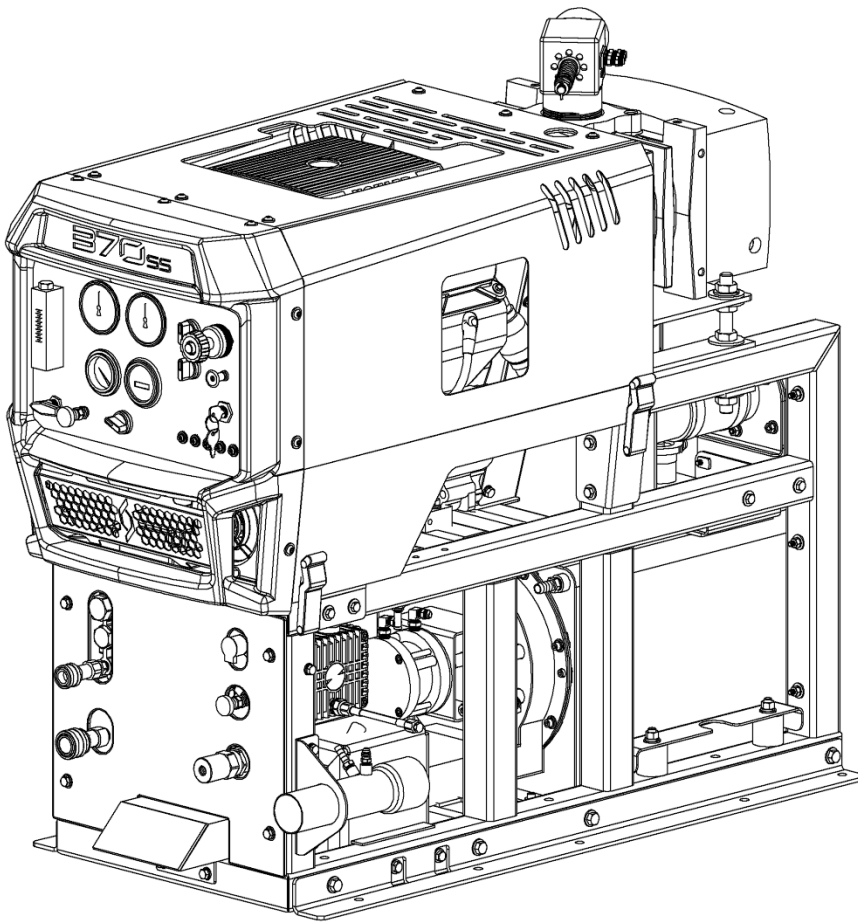




370 SS

Operation and Service Manual



Manual P/N 118189 (49-038)
Revision L, June 2022
From Serial Number 3975

UNIT DATA LABEL

Model:	_____
Date of Purchase:	_____
Serial Number:	_____
Dealer:	_____
Address:	_____
Phone Number:	_____
Sales Representative:	_____

Congratulations on the purchase of your Mobile Cleaning Unit. This instruction manual is a guide for operating and servicing your equipment. **Read this manual completely before installing or operating this unit.**

Proper operation and service are necessary to ensure the outstanding performance of this unit. When properly maintained, your truck-mount will have a long and trouble-free life.

The service methods outlined in this manual are detailed in a manner that operation and servicing may be performed properly and safely. Because service levels vary due to the skill of the mechanic, tools and parts availability, ensure that prior to attempting any maintenance or repair, you are familiar with the equipment and have all the proper tools to complete the task. Please call a **Legend Brands** service or customer care representative at 866-445-3030 for help with maintenance, repair, warranty and parts related questions.

THIS UNIT MUST BE INSTALLED BY THE DEALER THAT YOU PURCHASED IT FROM IN ACCORDANCE WITH THE PRESCRIBED INSTALLATION PROCEDURES.

Spare Parts and Reference documents are no longer included in this manual. Current parts diagrams can be found at <https://www.legendbrands.com/products/370-truckmount/> search under documents for manuals specific to your model based on serial number.

Information in this document is subject to change without notice and does not represent a commitment on the part of Legend Brands.

WARRANTY REGISTRATION

Thank you for purchasing a Legend Brands product. Warranty registration is quick and easy. Your registration will allow us to serve you better over the lifetime of the product.

To register your product go to:

<https://www.legendbrands.com/resources/warranty-registration/>

For customer assistance:

866-445-3030

LEGEND BRANDS LIMITED WARRANTY

Legend Brands Model 370 SS

What Does This Warranty Cover?

This warranty covers the Legend Brands Model 370 SS and is provided to the original purchaser only.

How Long Does This Warranty Last?

This warranty runs for:

Two (2) years from the date of installation on parts and labor (Excluding normal maintenance items.) Factory installed original belts are covered for 500 hours. Water box, recovery tank and frame are covered for five years. All other components including seals, o-rings and electrical components are covered for the entire two year warranty period.

What Legend Brands Will Do:

If a defect in materials or workmanship occurs within the warranty period, Legend Brands at its election will repair or replace the defective part at no charge.

