PRECISION BOILERS DEAERATING DESIGNS DIVISION

SURGE TANKS

OPERATION AND MAINTENANCE MANUAL

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RECEIVING AND INSPECTION:

This equipment was packed with care by experienced packers in accordance with weight and Inspection Bureau specifications. Check *all* equipment immediately upon delivery for damage or shortages. Note damage on freight bill and notify carrier at once. We are not responsible for damages which occur in transit.

INSTALLATION:

1. **POSTIONING:** The entire system should be positioned to allow access to operating controls, instruments and inspection openings.

2. **FOOTING:** The foundation should be level and designed to support the load. The calculations should be based upon the maximum of flooded weight of the entire system.

3. **RIGGING**: Only qualified riggers should be used to place the system on the foundation. Slings, blocks and all rigging equipment must be carefully placed to avoid damaging and or loosening piping, nozzles and other parts of the assembly. The system should be securely bolted to the foundation and shimmed to level if required.

4. **PIPING:** Prior to piping, all foreign material or debris must be removed to prevent possible malfunctions. Care should be taken to avoid imposing any pipe strain on the pumps. Provide expansion joints and suitable independently supported pipe hangers where necessary. Isolating valves should be installed to allow for cleaning or repairs. Make-up water and pump discharge piping should be sized in accordance with good piping practice, avoiding unnecessary bends or restrictions. The consideration of flows, pressures and distances should determine sizing, not the size of the pump or valve ports. Install a gate valve, check valve and expansion fitting in the discharge

line. The vent piping should be vertical, full size and free of valves, bends or restrictions.

5. **MAKE-UP VALVE**: Internal float assemble rod to float and valve. Install assembly in receiver.

6. **WATER GLASS GAUGE**: Install in openings provided on tank.

7. **THERMOMETER:** Install in openings provided on tank.

8. **WIRING:** Check voltage, phase and hertz available against motor nameplate for comparability. On dual voltage motors be sure leads are connected properly. Install power and control wiring to magnetic starter in accordance with the National Electric Code and local requirements.

9. **COUPLING ALIGNMENT:** (Flexible only)-The coupling between pump and motor has been properly aligned at the factory.

MAINTENANCE:

1. Inspect all controls for proper operation and lubricate all moving parts as required.

2. Clean and check the water glass gauge(s) for the presence of oil. If detected, immediate steps must be taken to find its source and eliminate it.

3. Pump bearings require lubrication. This can be accomplished by using the lubrication fittings in the pump frame. Lubricate at regular intervals using a ball bearing grease of high quality. Lithium, lithium soda or calcium base grease is recommended for pumps operating in both wet and dry locations. Do not mix different brands of grease. Avoid over-lubrication that may result in overheating and bearing failure. Adequate lubrication is assured if the amount of grease is maintained at ⅓ to ½ the capacity of the bearing and adjacent space

surrounding it. Periodically, about every 6 months, the bearings should be cleaned by flushing with kerosene and re-lubricated.

4. Check the mechanical seals. It is recommended not to re-use worn seals. A mechanical seal is similar to a gasket in this respect. Using an old one involves too great a risk of failure, considering the expense or removing and re-installing a pump. Attempts to lap the seal faces are not recommended under any circumstances.

5. Check the suction line. An obstruction in the suction line can best be determined by a thorough visual check or by installing a compound gauge (reading in vacuum and pressure) in the pump suction line close to the pump. A thoroughly clean and unrestricted line will produce a pressure reading on the gauge of approximately 1 psig while the pump is running. Any vacuum reading on the gauge would indicate an obstruction and necessitate a systemic inspection of the suction line to determine the cause.

6. Pump Cavitation: At any given temperature all liquids have a definite pressure at which they will boil. It follows, therefore, that a liquid will boil at any temperature if the pressure is reduced sufficiently. All pumps have a specific Net Positive Suction Head (NPSH) requirement. If this positive head is not available, pump cavitation will develop, resulting in severe damage. High water temperatures or a suction line restriction will cause cavitation (see Trouble Shooting). Any restriction must be corrected immediately or severe pump damage will result.

TROUBLE SHOOTING

PROBLEM:	POSSIBLE CAUSES:	ACTION:
Pump rotates freely but does not pump	Excessive feed water temperature (normal 195°F) Will result in flashing at pump inlet. 1. Look for a leaky check valve between pump & boiler. 2. Look for failure of steam traps to close tightly.	Repair or replace defective equipment at once before damaging pump.

	Obstruction in suction line	Systemic inspection of the line to determine cause. See #5 above Remove strainer basket, scrub clean & re-install.
	Motor not up to rated speed	Check speed tachometer.
	TROUBLE SHOOTING	
	Wrong direction of rotation	Check arrow on pump casing.
	Broken pump shaft	Check shaft at both ends.
Pump vibrates, noisy	Misalignment of pump & motor	Check coupling(see Installation)
		Check pipe strain (see Installation # 4
	Bent or broken shaft	
	Pump impeller binding	Check for foreign matter in pump,
		Check for bent impeller
		Check channel ring, spacer
	Mineral deposits on impeller	Have water analyzed & treated. Remove deposits from pump parts
	Worn bearings	Replace bearings
	Pump cavitation-	Check for high water temperatures
		Check suction line, clogged strainer, see above
		Check NPSH, see Maintenance #5
Receiver overflows constantly	Make up valve washer worn, not sealing tight	Replace washer
	Make up valve float water logged	Replace float
	Make up valve float disconnected	Replace float
Condensate oil contamination	Leaking heat exchanger	Fix exchanger. All components must be drained & thoroughly cleaned before returning to service
	Improper grade of oil used in steam driven equipment	Replace oil. All components must be drained & thoroughly

		cleaned before returning to service.
Motor failure	Tripped starter overload	
	Improper power supply	Check voltage & motor nameplate requirement
	Incorrect connections	Check wiring diagram
	TROUBLE SHOOTING	
	Mechanical failure	Check for free rotation & examine bearings
	Short circuited windings, indicated blown fuse or failure to start	Motor must be replaced
	Overload	Check pump for proper operation & free rotation
	1 phase open in 3 phase circuit	Check power supply lines
Blown fuses	Short circuited windings	Check motor
	Incorrect connections	Refer to wiring diagram
	Improper power supply	Check voltage & motor nameplate requirements
Starter overload	Tripped	Reset & inspect pump & motor for proper operation
Motor fails start	Boiler level switch	Check switch, see if functioning properly
	Control circuit	Check for continuity