SANDPIPER®
A WARREN RUPP PUMP BRAND

IDEX

II 2G c T5
II 2Dc T100°C

CE

SERVICE AND OPERATING MANUAL
Models MSA2 MSA2-B MSA2-C
Type 5
Mine/Construction-Duty

Table of Contents

Principle of Operation 1
Installation and Start-Up 1
Air Supply 1
Air Inlet & Priming 2
Air Valve Lubrication 2
ESADS+Plus®: Externally Serviceable Air Distribution System 2
Air Exhaust 3
Between Uses 3
Check Valve Servicing 3
Diaphragm Servicing 3
Reassembly 4
Pilot Valve 4
Pilot Valve Actuator 4
Service Instructions: Troubleshooting 4-5
Material Codes 6
Composite Repair Parts List MSA2 7
Composite Repair Drawing MSA2 8
Composite Repair Parts List MSA2-B (with Roll Cage) 9
Composite Repair Drawing MSA2-B (with Roll Cage) 10
Composite Repair Parts List MSA2-C (with Skid Base) 11
Composite Repair Drawing MSA2-C (with Skid Base) 12
CE Declaration of Conformity - Machinery 13
CE Declaration fo Conformity - ATEX 14

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Safety Information

⚠ IMPORTANT



Read the safety warnings and instructions in this manual before pump installation and start-up. Failure to comply with the recommendations stated in this manual could damage the pump and void factory warranty.



When the pump is used for materials that tend to settle out or solidify, the pump should be flushed after each use to prevent damage. In freezing temperatures the pump should be completely drained between uses.

⚠ CAUTION



Before pump operation, inspect all fasteners for loosening caused by gasket creep. Retighten loose fasteners to prevent leakage. Follow recommended torques stated in this manual.



Nonmetallic pumps and plastic components are not UV stabilized. Ultraviolet radiation can damage these parts and negatively affect material properties. Do not expose to UV light for extended periods of time.

⚠ WARNING



When used for toxic or aggressive fluids, the pump should always be flushed clean prior to disassembly.



Before maintenance or repair, shut off the compressed air line, bleed the pressure, and disconnect the air line from the pump. Be certain that approved eye protection and protective clothing are worn at all times. Failure to follow these recommendations may result in serious injury or death.



Airborne particles and loud noise hazards. Wear eye and ear protection.



In the event of diaphragm rupture, pumped material may enter the air end of the pump, and be discharged into the atmosphere. If pumping a product that is hazardous or toxic, the air exhaust must be piped to an appropriate area for safe containment.



Take action to prevent static sparking. Fire or explosion can result, especially when handling flammable liquids. The pump, piping, valves, containers and other miscellaneous equipment must be properly grounded.



This pump is pressurized internally with air pressure during operation. Make certain that all fasteners are in good condition and are reinstalled properly during reassembly.

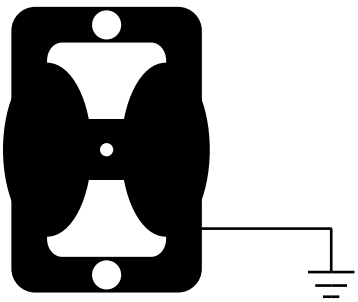


Use safe practices when lifting

RECYCLING

Many components of SANDPIPER® AODD pumps are made of recyclable materials. We encourage pump users to recycle worn out parts and pumps whenever possible, after any hazardous pumped fluids are thoroughly flushed.

Grounding ATEX Pumps



ATEX compliant pumps are suitable for use in explosive atmospheres when the equipment is properly grounded in accordance with local electrical codes. Pumps equipped with electrically conductive diaphragms are suitable for the transfer of conductive or non-conductive fluids of any explosion group. When operating pumps equipped with non-conductive diaphragms that exceed the maximum permissible projected area, as defined in EN 13461-1: 2009 section 6.7.5 table 9, the following protection methods must be applied:

- Equipment is always used to transfer electrically conductive fluids or
- Explosive environment is prevented from entering the internal portions of the pump, i.e. dry running

For further guidance on ATEX applications, please consult the factory.

SANDPIPER®
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SERVICE AND OPERATING MANUAL Models MSA2 MSA2-B MSA2-C Type 5 Mine/Construction-Duty

IDEX

Ex I M2 c T5
II 2GD T5

CE

PRINCIPLE OF PUMP OPERATION

This flap swing check valve pump is powered by compressed air and is a 1:1 pressure ratio design. It alternately pressurizes the inner side of one diaphragm chamber, while simultaneously exhausting the other inner chamber. This causes the diaphragms, which are connected by a common rod, to move endwise. Air pressure is applied over the entire surface of the diaphragm, while liquid is discharged from the opposite side. The diaphragm operates under a balanced condition during the discharge stroke, which allows the unit to be operated at discharge heads over 200 feet (61 meters) of water head.

Since the diaphragms are connected by a common rod, secured by plates to the center of the diaphragms, one diaphragm performs the discharge stroke, while the other is pulled to perform the suction stroke in the opposite chamber.

For maximum diaphragm life, keep the pump as close to the liquid being pumped as possible. Positive suction head in excess of 10 feet of liquid (3.048 meters) may require a back pressure regulating device. This will maximize diaphragm life.

Alternate pressuring and exhausting of the diaphragm chamber is performed by means of an externally mounted, pilot operated, four-way spool type air distribution valve. When the spool shifts to one end of the valve body, inlet air pressure is applied to one diaphragm chamber and the other diaphragm chamber exhausts. When the spool shifts to the opposite end of the valve body, the porting of chambers is reversed. The air distribution valve spool is moved by an internal pilot valve which alternately pressurizes one side of the air distribution valve spool, while exhausting the other side. The pilot valve is shifted at each end of the diaphragm stroke by the diaphragm plate coming in contact with the end of the pilot spool. This pushes it into position for shifting of the air distribution valve.

The chambers are manifolded together with a suction and discharge flap-type check valve for each chamber, maintaining flow in one direction through the pump.

INSTALLATION & START-UP

Locate the pump as close to the product being pumped as possible, keeping suction line length and number of fittings to a minimum. Do not reduce line size.

For installations of rigid piping, short flexible sections of hose should be installed between pump and piping. This reduces vibration and strain to the piping system. A Warren Rupp Tranquilizer® surge suppressor is recommended to further reduce pulsation in flow.

This pump was tested at the factory prior to shipment and is ready for operation. It is completely self-priming from a dry start for suction lifts of 20 feet (6.096 meters) or less. For suction lifts exceeding 20 feet of liquid, fill the chambers with liquid prior to priming.

AIR SUPPLY

Air supply pressures cannot exceed 125 psi (8.61 bar). Connect the pump air inlet to an air supply of sufficient capacity and pressure required for desired performance. When the air line is solid piping, use a short length of flexible hose [not less than 3/4" (19mm) in diameter] between pump and piping to eliminate strain to pipes.

