



PERFORMIX® *PM170*

Bentonite Mixing System

OWNERS MANUAL

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SAFETY

SAFETY PRECAUTIONS

⚠ WARNING A hazard that could result in death, serious injury, or substantial property damage.

⚠ CAUTION A hazard that could result in minor personal injury or property damage.

NOTE: is used to notify people of important installation, operation, or maintenance information.

⚠ WARNING

Avoid Inhalation of Dust When Mixing Dry Drilling Cycles!



Work in Ventilated Area! Wear Breathing Protection!

Prolonged breathing of dust particles can cause serious respiratory illnesses.

130294

⚠ WARNING

Accidental Starts can cause severe injury or death.

Disconnect and ground spark plug lead(s) before servicing.

Before working on engine or equipment, disable engine as follows: 1) Disconnect spark plug lead(s). 2) Disconnect negative (-) battery cable from battery.

⚠ WARNING

Hot Parts can cause severe burns.

Do not touch engine while operating or just after stopping.

Never operate engine with heat shields or guards removed.

⚠ WARNING

Cleaning Solvents can cause severe injury or death.

Use only in well ventilated areas away from ignition sources.

Carburetor cleaners and solvents are extremely flammable. Follow cleaner manufacturer's warnings and instructions on its proper and safe use. Never use gasoline as a cleaning agent.

⚠ WARNING

Explosive Fuel can cause fires and severe burns.

Do not fill fuel tank while engine is hot or running.

Gasoline is extremely flammable and its vapors can explode if ignited. Store gasoline only in approved containers, in well ventilated, unoccupied buildings, away from sparks or flames. Spilled fuel could ignite if it comes in contact with hot parts or sparks from ignition. Never use gasoline as a cleaning agent.

⚠ WARNING

Rotating Parts can cause severe injury.

Stay away while engine is in operation.

Keep hands, feet, hair, and clothing away from all moving parts to prevent injury. Never operate engine with covers, shrouds, or guards removed.

⚠ WARNING

Carbon Monoxide can cause severe nausea, fainting or death.

Avoid inhaling exhaust fumes. Never run engine indoors or in enclosed spaces.

Engine exhaust gases contain poisonous carbon monoxide. Carbon monoxide is odorless, colorless, and can cause death if inhaled.

⚠ CAUTION

Electrical Shock can cause injury.

Do not touch wires while engine is running.

⚠ CAUTION

Damaging Crankshaft and Flywheel can cause personal injury.

Using improper procedures can lead to broken fragments. Broken fragments could be thrown from engine. Always observe and use precautions and procedures when installing flywheel.

⚠ CAUTION

Failure to utilize or reassemble debris screen as designed could result in debris screen failure and serious personal injury.

⚠ WARNING

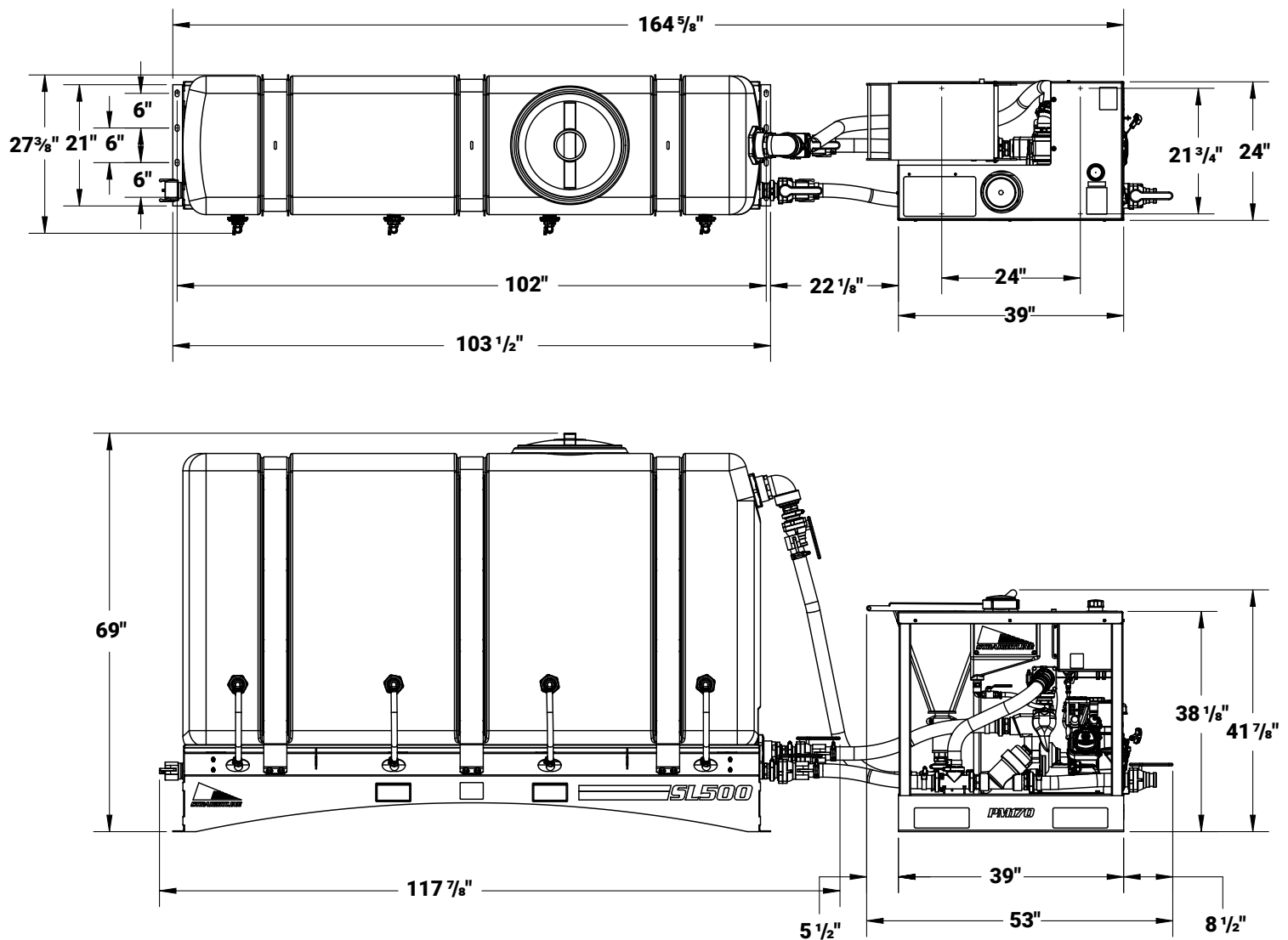
Uncoiling Spring can cause severe injury.

Wear safety goggles or face protection when servicing retractable starter.

Retractable starters contain a powerful, recoil spring that is under tension. Always wear safety goggles when servicing retractable starters and carefully follow instructions in Retractable Starter for relieving spring tension.

DIMENSIONS

***PM170 MIXER & SL500 TANK
ARE DESIGNED TO SIT 24" APART.***



StraightLine® Model PM170 Mixer Operation Instructions

Safety

This safety alert symbol (with associated alert message) appears on decals at various locations on this equipment. Carefully read and understand the cause of possible injury that each of these messages contain, then **HEED THE WARNING!**

- Do not operate this equipment unless you have been properly trained.
- Wear personal protective equipment and clothing, including safety glasses, hard hat, electrical insulating gloves, and boots to guard against possible contact with hazardous underground utilities, such as high voltage electric lines.
- Always shut this equipment down when performing maintenance.
- This unit must be mounted to a firm, stable structure.
- Avoid touching hot muffler with bare skin.
- Avoid inhalation of dust when mixing dry drilling clays. Wear a dust mask.
- Fuel and fumes can explode and cause serious burns or death. No smoking or open flames around fuel tank area.
- Avoid spilling fuel on hot muffler. Clean up all fuel spills as soon as they occur. **Turn the engine off while refueling.**

Operation

Before attempting to operate this equipment, study the diagram (shown) and become familiar with all the components and fluid circuits. Read the engine manual that is included with this unit and become familiar with all controls, fluid level checkpoints, filters, startup procedures and safety related instructions.

Prestart Fluid Line Valve Settings

- Discharge Valve on outlet line: **Closed**
 - Return Valve on return line: **Open**
 - Tank Inlet Valve on mixing line: **Open**
 - Hopper Valve on hopper: **Closed**
 - Antifreeze Tank Valve: **Closed**
- Three-way valve set to Hopper/Mud Pump
Pump: **Open** (This restriction will reduce cavitation)

Filling

Remove top lid of mixing tank and fill to capacity with clean potable water. Ensure that the Circulating Pump casing is allowed to fill with water in order to maintain a prime.

Engine Start

Ensure PM170 10 gallon fuel tank is full (E0-E10 87 octane unleaded gasoline). Open the fuel valve before starting the engine. Follow startup & run procedure as outlined in your engine manual.

- Engine fuel tank is plugged off and inoperable

Throttle Settings

For mixing: **HIGH**

For circulating to jets: **MID RANGE**

For transferring to mud pump: **LOW**

Mixing

- Start the engine and set to high throttle position
- Three-way valve set to mixing circuit (to hopper) position
- With hopper valve closed, fill the hopper with dry bentonite material
- Open hopper valve and introduce bentonite into the mixing circuit line After all material has cleared the hopper, close the hopper valve. Allow the mixing circuit to run as required to thoroughly mix the fluid and bring it to full "yield". Further mixing and yielding may be accomplished by moving the three-way valve to the circulation (to jets) setting.

