Message to Our Customers…

Acknowledging the number of pump types commercially available throughout the world today, we are renewing our commitment to provide our customers with technically-sound equipment use, sizing, selection and application knowledge. Enabling representatives and customers to make better-informed choices has been a hallmark commitment from Warren Rupp, Inc. for the past 45 years.

While there are hundreds of pump types manufactured, most can be classified as either centrifugal or displacement, each having its own inherent design strengths and weaknesses. As a result, our company founder, Warren E. Rupp recognized limitations with a one-design-fits-all approach to solving difficult pumping problems. Thus, the non-positive displacement pump, the air (or natural gas) powered, double diaphragm SANDPIPER® pump range offers our customers a variety of unique problem solving Air-Operated Double Diaphragm (AODD) pump designs. Today, our core designs include heavy duty ball, heavy duty flap, containment duty and standard duty configurations.

While we acknowledge that even the most diverse range of AODD pump designs cannot solve all problems or fill the needs of every pumping application, there is no other pump type on the market today that is so universally applicable and so responsive to pumping problem fluids.

We are proud to introduce (or maybe even reintroduce) you to our SANDPIPER® Pump Solutions!

Warren Rupp Team
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AODD pumps are air (or natural gas) operated displacement type pumps which uniquely differ from all other positive displacement pumps. As a result of air pressure acting on the entire surface of the diaphragm, the diaphragm is in a balanced condition while pumping. This measurably extends diaphragm life over that of mechanically operated diaphragm pumps. Because compressed air is limited, the maximum pressure developed by the pump is also safely limited. Thus AODD pumps are appropriately selected for on-demand intermittent requirements.
Variable flow and head conditions are achievable with the use of inexpensive off-the-shelf air line pressure regulators. Other commonly used flow control methods include restricting discharge and/or suction shutoff valves. Today, AODD pumps are appropriately selected for "process control" installations as automated control devices have become commercially available.

Air-operated double diaphragm pumps safely operate on deadheaded/standby demand without added costs associated with the need to relieve pressure. More importantly, at all deadheaded condition points the AODD pump consumes zero energy (SCFM).

AODD pumps are self-priming from a dry start, but these pumps are frequently installed in flooded suction installations as well as on suction lift installations. With caution given to the non-wetted materials of construction, AODD pumps can be submerged, for maximum installation versatility.

Solution providing AODD pump installation selected to reduce total costs of ownership and minimize floor space allocation.
• **Pumps abrasive and shear-sensitive materials**  
  Low internal velocities handle abrasive slurries with no damage to the pump or loss of volumetric efficiencies. The gentle pumping action does not shear fragile materials.

• **Pumps high viscosity fluids**  
  Heavy and pourable fluids efficiently handled

• **Pumps solids up to 3” line size**

• **Sealless**  
  No mechanical seals or packing to leak

• **Self-priming**  
  Maximum dry prime capabilities up to 24 ft. of water

• **Variable flow & pressure**  
  Simply regulate the inlet air supply to adjust the pump flow from zero to maximum rated capacity.

• **Optional discharge porting**  
  Select bottom porting for high concentration of heavy solids. Select top porting for thin liquids, or if entrained air could be a problem.

• **Runs dry without damage or heat build-up**  
  No internal damage

• **Deadheads against closed discharge**  
  Discharge pressures equal to or greater than inlet air pressure stops the pump without damage. Expensive bypass systems & pressure relief valves not required. The pump stops operation until the discharge is opened.

• **Fully groundable**

• **Portable & submersible**

• **Certifications**

*Please refer to the model specific Service Manual and Data Sheet for complete ATEX information.*
Primary Market Process Maps

Ideal Pump Types for your Ceramic Process

- **G1F Pump**
  - Tank bottoms circulation
  - Utility service for spill clean-up and general fluid transfer

- **GH2 Pump**
  - Wellbore circulation of heated liquid to keep production tubing warm
  - Hot glycol circulation as heat trace for well site applications

- **G30 Pump**
  - Surface casing grout and cellar pump-out

Ideal Pump Types for your Natural Gas Process

- **G1F Pump**
  - Hot glycol circulation as heat trace for well site applications

- **GH2 Pump**
  - Produced water bypass of compressor for reinjection into flowline

- **G5S or G1F Pump**
  - Utility service for spill clean-up and general fluid transfer

Ideal Pump Types for your Paint Process

- **G1F**
  - Pre-Mixing Tank
  - Dispersion

- **GH2**
  - Milling
  - Strainer

- **G5S or G1F**
  - Storage Tank

- **G30**
  - Injection Tank

- **CD**
  - Resins, Oils, Solvents

- **HDB**
  - Resins, Oils, Solvents

- **HDF**
  - Pigment Paste

Primary Market Process Maps

- **Automotive/Plating & Finishing**
- **Food Processing/ Biotech/Pharmaceutical**
- **Paint/Ink/Coatings**
- **Ceramic Slip/Glaze**
- **Industrial/Municipal Wastewater Treatment**
- **Chemical/ Petrochemical**
- **Mining**
- **Pulp/Paper Converters**
- **Construction/Utilities**
- **Oil & Gas**
ESADS+Plus® (Externally Serviceable Air Distribution System)

ON-OFF-ON... Reliability - GUARANTEED!
Primary system components = main directional air valve (with PATENTED cross-drilled pressure ports) & pilot valve

FEATURES: Independent of the pilot valve position, the cross-drilled pressure ports in the main directional air valve spool provide a pneumatic bias of the spool at either end of travel. This is accomplished by directing (inner) chamber pressure to the end of the spool, boosting and sustaining pilot pressure until point-of-shift of the pilot valve.

BENEFITS: Eliminates spool from drifting due to vibration and/or unbalanced pressure or system conditions.
- Process Reliability
- Consistent restarts
- Complete IN-LINE serviceable
- Lube Free

Connecting Rod Guarantee

GUARANTEED not to yield under:
- Tension
- Compression
- Bending
- Pump Operation

Durable, corrosion resistant 416 (Martensitic) and/or 316 (Austenitic) Stainless Steel diaphragm connecting rod - GUARANTEED!
All Bolted Construction

- Instant alignment
  - Ease of maintenance
- Uniform torquing of seal
  - Improved seal
- Maintains seal after repeated servicing
  - Lowers repair costs
- Withstands 4 times the pressure versus V-band clamps
  - Eliminates leakage at high pressure and deadheaded conditions

EXCLUSIVE Bottom Discharge Porting

Benefits of Bottom Discharge Porting:
- Ideal for difficult solids handling
- No more broken diaphragm plates
- No more premature diaphragm failure resulting from non-uniform wear
- No more bent rods
- No more restriction of suction check ball valve due to solids settling in bottom of chamber

Available in:
- Heavy Duty Flap
- Heavy Duty Ball
ESADS+Plus® • Performance Guaranteed • In-line Serviceable Air Valve System

- Bolted Construction • Safe • Reliable • Easy Maintenance
- Durable • Single-Purpose • Corrosion Resistant • Guaranteed Diaphragm Connecting Rod
- Bottom Discharge Porting - Eliminates Settling Solids
- Thick Wall Construction
- Horizontal and Vertical Manifold Connections
- Free Standing Base - Reduces Downtime - Easy Re-Build
- Heavy Duty Wear Package - Extends “MTBF”

<table>
<thead>
<tr>
<th>Weighted Ball Check Valves</th>
<th>Hinged Flap Check Valves</th>
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</thead>
<tbody>
<tr>
<td>Solids Range:  +1/4” (6mm) to 7/8” (22mm)</td>
<td>Solids Range:  +1” (25mm) to 3” (76mm)</td>
</tr>
<tr>
<td>Dry Primes up to 20 Feet of Water</td>
<td>Dry Primes up to 24 Feet of Water</td>
</tr>
</tbody>
</table>
**Containment Duty**
Metallic & Non-Metallic

**Standard Duty**
Metallic & Non-Metallic

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**FEATURES - BENEFITS**

**ESADS+Plus® - Performance Guaranteed - In-line Serviceable Air Valve System**

- Bolted Construction • Safe • Reliable • Easy Maintenance
- Durable • Single-Purpose • Corrosion Resistant • Guaranteed Diaphragm Connecting Rod
- Top Discharge Porting - Eliminates Entrained Air
- Metallic and Non-Metallic Materials of Construction
- Ball Check Valves - Light Weight - Portable
- 90° - 180° Manifold Connection Rotation

---

<table>
<thead>
<tr>
<th>Containment Duty</th>
<th>Standard Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containment Chamber with Leak Detection</td>
<td>Solids Range +1/8&quot; (3mm) to 1/2&quot; (12.7mm)</td>
</tr>
<tr>
<td>Hydraulically Balanced/Coupled Pumping and Driver Diaphragm Assemblies</td>
<td>Dry Primes up to 20 Feet of Water</td>
</tr>
<tr>
<td>Solids Range +1/4&quot; (6mm) to 3/4&quot; (18mm)</td>
<td>Solids Range +1/8&quot; (3mm) to 1/2&quot; (12.7mm)</td>
</tr>
<tr>
<td>Dry Primes up to 18 Feet of Water</td>
<td>Dry Primes up to 20 Feet of Water</td>
</tr>
<tr>
<td>Free Standing Support Base</td>
<td></td>
</tr>
</tbody>
</table>
**A. SELECT PUMP DESIGN**

A fundamental review of fluid characteristics, intended installation, and duty requirements are recommended for “best fit” design selections.

This design selection best practice ensures longest life, whether measuring:

- **MTBF:** Mean Time Between Failures,
- **MTBR:** Mean Time Between Repairs,
- **MTBC:** Mean Time Between Changes or
- **MTBM:** Mean Time Between Maintenance

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### CHARACTERISTICS CHART:

<table>
<thead>
<tr>
<th>Fluid Characteristics</th>
<th>Heavy Duty Ball Bottom Discharge</th>
<th>Heavy Duty Flap Bottom Discharge</th>
<th>Containment Duty Top Discharge</th>
<th>Standard Duty Top Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Metallic</td>
<td>Non-Metallic</td>
<td>Metallic</td>
<td>Non-Metallic</td>
</tr>
<tr>
<td>Water (Base Reference)</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Suspended Solids</td>
<td>A (top discharge porting)</td>
<td>B</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Non-Suspended Solids</td>
<td>A (bottom discharge porting)</td>
<td>A (bottom discharge porting)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Line Size Solids</td>
<td>X</td>
<td>A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sludge / Slurry</td>
<td>A (bottom discharge porting)</td>
<td>A (bottom discharge porting)</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>High Viscosity (Flowable Fluids)</td>
<td>A (weighted check valves)</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Erosion / Abrasive Fluids</td>
<td>High Moderate Low</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Corrosion</td>
<td>B</td>
<td>B</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

### INSTALLATION

- **Permanent**
- **Portable**
- **Containment / Prevention**
- **Flooded Suction**
- **Suction Lift**
- **Submerged**

### DUTY

- **Intermittent / On-Demand**
- **Continuous**

**A** = Best Type, **B** = Suitable, **C** = Caution (Limitations), **X** = Unsuitable
B. SELECT MATERIALS OF CONSTRUCTION
Reference the SANDPIPER® Chemical Resistance Chart

C. SELECT PUMP SIZE
1) Enter Flow (GPM) and Head
(example: 60 GPM @ 40 PSI)

2) Approximate energy requirements
in Pressure and Volume
(example: 62 PSI @ 50 SCFM)
Sizing to extend MTBF (Mean Time Between Failures)

Pumping requirements (flow & head) for most applications can be met by multiple sizes of pumps. Talk to Warren Rupp’s application engineers to assist you with a size selection which best fits your total cost of ownership budget. An appropriately sized-up pump will lower the consolidated initial investment, repair, labor and energy costs. This BEST PRACTICE ensures desirable returns on the initial investment frequently measurable in weeks.

