OPERATOR’S MANUAL SB20P-XXX-X
INCLUDING: OPERATION, INSTALLATION AND MAINTENANCE
RELEASED: 4-01-20 (REV: A)

2" SHOCK BLOCKER®
NON-METALLIC PULSATION DAMPENER

READ THIS MANUAL CAREFULLY BEFORE INSTALLING,
OPERATING OR SERVICING THIS EQUIPMENT.

It is the responsibility of the employer to place this information in the hands of the operator. Keep for future reference.

SERVICE KITS
Refer to the Model Description Chart to match the pump material options. 637550-X for repair of the diaphragms, “O” rings and other wear elastomers (see page 4).

PUMP DATA
Models: See Model Description Chart for “-XXX-X”
Pulsation Dampener Type: Non-Metallic
Material: See Model Description Chart
Weight
- SB20P-AXX-X: 41 lbs (18.6 kgs)
- SB20P-BXX-X: 41 lbs (18.6 kgs)
- SB20P-FXX-X: 45 lbs (20.4 kgs)
- SB20P-KXX-X: 43 lbs (19.5 kgs)
- SB20P-LXX-X: 43 lbs (19.5 kgs)
[add 9 lbs SB20R-XXX-X configuration with stainless steel valve body]

Material Inlet / Outlet
- SB20P-AXX-X: 2 - 11-1/2 NPTF- 1
- SB20P-BXX-X: Rp 2 (2 - 11 BSP parallel)
- SB20P-FPS-X: 2” ANSI / DIN Flange Inlet and Outlet
- SB20P-KPS-X: 2” ANSI / DIN Flange Fluid Inlet / NPTF Fluid Outlet
- SB20P-LPS-X: 2” ANSI / DIN Flange Fluid Inlet / BSPP Fluid Outlet

Air Inlet (female): 3/4 - 14 NPT

Maximum Air Inlet Pressure: 120 psig (8.3 bar)
Maximum Material Inlet Pressure: 120 psig (8.3 bar)

Maximum Temperature Limits (diaphragm / seal material)
- E.P.R. / EPDM: -60° to 280° F (-51° to 138° C)
- Nitrile: 10° to 180° F (-12° to 82° C)
- Santoprene*: 40° to 225° F (-40° to 107° C)
- PTFE: 40° to 225° F (4° to 107° C)
- Viton*: 40° to 350° F (-40° to 177° C)

Maximum Fluid Volume
- SB20P-APS-X: 184 in.³ (3.02 lit.)
- SB20P-BPS-X: 184 in.³ (3.02 lit.)
- SB20P-FPS-X: 226 in.³ (3.70 lit.)
- SB20P-KPS-X: 206 in.³ (3.38 lit.)
- SB20P-LPS-X: 206 in.³ (3.38 lit.)
[Volumes same for SB20R-XXX-X configuration]

Dimensional Data: see page 7 and 8

NOTICE: All possible options are shown in the chart, however, certain combinations may not be recommended, consult a representative or the factory if you have questions concerning availability.

MODEL DESCRIPTION CHART

Air Section Material
- P - Polypropylene (Aluminum valve body)
- R - Polypropylene (Stainless Steel valve body)

Fluid Connection
- A - 2 - 11-1/2 NPTF - 1
- B - Rp 2 (2 - 11 BSP parallel)
- F - 2” ANSI / DIN Flange Inlet & Outlet
- K - 2” ANSI / DIN Flange Fluid Inlet / NPTF Fluid Outlet
- L - 2” ANSI / DIN Flange Fluid Inlet / BSPP Fluid Outlet

Fluid Cap Material
- P - Polypropylene
- S - Stainless Steel

Diaphragm Material
- A - Santoprene
- G - Nitrile
- T - PTFE / Santoprene
- V - Viton

Hardware Material
- S - Stainless Steel

Fluid Section Service Kit Selection
- SB20X: 637550-X

EXAMPLE: Model #SB20P-BPS-G
Fluid Section Service Kit # 637550-G
OPERATING AND SAFETY PRECAUTIONS

**WARNING** EXPLOSION HAZARD. Do not exceed maximum fluid inlet pressure of 120 PSI (8.3 bar). Operating at higher pressure can cause explosion, resulting in property damage or severe injury.