AIR INLET & PRIMING

For start-up, open an air valve approximately 1/2" to 3/4" turn. After the unit primes, an air valve can be opened to increase flow as desired. If opening the valve increases cycling rate, but does not increase flow rate, cavitation has occurred, and the valve should be closed slightly.

For the most efficient use of compressed air and the longest diaphragm life, throttle the air inlet to the lowest cycling rate that does not reduce flow.

A NOTE ABOUT AIR VALVE LUBRICATION

The SANDPIPER pump's pilot valve and main air valve assemblies are designed to operate WITHOUT lubrication. This is the preferred mode of operation. There may be instances of personal preference, or poor quality air supplies when lubrication of the compressed air supply is required. The pump air system will operate with properly lubricated compressed air supplies. Proper lubrication of the compressed air supply would entail the use of an air line lubricator (available from Warren Rupp) set to deliver one drop of 10 wt., non-detergent oil for every 20 SCFM of air the pump consumed at its point of operation. Consult the pump's published Performance Curve to determine this.

It is important to remember to inspect the sleeve and spool set routinely. It should move back and forth freely. This is most important when the air supply is lubricated. If a lubricator is used, oil accumulation will, over time, collect any debris from the compressed air. This can prevent the pump from operating properly.

Water in the compressed air supply can create problems such as icing or freezing of the exhaust air causing the pump to cycle erratically, or stop operating. This can be addressed by using a point of use air dryer to supplement a plant's air drying equipment. This device will remove excess water from the compressed air supply and alleviate the icing or freezing problem.

ESADS: EXTERNALLY SERVICEABLE AIR DISTRIBUTION SYSTEM

Please refer to the exploded view drawing and parts list in the Service Manual supplied with your pump. If you need replacement or additional copies, contact your local Warren Rupp Distributor, or the Warren Rupp factory Literature Department at the number shown below. To receive the correct manual, you must specify the MODEL and TYPE information found on the name plate of the pump.

MODELS WITH 1" SUCTION/DISCHARGE OR LARGER, AND METAL CENTER SECTIONS:

The main air valve sleeve and spool set is located in the valve body mounted on the pump with four hex head capscrews. The valve body assembly is removed from the pump by removing these four hex head capscrews.

With the valve body assembly off the pump, access to the sleeve and spool set is made by removing four hex head capscrews (each end) on the end caps of the valve body assembly. With the end caps removed, slide the spool back and forth in the sleeve. The spool is closely sized to the sleeve and must move freely to allow for proper pump operation. An accumulation of oil, dirt or other contaminants from the pump's air supply, or from a failed diaphragm, may prevent the spool from moving freely. This can cause the spool to stick in a position that prevents the pump from operating. If this is the case, the sleeve and spool set should be removed from the valve body for cleaning and further inspection.

Remove the spool from the sleeve. Using an arbor press or bench vise (with an improvised mandrel), press the sleeve from the valve body. Take care not to damage the sleeve. At this point, inspect the o-rings on the sleeve for nicks, tears or abrasions. Damage of this sort could happen during assembly or servicing. A sheared or cut o-ring can allow the pump's compressed air supply to leak or bypass within the air valve assembly, causing the pump to leak compressed air from the pump air exhaust or not cycle properly. This is most noticeable at pump dead head or high discharge pressure conditions. Replace any of these o-rings as required or set up a routine, preventive maintenance schedule to do so on a regular basis. This practice should include cleaning the spool and sleeve components with a safety solvent or equivalent, inspecting for signs of wear or damage, and replacing worn components.

To re-install the sleeve and spool set, lightly lubricate the o-rings on the sleeve with an o-ring assembly lubricant or lightweight oil (such as 10 wt. air line lubricant). Re-install one end cap, gasket and bumper on the valve body. Using the arbor press or bench vise that was used in disassembly, carefully press the sleeve back into the valve body, without shearing the o-rings. You may have to clean the surfaces of the valve body where the end caps mount. Material may remain from the old gasket. Old material not cleaned from this area may cause air leakage after reassembly. Take care that the bumper stays in place allowing the sleeve to press in all the way. Reinstall the spool, opposite end cap, gasket and bumper on the valve body. After inspecting and cleaning the gasket surfaces on the valve body and intermediate, reinstall the valve body on the pump using new gaskets. Tighten the four hex head capscrews evenly and in an alternating cross pattern.

AIR EXHAUST

If a diaphragm fails, the pumped liquid or fumes can enter the air end of the pump, and be exhausted into the atmosphere. When pumping hazardous or toxic materials, pipe the exhaust to an appropriate area for safe disposition.

This pump can be submerged if materials of construction are compatible with the liquid. The air exhaust must be piped above the liquid level. Piping used for the air exhaust must not be smaller than 1" (2.54 cm). Reducing the pipe size will restrict air flow and reduce pump performance .When the product source is at a higher level than the pump (flooded suction), pipe the exhaust higher than the product source to prevent siphoning spills. (See page 7)

Freezing or icing-up of the air exhaust can occur under certain temperature and humidity conditions. Use of an air dryer unit should eliminate most icing problems.

BETWEEN USES

When used for materials that tend to settle out or transform to solid form, the pump should be completely flushed after each use, to prevent damage. Product remaining in the pump between uses could dry out or settle out. This could cause problems with valves and diaphragms at re-start. In freezing temperatures, the pump must be drained between uses in all cases.

CHECK VALVE SERVICING

Valve inspection requires removal of (4) $^{3}/_{8}$" hex nuts. On the suction side the flange, when removed, carries the valve and seat as an assembly. On the discharge side, the valve and seat will stay with the diaphragm housing. Visual inspection and cleaning is possible. If parts are to be replaced, remove the self locking nuts and all parts are accessible.

DIAPHRAGM SERVICING

Diaphragms can be inspected or the diaphragm assembly removed without removing the suction and discharge flanges. Remove (8) nuts around the chamber flange, and the housing assembly will pull off. Check valves can be inspected for proper seating at this point as well as the diaphragm. Use care to keep foreign matter from behind the diaphragm. The opposite diaphragm may be inspected by the same procedure. If either diaphragm has to be replaced, follow closely these steps: Pull the outer diameter of one diaphragm off the (8) capscrews. NOTE: One side only! On the free diaphragm assembly, use a 3/8" allen wrench to turn the assembly (diaphragm, plates and screw) loose from the shaft. Once the assembly has turned, it will turn out by hand by use of the diaphragm. Now the opposite diaphragm assembly and the drive shaft will pull free from the capscrews and pump intermediate assembly. The interior components consisting of sleeve bearings, rod seals, and pilot valve actuator bushings are now accessible for service if required. Hold the shaft in a clamping device making sure to protect surface of shaft so as not to scratch or mar it in any way. The diaphragm assembly will turn loose. To disassemble the components, turn a 1/4"-20 capscrew by hand into the tapped hole in the inner plate. This keeps the plate from turning while the socket head capscrew is removed. To do this, place assembly in a vise so the two protruding ends of screws are loose in the vise jaws (about 3/4" apart). Turn the center screw loose from the back plate and the assembly will come apart.

