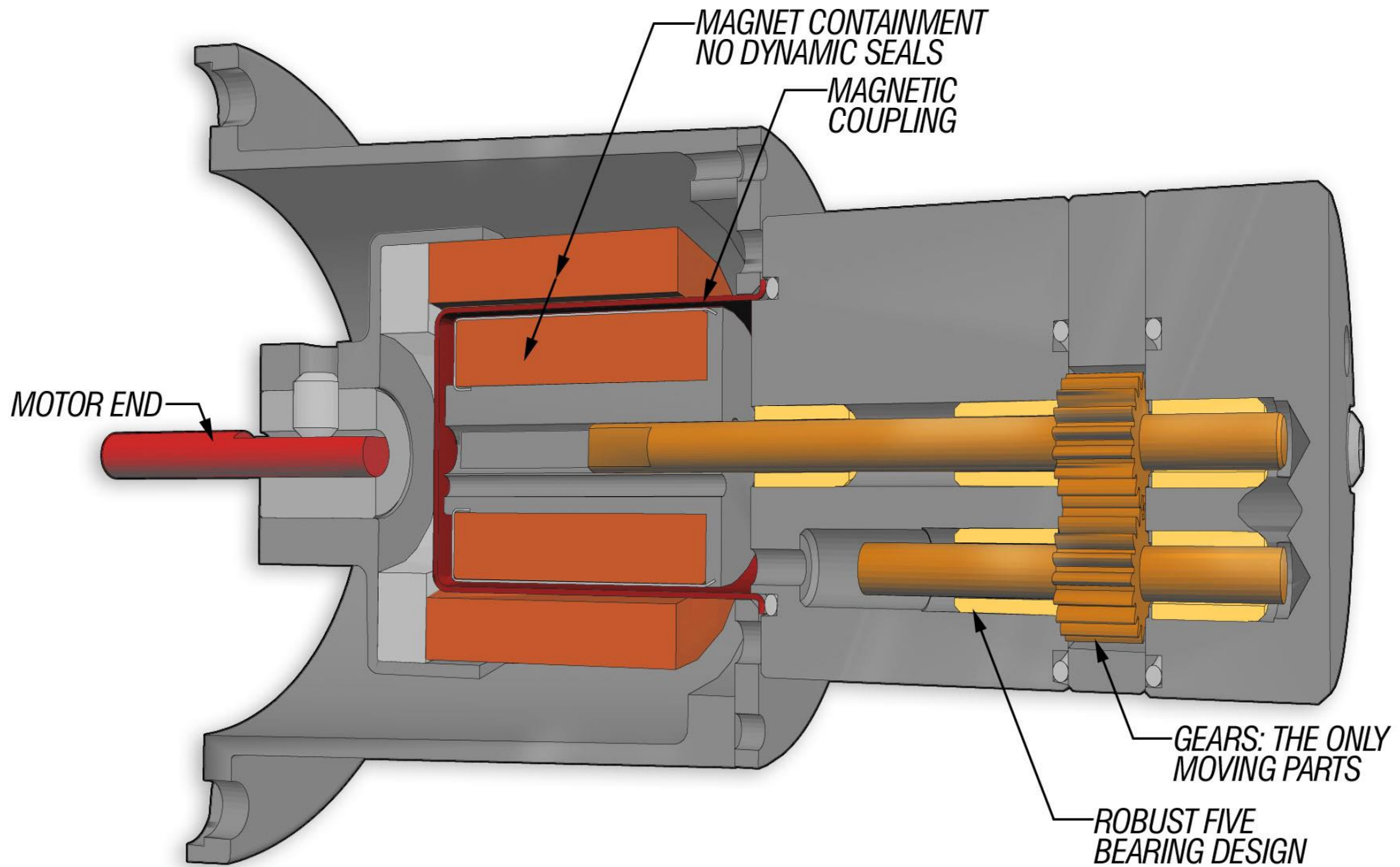


# Water & Waste Water Market

## Pump Applications & Solutions



# Metering with External Gear Pumps



# External Gear Pumps

Series	Displacement	Flow Rate
<b>D-Series</b>	0.11 to 2.3 mL/Rev	120 GPH @ 3500 RPM 380 LPH @ 2900 RPM
<b>T-Series</b>	2.6 to 12 mL/Rev	650 GPH @ 3500 RPM 2050 LPH @ 2900 RPM
<b>P-Series</b>	0.38 to 1.2 mL/Rev	60 GPH @ 3500 RPM 190 LPH @ 2900 RPM
<b>W-Series</b>	0.11 to 12 mL/Rev	650 GPH @ 3500 RPM 2050 LPH @ 2900 RPM

