24 20 | 17 10 | | | | | 69 | 160psig | 200° F | | | | | | | | | |
| CJ101B201AB CJ101B201TAB | CJ101B203AB CJ101B203TAB | CJ101B2010AB | 2 | 2 | 5 15 25 | 56 50 37 | 52 49 36 | 47 45 35 | 41 39 34 | 34 31 27 | 24 19 | | | | | 70 | 160psig | 200° F | | | | | | | | | |
| CJ101C201AB CJ101C201TAB | CJ101C203AB CJ101C203TAB | | 2 | 3 | 5 15 25 | 49 45 35 | 47 44 34 | 43 42 33 | 40 39 32 | 36 35 31 | 32 31 29 | 28 26 23 | 22 19 15 | 12 | | 98 | 160psig | 200° F | | | | | | | | | |
| CJ101C301AB CJ101C301TAB | CJ101C303AB Δ CJ101C303TAB | | 3 | 3 | 5 15 25 | 56 50 37 | 54 49 36 | 51 48 36 | 48 46 35 | 44 42 34 | 39 37 33 | 33 31 29 | 27 24 20 | 18 | | 95 | 160psig | 200° F | | | | | | | | | |

Δ Less than 50% US content

PUMP PERFORMANCE

CJ103 SERIES CENTRIFUGAL PUMPS, LOW LEAD BRASS IMPELLERS

| MODEL NO. | | | HP | STAGES | LIFT FT. | Discharge Pressure PSI | | | | | | | | | | MAX. PRESS. PSI | *MAX. CASE PRESS. | *MAX. LIQUID TEMP. | | | | | | | | | |
|---------------------------|-----------------------|------------|-------|--------|---------------|------------------------|------------------|----------------|----------------|----------------|----------|----|----|----|-------------------|-----------------|-------------------|--------------------|--------|--|--|--|--|--|--|--|--|
| 1 PHASE | 3 PHASE | LESS MOTOR | | | | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | CAPACITY U.S. GPM | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CJ103031AB | | | 1/3 | 1 | 5 15 25 | 42 36 28 | 34 26 | 21 | | | | | | | | | 27 | 100psig | 200° F | | | | | | | | |
| CJ103051AB CJ103051TAB | | | 1/2 | 1 | 5 15 25 | 50 43 33 | 47 40 30 | 37 29 15 | 25 9 | | | | | | | | 32 | 100psig | 200° F | | | | | | | | |
| CJ103071 CJ103071T | CJ103073 CJ103073T | | 3/4 | 1 | 5 15 25 | 71 66 57 | 62 54 43 | 51 40 25 | 36 19 | 11 | | | | | | | 32 | 100psig | 200° F | | | | | | | | |
| CJ103101 CJ103101T | CJ103103 CJ103103T | | 1 | 1 | 5 15 25 | 76 73 66 | 69 65 57 | 61 54 45 | 50 41 29 | 36 24 | 16 | | | | | | 39 | 100psig | 200° F | | | | | | | | |
| CJ103151 CJ103151T | CJ103153 CJ103153T | | 1 1/2 | 1 | 5 15 25 | 94 92 74 | 88 85 72 | 80 75 66 | 70 63 52 | 59 49 34 | 44 27 | 18 | | | | | 43 | 100psig | 200° F | | | | | | | | |
| CJ103201 | | | 3 | 1 | 5 15 25 | 109 109 90 | 103 103 89 | 96 94 85 | 86 82 71 | 75 67 51 | 61 45 | 39 | | | | | 44 | 100psig | 200° F | | | | | | | | |
| CJ103201T | CJ103203 CJ103203T | | 2 | | | | | | | | | | | | | | | | | | | | | | | | |

CJ101 SERIES CENTRIFUGAL PUMPS, PLASTIC IMPELLERS

| MODEL NO. | | | HP | STAGES | LIFT FT. | Discharge Pressure PSI | | | | | | | | | | MAX. PRESS. PSI | *MAX. CASE PRESS. | *MAX. LIQUID TEMP. | | | | | | | | | |
|-----------|-----------|------------|-------|--------|---------------|------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----|-------------------|-----------------|-------------------|--------------------|--------|--|--|--|--|--|--|--|--|
| 1 PHASE | 3 PHASE | LESS MOTOR | | | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | CAPACITY U.S. GPM | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CJ101P071 | CJ101P073 | | 3/4 | 2 | 5 15 25 | 41 38 32 | 35 32 29 | 28 26 22 | 20 13 | | | | | | | | 49 | 160psig | 160° F | | | | | | | | |
| CJ101P101 | CJ101P103 | | 1 | 2 | 5 15 25 | 45 42 35 | 40 39 33 | 35 33 30 | 28 26 22 | 20 15 | | | | | | | 60 | 160psig | 160° F | | | | | | | | |
| CJ101P151 | CJ101P153 | | 1 1/2 | 2 | 5 15 25 | 54 48 37 | 50 46 35 | 44 42 33 | 38 35 28 | 28 23 17 | | | | | | | 61 | 160psig | 160° F | | | | | | | | |
| CJ101P201 | CJ101P203 | | 2 | 2 | 5 15 25 | 55 49 37 | 52 47 36 | 47 45 33 | 41 39 32 | 34 30 26 | 23 17 | | | | | | 67 | 160psig | 160° F | | | | | | | | |
| CJ101D201 | CJ101D203 | | 2 | 3 | 5 15 25 | 44 36 26 | 44 36 26 | 44 36 24 | 41 36 24 | 37 35 24 | 32 30 22 | 28 25 20 | 22 20 15 | 16 | | 101 | 160psig | 160° F | | | | | | | | | |
| | CJ101D303 | | 3 | 3 | 5 15 25 | 54 48 36 | 52 47 36 | 50 46 36 | 47 45 35 | 44 42 33 | 39 37 31 | 33 30 27 | 25 22 19 | 15 | | 95 | 160psig | 160° F | | | | | | | | | |