**EXAMPLE: 80 GPM @ 30 PSI**

<table>
<thead>
<tr>
<th>Air Inlet Pressure</th>
<th>1 ½&quot; Performance Curve</th>
<th>2&quot; Performance Curve</th>
<th>3&quot; Performance Curve</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 PSI</td>
<td>30(51)</td>
<td>20(34)</td>
<td>20(34)</td>
</tr>
<tr>
<td>40 PSI</td>
<td>60(101.9)</td>
<td>40(68)</td>
<td>40(68)</td>
</tr>
<tr>
<td>60 PSI</td>
<td>90(152.9)</td>
<td>60(101.9)</td>
<td>60(101.9)</td>
</tr>
<tr>
<td>80 PSI</td>
<td>120(203.9)</td>
<td>80(135.9)</td>
<td>80(135.9)</td>
</tr>
<tr>
<td>100 PSI</td>
<td>150(264.9)</td>
<td>100(169.9)</td>
<td>100(169.9)</td>
</tr>
</tbody>
</table>

1 ½" Performance Curve. 30 PSI, 80 GPM = 90 SCFM

2" Performance Curve. 30 PSI, 80 GPM = 55 SCFM

3" Performance Curve. 30 PSI, 80 GPM = 45 SCFM

**EXAMPLE:**

- **1 ½" Performance Curve:** 30 PSI, 80 GPM = 90 SCFM
- **2" Performance Curve:** 30 PSI, 80 GPM = 55 SCFM
- **3" Performance Curve:** 30 PSI, 80 GPM = 45 SCFM

Experienced application engineers are available to help you determine the best fit pump size for your application. Call our factory or email appltech.warrenrupp@idexcorp.com.
Comparative Example

Compare the total cost of ownership of 2 to 3 AODD pump sizes, including purchase price, compressed air cost, repair parts cost, and maintenance labor cost. Required inputs are flow rate (GPM), discharge pressure (PSI), air inlet pressure (PSI), air consumption (SCFM), displacement per stroke (gal), wet end kit cost, electricity cost ($/kw-hr), labor cost ($/hr) and weekly hours of operation.

**INDUSTRY ACCEPTED BEST PRACTICES & ASSUMPTIONS**
- Maintenance performed every 10 million pump strokes
- Two hours of labor required for each rebuild

### Step 1: Input Pump Data

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>Model</th>
<th>Price ($)</th>
<th>Flow Rate (GPM)</th>
<th>Discharge Pressure (PSI)</th>
<th>Air Inlet Pressure (PSI)</th>
<th>Air Consumption (SCFM)</th>
<th>Displacement per Stroke (gal)</th>
<th>Wet End Kit Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1½&quot;</td>
<td>$1,217.00</td>
<td>79</td>
<td>91</td>
<td>79</td>
<td>91</td>
<td>0.34</td>
<td>$151.42</td>
</tr>
<tr>
<td>B</td>
<td>2&quot;</td>
<td>$1,354.00</td>
<td>80</td>
<td>30</td>
<td>60</td>
<td>55</td>
<td>0.43</td>
<td>$249.85</td>
</tr>
<tr>
<td>C</td>
<td>3&quot;</td>
<td>$3,225.00</td>
<td></td>
<td></td>
<td></td>
<td>43</td>
<td>1.8</td>
<td>$508.35</td>
</tr>
</tbody>
</table>

### Step 2: Input Cost Data

- Electricity Cost ($/kw-hr) $0.07
- Labor Cost ($/hr) $75.00
- Weekly Hours of Operation 40

### Step 3: View Cost Summary

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>$1,720.18</td>
<td>$221.70</td>
<td>$220.24</td>
<td>35</td>
<td>$41.58</td>
<td>$2,162.12</td>
<td>$3,379.12</td>
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<tr>
<td>B</td>
<td>$880.89</td>
<td>$290.23</td>
<td>$174.14</td>
<td>45</td>
<td>$25.87</td>
<td>$1,345.26</td>
<td>$2,699.26</td>
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<tr>
<td>C</td>
<td>$514.70</td>
<td>$140.89</td>
<td>$41.60</td>
<td>188</td>
<td>$13.41</td>
<td>$697.18</td>
<td>$3,922.18</td>
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</table>

### Step 4: Evaluate Return on Investment

Additional Investment Payback Period (weeks)
- Pump Size B (Higher Price) vs. Pump Size A (Lower Price)
- = 8.7 weeks

**Total Cost of Ownership** calculator allows user to compare the total cost of ownership of 2 to 3 AODD pump sizes. This calculator is available through IDEX Commercial Operations Regional Managers.
HEAVY DUTY BALL

All Bolted Construction

ESADS+Plus®
(Externally Serviceable Air Distribution System)
Lube Free

Durable Diaphragm Connecting Rod

Thick Wall Construction

Weighted Elastomeric Ball Checks

Bottom Discharge Ported

Rotate Porting Flange 180° to Achieve 90° Vertical Connections

Free Standing Support Base

Warren Rupp Signature Features - in BLUE
FEATURES:
• HEAVY DUTY BALL
• ESADS+Plus®
• All Bolted Construction
• Bottom Discharge
• Thick Wall Construction
• Durable Diaphragm Connecting Rod
• Horizontal & Vertical Manifold Connections
• Solids Range +¼" (6mm) to ⅞" (22mm)
• Dry Primes up to 20 Feet of Water
• Free Standing Support Base
• HD Extended Wear Package (1½" to 4")

CHARACTERISTICS CHART:

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</tr>
<tr>
<td>Submerged</td>
<td>B</td>
</tr>
<tr>
<td>Intermittent / On-Demand</td>
<td>A</td>
</tr>
<tr>
<td>Continuous</td>
<td>A</td>
</tr>
</tbody>
</table>

A = Best Type  C = Caution (Limitations)
B = Suitable   X = Unsuitable
HEAVY DUTY FLAP

90°-180° Manifold Connection Rotation

ESADS+Plus®
(Externally Serviceable Air Distribution System)
Lube Free

Durable Diaphragm Connecting Rod

Flap Check Valves

All Bolted Construction

90°-180° Manifold Connection Rotation

Free Standing Support Base

Thick Wall Construction

Warren Rupp Signature Features - in BLUE
FEATURES:

- HEAVY DUTY FLAP
- ESADS+Plus®
- All Bolted Construction
- Bottom Discharge
- Flap Check Valves
- Thick Wall Construction
- Durable Diaphragm Connecting Rod
- 90° - 180° Manifold Connection Rotation
- Solids Range +1” (25mm) to 3” (76mm)
- Dry Primes up to 24 Feet of Water
- Free Standing Support Base
- HD Extended Wear Package (2” to 4”)

CHARACTERISTICS

CHART:

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<tr>
<td>Erosion / Abrasive Fluids</td>
<td>High A, Moderate A, Low A</td>
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<table>
<thead>
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B = Suitable  X = Unsuitable

CURVES:

VARIABLE HEADS

VARIABLE FLOWS - GPM
Hydraulically Balanced/Coupled Pumping and Driver Diaphragm Assemblies

90°-180° Manifold Connection Rotation

Containment Chamber with Leak Detection

ESADS+Plus® (Externally Serviceable Air Distribution System) Lube Free

All Bolted Construction

Durable Diaphragm Connecting Rod

All Bolted Construction

Free Standing Support Base

Warren Rupp Signature Features - in BLUE
FEATURES:
• CONTAINMENT DUTY BALL
• ESADS+Plus®
• All Bolted Construction
• Containment Chamber with Leak Detection
• Top Discharge
• Ball Check Valves
• Light Weight - Portable
• Durable Diaphragm Connecting Rod
• 90° - 180° Manifold Connection Rotation
• Solids Range +¼” (6mm) to ¾” (18mm)
• Dry Primes up to 18 Feet of Water
• Free Standing Support Base

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<tr>
<th>Fluid Characteristics</th>
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<tbody>
<tr>
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<tr>
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<tr>
<td>Suspended Solids</td>
<td>A</td>
<td>B</td>
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<tr>
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<tr>
<td>Line Size Solids</td>
<td>X</td>
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</tr>
<tr>
<td>Sludge / Slurry</td>
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<td>C</td>
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<tr>
<td>High Viscosity (Flowable Fluids)</td>
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<tr>
<td>Erosion / Abrasive Fluids</td>
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Installation

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<th>Suction Lift</th>
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Duty

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<tbody>
<tr>
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<td>B</td>
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</tbody>
</table>

A = Best Type  B = Suitable  C = Caution (Limitations)  X = Unsuitable

CURVES:
STANDARD DUTY BALL

180° Manifold Connection Rotation

All Bolted Construction

ESADS+Plus® (Externally Serviceable Air Distribution System) Lube Free

90°-180° Manifold Connection Rotation

All Bolted Construction

Durable Diaphragm Connecting Rod

S05 & S1F Now Available with Polypropylene 1-piece Manifold

Warren Rupp Signature Features - in BLUE

NEW
FEATURES:
- STANDARD DUTY BALL
- ESADS+Plus®
- All Bolted Construction
- Top Discharge
- Ball Check Valves
- Durable Diaphragm Connecting Rod
- Light Weight - Portable
- 90° - 180° Manifold Connection Rotation
- Solids Range +¼” (2mm) to ½” (12.7mm)
- Dry Primes up to 20 Feet of Water

CHARACTERISTICS CHART:

<table>
<thead>
<tr>
<th>Fluid Characteristics</th>
<th>Standard Duty</th>
<th>Top Discharge</th>
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<tr>
<td>Line Size Solids</td>
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<td>Sludge / Slurry</td>
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<td>C</td>
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<tr>
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<td>C</td>
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<td>B</td>
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<td>Suction Lift</td>
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</tr>
</tbody>
</table>

A = Best Type  C = Caution (Limitations)
B = Suitable  X = Unsuitable

CURVES:

[Graph showing performance curves for different fluid characteristics and pump sizes.]
Go Green, Save Green

AirVantage is a new technology for Air Operated Double Diaphragm pumps that significantly reduces air consumption over conventional AODD pumps.

- Advanced learning program modulates pump performance to optimize energy usage and match changes in system demand.
- Automatically adapts to changing process conditions by constantly managing the amount of air that is used to drive the pump.
- Completely sustainable with a self-contained 12v power generation module, only needs compressed air. No need for batteries or hard-wiring.

How AirVantage™ Works

Air Regulator Control
Contains PowerGen regulator and electro/pneumatic SMC pilot valve.

Mechanical Valve
Opens and partially closes as directed by the Velocity Feedback System to save air while maintaining flow.

Velocity Feedback System
Advanced learning program modulates air flow to optimize energy usage. Automatically adapts to changing process conditions. Green LED light indicates proper operation & is a diagnostic tool.

PowerGen
Self contained 12v Power Generation module. Generates power for system using existing air, no need to run electrical or replace batteries.
**FEATURES/BENEFITS:**
SAME FEATURES AS STANDARD DUTY PLUS: (P. 22-23)

- Saves up to 50% air consumption
- Relieves air compressor demand
- Reduces equipment maintenance & repairs
- “Dial-Free” operation self adjusts to process changes
- Reduces factory noise levels
- No electricity or battery back-up required

**CONTACT YOUR SALES REPRESENTATIVE.**

---

**CHARACTERISTICS CHART:**

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<thead>
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<th>Fluid Characteristics</th>
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**CURVE: RS20 METALLIC**

**CURVE: RS30 METALLIC**

---

**FREE 30-DAY TRIAL**

NO RISK

Contact your sales representative.
Recommended process control loop accessory components.