# Side-by-Side Comparison

	P-Series	D-Series	T-Series	W-Series
<b>Displacement (Ml/Rev)</b>	0.23 to 1.2	0.11 to 2.3	2.6 to 12.0	0.11 to 12.0
<b>Flow, Maximum</b>	1 GPM (3.8 LPM)	2 GPM (7.6 LPM)	10 GPM (38 LPM)	10 GPM (38 LPM)
<b>Material</b>	PPS & 316 SS	316 SS	316 SS	316 SS
<b>Optional Materials</b>	PPS, Hastelloy, or Titanium	Hastelloy C or Titanium	Hastelloy C or Titanium	Hastelloy C or Titanium
<b>Differential Pressure</b>	150 PSI (10 BAR)	250 PSI (17 BAR)	250 PSI (17 BAR)	250 PSI (17 BAR)
<b>System Pressure</b>	300 PSI (21 BAR)	500 PSI (34 BAR)	500 PSI (34 BAR)	500 PSI (34 BAR)
<b>Temperature, Maximum</b>	150°F (65°C)	350°F (176°C)	350°F (176°C)	350°F (176°C)
<b>Ports</b>	1/8 NPT	1/8 NPT & 1/4 NPT	3/8 NPT & 3/4 NPT	1/4, 3/8, & 3/4 NPT
<b>Non-standard Ports</b>	None	Available	Available	None
<b>Gear &amp; Bearing Material</b>	PPS	PPS or PEEK	PPS or PEEK	PPS or PEEK
<b>Optional Gear &amp; Bearing Materials</b>	None	Available	Available	None
<b>O-ring Materials</b>	VITON	VITON or PTFE	VITON or PTFE	VITON or PTFE
<b>Optional O-ring Material</b>	As Required	As Required	As Required	None
<b>Relief Valve</b>	Optional	Optional	None	None
<b>Typical Expected Life</b>	10,000 Hours	20,000 Hours	20,000 Hours	20,000 Hours

# Magnet. Coupled External Gear Pumps

- Non-sliding Gear Mesh
- Leak Free
- No Valve = No Vapor Trapping
- Smooth Flow Delivery
- Low Slip To Displacement Ratio
- Self Priming
- Turndown - 100:1 +
- Easy & Quick Field Repair
- Long Life –Typically 10,000 To 20,000 Hours

# Magnet. Coupled External Gear Pumps

- Chemical & Corrosion Resistant
- High Strength Engineered Plastics
- Precision Tolerances
- High Rotational Speed Design
- Competitive Price Technology
- Metering Accuracy To 0.25%
- Low Shear
- Compact Package Size

