

## TROUBLESHOOTING

### Does Not Operate/Gas Applied/Outlet Valve Open

Gas pressure too high  
Outlet tube kinked or restricted  
Operated without fluid, causing excessive dry run  
[piston shaft seized on center body seals - non-repairable]  
Control cover subjected to contaminated gas supply or damaged  
[replace control cover assy and insure clean gas supply]

### Operates-Will not Prime/Outlet Valve Open

Warped/swollen valves or debris in valve seats  
[check fluid compatibility and clean or replace valves as needed]

### Fluid from Exhaust or Fluid in Gas Inlet Tubing

Insure clean gas supply  
Inspect diaphragm/piston assemblies for ruptures  
[replace diaph/piston assy and control cover; check fluid compatibility]

### Air in Inlet and/or Outlet Tubing

Inspect inlet tube/fitting for vacuum leaks  
Inspect inlet fitting o-ring: missing or pinched  
Check for air bubbles in output tubing only  
[inspect diaphragms for ruptures]

### Strokes with Outlet Valve Closed

Check for air trapped in outlet tube or fluid chambers  
[open outlet and purge air and check for vacuum leaks]  
Check for warped outlet valves or debris in valve seats  
[check compatibility and clean/replace valves as needed]  
Inspect center body o-rings and piston shaft for wear  
[piston shaft leaking across seals - non-repairable]

### Gas Blowing Continuously From Exhaust

Control cover subjected to contaminated gas supply or damaged  
[replace control cover assy and insure clean gas supply]

## RETURN POLICY

All Industrial pumps/products **must** be flushed of **any** chemical (ref. OSHA Section 1910.1200 (d)(e)(f)(g)(h)) and hazardous chemicals **must** be labeled/tagged before being shipped\* to SHURFLO for service or warranty consideration. SHURFLO reserves the right to request a Material Safety Data Sheet from the returnee for any pump/product it deems necessary. SHURFLO reserves the right to "disposition as scrap" pumps/products returned which contain unknown fluids. SHURFLO reserves the right to charge the returnee for any and all costs incurred for chemical testing, and proper disposal of components containing unknown fluids. SHURFLO requires this in order to protect the environment and personnel from the hazards of handling unknown fluids.

## LIMITED WARRANTY PROCEDURE

SHURFLO warrants Industrial 5000 series pumps to be free from material and workmanship defects (under normal use and service) for a period of one (1) year from the date of manufacture, or (1) one year use with proof of purchase, not to exceed (2) two years in any event.

The limited warranty will not apply to pumps that were improperly installed, misapplied, or incompatible with fluids or components not manufactured by SHURFLO. SHURFLO will not warrant any pump which is damaged or modified outside the SHURFLO factory.

All Industrial pumps/products **must** be flushed of **any** chemicals before shipping\*. All warranty considerations are governed by SHURFLO's written Return Policy.

Returns are to be shipped postage prepaid to our service center in Elkhart, IN. SHURFLO shall not be liable for freight damage incurred during shipping. Package returns carefully. SHURFLO, 52748 Park Six Ct., Elkhart, IN 46514.

Upon receiving a pump, it will be tested per SHURFLO's test criteria. SHURFLO's obligation under this warranty policy is limited to the repair or replacement of the unit. Pumps found not defective (under the terms of this limited warranty) are subject to charges to be paid by the returnee for the testing and packaging of "tested good" units.

No credit or labor allowances will be given to the returnee for pumps returned as defective. Warranty replacements will be shipped on a freight allowed basis. SHURFLO reserves the right to choose the method of transportation.

This limited warranty is in lieu of all other warranties, expressed or implied, and no other person is authorized to give any other warranty or assume obligation or liability on SHURFLO's behalf. SHURFLO shall not be liable for any labor, damage or other expense, nor shall SHURFLO be liable for any indirect, incidental or consequential damages of any kind incurred by the reason of the use or sale of any defective product or part. This limited warranty covers pumps distributed within the United States of America. Other world market areas should consult with their local distributor for any deviation from this document.

\*Carriers, including U.S.P.S., airlines, UPS, ground freight, etc., require specific identification of any hazardous materials being shipped. Check with your shipping company for specific instructions. Failure to do so may result in substantial penalties.



