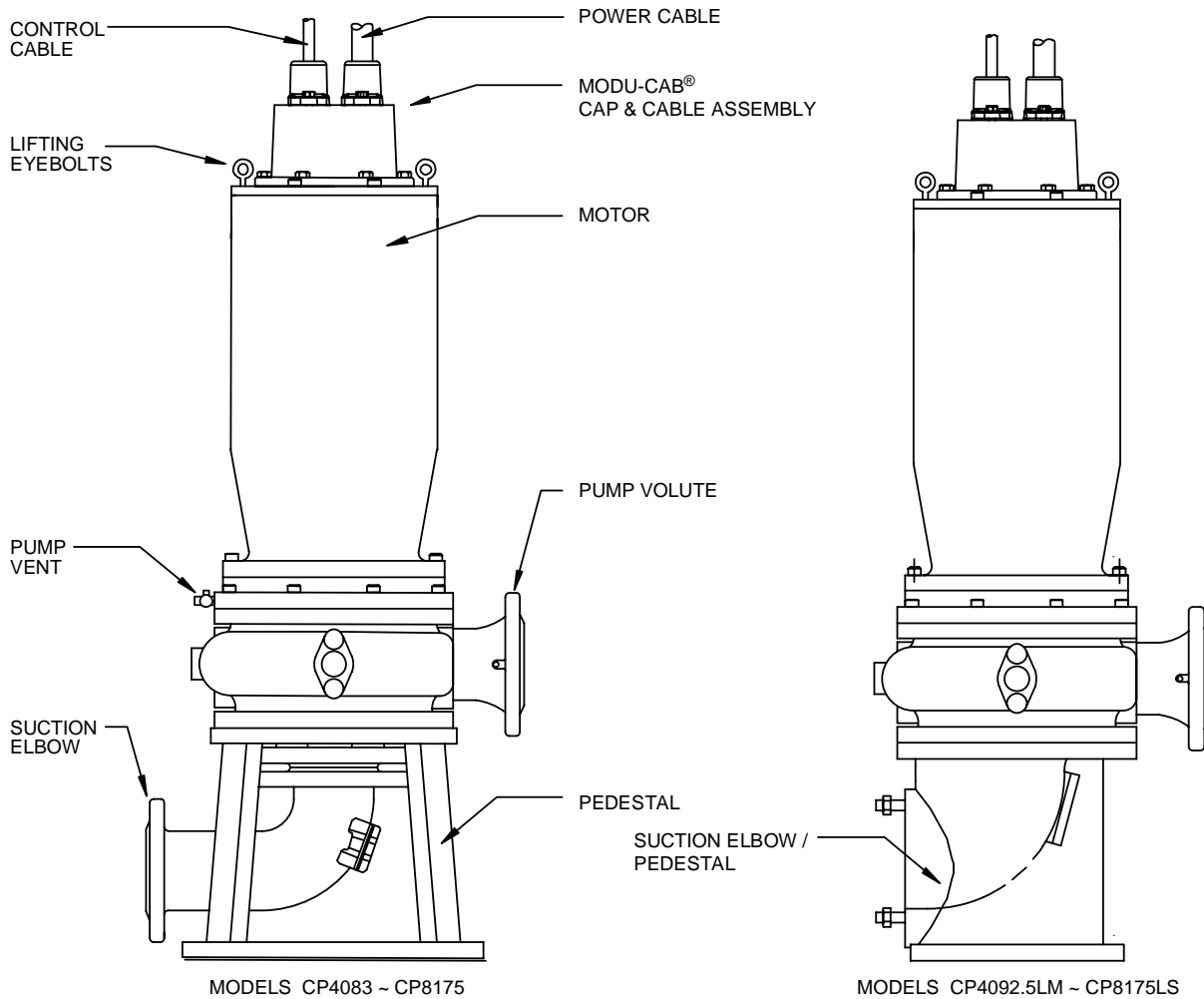




# DRY PIT SUBMERSIBLE PUMPS

## INSTALLATION, OPERATION AND MAINTENANCE MANUAL SERIES 2235



### TYPICAL PUMPS

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**CHICAGO PUMP COMPANY  
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**PLEASE NOTE: THIS INSTRUCTION IS INTENDED FOR THE PUMP. FOR MOTOR INSTALLATION, OPERATION & MAINTENANCE, PLEASE REFER TO INSTRUCTION 9200MR OR 9900MR.**