# Metering Pump Technology

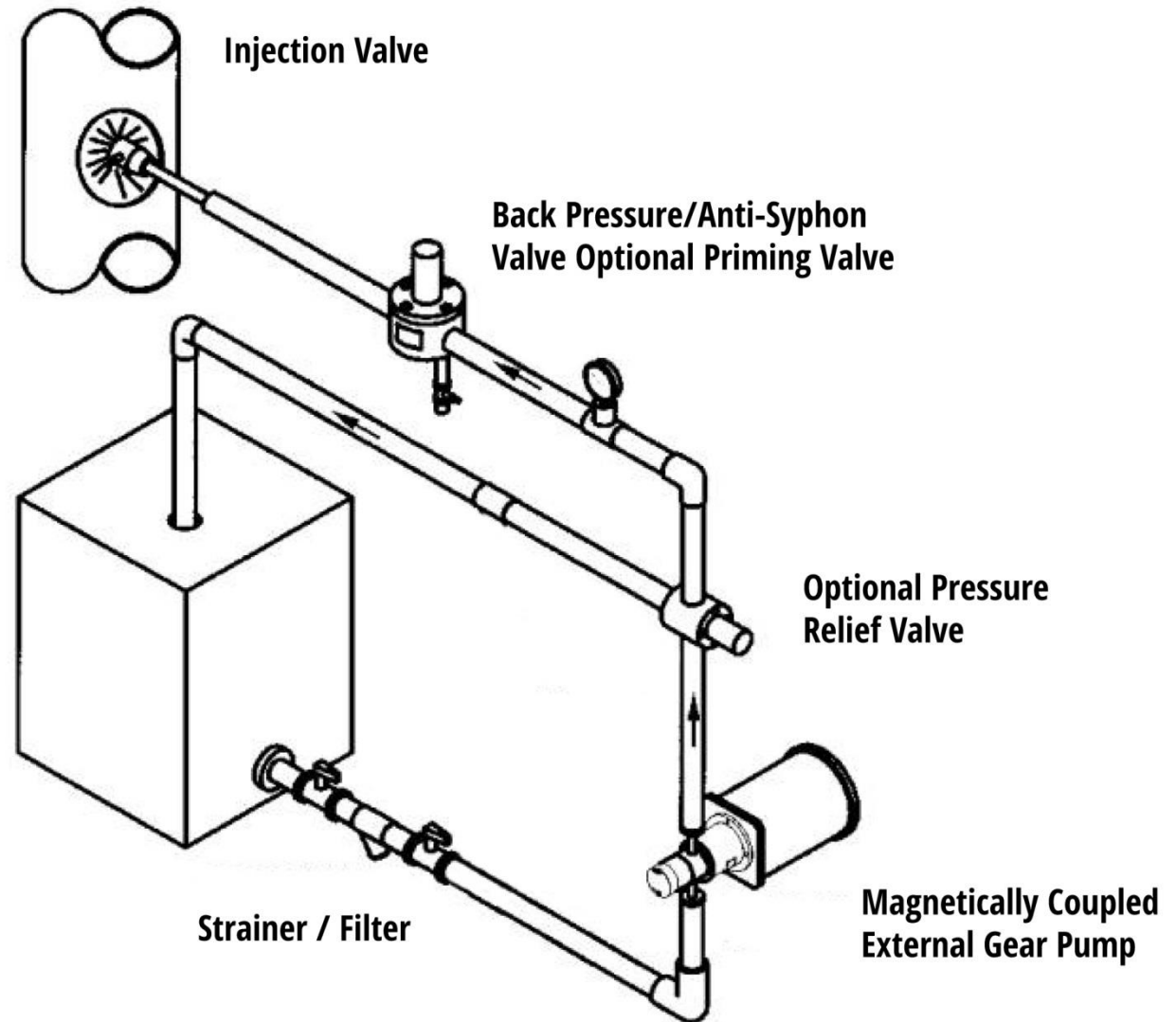
Feature	Magnetically Coupled External Gear	Peristaltic	Solenoid Actuated Piston	Hydraulic & Mechanical Diaphragm	Progressing Cavity
High Differential Pressure	Yes	No	Yes	Yes	Yes
High System Pressure	Yes	No	Yes	Yes	No
High Temperature	Yes	No	Yes	No	No
Abrasive	No	Yes	Yes	Yes	Yes
Low Viscosity	Yes	Yes	Yes	Yes	Yes
High Viscosity	Yes	Yes	Yes	Yes	Yes
Long Life	Yes	No	Yes	Yes	No
Leak Free	Yes	Yes	Yes	Yes	No
Precision	Yes	Yes	Yes	Yes	Yes
Valveless	Yes	Yes	No	No	Yes