REASSEMBLY

All procedures for reassembling the pump are the reverse of the previous instructions with further instructions as shown:

1. The diaphragm assemblies are to be installed with the natural bulge outward or toward the head of the center screw. Make sure both plates are installed with outer radii against the diaphragm. After all components are in position in a vise and hand tight, set a torque wrench for 480 inch pounds (40 ft. pounds) (54.23 Newton meters) using a (3/8") allen head socket. After each diaphragm sub assembly has been completed, thread one assembly into the shaft (held near the middle in a vise having soft jaws to protect the finish) making sure the stainless steel washer is in place on the capscrew.

Make sure 1/4"-20 mounting screw has been removed and that the bumper (Item #19 on drawing) is in place in the shaft.

Install this sub assembly into the pump and secure by placing the outer chamber housing and capscrews on the end with the diaphragm. This will hold the assembly in place while the opposite side is installed. Make sure the last diaphragm assembly is torqued to 30 ft. lbs. (40.67 Newton meters) before placing the outer diaphragm over the capscrews. If the holes in the diaphragm flange do not line up with the holes in the chamber flange, turn the diaphragm assembly in the direction of tightening to align the holes so that the capscrews can be inserted. This final torquing of the last diaphragm assembly will lock the two diaphragm assemblies together. Place remaining outer chamber on the open end and tighten down the securing nuts gradually and evenly on both sides.

Caution should be used while reassembling check valves. The valves are designed for some preload over the retainer hinge pad. This is done to insure proper face contact with the seat. After all parts are in place, tighten the lock nuts down on the assembly to the point where visual inspection shows that seat and valve face mate without gap. This is important for dry prime. However, after priming action has started, valves will function due to differential pressure without concern or trouble.

PILOT VALVE

The pilot valve assembly is accessed by removing the main air distribution valve body from the pump and lifting the pilot valve body out of the intermediate housing.

Most problems with the pilot valve can be corrected by replacing the o-rings. Always grease the spool prior to inserting it into the sleeve. If the sleeve is removed from the body, reinsertion must be at the chamfered side. Grease the o-rings to slide the sleeve into the valve body. Securely insert the retaining ring around the sleeve. When reinserting the pilot valve, push both plungers (located inside the intermediate bracket) out of the path of the pilot valve spool ends to avoid damage.

PILOT VALVE ACTUATOR

Bushings for the pilot valve actuators are threaded into the intermediate bracket from the outside. The plunger may be removed for inspection or replacement. First remove the air distribution valve body and the pilot valve body from the pump. The plungers can be located by looking into the intermediate. It may be necessary to use a fine piece of wire to pull them out. The bushing can be turned out through the inner chamber by removing the outer chamber assembly. Replace the bushings if pins have bent.

TROUBLESHOOTING

PROBLEM: Pump cycles but will not pump. (Note: higher suction lifts require faster cycling speed for priming.)

POSSIBLE CAUSES:

A. Air leak in suction line.
B. Excessive suction lift.
C. Check valve not seating properly.
D. Leakage at joint of suction manifold or elbow flange.
E. Suction line or strainer plugged.
F. Diaphragm ruptured.

PROBLEM: Pump will not cycle. (Note: Always disconnect air supply to relieve air pressure before disassembling any portion of pump.)
POSSIBLE CAUSES:
A. Discharge hose or line plugged, or discharge head requirement greater than air supply pressure. (Disconnect discharge line to check.)
B. Spool in air distribution valve not shifting. (Remove end cap and check spool — must slide freely.)
C. Diaphragm ruptured. (Air will escape out discharge line in this case.)
D. Blockage in diaphragm chamber preventing movement. (Shut off air supply and reopen after pressure is relieved.)

PROBLEM: Uneven discharge flow. (Indicates one chamber not operating properly.)
POSSIBLE CAUSES:
A. Check valve not sealing properly in one chamber.
B. Diaphragm failure in one chamber.
C. Air leak at suction manifold joint or elbow flange one side.

For additional information, see the Warren Rupp Troubleshooting Guide.

WARRANTY:

This unit is guaranteed for a period of five years against defective material and workmanship.

Material Codes

The Last 3 Digits of Part Number

000	Assembly, sub-assembly; and some purchased items
010	Cast Iron
012	Powered Metal
015	Ductile Iron
020	Ferritic Malleable Iron
025	Music Wire
080	Carbon Steel, AISI B-1112
100	Alloy 20
110	Alloy Type 316 Stainless Steel
111	Alloy Type 316 Stainless Steel (Electro Polished)
112	Alloy C
113	Alloy Type 316 Stainless Steel (Hand Polished)
114	303 Stainless Steel
115	302/304 Stainless Steel
117	440-C Stainless Steel (Martensitic)
120	416 Stainless Steel (Wrought Martensitic)
123	410 Stainless Steel (Wrought Martensitic)
148	Hardcoat Anodized Aluminum
149	2024-T4 Aluminum
150	6061-T6 Aluminum
151	6063-T6 Aluminum
152	2024-T4 Aluminum (2023-T351)
154	Almag 35 Aluminum
155	356-T6 Aluminum
156	356-T6 Aluminum
157	Die Cast Aluminum Alloy #380
158	Aluminum Alloy SR-319
159	Anodized Aluminum
162	Brass, Yellow, Screw Machine Stock
165	Cast Bronze, 85-5-5-5
166	Bronze, SAE 660
170	Bronze, Bearing Type, Oil Impregnated
175	Die Cast Zinc
180	Copper Alloy
305	Carbon Steel, Black Epoxy Coated
306	Carbon Steel, Black PTFE Coated
307	Aluminum, Black Epoxy Coated
308	Stainless Steel, Black PTFE Coated
309	Aluminum, Black PTFE Coated
310	PVDF Coated
330	Zinc Plated Steel
331	Chrome Plated Steel
332	Aluminum, Electroless Nickel Plated
333	Carbon Steel, Electroless Nickel Plated
335	Galvanized Steel
336	Zinc Plated Yellow Brass
337	Silver Plated Steel
340	Nickel Plated
342	Filled Nylon
353	Geolast; Color: Black
354	Injection Molded #203-40 Santoprene- Duro 40D +/-5; Color: RED
355	Thermal Plastic
356	Hytrel
357	Injection Molded Polyurethane
358	Urethane Rubber (Some Applications) (Compression Mold)
359	Urethane Rubber
360	Nitrile Rubber. Color coded: RED
361	FDA Accepted Nitrile
363	FKM (Fluorocarbon). Color coded: YELLOW
364	E.P.D.M. Rubber. Color coded: BLUE
365	Neoprene Rubber. Color coded: GREEN
366	Food Grade Nitrile
368	Food Grade EPDM
370	Butyl Rubber. Color coded: BROWN
371	Philthane (Tuftane)
374	Carboxylated Nitrile
375	Fluorinated Nitrile
378	High Density Polypropylene
379	Conductive Nitrile
405	Cellulose Fibre
408	Cork and Neoprene
425	Compressed Fibre
426	Blue Gard
440	Vegetable Fibre
465	Fibre
500	Delrin 500
501	Delrin 570
502	Conductive Acetal, ESD-800
503	Conductive Acetal, Glass-Filled
505	Acrylic Resin Plastic
506	Delrin 150
520	Injection Molded PVDF Natural color
521	Conductive PVDF
540	Nylon
541	Nylon
542	Nylon
544	Nylon Injection Molded
550	Polyethylene
551	Glass Filled Polypropylene
552	Unfilled Polypropylene
553	Unfilled Polypropylene
555	Polyvinyl Chloride
556	Black Vinyl
557	Conductive Polypropylene
558	Conductive HDPE
559	Glass-Filled Conductive Polypropylene
570	Rulon II
580	Ryton
590	Valox
591	Nylatron G-S
592	Nylatron NSB
600	PTFE (virgin material) Tetrafluorocarbon (TFE)
601	PTFE (Bronze and moly filled)
602	Filled PTFE
603	Blue Gylon
604	PTFE
606	PTFE
607	Envelon
608	Conductive PTFE
610	PTFE Integral Silicon
611	PTFE Integral FKM
632	Neoprene/Hytrel
633	FKM (Fluorocarbon)/PTFE
634	EPDM/PTFE
635	Neoprene/PTFE
637	PTFE, FKM (Fluorocarbon)/PTFE
638	PTFE, Hytrel/PTFE
639	Nitrile/TFE
643	Santoprene/EPDM
644	Santoprene/PTFE
650	Bonded Santoprene and PTFE
654	Santoprene Diaphragm, PTFE Overlay Balls and seals
656	Santoprene Diaphragm and Check Balls/EPDM Seats
661	EPDM/Santoprene