*Do not exceed the maximum case pressure and maximum liquid temperature rating of the pump. Performance shown for 60Hz models. 50 Hz models also available. Suction and Discharge Tappings 1-1/2" X 1-1/4"

CJ103 SERIES CENTRIFUGAL PUMPS, PLASTIC IMPELLERS

| MODEL NO. | | | HP | STAGES | LIFT FT. | Discharge Pressure PSI | | | | | | | | | | MAX. PRESS. PSI | *MAX. CASE PRESS. | *MAX. LIQUID TEMP. | | | | | | | | | |
|-----------|-----------|------------|-------|--------|---------------|------------------------|----------------|----------------|----------------|----------------|----------|----|----|----|-------------------|-----------------|-------------------|--------------------|--------|--|--|--|--|--|--|--|--|
| 1 PHASE | 3 PHASE | LESS MOTOR | | | | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | CAPACITY U.S. GPM | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CJ103P031 | | | 1/3 | 1 | 5 15 25 | 43 35 26 | 35 24 | 21 | | | | | | | | | 26 | 100psig | 160° F | | | | | | | | |
| CJ103P051 | CJ103P053 | | 1/2 | 1 | 5 15 25 | 45 41 31 | 45 41 29 | 44 38 27 | 36 24 | 19 | | | | | | | 32 | 100psig | 160° F | | | | | | | | |
| CJ103P071 | CJ103P073 | | 3/4 | 1 | 5 15 25 | 69 64 49 | 68 62 48 | 64 57 45 | 57 46 31 | 42 28 | 20 | | | | | | 38 | 100psig | 160° F | | | | | | | | |
| CJ103P101 | CJ103P103 | | 1 | 1 | 5 15 25 | 67 61 47 | 65 59 46 | 64 58 45 | 62 55 43 | 51 41 23 | 35 | | | | | | 40 | 100psig | 160° F | | | | | | | | |
| CJ103P151 | CJ103P153 | | 1 1/2 | 1 | 5 15 25 | 68 62 48 | 67 61 47 | 66 60 46 | 65 59 45 | 63 55 41 | 52 39 | 31 | | | | | 44 | 100psig | 160° F | | | | | | | | |

*Do not exceed the maximum case pressure and maximum liquid temperature rating of the pump. Performance shown for 60Hz models. 50 Hz models also available. Models with suffix T denotes TEFC motor. All other models utilize ODP motors. Suction and Discharge Tappings 1-1/2" X 1-1/4"

INSPECTION AND STORAGE

When unpacking the unit, inspect carefully for any damage that may have occurred during shipment. If the unit is received sometime before it can be used, it should be inspected, resealed and stored in a dry location.

LOCATION

IMPORTANT: In installations where property damage might result from an inoperative or leaking pump due to power outages, discharge line blockage or any other reason, a back-up system (s) and/or warning system (s) should be used. Install a gate valve and union in the suction and discharge lines. For removal of the pump for service, close the gate valve and disconnect the union.

1. Locate pump as close to the fluid source as possible.
2. Place unit where the motor electrical components and piping are protected from the weather and extremes of heat, humidity and below freezing temperatures.
3. Mount unit in a dry location that is easily accessible for inspection and maintenance. If a dry location is not available, mount it on a foundation well above the wet floor.
4. Allow ample clearance around unit for free air circulation.
5. CJ103 Series pumps incorporate a discharge port on the pump casing that can be adjusted in 90 increments. If necessary, adjust the discharge port to accommodate the specific application. Pump performance will not be affected by the position of the discharge port.
6. This unit is not waterproof, and is not intended to be used in showers, saunas, or other potentially wet locations. The motor is designed to be used in a clean, dry location with access to an adequate supply of cooling air. Ambient temperature around the motor should not exceed 104°F (40°C). For outdoor installations, motor must be protected by a cover that does not block airflow to and around the motor. This unit is not weatherproof, nor is it able to be submersed in water, or any other liquid.

SUCTION LIMITATIONS

1. Units are non self-priming. Normally after being primed the total suction lift of the pump is 25 feet. Suction lift varies depending upon elevation (altitude) and water temperature. See Practical Suction Lift chart.
2. Where liquids at or near their boiling points are being handled, the supply must be located above the suction, so that the available NPSH will be greater than that required by the unit.