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# ACCEPTANCE OF SHIPMENT

Thoroughly inspect this equipment before accepting shipment from the transportation company. If any of the goods called for in the bill of lading or express receipt are damaged or the quantity is short, do not accept them until the freight or express agent makes an appropriate notation on your freight bill or express receipt. If any concealed loss or damage is discovered later, notify your freight or express agent at once and request him to make an inspection. We will assist you in collecting claims for loss or damage in shipment; however, this willingness on our part does not remove the transportation company's responsibility in reimbursing you for collection of claims or replacement of material. Claims for loss or damage in shipment must not be deducted from the YCC invoice, nor should payment of the YCC invoice be withheld awaiting adjustment of such claims, as the carrier guarantees safe delivery. If considerable damage has been incurred and the situation is urgent, contact the nearest YCC Representative or the factory for assistance. Please keep a written record of all such communications.

**READ INSTRUCTIONS THOROUGHLY BEFORE INSTALLING OR OPERATING THIS UNIT.  
KEEP THESE INSTRUCTIONS IN THE INSTRUCTION ENVELOPE. DO NOT DESTROY.**

If these instructions should be lost or soiled, a new copy may be procured from Yeomans Chicago Corporation by writing for it and stating number of the unit as indicated on the nameplate. For names of parts see parts list and illustration.

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## GENERAL

**PURPOSE AND IMPORTANCE OF MANUAL:** Your Chicago Pump Dry Pit Submersible Pump is built to give trouble-free service and this manual is intended to instruct in its proper installation, operation and maintenance. Strict compliance with these instructions will insure reliable performance in wastewater service. Keep it handy for ready reference.

**SPECIAL PRECAUTIONS:** Yeomans Chicago Corporation cannot be responsible for any damage resulting from failure to comply with these instructions. This pump is not to be operated at conditions or with liquids other than those stated in the original order acknowledgment without written permission from Yeomans Chicago Corporation.

**PRESERVATION AND STORAGE:** As shipped, the pump has adequate protection for shipment in covered trucks also for covered storage at the job site and for a limited time between installation and start-up. If anticipated that the equipment will be exposed to extreme or extended storage conditions prior to installation, Yeomans Chicago Corporation should be notified so that shipment can be given special protection.

**NOTE:** If the pump is to be stored for a prolonged period of time before installation, rotate the pump shaft manually every two weeks until the unit is placed in operation.

**HANDLING:** The Pump and other vulnerable parts which may be subject to damage are provided with eyebolts or lifting lugs. Be sure to use these and above all, **DO NOT LIFT PUMP BY THE ELECTRIC POWER CABLES.**

## INSTALLATION

**MOTOR AND MECHANICAL SEALS:** The motor is a "dry" type as opposed to one with oil filled stator. The cooling fluid fills a cavity surrounding the mechanical seals and the stator. The only bearings are those in the motor. These two ball bearings are pre-lubricated with grease for at least five years of service before requiring attention. The tandem mechanical seals are housed in an oil filled reservoir. This assures lubrication of the seal faces even when the motor is operated in air. The motor is designed for continuous operation in air or submerged in water or sewage. The thermal protectors are automatic reset types for use in a normally closed circuit and are connected in series with the holding coil of the magnetic starter. The oil filled seal reservoir has two electrodes, which are connected to a moisture sensing circuit, which will detect any water that may leak into the reservoir. This will indicate a faulty outer (lower) mechanical seal.