**WARNING** USE ONLY WITH COMPRESSED AIR. Do not use bottled gas products to run the pulsation dampener. Unregulated high pressure bottled gas has the potential for overpressurization. Certain gasses, such as Nitrogen, can cause unpredictable results. The pressure source must be regulated.

**WARNING** CHEMICAL COMPATIBILITY HAZARD. Do not use with certain fluids. Incompatible fluids may attack and weaken the housing, causing rupture or explosion, which can result in property damage or severe injury. See manufacturer’s information on fluid compatibility.

**WARNING** DISASSEMBLY HAZARD. Do not disassemble this unit when it is under pressure. Relieve all material pressure in the pumping system before attempting service or disassembly. Disconnect air lines and carefully bleed any pressure off the system. Be certain the system is not maintaining pressure due to a material restriction in the hose, line, dispensing device or the spray or extrusion tip. Failure to relieve pressure, both upstream and downstream, may result in an injury upon disassembly.

**WARNING** HEED WARNINGS AS SHOWN IN “OPERATING AND SAFETY PRECAUTIONS” ABOVE.

**CAUTION** AIR MUST BE SUPPLIED TO THE SHOCK BLOCKER BEFORE APPLYING FLUID PRESSURE. Failure to pressurize with air first can damage the diaphragm.

**CAUTION** ALWAYS RELIEVE THE FLUID PRESSURE BEFORE REMOVING THE AIR PRESSURE. Failure to relieve fluid pressure can damage the diaphragm.

**CAUTION** NOT FOR STRUCTURAL SUPPORT. Do not use this product to support other system components or use as a step. Improper support can result in fracture of the housing, causing damage. Plumbing must be supported to prevent stresses upon it.

**NOTICE** Replacement warning labels are available upon request: “Static Spark & Diaphragm Rupture” pn 94080.

**WARNING** = Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.

**CAUTION** = Hazards or unsafe practices which could result in minor personal injury, product or property damage.

**NOTICE** = Important installation, operation or maintenance information.

OPERATING INSTRUCTIONS

**AIR REQUIREMENTS**
- Supply the unit with clean, dry air.
- A filter capable of filtering out particles larger than 50 microns should be used on the air supply.

**INSTALLATION INSTRUCTIONS**
- Position the shock blocker pulsation dampener as close to the pump discharge as possible (as shown in figure 2).

TYPICAL SYSTEM INSTALLATION

- **Discharge**
- **Shut-off Valve**
- **Back Pressure Gauge (optional)**
- **Check Valve**
- **Support required. (see “Installation Instructions”)**
- **Suction**

Figure 2
GENERAL DESCRIPTION

The ARO® shock blocker pulsation damper is designed to work with 1:1 ratio pumps having an outlet pressure not exceeding 120 PSI (8.3 bar). The shock blocker will effectively reduce material pressure variations, surges and shock to piping and delivery in fluid systems during pump reversal. It can significantly contribute to pulse reduction in low pressure spray applications.

Accurate selection of wetted material will assure longest service life and minimize down time. Fluid section materials available include: polypropylene. For specific fluid compatibility, consult the chemical manufacturer.

The shock blocker uses a single air pressurized, flexible diaphragm working against the fluid line pressure. Several diaphragm material options are available to allow custom matching to the fluid material for best compatibility (refer to the model description chart).

Shock blocker units can also be added in series to provide additional dampening on the material.

Pressure relief through the exhaust port is a normal compensating function of the control valve in the shock blocker. It will automatically adjust itself to the required operating pressure once the material pressure has been applied. The pressure supplied to the shock blocker needs to be equal to the material pressure to provide the proper dampening effect.

AIR AND LUBE REQUIREMENTS

WARNING: EXCESSIVE AIR PRESSURE. Can cause pulsation damper damage, personal injury or property damage.

- A filter capable of filtering out particles larger than 50 microns should be used on the air supply. There is no lubrication required other than the "O" ring lubricant which is applied during assembly or repair.
- If lubricated air is present, make sure that it is compatible with the "O" rings and seals in the air motor section of the pump.

CAUTION: DO NOT EXCEED 120 PSI (8.3 BAR). Operating at higher pressure can cause explosion, resulting in property damage or severe injury.