1. Leak Detection
2. Liquid Level Controls
3. Banjo® Ball Valve
4. Blacoh® Inlet Stabilizer
5. Pulse Output Kits
6. Muffler Options
7. Tranquilizer® (Surge Dampeners) Blacoh® Plastic Dampener
8. Stroke Counter/Batch Control
9. Air Line Solenoid
10. Variable Speed Control
11. Filter/Regulator
12. Air Dryer
1. LEAK DETECTION

**Electronic**
At the point the primary pumping diaphragm fails, this modular, watertight unit senses conductivity changes between the driver fluid and the pumped fluid. Warning lights indicate which side of the pump is tainted. The unit can also be wired for audible alarm or pump shutdown. Low voltage. Simple installation.

Part # 032.XXX.000

**Visual**
A sight tube style leak detector is installed on each driver chamber. If a pumping diaphragm break occurs, liquid in the sight tube changes. This type of leak detection is standard construction on non-metallics spill containment pumps.

Part # 031.XXX.110

**Mechanical**
When a leak chemically attacks an internal o-ring on this detector, it actuates a plunger. This opens an air valve, which in turn activates a customer-supplied solenoid (or similar device) to trigger a signal. For use with the CONTAINMENT DUTY Spill Containment SANDPIPER® pumps ONLY.

2. LIQUID LEVEL CONTROLS

Warren Rupp’s float actuated liquid level control provides all-pneumatic operation. Especially useful in sump and liquid transfer situations, the float actuated switch opens and closes air supply to the pump for positive ON-OFF response. High capacity air valve accommodates air flow requirements up to 125 cfm, with a pressure drop less than 10 PSI.

Part # 032.036.000

3. BANJO® BALL VALVE

Precision-molded Polypropylene ball valves are reinforced with fiberglass for additional strength.

316 Stainless Steel two-piece ball valves have blow-out proof stems and are rated at 1000 PSI.

Both Polypropylene and Stainless Steel have PTFE seals and seats. Tank accessories include 150# ANSI flanges and ANSI flange gaskets in both EPDM and FKM.

4. BLACOH® SENTRY®/INLET STABILIZER

Blacoh’s® SENTRY® Inlet (Suction) Stabilizers at the pump’s inlet reduces pressure fluctuations and aids in filling the pump head with fluid during each inlet stroke. In high suction lift applications, SENTRY® Inlet Stabilizers will momentarily maintain the flow of the accelerated fluid.

Part # 475.000.000

5. PULSE OUTPUT KITS

Offered in a wide variety of sizes and voltages. These controls interface with the Warren Rupp Batch Controller, or your own process controls (PLC’s). Available in kits, for field installation, or factory built into a new pump.

Refer to Service Manuals & Data Sheets for ATEX Compliance.

Part # 530.XXX.000

6. MUFLER OPTIONS

Effective sound dampening for Warren Rupp pumps. Mufflers are a rugged Polymer or metallic housing. Sound dampening and encapsulated mufflers have replaceable acoustic composite inserts. All Warren Rupp pumps are supplied with a basic muffler. Meets OSHA dBA requirements.

Part # 530.XXX.000
Provides automatic on/off operation of air-driven equipment. 110/120VAC and 220/240VAC (50/60 hertz) kits operate with the Warren Rupp or customer’s control units. 12VDC and 24VDC kits operate with customer-supplied controls only.

**9. AIR LINE SOLENOID**

| Part # 894.XXX.000 |

**10. ELECTRONIC SPEED CONTROL**

Easy installation and operation. Fits most air-operated diaphragm pumps with operating pressures to 125 PSI. Accurate control of variable flow rates, from zero flow to maximum. Operates on 110 or 220VAC. Manual operation with on-board, single turn potentiometer or automatic mode for remote control using the optional 4-20 mA input terminal. Speed Control System can be integrated with existing process control systems.

| Part # 032.XXX.000 |

**11. FILTER/REGULATOR**

Clean, dry air is the key to trouble-free pump operation. The Warren Rupp Filter/Regulator line offers modular convenience for easy installation and service.

| Part # 020.XXX.XXX |

**12. AIR DRYER**

This point-of-use air dryer is designed to remove 99% of the water, rust and other contaminants commonly present in compressed air lines. Clean, dry air enhances the life and performance of pneumatically-driven equipment.

| Part # 020.XXX.XXX |

---

**7. TRANQUILIZER®/DAMPENERS**

**Metallic Surge Suppressors**

For use with any reciprocating pump, Tranquilizer surge suppressors maintain a constant air cushion volume in a pumping application for the most effective surge suppression. All Tranquilizer models are automatically self-charging and self-venting. Flexible diaphragm separates air cushion from pumped product.

| Part # TA-1, TD-1½, TA-2, TA-3 |

**Non-Metallic Surge Dampeners**

Designed for use with ½”, ¾” and 1” pumps, these dampeners are manually charged with air. PTFE diaphragms are standard, with wetted parts available in Polypropylene, PVDF, and Nylon. The DA05 is also available in Aluminum and Stainless Steel. Flow and pressure fluctuations are minimized, the dampener consumes no air after initial charging. Hardware is 302/304 Stainless Steel.

| Part # DA05, DA07 & DA10 |

**Blacoh® SENTRY® Plastic Pulsation Dampeners**

These dampeners remove virtually all hydraulic shock, enhancing all-around performance and reliability of fluid handling equipment in industrial and chemical transfer applications.

| Part # 032.XXX.000 |

---

**8. STROKE COUNTER/BATCH CONTROL**

Transforms your diaphragm pump into an accurate, controllable pump system. Uses interfaceable, user-friendly components in your process control systems and existing or new pumps. It eliminates troublesome and expensive flow-sensing devices. The Stroke Counter/Batch Control is an interfaceable electronic control to program repetitive diaphragm pump operations. This industrial-grade control offers performance and repeatability. Compatible with all Warren Rupp air-operated diaphragm pumps. The control unit functions as a batch control, a stroke counter, or both. The complete system requires the Stroke Counter/Batch Controller, the Pulse Output Kit & the Air line Solenoid.
Surge Suppression for AODD Pumps

- Virtually surge-free flows
- Steadier pressures
- Less vibration and noise
- Simple installation
- Variety of sizes and materials
- Automatically self-charging and self-venting
- Longest life balanced diaphragm

**OPERATING PRINCIPLE**

An air cushion is established by liquid pressure pushing the diaphragm upward. This allows air to enter the chamber. The balancing air cushion keeps the diaphragm centered at mid stroke.

During operation, the diaphragm(s) flex within the mid-range position, absorbing and equalizing discharge surge.

If pressure changes in the system, the air cushion pressure compensates, automatically increasing or decreasing. If liquid pressure is released, air in the suppressor chamber exhausts into the atmosphere.

Properly sized and installed, Tranquilizers provide virtually surge-free discharge flow.
Tranquilizer® Options

Also available from Warren Rupp: Surge Dampeners for smaller pumps. Ask about the DA Series of Surge Dampeners. Now available in Aluminum, Polypropylene, PVDF and Stainless Steel.

See ACCESSORIES #7 on page 27.
ACCESSORIES - DRUM PUMP

Pail & Drum Kits

Converting our ¼”, ½” and ¾” plastic pumps to a drum or pail application is easy. The adaptor kits are constructed of chemically-resistant materials to handle the job. Plastic pipe assembly comes complete with all the hardware needed. Simply attach the threaded end to the suction manifold and lower it into the liquid source.

The 55-gallon Drum Transfer Kit includes pump support legs to minimize the vibration occurring in a diaphragm pump.

The 120# Barrel Transfer Kit includes a lid with adjustment screws for a snug fit every time.

Part # 031.091.000

The Pail Transfer Kit also includes a lid with adjustment screws, plus handles for easy mobility.

Part # 475.196.XXX
475.149.XXX
475.150.XXX
475.151.XXX
475.194.XXX
475.195.XXX

Pail mounted SANDPIPER® Pumps installed on paint spray booth station.
Warren Rupp offer existing products, modified products and custom built products. Whether you need private labeling, special accessories, or an entire system, let our experienced staff assist you in meeting your special needs.

- **STANDARD**
  Special blanket pricing available on standard pumps in larger quantities.

- **SPECIAL**
  Special material combinations, construction, painting and labeling.

- **CUSTOM**
  Custom built, multi-pump systems. Customized shipping materials and fixtures to fit your manufacturing process.

- **ENGINEERING SERVICES**
  - Experienced Engineering staff
  - Latest Cad/Cam design equipment with 3-D modeling
  - Cad library
  - Precise laboratory test equipment

- **TECHNICAL SERVICES**
  - Experienced staff for technical support
  - Available in-house and field service analysis
  - Worldwide support

- **MANUFACTURING SERVICES**
  - Latest in CNC capabilities
  - Quick turnaround to meet customer scheduling needs
  - Just-in-time scheduling available
  - Custom packaging
  - Fabrication experience

- **FLEXIBLE KANBAN AGREEMENTS**

**WR10 3/8” AODD OEM Pump**

**BENEFITS:**
- Flows to 5 GPM (19 LPM)
- Multiple mounting positions
- Similar envelope dimensions to a standard ¼” pump, but almost double the flow rate
- Cost competitive
- Dependable operation
- Size ideal for OEM applications

**APPLICATIONS:**
- Car Wash Chemicals
- Wash Solutions
- Dispensing of:
  - Pigments • Inks • Paints
  - Additives • Sanitizers
- Drum Transfer

**WR10 SPECIFICATIONS**

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<tr>
<th>Specifications</th>
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<th>WR10 3/8” Pump</th>
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<td>3 lbs.</td>
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<tr>
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<td>1 bar</td>
</tr>
<tr>
<td>Max. particle size</td>
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<td>16.5 ft.</td>
<td>5m</td>
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<td>Suction lift (wet)</td>
<td>20 ft.</td>
<td>6m</td>
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<td>Air inlet</td>
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Materials: Polypropylene body with Santoprene elastomers; Polypropylene body with PTFE elastomers; PVDF body with Santoprene elastomers; PVDF body with PTFE elastomers
**HEAVY DUTY BALL**

**HDB (SB) Metallic Pumps** are ideal for thin to highly viscous and small solids-laden fluids. SANDPIPER® Heavy Duty Ball Valve Pumps (SB) provide excellent suction lift capability and exclusive variable porting options (side, top, bottom and dual). HDB pumps are thick wall constructed of Sand Casted Aluminum, Cast Iron, Stainless Steel or Alloy C with elastomer, TPE (thermal plastic elastomers) and PTFE options in diaphragms and check valves. HDB pumps are enhanced with an extended wear package.