**ELECTRICAL LEADS:** All leads are epoxy sealed to the cable connector. Most motors are connected where one cable (the larger) has the power leads and ground wire and the other contains the thermal protector and seal moisture detector leads. Check the current characteristics of the motor nameplate with those of the control panel. If not in agreement, notify Yeomans Chicago Corporation immediately.

**LOCATION:** Both pump and motor should be located in a clean drained area where they are accessible for installation, inspection and maintenance. This location should be dry and well ventilated. Overhead room and facilities must be allowed for installation and removing of the pump or motor for repairs.

**PUMP FOUNDATIONS:** For permanence and quiet operation, it is important that the pump be firmly bolted down. Figure 1 illustrates the generally accepted method of anchorage. This system traps the bolt for anchorage, at the same time permits the bolt to move within the sleeve for aligning with the holes in the pump base. This permits the bolts to be adjusted slightly after concrete has set allowing the bolts to conform accurately with pedestal boltholes. This prevents strains or difficulties arising from slight dimensional discrepancies. Pipe sleeve should be about two and one half diameters larger than the bolts used, and the bolts must be long enough to permit the pump to be raised 1" from grouting. If a raised foundation is desired, it should be at least six inches greater in length and width than the base of the pump pedestal and at least deep enough to "bury" the recommended anchorage. It should never be superficially poured over a smooth concrete floor, but should be rooted by one of the following means: (a) when the concrete is newly poured, cast a shallow depression in the floor using a box form, (b) leave reinforcement bars protruding above the floor level or (c) gouge out holes in an existing concrete floor.

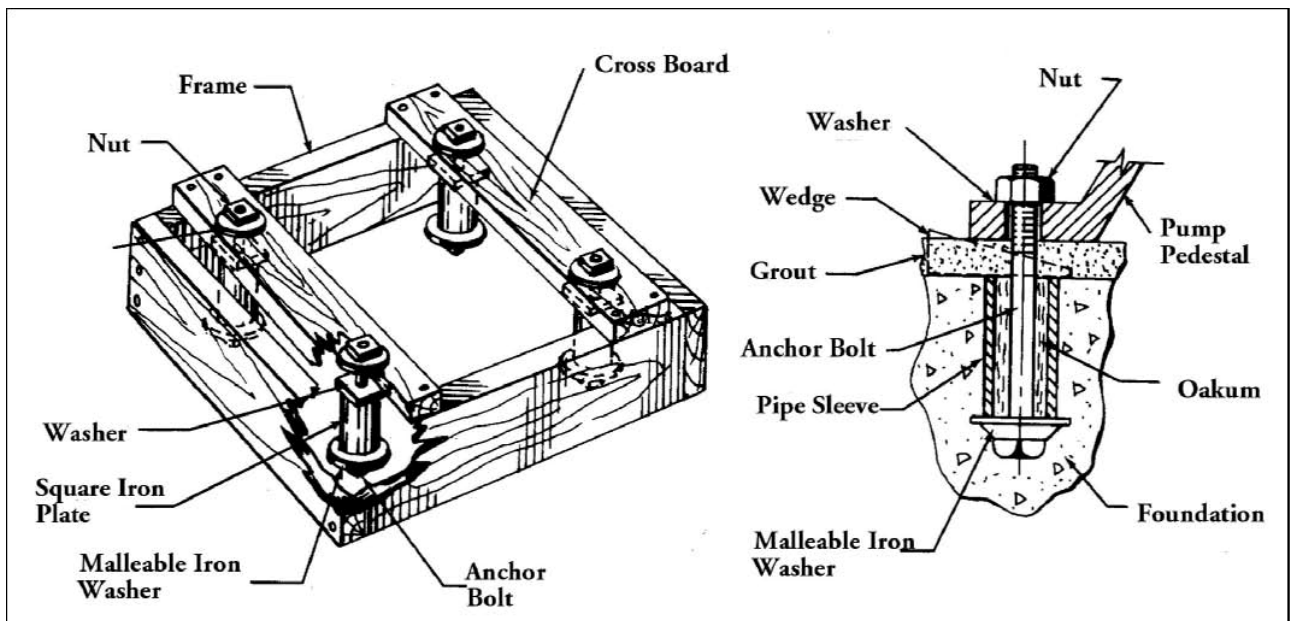


Figure 1 - A Recommended System of Foundation Construction

**SETTING THE PUMP:** Set pump on the foundation over the anchor bolts, but do not bolt down. Raise the pump unit 1" and level carefully for grouting by driving wedges under the pedestal. For leveling pump, place level on face of pump coupling half and face of pump discharge flange, NOT ON PUMP BASE.