What This Warranty Does Not Cover:

This warranty does not cover or apply to defects due directly or indirectly to misuse, abuse, disassembly, alteration, corrosive chemicals, improper voltage, improper fuel, fire, flood, negligence, accident, improperly or incorrectly performed maintenance or repair, or failure to perform necessary or recommended maintenance or repair (See your Owner's Manual) or if the use of this product is not in compliance with the instructions and specifications for its use. This warranty does not cover normal maintenance items such as air and oil filters, lubricants and tune up parts. Paint is not covered. Water box, recovery tank and frame are covered for five years. All other components including seals, o-rings and electrical components are covered for the entire two year warranty period. We limit all implied warranties to:

Two (2) years from the installation date on parts and labor. It is strongly recommended that this truck mount be used with, and only with, Legend Brands recommended chemicals and as directed by label instructions on chemical bottles.

OTHER THAN THE WARRANTIES PROVIDED HEREIN, LEGEND BRANDS MAKES NO EXPRESS OR IMPLIED, ORAL OR WRITTEN WARRANTIES WITH RESPECT TO THIS PRODUCT OR WORKMANSHIP AND ALL WARRANTIES IMPLIED BY LAW INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO THE DURATION OF THIS WARRANTY.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you. WE SHALL IN NO EVENT BE LIABLE FOR DEATH, INJURIES TO PERSONS OR PROPERTY OR FOR INCIDENTAL, CONTINGENT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING FROM USE OF OUR PRODUCTS. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

How Do I Get Service?

In order to be eligible for service under this warranty you MUST do the following: (a) fill out the warranty registration card on-line within thirty (30) days of the installation of our product; (b) write or call a service representative at Legend Brands for a return material authorization (RMA); and (c) have the serial number available. Proof of proper maintenance may be required before warranty is granted.

Contact us at:

Legend Brands

2604 Liberator, Prescott, AZ 86301

Phone: 928-445-3030 / 866-445-3030

If Legend Brands uncovers a defect we will repair or replace the product, at our election. Ground shipping and transportation costs will be covered by the manufacturer. Returning defective parts to the manufacturer, if required, shall be the responsibility of the purchaser. Warranty may be denied if defective parts are not returned within 90 days. If it is determined that there is no defect in the product, or that the defect resulted from causes not within the scope of our warranty, then the product will be repaired or replaced only at your request and at your expense and you must bear all shipping costs.

How Does State Law Apply?

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

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HOW TO USE THIS MANUAL

This manual contains the following sections:

- How to Use This Manual
- Safety
- Installation
- Operation
- Maintenance & Service
- Reference Diagrams

The **HOW TO USE THIS MANUAL** section will tell you how to find important information for ordering correct repair parts.

Spare Parts and Reference documents are no longer included in this manual. Current parts diagrams can be found at:

<https://www.legendbrands.com/products/370-truckmount/>

Search under documents for manuals specific to your model based on serial number

Parts may be ordered from authorized dealers. When placing an order for parts, the machine model and machine serial number are important. Refer to the MACHINE DATA box which is filled out during the installation of your machine. The MACHINE DATA box is located on the inside of the front cover of this manual.

Model: _____

Date of Purchase: _____

Serial Number: _____

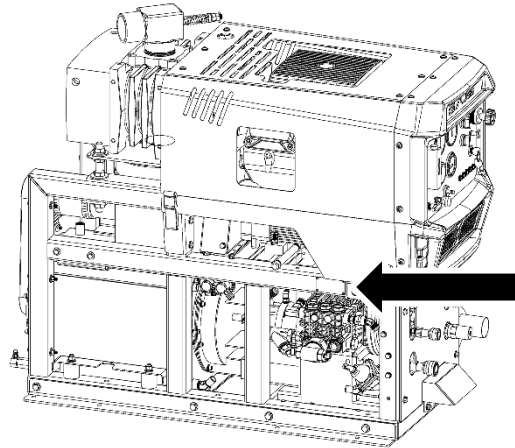
Dealer: _____

Address: _____

Phone Number: _____

Sales Representative: _____

The model and serial number of your unit is located on the front left side of the frame as shown here:



The **SAFETY** section contains important information regarding hazardous or unsafe practices for this machine. Levels of hazards are identified that could result in product damage, personal injury, or severe injury resulting in death.

The **INSTALLATION** section contains information on how to properly install the unit in your vehicle.

The **OPERATION** section is to familiarize the operator with the operation and function of the machine.

The **MAINTENANCE** section contains preventive maintenance to keep the machine and its components in good working condition.