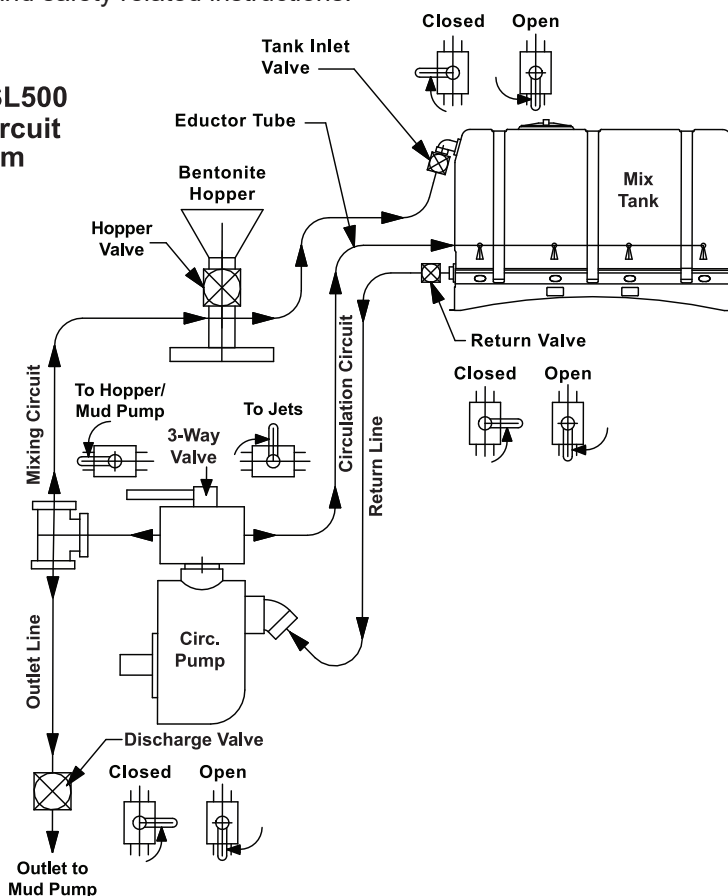
Shut Down

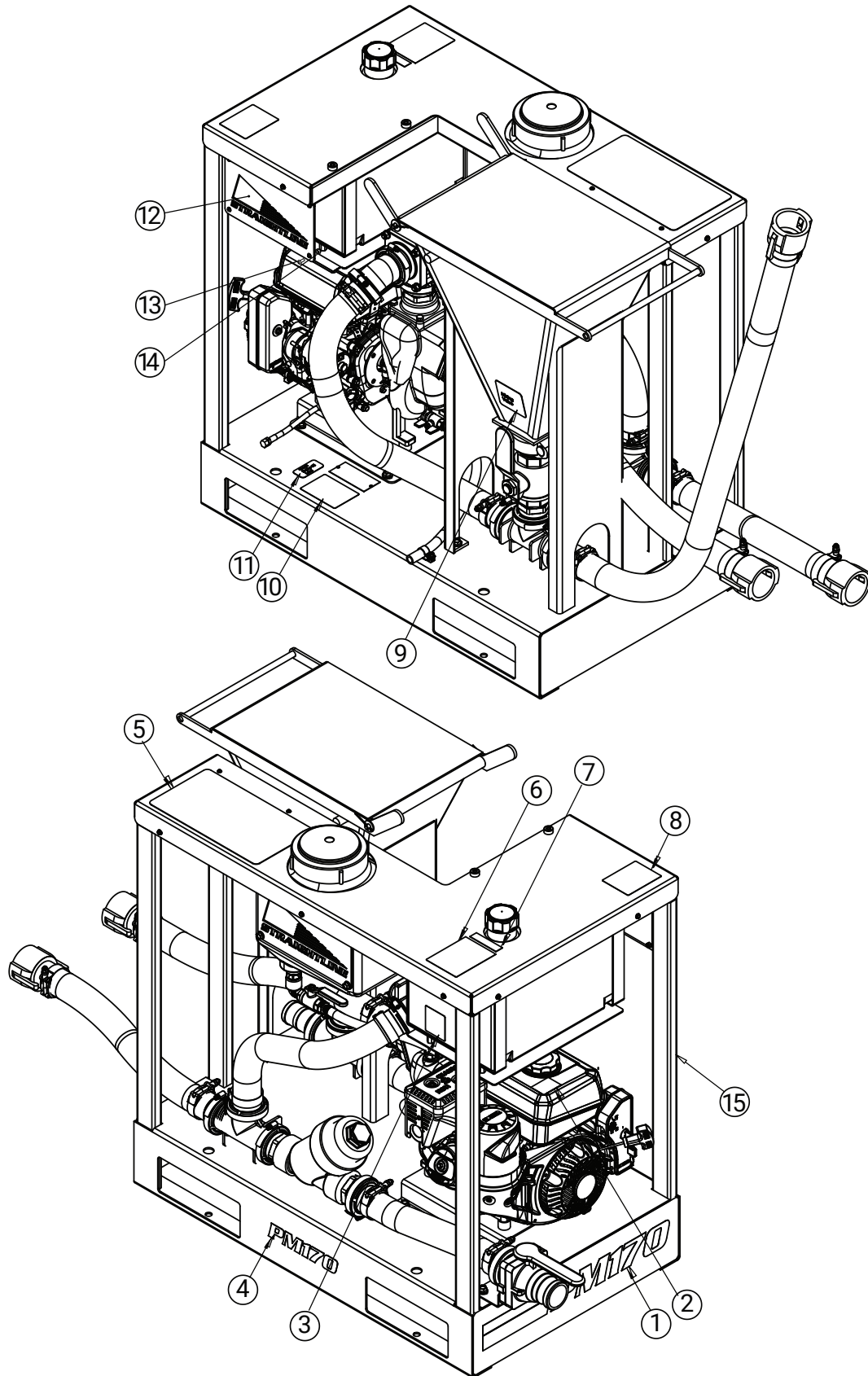
Set engine On/Off switch to **OFF**. Shut fuel tank valve off. If the unit is through working for the day, the drilling fluid must be off-loaded and the entire fluid system flushed with clean water (if under freezing condition, antifreeze must be added to the mixing pump).

Antifreeze Procedure

- With the engine **OFF**,
- Open all valves on the mixer
- Unhook all hoses from the tank using the quick connect fittings and drain
- Remove the drain plug on the front lower section of the pump and drain
- Install drain plug in the pump
- Open valve under the anti-freeze tank that drains into the pump
- After the tank is empty, close the valve under the anti-freeze tank
- Re-connect hoses to tank if desired

PM170 | SL500
Piping Circuit
Diagram

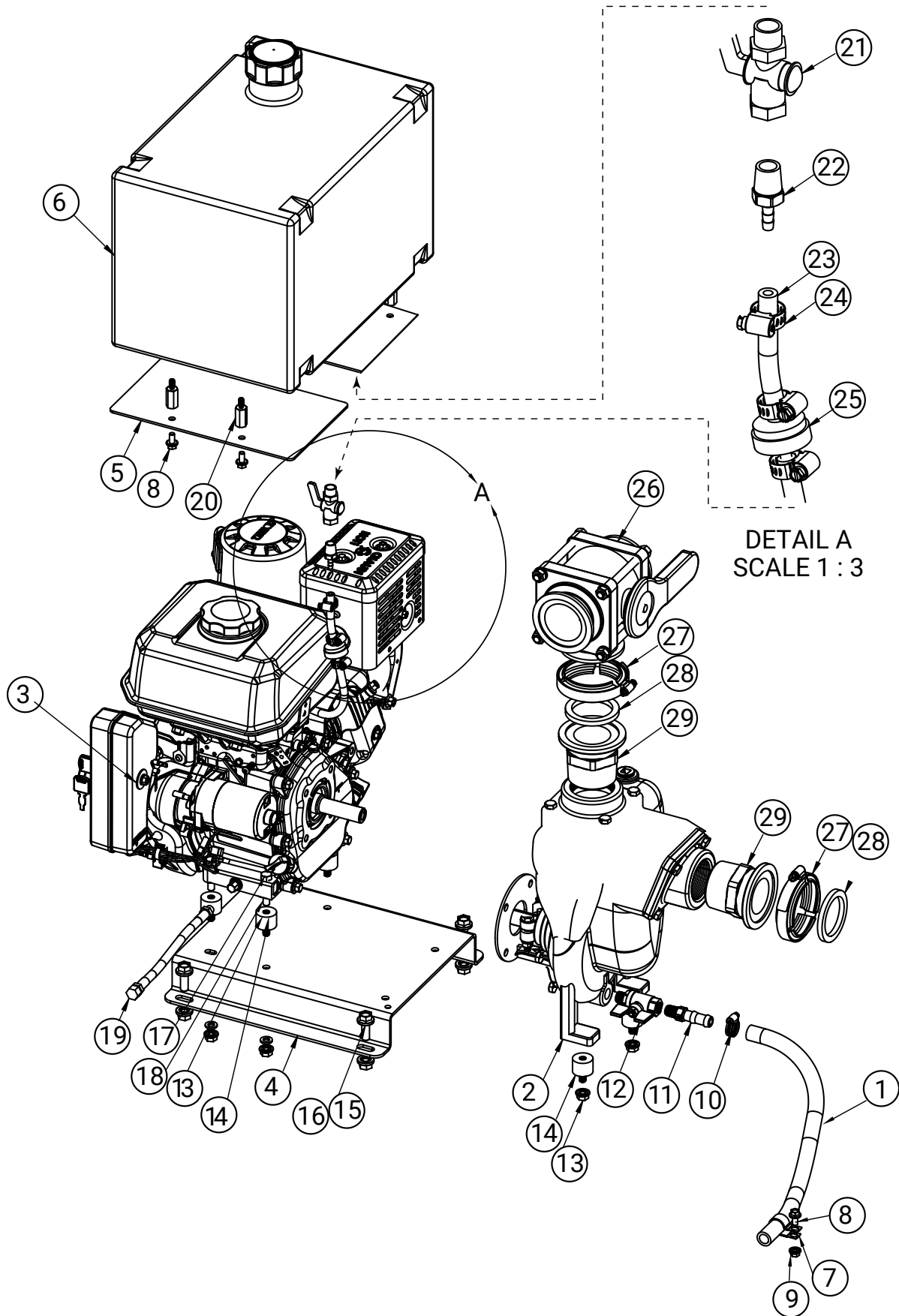




SAFETY DECALS / BRANDING

ITEM	PART #	DESCRIPTION	QTY
1	25062	DECAL, PM170 W/STRIPE	1
2	25065	DECAL, NOTICE, FUEL TANK INOPERABLE	1
3	120344	Decal, WARNING, HOT MUFFLER	1
4	25063	DECAL, PM170	1
5	25058	Decal, Operating Instructions_SL300	1
6	120285	Decal, DANGER, AVOID FUEL FIRE	1
7	23269	Decal, Use Unleaded Gasoline Only	1
8	120286	Decal, Warning_Avoid Breathing Dust	1
9	120271	Decal, Mixing Valve	1
10	750-114-02	DECAL, FLAG	1
11	120279	Decal, Check Engine Oil Level	1
12	68945	PERFORMIX, SS BACKER PLATE, SL WEDGE GUSSET PLATE	1
13	1024X12BHC SSS	SCREW, CAP, BUTTON HEAD, 10-24 x ½", STAINLESS	4
14	1024HNNL	NUT, HEX, NYLOCK, 10-24, GR5, ZN	4
15	71788	MAIN FRAME WELDMENT	1