Practical Suction Lifts at Various Elevations and Water Temperatures in Degrees Fahrenheit

| Altitude | 60° | 80° | 100° | 120° | 140° | 160° | 180° | 200° |
|-----------|-----|-----|------|------|------|------|------|------|
| Sea Level | -22 | -21 | -20 | -18 | -15 | -10 | -4 | +5 |
| 2000 | -20 | -19 | -18 | -16 | -12 | -7 | -1 | +8 |
| 4000 | -17 | -16 | -15 | -13 | -10 | -4 | +2 | +12 |
| 6000 | -15 | -14 | -13 | -11 | -7 | -2 | +6 | +16 |
| 8000 | -13 | -12 | -10 | -8 | -4 | +2 | +9 | — |
| 10000 | -10 | -9 | -8 | -6 | -2 | +4 | +13 | — |

This table gives the maximum permissible suction lift or the minimum head permitted on the suction side of a pump at various altitudes and liquid temperatures. A minus sign before a number indicates suction lift. A plus sign before a number indicates minimum head. These figures are to be used as a guide.

PIPING

1. Use galvanized piping, rigid plastic or other suitable pipe that will not collapse under suction or rupture due to pressure.
2. The diameter of the suction and discharge pipe should be no smaller than the corresponding tapings of the pump (see Figure 3 & 4). If long runs are encountered larger pipe should be used. Smaller pipe will reduce the capacity of the pump.
3. All joints and connections should have Teflon tape or pipe sealing compound (male threads only) applied and drawn up tightly.

CAUTION The entire system must be air and water tight for efficient operation.

PUMP INSTALLATION

Refer to Figures 5, 6, and 7 for typical installations. Both the suction and discharge pipe should be supported at a point near the pump to avoid strains being placed on the pump.

1. If the pump is used as part of a permanent installation, secure to a rigid foundation with appropriate fasteners.
2. Locate the pump as close to the water as possible, keeping the suction pipe as short as conditions permit.
3. Avoid dips or pockets in offset piping or air will accumulate at high points which will make priming difficult.
4. The suction pipe should slope upward to the pump inlet. A horizontal suction line must have a gradual rise to the pump.

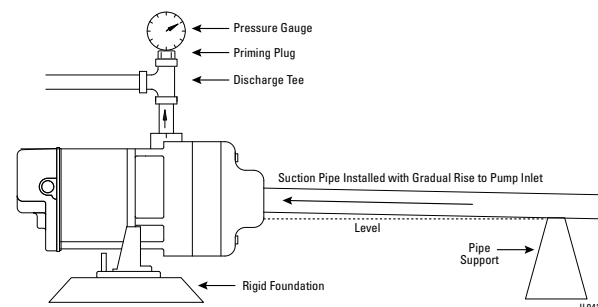


Figure 7

5. On suction lift installations, a foot valve located in the water or a check valve located as close to the water as possible will reduce priming time of the pump and help maintain prime. A strainer must be used on the suction line to filter out dirt and debris.
6. A priming tee installed in the pump discharge port allows water to be poured into the pump case and suction piping, which is required for priming on suction lift installations.
7. Install a gate valve and union in the suction and discharge lines. For removal of the pump for service, close the gate valve and disconnect the union.

CAUTION Do not use a globe valve or other restricting type of valve at the discharge. This will seriously restrict the capacity of the pump.

8. Pressure Gauges - Properly sized vacuum or pressure gauges can be installed in both the suction and discharge pipe. The gauges will enable observation of the pump's performance as well as detecting cavitation, vapor binding or other unstable operation.

CAUTION Use only components that are rated higher than shut-off pressure of the system. Do not exceed the pump's maximum case pressure as listed in the following table.

| Models | Maximum Case Pressure |
|--------|-----------------------|
| CJ103 | 100 PSI |
| CJ101 | 160 PSI |

WARNING A pressure relief valve of adequate capacity must be installed on any installation where the pump pressure can exceed the pressure tank's maximum working pressure or on systems where the discharge line can be shut-off or obstructed. Not providing a relief valve can cause extreme over pressure which could result in personal injury and/or property damage.

ELECTRICAL

WARNING Hazardous voltage. Can shock, burn or cause death. Failure to follow warnings can cause fatal or severe shock hazard or equipment failure.

WARNING Ground motor before connecting to electrical power supply.

WARNING Connect the motor frame to equipment grounding conductor by using green screw. Do not connect green ground wire to any of the motor leads.

WARNING Do not ground to a gas supply line.

WARNING Turn off power to motor before working on electrical connections.

WARNING Supply voltage must be within $\pm 10\%$ of nameplate voltage. If in doubt consult a licensed electrician.

WARNING Use wire size specified in wiring Chart E. If possible, connect pump to a separate branch circuit with no other appliances on it. If wiring diagram on motor model plate differs from diagram shown in figures 8, 8A, 9, 10, 11 & 12 follow diagram on motor.

All wiring should be performed by a qualified electrician and in accordance with the national and local electric codes.

WIRING

1. Motor voltages will vary depending upon the motor horsepower and phase. Refer to the motor nameplate and the Motor Data Chart (Chart C) for voltage and electrical data.

WARNING Make certain that the power supply conforms to the electrical specifications of the motor supplied. Failure to do so may cause premature motor failure and will void the warranty.

2. To change voltage, remove the rear access cover, which is held in place with two (2) screws. For proper electrical connection, refer to the connection diagram located on the motor nameplate or figures 8, 8A, 9, 10, 11, 12.

WARNING Replace rear access cover before starting or operating pump. Failure to do so can result in personal injury.

MOTOR PROTECTION

1. All single phase motors have built in thermal protection for all voltages. The overload protects the motor against burnout from overload of low voltage, high voltage and other causes. The device is automatic and resets itself once the temperature has dropped to a safe point. Frequent tripping of the device indicates trouble in the motor or power lines and immediate attention is needed.