The **PARTS LISTING & DIAGRAMS** section contains assembled parts illustrations and corresponding parts list. The parts lists include a number of columns of information:

NOTE: *If a service or option kit is installed on your machine, be sure to keep the KIT INSTRUCTIONS which came with the kit. It contains replacement parts numbers needed for ordering future parts.*

SAFETY

The following warning labels are on your mobile cleaning unit. These labels point out important **WARNINGS** and **CAUTIONS**, which must be followed at **ALL** times. Failure to follow these warnings could result in injury or fatality to yourself and/or others or property damage. Please follow these instructions carefully! **DO NOT remove these decals.**

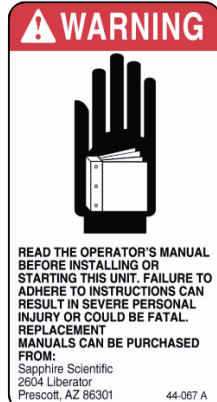
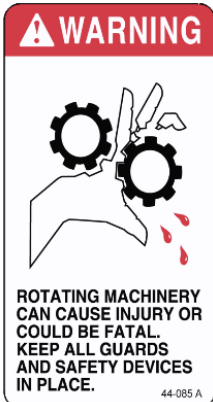
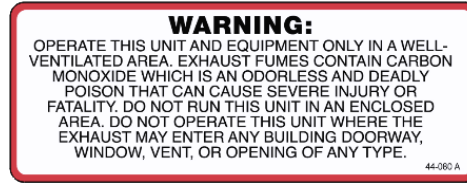


ROTATING MACHINERY. WATER UNDER PRESSURE AT HIGH TEMPERATURE. IMPROPER MODIFICATION OF EQUIPMENT CAN CAUSE SEVERE PERSONAL INJURY OR COULD BE FATAL.

DANGER

DO NOT MODIFY UNIT WITHOUT WRITTEN PERMISSION FROM MANUFACTURER

44-082 A



This WARNING symbol is used throughout the manual to warn of the possibility of physical injury or fatality. Please read all warnings carefully before operating the equipment.



This CAUTION symbol is used throughout the manual to warn of the possibility of damage to equipment or personal property.

**Read the operator's manual before starting this unit.**

Failure to adhere to instructions could result in severe personal injury or could be fatal.

Operate your vehicle and equipment in a well-ventilated area.

Exhaust fumes contain carbon monoxide, which is an odorless and deadly poison that can cause severe injury or death. DO NOT run the vehicle in an enclosed area. DO NOT operate this unit where the vehicle exhaust may enter a building doorway, window, vent or other opening.

This unit must be operated with the vehicle doors open in order to ensure adequate ventilation to the engine..

Gasoline is extremely flammable and its vapors can explode if ignited. Store gasoline only in approved containers, in well-ventilated, unoccupied buildings and away from sparks or flames. Never carry gasoline or any flammable materials in the vehicle. Fumes could accumulate inside of the vehicle and ignite, causing an explosion.

DO NOT operate unit if gasoline is spilled. Do not turn ignition switch until the gasoline has been cleaned up. Never use gasoline for cleaning purposes.

DO NOT place hands, feet, hair, clothing or any body parts near rotating or moving parts. Rotating machinery can cause severe injury or death.

NEVER operate this unit without belt and safety guards. High speed moving parts, such as belts and pulleys should be avoided while the unit is running. Severe injury, fatality and/or damage may result.

NEVER service a unit while it is running. High speed mechanical parts as well as high temperature components and fluids may result in severe injury or fatality.

Engine, vacuum pump and heat exchanger components, hoses and fittings will be extremely hot from operation. To prevent severe burns, **DO NOT** touch these areas while the unit is running, or shortly after the unit is shut off.

DO NOT touch any part of the exhaust system while the system is running or for 20 minutes after the unit is shut off. Severe burns could result.

Water under pressure can cause severe personal injury or fatality. Shut down unit, allow to cool down, and relieve system of all pressure before removing caps, valves, plugs, fittings, filters or hardware.

NEVER leave the vehicle engine running while the unit is in operation.

Battery acid contains sulfuric acid. To prevent acid burns, avoid contact with skin, eyes and clothing. Batteries also produce explosive hydrogen gases while charging. To prevent fire or explosion, charge batteries only in a well ventilated area. Keep sparks, open flames, as well as other sources of ignition away from battery at all times. Remove all jewelry prior to servicing batteries. Keep batteries out of the reach of children.

Before disconnecting the negative (-) ground cable, ensure that all switches are in the off position. If on, a spark could occur at the ground connection terminal which could cause an explosion if hydrogen gas or gasoline vapors are present. ALWAYS disconnect the negative (-) terminal first

SECTION ONE: GENERAL INFORMATION

DO NOT smoke around the vehicle. Gas fumes could accumulate and ignite. Battery gasses are extremely flammable. This will prevent possible explosions.

NEVER cut or splice any of the vehicle fuel lines during fuel line installation. This will result in fuel leaks and potentially dangerous conditions. Use only the provided fuel hose for fuel lines. When going through the vehicle floor with fuel lines, always utilize bulkhead adaptors. This will prevent fuel leaks and ensure that hoses are not punctured by vehicle vibration abrasion.

All high-pressure hoses must be rated at 250° F and 3000 PSI. Severe injuries may result from improper hoses.

The Occupational and Health Administration (OSHA) recommends the use of hearing protection when a technician is exposed to an average of 85 decibels (this is an average of exposure over an 8 hour period). This equipment can produce 85 decibels at a distance of 10 feet. Please check with your local state agencies to see if OSHA standards apply to your application.

This unit produces high solution pressure. Improper use could result in injury.