- Pressure relief through the exhaust port is a normal compensating function of the control valve in the shock blocker. It will automatically adjust itself to the required operating pressure once the material pressure has been applied.
- Operate the system for a few minutes to equalize air and fluid chambers of the pulsation damper.

OPERATION

- Clean and inspect all parts. Replace worn or damaged parts with new parts as required. Lubricate all replacement parts and metallic moving parts with Lubriplate® FML-2 grease upon reassembly.

- Assemble (101) air valve body to (68) air cap.
- Assemble (103) sleeve into the (101) air valve body.
- Grease and assemble two (173) "O" rings to (1) rod.
- Assemble (1) rod to (6) screw.
- Place this assembly into (68) air cap.

- Tighten (131) screws, two (235) tri plates, and two (237) track gaskets, securing (68) air cap. NOTE: Tighten (131) screws to 15 - 20 ft lbs (20.3 - 27.1 Nm). Grease (237) track gasket during assembly.
- Assemble (7) or (7 and 8) diaphragms, (5) back-up washer and (2) stopper to (6) screw. NOTE: For models with PTFE diaphragms: Item (8) Santoprene diaphragm is installed with the side marked "AIR SIDE" towards the pump center body. Install the PTFE diaphragm (7) with the side marked "FLUID SIDE" towards the (15) fluid cap.
- Assembly (1) rod to (6) screw.
- Grease and assemble two (173) "O" rings to (1) rod.
- Place this assembly into (68) air cap.
- Assemble (9) washer and (186) screw into (101) air valve body and thread into (1) rod. Clamp (6) screw in a vise, with (186) screw upward, and tighten (186) screw to 65 - 70 ft lbs (88.1 - 94.9 Nm).
- Remove assembly from the vise and assemble to (15) fluid cap, securing with fourteen (27) screws, (28) washers and (29) nuts. NOTE: Tighten (27) screws to 15 - 20 ft lbs (20.3 - 27.1 Nm).
- Grease and assemble one (11) "O" ring to (4) flange and one (11) "O" ring to (15) fluid cap.
- Assemble two (3 and 4) flanges to (15) fluid cap, securing with eight (26) screws and (28) washers. NOTE: Tighten (26) screws to 15 - 20 ft lbs (20.3 - 27.1 Nm).
- Apply Lubriplate FML-2 grease to threads of (101) air valve body. Apply PTFE tape to threads of (107) reducing bushing and assemble to (101) air valve body.
PARTS LIST / SB20P-XXX-X

**Indicates parts included in 637550-X service kit. Service kit also includes 94276 Lubriplate FML-2 grease packet.**

### DIAPHRAGM OPTIONS SB20P-XXX-X

<table>
<thead>
<tr>
<th>Item</th>
<th>Description (size)</th>
<th>Qty</th>
<th>Polypropylene Part No.</th>
<th>Polypropylene Part No.</th>
<th>SB20P-XXX-A Part No.</th>
<th>SB20P-XXX-G Part No.</th>
<th>SB20P-XXX-T Part No.</th>
<th>SB20P-XXX-V Part No.</th>
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<tbody>
<tr>
<td>8</td>
<td>Diaphragm</td>
<td>(1)</td>
<td>-----</td>
<td>----</td>
<td>----</td>
<td>94330-A [Sp]</td>
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### AIR SECTION PART OPTIONS SB20P-XXX-X

<table>
<thead>
<tr>
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<th>Description (size)</th>
<th>Qty</th>
<th>Material Code</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Backup Washer</td>
<td>(1)</td>
<td>[A] Aluminum</td>
<td>96503</td>
</tr>
<tr>
<td>68</td>
<td>Air Cap</td>
<td>(1)</td>
<td>[P] Polypropylene</td>
<td>97920</td>
</tr>
<tr>
<td>101</td>
<td>Valve Body</td>
<td>(1)</td>
<td>[I] Iron</td>
<td>94839</td>
</tr>
<tr>
<td>107</td>
<td>Reducing Bushing</td>
<td>(1)</td>
<td>[Sp] Santoprene</td>
<td>Y45-22-C</td>
</tr>
<tr>
<td>181</td>
<td>Roll Pin</td>
<td>(2)</td>
<td>[SS] Stainless Steel</td>
<td>Y178-56-S</td>
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### EXTERNAL HARDWARE OPTIONS SB20P-XXX-X