**GROUTING THE PUMP:** After pump is raised and leveled, pour a good quality grout under the pedestal and allow it to set to prevent distortion, do not tighten down the nuts on the foundation bolts until the grout has properly hardened. When the pump is correctly installed, bring the suction and discharge piping to the pump connections; never force pump connections to install piping.

**PIPING:** To obtain a well-designed pipe system, note the following piping recommendations:

1. Make pipe connections to the pump so that there is no pipe strain upon the unit. Support the weight of piping on suitable concrete piers or on supporting pipes with flange feet.
2. When running a pipe through a concrete wall, leave a generous, grooved, square hole and grout the pipe in only after pump unit is set and all final connections have been made.
3. Suction and discharge pipelines should not be smaller in size than the connections on the pump; it is preferred that they should be at least a pipe size or two larger.
4. In the suction pipeline include a gate valve near the pump, and employ flexible pipe connections (see Figure2) for ease in making final connections to concrete piers, support pipes or hangers.
5. On the discharge line include a suitable swing check valve and a gate valve near the pump.

**CONTROLS:** The control consists of a motor control panel plus liquid level sensors, alarms and many options. The controls must comply with different specifications, the National Electric Code and building codes which vary with each location, hence, must be detailed separately for each individual installation. The main control panel is generally located outside of the hazardous area and can be NEMA 3R.

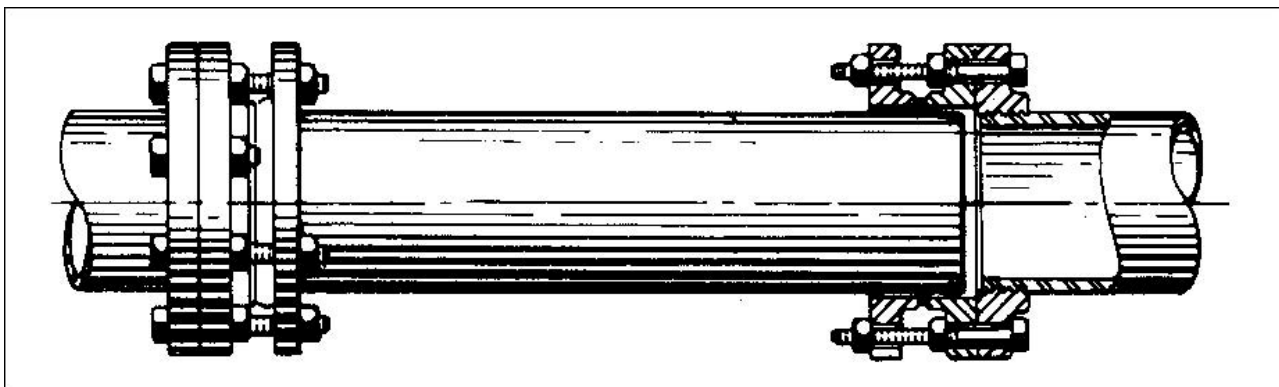


Figure 2 - Flexible Pipe Connections

## OPERATION

Before making electrical connections check that the impeller can be turned freely by hand. This can be done by reaching into the suction elbow handhole. There is a certain drag from the seals so the impeller will not spin but it should be turned at least two revolutions. If it cannot be turned, correct the problem before starting. Check the direction of rotation by connecting leads to the starter (see wiring diagram in motor instruction manual) and jogging in manual mode. The rotation should be in accordance with rotation arrow on the discharge casing. This can be observed by the use of a flashlight through the handhole in the suction elbow. If rotation is incorrect, switch any two leads and check again. This procedure is required only on three phase motors. Single-phase motors operate only in one direction and were checked at the factory. Mark each electrical lead to assure the correct rotation is maintained if leads are disconnected at any time. Check the moisture sensing circuit for the mechanical seal by means of a check button. If light turns on, circuit is working; if not, correct before proceeding