California Proposition 65 Warning: Engine exhaust from this product contains chemicals known by the State of California to cause cancer, birth defects, or other reproductive harm.

The following label (Legend Brands part number 114168) has been included with your cleaning unit installation kit. In the state of California, this label must be installed on the vehicle or trailer where the unit is installed in an area that is clearly visible while the unit is operating.

WARNING: THIS AREA CAN EXPOSE YOU TO CARBON MONOXIDE THROUGH ENGINE EXHAUST, A CHEMICAL KNOWN BY THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS, AND/OR OTHER REPRODUCTIVE HARM.

44-279 B

 **CAUTION**

DO NOT damage the vehicle in any way during the installation. Avoid component or hose contact with moving parts, hot surfaces, brake lines, fuel lines, catalytic converters, exhaust pipes, mufflers, rotating parts or sharp objects.

DO NOT exceed the vehicle's payload capacity. This will prevent unsafe or hazardous driving conditions. Before installing any components into the vehicle, check with the vehicle manufacturer for the Gross Vehicle Weight Rating (GVWR). GVWR is the maximum allowable combined weight of the vehicle, including all passengers, fuel, fluids, tools and cargo.

Example: If the GVWR for a vehicle is 9600 lbs. and the vehicle has a base curb weight of 6406 lbs., this leaves a payload capacity of 3194 lbs. (GVWR - Curb Weight = Payload Capacity).

Always keep your vehicle clean and orderly. Tools and accessories must be securely stowed while driving the vehicle.

Ensure that you have received proper training and are familiar with the start-up and shut-down procedures prior to operation.

DO NOT alter or modify your unit in any way. Use only replacement parts authorized by **Legend Brands**. Modifications or use of unapproved parts could create a hazard and will void your warranty. This includes the use of any open ended hoses.

Failure to apply preventative measures towards freezing can result in system failure and loss of warranty on affected parts. Water freezes at 32° F and 0° C.

READ AND SAVE THESE INSTRUCTIONS

SPECIFICATIONS

Engine Speed	3000 RPM (High Speed/No Load) 1550 RPM (Idle/No Load)
Water Pump RPM	1579 RPM (High Speed/No Load)
Water Pump Flow Rate	3.5 GPM (Maximum)
Solution Pump Pressure	1500 PSI (Maximum)
Vacuum Pump	3000 RPM (High Speed/No Load)
Vacuum Relief Valve	13 in. Hg
Waste Tank Capacity at Shut-Off	90 gallons / 120 gallons (optional high-capacity tank)
Console Weight	644 lbs. (dry)
Standard Install Package Weight	916 lbs. w/90 gal. waste tank (dry) 926 lbs. w/120 gal. waste tank (dry)
Operating Weight (full water)	1580 lbs. w/90 gal. waste tank (full water) 1934 lbs. w/120 gal. waste tank (full water)