Delrin and Hytrel are registered tradenames of E.I. DuPont.

Gylon is a registered tradename of Garlock, Inc.

Nylatron is a registered tradename of Polymer Corp.

Santoprene is a registered tradename of Monsanto Corp.

Rulon II is a registered tradename of Dixion Industries Corp.

Ryton is a registered tradename of Phillips Chemical Co.

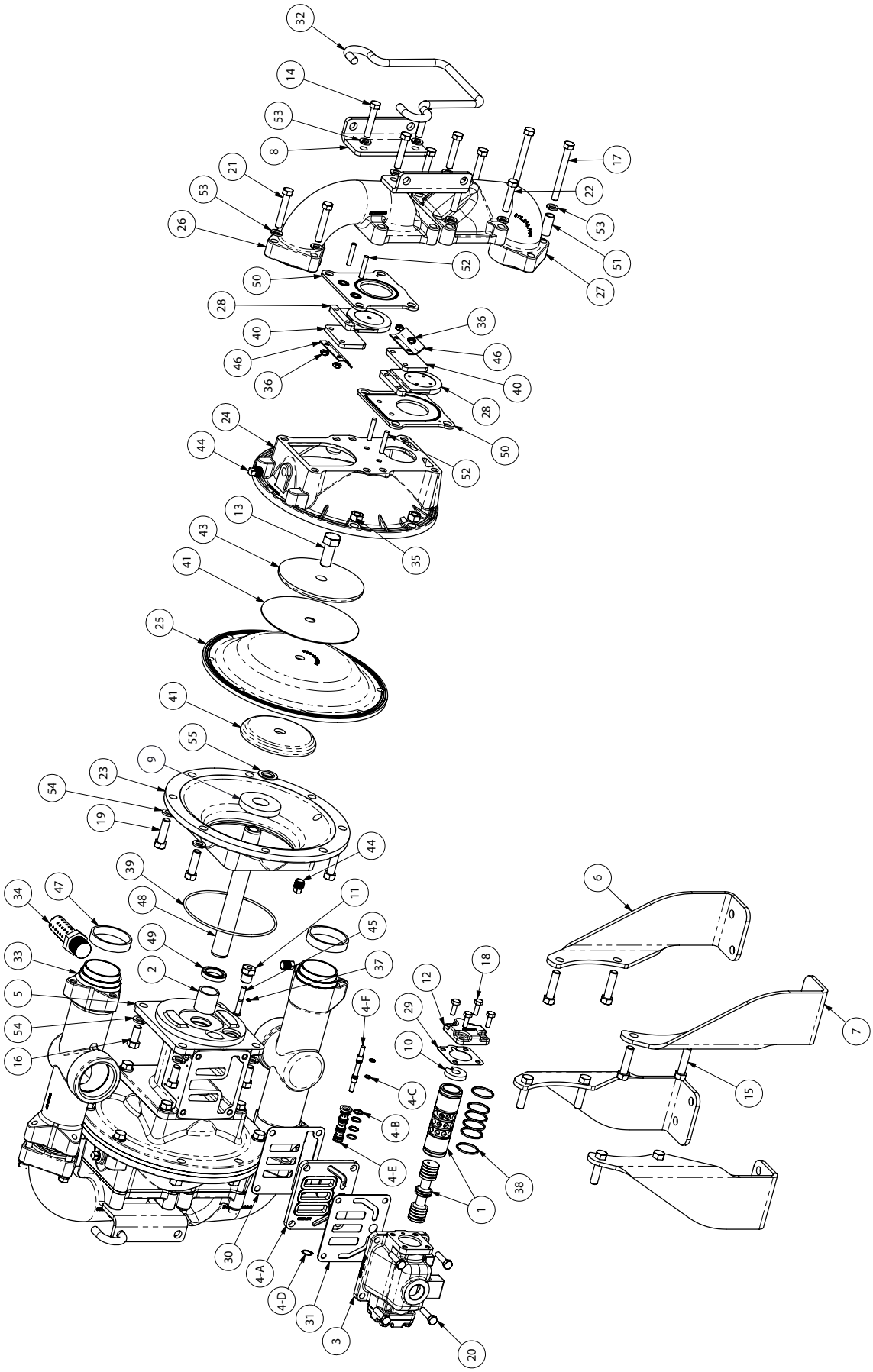
Valox is a registered tradename of General Electric Co.