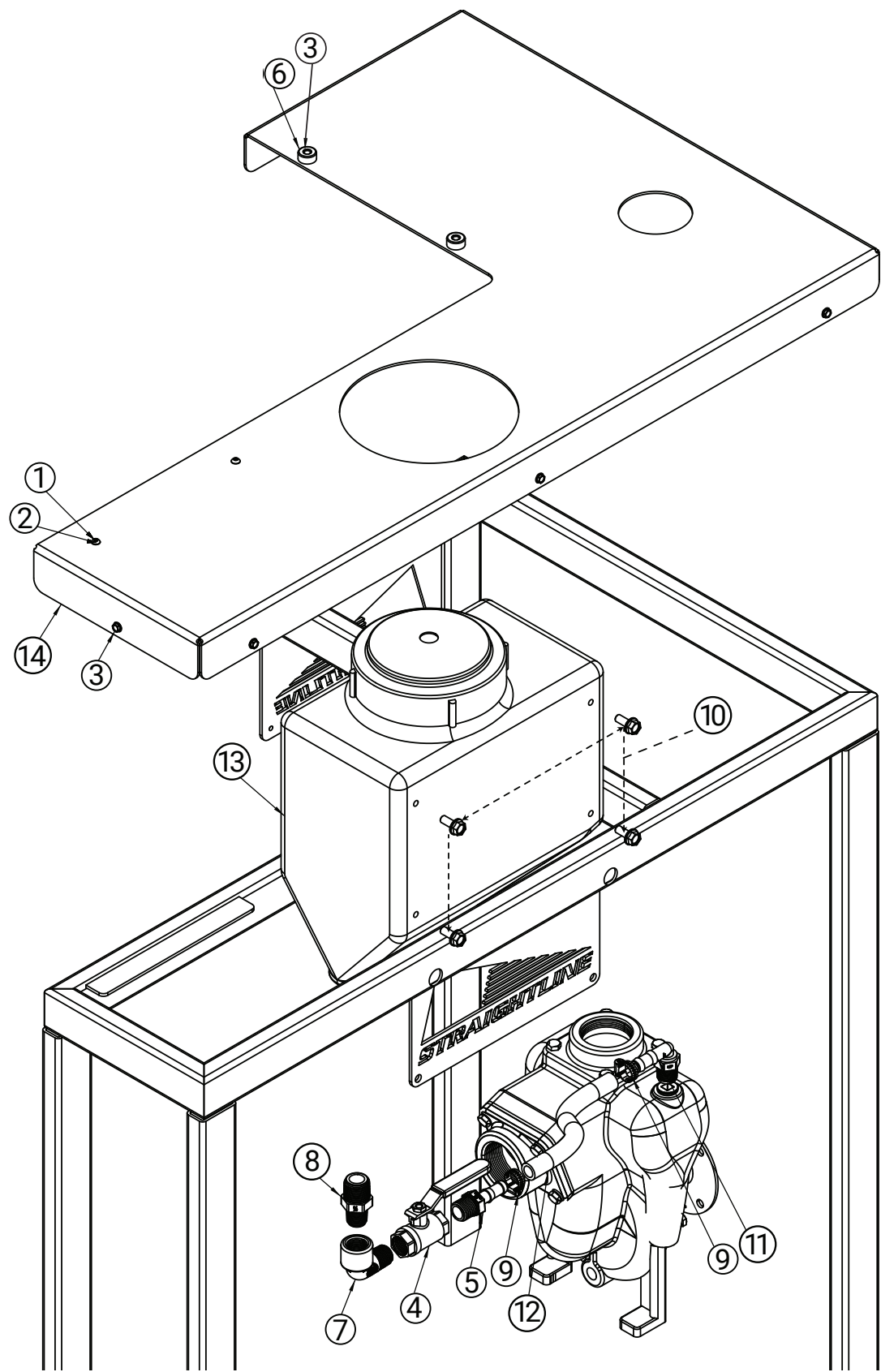
ENGINE AND PUMP MOUNT ASSEMBLY



ENGINE AND PUMP MOUNT ASSEMBLY

ITEM	PART #	DESCRIPTION	QTY
1	46938	HOSE, CLEAR PVC, BRAIDED, ½" ID, CLV12RE	1
2	23747	PUMP, FLOMAX, 2" ENG.. 21339, MP PUMPS	1
3	23901	Engine, Kohler, 7 HP, CH270-3011	1
4	68880	PERFORMIX, SL500, PLATE, MOTOR MOUNT	1
5	68971	PLATE, DEFLECTOR, FUEL TANK, SS	1
6	22000	FUEL TANK - PERFORMIX	1
7	24458	CLAMP, "P", ZINC, EPDM COATED, ¾" LOOP ID x ½" WIDE	1
8	1420X12WHB	BOLT, WHIZ, 1/4-20 X 1/2" LONG	5
9	1420WHN	NUT, WHIZ, 1/4-20	1
10	46943	CLAMP, HOSE, 5/16 ~ 7/8", #6, IDEAL	1
11	25072	Fitting, Poly, Banjo, Hose Barb, HB025-050	1
12	25073	Valve, Ball, Brass, 1/4 FNPT x MNPT	1
13	51618WHN	NUT, WHIZ, 5/16-18	6
14	24994	VIBRATION ISOLATOR - 9378K362	6
15	3816X1WHB	BOLT, WHIZ, 3/8-16 X 1" LONG	4
16	3816WHN	NUT, WHIZ, 3/8-16	4
17	51618X112HB	Bolt, Hex, 5/16-18 X 1 1/2, 13059	4
18	516LW	WASHER, LOCK, 5/16, (33620)	4
19	24993	DRAIN EXTENSION, OIL, DRAINZIT - Model: 1010	1
20	25074	STANDOFF, MALE-FEMALE THREADED HEX , MMC #93620A196	4
21	22169	VALVE-SHUTOFF, 0.250	1
22	23815	FITTING, 1/4 MP X 3/16 BARB, BRASS	1
23	706-106-02	3/16 X 25 INCH FUEL LINE, 2.09 ft (CUT-2 PIECES , BOTH SIDES OF FILTER)	1
24	46942	CLAMP, HOSE, 5/16 ~ 5/8", #4, IDEAL	4
25	23921	Filter, Fuel, 3/16 Inline, 315-1920	1
26	22457	Valve, 3-way, for 2inch hose	1
27	22543	BANJO - 2" FULL PORT MANIFOLD HOSE CLAMP	2
28	22535	BANJO - 2" BUNA GASKET	2
29	22534	BANJO - 2" MANIFOLD X 2" FULL PORT	2