### SHURFLO

3545 Harbor Gateway South, Ste. 103, Costa Mesa, CA 92626, (800) 854-3218 [www.shurflo.com](http://www.shurflo.com)

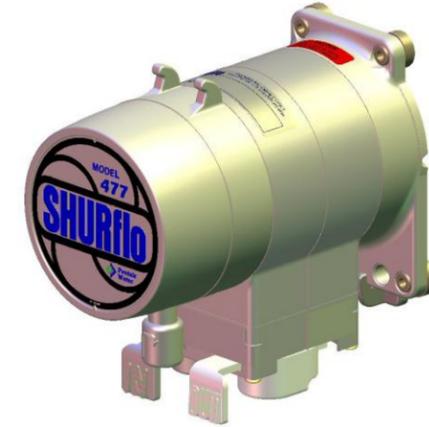
**SHURFLO Europe, Middle East, Africa**

**Pentair Water Belgium bvba**, Industriepark Wolfstee, Toekomstlaan 30, B-2200 Herentals, Belgium, +32-14-283500

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## SHURFLO® Model 477 AODD Pneumatic Pump Installation & Operation Manual



## DESCRIPTION

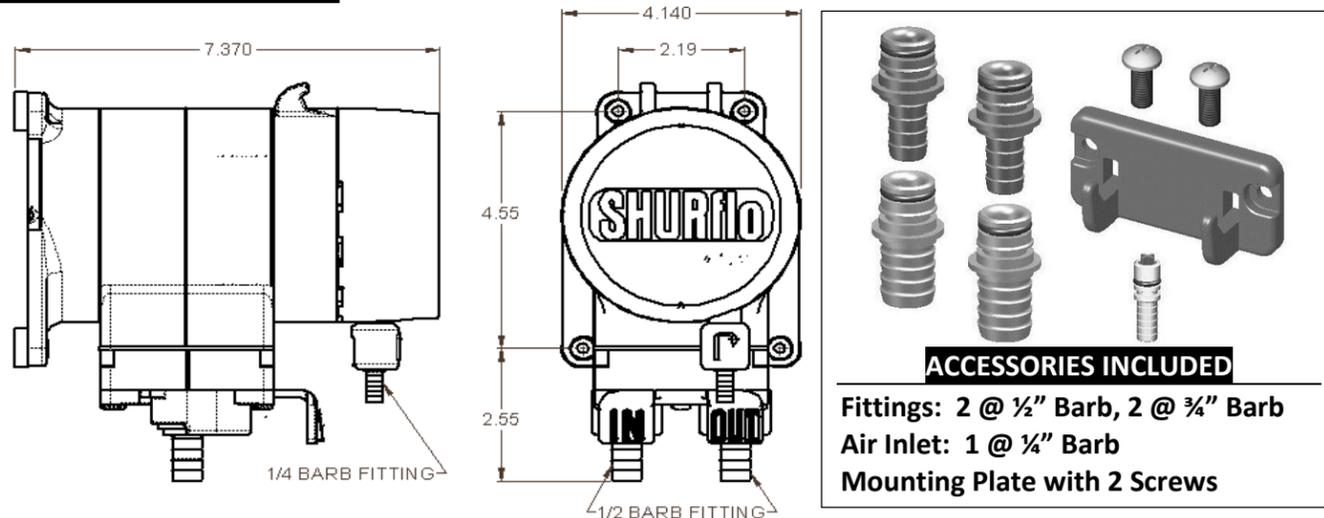
SHURFLO's 477 AODD pump [Air-Operated Double Diaphragm] is designed for the most demanding industrial applications. It employs a dual diaphragm design and pneumatic spool valves to provide exceptionally long life and consistent flow. The 477 series is available in various configurations. Each utilizes specialized elastomers, allowing compatibility with the most caustic or acidic fluids.