Now open the pump discharge valve or valves and open influent valve. After pump is full of water, before starting motor, open vent valve located either in the adapter between pump and motor or on the motor lower seal housing. There is a brass vent cock and label "PUMP VENT". Allow air to escape and then close vent. This procedure minimizes the air in the pump and assures the lower seal does not run in a pocket of air. Start each pump separately and take current readings in each phase. If these are much less than the nameplate values, pump may be air bound. Jog motor several times until better agreement is reached. Also observe for any unusual vibration. If all seems normal, switch selector to automatic and note that the pump starts at high level and stops at low level; or, in case of duplex station, that the pumps alternate properly. Observe pumps the first few hours of operation with special attention to the moisture sensing device and the thermal overload relays.

**SHUT-DOWN INSTRUCTIONS:** Pump may be shut down without closing any valves, unless there are no check valves, then the discharge gate valve must be closed before stopping pump in order to prevent back flow through the pump. If the pump is to be serviced, be sure the power is off and the motor safety switch is padlocked to prevent another person turning it on.

# MAINTENANCE

Preventive maintenance should be carried out per the following schedule:

## FREQUENCY –EVERY MONTH

Work Required:

- a) Check moisture sensor circuit by means of the test button or by disconnecting moisture circuit motor control wires as described in either 9200MR or 9900MR motor manual.
- b) On duplex unit and if equipped with elapsed time meters, check to see if elapsed time is balanced between the two pumps. Any gross unbalance indicates a defective unit, float switch, or control.
- c) Inspect float switches for any material that might be lodged and impairing its operation.

## FREQUENCY -EVERY TWO YEARS

Work Required: (When practical and possible, depending on installation and fluid drain configuration)

- a) Drain, flush and refill the seal chamber with new oil or cooling fluid as specified in the motor instruction 9200MR & 900MR.
- b) Inspect for any signs of water intrusion in the seal chamber and terminal board chamber. On the seal chamber this may be accomplished by inspection of the oil that was drained. The terminal board chamber should be visually inspected for moisture. Some condensation is to be expected inside the sealed motor however accumulation should be minimal (several tablespoonfuls maximum).
- c) Inspect power cable for any signs of abrasion or damage that might affect the integrity of the outer jacket.
- d) Inspect impeller and casing for unusual wear. Replace parts if required.

## FREQUENCY -EVERY FIVE YEARS

Work Required: A complete overhaul should include the following:

**PLEASE REFER TO MOTOR INSTRUCTION 9200MR OR 9900MR FOR COMPLETE INSTRUCTIONS.**

- a) Completely drain and dismantle the pump and motor.
- b) Clean and inspect all parts.
- c) Inspect all mechanical seal parts.
- d) Replace worn and damaged parts.
- e) Replace ball bearings (regardless of condition)
- f) Replace all o-rings and gaskets.
- g) Inspect motor stator for any signs of abrasion and burned spots on the windings. Conduct an insulation test.

NOTE: Under adverse conditions increase frequency of checks.

# DISASSEMBLY AND REASSEMBLY

**TO AVOID CONTACT WITH LIVE PARTS, DISCONNECT ALL POWER INCLUDING POWER TO THE MOISTURE CONTROL SYSTEM BEFORE PERFORMING ANY DISASSEMBLY OPERATIONS.**

Due to the variety of pump and motor combinations, some pumps do not exactly match the attached drawing. Additionally, some pumps require that the motor be unbolted from the adapter while the adapter remains in place due to access to mounting screws. Remove cap screws and lift motor with impeller out of volute. If gasket is destroyed, note its thickness for replacement. Lay the assembly on its side on a bench. Remove impeller cap screw or locknut and washer then pull the impeller off the motor shaft using a wheel puller or similar tool. Remove impeller key. If pump has adapter plate, there is no need to remove it. Wear ring may be removed by heating screws with a torch and removing before prying ring loose. For the disassembly of the motor, refer to motor instruction manual.