*Weights are approximate and do not include optional accessory items

TORQUE VALUES

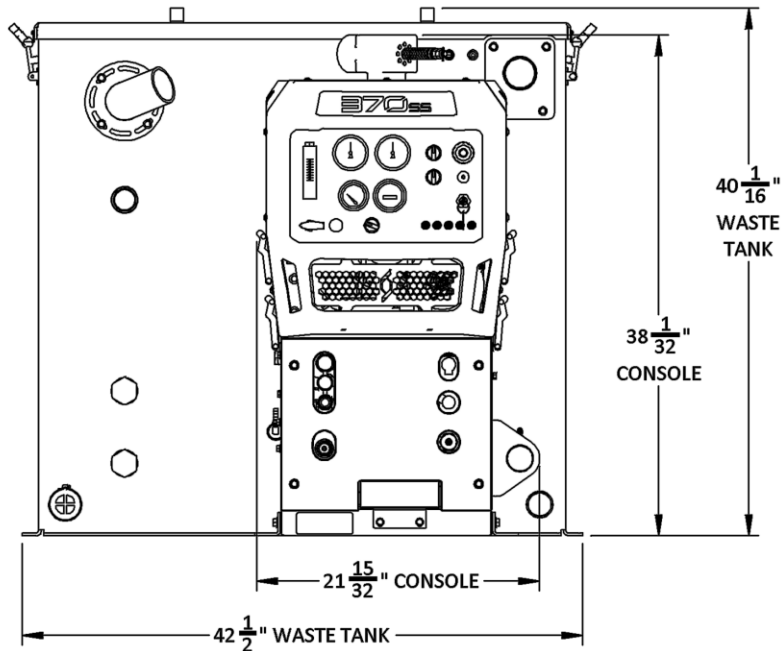
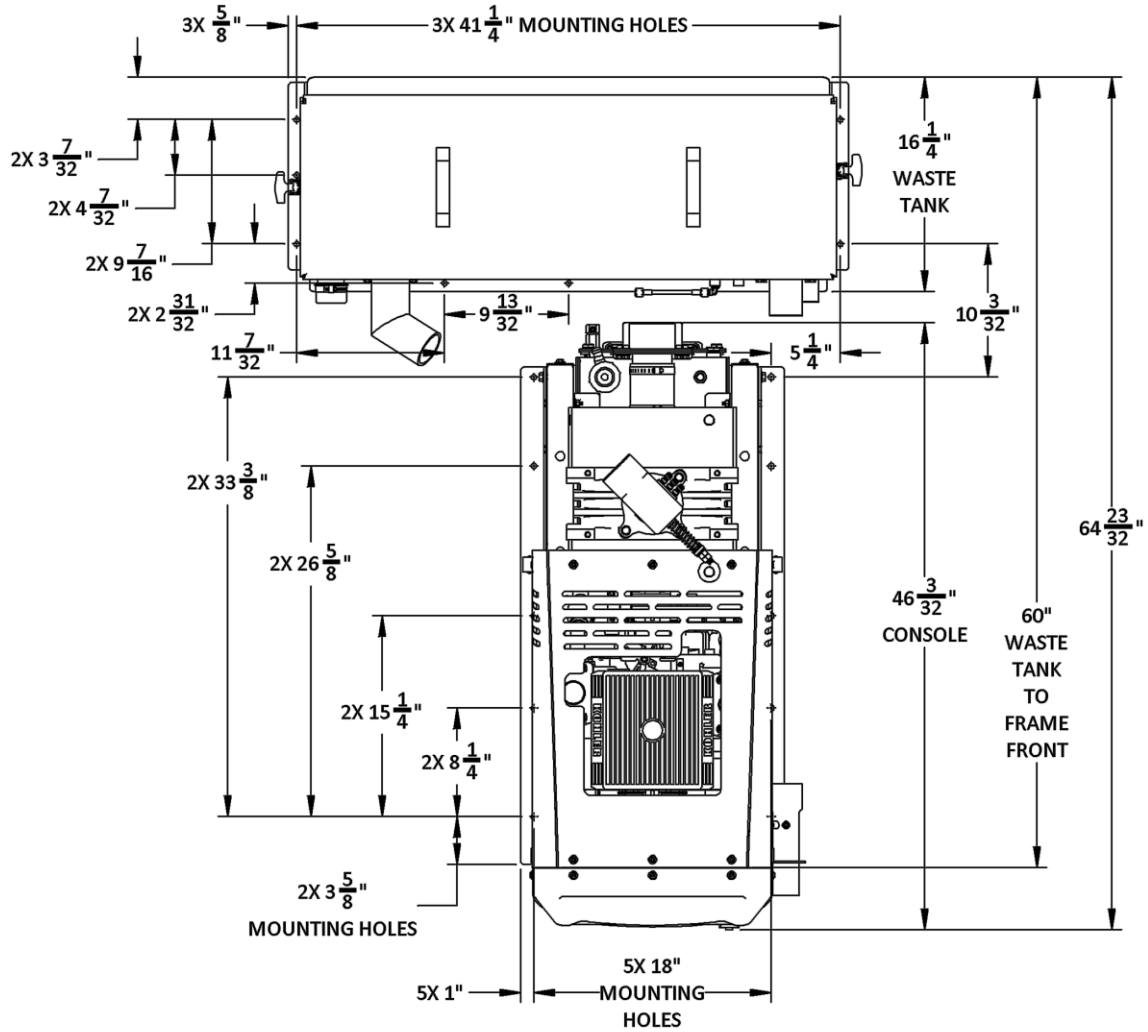
Engine Crankshaft / Blower Pulley	122 in-lbs
Engine Front / Water Pump Pulley	122 in-lbs

