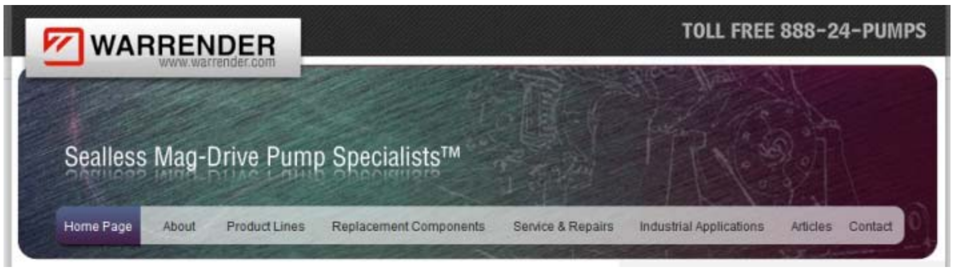
WARRENDER, LTD. Newsletter

Turbine Seal-less Mag-Drive Pumps

Attn: Seal-Less Pump Distributors
From: Joe Warrender, V.P.

March 1, 2009



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WARRENDER Brand Name & Website Links

All WARRENDER, LTD. mag-drive pumps are now trademarked simply as WARRENDER for the heavy-duty process pumps and PROMAG for the Series M. Additionally, an updated and expanded WARRENDER, LTD. website is complete and we urge all qualified distributors to link websites to www.warrender.com.

WARRENDER Seal-less Magnetic Pumps
Mag-Drive Turbine vs. AOD Double Diaphragm
Seal-less, High Head, Self-Priming Process Requirements

To: WARRENDER, LTD. Pump Distributors
From: Joe Warrender, V.P. Sales & Marketing

Process Requirements: Corrosive Handling, High Head, Self-Priming, Seal-less Design

Hydraulic Efficiencies: Electric vs. Air
Electric pumps are in the range of 2-4 times more efficient than pneumatic pumps; depending upon turbine or centrifugal and duty point. Many electric power companies are actually subsidizing the replacement of air powered equipment and AOD pumps are one of the primary targets.

With pneumatic power, energy is spent to compress the air, then the air is used to drive the pump; with 4 cfm @ 90 psig developed per *1 hp with a typical air compressor.

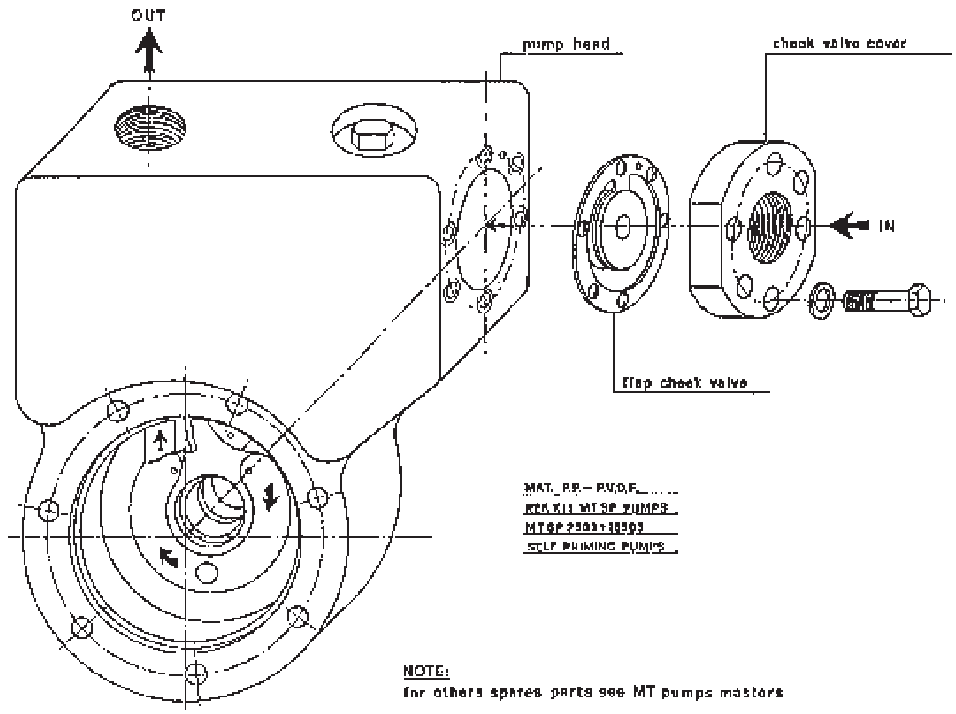
Therefore, working examples for power consumption are as follows:
Application 1) Sodium Hypochlorite with 1.12 s.g., 5 GPM @ 40 psig or 85' TDH
a) Mag-Drive Turbine Pump Selection: MT3003, 3/4" x 3/4", 0.78 bhp
b) AOD Pump Selection: 1/2" x 1/2", 8 CFM, 2.0 HP
Estimated Power Savings: 1.22 HP or $400.00- $500.00 per year