Note that electrical repairs can be made with only partial disassembly. However, if complete disassembly is required, follow complete procedure in motor instruction manual. After the motor is repaired and reassembled, again place it on its side on a bench and assemble the pump in the reverse order of disassembly. Any worn or damaged parts should be repaired or replaced.

## **GENERAL DESCRIPTION AND OPERATION OF SERIES 2235 PUMP**

Series 2235 models are vertical dry pit pumps with close-coupled submersible motors. They are to be used in dry pit installations subjected to floods. The only bearings in the unit are those in the motor. Sealing is provided by the tandem mechanical seals installed in the motor. The motor is hermetically sealed, thermally protected and has moisture detection system. Motor is designed to work continuously in air or completely submerged in water or sewage and has an internal cooling system. External source of cooling water is not needed since the heat generated within the motor is dissipated through the lower flange of the motor to the pumped liquid. The pump is equipped with a solids-handling impeller mounted directly on the motor shaft.

**RECOMMENDED REPLACEMENT OIL: (Cooling Fluid)** When checking the level or adding fluid, add the same fluid (do not mix).

### **UNITS SHIPPED PRIOR TO JANUARY, 2008:**

- 1 Mobil Mobiltherm 603
- 2 Amoco Heat Transfer Oil No. 4199
- 3 Citgo Sentry 19

### **UNITS SHIPPED AFTER JANUARY, 2008:**

These units have a tag or sticker identifying the fluid as **Royal Purple Barrier Fluid FDA Grade 22**.

All CLC motors can be upgraded to the preferred product Royal Purple Barrier Fluid FDA Grade 22 after draining all of the existing fluid.

When checking the level or adding fluid, add the same fluid (do not mix).

For oil quantities and details on draining and refilling, refer to motor instruction manual.

# TROUBLE SHOOTING

**Caution: Motor section of this pump is sealed against outside contamination. Before inspecting pump, disconnect all electrical power to pump(s) and accessories including moisture detection circuit.**

PROBLEM	PROBABLE CAUSES	CORRECTIVE ACTION
<b>Pump will not run.</b>	Improper wiring	Check wiring
<b>a) Manual Operation</b>	Low Voltage	Check voltage at contactor, starter or receptacle to make certain it coincides with nameplate voltage.
	Blown fuse, broken or loose electrical connection.	Check fuses, circuit breakers, and electrical connections.
	Power cord insulation damaged.	Replace power cord.
	Power cord may be opened or grounded.	Resistance between hot leads should be close to zero. Resistance between hot lead and ground (green) should be infinite.
	Pump Impeller locked.	Check amps drawn by motor. If reading is 2 or more times maximum amps listed in specification table, impeller is locked, motor bearing frozen, or shaft bent. Remove pump casing for inspection and cleaning.
NOTE: Before trouble shooting automatic control check to see that pump operates on manual control. If it does, automatic controls are at fault. If not, fault is in pump or power supply.	Motor overload protection tripped.	Allow overload protectors to cool then restart pump. Check amps. If current is present but pump does not run, locked impeller conditions exists.
<b>b) Automatic Operation</b>	Loose connection in level control wiring.	Check control panel wiring.
	Defective Switch.	Disconnect level control and with ohmmeter perform a continuity check. Activate switch manually. Closed switch should read zero resistance, open switch infinite resistance. If not, replace switch.
	Insufficient liquid level to activate controls	Allow liquid to rise 3 to 4 inches above switch turn-on-point.
<b>Pump will not shut off.</b>	Level control tangled.	Free the level controls.
	Pump is air locked.	Shut power off for approximately one minute, open vent cock on motor flange, then restart. Repeat several times to clear air from pump. If system includes a check valve, open a vent plug on the discharge nozzle to vent air out.
	Liquid inflow matches pump capacity.	Larger pump required.