WARNING Never examine, make wiring changes or touch the motor before disconnecting the main electrical supply switch. The thermal device may have opened the electrical circuit.

2. Three phase motors do not have a built in thermal protection. It is recommended that a properly sized magnetic or manual starter (both with properly sized heaters) be used with all three phase motors. Install starters following instructions of the starter manufacturer. See Figure 13 for magnetic starter wiring diagram.
3. All motors (single and three phase) should be equipped with a correctly fused disconnect switch to provide protection. consult local or national electric codes for proper fuse protection based on motor data chart (see Charts C & D).

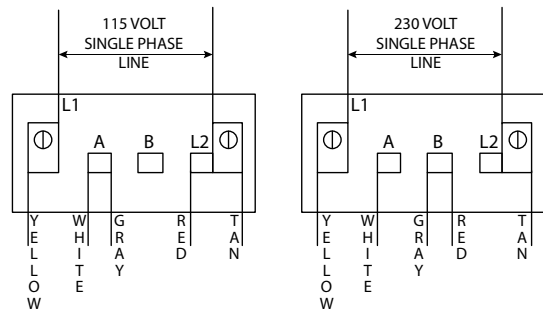


Figure 8 - F&W Wiring Diagram for Single Phase
1/3 - 3/4 HP CJ103, 1/3 - 2 HP CJ101