3" HDB bottom ported pump installed as a plate & frame filter press, pre-coat supply pump.
<table>
<thead>
<tr>
<th>PUMP MODELS</th>
<th>A (inches)</th>
<th>B (inches)</th>
<th>C (inches)</th>
<th>D (inches)</th>
<th>E (inches)</th>
<th>Connection Style</th>
<th>Pipe Size</th>
<th>Displacement Per Stroke</th>
<th>Max Flow Per Minute</th>
<th>Max Solids Handling</th>
<th>Max Discharge Pressure</th>
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<td>1 (25)</td>
<td>.09 (.34)</td>
<td>42 (159)</td>
<td>.25 (6)</td>
<td>125 (8.6)</td>
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<td>13 1/2 (34)</td>
<td>11 3/4 (29)</td>
<td>13 9/32 (33)</td>
<td>5 1/4 (13)</td>
<td>13 (33)</td>
<td>1” NPT/BSP</td>
<td>1 (25)</td>
<td>.09 (.34)</td>
<td>42 (159)</td>
<td>.25 (6)</td>
<td>125 (8.6)</td>
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<td>13 11/16 (34)</td>
<td>11 3/4 (29)</td>
<td>13 9/32 (33)</td>
<td>5 1/4 (13)</td>
<td>13 (33)</td>
<td>1” NPT/BSP</td>
<td>1 (25)</td>
<td>.09 (.34)</td>
<td>42 (159)</td>
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<td>90 (340)</td>
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<td>HDB1½-A TOP</td>
<td>19 3/2 (48)</td>
<td>15 1/2 (39)</td>
<td>17 (43)</td>
<td>8 9/64 (207)</td>
<td>18 5/64 (459)</td>
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<td>15 1/2 (39)</td>
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<td>8 9/64 (207)</td>
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<td>20 7/8 (530)</td>
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<td>3 7/16 (87)</td>
<td>15 3/16 (386)</td>
<td>2” NPT</td>
<td>2 (50)</td>
<td>.43 (1.63)</td>
<td>135 (511)</td>
<td>.38 (9)</td>
<td>125 (8.6)</td>
</tr>
<tr>
<td>SB2-A BOTTOM</td>
<td>23 1/4 (59)</td>
<td>15 1/2 (39)</td>
<td>16 13/16 (42)</td>
<td>3 7/16 (87)</td>
<td>15 3/16 (386)</td>
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<td>2 (50)</td>
<td>.43 (1.63)</td>
<td>135 (511)</td>
<td>.38 (9)</td>
<td>125 (8.6)</td>
</tr>
<tr>
<td>SB3-A TOP</td>
<td>37 1/8 (94)</td>
<td>26 (66)</td>
<td>20 3/4 (527)</td>
<td>20 (509)</td>
<td>33 3/8 (848)</td>
<td>3” 125# ANSI</td>
<td>3 (80)</td>
<td>1.8 (6.81)</td>
<td>260 (988)</td>
<td>.87 (22)</td>
<td>125 (8.6)</td>
</tr>
<tr>
<td>HDB3-A TOP</td>
<td>31 1/4 (794)</td>
<td>26 (66)</td>
<td>24 5/8 (625)</td>
<td>5 3/4 (146)</td>
<td>19 3/8 (492)</td>
<td>3” 125# ANSI</td>
<td>3 (80)</td>
<td>1.8 (6.81)</td>
<td>260 (988)</td>
<td>.87 (22)</td>
<td>125 (8.6)</td>
</tr>
<tr>
<td>SB4-A TOP</td>
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<td>4” 125# ANSI</td>
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<td>1.8 (6.81)</td>
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<td>.87 (22)</td>
<td>125 (8.6)</td>
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<tr>
<td>HDB4-A TOP</td>
<td>31 1/4 (793)</td>
<td>26 (66)</td>
<td>27 1/2 (699)</td>
<td>5 3/4 (146)</td>
<td>19 3/8 (492)</td>
<td>4” 125# ANSI</td>
<td>4 (100)</td>
<td>1.8 (6.81)</td>
<td>260 (988)</td>
<td>.87 (22)</td>
<td>125 (8.6)</td>
</tr>
</tbody>
</table>

All Dimensions ± 1/8 (3)
### SB1-A Performance Curve

<table>
<thead>
<tr>
<th>AIR INLET PRESSURE (PSI)</th>
<th>HDB 10(17)</th>
<th>20(34)</th>
<th>30(51)</th>
<th>40(58)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 PSI</td>
<td>100</td>
<td>80</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>40 PSI</td>
<td>50(85)</td>
<td>40(58)</td>
<td>30(51)</td>
<td>20(34)</td>
</tr>
<tr>
<td>60 PSI</td>
<td>40(58)</td>
<td>30(51)</td>
<td>20(34)</td>
<td>10(17)</td>
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<tr>
<td>80 PSI</td>
<td>30(51)</td>
<td>20(34)</td>
<td>10(17)</td>
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### HDB1½-A (SB1½-A) Performance Curve

<table>
<thead>
<tr>
<th>AIR INLET PRESSURE (PSI)</th>
<th>HDB 10(17)</th>
<th>20(34)</th>
<th>30(51)</th>
<th>40(58)</th>
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<tbody>
<tr>
<td>20 PSI</td>
<td>100</td>
<td>80</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>40 PSI</td>
<td>90(152.9)</td>
<td>70(118.9)</td>
<td>50(85)</td>
<td>30(51)</td>
</tr>
<tr>
<td>60 PSI</td>
<td>80(135.9)</td>
<td>60(101.9)</td>
<td>40(58)</td>
<td>20(34)</td>
</tr>
<tr>
<td>80 PSI</td>
<td>70(118.9)</td>
<td>50(85)</td>
<td>30(51)</td>
<td>10(17)</td>
</tr>
<tr>
<td>100 PSI</td>
<td>60(101.9)</td>
<td>40(58)</td>
<td>20(34)</td>
<td>0</td>
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</table>

HDB bottom discharge ported pumps with tranquilizers installed at an industrial waste treatment facility.
1" ball valve pumps installed in a paint mixing and tinting operation.
HDF (SA) Pumps are recommended for abrasive slurries, suspended and non-suspended solids and line-size solids requirements. All SANDPIPER® Heavy Duty Flap Valve pumps (SA) are configured in bottom discharge porting arrangements and provide superior suction lift. HDF pumps are thick wall constructed of Sand Casted Aluminum, Cast Iron and Stainless Steel with elastomer, TPE (thermal plastic elastomers) and PTFE options in diaphragms and check valves.

HDF pumps are enhanced with an extended wear package.

Heavy duty flap valve pumps with tranquilizers permanently installed in an automotive industrial waste treatment facility.
## Dimensional Detail

### Bottom Discharge Ported

<table>
<thead>
<tr>
<th>PUMP MODELS</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Connection Style</th>
<th>Pipe Size</th>
<th>Displacement Per Stroke</th>
<th>Max Flow Per Minute</th>
<th>Max Solids Handling</th>
<th>Max Discharge Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Height</td>
<td>Width</td>
<td>Depth</td>
<td>Bottom of Base to Center Line of Suction</td>
<td>inches (mm)</td>
<td>inches (mm)</td>
<td>inches (mm)</td>
<td>inch (mm)</td>
<td>gal (liter)</td>
<td>gal (liter)</td>
<td>inch (mm)</td>
</tr>
<tr>
<td>HDF1</td>
<td>15 11/16 (398)</td>
<td>16 3/4 (425)</td>
<td>10 13/16 (274)</td>
<td>14 1/16 (356)</td>
<td>2.9/16 (65)</td>
<td>1” NPT/BSP</td>
<td>1 (25)</td>
<td>.10 (.38)</td>
<td>70 (265)</td>
<td>1 (25)</td>
<td>125 (8.6)</td>
</tr>
<tr>
<td>SA2-A HDF2-A</td>
<td>20 5/16 (516)</td>
<td>21 3/4 (552)</td>
<td>13 5/8 (346)</td>
<td>17 11/16 (449)</td>
<td>2 9/16 (65)</td>
<td>2” NPT only</td>
<td>2 (50)</td>
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<td>140 (530)</td>
<td>2 (50)</td>
<td>125 (8.6)</td>
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<tr>
<td>SA3-A HDF3-A</td>
<td>29 1/2 (749)</td>
<td>36 9/16 (929)</td>
<td>16 1/4 (413)</td>
<td>26 3/4 (654)</td>
<td>4 1/4 (108)</td>
<td>3” 125# ANSI</td>
<td>3 (80)</td>
<td>1.62 (6.15)</td>
<td>260 (988)</td>
<td>3 (80)</td>
<td>125 (8.6)</td>
</tr>
<tr>
<td>SA3-M HDF3-M</td>
<td>30 1/4 (768)</td>
<td>32 5/16 (821)</td>
<td>16 3/16 (411)</td>
<td>26 1/2 (673)</td>
<td>5 (127)</td>
<td>3” 125# ANSI</td>
<td>3 (80)</td>
<td>1.23 (4.66)</td>
<td>260 (988)</td>
<td>3 (80)</td>
<td>125 (8.6)</td>
</tr>
<tr>
<td>SA4-A HDF4-A</td>
<td>31 (787)</td>
<td>36 9/16 (929)</td>
<td>21 1/4 (540)</td>
<td>26 1/2 (673)</td>
<td>5 (127)</td>
<td>4” 125# ANSI</td>
<td>4 (100)</td>
<td>1.62 (6.15)</td>
<td>260 (988)</td>
<td>3 (80)</td>
<td>125 (8.6)</td>
</tr>
<tr>
<td>SA4-M HDF4-M</td>
<td>31 (787)</td>
<td>32 5/16 (821)</td>
<td>16 3/16 (411)</td>
<td>26 1/2 (673)</td>
<td>5 (127)</td>
<td>4” 125# ANSI</td>
<td>4 (100)</td>
<td>1.23 (4.66)</td>
<td>260 (988)</td>
<td>3 (80)</td>
<td>125 (8.6)</td>
</tr>
</tbody>
</table>

All Dimensions +/- 1/8 (3)
HEAVY DUTY FLAP

HDF1 Performance Curve

HDF2-A (SA2-A) Performance Curve

HDF3-A (SA3-A) & HDF4-A (SA4-A) Performance Curve
HDF3-M (SA3-M) & HDF4-M (SA4-M) Performance Curve

Heavy duty flap valve pump installed on an underflow sludge transfer application.

Heavy duty flap valve pump temporarily installed pumping settling pond sludge. (Perfect alignment not required).
Containment Duty Metallic and Non-Metallic Pumps are ideal for highly corrosive and hazardous chemical fluid requirements. All CD duty pumps are exclusively designed with containment chambers, hydraulically balanced/coupled pumping diaphragm and driver diaphragm assemblies. All containment chambers are designed to accommodate visual, mechanical and low voltage leak detection devices. CD pumps are constructed of Aluminum, Cast Iron, Stainless Steel, Alloy C, Polypropylene and PVDF with TPE (thermal plastic elastomers), PTFE options in diaphragms and check valves.

Containment Duty Pumps additional FEATURES and BENEFITS

**Spill Containment**
- Safe pumping of aggressive, unpredictable, hazardous or toxic liquids.
- Chambers keep accidental spills from entering the air valve, protecting plant environment and personnel.
- Allows the pump to complete the batch or operation in progress, before repair has to be done.

**Hydraulically Balanced/Coupled Diaphragms**
- Pumping diaphragms are balanced on suction and discharge stroke.
- Evenly distributed pressure over the surface of the diaphragm gives longer life.

**Save Money and Downtime**
- Protects air valve parts from contamination, meaning fewer service parts and less maintenance time.
- Longer flex life of the diaphragm means less frequent routine servicing.