Warren Rupp, SANDPIPER, PortaPump, Tranquilizers and SludgeMaser are registered tradenames of IDEX AODD Inc.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	031.012.000	SLEEVE & SPOOL SET	1
2	070.006.170	BEARING	2
3	095.043.010	BODY, AIR VALVE	1
	095.043.156	BODY, AIR VALVE	1
4	095.073.000	PILOT VALVE ASSEMBLY	1
4-A	095.070.551	BODY, PILOT VALVE	1
4-B	560.033.360	O-RING	4
4-C	560.023.360	O-RING (SPOOL)	2
4-D	675.037.080	RETAINING RING	1
4-E	755.025.000	SLEEVE, PILOT VALVE	1
4-F	775.026.000	SPOOL, PILOT VALVE	1
5	114.002.010	INTERMEDIATE	1
	114.002.156	INTERMEDIATE	1
6	115.158.080	BRACKET, LEG	2
7	115.159.080	BRACKET, LEG	2
8	115.160.080	BRACKET, HANDLE	4
9	132.002.360	BUMPER, DIAPHRAGM PLATE	2
10	132.014.358	BUMPER, AIR VALVE	2
11	135.016.162	BUSHING, THREADED, W/ O-RING 560.001.360	2
12	165.011.010	CAP, END	2
	165.011.157	CAP, END	2
13	170.010.115	CAPSCREW, HEX HEAD 5/8-11 X 1 1/2	2
14	170.020.330	CAPSCREW, HEX HEAD 3/8-16 X 1 3/4	8
15	170.023.330	CAPSCREW, HEX HEAD (ALUMINUM ONLY)	8
15	170.023.330	CAPSCREW, HEX HEAD (CAST IRON & STAINLESS STEEL)	16
15	170.024.330	CAPSCREW, HEX HD, 7/16-14 X 1	8
17	170.026.330	CAPSCREW, HEX HEAD 3/8-16 X 3 1/2 (ALUMINUM ONLY)	4
17	170.026.330	CAPSCREW, HEX HEAD 3/8-16 X 3 1/2 (CAST IRON & STAINLESS STEEL)	2
18	170.032.330	CAPSCREW, HEX HEAD 1/4-20 X 3/4	8
19	170.035.330	CAPSCREW, HEX HD, 7/16-14 X 1 1/2 (ALUMINUM ONLY)	8
20	170.045.330	CAPSCREW, HEX HEAD 5/16-18 X 1 1/4	4
21	170.052.330	CAPSCREW, HEX HEAD 3/8-16 X 2 1/2 (ALUMINUM ONLY)	4
21	170.052.330	CAPSCREW, HEX HEAD 3/8-16 X 2 1/2 (CAST IRON & STAINLESS STEEL)	2
22	170.061.330	CAPSCREW, HEX HEAD 3/8-16 X 2	8
23	196.001.010	CHAMBER, INNER	2
	196.001.157	CHAMBER, INNER	2
24	196.002.010 NS	CHAMBER, OUTER	2
	196.002.157 NS	CHAMBER, OUTER	2
25	286.007.354	DIAPHRAGM	2
	286.007.360	DIAPHRAGM	2
	286.007.365	DIAPHRAGM	2
26	312.012.156	ELBOW SUCTION	2
27	312.013.156	ELBOW, DISCHARGE	2
28	338.010.357	FLAP VALVE	4
29	360.010.425	GASKET, END CAP	2
30	360.041.379	GASKET, VALVE BODY	1
31	360.048.425	GASKET, VALVE BODY	1
32	405.012.330	HANDLE	2
33	518.001.010	MANIFOLD	2
	518.001.157	MANIFOLD	2
34	530.036.000	MUFFLER	1
35	545.007.330	NUT, HEX - 7/16-14 (ALUMINUM ONLY)	8
35	545.007.330	NUT, HEX - 7/16-14 (CAST IRON & STAINLESS STEEL)	16
36	547.002.110	NUT, STOP	8
37	560.001.360	O-RING	2
38	560.020.360	O-RING	6
39	560.022.360	O-RING	2
40	570.001.360	PAD, HINGE-FLAP VALVE	4
	570.001.364	PAD, HINGE-FLAP VALVE	4
	570.001.365	PAD, HINGE-FLAP VALVE	4
41	570.009.360	PAD, WEAR	2
	570.009.365	PAD, WEAR	2
42	612.215.330	PLATE, INNER DIAPHRAGM	2
43	612.224.000	PLATE, OUTER DIAPHRAGM	2
44	618.003.330	PLUG, PIPE, 1/4 (ALUMINUM)	6
44	618.003.110	PLUG, PIPE, 1/4 (CAST IRON & STAINLESS STEEL)	4
45	620.011.114	PLUNGER, ACTUATOR	2
45	670.005.110	RETAINER, FLAP VALVE	4
46	675.013.360	RING, SEALING	4
	675.013.364	RING, SEALING	4
	675.013.365	RING, SEALING	4
47	685.007.120	ROD, DIAPHRAGM	1
48	720.004.360	SEAL, U-CUP	2
49	722.070.360	SEAT, FLAP VALVE	4
	722.070.364	SEAT, FLAP VALVE	4
	722.070.365	SEAT, FLAP VALVE	4
51	770.005.330	SPACER (ALUMINUM ONLY)	4
51	770.005.330	SPACER (CAST IRON & STAINLESS STEEL)	2
52	807.018.110	STUD, 1/4-20	8
53	900.005.330	WASHER, LOCK, 3/8 (ALUMINUM ONLY)	24
53	900.005.330	WASHER, LOCK, 3/8 (CAST IRON & STAINLESS STEEL)	20
54	900.006.330	WASHER, LOCK - 7/16 (ALUMINUM)	16
54	900.006.330	WASHER, LOCK - 7/16 (CAST IRON & STAINLESS STEEL)	8
55	902.003.000	WASHER, SEALING	2