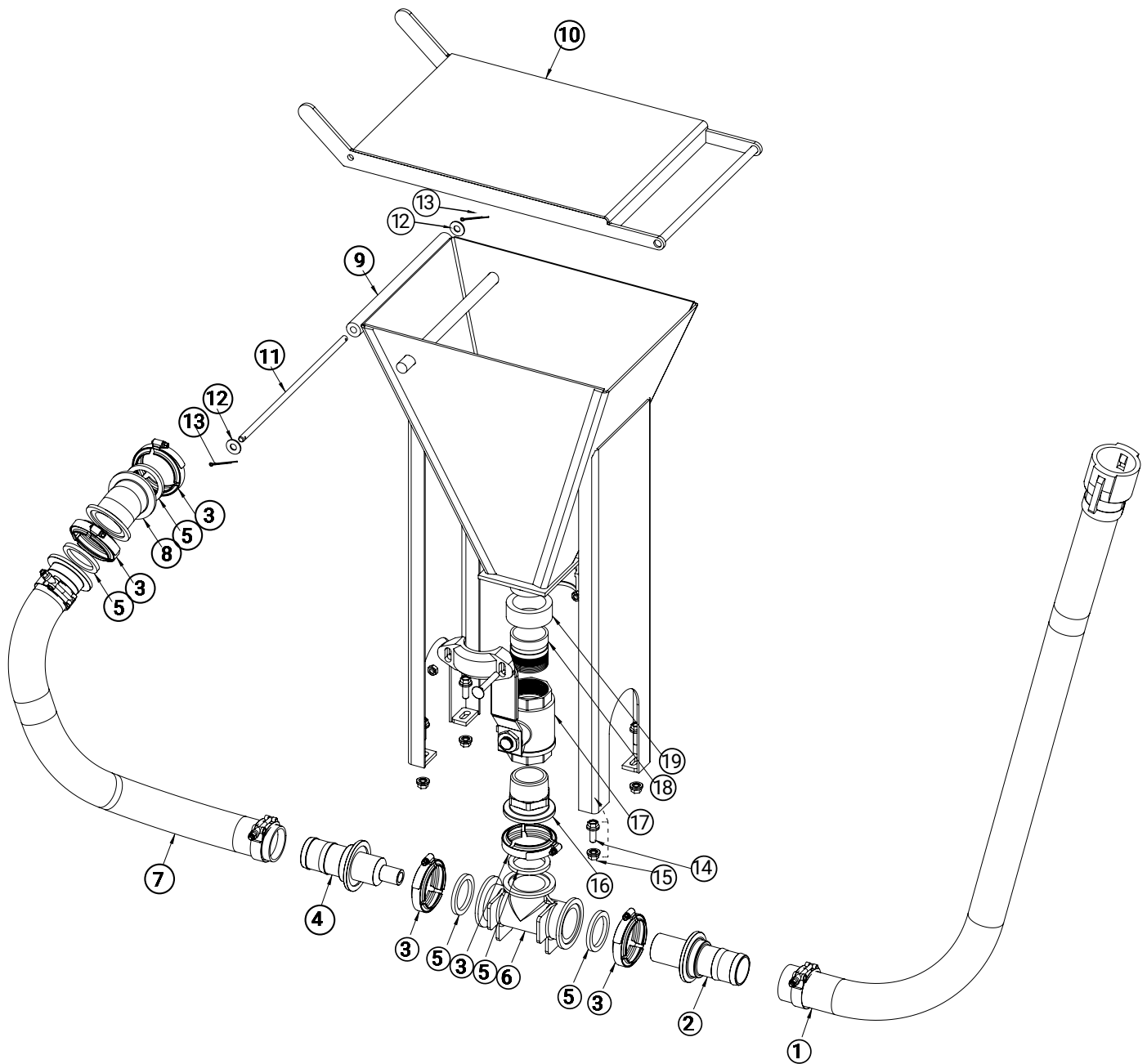
ANTIFREEZE TANK MOUNT



ANTIFREEZE TANK MOUNT

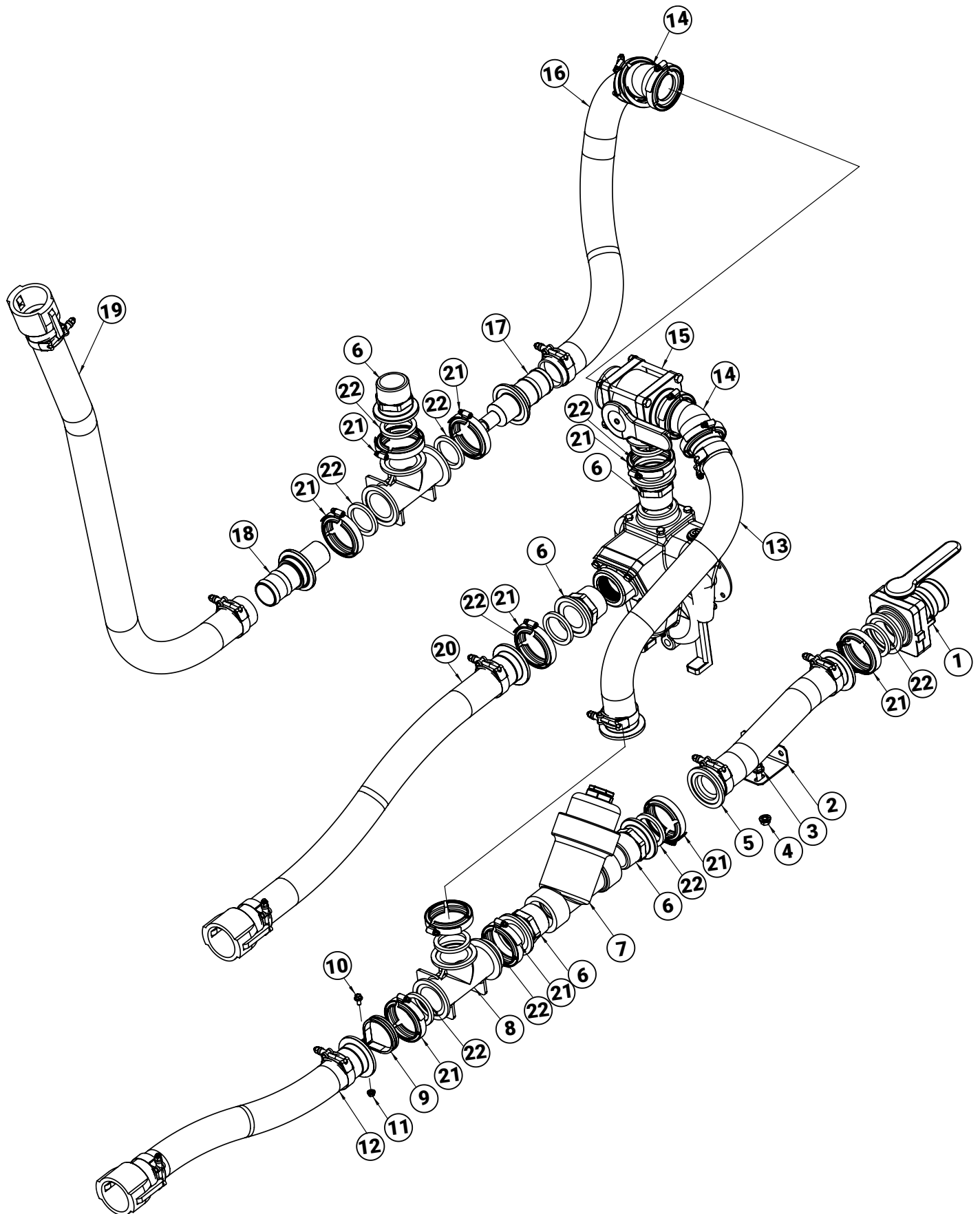
ITEM	PART #	DESCRIPTION	QTY
1	1024HNNL	NUT, HEX, NYLOCK, 10-24, GR5, ZN	2
2	1024X12BHCSSS	SCREW, CAP, BUTTON HEAD, 10-24 x ½", STAINLESS	2
3	10X34HHSDES	SCREW, HEX HEAD, SELF DRILLING, 10 X 3/4	9
4	22931	VALVE, BALL, BRASS, ½" NPT	1
5	23650	Fitting, Poly, Hose Barb, 1/2", HB050	1
6	24712	BUMPER-RUBBER	2
7	24969	Fitting, Poly, Banjo, 1/2", PIPE STREET 90DEG EL SL050-90	1
8	24975	FITTING, BANJO, 3/4 X 1/2 Male Reducing Nipple RN075-050	1
9	46943	CLAMP, HOSE, 5/16 ~ 7/8", #6, IDEAL	2
10	51618X34WHB	BOLT, WHIZ, 5/16-18 X 3/4" LONG	4
11	23651	Fitting, Poly, Hose Barb, 1/2" MPT x 1/2" HB, HB05090	1
12	46938	HOSE, CLEAR PVC, BRAIDED, ½" ID, CLV12RE	0.92 ft.
13	22548	Tank, Poly, PM170 Antifreeze, 7x12x14	1
14	71798	WELDMENT, PM170 LID	1

HOPPER AND VENTURI ASSEMBLY



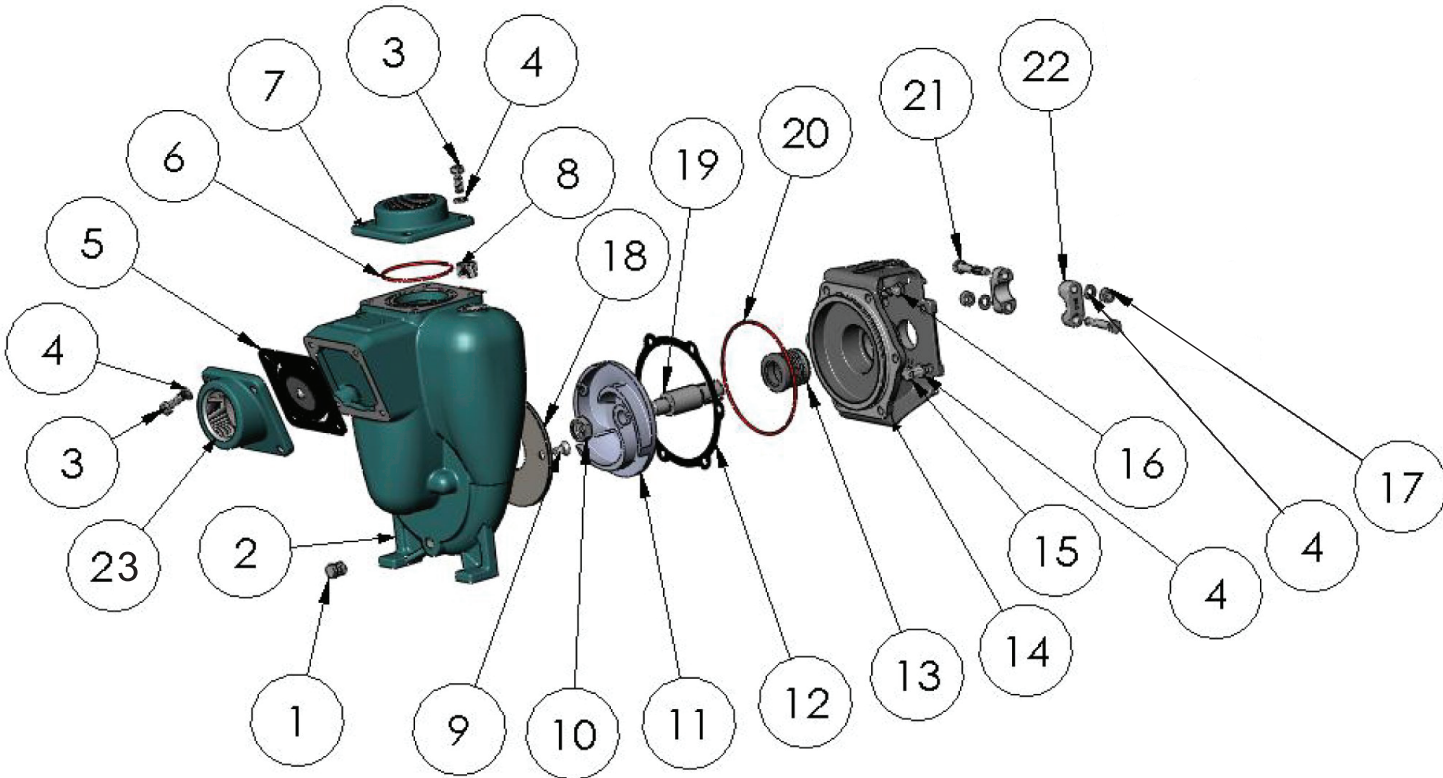
HOPPER AND VENTURI ASSEMBLY

ITEM	PART #	DESCRIPTION	QTY
1	81263	HOSE, VENTURI to TOP OF TANK, 2" X 49 INCH	1
2	64501	PERFORMIX 300 GAL - EDUCTOR VENTURI	1
3	22543	BANJO - 2" FULL PORT MANIFOLD HOSE CLAMP	5
4	64500	PERFORMIX 300 GAL - JET VENTURI	1
5	22535	BANJO - 2" BUNA GASKET	5
6	22695	FITTING, POLY, BANJO, M220TEE	1
7	81264	HOSE, 2-WAY VALCE TO VENTURI, 2" X 40 INCH	1
8	22582	FITTING, POLY, BANJO, M220CPG45	1
9	70887	HOPPER	1
10	70883	LID HOPPER	1
11	63935	ROD LID	1
12	38FW	WASHER, FLAT, 3/8"	2
13	236-2978-02	COTTER PIN-.125 X 1.250	2
14	3816X1WHB	BOLT, WHIZ, 3/8-16 X 1" LONG	4
15	3816WHN	NUT, WHIZ, 3/8-16	4
16	22534	BANJO - 2" MANIFOLD X 2" FULL PORT	1
17	236-7978-02	VALVE, BRASS, BALL, 2" NPT	1
18	64015	TUBE 2" GROOVLOK	1
19	120957	Coupler, Flex, Victaulic Firelock w/gasket, 2"	1