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<th>Material Code</th>
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<tbody>
<tr>
<td>26</td>
<td>Screw (M10 x 1.5 - 6g x 34 mm)</td>
<td>(8)</td>
<td>[SS] Stainless Steel</td>
<td>95925</td>
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<tr>
<td>27</td>
<td>Screw (M10 x 1.5 - 6g x 45 mm)</td>
<td>(14)</td>
<td>[SS] Stainless Steel</td>
<td>95922</td>
</tr>
<tr>
<td>28</td>
<td>Washer (0.406&quot; ID)</td>
<td>(22)</td>
<td>[SS] Stainless Steel</td>
<td>93360-1</td>
</tr>
<tr>
<td>29</td>
<td>Flange Nut (M10 x 1.5 - 6g)</td>
<td>(14)</td>
<td>[SS] Stainless Steel</td>
<td>94992</td>
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</table>

### FLUID CONNECTION / FLUID CAP MATERIAL OPTIONS SB20P-XXX-X

<table>
<thead>
<tr>
<th>Item</th>
<th>Description (size)</th>
<th>Qty</th>
<th>Type</th>
<th>ANSI / DIN Flange Fluid Inlet / and NPTF Fluid Outlet Part No.</th>
<th>ANSI / DIN Flange Fluid Inlet / and BSPP Fluid Outlet Part No.</th>
<th>ANSI / DIN Flange Fluid Inlet and Outlet Part No.</th>
<th>ANSI / DIN Flange Fluid Inlet / and BSPP Fluid Outlet Part No.</th>
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</thead>
<tbody>
<tr>
<td>15</td>
<td>Fluid Cap</td>
<td>(1)</td>
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<td>95855-1 [P]</td>
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<td>95855-1 [P]</td>
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### FLUID CONNECTION / FLUID CAP MATERIAL OPTIONS SB20P-XXX-X

<table>
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<tr>
<th>Item</th>
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<th>Qty</th>
<th>Type</th>
<th>ANSI / DIN Flange Fluid Inlet and Outlet Part No.</th>
<th>ANSI / DIN Flange Fluid Inlet and NPTF Fluid Outlet Part No.</th>
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<tbody>
<tr>
<td>3</td>
<td>Flange</td>
<td>(1)</td>
<td>BSPP</td>
<td>97983-2 [P]</td>
<td>BSPP 97983-1 [P]</td>
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<tr>
<td>4</td>
<td>Flange</td>
<td>(1)</td>
<td>ANSI / DIN</td>
<td>98021 [P]</td>
<td>ANSI / DIN 98021 [P]</td>
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<tr>
<td>15</td>
<td>Fluid Cap</td>
<td>(1)</td>
<td>----</td>
<td>95855-1 [P]</td>
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### COMMON PARTS

<table>
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<th>Qty</th>
<th>Material Code</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rod</td>
<td>(1)</td>
<td>[C] Carbon Steel</td>
<td>94835</td>
</tr>
<tr>
<td>2</td>
<td>Stopper</td>
<td>(1)</td>
<td>[D] Cast Iron</td>
<td>94837</td>
</tr>
<tr>
<td>6</td>
<td>Diaphragm Screw</td>
<td>(1)</td>
<td>[P] Polypropylene</td>
<td>95858-1</td>
</tr>
<tr>
<td>9</td>
<td>Washer</td>
<td>(1)</td>
<td>[SS] Stainless Steel</td>
<td>93065</td>
</tr>
<tr>
<td>70</td>
<td>&quot;O&quot; Ring (3/32&quot; x 5/8&quot; OD)</td>
<td>(4)</td>
<td>[B] Viton</td>
<td>Y325-111</td>
</tr>
<tr>
<td>103</td>
<td>Sleeve</td>
<td>(1)</td>
<td>[Bz] Bronze</td>
<td>94836</td>
</tr>
<tr>
<td>131</td>
<td>Screw (M10 x 1.5 - 6g x 35 mm)</td>
<td>(4)</td>
<td>[B] Viton</td>
<td>98025</td>
</tr>
<tr>
<td>144</td>
<td>&quot;U&quot; Cup (3/16&quot; x 1-3/8&quot; OD)</td>
<td>(1)</td>
<td>[C] Carbon Steel</td>
<td>Y186-51</td>
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</tbody>
</table>