**Leak Detection - See page 43**

<table>
<thead>
<tr>
<th>PUMP MODELS</th>
<th>A Height (inches (mm))</th>
<th>B Width (inches (mm))</th>
<th>C Depth (inches (mm))</th>
<th>D Bottom of Base to Suction (inches (mm))</th>
<th>E Center Line of Discharge (inches (mm))</th>
<th>Connection Style</th>
<th>Pipe Size</th>
<th>Displacement Per Stroke (gal liter)</th>
<th>Max Flow Per Minute (gal liter)</th>
<th>Max Solids Handling (inch (mm))</th>
<th>Max Discharge Pressure (psi (bar))</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST1-A/ST25A</td>
<td>14 13/32 (366)</td>
<td>14 17/32 (369)</td>
<td>14 9/32 (363)</td>
<td>5 1/4 (133)</td>
<td>13 (330)</td>
<td>1” NPT/BSP</td>
<td>1 (25)</td>
<td>.09 (.34)</td>
<td>42 (159)</td>
<td>.25 (6)</td>
<td>125 (8.6)</td>
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<tr>
<td>ST1½-A/ST40A</td>
<td>17 1/2 (445)</td>
<td>16 1/2 (419)</td>
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<td>5 9/32 (134)</td>
<td>15 15/64 (387)</td>
<td>1½” NPT/BSP</td>
<td>1.5 (40)</td>
<td>.30 (1.14)</td>
<td>90 (340)</td>
<td>.25 (6)</td>
<td>125 (8.6)</td>
</tr>
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<td>S1F</td>
<td>20 3/4 (527)</td>
<td>21 3/4 (553)</td>
<td>12 1/16 (306)</td>
<td>2 1/2 (64)</td>
<td>20 3/4 (527)</td>
<td>1” 125# ANSI</td>
<td>1 (25)</td>
<td>.17 (64)</td>
<td>45 (170)</td>
<td>.25 (6)</td>
<td>100 (6.9)</td>
</tr>
<tr>
<td>S15</td>
<td>28 11/16 (729)</td>
<td>28 5/8 (726)</td>
<td>15 1/4 (387)</td>
<td>3 1/2 (89)</td>
<td>28 11/16 (729)</td>
<td>1½” 125# ANSI</td>
<td>1.5 (40)</td>
<td>.36 (1.36)</td>
<td>100 (378)</td>
<td>.47 (12)</td>
<td>100 (6.9)</td>
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<tr>
<td>S20</td>
<td>32 1/16 (814)</td>
<td>29 3/8 (746)</td>
<td>15 1/4 (387)</td>
<td>3 13/16 (96)</td>
<td>32 1/16 (814)</td>
<td>2” 125# ANSI</td>
<td>2 (50)</td>
<td>.36 (1.36)</td>
<td>160 (605)</td>
<td>.66 (17)</td>
<td>100 (6.9)</td>
</tr>
<tr>
<td>S30</td>
<td>40 5/8 (1032)</td>
<td>37 15/16 (964)</td>
<td>19 5/8 (496)</td>
<td>4 7/8 (124)</td>
<td>40 5/8 (1032)</td>
<td>3” 125# ANSI</td>
<td>3 (80)</td>
<td>.9 (3.41)</td>
<td>238 (901)</td>
<td>.71 (18)</td>
<td>100 (6.9)</td>
</tr>
</tbody>
</table>

All Dimensions *± 1/8 (3)
LEAK DETECTION OPERATING PRINCIPLE

Electronic Leak Detection

How electronic leak detection works.

At a point the pumping diaphragm fails, pumped liquid enters the spill chamber displacing driver fluid. The leak detector, working on the principle of conductance, senses the conductivity change. This activates a warning light on the control box. The device can also be wired into the pump user’s existing system, for an audible or visual alarm, or pump shut-down response. It is important to specify an appropriate drive fluid which is both chemically compatible with the pumped fluid and displays the opposite conductance properties. Polarity of the leak detector can be set to sense conductive or non-conductive fluid. If a leak occurs, pumpage is contained in the spill chamber. The pump will continue to work, and in many cases, repairs can be done when the batch is completed. The air valve and work environment are protected.

Visual Leak Detection

How visual leak detection works.

At a point the pumping diaphragm fails, pumped liquid enters the spill chamber, displacing driver fluid. The exchange of pumpage and driver fluid displays a color change in the sight tube, giving a visible signal. Driver fluid should be chemically compatible with the pumped fluid, with an obvious difference in color. In the event a leak occurs, pumpage is contained in the spill chamber. The pump will continue to work, and in many cases, repairs can be done when the batch is completed. The air valve and work environment are protected.

Electronic Leak Detector: Working on the principle of conductance, this monitor can be wired for visual, audible or pump shut-down response. The electronic leak detector is an optional accessory which can be installed on all models.

Visual Leak Detector: A sight tube style leak detector is installed on each driver chamber. If a pumping diaphragm break occurs, liquid in the sight tube changes color.

Mechanical Leak Detector: When a leak chemically attacks an internal o-ring on this detector, it actuates a plunger. This opens an air valve, which in turn activates a customer-supplied solenoid (or similar device) to trigger a signal.
CONTAINMENT DUTY BALL

ST1-A Metallic Performance Curve

ST1½-A Metallic Performance Curve

S1F Non-Metallic Performance Curve

Performance based on water at ambient temperature.
Metallic Containment duty pumps and tranquilizers installed in a chemical processing plant.
Standard Duty Metallic Pumps are ideally suited for intermittent/on-demand, portable, moderately abrasive fluids, and suspended solids. Standard duty metallic pumps are constructed in Aluminum, Cast Iron, Stainless Steel and Alloy C with elastomer TPE (thermal plastic elastomers) and PTFE options in diaphragms and check valves.

NOTE: Pumps are only ATEX Compliant when ordered with wetted option C (Conductive Polypropylene) or wetted option V (Conductive PVDF), non-wetted option C (Conductive Polypropylene), pump options 6 or 7, and kit options 00, P1, E1, E3, E5, E7, E8 or E9. All options must be included to meet ATEX Compliance.

Metallic standard duty pumps handling suspended solids in an industrial waste treatment operation.
DIMENSIONAL DETAIL

Metallic standard duty pumps installed for exterior sump pumping requirements.

<table>
<thead>
<tr>
<th>PUMP MODELS</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Pipe Size</th>
<th>Displacement Per Stroke</th>
<th>Max Flow Per Minute</th>
<th>Max Solids Handling</th>
<th>Max Discharge Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Height</td>
<td>Width</td>
<td>Depth</td>
<td>Bottom of Base to Suction</td>
<td>Center Line of Discharge</td>
<td>Connection Style</td>
<td>inches (mm)</td>
<td>gal (liter)</td>
<td>inch (mm)</td>
<td>psi (bar)</td>
</tr>
<tr>
<td>E02</td>
<td>5 13/16 (148)</td>
<td>7 7/16 (189)</td>
<td>4 3/8 (111)</td>
<td>5/8 (16)</td>
<td>5 13/32 (138)</td>
<td>1/4&quot; NPT</td>
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<td>.003 (.01)</td>
<td>.079 (2)</td>
<td>125 (8.6)</td>
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<tr>
<td>S05 AL</td>
<td>11 1/2 (292)</td>
<td>10 1/4 (260)</td>
<td>7 1/16 (179)</td>
<td>1 5/16 (33)</td>
<td>11 1/2 (292)</td>
<td>1&quot; MNPT</td>
<td>.5 (13)</td>
<td>.026 (.098)</td>
<td>15 (57)</td>
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<tr>
<td>S05 SS</td>
<td>10 3/8 (264)</td>
<td>10 1/4 (260)</td>
<td>7 1/16 (179)</td>
<td>1 5/16 (33)</td>
<td>9 23/32 (247)</td>
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<td>.026 (.098)</td>
<td>15 (57)</td>
<td>125 (8.6)</td>
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<td>S1F AL / CI</td>
<td>12 23/32 (323)</td>
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<td>10 3/8 (264)</td>
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<td>11 27/32 (301)</td>
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<td>.11 (.42)</td>
<td>45 (170)</td>
<td>25 (6)</td>
</tr>
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<td>S1F SS</td>
<td>12 27/32 (328)</td>
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<td>10 3/8 (264)</td>
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<td>11 31/32 (304)</td>
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<td>25 (6)</td>
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<tr>
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<td>16 21/32 (423)</td>
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<td>1 29/32 (49)</td>
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<td>1 1/2&quot; NPT</td>
<td>1.5 (40)</td>
<td>.41 (1.55)</td>
<td>106 (401)</td>
<td>25 (6)</td>
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<tr>
<td>S15 SS</td>
<td>21 21/32 (550)</td>
<td>16 21/32 (423)</td>
<td>12 23/6 (314)</td>
<td>1 31/32 (50)</td>
<td>20 3/8 (518)</td>
<td>1 1/2&quot; NPT</td>
<td>1.5 (40)</td>
<td>.41 (1.55)</td>
<td>106 (401)</td>
<td>25 (6)</td>
</tr>
<tr>
<td>S20 AL / CI</td>
<td>26 5/16 (669)</td>
<td>16 7/8 (428)</td>
<td>12 19/32 (320)</td>
<td>1 7/8 (48)</td>
<td>24 5/8 (625)</td>
<td>2&quot; NPT</td>
<td>2 (50)</td>
<td>.42 (1.59)</td>
<td>150 (567)</td>
<td>25 (6)</td>
</tr>
<tr>
<td>S20 SS</td>
<td>26 5/16 (669)</td>
<td>16 7/8 (428)</td>
<td>12 19/32 (320)</td>
<td>2 (51)</td>
<td>24 3/4 (629)</td>
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<td>2 (50)</td>
<td>.42 (1.59)</td>
<td>150 (567)</td>
<td>25 (6)</td>
</tr>
<tr>
<td>S30 Al/CI</td>
<td>32 1/16 (814)</td>
<td>19 21/32 (499)</td>
<td>15 3/4 (400)</td>
<td>2 11/32 (60)</td>
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<td>.38 (9.5)</td>
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<td>15 3/4 (400)</td>
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<td>30 31/32 (767)</td>
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<td>3 (80)</td>
<td>.94 (3.56)</td>
<td>238 (901)</td>
<td>.38 (9.5)</td>
</tr>
</tbody>
</table>

All Dimensions +/- 1/8 (3)

WWW.SANDPIPERPUMP.COM
Permanently installed metallic standard duty pumps in an interior chemical industry sumping installation.
**Standard Duty Non-Metallic Pumps** are ideally suited for highly corrosive fluids, intermittent/on-demand, portable, low abrasive fluids, and suspended solids. Standard duty non-metallic pumps are constructed in Polypropylene, PVDF, Conductive Acetal and Conductive Polypropylene with TPE (thermal plastic elastomers) and PTFE options in diaphragms and check valves.

*ATEX 100a Compliance to EC Directive 94/9/EC for use of equipment in potentially explosive environments.*
## Dimensional Detail

- Distributor fabricated portable filtration cart with standard duty non-metallic pump.
- Standard Duty Polypropylene pumps installed for chemical processing.

### PUMP MODELS

<table>
<thead>
<tr>
<th>Model</th>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
<th>Suction Bottom to Center Line of Discharge</th>
<th>Connection Style</th>
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<tbody>
<tr>
<td>PB½-A</td>
<td>7 13/16 (198)</td>
<td>7 1/2 (140)</td>
<td>3/4 (19)</td>
<td>7 13/16 (198)</td>
<td>½” MNPT</td>
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<tr>
<td>S05</td>
<td>11 5/16 (287)</td>
<td>10 1/8 (257)</td>
<td>1 3/8 (35)</td>
<td>11 5/16 (287)</td>
<td>1” MNPT</td>
</tr>
<tr>
<td>S07T*</td>
<td>13 11/32 (339)</td>
<td>11 13/16 (300)</td>
<td>1 13/16 (46)</td>
<td>13 11/32 (339)</td>
<td>1 1/2” MNPT</td>
</tr>
<tr>
<td>S07</td>
<td>13 11/32 (339)</td>
<td>11 13/16 (300)</td>
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<td>1 1/2” MNPT</td>
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<tr>
<td>S10</td>
<td>13 13/16 (351)</td>
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<td>1” 1 1/4” ANSI</td>
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<tr>
<td>S15</td>
<td>21 (533)</td>
<td>17 (433)</td>
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<td>1” 1/4” ANSI</td>
</tr>
<tr>
<td>S1F</td>
<td>21 (533)</td>
<td>17 (433)</td>
<td>2 1/2 (64)</td>
<td>21 (533)</td>
<td>1” 1/4” ANSI</td>
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<tr>
<td>S15</td>
<td>23 1/4 (584)</td>
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<tr>
<td>S20</td>
<td>32 1/4 (819)</td>
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<td>2” 1 1/4” ANSI</td>
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<tr>
<td>S30</td>
<td>40 5/8 (1032)</td>
<td>33 3/8 (848)</td>
<td>18 1/4 (464)</td>
<td>40 5/8 (1032)</td>
<td>3” 1/4” ANSI</td>
</tr>
</tbody>
</table>

### Dimensions

- All Dimensions ± 1/8 (3)
- *T = Trihedral

### OTHER INFORMATION

- Standard Duty Polypropylene pumps installed for chemical processing.
- 90° - 180° rotation

### Diagram

- Diagram of pump model showing dimensions and connections.
S07/S10 Non-Metallic Performance Curve

PB¼-A Non-Metallic Performance Curve

S07T Trihedral Non-Metallic Performance Curve

S05 Non-Metallic Performance Curve

Performance based on water at ambient temperature.
Air-powered single diaphragm high pressure metallic pumps deliver discharge pressure twice the inlet pressure, up to 250 PSI (17 BAR). Designed for filter press feed and applications requiring higher discharge pressures. Available in Aluminum, Cast Iron and Stainless Steel with various elastomer options.