REPAIR PARTS

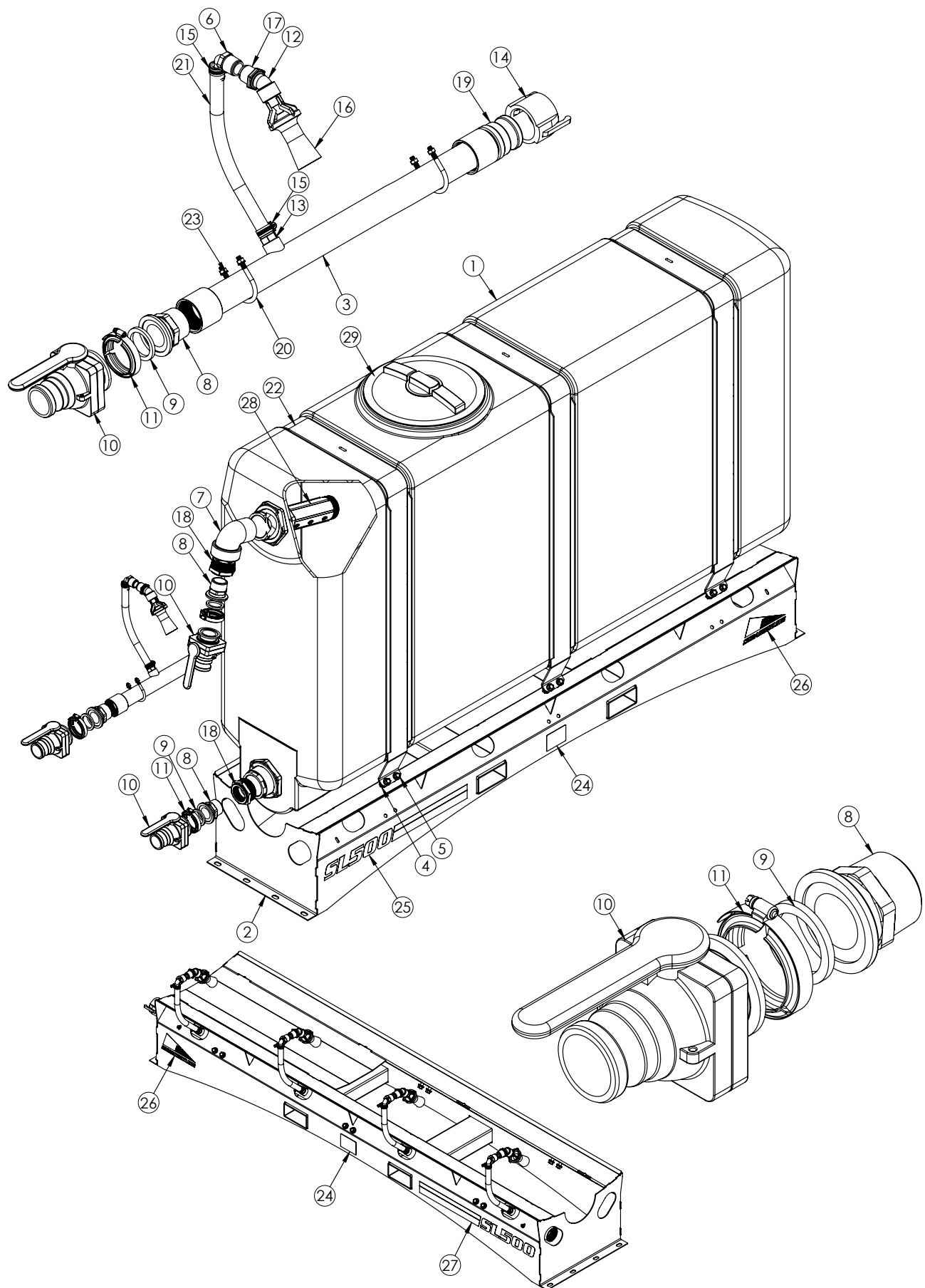
ITEM	PART #	DESCRIPTION	QTY
1	22537	BANJO - 2" FULL PORT FLANGE X 2" MALE CAM	1
2	68970	BRACKET, HOSE MOUNT	1
3	3816X1WHB	BOLT, WHIZ, 3/8-16 X 1" LONG	2
4	3816WHN	NUT, WHIZ, 3/8-16	2
5	81265	HOSE, FILTER TO DISCHARGE, 15 INCH	1
6	22534	BANJO - 2" MANIFOLD X 2" FULL PORT	5
7	121044	Filter Trap Assembly	1
8	22695	FITTING, POLY, BANJO, M220TEE	2
9	24965	P-CLAMP, 2 1/2 ID, (McMASTER-CARR 3225T32)	1
10	1420X12WHB	BOLT, WHIZ, 1/4-20 X 1/2" LONG	1
11	1420WHN	NUT, WHIZ, 1/4-20	1
12	81261	HOSE, TEE TO TANK JETS, 21 INCH	1
13	81282	HOSE, 2-WAY VALVE TO TEE, 24 INCH	1
14	22582	FITTING, POLY, BANJO, M220CPG45	2
15	22457	Valve, 3-way, for 2inch hose	1
16	81264	HOSE, 2-WAY VALCE TO VENTURI, 40 INCH	1
17	64500	PERFORMIX 300 GAL - JET VENTURI	1
18	64501	PERFORMIX 300 GAL - EDUCTOR VENTURI	1
19	81263	HOSE, VENTURI to TOP OF TANK, 49 INCH	1
20	81262	HOSE, TANK SUMP TO PUMPINLET, 29.5 INCH	1
21	22543	BANJO - 2" FULL PORT MANIFOLD HOSE CLAMP	14
22	22535	BANJO - 2" BUNA GASKET	14



PUMP


ITEM	PART #	DESCRIPTION	QTY
1	120140	PIPE PLUG• 1/4" NPT	2
2	25210	HOUSING	1
3	51618X78HB	CAPSCREW. 5/16"-18 X 7/8	8
4	516LW	LOCKWASHER - 5/16"	14
5	25211	FLAPPER ASSY.	1
6	25212	O RING- VITON	1
7	25213	DISCHARGE FLANGE.2" NPT	1
8	120138	FILL PLUG ZPS. 1/2"NPT	1
9	51618X58FHCSSS	SCREW S.S. FHS 5/16-18 X .63	2
10	25286	Nut, Hex, Jam, 5/8-18 SS	1
11	25214	IMPELLER C.I.- 05.00	1
12	25215	GASKET. NI-2085	1
13	25216	SEAL ASSY. T-2100 VITON	1
14	25217	ADAPTER C.I.	1
15	51618X78HBSS	CAPSCREW S.S. • 5/16-18 X .88	4
16	25218	CAPSCREW S.S. • 5/16-18 X .75 PATCH	6
17	51618HNSS	HEXNUT S.S.- 5/16-18	2
18	25219	WEAR PLATE STL	1
19	25220	DRIVE SHAFT / SLEEVE S.S.- 3/4"	1
20	25221	O RING - VITON	1
21	51618X134HB	CAPSCREW-5/16"-18 X 1 3/4	2
22	25222	CLAMPS, S.S. ASSEMBLY	2
23	25224	SUCTION FLANGE C.I.	1

SL500 ASSEMBLY / PARTS LIST



SL500 ASSEMBLY / PARTS LIST

ITEM	PART #	DESCRIPTION	QTY
1	24835	TANK ASSEMBLY, POLY, SL, SQUARED, 500 GAL	1
2	71759	CRADLE FRAME, PERFORMIX, ULTRA MIX SYSTEM PUMP, 500 GAL	1
3	71794	SL, PERFORMIX, 500 SQ. TANK, EDUCTOR TUBE WELDMENT	1
4	1213WHN	NUT, WHIZ, 1/2-13	12
5	1213X112WHB	BOLT, WHIZ, 1/2-13 X 1 1/2" LONG	12
6	203-169-02	FITTING, POLY, BANJO, HB10007590	4
7	22527	BANJO - 3" STREET ELBOW	1
8	22534	BANJO - 2" MANIFOLD X 2" FULL PORT	3
9	22535	BANJO - 2" BUNA GASKET	3
10	22537	BANJO - 2" FULL PORT FLANGE X 2" MALE CAM	3
11	22543	BANJO - 2" FULL PORT MANIFOLD HOSE CLAMP	3
12	22549	FITTING, POLY, STREET ELBOW, 3/4" 45DEG	4
13	22550	FITTING, POLY, HOSE BARB, 3/4" MPT x 3/4" HOSE BARB	4
14	22554	FITTING, POLY, CAMLOCK CAP, 2"	1
15	22556	HOSE CLAMP, 3/4" TO 1-3/4"	8
16	22610	TANK GUN - POLY - 3/4 MPT	4
17	22611	FITTING, POLY, BANJO, RB 100-075	4
18	23057	Fitting, Poly, Banjo, Bushing, RB300200	2
19	236-3757-02	QUICK CONNECT-2.00 M X 2.00 MNPT	1
20	24921	U-Bolt, 5/16 x 2 1/8" ID MMC#(3042T89)	2
21	24972	HOSE, CLEAR PVC, BRAIDED, 3/4" ID	4
22	71808	STRAP WELDMENT	3
23	516LW	WASHER, LOCK, 5/16, (33620)	4
24	750-114-02	DECAL, FLAG	2
25	25067	DECAL, SL500 W/STRIPE, LH	1
26	236-9443-02	STRAIGHTLINE LOGO - 4" X 8.5"	2
27	25061	DECAL, SL500 W/STRIPE, RH	1
28	25139	Fitting, Poly, Banjo, Nipple, 3 NPT x 12, NIP300-12	1
29	23748	16" Tank Lid, Ring and 4" Center Lid / Vent	1

	<p style="text-align: center;">⚠ WARNING</p> <p>Accidental Starts can cause severe injury or death.</p> <p>Disconnect and ground spark plug lead(s) before servicing.</p>	<p>Before working on engine or equipment, disable engine as follows: 1) Disconnect spark plug lead(s). 2) Disconnect negative (–) battery cable from battery.</p>
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Normal maintenance, replacement or repair of emission control devices and systems may be performed by any repair establishment or individual; however, warranty repairs must be performed by a Kohler authorized dealer.