## FEATURES

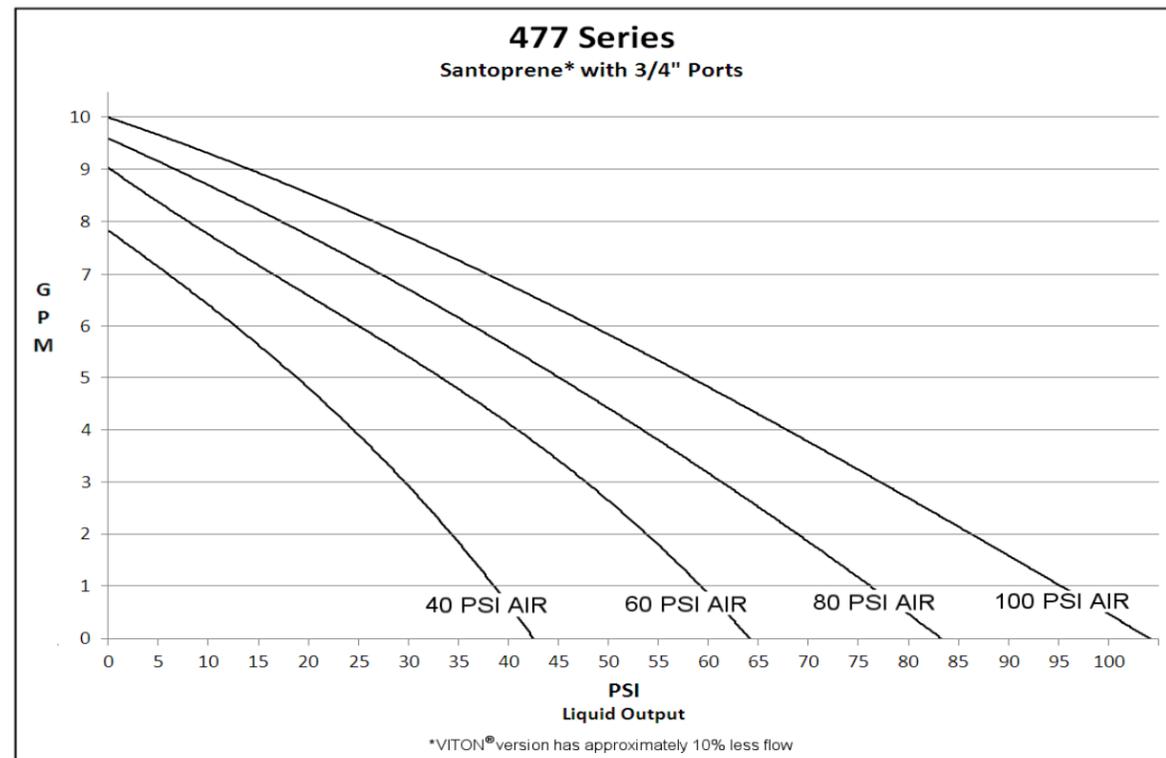
- No Stall, High-efficiency Pneumatic Spool Valves for Long Life
- Up to 10 GPM Open Flow @ 100 PSI Air Pressure [37.8 LPM @ 689 kPa]
- 40–100 PSI Air Pressure Operating Range [275 – 689 kPa]
- Pumps Handle Caustic or Acidic Fluids, Including High-viscosity Fluids
- Santoprene and Viton Models Available
- Industry Standard Mounting and Ports
- Both 1/2" & 3/4" Barbed Liquid Port Fittings Included
- Can Run Dry without Damage

Viton is a registered trademark of DuPont Performance Elastomers L.L.C. Santoprene is a registered trademark of ExxonMobil

## TECHNICAL SPECIFICATIONS



Model	477-400-01 - Santo/EPDM	477-400-02 - Viton
<b>Displacement</b>	4.38 Ounces per Stroke [129.5 Milliliters per Stroke]	3.04 Ounces per Stroke [90 Milliliters per Stroke]
<b>Flow Rate</b>	10 Gallons per Minute Max [37.8 Liters per Minute Max]	9 Gallons per Minute Max [34 Liters per Minute Max]
<b>Power Source</b>	CO <sub>2</sub> , Nitrogen, or Compressed Filtered Air	
<b>Operating Pressure</b>	40PSI Min - 100 PSI Max [2.8 Bar Min - 6.9 Bar Max]	
<b>Temperature Limits</b>	34°F - 120°F [1.1°C - 49°C]	
<b>Suction Lift</b>	15 Inches Hg [85 kPa]. Not intended for dry run	
<b>Particulate Passage</b>	.125 in. [3 mm] round soft particulates max.	
<b>Weight</b>	2.5 Lbs. [1.13 Kgs.]	
<b>Fittings</b>	1/2" and 3/4" Barb [2 of each]	



## WARNING

**DO NOT** pump flammable liquids. Insure that pumps are mounted away from potential ignition sources.

**DO NOT** assume compatibility of the pump with the fluid being used. If the fluid is incorrectly matched to the pump's elastomers, leaks may occur.