Parts underlined are only available for sale in kits

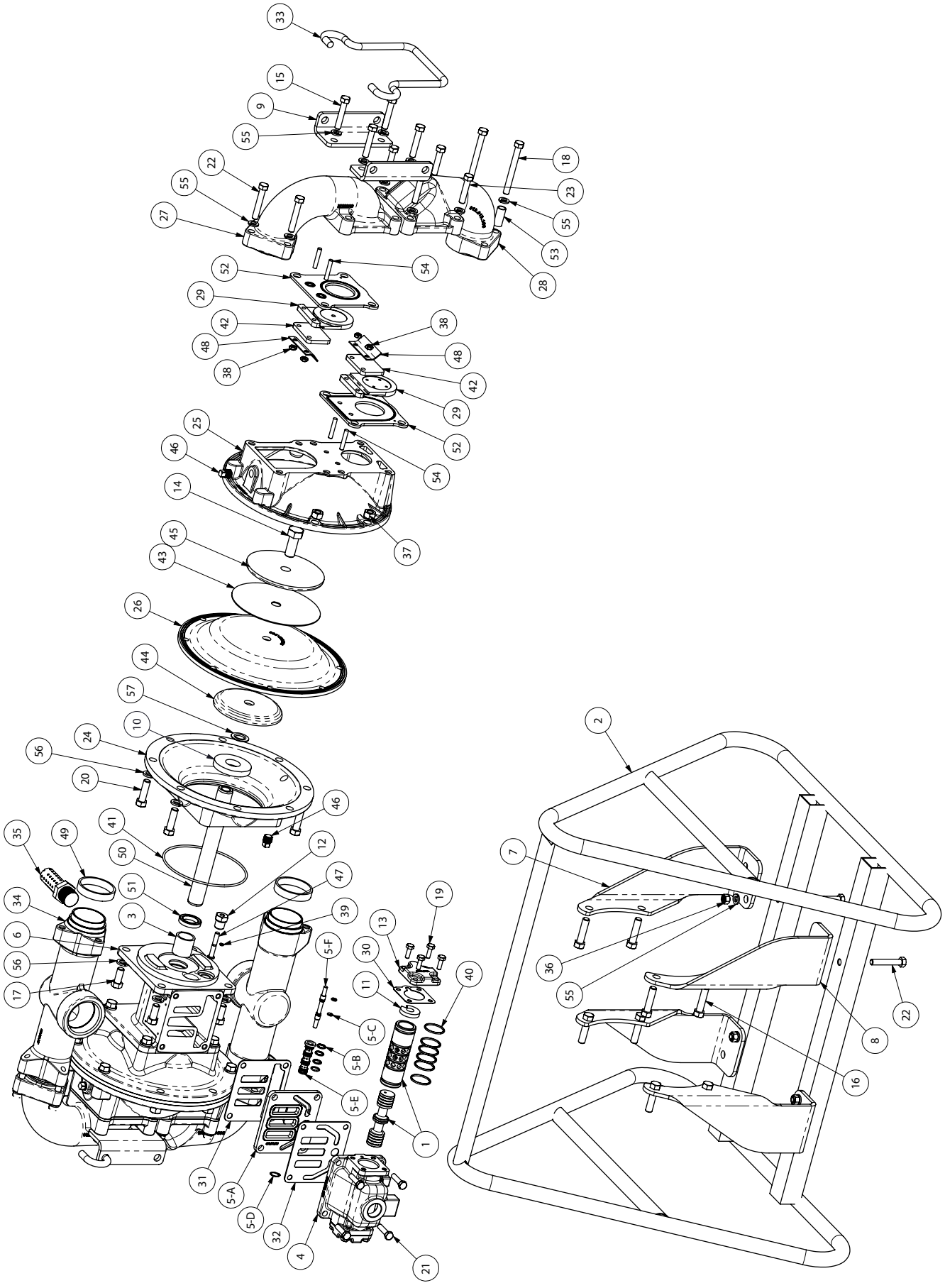
Model MSA2


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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	031.012.000	SLEEVE & SPOOL SET	1
2	060.045.000	BASE, CAGE, WELDMENT	1
3	070.006.170	BEARING	2
4	095.043.010	BODY, AIR VALVE	1
	095.043.156	BODY, AIR VALVE	1
5	095.073.000	PILOT VALVE ASSEMBLY	1
5-A	095.070.551	BODY, PILOT VALVE	1
5-B	560.033.360	O-RING	4
5-C	560.023.360	O-RING (SPOOL)	2
5-D	675.037.080	RETAINING RING	1
5-E	755.025.000	SLEEVE, PILOT VALVE	1
5-F	775.026.000	SPOOL, PILOT VALVE	1
6	114.002.010	INTERMEDIATE	1
	114.002.156	INTERMEDIATE	1
7	115.158.080	BRACKET, LEG	2
8	115.159.080	BRACKET, LEG	2
9	115.160.080	BRACKET, HANDLE	4
10	132.002.360	BUMPER, DIAPHRAGM PLATE	2
11	132.014.358	BUMPER, AIR VALVE	2
12	135.016.162	BUSHING, THREADED, W/ O-RING 560.001.360	2
13	165.011.010	CAP, END	2
	165.011.157	CAP, END	2
14	170.010.115	CAPSCREW, HEX HEAD 5/8-11 X 1 1/2	2
15	170.020.330	CAPSCREW, HEX HEAD 3/8-16 X 1 3/4	8
16	170.023.330	CAPSCREW, HEX HEAD (ALUMINUM ONLY)	8
16	170.023.330	CAPSCREW, HEX HEAD (CAST IRON AND STAINLESS STEEL)	16
17	170.024.330	CAPSCREW, HEX HD, 7/16-14 X 1	8
18	170.026.330	CAPSCREW, HEX HEAD 3/8-16 X 3 1/2 (ALUMINUM ONLY)	4
18	170.026.330	CAPSCREW, HEX HEAD 3/8-16 X 3 1/2 (CAST IRON & STAINLESS STEEL)	2
19	170.032.330	CAPSCREW, HEX HEAD 1/4-20 X 3/4	8
20	170.035.330	CAPSCREW, HEX HD, 7/16-14 X 1 1/2 (ALUMINUM ONLY)	8
21	170.045.330	CAPSCREW, HEX HEAD 5/16-18 X 1 1/4	4
22	170.052.330	CAPSCREW, HEX HEAD 3/8-16 X 2 1/2 (ALUMINUM ONLY)	8
22	170.052.330	CAPSCREW, HEX HEAD 3/8-16 X 2 1/2 (CAST IRON & STAINLESS STEEL)	6
23	170.061.330	CAPSCREW, HEX HEAD 3/8-16 X 2	8
24	196.001.010	CHAMBER, INNER	2
	196.001.157	CHAMBER, INNER	2
25	196.002.010 NS	CHAMBER, OUTER	2
	196.002.157 NS	CHAMBER, OUTER	2
26	286.007.354	DIAPHRAGM	2
	286.007.360	DIAPHRAGM	2
	286.007.365	DIAPHRAGM	2
27	312.012.156	ELBOW SUCTION	2
28	312.013.156	ELBOW, DISCHARGE	2
29	338.010.357	FLAP VALVE	4
30	360.010.425	GASKET, END CAP	2
31	360.041.379	GASKET, VALVE BODY	1
32	360.048.425	GASKET, VALVE BODY	1
33	405.012.330	HANDLE	2
34	518.001.010	MANIFOLD	2
	518.001.157	MANIFOLD	2
35	530.036.000	MUFFLER	1
36	545.005.330	NUT, HEX 3/8-16	4
37	545.007.330	NUT, HEX - 7/16-14 (ALUMINUM ONLY)	8
37	545.007.330	NUT, HEX - 7/16-14 (CAST IRON & STAINLESS STEEL)	16
38	547.002.110	NUT, STOP	8
39	560.001.360	O-RING	2
40	560.020.360	O-RING	6
41	560.022.360	O-RING	2
42	570.001.360	PAD, HINGE-FLAP VALVE	4
	570.001.364	PAD, HINGE-FLAP VALVE	4
	570.001.365	PAD, HINGE-FLAP VALVE	4
43	570.009.360	PAD, WEAR	2
	570.009.365	PAD, WEAR	2
44	612.215.330	PLATE, INNER DIAPHRAGM	2
45	612.224.000	PLATE, OUTER DIAPHRAGM	2
46	618.003.330	PLUG, PIPE, 1/4 (ALUMINUM)	6
46	618.003.110	PLUG, PIPE, 1/4 (CAST IRON & STAINLESS STEEL)	4
47	620.011.114	PLUNGER, ACTUATOR	2
48	670.005.110	RETAINER, FLAP VALVE	4
49	675.013.360	RING, SEALING	4
	675.013.364	RING, SEALING	4
	675.013.365	RING, SEALING	4
50	685.007.120	ROD, DIAPHRAGM	1
51	720.004.360	SEAL, U-CUP	2
52	722.070.360	SEAT, FLAP VALVE	4
53	770.005.330	SPACER (ALUMINUM ONLY)	4
53	770.005.330	SPACER (CAST IRON & STAINLESS STEEL)	2
54	807.018.110	STUD, 1/4-20	8
55	900.005.330	WASHER, LOCK, 3/8 (ALUMINUM ONLY)	28
55	900.005.330	WASHER, LOCK, 3/8 (CAST IRON & STAINLESS STEEL)	24
56	900.006.330	WASHER, LOCK - 7/16 (ALUMINUM)	16
56	900.006.330	WASHER, LOCK - 7/16 (CAST IRON & STAINLESS STEEL)	8
57	902.003.000	WASHER, SEALING	2