MAINTENANCE SCHEDULE

Weekly

- Check heavy-duty air cleaner. *AIR CLEANER / INTAKE*

Every 25 Hours or Annually¹

- Service/replace low-profile precleaner. *AIR CLEANER / INTAKE*

Every 100 Hours or Annually¹

- Replace low-profile air cleaner element. *AIR CLEANER / INTAKE*
- Change oil. *LUBRICATION SYSTEM / CLUTCH*
- Remove cooling shrouds and clean cooling areas. *AIR CLEANER / INTAKE*
- Check oil cooler fins, clean as necessary (if equipped). *LUBRICATION SYSTEM*

Every 200 Hours

- Change oil filter. *LUBRICATION SYSTEM*
- Replace fuel filter.

Every 250 Hours¹

- Replace heavy-duty air cleaner element and check inner element. *AIR CLEANER / INTAKE*

Every 300 Hours³

- Change oil and filter (KOHLE PRO 10W-50 oil and KOHLE PRO filter only). *LUBRICATION SYSTEM*

Every 500 Hours¹

- Replace heavy-duty inner air cleaner element. *AIR CLEANER / INTAKE*
- Replace spark plugs and set gap. *ELECTRICAL SYSTEM*

Every 500 Hours²

- Have crankshaft spline lubricated.
- 1. Perform these procedures more frequently under severe, dusty, dirty conditions.
- 2. Have a Kohler authorized dealer perform this service.
- 3. Option only if using KOHLE® PRO oil and PRO filter.

REPAIRS/SERVICE PARTS

Kohler genuine service parts can be purchased from Kohler authorized dealers. To find a local Kohler authorized dealer visit KohlerEngines.com or call 1-800-544-2444 (U.S. and Canada).



MAINTENANCE

OIL RECOMMENDATIONS


All-season KOHLER® PRO 10W-50 Synthetic Oil is the ideal oil for KOHLER engines. It is specifically formulated to extend the oil and oil filter change interval to 300 Hours when paired with a KOHLER PRO Extended Life Oil Filter.

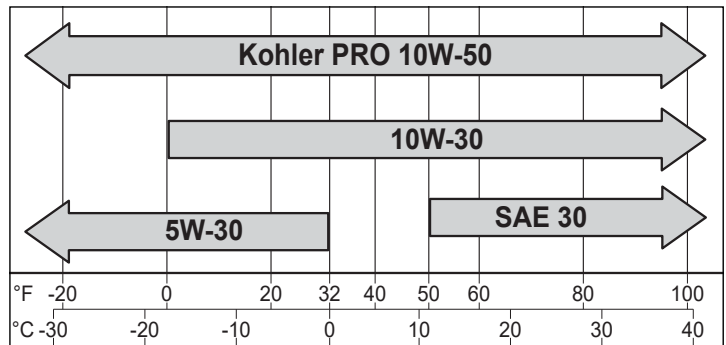
300-Hour oil and oil filter change intervals are exclusive to and only authorized on KOHLER engines that utilize both the KOHLER PRO 10W-50 Synthetic Oil and KOHLER PRO Extended Life Oil Filter. Alternative engine oils and oil filters may be used with KOHLER engines but require 100-Hour oil and 200-Hour oil filter change intervals for proper maintenance. Oil must be API (American Petroleum Institute) service class SJ or higher. Select viscosity based on air temperature at time of operation as shown below.

STORAGE

If engine will be out of service for 2 months or more follow procedure below.

1. Add Kohler PRO Series fuel treatment or equivalent to fuel tank. Run engine 2-3 minutes to get stabilized fuel into fuel system (failures due to untreated fuel are not warrantable).
2. Change oil while engine is still warm from operation (NOT required if using KOHLER PRO 10W-50 full-synthetic oil). Remove spark plug(s) and pour about 1 oz. of engine oil into cylinder(s). Replace spark plug(s) and crank engine slowly to distribute oil.
3. Disconnect negative (-) battery cable.
4. Store engine in a clean, dry place.

	⚠ WARNING
	Explosive Fuel can cause fires and severe burns.
	Do not fill fuel tank while engine is hot or running.
Gasoline is extremely flammable and its vapors can explode if ignited. Store gasoline only in approved containers, in well ventilated, unoccupied buildings, away from sparks or flames. Spilled fuel could ignite if it comes in contact with hot parts or sparks from ignition. Never use gasoline as a cleaning agent.	



NOTE: E15, E20 AND E85 are NOT approved and should NOT be used; effects of old, stale or contaminated fuel are not warrantable

Fuel must meet these requirements:

- Clean, fresh, unleaded gasoline.
- Octane rating of 87 (R+M)/2 or higher.
- Research Octane Number (RON) 90 octane minimum.
- Gasoline up to 10% ethyl alcohol, 90% unleaded is acceptable.
- Methyl Tertiary Butyl Ether (MTBE) and unleaded gasoline blend (max 15% MTBE by volume) are approved.
- Do not add oil to gasoline.
- Do not overfill fuel tank.
- Do not use gasoline older than 30 days.

WARRANTY

StraightLine HDD, Inc. (Company) warrants this equipment for 12 months or 1000 hours to be free from defects in material and workmanship, under normal use. Equipment and components not manufactured by StraightLine HDD are covered to the extent of the original manufacturer's warranty and subject to their allowance only if found defective by such manufacturer.

This Limited Warranty covers parts deemed defective by StraightLine HDD, Inc. which aren't covered under original manufacturer's warranty, only and does not cover any labor costs for diagnosis, troubleshooting, removal, installation, export duties, shipping, freight, or other transportation to or from the company.

Exclusion of Warranties: *Except for warranties expressly made herein. StraightLine HDD makes no other warranties, and liability hereunder is in lieu of all other merchantability or fitness for a particular purpose. StraightLine HDD reserve the right to modify, alter and improve any product without incurring any obligation to replace any product previously sold with such modification. No person is authorized to give any other warranty, or assume any additional obligation on StraightLine HDD's behalf.*

FlowMax Warranty

1. Limited Warranty. Seller warrants to Buyer and, if Buyer is not the original end-user purchaser, to the original end-user purchaser, that the goods sold will be free from defects in material and workmanship (in either case the "Limited Warranty"). The period of the Limited Warranty (the "Warranty Period") shall be twenty-four months for FLO-MAX® brand product (except for the drive, which is warranted for twelve months) and twelve months for all other goods, in each case measured from the date of sale to the Buyer or the original end user purchaser as applicable. This Limited Warranty covers only parts of new goods which are found upon examination by Seller's factory in Fraser, Michigan, to be defective in material or workmanship as delivered to Buyer or the original end-user purchaser as applicable. Except as expressly set forth in this Section 10 or specifically authorized by an executive officer of Seller in writing, the Limited Warranty is not transferable or assignable and any such transfer or assignment is void. The Limited Warranty does not cover service trips, service calls, costs of removing and reinstalling goods or components and other labor charges or the cost of shipment of replacement parts. The Limited Warranty does not cover and excludes damages due to (i) failure to install, label, operate or maintain goods as directed in any instruction manual or bulletin or under applicable law or regulation, (ii) misuse, abuse, neglect or modification of the goods in any way, (iii) improper service, use of replacement.

MP PUMPS, INC. PHONE: (800) 563-8006 FAX: (586) 293-8469 www.mppumps.com

Parts or accessories that are not specified by Seller, (iv) improper installation, incorrect supply, accident, fire, flood, acts of God or other casualty, (v) use of any goods other than their intended purpose and normal usage, (vi) damage during shipment (all claims must be filed with carrier), or (vii) incompatibility with items not supplied by Seller. Wear items or normal maintenance items including but not restricted to seals and wear plates, etc. are not included under the Limited Warranty. No warranty coverage is applicable if Buyer or the original end-user purchaser cannot prove the original purchase date, the data plate and/or serial number on any goods is removed, defaced, modified or altered in any way, or Seller is not permitted to inspect the damaged goods.

The Limited Warranty is VOID if the goods are not decontaminated prior to return to Seller or if the material pumped is not identified as provided below.

2. Securing Warranty Service. Warranty service can be arranged by contacting Seller at M. P. PUMPS, Inc., c/o Service Manager, 34800 Bennett Drive, Fraser, Michigan 48026. Warranty service can only be obtained through Seller at its factory in Fraser, Michigan. At the time of requesting warranty service, evidence must be presented of the date of sale to the Buyer or original end-user purchaser as applicable and the serial number of the goods. Seller, at its option, will supply a "Return Goods Authorization Form" ("RGA") or will prepare an RGA and provide an RGA reference number. The person requesting service must fully identify the product pumped and that product shall be listed on the RGA. All goods or parts returned to Seller for any reason must be completely and properly decontaminated prior to delivery to Seller. If the product pumped requires a Material Safety Data Sheet ("MSDS"), reference to this fact must be indicated under "Application Information" on the RGA form which must be returned with the part(s) or if an RGA was completed by Seller the person requesting service must provide the RGA reference number. A copy of all applicable MSDS's must also be included with the returned RGA forms or with the RGA reference number. New or unused goods need not be decontaminated. This fact must be indicated under "Application Information" on the RGA form which must be returned with the goods. The person seeking service shall pay any charges for making service calls and/or for transporting the goods to and from the place where the inspection and/or warranty work is performed. Goods submitted for inspection and/or warranty work that are not covered by the Limited Warranty or which do not comply with the requirements of this section will be returned to the sender at the sender's expense or scrapped at Seller's facility and no credits will be issued. The person requesting service shall be responsible for any damage or loss incurred in connection with the transportation of the goods or any component submitted for inspection and/or warranty work. 12. Limitation on Warranties/Damages. Any claim under the Limited Warranty must be made within the Warranty Period or such claim is waived. No person (including without limitation any dealer or distributor) other than an executive officer of Seller has authority to change or extend the terms of the Limited Warranty, and Buyer confirms that no other warranty terms have been extended by Seller or are applicable to the goods. Change or extensions to the terms of the Limited Warranty (whether before or after sale) are binding only if confirmed in writing by Seller's duly authorized executive officer. Except as set forth in these terms, Seller makes no representation or warranty of any type, express or implied, including any warranty of merchantability, warranty of fitness for a particular purpose or warranty of non-infringement or warranty arising from any course of dealing, course of performance or usage of trade. Seller will not under any circumstances, be liable for any special, indirect, punitive or consequential damages (even if Seller has been notified of the possibility of such damages) resulting from or related to a product including, without limitation, any loss of profits, or loss of opportunity. Some jurisdictions do not allow limitations on warranties or damages, so this limitation or exclusion may not apply.