JET SIZING

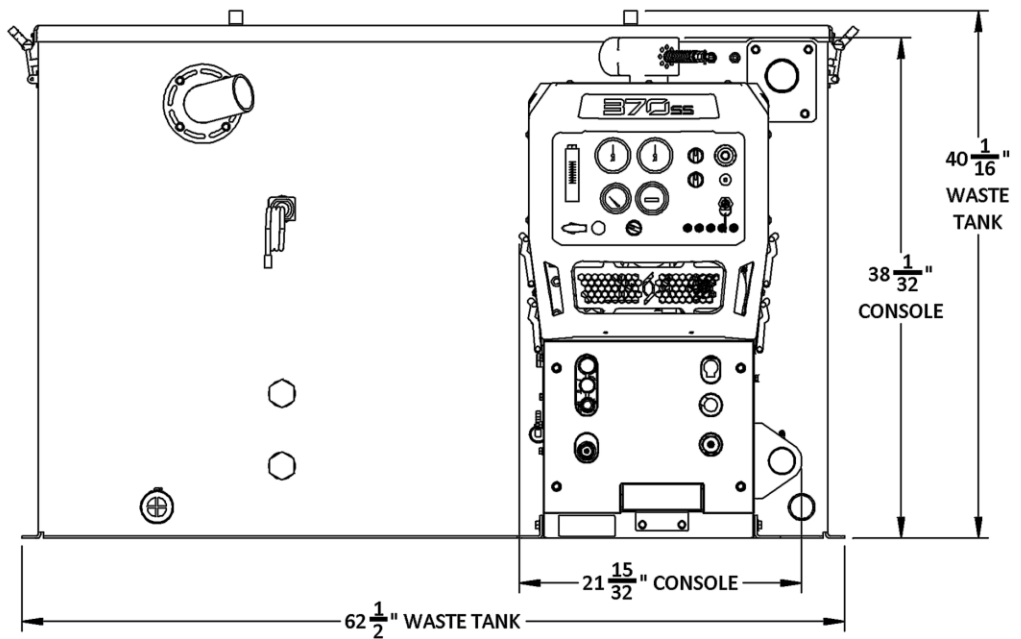
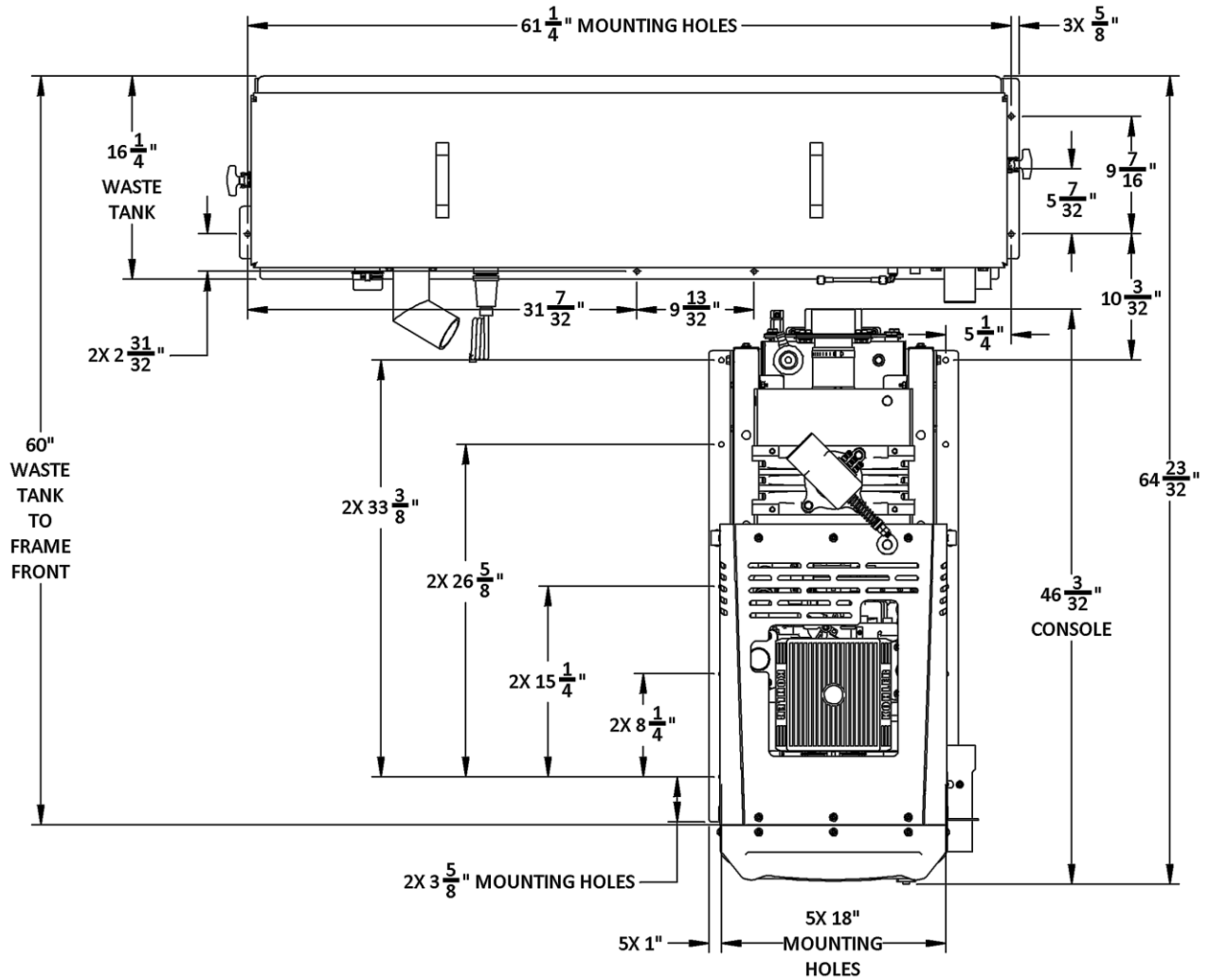
Legend Brands recommends that the total floor tool tip size be #6