# Metering Pump Technology

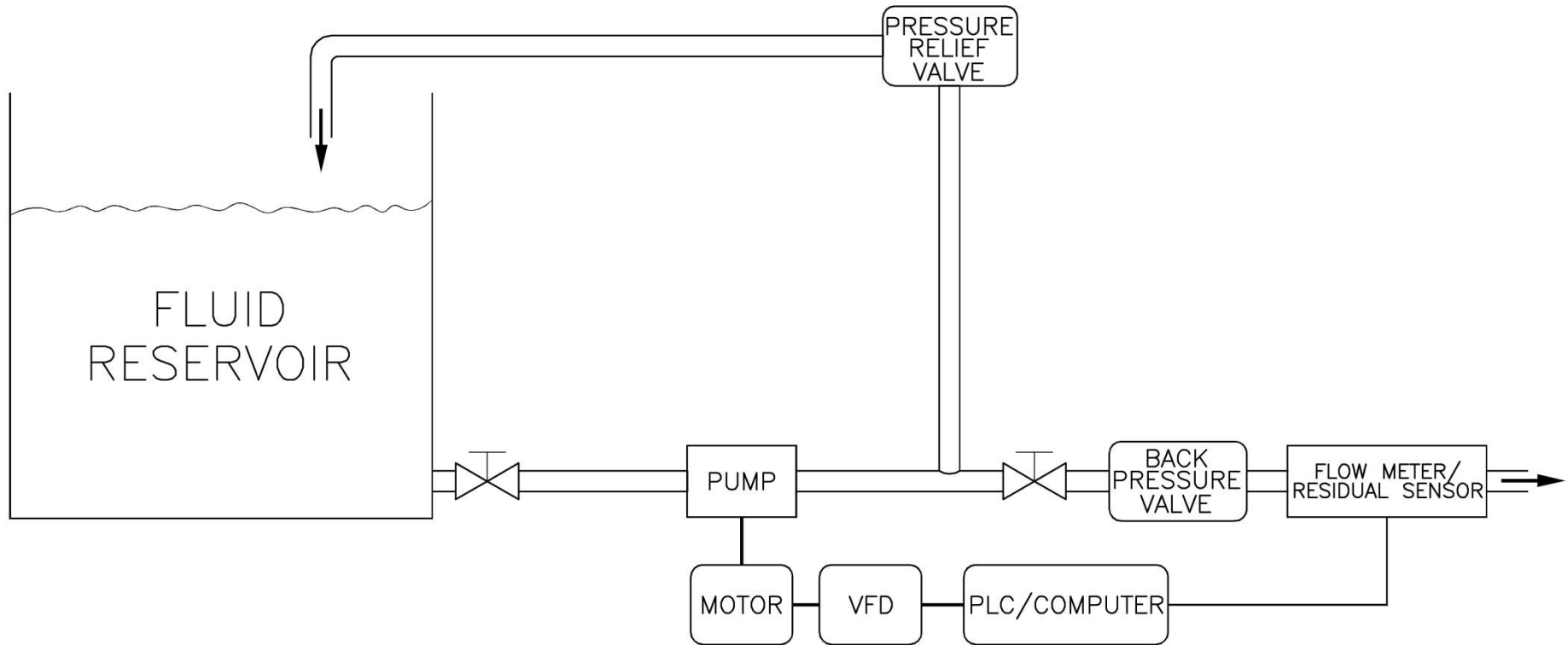
Feature	Magnetically Coupled External Gear	Peristaltic	Solenoid Actuated Piston	Hydraulic Diaphragm	Progressing Cavity
<b>Pulsation</b>	None	High	High	High	Low
<b>Chemical/Corrosion Resistance</b>	Excellent	Excellent	Excellent	Excellent	Excellent
<b>Seal-less</b>	Yes	Yes	No	Yes	No
<b>Leak Potential</b>	Low	Medium	Low to Medium	Medium	Medium
<b>Flow Regulation</b>	Speed	Speed	Stroke	Stroke & Speed	Speed
<b>Gear Reducer</b>	None	Required	Required	Required	Required
<b>Initial Cost</b>	Low to Medium	Medium	Medium	High	Medium
<b>Maintenance Cost</b>	Low	Low	Low	High	High
<b>Life</b>	Long	Short	Long	Long	Short
<b>System Complexity</b>	Simple	Complex	Complex	Complex	Complex
<b>Calibration Frequency</b>	Low	High	Medium	Medium	Medium
<b>Priming</b>	Self	Self	Self	Self	Self
<b>Temperature Range</b>	Excellent	Limited	Good	Limited	Limited
<b>Viscosity Range</b>	Excellent	Excellent	Excellent	Excellent	Excellent