<table>
<thead>
<tr>
<th>PUMP MODELS</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Connection Style</th>
<th>Pipe Size</th>
<th>Displacement Per Stroke</th>
<th>Max Flow Per Minute</th>
<th>Max Solids Handling</th>
<th>Max Discharge Pressure</th>
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<tr>
<td></td>
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<td>inches (mm)</td>
<td>inches (mm)</td>
<td>inches (mm)</td>
<td>inches (mm)</td>
<td>inch (mm)</td>
<td>gal (liter)</td>
<td>gal (liter)</td>
<td>inch (mm)</td>
<td>psi (bar)</td>
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<tr>
<td>EH2-M</td>
<td>25 (635)</td>
<td>25 13/16 (656)</td>
<td>11 3/4 (298)</td>
<td>2 3/16 (56)</td>
<td>25 (635)</td>
<td>&quot;&quot; NPT 2&quot;&quot;</td>
<td>(50) .30</td>
<td>1.1</td>
<td>62 (235) .25</td>
<td>6</td>
<td>250 (17.2)</td>
</tr>
<tr>
<td>SH2-M</td>
<td>18 9/16 (471)</td>
<td>26 7/8 (683)</td>
<td>11 3/8 (289)</td>
<td>11 15/32 (291)</td>
<td>5 11/32 (136)</td>
<td>&quot;&quot; NPT 2&quot;&quot;</td>
<td>(50) .30</td>
<td>1.1</td>
<td>62 (235) .25</td>
<td>6</td>
<td>250 (17.2)</td>
</tr>
</tbody>
</table>

All Dimensions ±1/8 (3)

EH2-M & SH2-M Performance Curve
Blagdon 1” & 2” High Pressure Pumps provide enhanced power in applications where pressure is paramount and flow rate is an issue. Using two air chambers to double the air per stroke, these pumps achieve discharge pressure up to 238 pounds per square inch with flow rates as high as 30 gallons per minute for N25 and as high as 90 gallons per minute with N50.

The Blagdon HP Pump’s full flow design incorporates an additional air chamber to deliver higher flow rates with less pulsation, so there’s less wear on pipes and fittings. In addition, the pump can start at zero head pressure with no damage to diaphragms and no need for a separate fill pump.

The pumps are available in either aluminum or stainless steel. It features a non-stalling, non-icing air valve system with shoe-valve technology to eliminate blow-by.

<table>
<thead>
<tr>
<th>PUMP MODELS</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Pipe Size</th>
<th>Displacement Per Stroke</th>
<th>Max Flow Per Minute</th>
<th>Max Solids Handling</th>
<th>Max Discharge Pressure</th>
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<tr>
<td></td>
<td>inch (mm)</td>
<td>inch (mm)</td>
<td>inch (mm)</td>
<td>inch (mm)</td>
<td>inch (mm)</td>
<td>inch (mm)</td>
<td>gal (liter)</td>
<td>gal (liter)</td>
<td>inch (mm)</td>
<td>psi (bar)</td>
</tr>
<tr>
<td>N50</td>
<td>24.41 (620)</td>
<td>28.70 (729)</td>
<td>13.07 (332)</td>
<td>3.66 (93)</td>
<td>22.95 (583)</td>
<td>1” NPT</td>
<td>2 (50)</td>
<td>.5 (1.9)</td>
<td>90 (341)</td>
<td>.125 (3)</td>
</tr>
<tr>
<td>N25</td>
<td>15.94 (405)</td>
<td>18.27 (464)</td>
<td>11.02 (280)</td>
<td>1.97 (50)</td>
<td>14.95 (380)</td>
<td>1” NPT</td>
<td>1 (25)</td>
<td>.13 (.5)</td>
<td>30 (114)</td>
<td>.125 (3)</td>
</tr>
</tbody>
</table>

All Dimensions *1/-1/8 (3)
Built-to-order, multi-pump systems combine a high volume fill pump with a high pressure feed pump. Frequently used for filter press feed applications, the systems produce operating pressures to 250 PSI (17 BAR). This results in shortened press cycles, drier cake and less costly disposal.

**BASE SYSTEMS**

040.010.000. consists of:
(1) S20W1INCANS100.
(1) EH2-M, TN-4-I
Filter/Regulator (1) 020.052.000.
Filter/Regulator (1) 020.051.000.

Includes base & piping with 2” flange suction & discharge connections.

040.011.000. consists of:
(1) S30W1INCANS100.
(1) EH2-M, TN-4-I
Filter/Regulator (1) 020.052.000.
Filter/Regulator (1) 020.051.000.

Includes base & piping with 3” flange suction & discharge connections.

040.003.000. consists of:
(1) SA2-A, DA-5-II
(1) SH2-M, DN-7-I
Filter/Regulator (1) 020.052.000.
Filter/Regulator (1) 020.051.000.

Includes base & piping with 2” flange suction & discharge connections.

040.004.000. consists of:
(1) SA3-M, DA-2-II
(1) SH2-M, DN-7-I
Filter/Regulator (1) 020.052.000.
Filter/Regulator (1) 020.051.000.

Includes base & piping with 3” flange suction & discharge connections.

**PLEASE CONSULT FACTORY FOR:**
- LEAD TIME
- PRICING; AND
- COMBINATIONS OF PUMPS FOR OTHER SYSTEMS
Non-Clog Wastewater Pumps are fitted with swing check valves and easy access clean-outs. The pumps are designed specifically for slurry and solids-laden materials. Flap valves allow passage of suspended, pipe-size solids and stringy material. Constructed of cast iron and durable epoxy coating inside and out.

### Performance Curves

**W09 Performance Curve**

**W15 Performance Curve**

### Technical Specifications

#### Pump Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimensions</th>
<th>Connection</th>
<th>Pipe Size</th>
<th>Displacement Per Stroke</th>
<th>Max Flow Per Minute</th>
<th>Max Solids Handling</th>
<th>Max Discharge Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>W09-2</td>
<td>23 3/4 (608) x 28 1/4 (724) x 19 3/4 (506)</td>
<td>2&quot; ANSI</td>
<td>2 (50)</td>
<td>1.43 (1.60)</td>
<td>140 (530)</td>
<td>2 (50)</td>
<td>125 (8.6)</td>
</tr>
<tr>
<td>W09-3</td>
<td>24 1/2 (627) x 28 1/4 (724) x 19 3/4 (506)</td>
<td>3&quot; ANSI</td>
<td>3 (80)</td>
<td>1.43 (1.60)</td>
<td>140 (530)</td>
<td>2 (50)</td>
<td>125 (8.6)</td>
</tr>
<tr>
<td>W15-3</td>
<td>31 1/2 (800) x 44 1/2 (1130) x 21 1/2 (546)</td>
<td>3&quot; ANSI</td>
<td>3 (80)</td>
<td>1.23 (4.66)</td>
<td>260 (988)</td>
<td>3 (76)</td>
<td>125 (8.6)</td>
</tr>
<tr>
<td>W15-4</td>
<td>32 1/4 (819) x 44 1/2 (1130) x 21 1/2 (546)</td>
<td>4&quot; ANSI</td>
<td>4 (100)</td>
<td>1.23 (4.66)</td>
<td>260 (988)</td>
<td>3 (76)</td>
<td>125 (8.6)</td>
</tr>
</tbody>
</table>

All Dimensions ±1/8 (3)
**UL: Underwriters Laboratory**

UL (Underwriters Laboratory) Pumps are designed to meet UL79 standards for diaphragm pumps handling flammable liquids. All Aluminum construction with approved Nitrile or Virgin PTFE UL elastomers. Fully groundable to prevent static discharge.

### U1F Performance Curve

![U1F Performance Curve](image)

### U1F Pump Models

<table>
<thead>
<tr>
<th>PUMP MODELS</th>
<th>A  (Height)</th>
<th>B  (Width)</th>
<th>C  (Depth)</th>
<th>D  (Bottom of Base to Suction)</th>
<th>E  (Center Line of Discharge)</th>
<th>Connection Style</th>
<th>Pipe Size</th>
<th>Displacement Per Stroke (gal/liter)</th>
<th>Max Flow Per Minute (gal/liter)</th>
<th>Max Solids Handling</th>
<th>Max Discharge Pressure (psi/bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1F</td>
<td>12 23/32 (323)</td>
<td>10 1/4 (260)</td>
<td>10 3/8 (264)</td>
<td>1 3/32 (28)</td>
<td>11 27/32 (301)</td>
<td>1&quot; NPT</td>
<td>1 (25)</td>
<td>.11 (.42)</td>
<td>45 (170)</td>
<td>.25 (6)</td>
<td>125 (8.6)</td>
</tr>
</tbody>
</table>

All Dimensions *± 1/8 (3)
The PortaPump® Submersible, Battery-Powered Pump operates using any 12-volt car or truck battery. It comes equipped with cables and battery clips. Extremely portable, the pump weighs only 33 pounds (15kg) and can fit through openings as small as 10" (25cm). Electrically safe and whisper quiet.

The SludgeMaster™ Submersible, Air-Powered Trash Pump handles mud, leaves, twigs, sand, sludge, trash-laden water and soft solids to 1½" (3.8cm). High capacity, low head. The pump weighs only 59 pounds (26kg), and can fit through an opening as small as 14" (35cm). Sturdy construction for rough handling and long life. Optional rock screen available.

### PUMP MODELS

<table>
<thead>
<tr>
<th>PUMP MODELS</th>
<th>Pipe Size</th>
<th>Max Flow Per Minute</th>
<th>Max Solids Handling</th>
<th>Max Discharge Height</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inches (mm)</td>
<td>gal (liters)</td>
<td>Inches (mm)</td>
<td>feet (m)</td>
</tr>
<tr>
<td>SPA1½-E3</td>
<td>1.5 (40)</td>
<td>43 (163)</td>
<td>1/16 (1)</td>
<td>25 (7.6)</td>
</tr>
<tr>
<td>SMA3-A</td>
<td>3 (80)</td>
<td>300 (1140)</td>
<td>1.5 (40)</td>
<td>65 (19.8)</td>
</tr>
</tbody>
</table>

### Performance Curves

#### SPA1½-E

- **Performance Curve**

#### SMA3-A

- **Performance Curve**

---

**Note:** This performance based on water air consumption.
USDA: United States Department of Agriculture

USDA certified ball check valve pump in a clean-in-place, sanitary piping installation.
**DSB1-A** Designed to meet USDA (Dairy Division) Standards. Must be fitted with Electronic Leak Detector to maintain Dairy Approval. Leak Detector purchased separately.