SECTION ONE: GENERAL INFORMATION

LAYOUT WITH 90 GALLON WASTE TANK



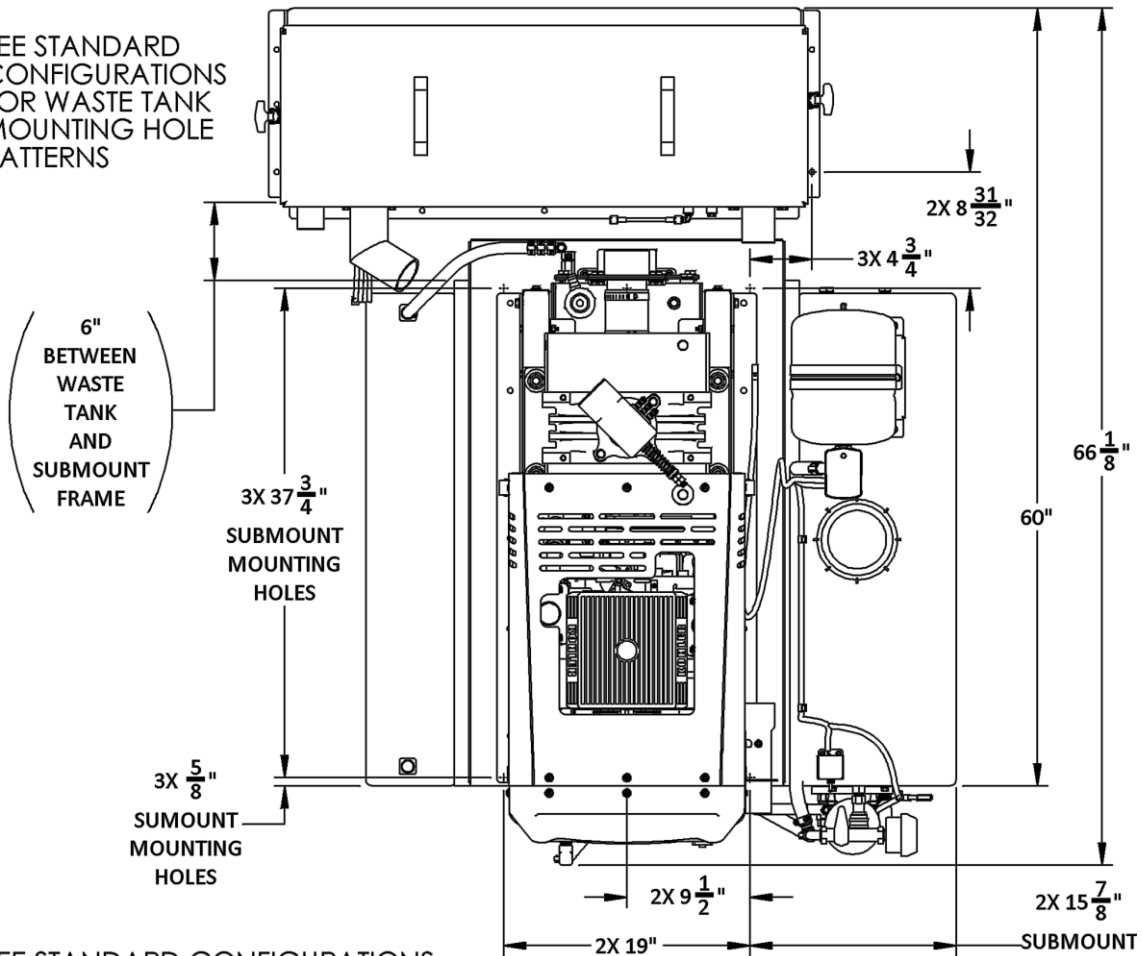
SECTION ONE: GENERAL INFORMATION
LAYOUT WITH 120 GALLON WASTE TANK



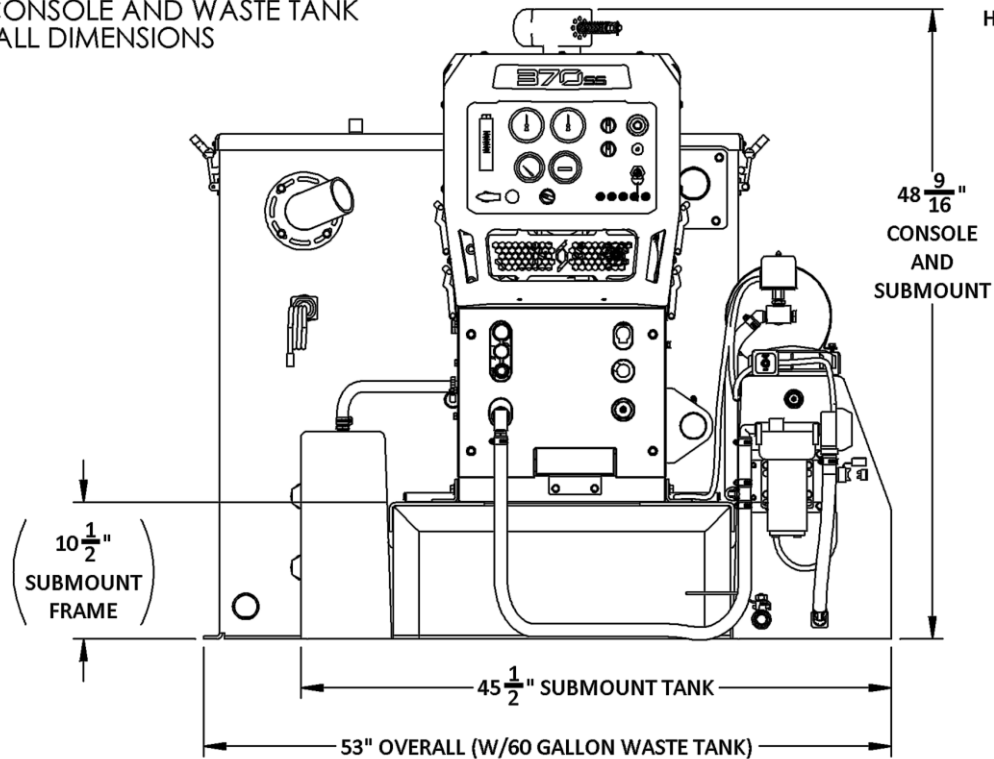
SECTION ONE: GENERAL INFORMATION

LAYOUT WITH OPTIONAL SUBMOUNT WATER TANK

SEE STANDARD CONFIGURATIONS FOR WASTE TANK MOUNTING HOLE PATTERNS



SEE STANDARD CONFIGURATIONS FOR CONSOLE AND WASTE TANK OVERALL DIMENSIONS



FUEL REQUIREMENTS

Use **unleaded fuel ONLY**. Use only fresh, clean unleaded gasoline with a minimum octane rating of 87. **Do Not** use high octane gasoline. Gasoline with up to, not exceeding, 10% ethanol is acceptable.

NOTE: Using other gasoline/alcohol blends including E20 and E85 will cause damage to engine components and will void warranty.

ENGINE OIL REQUIREMENTS

Use high-quality oil of at least API (American Petroleum Institute) service class SG or higher. **Do not use additives**. High quality 10W-30 or 10W-40 oil is recommended. It is never recommended to extend oil change intervals past 200 hours. See the maintenance section in this manual, or the engine owner’s manual for more information.

Engine Oil Capacity	1.4 L (1.5 US qt.) when oil filter is not removed 1.6 L (1.7 US qt.) when oil filter is removed
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NOTE: Using lower service class oil or extending oil change intervals longer than recommended can cause engine damage.

CHEMICAL REQUIREMENTS

This unit’s unique last step chemical injection system can be used with a wide variety of water diluted chemical compounds, either acidic or alkaline, depending on the work to be performed. We recommend using only **Legend Brands** chemistry.