Application 2) ***Lift Prime*** Concentrated HCL or HF Acid, 1.18 s.g., 10 GPM @ 50 psig or 98' TDH'
a) Mag-Drive Self-Priming Turbine Pump Selection: MTSP5003 1" x 1", 1.65 bhp, ***NPSHr = 8 feet***
b) AOD Pump Selection: 1" x 1", 10 CFM or 2.5 HP, ***NPSHr =?***
Estimated Power Savings: 0.85 HP or $300.00- $400.00 per year

Application 3) Concentrated Caustic Soda, 1.52 s.g., 17 GPM @ 75 psig or 114' TDH'
a) Mag-Drive Turbine Pump Selection: MT7003 1" x 1", 4.2 bhp
b) AOD Pump Selection: 1" x 1", 20 CFM or 5 HP
Estimated Power Savings: 0.8 HP or $300.00-$400.00 per year

Lift Prime, Cavitation & NPSHr
NPSHa with a lift-prime requirement is impacted by the height of lift, minus liquid vapor pressure and pipe frictional losses. The alternating flow characteristics and corresponding high velocities of AOD pumps are 3-4 times more than the continuous flow turbine pump. As a result, lift priming with pulsating pumps will often separate volatile or viscous liquids into gas prior to reaching the pump cavity.

Self-Draining Piping, Re-Priming Suction (cross section of mtsp w/ suction check valve)
Discharge check valves can be problematic in a lift prime application due to trapped liquid in a high static discharge line. This is particularly the case if the suction line can be evacuated at any point following the initial start-up. Basically, the weight of the liquid and corresponding pressure that is exerted on either auxiliary or AOD pump check valves cannot exceed the suction capability of the pump to compressed the air. However, the suction check valve of the MTSP self-priming turbine pumps will serve to hold the suction line for instantaneous priming without becoming air bound. For this reason, self-priming pump installations should be free-flowing, possibly with the addition of a siphon breaker, without the troublesome discharge check valves that are inherent to AOD pumps.



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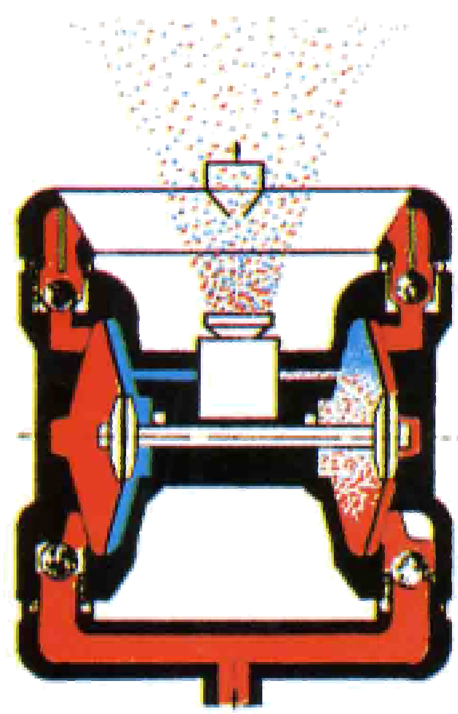
Pump Maintenance: MTBF / MTBPM Issues
AOD pumps have numerous wearing parts including the diaphragms, check balls and seats, and air shuttle valves. In continuous duty, AOD pumps operating between the normal range of 50-100 strokes per minute will reach 30 to 60 million cycles annually. The 10M cycle life projection for many PTFE diaphragms can be merely 2-3 months.



Modes of Failure: Seal-less or Leak-Proof?
Following a process upset, turbine mag-drive pumps will typically just stop pumping without releasing process fluid. An AOD designs can actually discharge chemicals through the exhaust muffler when one of the diaphragms eventually ruptures; transfer applications from drums or tote tanks can be particularly hazardous when AOD pumps are mounted on a wall or support platform at eye level.