**SSB1-A** Designed to meet USDA Standards. 1½" (38mm) Ball Valve, 0 to 54 GPM (204 liters) Handles solids to ¼" (6mm), Top Discharge

**SSB2-A** Designed to meet USDA Standards, 2" (50.8mm) Ball Valve, 0 to 125 GPM (473 liters) Handles solids to ¼" (6mm), Top Discharge

**SSA2-A** Designed to meet USDA Standards. 2½" (63.5mm) Flap Valve, 0 to 150 GPM (570 liters) Handles solids to 1½" (27.4mm), Top or Bottom Discharge

**SET1-A** Sanitary Pump designed to meet USDA Standards. 1" (25.4mm) Ball Valve, 0 to 54 GPM (204 liters) Handles solids to ¼" (6mm), Top Discharge

**SET2-A** Sanitary Pump designed to meet USDA Standards. 2" (50.8mm) Ball Valve, 0 to 123 GPM (465 liters) Handles solids to ¼" (6mm), Top Discharge

**Electronic Leak Detector** - This leak detector works on the principle of conductance, sensing liquid or condensation entering the air side of the pump. It is installed through a boss on the inner chambers. A probe senses pooled conductive liquid, producing a low current (1.2 volt DC), which signals a control unit. Indicator lights signal not only contamination, but also which side is tainted. The control unit can be easily wired to an audible alarm or pump shutdown mechanism if needed. Modular, water-tight construction.

Sensitivity range is adjustable from 500 ohm (2000 micro mho) to 100,000 ohm (10 micro mho). Available for 115V (032.017.000) and 220V (032.018.000) power supply. This unit must be purchased separately.

**Materials of Construction** - Wetted parts of these Meat/Poultry* pumps are electropolished 316 and 302/304 Stainless Steel. Non-wetted parts are electroless nickel-plated aluminum and polypropylene. All are fitted with food grade, white nitrile elastomers. The Dairy* pumps have mechanically-polished 316 Stainless Steel wetted parts, and must be fitted with the Warren Rupp® Electronic Leak Detector to maintain Dairy standards.

*Designed to meet USDA Standards.
**SPECIAL DUTY - FDA COMPLIANT PUMPS**

**FDA: Food & Drug Administration**

FDA Materials Compliant Pumps are ideally suited for a variety of food processing, pharmaceutical and cosmetic industry applications. The pumps are available in 1" through 3" ball check valve designs and a 2" (line size solids handling) flap check valve design. Variable flow capacities across the range are 0–235 gallons per minute. These special duty pumps are constructed of FDA material compliant components of Stainless Steel (wetted castings) and a selection of FDA Santoprene, FDA Nitrile and PTFE diaphragms, check valves and valve seats. Standard non-wetted components are white epoxy coated Aluminum with stainless steel hardware. 1", 1½" and 2" pumps are offered with sanitary clamp fittings and 3" pumps are offered with an ANSI flange.

<table>
<thead>
<tr>
<th>PUMP MODELS</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Connection Style</th>
<th>Sanitary Clamp</th>
<th>Pipe Size</th>
<th>Displacement Per Stroke</th>
<th>Max Flow Per Minute</th>
<th>Max Solids Handling</th>
<th>Max Discharge Pressure</th>
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<tr>
<td></td>
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<td>inches (mm)</td>
<td>inches (mm)</td>
<td>inch (mm)</td>
<td>gal (liter)</td>
<td>gal (liter)</td>
<td>inch (mm)</td>
<td>psi (bar)</td>
<td></td>
<td></td>
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<tr>
<td>TSA2-A</td>
<td>20 13/16 (529)</td>
<td>21 1/4 (559)</td>
<td>13 (335)</td>
<td>2 9/16 (55)</td>
<td>17 9/16 (447)</td>
<td>2½&quot; Clamp</td>
<td>2 (50)</td>
<td>.43 (1.60)</td>
<td>140 (530)</td>
<td>2 (50)</td>
<td>125 (8.6)</td>
<td></td>
</tr>
<tr>
<td>T1F</td>
<td>12 31/32 (326)</td>
<td>10 1/4 (260)</td>
<td>10 3/8 (258)</td>
<td>1 7/32 (31)</td>
<td>11 31/32 (304)</td>
<td>1⅛&quot; Clamp</td>
<td>1 (25)</td>
<td>.11 (.42)</td>
<td>45 (170)</td>
<td>.25 (6)</td>
<td>125 (8.6)</td>
<td></td>
</tr>
<tr>
<td>T15</td>
<td>21 13/16 (554)</td>
<td>16 21/32 (423)</td>
<td>12 23/32 (314)</td>
<td>1 31/32 (50)</td>
<td>20 3/8 (518)</td>
<td>2&quot; Clamp</td>
<td>1.5 (40)</td>
<td>.41 (1.55)</td>
<td>106 (401)</td>
<td>.25 (6)</td>
<td>125 (8.6)</td>
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</tr>
<tr>
<td>T20</td>
<td>26 9/16 (674)</td>
<td>16 7/8 (428)</td>
<td>12 19/32 (320)</td>
<td>2 (51)</td>
<td>24 3/4 (629)</td>
<td>2½&quot; Clamp</td>
<td>2 (50)</td>
<td>.42 (1.59)</td>
<td>150 (567)</td>
<td>.25 (6)</td>
<td>125 (8.6)</td>
<td></td>
</tr>
<tr>
<td>T30</td>
<td>32 9/32 (820)</td>
<td>19 21/32 (499)</td>
<td>15 3/4 (400)</td>
<td>4 7/32 (107)</td>
<td>30 27/32 (808)</td>
<td>3&quot; # FF ANSI</td>
<td>3 (80)</td>
<td>.94 (3.56)</td>
<td>238 (901)</td>
<td>.38 (9.5)</td>
<td>125 (8.6)</td>
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</tr>
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</table>

All Dimensions *± 1/8 (3)
T30 FDA Material compliant pump cart system for wine industry applications.

**MODEL S30 Metallic Performance Curve**

Performance based on water at ambient temperature.

<table>
<thead>
<tr>
<th>CAPACITY</th>
<th>Liters per minute</th>
<th>U.S. Gallons per minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIR CONSUMPTION</td>
<td>SCFM (MPH)</td>
<td>NPSHR</td>
</tr>
<tr>
<td>HEAD</td>
<td>BAR</td>
<td>PSI</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>100</td>
<td>170</td>
<td>100</td>
</tr>
<tr>
<td>20(34)</td>
<td>0.34</td>
<td>2.25</td>
</tr>
<tr>
<td>40(68)</td>
<td>0.68</td>
<td>4.54</td>
</tr>
<tr>
<td>60(102)</td>
<td>1.02</td>
<td>6.83</td>
</tr>
<tr>
<td>80(136)</td>
<td>1.36</td>
<td>9.12</td>
</tr>
<tr>
<td>100(170)</td>
<td>1.70</td>
<td>10.41</td>
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**MODEL S15 Metallic Performance Curve**

Performance based on water at ambient temperature.

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<th>U.S. Gallons per minute</th>
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</thead>
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<td>AIR CONSUMPTION</td>
<td>SCFM (MPH)</td>
<td>NPSHR</td>
</tr>
<tr>
<td>HEAD</td>
<td>BAR</td>
<td>PSI</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10(17)</td>
<td>0.17</td>
<td>1.14</td>
</tr>
<tr>
<td>20(34)</td>
<td>0.34</td>
<td>2.25</td>
</tr>
<tr>
<td>40(68)</td>
<td>0.68</td>
<td>4.54</td>
</tr>
<tr>
<td>60(101.9)</td>
<td>1.019</td>
<td>6.83</td>
</tr>
<tr>
<td>80(135.9)</td>
<td>1.359</td>
<td>9.12</td>
</tr>
<tr>
<td>100(169.9)</td>
<td>1.699</td>
<td>10.41</td>
</tr>
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</table>

**MODEL S1F Metallic Performance Curve**

Performance based on water at ambient temperature.

<table>
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<th>CAPACITY</th>
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<th>U.S. Gallons per minute</th>
</tr>
</thead>
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<td>AIR CONSUMPTION</td>
<td>SCFM (MPH)</td>
<td>NPSHR</td>
</tr>
<tr>
<td>HEAD</td>
<td>BAR</td>
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<td>0.34</td>
<td>2.25</td>
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<td>40(68)</td>
<td>0.68</td>
<td>4.54</td>
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<tr>
<td>60(101.9)</td>
<td>1.019</td>
<td>6.83</td>
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<td>80(135.9)</td>
<td>1.359</td>
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<tr>
<td>100(169.9)</td>
<td>1.699</td>
<td>10.41</td>
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**MODEL S20 Metallic Performance Curve**

Performance based on water at ambient temperature.

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<th>U.S. Gallons per minute</th>
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<tr>
<td>AIR CONSUMPTION</td>
<td>SCFM (MPH)</td>
<td>NPSHR</td>
</tr>
<tr>
<td>HEAD</td>
<td>BAR</td>
<td>PSI</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>100</td>
<td>170</td>
<td>100</td>
</tr>
<tr>
<td>20(34)</td>
<td>0.34</td>
<td>2.25</td>
</tr>
<tr>
<td>40(68)</td>
<td>0.68</td>
<td>4.54</td>
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<tr>
<td>60(101.9)</td>
<td>1.019</td>
<td>6.83</td>
</tr>
<tr>
<td>80(135.9)</td>
<td>1.359</td>
<td>9.12</td>
</tr>
<tr>
<td>100(169.9)</td>
<td>1.699</td>
<td>10.41</td>
</tr>
</tbody>
</table>

**MODEL S30 Metallic Performance Curve**

Performance based on water at ambient temperature.

<table>
<thead>
<tr>
<th>CAPACITY</th>
<th>Liters per minute</th>
<th>U.S. Gallons per minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIR CONSUMPTION</td>
<td>SCFM (MPH)</td>
<td>NPSHR</td>
</tr>
<tr>
<td>HEAD</td>
<td>BAR</td>
<td>PSI</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>100</td>
<td>170</td>
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</tr>
<tr>
<td>20(34)</td>
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</tr>
<tr>
<td>100(169.9)</td>
<td>1.699</td>
<td>10.41</td>
</tr>
</tbody>
</table>
PART #475.246.000. CENTER SECTION
+ #475.248.000 = MSB2-A WITH STRAINER BASE
ALSO AVAILABLE MODEL MSB2-B
WITH MANIFOLD MOUNTING FEET #475.249.000

PART #475.039.000

PART #475.040.000

PART #475.046.000

CUTS FOR Suction and Strainer

CUTS FOR Suction tube dimensions.

SPECIAL DUTY - MINE/CONSTRUCTION

HANDLE MOUNTED STANDARD DUTY

SKID MOUNTED SA3-C

CONSULT FACTORY FOR SKID BASE DIMENSIONS.

ROLL CAGE MOUNTED MSA2-B
Natural Gas Operated Pumps are CSA* (Canadian Standards Association) certified for operation using sweet or sour natural gas. The pumps are also compliant with NACE Standard MR0175/ISO15156. The gas pump utilizes Aluminum or 316 Stainless Steel wetted construction with Nitrile or Virgin PTFE diaphragms and check balls. The gas valve is constructed of Aluminum with Nitrile or FKM (fluorocarbon) elastomers. Pumps are fully groundable, preventing static discharge. A Stainless Steel gas valve option is available on G15 to G30 pumps for more corrosive applications.

*CSA is the Canadian Standards Association, an international organization for testing products to ensure public safety, and the governing agency for the Natural Gas Industry.