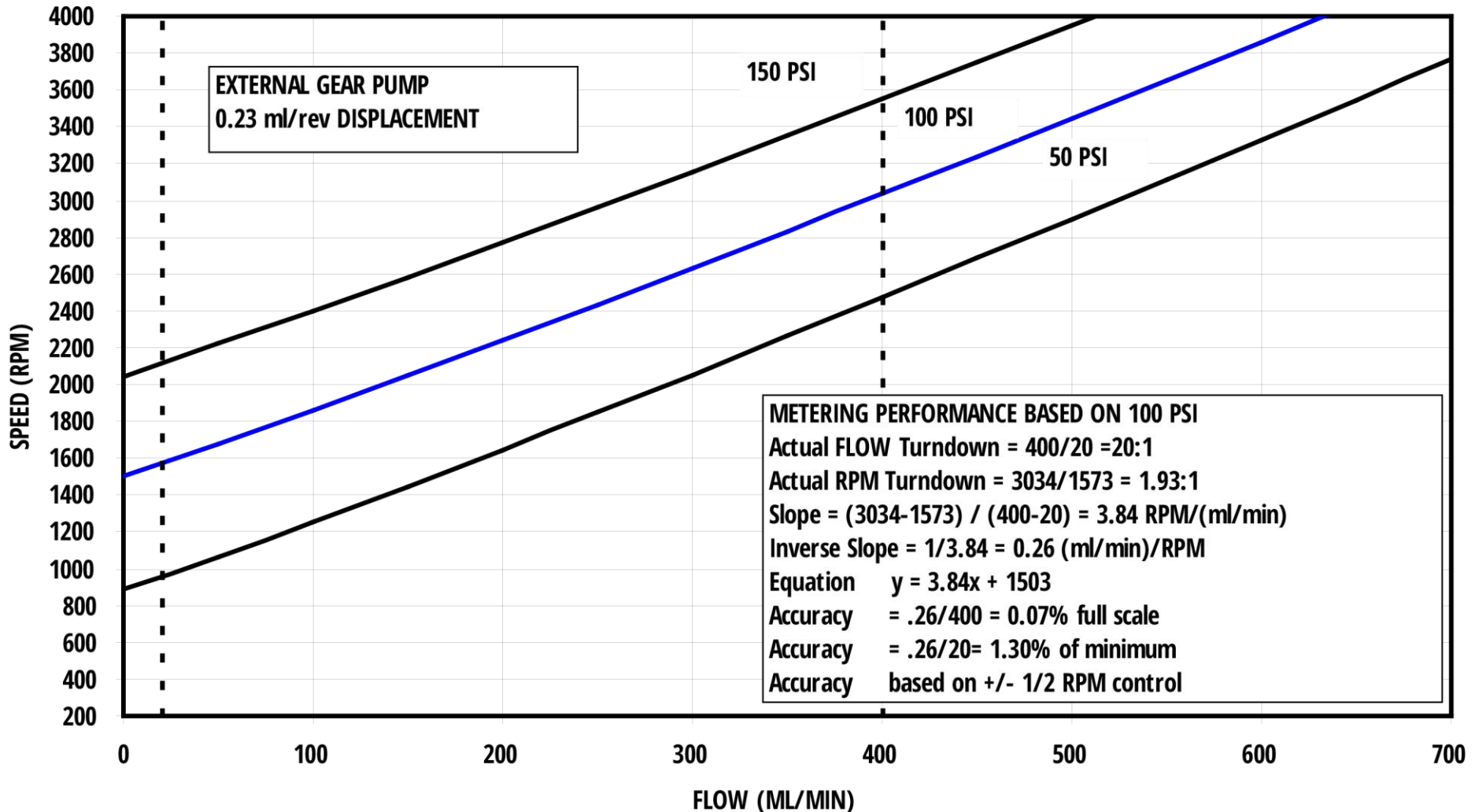
# Metering Diagram - Open Loop System



# Metering Diagram - Closed Loop System



# Metering Diagram - Closed Loop System



# Standard Motors & Controllers

**DC Voltage Drives** - 115 or 230 Volt AC Input, Signal Following, and +/- 1/2 rpm Accuracy (Digital)

**AC Inverter Drives** - 115 to 460 Volt AC Input or Signal Following



# Water & Waste Water Chemicals

- Alums
- Aqueous Ammonia
- Calcium Hydroxide
- Calcium Hypochlorite
- Copper Sulfate
- Ferric Chloride
- Ferric Sulfate
- Hydrofluorosilicic Acid
- Methanol
- Polymers
- Potassium Permanganate
- Sodium Aluminate
- Sodium Bisulfite
- Sodium Carbonate (Soda Ash)
- Sodium Hydrosulfite
- Sodium Hypochlorite
- Sodium Silicate
- Sulfuric Acid

# Waste Water Treatment

## Sodium Bisulfite Solution



**Replaced Pulsafeeder Diaphragm Pump**

- Facility - Napa Sanitation, CA
- T Series 316 SS MCEG Pump
- Displacement - 2.6 ml/rev
- 60 PSI Continuous Duty
- PPS Gear & Bearings
- Flow - 0 to 125 GPH
- AC Inverter Drive

# Waste Water Treatment

## Methanol



- Facility - Truckee, Nevada
- T Series 316 SS MCEG Pump
- Replaced Diaphragm Pump
- Displacement - 2.6 ml/rev
- 60 PSI Continuous Duty
- PPS Gears & Bearings
- Flow - 0 to 125 GPH
- AC Inverter Drive



# Waste Water Treatment

## Ferric Chloride



- Facility - Truckee, Nevada
- Titanium MCEG Pump
- Displacement 1.3 ml/rev
- Flow - 30 GPH
- 50 PSI Continuous Duty
- AC Inverter Drive



# Waste Water Treatment

## Polymer



- Facility – Napa Sanitation, CA
- 316 SS MCEG Pump