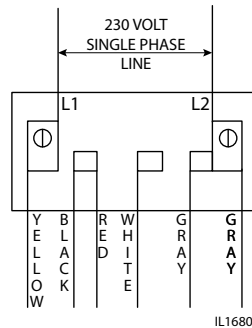


Figure 8A - F&W Wiring Diagram for Single Phase
1 - 3 HP CJ103, 3 HP CJ101

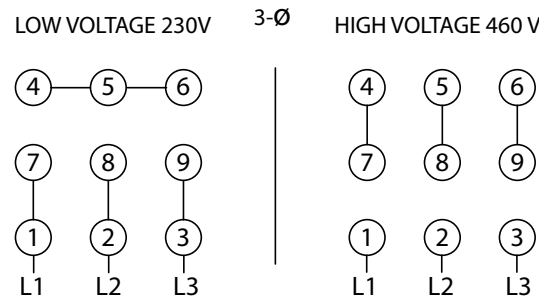


Figure 9 - F&W Wiring Diagram for Three Phase

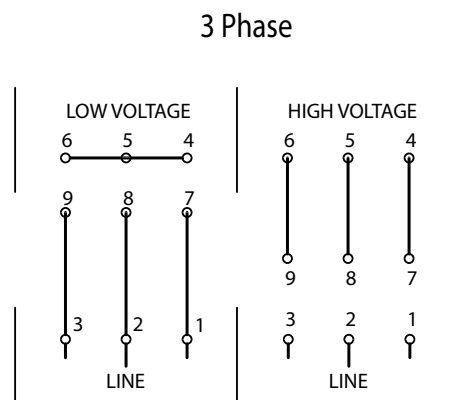


Figure 10 - Wiring Diagram for Baldor TEFC 3 Phase motors

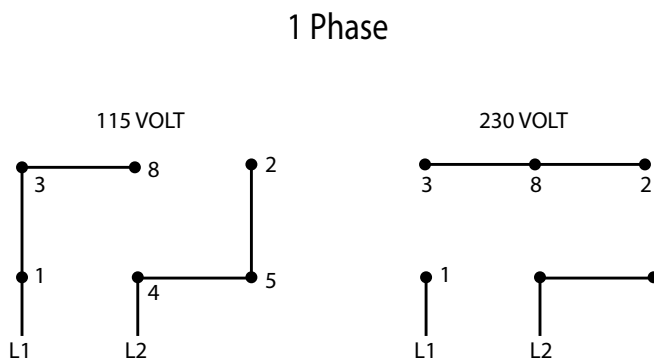


Figure 11 - Wiring Diagram for Baldor 1 Phase TEFC

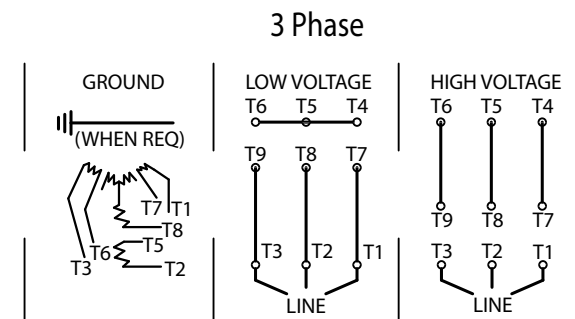


Figure 12 - Wiring Diagram for Marathon TEFC 3 Phase motors

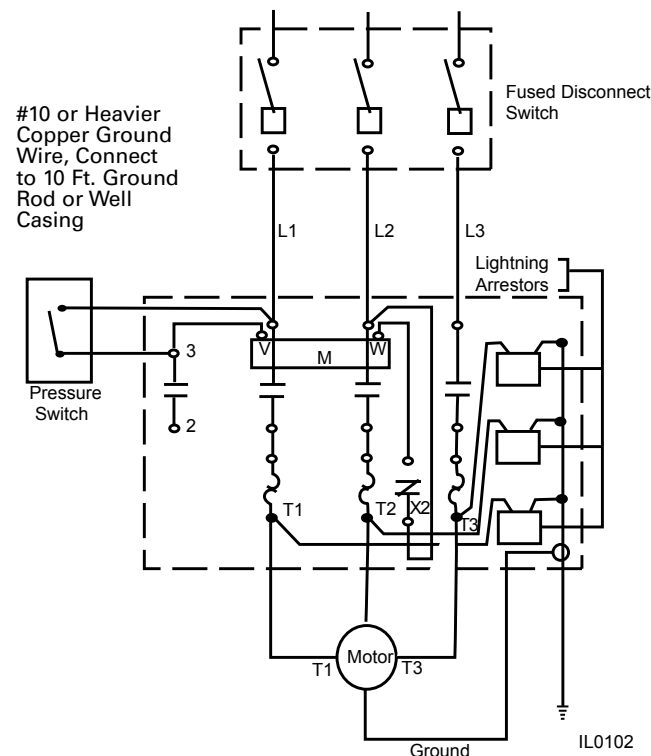


Figure 13 - Magnetic Starter Wiring Diagram Three Phase

PRIMING

1. Before starting any centrifugal pump, it is absolutely necessary that both the casing and suction pipe be completely filled with liquid. This priming can be accomplished by any of the following methods:
2. When the liquid supply level is above the center line of the pump, it is primed by opening the suction and discharge valves. The inflowing liquid will displace the air and fill the suction line, pump casing, and discharge line up to the level of supply.
3. Where the pump is operating with suction lift and the suction line is equipped with a foot valve, remove the priming plug from the discharge tee (see Figures 5-8) and fill the pump body and suction pipe completely with water. No additional water will be needed for subsequent start-ups unless the pump body is drained.
4. After the pump is turned on it will require 2-5 minutes before all air is evacuated from the suction line and water begins to flow. If there is no water after 5 minutes, turn the pump off and check the following:
5. Any air leaks on the suction line must be eliminated.
6. Suction pipe inlet should be a minimum of 5 feet below the water level.
7. Total suction lift cannot be greater than 25 feet.
8. Any restrictions in the discharge pipe, such as a closed valve must be eliminated.

NOTE: Unit must be full of liquid before operating. Never run dry, or against a closed discharge. Dry running or running unit against a closed discharge will cause damage to the shaft seal. Do not pump dirty water or abrasive liquids, otherwise the same may occur as if running dry.

MOTOR ROTATION

1. Single phase models are one (1) rotation only (counterclockwise when facing the pump suction tapping) and cannot be reversed.
2. Proper rotation of pump impeller is critical for three phase pumps. Pump motor should turn counterclockwise (CCW) when facing pump suction tapping. Momentarily "bump" (apply power for less than a second) the motor to check for proper rotation. To change rotation on three phase units, interchange any two (2) incoming line (power) leads.

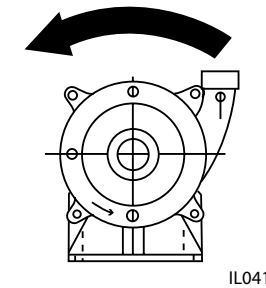


Figure 14 - Correct Motor Rotation

MAINTENANCE

Lubrication

The pumps and motors require no lubrication. The ball bearings of the motor have been greased at the factory. Under normal operating conditions they should require no further greasing.

Winterizing your Pump

Cracked pump housings caused by freezing are not covered by warranty. To protect your pump from freezing, for best results remove the pump and store in a warm environment. If pump cannot be removed from your system, remove both drain plugs, one on the suction flange and one at the bottom rear of the pump (see fig 2 in the instructions.) Allow the water to completely drain from the pump. Re-install both drain plugs and fill pump with RV type antifreeze. Antifreeze also acts as a rust inhibitor. It will help keep rust build up to a minimum and seals lubricated inside the pump while it is not in use.

ROTARY SEAL ASSEMBLY REPLACEMENT

Disassembly

CAUTION When disassembling the pump, care should be taken not to damage the gaskets. If torn or damaged, replace with new gasket (see parts list).

1. Remove the four (4) pump through bolts that connect the mounting ring to the pump body. Remove the pump body, taking care not to damage the gasket or o-ring.
2. Remove the impellers. CJ103 Models are single stage units, having one impeller. Using a 9/16" open end wrench, hold the motor shaft flat and unthread the impeller by turning it counterclockwise. The motor shaft flat area is located in the middle of the mounting ring.
3. CJ101 models are multi stage units, having two or more impellers and one or more intermediate stages. Using an 11/16" open end wrench on the motor shaft extension flat, remove the first impeller by turning or counterclockwise. Remove the intermediate stage (stages) taking care not to damage the gasket (gaskets) and unthread the remaining impellers.

- Remove the mechanical seal assembly. The rotary portion of the seal assembly (carbon ring, Buna-N gasket and spring) will easily slide off the end of the shaft. The ceramic portion can be pried out of the rubber seating using two (2) screwdrivers (see Figure 15).