Pumps used with harmful chemicals, or operated with CO<sub>2</sub> or Nitrogen **must** be operated in a ventilated area to guard against the possibility of injury due to harmful, or explosive, liquids/vapors. If located in a confined area (basement, closet, etc.) an exhaust fan capable of changing the room air on a continuous basis should be installed.

Fluids subject to freezing **must** be purged from the pump prior to exposure to freezing conditions.

## INSTALLATION GUIDELINES

1. Mount the pump in a dry and adequately ventilated area, away from sun or other extreme environmental conditions.
2. The pump is self-priming and should be mounted at the same level or above the fluid supply. Depending on the fluid viscosity, the inlet suction lift may need to be minimized to prevent loss of performance. In cases where pumps are mounted below the fluid container, take precautions to prevent siphoning, if the tubing or port fitting becomes loose or damaged.

**NOTE:** Restrictions on the inlet may cause the vacuum level to reach the fluid's vapor pressure, causing cavitation, degassing, or vapor lock, depending upon the fluid and inlet condition.

3. Fasten the pump to a vertical surface or wall using the appropriate hardware (not included). Alternately, pump may be mounted using supplied Backing Plate and Hardware. The pump should be positioned with the port fittings pointing down.
4. Use only flexible tubing for the inlet/outlet plumbing and insure compatibility with the fluid.
5. Inlet tubing should be vacuum rated and at minimum 1/2" I.D.
6. Outlet tubing must be rated for high pressure and must meet acceptable PSI rating for the intended system operation, or if regulator failure causes over-pressurization of inlet air pressure.
7. All tubing clamps should be of high quality and have appropriate corrosion resistance for the type of fluid being pumped. Route and fasten the tubing to prevent tubing kinks or pinching. Kinks and pinching can restrict the flow.
8. Air supply tubing must be plumbed with clean (new) 1/4" [6mm], high-pressure, braided tubing. A secondary, low-pressure adjustable regulator should be installed as a back-up in case of primary regulator failure, which may over-pressurize the system.
9. Air compressor must be equipped with adequate particulate and moisture separator. The storage tank should be drained on a regular basis.

**NOTE:** Air supplied to the pump **must** be clean and contain no contaminants (e.g., oil, rust, water). Pump damage due to 'contaminated air' is not covered under warranty.

10. All tubing should be visibly marked at the pump, and along the length of the tubing, to prevent accidental contact with potentially hazardous chemicals contained within the tubing.
11. Protect against particulates entering the pump. If necessary, a 50-mesh strainer is recommended on the inlet to trap particulates or other foreign matter, especially when drawing from open containers.
12. If drawing product from a hard-sided container, vent the container to prevent collapse from vacuum.

## START-UP PROCEDURE

1. Confirm that all tubing connections are properly clamped, fittings are tight, and tubing is not kinked.
2. Insert the inlet tube into fluid container. Open outlet valve to permit trapped air to purge. Adjust gas regulator to 40 PSI [2.8 Bar], allowing the pump to stroke slowly until primed. Operate the pump until all air is purged.
3. Adjust the gas regulator to achieve sufficient backpressure for the desired flow rate. Restrict fluid delivery, increase gas pressure, or both, to achieve a differential across the pump of not more than 5 PSI, while maintaining the stroke rate at, not more than, two strokes per second.
4. **Maximum** static gas pressure to the pump is 100 PSI [6.9 bar], minimum is 40 PSI [2.8 bar]. Most efficient gas usage is at 40 PSI [2.8 Bar].

## FLUSHING

If pump is not to be used for an extended period of time, flush any chemicals from the pump with fresh water. Flushing the pump will ensure a long, problem-free life and easy start-up when the pump is needed again.

**NOTE: DO NOT** flush with petroleum-based chemicals. Use only water to flush the pump. Be sure to properly dispose of the contaminated rinse water used to the flush the pump.