- Displacement - 2.6 ml/rev
- Replaced Diaphragm Pump
- Flow - 0 to 125 GPH
- 60 PSI Continuous Duty
- AC Inverter Drive



# Polymer

## Application 1

- 120 GPM
- 30,000 cps raw
- 100 PSI

## Application 2

- 70 to 120 GPM
- 2,000 cps dilute
- 60 PSI

**A Detroit Wastewater Treatment Plant installed a Stainless Steel HD 600 Pump. The pump had an AC Inverter Drive. Tuthill displaced a Progressing Cavity Pump.**

# Polymer

## User is City of Detroit - HD Opportunity

- Polymer Unloading & Transfer
- Application Challenges
  - Shear Sensitive
  - Run Dry Potential
- HD Pump Solution
  - Low Shear
  - Will Tolerate Run Dry



# Dissolved Air Flotation (DAF)

**User** - Minneapolis St Paul Metro Wastewater Treatment Plant, MN

**Application Challenges** - Entrained air, solids, and varying viscosity.

**Tuthill Solution** - HD330 Tutrided Ductile Iron pumps The HD pump will handle solids, run dry, have no metal to metal contact, and serve a long life.

# Metering Sodium Hypochlorite (NaOCL)

## General Characteristics

- Safe to Store and Handle
- Effective as Chlorine Gas
- Requires use of Metering Pumps
- Concentrated Solutions Produce Outgassing

# NaOCL Pumps

## Common Pumps in the field

- Prominent - Diaphragm
- Milton Roy - Diaphragm
- Pulsafeeder - Diaphragm
- Seepex - Progressing Cavity
- Wallace & Tiernan - Piston & Diaphragm

# Typical NaOCl Pumps

## Common Diaphragm & Piston Disadvantages

- Prone to Vapor Locking
- Pulsating Flow
- Lengthy Repair Cycle
- High Initial Cost
- High Maintenance Costs