Reassembly

CAUTION *The precision lapped faces of the mechanical seal are easily damaged. Handle the replacement seal carefully. Short seal life will result if seal faces (ceramic & carbon) are nicked, scratched or dirty.*

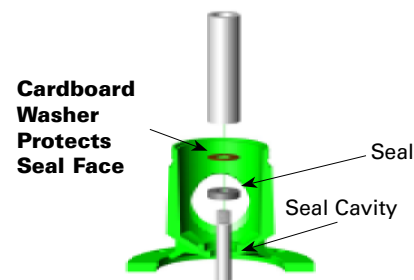
- Clean the seal cavity of the mounting ring and the motor shaft thoroughly.
- Apply liquid soap (one drop only) to the outside of the Buna-N gasket that houses the ceramic seal seat. With thumb pressure, press the ceramic seat, polished face up, squarely into the seal cavity (see Figure 16).
- If seal does not seat squarely, remove and reclean the seal cavity. Place a cardboard washer over the polished seal face and carefully press into place using a piece of pipe or tubing (see Figure 17). Discard cardboard washer.
- Apply liquid soap (one drop only) to the inside diameter of the rubber drive ring. Slip rubber drive ring (carbon face down) and the spring over the shaft.
- Reassemble the pump by following the reverse order of the disassembly instructions.



Figure 15 - Remove Mechanical Seal



Figure 16 - Press in Seal



IL0554
Figure 17- If Necessary, Press with Cardboard and Pipe

MOTOR REPLACEMENT

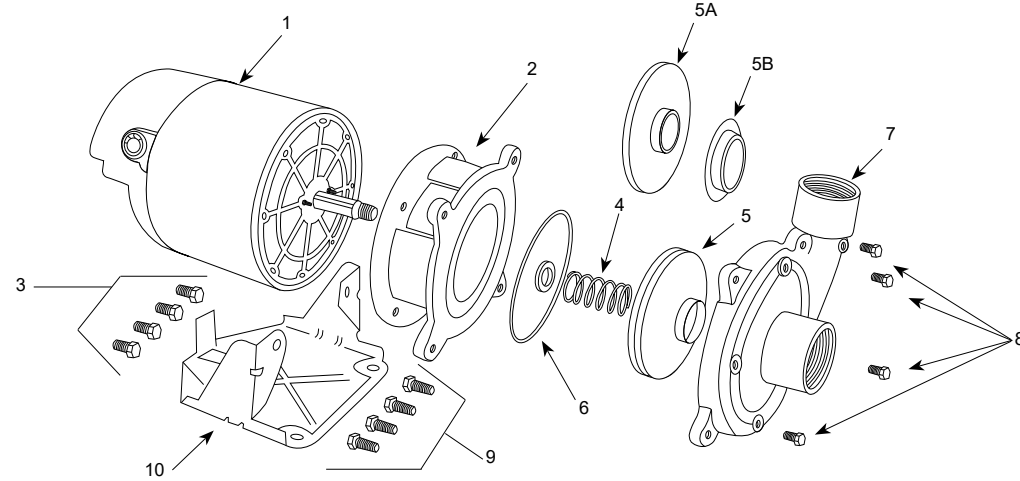
- Nema J motors can be replaced in the field with any standard Nema J jet pump motor by referring to the following instructions and the attached parts list.
- Follow steps as outlined under Rotary Seal Replacement to remove the pump body, diffuser, impeller and rotary seal.
- Remove bolts that connect the motor to the mounting ring and pull motor away.
- Replace motor with standard Nema J jet pump motor by positioning motor against the mounting frame and assembling with four (4) 3/8" x 3/4" cap screws. The mounting base is connected at the bottom of the mounting frame with two (2) 3/8" x 1/2" cap screws.
- Follow steps of Rotary Seal Assembly to reassemble the remainder of the pump.

BECAUSE DAMAGE TO THE SHAFT SEAL IS MOST LIKELY TO OCCUR IN DISASSEMBLY, A NEW SEAL WILL BE NECESSARY.

Troubleshooting Chart

| Symptom | Possible Cause(s) | Corrective Action |
|--|--|---|
| Little or no discharge | <ol style="list-style-type: none"> Pump not primed Total head too high Suction head higher than pump designed for Impeller clogged Incorrect rotation Leak in suction line Inadequate foot valve Impeller damaged Foot valve or suction line not submerged deep enough in water Insufficient inlet pressure or suction head Wrong size piping Casing gasket leaking Suction or discharge line valves closed | <ol style="list-style-type: none"> Prime unit Shorten suction lift and/or discharge head Lower pump inlet Clean Refer to wiring information Repair or replace Make needed adjustments Replace Submerge lower in water Increase inlet pressure by adding more fluid to fluid source Make needed adjustments Replace gasket Open |
| Loss of suction | <ol style="list-style-type: none"> Air leak in suction line Suction head too high Insufficient inlet pressure or suction head Clogged foot valve or strainer | <ol style="list-style-type: none"> Repair Lower pump inlet Increase inlet pressure by adding more fluid to fluid source Clean or replace |
| Pump vibrates and/or makes excessive noise | <ol style="list-style-type: none"> Mounting plate or foundation not rigid enough Foreign material in pump Damaged impeller Cavitation present Worn motor bearings Bent impeller shaft | <ol style="list-style-type: none"> Reinforce Clean Replace Check suction line for proper size and be certain valve is open. Remove excessive loops in suction line Replace Replace |
| Pump will not start or run | <ol style="list-style-type: none"> Improperly wired Blown fuse or open circuit breaker Loose or broken wiring Impeller clogged Motor shorted out | <ol style="list-style-type: none"> Refer to wiring diagram Replace fuse or close circuit breaker Tighten connections and replace broken wiring Clean Replace |
| Pumps leaks at shaft | <ol style="list-style-type: none"> Worn mechanical seal Bent impeller shaft | <ol style="list-style-type: none"> Replace Replace |