### MATERIAL CODE

- [A] = Aluminum
- [B] = Nitrile
- [Br] = Brass
- [Bz] = Bronze
- [C] = Carbon Steel
- [CI] = Cast Iron
- [Co] = Copper
- [D] = Acetal
- [E] = E.P.R.
- [I] = Iron
- [P] = Polypropylene
- [Sp] = Santoprene
- [SS] = Stainless Steel
- [T] = PTFE
- [V] = Viton
ASSEMBLY TORQUE REQUIREMENTS

NOTE: DO NOT OVERTIGHTEN FASTENERS.

(6) screw, 65 - 70 ft lbs (88.1 - 94.9 Nm).
(26) screws, 15 - 20 ft lbs (20.3 - 27.1 Nm).
(27) screws, 15 - 20 ft lbs (20.3 - 27.1 Nm).
(131) screws, 15 - 20 ft lbs (20.3 - 27.1 Nm).

LUBRICATION / SEALANTS

1. Apply Lubriplate FML-2 grease (94276) to all "O" rings, "U" cups, other elastomers and mating parts.
2. Apply anti-seize compound to threads and bolt and nut flange heads which contact pump case when using stainless steel fasteners.

NOTE: Lubriplate FML-2 is a white food grade petroleum grease.

PARTS LIST / SB20P-XXX-X

<table>
<thead>
<tr>
<th>COLOR CODE</th>
<th>Diaphragm Material</th>
<th>Color</th>
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<tbody>
<tr>
<td>Nitrile</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>Santoprene</td>
<td>Tan</td>
<td></td>
</tr>
<tr>
<td>Santoprene (back-up)</td>
<td>Green</td>
<td></td>
</tr>
<tr>
<td>PTFE</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>Viton</td>
<td>Yellow (-)</td>
<td></td>
</tr>
<tr>
<td>(-) Dash</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 3

View for SB20P-XXX-X (PTFE diaphragm) configuration only.
No dampening effect or erratic performance.
- Check for diaphragm rupture.
- Check for blocked or restricted outlet hoses.
- Check the air supply. Make certain the air pressure to the shock blocker is equal to the fluid pressure.

Constant air leakage:
  from exhaust port.
  - Check for damaged (172 and 173) "O" rings.
  from air cap.
  - Check the tightness of (27) screws.

Air bubbles in product discharge.
- Check connections of the pump’s suction plumbing.
- Check tightness of (6) diaphragm screw.

Fluid leakage:
  from exhaust port.
  - Check for diaphragm rupture.
  from flange.
  - Check for damaged (11) "O" ring.
  - Check the tightness of (26) screws.
  from fluid cap.
  - Check air pressure to the valve block (relieve fluid pressure).
  - Check the tightness of (27) screws.
  - Check for cracks. Discontinue use.
Dimensions shown are for reference only, they are displayed in inches and millimeters (mm).

**Model SB20P-APS-X, SB20P-BPS-X**

- **Material Inlet**
- **Material Outlet**
- **3/4 - 14 NPT Air inlet**
- **2 - 11-1/2 NPTF - 1 or Rp 2 (2 - 11 BSP parallel)**
- **14-5/8” (371 mm)**
- **10-1/2” (267 mm)**
- **20-15/16” (532 mm)**

**Figure 5**

**Model SB20P-FPS-X**

- **Material Inlet**
- **Material Outlet**
- **2” ANSI/DIN Flange**
- **3/4 - 14 NPT Air inlet**
- **14-5/8” (371 mm)**
- **31-7/8” (810 mm)**
- **16” (406 mm)**
- **13-7/8” (352 mm)**

**Figure 6**
DIMENSIONAL DATA

Dimensions shown are for reference only, they are displayed in inches and millimeters (mm).

Model SB20P-KPS-X, SB20P-LPS-X

3/4-14 NPT Air inlet

14-5/8” (371 mm)

Material Inlet

Material Outlet

2" ANSI/DIN Flange

13-7/8” (352 mm)

26-7/16” (672 mm)

10-1/2” (267 mm)

2-11 1/2 NPTF-1 or Rp 2 (2-11 BSP parallel)

Figure 7