# Tuthill NaOCL External Gear Pumps

## Advantages

- Robust Design – Long Life
- Field Repairable – Easy And Quick
- Installation – Simple And Compact
- NaOCL Outgassing - No Vapor Trapping
- Flow Control – Standard Motors & Controllers
- Smooth Flow – Flow Meter Friendly, No Pulsation Dampener



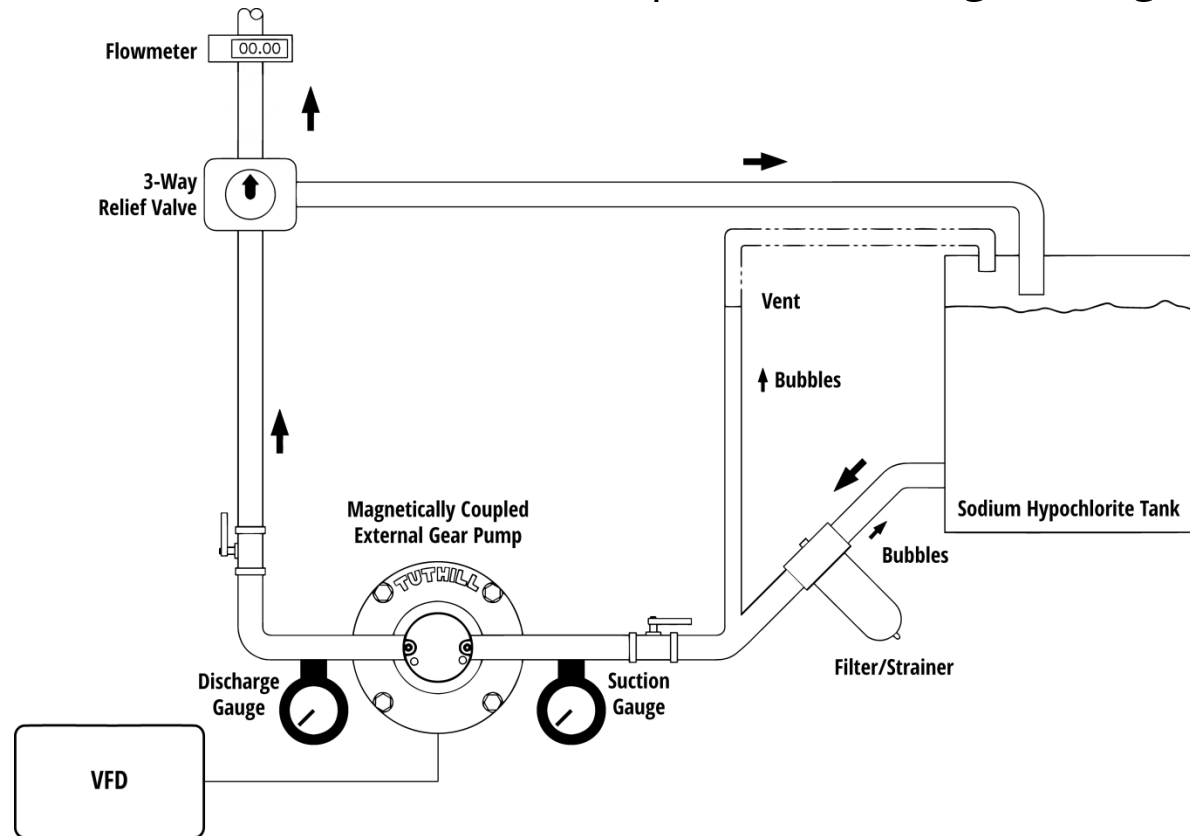
# NaOCL System

## Recommendations

- Priming – 3 Way Valve for Initial Startup
- Flow Regulation / Feedback - Flow Meter
- Foreign Materials in Fluid – Filtration
- Outgassing – Limit Gas Trapping On Inlet
- System Pressure Variation – Back Pressure Valve
- System Liquid Preservation – Back Flow Valve

# Suggested NaOCl System

Valves designed with vent option (hole) for sodium hypochlorite use are recommended to prevent off gassing.