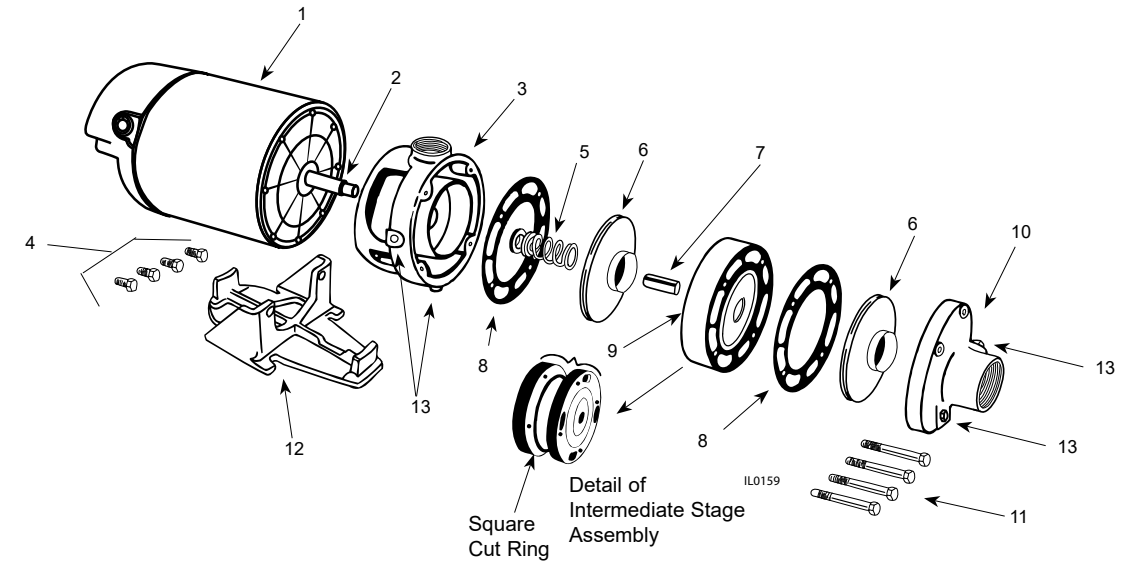
**CENTRIFUGAL PUMP REPAIR PARTS
CJ103 SERIES**
(For Pricing Refer To Repair Parts Price List)



| ITEM | DESCRIPTION | PART NO. | HP | 1/3 | 1/2 | 3/4 | 1 | 1-1/2 | 3** |
|------|---|----------|---------|-----------|-----------|-----------|-----------|-----------|-----------|
| | | | STAGE | 1 | 1 | 1 | 1 | 1 | 1 |
| ITEM | SINGLE PHASE BRASS IMPELLER | | | CJ103031 | CJ103051 | CJ103071 | CJ103101 | CJ103151 | CJ103201 |
| | THREE PHASE BRASS IMPELLER | | | | CJ103053 | CJ103073 | CJ103103 | CJ103153 | CJ103203 |
| | SINGLE PHASE PLASTIC IMPELLER | | | CJ103P031 | CJ103P051 | CJ103P071 | CJ103P101 | CJ103P151 | CJ103P201 |
| | THREE PHASE PLASTIC IMPELLER | | | | CJ103P053 | CJ103P073 | CJ103P103 | CJ103P153 | CJ103P203 |
| | DESCRIPTION | PART NO. | QTY. | | | | | | |
| 1 | Motor, Nema J - 1PH Feb 1, 2020 and later | | 98J103 | 98J105 | 98J107 | 98J610*** | 98J615*** | 98J630*** | |
| 1 | Motor, Nema J - 1PH Jan 30, 2020 and earlier | | 98J103 | 98J105 | 98J107 | 98J110 | 98J115 | 98J120 | |
| 1 | Motor, Nema J - 3PH Jan 30, 2020 and earlier | 021301R | — | 98J305 | 98J307 | 98J310 | 98J315 | 98J320 | |
| | Motor Access Cover | 021302 | 1 | 1 | 1 | 1 | 1 | 1 | |
| | Screws, Access Cover | | 2 | 2 | 2 | 2 | 2 | 2 | |
| ‡ | Slinger Washer | 126905 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | Mounting Ring | 134107 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 3 | Hex Hd. Cap Screws 3/8 x 3/4" | * | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 4 | Seal, Rotary w/Spring | 131100 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 5 | Impeller - Brass | 130403 | 126900 | 127805 | 127806 | 127806 | 127806 | 127848 | |
| 5A | Impeller - Plastic | 133426 | 139222 | 021280 | 135248 | 021279 | N/A | N/A | |
| 5B | Clearance Ring | N/A | 138138 | 134240 | 134240 | 134240 | N/A | N/A | |
| 6 | Ring, Square Cut † | 132583 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 7 | Body Assembly - Brass Impeller | | 127870 | 127870 | 127780 | 127780 | 127780 | 127780 | |
| | Body Assembly - Plastic Impeller | 021439 | 1 | 1 | 1 | 1 | 1 | N/A | |
| ‡ | Suction Clearance Ring-Brass | | 127869A | 127869A | N/A | N/A | N/A | N/A | |
| 8 | Pipe Plugs, 1/8" NPT | * | 4 | 4 | 4 | 4 | 4 | 4 | |
| 9 | Hex Hd. Cap Screws 3/8 x 1" | * | 4 | 4 | 4 | 4 | 4 | 4 | |
| 10 | Base | 125855 | 1 | 1 | 1 | 1 | 1 | 1 | |