Burst Pressure to:
500 PSI (34.5 bar)

Temperature Limits:
-10°F (-23°C) to +180°F (82°C)

These stringent tests meet the actual minimum and maximum temperatures that pumps are subjected to in typical gas and oil field applications.
High Pressure Natural Gas Pump

**GH2-M**

(NACE Standard not applicable)

---

### PUMP MODELS

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>Width</td>
<td>Depth</td>
<td>Bottom of Base to Center Line of Suction</td>
<td>Discharge</td>
</tr>
<tr>
<td>inches (mm)</td>
<td>inches (mm)</td>
<td>inches (mm)</td>
<td>inches (mm)</td>
<td>inches (mm)</td>
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<tr>
<td>-------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>GH2-M</td>
<td>25 (635)</td>
<td>25 13/16 (656)</td>
<td>11 3/4 (298)</td>
<td>2 3/16 (56)</td>
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<tr>
<td></td>
<td>25 (635)</td>
<td>2&quot; NPT</td>
<td>2 (50)</td>
<td>.30 (1.1)</td>
</tr>
<tr>
<td></td>
<td>62 (235)</td>
<td>.25 (6)</td>
<td>250 (17.2)</td>
<td></td>
</tr>
</tbody>
</table>

**GH2-M Performance Curve**

**GH2-M** Performance based on water at ambient temperature.

**Model GH2-M Performance Curve**

**CAPACITY**

- **HEAD**
  - 0 - 200 gallons per minute
  - 0 - 300 liters per minute

- **PSI**
  - 0 - 200 psi

- **BAR**
  - 0 - 200 bar

**AIR CONSUMPTION**

- **SCFM (M3/hr)**
  - 30 (51)

**Ave. Displacement per stroke**

- 0.3 gallon (1.1 liter)

---

**All Dimensions +/- 1/8 (3)**

---

**All Dimensions +/- 1/8 (3)**

---

**G05**

11 1/2 (292)

10 1/4 (260)

7 1/16 (179)

1 5/16 (33)

11 1/2 (292)

1" MNPT

.5 (13)

.028 (0.998)

15 (57)

125 (3)

125 (8.6)

**G1F**

12 23/32 (323)

10 1/4 (260)

10 3/8 (264)

1 3/32 (28)

11 27/32 (301)

1" NPT

1 (25)

.11 (.42)

45 (170)

.25 (6)

125 (8.6)

**G15**

21 37/64 (548)

16 21/32 (423)

12 23/32 (314)

1 29/32 (49)

20 5/16 (516)

1" NPT

1.5 (40)

.41 (4.55)

106 (401)

.25 (6)

125 (8.6)

**G20**

26 5/16 (668)

16 7/8 (428)

12 19/32 (320)

1 7/8 (48)

24 5/8 (625)

2" NPT

2 (50)

.42 (1.59)

150 (567)

.25 (6)

125 (8.6)

**G30**

32 1/16 (814)

19 21/32 (499)

15 3/4 (403)

2 11/32 (60)

29 31/32 (761)

3" NPT

3 (80)

.94 (3.56)

238 (901)

.38 (9.5)

125 (8.6)
CSA Certified Natural Gas Regulators

Superior regulation and excellent stability make the 020.057.000 regulator ideal for lower flow applications. Square head adjustment screw allows for easy in-field calibration. The 020.057.000 is available with hand wheel adjustment, output pressure gauge and/or mounting bracket as options.

The 020.058.000 & 020.059.000 contain many of the same characteristics as the 020.060.000, but at a reduced cost. At 110 SCFM (16.5 Mbtu/hr.), the 020.059.000 offers flow rates comparable to current market suppliers. The use of a relief valve is recommended for this product in accordance with NFPA 58.

The 020.060.000 uses a patented balanced pintle design which eliminates unsteady changes in outlet pressure due to inlet pressure fluctuations. The 020.060.000 is a spring opposed, diaphragm-operated, non-relieving regulator. The use of a relief valve is recommended for this product in accordance with NFPA 58.

All of the regulators have vent ports that are tapped ¼” NPT. A pipe or hose fitting can be installed and any natural gas that escapes due to a diaphragm rupture can be diverted to be reclaimed. No gas is vented into the surrounding atmosphere. This feature provides for a safer regulator and is environmentally friendly.

Note: Regulators come standard with gauge. Replacement gauges 020.061.000 are available.

Interceptor (Particulate Removal) 3P U - Aluminum Housing Filter

Applications:
- Particulate removal where very high dirt-holding capacity is required. Safety after filter for desiccant dryer, pore matched prefilter for coalescer or as general use for final instrument air protection.
- Desiccant dryer after filter
- Prefilter for coalescer
- Systems with high concentrations of solid contaminant
- Particulate protection for non-lubricated systems

Natural Gas-Operated Pumps used for Offshore Drilling and Production Applications

Interceptor End Seals: U=Molded urethane. Standard on all 3P pleated cellulose filter elements.
BENEFITS of our One-Piece Diaphragm assembly are:

• TORQUE-FREE – “Spin & Go”– one-piece diaphragm is simply hand turned into position

• Tool-less installation

• Fewer leak paths

• Fewer parts – less inventory

• No outer diaphragm plate abrasion due to trapped fluids

• Diaphragm flex life improvements of 20% to 400% as reported by end users and documented lab testing

• Start-up pressure of less than 10 psi on Warren Rupp One-Piece Diaphragm vs. 25 psi or more on competitive designs

---

<table>
<thead>
<tr>
<th>Part Number (Conversion Kit)*</th>
<th>Inner Diaphragm Plate**</th>
<th>Where Used</th>
<th>Wet End Kit</th>
<th>Where Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>286.116.000 (475.251.000)</td>
<td>612.221.330</td>
<td>S05, S07, S10 Non-Metallic and S05 Metallic</td>
<td>476.202.659</td>
<td>S05 Non-Metallic</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>476.199.659</td>
<td>S05 Metallic</td>
</tr>
<tr>
<td>286.112.000 (475.250.000)</td>
<td>612.218.330</td>
<td>S1F Metallic, SB1</td>
<td>476.034.659</td>
<td>SB1-A</td>
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<td></td>
<td>476.194.659</td>
<td>S1F Metallic</td>
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<tr>
<td>286.118.000 (475.252.000)</td>
<td>612.215.330</td>
<td>HDB2</td>
<td>476.043.659</td>
<td>HDB2</td>
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<tr>
<td>286.116.000 (475.253.000)</td>
<td>612.214.150</td>
<td>S20 Metallic</td>
<td>476.042.659</td>
<td>S20 Metallic</td>
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<td>286.113.000 (475.254.000)</td>
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<td>S15 Metallic</td>
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<td>612.219.150</td>
<td>HDB1½</td>
<td>476.194.659</td>
<td>HDB1½</td>
</tr>
</tbody>
</table>

---

*Conversion Kits include (2) Diaphragms with Studs and (2) Inner Plates  
**Order this Inner Diaphragm Plate when ordering the One-Piece Diaphragm
Quality after market service parts for standard duty pump brands.

- Competitive Pricing
- Prompt Shipment
- All Parts Warranted

Products
Pumper parts has individual parts and repair kits that fit Wilden®, ARO® and Yamada® air-operated double diaphragm pumps. Materials include synthetic rubbers, injection-molded thermoplastics and Teflon®.

Quality
Pumper Parts manufactures to meet or exceed the highest quality standards in the industry. All parts are engineered to perform equal to or better than the original equipment manufacturer's specifications.
SANDPIPER® Air-operated double diaphragm (AODD) pumps are powered by compressed air, nitrogen or natural gas.

The main directional (air) control valve ① distributes compressed air to an air chamber, exerting uniform pressure over the inner surface of the diaphragm ②. At the same time, the exhausting air ③ from behind the opposite diaphragm is directed through the air valve assembly(s) to an exhaust port ④.

As inner chamber pressure (P1) exceeds liquid chamber pressure (P2), the rod ⑤ connected diaphragms shift together creating discharge on one side and suction on the opposite side. The discharged and primed liquid's directions are controlled by the check valves (ball or flap) ⑥ orientation.

The pump primes as a result of the suction stroke. The suction stroke lowers the chamber pressure (P3) increasing the chamber volume. This results in a pressure differential necessary for atmospheric pressure (P4) to push the fluid through the suction piping and across the suction side check valve and into the outer fluid chamber ⑦.

Suction (side) stroking also initiates the reciprocating (shifting, stroking or cycling) action of the pump. The suction diaphragm’s movement is mechanically pulled through its stroke. The diaphragm’s inner plate makes contact with an actuator plunger aligned to shift the pilot signaling valve. Once actuated, the pilot valve sends a pressure signal to the opposite end of the main directional air valve, redirecting the compressed air to the opposite inner chamber.
Recommended Installation Guidelines

For best results, the factory recommends installing the surge suppressor on the discharge side of the pump. Though the more common top-port pump is shown here, this recommendation also applies to bottom, side and dual-port diaphragm pumps.

The compressed air supply line to the surge suppressor should connect before a filter/regulator unit limited to inlet air of 125 PSI. To reduce piping and pump connection stresses, we recommend flexible connections on both inlet and outlet piping and air inlet connections.

The compressed air supply line to the surge suppressor should connect before a filter/regulator unit limited to inlet air of 125 PSI. To reduce piping and pump connection stresses, we recommend flexible connections on both inlet and outlet piping and air inlet connections.
Pump Testing for Quality Assurance

To complete the pump assembly process, ALL PUMPS are tested in the following manner to ensure a quality built SANDPIPER® product:

- Tested at 95 PSI for fluid and air leakage
- Prime from a dry start
- Deadhead the pump (each side) for a specific check for fluid or air leakage (internal and external)
- Observation run cycle at high PSI/cycling rate
  1. Checking for porosity
  2. Rhythmic cycling
  3. Abnormal mechanical noises
  4. Visual inspection
     - Hardware
     - Mating surfaces
     - Pipe threads
     - Wetted materials
- Maximum vacuum check
- Drain and air dry pump

![Pump Assembly - First Pass Yield](chart.png)

Experience Warren Rupp assembler monitors pump performance with pressure and vacuum gauges.
5 - YEAR
Limited Product Warranty

Quality System ISO9001 Certified
Environmental Management Systems ISO14001 Certified

Warren Rupp, Inc. ("Warren Rupp") warrants to the original end-use purchaser that no product sold by Warren Rupp that bears a Warren Rupp brand shall fail under normal use and service due to a defect in material or workmanship within five years from the date of shipment from Warren Rupp's factory. Warren Rupp brands include SANDPIPER®, MARATHON®, PortaPump®, SludgeMaster™ and Tranquilizer®.

- See complete warranty at www.sandpiperpump.com/About/guaranteesandwarranties.html -

Diaphragm Connecting Rod Guarantee

GUARANTEED - NOT TO YIELD UNDER:
Tension • Compression • Bending • Pump Operation

For complete Guarantee conditions, eligibility requirements and liability, visit us at www.sandpiperpump.com/About/guaranteesandwarranties.html

Non-Stalling Air Valve Performance Guarantee

If a Warren Rupp ESADS® (Externally Serviceable Air Distribution System) EVER* fails to operate or restart after shutdown due to “centering” of the main air valve or pilot valve, Warren Rupp will replace the air drive system free of charge. Having supplied this UPGRADED, FIELD PROVEN, RETROFITABLE, air drive system since 1996, the absence of any field failures related to design, gives Warren Rupp the CONFIDENCE to offer the ONLY WRITTEN AIR VALVE PERFORMANCE GUARANTEE IN THE AODD INDUSTRY!

- See complete guarantee at www.sandpiperpump.com/About/guaranteesandwarranties.html -
SANDPIPER® products are marketed worldwide, in every major trading area. Contact your local Factory-Authorized Distributor for pricing and availability. To locate your local distributor, or receive additional information, contact the factory or visit our website. sandpiperpump.com

WITH MORE WAYS THAN ONE...GLOBALLY!
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WARREN RUPP®

Warren Rupp, Inc. • A Unit of IDEX Corporation
800 North Main Street • P.O. Box 1568 • Mansfield, OH 44901-1568 USA
Phone: (419) 524-8388 • Fax: (419) 522-7867
www.sandpiperpump.com • email: info@warrenrupp@idexcorp.com

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