WARRANTY

LIMITED WARRANTY, COMMAND PRO

Kohler Co. warrants to the original retail consumer that each new engine will be free from manufacturing defects in materials or workmanship for the applicable coverage period as set forth below, beginning on date of purchase; provided the engine is operated and maintained in accordance with Kohler Co.'s instructions and manuals.

Type of use:

Residential - 3 Years

Commercial/Rental - 3 Years

Our obligation under this warranty is expressly limited, at our option, to the replacement or repair of such part or parts as inspection shall disclose to be defective at Kohler Co., Kohler, Wisconsin 53044, or at a service facility designated by Kohler Co.



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EXCLUSIONS:

Mufflers on engines used commercially (non-residential) are warranted for one (1) year from date of purchase, except catalytic mufflers, which are warranted for two (2) years. The following items are not covered by this warranty.

- Damage caused as a result of an accident or casualty.
- Failures caused by faulty repairs made by others.
- Failures caused by use of non-Kohler replacement service parts.
- Transportation charges in connection with the repair or replacement of defective parts.
- Repairs caused from improper storage, old or contaminated fuel left within the fuel system (tanks, fuel lines or carburetor).
- Damage caused from unreasonable use or neglect, normal wear, or premature wear from improper maintenance.
- Engine accessories such as fuel tanks, clutches, transmissions, power drive assemblies, and batteries, unless supplied or installed by Kohler Co. These are subject to the warranties, if any, of their manufacturers.

IMPLIED OR STATUTORY WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY LIMITED TO THE DURATION OF THIS WRITTEN WARRANTY. WE MAKE NO OTHER EXPRESS WARRANTY, OR IS ANYONE AUTHORIZED TO MAKE ANY ON OUR BEHALF. KOHLER CO. AND/OR THE SELLER SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND.

Some states or countries do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from country to country, or state to state within U.S.A.

TO OBTAIN WARRANTY SERVICE:

Original retail consumer must bring the engine to an authorized Kohler dealer found by visiting www.KohlerEngines.com or telephone 1-800-544-2444 (U.S.A. and Canada).

Warranty Conditions-Australia

The benefits given to you under this warranty are in addition to other rights and remedies that you have under Australian law in relation to the goods. All costs associated with claiming under this warranty must be borne by the consumer, including transport costs incurred in the repair or replacement of any defective part. Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Kohler Co. Service Agent in Australia:

EPG Engines

31 Powers Road

Seven Hills, NSW, 2147

61 2 9830 2295

61 1800 069 399

www.epgengines.com.au

ENGINE DIVISION, Kohler Co., Kohler Wisconsin

B) CALIFORNIA AND FEDERAL EXHAUST AND EVAPORATIVE EMISSIONS CONTROL WARRANTY STATEMENT YOUR WARRANTY RIGHTS AND OBLIGATIONS

The California Air Resources Board, US Environmental Protection Agency ("US EPA") and Kohler Co. are pleased to explain the exhaust and evaporative emissions control systems warranty on your 2020-2022 Small Off-Road Engine ("SORE") and engine powered equipment as applicable. In California and the USA, new equipment that use SORE must be designed, built and equipped to meet California and US EPA stringent anti-smog standards. Kohler Co. must warrant the emission control systems on your SORE and engine powered equipment for the period listed below provided there has been no abuse, neglect or improper maintenance of your SORE or engine powered equipment leading to the failure of the emission control systems. Your exhaust emission control systems may include parts such as carburetors, fuel-injection systems, the ignition system, and catalytic converters. Also included may be an evaporative emission control system which may include parts such as fuel tanks, fuel lines (for liquid fuel and vapors), fuel caps, valves, carbon canisters, clamps, connectors, and other associated components.

MANUFACTURER'S WARRANTY COVERAGE:

The 1995 and later SORE exhaust and evaporative emission control systems are warranted for three years. If any exhaust or evaporative emission-related part on your SORE or engine powered equipment is defective, the part will be repaired or replaced by Kohler Co.

OWNER'S WARRANTY RESPONSIBILITIES:

As the SORE or engine powered equipment owner, you are responsible for the performance of the required maintenance listed in your owner's manual. Kohler Co. recommends that you retain all receipts covering maintenance on your SORE or engine powered equipment, but Kohler Co. cannot deny warranty coverage solely for the lack of receipts. As the SORE or engine powered equipment owner, you should however be aware that Kohler Co. may deny you warranty coverage if your SORE or engine powered equipment or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

You are responsible for presenting your SORE or engine powered equipment to a Kohler Co. distribution or service center as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days. If you have a question regarding your warranty coverage, you should contact a Kohler Dealer at 1-800-544-2444 or visit www.kohlerengines.com.

GENERAL EMISSIONS WARRANTY COVERAGE

The warranty period begins on the date the engine or equipment is delivered to an ultimate purchaser. Kohler Co. warrants to the ultimate purchaser and each subsequent purchaser that the engine is: Designed, built, and equipped so as to conform with all applicable regulations adopted by the Air Resources Board and US EPA; and free from defects in materials and workmanship that cause the failure of a warranted part to be identical in all material respects to the part as described in the engine manufacturer's application for certification for the warranty period stated above.

THE WARRANTY ON EMISSIONS-RELATED PARTS IS AS FOLLOWS

1. Any warranted part that is not scheduled for replacement as required maintenance in the owner's manual supplied, is warranted for the warranty period stated above. If any such part fails during the period of warranty coverage, the part will be repaired or replaced by Kohler Co. at no charge to the owner. Any such part repaired or replaced under the warranty will be warranted for the remaining warranty period.
2. Any warranted part that is scheduled only for regular inspection in the owner's manual supplied, is warranted for the warranty period stated above. Any such part repaired or replaced under warranty will be warranted for the remaining warranty period.
3. Any warranted part that is scheduled for replacement as required maintenance in the owner's manual supplied, is warranted for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part will be repaired or replaced by Kohler Co. at no charge to the owner. Any such part repaired or replaced under warranty will be warranted for the remainder of the period prior to the first scheduled replacement point for the part.
4. Add-on or modified parts that are not exempted by the Air Resources Board may not be used. The use of any non-exempted add-on or modified parts by the ultimate purchaser will be grounds for disallowing a warranty claim. The manufacturer will not be liable to warrant failures of warranted parts caused by the use of a non-exempted add-on or modified part.

PARTS COVERED BY WARRANTY

Listed below are the parts (if equipped) covered by the Federal and California Emission Control Systems Warranty. Some parts listed below may require scheduled maintenance and are warranted up to the first scheduled replacement point for that part.

- Oxygen sensor
- Intake manifold
- Exhaust manifold
- Catalytic muffler
- Thermal reactor muffler
- Spark advance module
- Crankcase breather
- Air Injection System
 - Air pump or pulse valve assembly
 - Control/distribution valve
 - Distribution manifold
 - Air hoses
 - Vacuum lines
- Ignition module(s) with high tension lead
- Gaseous fuel regulator
- Electronic control unit
- Carburetor or fuel injection system
- Fuel metering valve
- Air filter, fuel filter, and spark plugs (only to first scheduled replacement point)
- Evaporative System
 - Carbon canister and carbon canister mounting bracket
 - Carbon canister filter
 - Purge port/orifice connector
 - Fuel tank
 - Fuel cap and fuel cap gasket
 - Primer bulb canister
 - Fuel line (for liquid fuel and fuel vapors), fuel line fittings and clamps
 - Carburetor purge port connector

LIMITATIONS

This Emission Control Systems Warranty shall not cover any of the following:

- Consequential damages such as loss of time, inconvenience, loss of use of the engine or equipment, etc
- Diagnosis and inspection fees that do not result in eligible warranty service being performed

C) CALIFORNIA AND FEDERAL EXHAUST EMISSION CONTROL WARRANTY STATEMENT YOUR WARRANTY RIGHTS AND OBLIGATIONS

The California Air Resources Board, US Environmental Protection Agency ("US EPA") and Kohler Co. are pleased to explain the exhaust emission control systems warranty on your 2020-2022 Off-Road Large Spark-Ignition engine displacing less than 1 liter ("LSI <1L") and engine powered equipment as applicable. In California and the USA, LSI <1L must be designed, built and equipped to meet California and US EPA stringent anti-smog standards. Kohler Co. must warrant the emission control systems on your LSI <1L for the period listed below provided there has been no abuse, neglect or improper maintenance of your LSI <1L. Your exhaust emission control systems may include parts such as carburetors, fuel-injection systems, the ignition system, and catalytic converters.

MANUFACTURER'S WARRANTY COVERAGE:

The 1995 and later LSI <1L exhaust emission control system is warranted for three years. If any exhaust emission-related part on your LSI <1L is defective, the part will be repaired or replaced by Kohler Co.

OWNER'S WARRANTY RESPONSIBILITIES:

As the LSI <1L owner, you are responsible for the performance of the required maintenance listed in your owner's manual. Kohler Co. recommends that you retain all receipts covering maintenance on your LSI <1L, but Kohler Co. cannot deny warranty solely for the lack of receipts. As the LSI <1L owner, you should however be aware that Kohler Co. may deny you warranty coverage if your LSI <1L or a part has failed due to abuse, neglect, improper maintenance, or unapproved modifications.



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The California Air Resources Board, US Environmental Protection Agency ("US EPA") and Kohler Co. are pleased to explain the exhaust emission control systems warranty on your 2020-2022 Off-Road Large Spark-Ignition engine displacing less than 1 liter ("LSI <1L") and engine powered equipment as applicable. In California and the USA, LSI <1L must be designed, built and equipped to meet California and US EPA stringent anti-smog standards. Kohler Co. must warrant the emission control systems on your LSI <1L for the period listed below provided there has been no abuse, neglect or improper maintenance of your LSI <1L.

Your exhaust emission control systems may include parts such as carburetors, fuel-injection systems, the ignition system, and catalytic converters.