# NaOCl Metering System

Calibration Cylinder	Optional
Back Pressure Valve <sup>1</sup>	Preferred for Open Loop
Back Flow (Antisiphon) Valve <sup>1</sup>	Required for Closed Loop
3 Way Valve / Priming Valve	Preferred
Relief Valve – External	Optional
Inlet Strainer/Filter	Preferred
Flow Meter/Residual Sensor	Required for Closed Loop
Pulsation Dampener	None Required

**Note:** <sup>1</sup> All systems require either a back pressure or back flow valve.

# Waste Water Treatment

## Sodium Hypochlorite (12.5%)



- Well Water Treatment
- Facility – Vacaville, CA
- Hastelloy MCEG Pump
- 0 to 2 GPH (125 ml/min)
- 0.23 ml/rev & 120 PSI
- AC Inverter Drive
- Replaced Prominent Diaphragm Pump

# Waste Water Treatment

## Sodium Hypochlorite (12.5%)



- Facility - Vallejo Sanitation, CA
- Hastelloy MCEG Pump
- 0 to 80 GPH, 2.3 ml/rev
- 65 PSI Continuous Duty
- AC Inverter Drive, Flow Meter
- Replaced Pulsafeeder Diaphragm Pump

**Click picture for full story.**

# Learn More About Tuthill

## Visit Our Websites

[www.tuthillpump.com](http://www.tuthillpump.com)

[www.tuthill.com](http://www.tuthill.com)



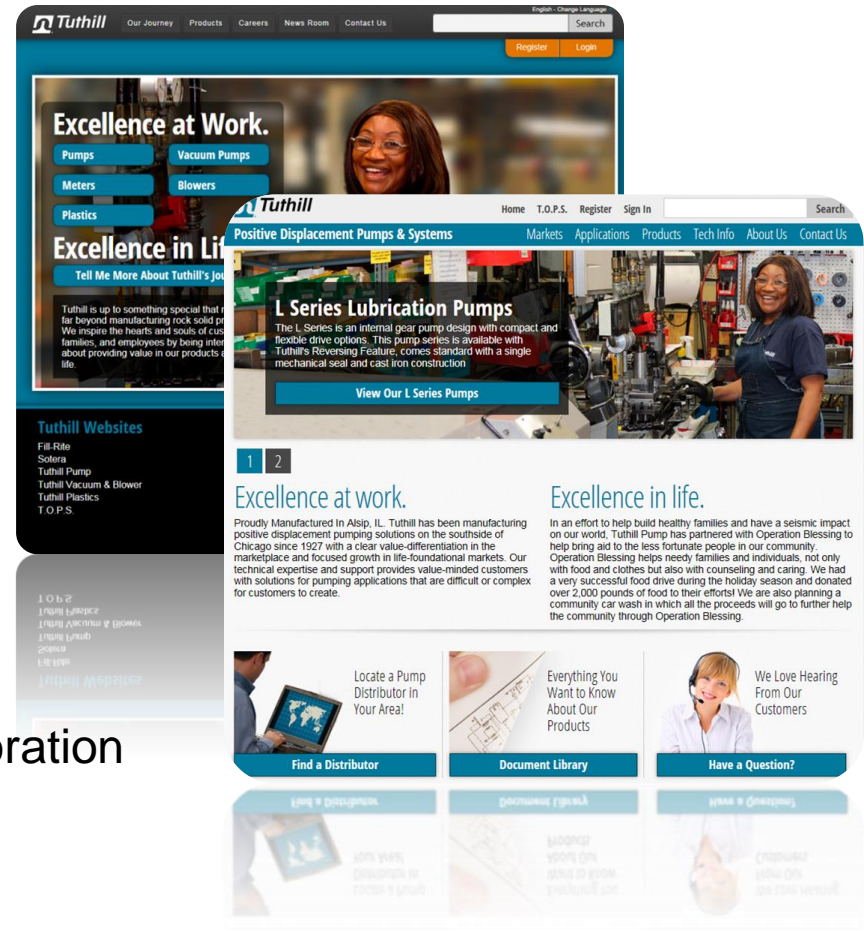
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