Dry-Run Capability

Although AOD pumps are touted for dry-running, diaphragms (particularly PTFE) can fatigue and fail rapidly from erratic fast cycling. Turbine mag-drive pumps maintain a certain volume of liquid in the pump cavity following the initial set-up that allows for 5-10 minutes of a loss of suction liquid without sustaining damage. A relatively low cost single trip switch power monitor will protect WARRENDER turbine mag-drive pumps from dry-running or excessive cavitation; a dual trip switch unit will also protect against excessive pressure or *dead-heading. The power monitors are low cost, non-invasive, and free of wearing parts, vs. pulsation dampeners for the AOD that are often required on the discharge and even suction pipe lines.

Note: Dead-heading or stalling is another selling point for the AOD but undetected pressurizing pipe lines full of hazardous chemicals can be potentially risky for inexperienced pipe fitters.

AOD Composite Molded Components

Glass-reinforced thermoplastic molded pump components can be attacked and permeating by many corrosive chemicals (e.g., caustics, chlorides, fluorides, bromides, etc.) due to etching and wicking of the glass fibers, leading to permeation. Unfilled, thin walled molded components have extremely poor mechanical characteristics.

Machined Extruded Thermoplastics

WARRENDER robust glass-free PP & PVDF turbine mag-drive pumps are constructed from heavy walled machined extruded thermoplastics with higher density to resist permeation, and 3-4X the thickness of molded components for maximum chemical and temperature resistance.

Pulse-Free Flow vs. Pulsing Flow

Turbine mag-drive pumps provide pulse-free flow and are rated for continuous duty in low flow – high head systems. AOD pump alternating flow generates a strong pulse that can interfere with flow metering equipment and instrumentation.

Water Hammer Effect

The alternating, high velocity generated by AOD pumps can severely damage piping particularly with quick closing discharge valves. When factoring the speed of the liquid in a water hammer calculation, the potential for pressure spikes is directly impacted by the accelerating liquid generated by a pulsing AOD pump by a factor of 3-4. The combination of 50-100 PSIG air/ differential pressure, accelerating flow and a reverse water hammer (e.g., from a quick acting control valve), can have devastating effects, particularly on plastic piping systems. For example, a continuous flow pumping system operating at 75 PSID can see an additional surge of 100 PSIG for a total instantaneous system pressure of 175 PSIG. The pressure surge of a pulsing AOD pump system can be **more than double** that value due to the higher speed of the liquid.

MT SERIES

MTSP SERIES

GROUP WMTP ("WARRENDER Mag-Drive Turbine Polymer") for corrosives liquids and OEM processes

WMTP Features & Performances

- Provides continuous, pulse-free pumping in low flow, high head systems
- Handles up to 20% entrained gas, resists vapor locking
- Published NPSHr curves for precise pump selection
- Flows up to 60 gpm (14 m^3/hr)
- Heads up to 200 feet (60 m)

Typical Applications

- All EPA monitored chemicals
- Corrosive acids (HCL, H_2SO_4, HF, nitric, phosphoric, acetic, etc.)
- Caustics (sodium hydroxide, potassium hydroxide, etc.)
- Chlorine, sodium hypochlorite
- Halogen solutions (chlorine, fluorine, bromine, hot HCL)
- High purity liquids
- Precious liquids

GROUP WMTA ("WARRENDER Mag-Drive Turbine Alloy") for high or low temperatures and high pressure systems

WMTA Features & Performances

- Provides continuous pumping in low flow, high pressure systems
- Handles up to 20% entrained gas, resists vapor locking
- Flows up to 45 gpm (10 m^3/hr)
- Heads up to 3,250 feet (990 m)
- System pressures from vacuum up to 7,250 psig (500 bar)

Temperature from -150°F/ -100°C to +650°F/ 343°C (840° F w/ heat exchanger)

Typical Applications

- All EPA monitored chemicals
- Corrosive acids (H_2SO_4, nitric, phosphoric, etc.)
- Caustics (sodium hydroxide, potassium hydroxide, etc.)
- Dangerous, toxic, noxious and carcinogenic liquids
- Solvents, hydrocarbons and other volatile liquids
- Flammables & pyrophorics
- Heat transfer fluids
- Super heated water
- Liquid ammonia and refrigerants
- Liquefied gases (LNG, LPG, CO_2)
- Cryogenic processes
- High pressure systems

WMDAT SERIES