<b>PROBLEM</b>	<b>PROBABLE CAUSES</b>	<b>CORRECTIVE ACTION</b>
<b>Pump runs but does not discharge liquid.</b>	Check valves installed backwards.	Check flow indicating arrow on check valve body to insure it is installed properly.
	Check valve stuck or plugged.	Remove check valve and inspect for proper operation.
	System head too high for pump.	Check pump performance curve.
	Inlet to impeller plugged.	Inspect pump through handholes and clean.
	Pump is air locked.	(See corrective action above)
	Improper wiring.	Check wiring.
<b>Pump does not deliver rated capacity.</b>	System head too high for pump.	Check pump performance curve.
	Impeller or discharge pipe is clogged.	Inspect pump through handholes and clean. Check pipe for scale or corrosion.
	Impeller may be rotating in the wrong direction.	Three phase units - interchange any two (2) power lead connections at pump side of control panel.
	Wear ring or impeller wear due to abrasives or corrosion.	Replace worn impeller or wear ring.
	Improper wiring.	Check wiring.
<b>Pump cycles continually.</b>	No check valve in long discharge pipe allowing liquid to drain back into basin.	Install a check valve in discharge line.
	Check valve leaking.	Inspect check valve for correct operation.
	Sewage basin too small for inflow.	Install larger size sewage basin.

# CROSS SECTION AND PARTS IDENTIFICATION DRAWING

PARTS LIST		
ITEM	DESCRIPTION	MATERIAL
1	MOTOR, DRY PIT SUBMERSIBLE	
2	HEX HEAD CAP SCREW- MOTOR TO ADAPTER	STAINLESS STEEL
3	GASKET, MOTOR TO ADAPTER (WHEN REQD)	NEOPRENE
4	ADAPTER PLATE, MOTOR TO PUMP (WHEN REQD)	STEEL
5	GASKET, ADAPTER TO PUMP CASING (WHEN REQD)	NEOPRENE
6	SOCKET HEAD CAP SCREW- ADAPTER/ PUMP CASING	STAINLESS STEEL
7	PUMP CASING	CAST IRON
8	PUMP IMPELLER	CAST IRON
9	WASHER, IMPELLER	STAINLESS STEEL
10	LOCKNUT OR SCREW, IMPELLER	STAINLESS STEEL
11	KEY- IMPELLER	STAINLESS STEEL
12	PIPE PLUG	STAINLESS STEEL
13	GASKET	NEOPRENE
14	CAP SCREW, NUT AND WASHER	STAINLESS STEEL
15	HANDHOLE COVER, SUCTION ELBOW	CAST IRON
16	GASKET, SUCTION ELBOW HANDHOLE COVER	NEOPRENE
17	CAP SCREW NUT AND WASHER	STAINLESS STEEL
18	GASKET, SUCTION PLATE TO SUCTION ELBOW	NEOPRENE
19	PUMP SUPPORT	STEEL
20	PIPE PLUG	STAINLESS STEEL
21	HANDHOLE COVER, VOLUTE	CAST IRON
22	GASKET, VOLUTE HANDHOLE COVER	NEOPRENE
23	WEAR RING, SUCTION (WHEN REQD)	STAINLESS STEEL
24	HEX HEAD CAP SCREW AND WASHER	STAINLESS STEEL
25	SUCTION PLATE	CAST IRON
26	HEX HEAD CAP SCREW AND WASHER	STAINLESS STEEL
27	WEAR RING, IMPELLER (WHEN REQD)	STAINLESS STEEL
28	FLAT HEAD MACHINE SCREW (WHEN REQD)	STAINLESS STEEL
29	ELBOW	CAST IRON
30	PIPE PLUG	STEEL
31	PUMP VENT	BRASS