MANUFACTURER'S WARRANTY COVERAGE

The 1995 and later LSI <1L exhaust emission control system is warranted for three years. If any exhaust emission-related part on your LSI <1L is defective, the part will be repaired or replaced by Kohler Co.

OWNER'S WARRANTY RESPONSIBILITIES:

As the LSI <1L owner, you are responsible for the performance of the required maintenance listed in your owner's manual. Kohler Co. recommends that you retain all receipts covering maintenance on your LSI <1L, but Kohler Co. cannot deny warranty solely for the lack of receipts. As the LSI <1L owner, you should however be aware that Kohler Co. may deny you warranty coverage if your LSI <1L or a part has failed due to abuse, neglect, improper maintenance, or unapproved modifications.

You are responsible for presenting your LSI <1L to a Kohler Co. distribution or service center as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days. If you have a question regarding your warranty coverage, you should contact Kohler Dealer at 1-800-544-2444 or visit www.KohlerEngines.com.

GENERAL EMISSIONS WARRANTY COVERAGE

The warranty period begins on the date the engine or equipment is delivered to an ultimate purchaser. Kohler Co. warrants to the ultimate purchaser and each subsequent purchaser that the engine is:

Designed, built, and equipped so as to conform with all applicable regulations adopted by the Air Resources Board and US EPA; and Free from defects in materials and workmanship that cause the failure of a warranted part to be identical in all material respects to the part as described in the engine manufacturer's application for certification.

The warranty on emissions-related parts is as follows:

1. Any warranted part that is not scheduled for replacement as required maintenance in the owner's manual supplied, is warranted for the warranty period stated above. If any such part fails during the period of warranty coverage, the part will be repaired or replaced by Kohler Co. at no charge to the owner. Any such part repaired or replaced under the warranty will be warranted for the remaining warranty period.
2. Any warranted part that is scheduled only for regular inspection in the owner's manual supplied, is warranted for the warranty period stated above. Any such part repaired or replaced under warranty will be warranted for the remaining warranty period.
3. Any warranted part that is scheduled for replacement as required maintenance in the owner's manual supplied, is warranted for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part will be repaired or replaced by Kohler Co. at no charge to the owner. Any such part repaired or replaced under warranty will be warranted for the remainder of the period prior to the first scheduled replacement point for the part.
4. Add-on or modified parts that are not exempted by the Air Resources Board may not be used. The use of any non-exempted add-on or modified parts by the ultimate purchaser will be grounds for disallowing a warranty claim. The manufacturer will not be liable to warrant failures of warranted parts caused by the use of a non-exempted add-on or modified part.

PARTS COVERED BY WARRANTY

Listed below are the parts (if equipped) covered by the Federal and California Emission Control Systems Warranty. Some parts listed below may require scheduled maintenance and are warranted up to the first scheduled replacement point for that part.

- Oxygen sensor
- Intake manifold
- Exhaust manifold/Catalytic muffler
- Thermal reactor muffler
- Fuel line, fuel line fittings and clamps
- Spark advance module
- Crankcase breather
 - Air Injection System
 - Air pump or pulse valve assembly
 - Control/distribution valve
 - Distribution manifold
 - Air hoses
 - Vacuum lines
- Ignition module(s) with high tension lead
- Gaseous fuel regulator
- Electronic control unit
- Carburetor or fuel injection system
- Fuel metering valve
- Air filter, fuel filter, and spark plugs (only to first scheduled replacement point)

LIMITATIONS

This emission control systems warranty shall not cover any of the following:

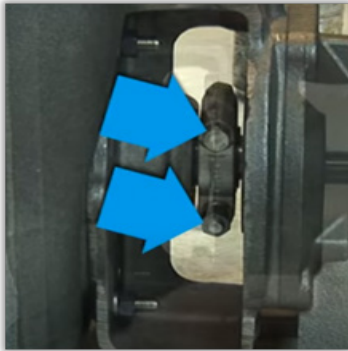
1. Consequential damages such as loss of time, inconvenience, loss of use of the engine or equipment, etc.
2. Diagnosis and inspection fees that do not result in eligible warranty service being performed.

<i>TROUBLESHOOTING</i>	
ISSUE	DESCRIPTION
Pump makes rattling noise while running	Cavitation or pump starvation (suction lift is too high or inlet line is too restrictive)
Reduced pump output or pressure	<ul style="list-style-type: none"> • Clogged impeller or inlet piping (including strainer) • Leaks in suction line or at inlet gasket • Collapsed suction line • Trapped air in sections of suction line • Suction lift is too great • Worn or damaged parts (impeller or casing)
Pump fails to prime or slow prime	<ul style="list-style-type: none"> • Leaks in suction line or at inlet gasket • Failure to pre-fill pump with fluid to generate suction • Suction lift is too great • Collapsed suction line • User may need to swap in inlet flange orientation (change from center inlet to high inlet without flap)
Pump makes screeching or metal on metal noises	<ul style="list-style-type: none"> • Improper installation on motor or engine. The impeller has been forced into the pump and against the volute.

SEAL REPLACEMENT INSTRUCTIONS FOR MP PUMPS

DISASSEMBLY

1. Loosen drive sleeve clamp bolts



2. Remove the Drive Sleeve Clamp from the Drive Sleeve



3. Remove the (6) bolts that attach to the pump



4. Lift adapter and pull away from the housing



5. Loosen drive sleeve clamp bolts



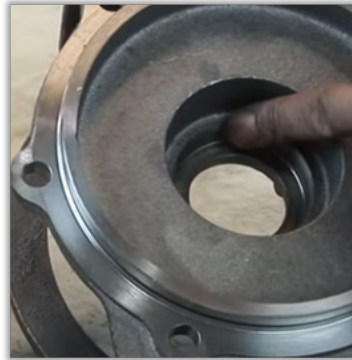
6. Remove the stationary seal face out of the adapter using a flat head screwdriver
 - a. Drive stationary seal face out of the adapter bore by gently tapping out of the adapter



7. The rotary seal bellows from the drive sleeve (pumps in service for some time could have rotary seal bellows that has become bonded to the drive sleeve – remove with patience



- b. Seal bore - clean and free of burrs, scars, pits, corrosion, use Scotch-Brite Pad for minor imperfections



- c. Seal Faces - should be checked for cracks or chips



- d. Elastomers – check for chips or tears



ASSEMBLY

1. Properly clean the parts and inspect for damage
- a. Drive Sleeve – clean and free of burrs, scars, pits, corrosion, use Scotch-Brite Pad for minor imperfections



2. Adapter O-ring – inspect for rips or tears



3. Scrape off torn housing gasket (if present), ensure clean surface for new gasket



4. Lubricate stationary seal face and insert into seal housing (P80 rubber lubricant is factory recommended)
5. Lubricate inside of stationary seal housing
6. Side of seal face with groove or dot is installed first or down into adapter bore – leaving polished side up to mate with rotating seal element



- a. Do not use a hammer – no force greater than can be applied with your thumbs should be used to install
b. Ensure that it is seated squarely in the bottom of the bore
7. Lubricate the elastomeric bellows and drive sleeve with P80 rubber lubricant (or equivalent)



8. Push rotating assembly into place with spring down towards the impeller – do not compress the spring



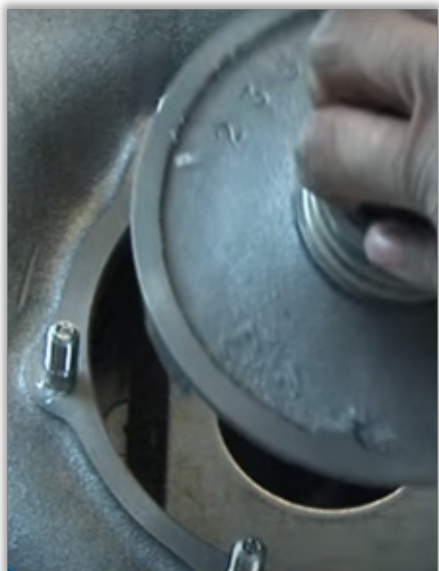
9. Loosen drive sleeve clamp bolts



10. Shim the pump at this time with 0.020-inch shim



11. Loosen drive sleeve clamp bolts



12. Place the O-ring onto the adapter

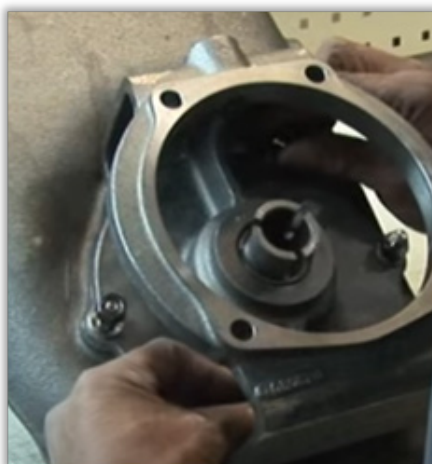


13. Loosen drive sleeve clamp bolts



14. Loosen drive sleeve clamp bolts

15. Tighten the (6) bolts that secure the adapter to the housing



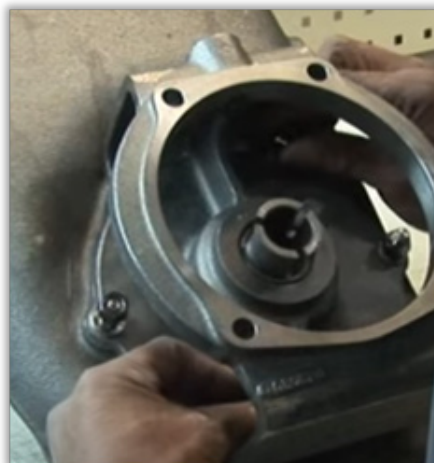
- 16. Do not contact the drive sleeve end with the stationary seal face – this could scar or crack the face and cause the seal to fail
- 17. Install the drive sleeve clamp onto the drive sleeve



- 18. Insert drive shaft into drive sleeve
- 19. Ensure play is taken out of impeller by pushing collar inward which will push impeller into shim. The farther the impeller sits away from the shim, the less efficient the pump will be
- 20. Tighten collar evenly



- 21. Remove the shim from the discharge port of the housing



- 22. Rotate the pump to ensure the impeller spins freely – if “ticking” or “grinding” is noticed – re-shim

Video:

<https://www.dultmeier.com/videos/self-priming-centrifugal-pump-seal-replacement.php>