Parts underlined are only available for sale in kits

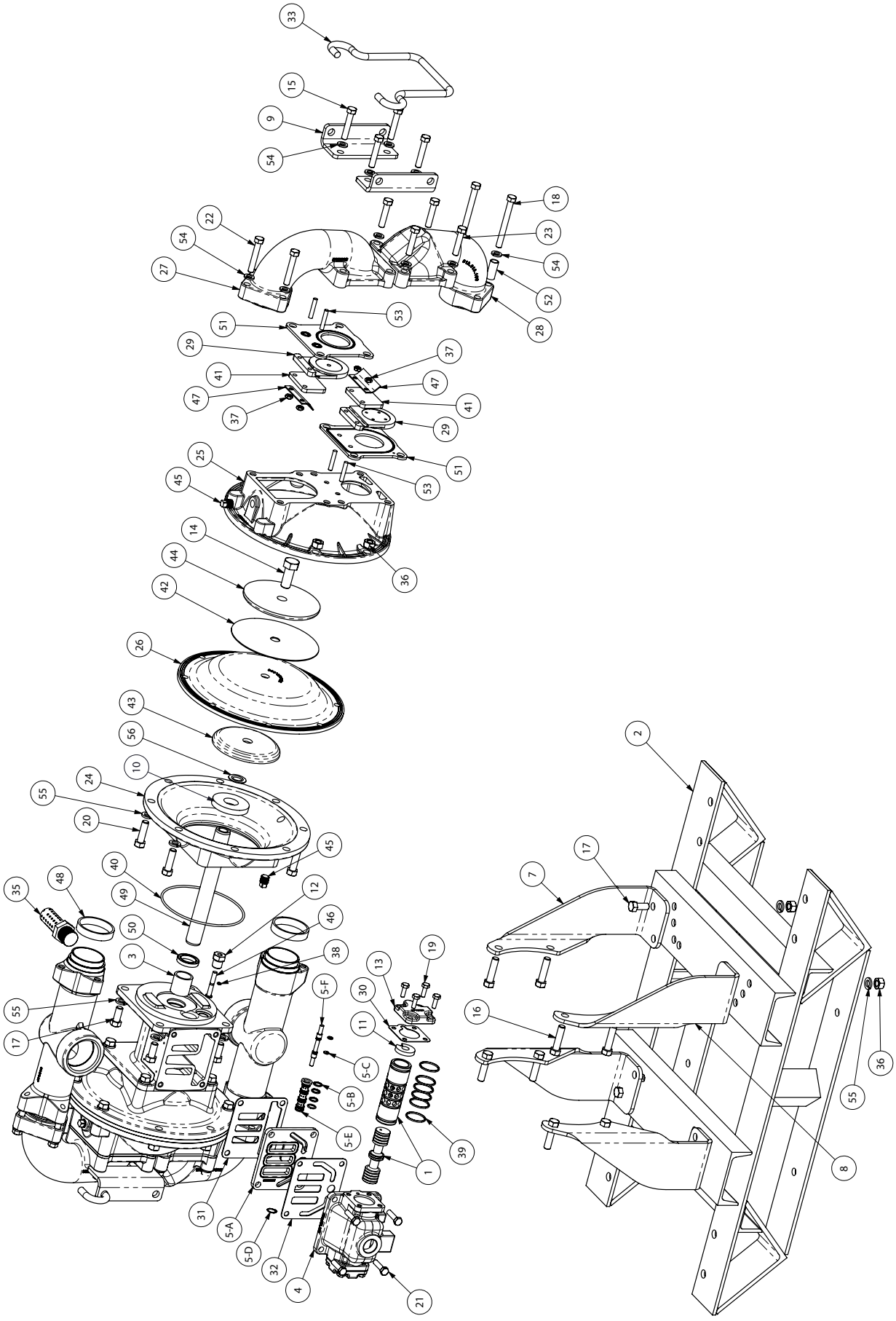
Model MSA2-B


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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	031.012.000	SLEEVE & SPOOL SET	1
2	060.096.000	BASE, PUMP	1
3	070.006.170	BEARING	2
4	095.043.010	BODY, AIR VALVE	1
	095.043.156	BODY, AIR VALVE	1
5	095.073.000	PILOT VALVE ASSEMBLY	1
5-A	095.070.551	BODY, PILOT VALVE	1
5-B	560.033.360	O-RING	4
5-C	560.023.360	O-RING (SPOOL)	2
5-D	675.037.080	RETAINING RING	1
5-E	755.025.000	SLEEVE, PILOT VALVE	1
5-F	775.026.000	SPOOL, PILOT VALVE	1
6	114.002.010	INTERMEDIATE	1
	114.002.156	INTERMEDIATE	1
7	115.158.080	BRACKET, LEG	2
8	115.159.080	BRACKET, LEG	2
9	115.160.080	BRACKET, HANDLE	4
10	132.002.360	BUMPER, DIAPHRAGM PLATE	2
11	132.014.358	BUMPER, AIR VALVE	2
12	135.016.162	BUSHING, THREADED, W/ O-RING 560.001.360	2
13	165.011.010	CAP, END	2
	165.011.157	CAP, END	2
14	170.010.115	CAPSCREW, HEX HEAD 5/8-11 X 1 1/2	2
15	170.020.330	CAPSCREW, HEX HEAD 3/8-16 X 1 3/4	8
16	170.023.330	CAPSCREW, HEX HEAD (ALUMINUM ONLY)	8
16	170.023.330	CAPSCREW, HEX HEAD (CAST IRON & STAINLESS STEEL)	16
17	170.024.330	CAPSCREW, HEX HD, 7/16-14 X 1	12
18	170.026.330	CAPSCREW, HEX HEAD 3/8-16 X 3 1/2 (ALUMINUM ONLY)	4
18	170.026.330	CAPSCREW, HEX HEAD (CAST IRON & STAINLESS STEEL)	2
19	170.032.330	CAPSCREW, HEX HEAD 1/4-20 X 3/4	8
20	170.035.330	CAPSCREW, HEX HD, 7/16-14 X 1 1/2 (ALUMINUM ONLY)	8
21	170.045.330	CAPSCREW, HEX HEAD 5/16-18 X 1 1/4	4
22	170.052.330	CAPSCREW, HEX HEAD 3/8-16 X 2 1/2 (ALUMINUM ONLY)	4
22	170.052.330	CAPSCREW, HEX HEAD (CAST IRON & STAINLESS STEEL)	2
23	170.061.330	CAPSCREW, HEX HEAD 3/8-16 X 2	8
24	196.001.010	CHAMBER, INNER	2
	196.001.157	CHAMBER, INNER	2
25	196.002.010 NS	CHAMBER, OUTER	2
	196.002.157 NS	CHAMBER, OUTER	2
26	286.007.354	DIAPHRAGM	2
	286.007.360	DIAPHRAGM	2
	286.007.365	DIAPHRAGM	2
27	312.012.156	ELBOW SUCTION	2
28	312.013.156	ELBOW, DISCHARGE	2
29	338.010.357	FLAP VALVE	4
30	360.010.425	GASKET, END CAP	2
31	360.041.379	GASKET, VALVE BODY	1
32	360.048.425	GASKET, VALVE BODY	1
33	405.012.330	HANDLE	2
34	518.001.010	MANIFOLD	2
	518.001.157	MANIFOLD	2
35	530.036.000	MUFFLER	1
36	545.007.330	NUT, HEX - 7/16-14 (ALUMINUM ONLY)	12
36	545.007.330	NUT, HEX - 7/16-14 (CAST IRON & STAINLESS STEEL)	20
37	547.002.110	NUT, STOP	8
38	560.001.360	O-RING	2
39	560.020.360	O-RING	6
40	560.022.360	O-RING	2
41	570.001.360	PAD, HINGE-FLAP VALVE	4
	570.001.364	PAD, HINGE-FLAP VALVE	4
	570.001.365	PAD, HINGE-FLAP VALVE	4
42	570.009.360	PAD, WEAR	2
	570.009.365	PAD, WEAR	2
43	612.215.330	PLATE, INNER DIAPHRAGM	2
44	612.224.330	PLATE, OUTER DIAPHRAGM	2
45	618.003.330	PLUG, PIPE, 1/4 (ALUMINUM)	6
45	618.003.110	PLUG, PIPE, 1/4 (CAST IRON & STAINLESS STEEL)	4
46	620.011.114	PLUNGER, ACTUATOR	2
47	670.005.110	RETAINER, FLAP VALVE	4
48	675.013.360	RING, SEALING	4
	675.013.364	RING, SEALING	4
	675.013.365	RING, SEALING	4
49	685.007.120	ROD, DIAPHRAGM	1
50	720.004.360	SEAL, U-CUP	2
51	722.070.360	SEAT, FLAP VALVE	4