(*) Standard hardware item
(‡) Not shown
(†) For pumps with paper gasket, replace with part number 127782
(Δ) Kit Includes: Access Cover, Screws & Wiring Diagrams
(**) 2HP Jan 30, 2020 and earlier
(***) 230V only

**CENTRIFUGAL PUMP REPAIR PARTS
CJ101 SERIES**
(For Pricing Refer To Repair Parts Price List)



| ITEM | DESCRIPTION | PART NO. | HP | 3/4 | 1 | 1-1/2 | 2 | 2 | 3 |
|------|---|----------|---------|-----------|-----------|-----------|------------|-----------|-----------|
| | | | STAGE | 2 | 2 | 2 | 2 | 3 | 3 |
| ITEM | SINGLE PHASE - BRASS IMPELLER | | | CJ101B071 | CJ101B101 | CJ101B151 | CJ101B201 | CJ101C201 | CJ101C301 |
| | THREE PHASE - BRASS IMPELLER | | | CJ101B073 | CJ101B103 | CJ101B153 | CJ101B203 | CJ101C203 | CJ101C303 |
| | SINGLE PHASE - PLASTIC IMPELLER | | | CJ101P071 | CJ101P101 | CJ101P151 | CJ101P201 | CJ101D201 | CJ101D301 |
| | THREE PHASE - PLASTIC IMPELLER | | | CJ101P073 | CJ101P103 | CJ101P153 | CJ101P203 | CJ101D203 | CJ101D303 |
| | DESCRIPTION | PART NO. | QTY. | | | | | | |
| 1 | Motor, Nema J - 1 PH | | 98J107 | 98J110 | 98J115 | 98J120 | 98J120 | 98J630 | |
| 1 | Motor, Nema J - 3 PH | | 98J307 | 98J310 | 98J315 | 98J320 | 98J320 | 023251 | |
| | Motor Cover w/Screws | 021301R | 1 | 1 | 1 | 1 | 1 | 1 | |
| | Screws, Cover | 021302 | 2 | 2 | 2 | 2 | 2 | 2 | |
| ‡ | Slinger Washer | 126905 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 2 | Shaft | | 135279A | 135279A | 135279A | 135279A | 136612A | 136612A | |
| 3 | Mounting Ring | 125204 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 4 | Hex Hd. Cap Screws 3/8 x 3/4" | * | 2 | 2 | 2 | 2 | 2 | 2 | |
| 5 | Seal, Rotary w/Spring | 131100 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 6 | Impeller, Brass | | †135280 | †135281 | †126900 | †126901 | †139126 | †136951 | |
| 6 | Impeller, Thermoplastic | | †133425 | †133427 | †139180 | †128472 | †139348*** | †139104 | |
| 7 | Spacer, Shaft | 133380 | 1 | 1 | 1 | 1 | 2 | 2 | |
| 8 | Gasket | 130968 | 2 | 2 | 2 | 2 | 3 | 3 | |
| 9 | Intermediate Stage Assy-Brass** | 131239B | 1 | 1 | 1 | 1 | 2 | 2 | |
| 9 | Intermediate Stage Assy-Plastic** | 023405 | 1 | 1 | 1 | 1 | 2 | 2 | |
| ‡ | Suction Clearance Ring | 130957 | 1 | 1 | 1 | 1 | 2 | 2 | |
| ‡ | Hub Clearance Ring | 131282 | 1 | 1 | 1 | 1 | 2 | 2 | |
| ‡ | Square Cut Ring Interm. Stg. | 020240 | 1 | 1 | 1 | 1 | 2 | 2 | |
| 10 | Suction Flange Assembly-Brass | 125227A | 1 | 1 | 1 | 1 | 1 | 1 | |
| 10 | Suction Flange Assembly-Plastic | 023404 | 1 | 1 | 1 | 1 | 1 | 1 | |
| ‡ | Suction Clearance Ring | 130957 | 1 | 1 | 1 | 1 | 1 | 1 | |
| ‡ | Suction Bearing | 020053 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 11 | Pump thru Bolts (Grade 5) 3/8" x 3-1/4" | * | 4 | 4 | 4 | 4 | -- | -- | |
| 11 | Pump thru Bolts (Grade 5) 3/8" x 5" | | -- | -- | -- | -- | 4 | 4 | |
| 12 | Base w/ Bolts 3/8" x 1-1/4" | 020054 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 13 | 1/4" NPT Plug | * | 4 | 4 | 4 | 4 | 4 | 4 | |

(*) Standard hardware item
(†) For quantity required — See number of stages
(‡) Not shown
(**) Includes two castings, square cut ring, suction and hub clearance ring - See Detail Drawing
(***) Includes 138138 seal ring and 139221 impeller
(Δ) Kit Includes: Access Cover, Screws & Wiring Diagrams