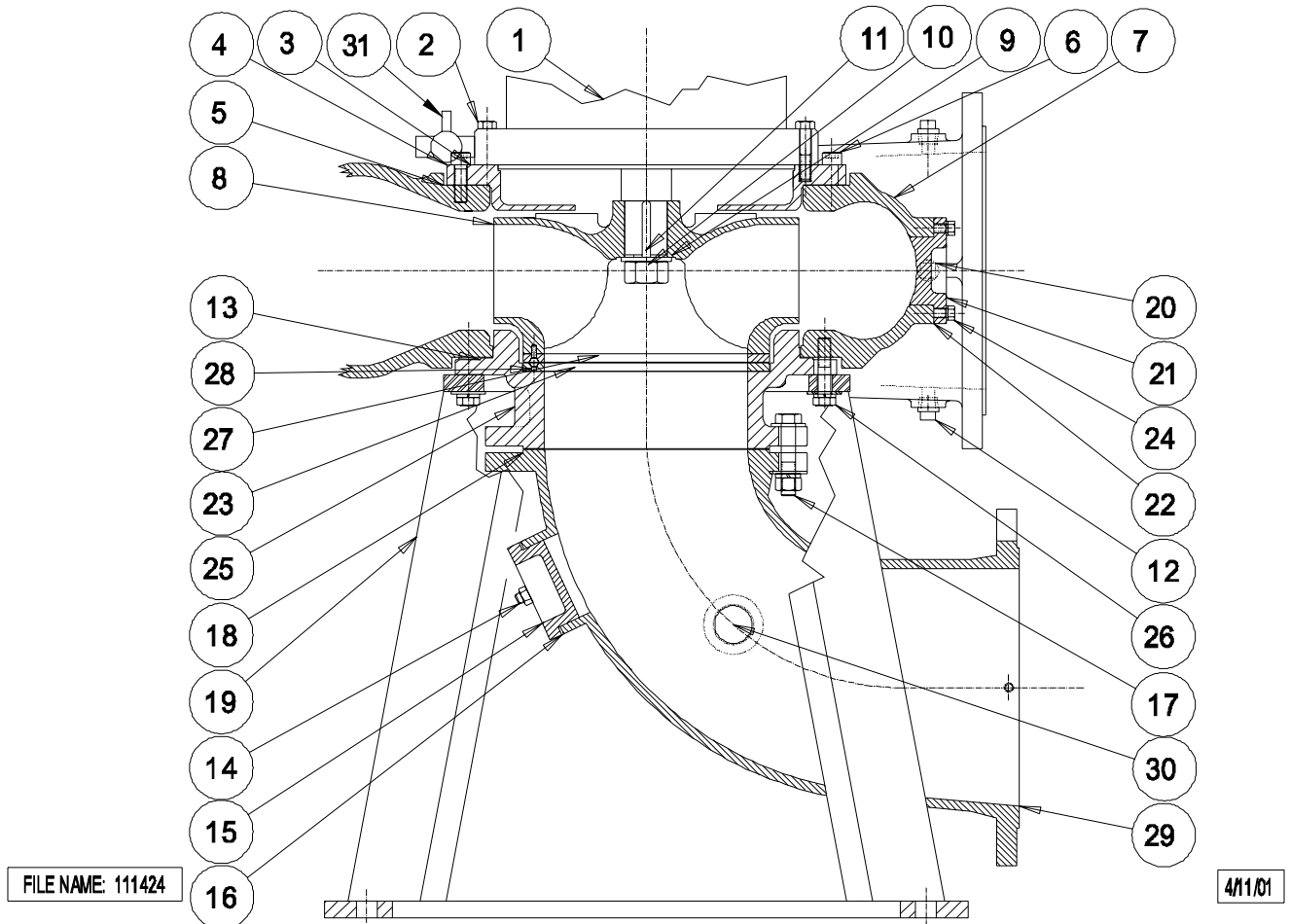


FIGURE 3 – TYPICAL DRY-PIT SUBMERSIBLE PUMP