52	770.005.330	SPACER (ALUMINUM ONLY)	4
52	770.005.330	SPACER (CAST IRON AND STAINLESS STEEL)	2
53	807.018.110	STUD, 1/4-20	8
54	900.005.330	WASHER, LOCK, 3/8 (ALUMINUM ONLY)	24
54	900.005.330	WASHER, LOCK, 3/8 (CAST IRON & STAINLESS STEEL)	20
55	900.006.330	WASHER, LOCK - 7/16 (ALUMINUM)	20
55	900.006.330	WASHER, LOCK 7/16 (CAST IRON AND STAINLESS STEEL)	12
56	902.003.000	WASHER, SEALING	2

Parts underlined are only available for sale in kits

Model MSA2-C


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5 - YEAR Limited Product Warranty

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 Warren Rupp®,SANDPIPER®, MARATHON®, PortaPump®, SludgeMaster™ and Tranquilizer®.

~ See sandpiperpump.com/content/warranty-certifications for complete warranty, including terms and conditions, limitations and exclusions. ~

WARREN RUPP, INC.

Declaration of Conformity

Manufacturer: Warren Rupp, Inc., 800 N. Main Street
Mansfield, Ohio, 44902 USA

Certifies that Air-Operated Double Diaphragm Pump Series: HDB, HDF, M Non-Metallic, S Non-Metallic, M Metallic, S Metallic, T Series, G Series, U Series, EH and SH High Pressure, RS Series, W Series, SMA and SPA Submersibles, and Tranquilizer® Surge Suppressors comply with the European Community Directive 2006/42/EC on Machinery, according to Annex VIII. This product has used Harmonized Standard EN809:1998+A1:2009, Pumps and Pump Units for Liquids - Common Safety Requirements, to verify conformance.

David Roseberry
Signature of authorized person

October 20, 2005
Date of issue

David Roseberry
Printed name of authorized person

Engineering Manager
Title

Revision Level: F

August 23, 2012
Date of revision

IDEX

CE

WARREN RUPP, INC.

EC / EU Declaration of Conformity

The objective of the declaration described is in conformity with the relevant Union harmonisation legislation: Directive 94/9/EC (until April 19, 2016) and Directive 2014/34/EU (from April 20, 2016).

Manufacturer:
Warren Rupp, Inc.
A Unit of IDEX Corportion
800 North Main Street
P.O. Box 1568
Mansfield, OH 44902 USA

Applicable Standard:
EN13463-1: 2001
EN13463-5: 2003
EN60079-25: 2004
Harmonised Standard:
EN13463-1: 2009
EN13463-5: 2011
EN60079-25:2010

The harmonised standards have been compared to the applicable standards used for certification purposes and no changes in the state of the art technical knowledge apply to the listed equipment.

AODD Pumps and Surge Suppressors
Technical File No.: 203104000-1410/MER

AODD (Air-Operated Double Diaphragm) Pumps
EC Type Examination Certificate No. Pumps: KEMA 09ATEX0071 X

DEKRA Certification B.V. (0344)
Meander 1051
6825 MJ Arnhem
The Netherlands

Hazardous Locations Applied:

I M1 c	II 1 G c T5
II 2 G Ex ia c IIC T5	II 1 D c T100°C
II 2 D Ex c iaD 20 IP67 T100°C	II 2 G c T5
II 2 G Eex m c II T5	II 2 D c T100°C
II 2 D c IP65 T100°C	

SANDPIPER®
A WARREN RUPP, INC. BRAND

Tranquilizer®

DATE/APPROVAL/TITLE:
18 March 2016

David Roseberry
David Roseberry, Director of Engineering

IDEX