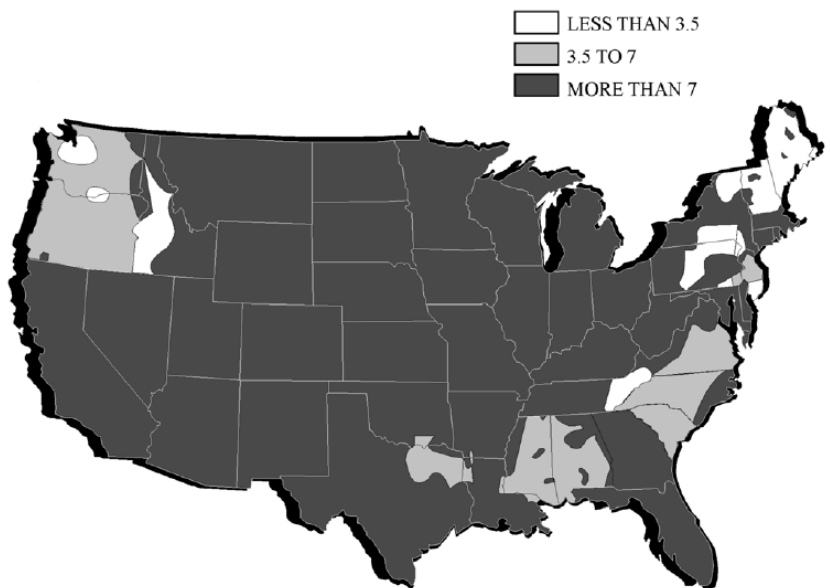
WATER REQUIREMENTS

Hard water deposits will damage the plumbing and heat exchange systems on this unit. The map below will give you an idea of where areas of high water hardness may occur. However, any water supply obtained from a well is almost always hard water.

It is highly recommended that a high quality water softener be used in areas where the water hardness exceeds 3½ grains. If a water softener is used, it must have a flow capacity of at least five (5) GPM or greater, without any hose constrictions.

The use of a water softening system will reduce maintenance and reduce down time caused by hard water scaling. It will also enhance the performance of cleaning chemicals, which will result in greater efficiency in lower concentrations.

If you require a water softener, your dealer has a model to meet your needs. Please contact your nearest distributor for information, price and availability.



RECEIVING YOUR TRUCK-MOUNT UNIT

DEALER RESPONSIBILITIES

The Legend Brands authorized dealer that you purchased this unit from is responsible for:

1. Correctly installing and properly securing equipment with proper hardware and underside mounting plates.
2. Checking the components and oil levels prior to starting the unit.
3. Checking that all components are operating at the factory specification.
4. Checking all hoses and accessories for correct operation.
5. Checking all tools/wands for correct operation.
6. Training you in the operation, maintenance and safety precautions of your unit.

It is the purchaser's responsibility to become familiar with the entire Owner's Manual, most importantly all Warnings, Cautions and Notices.

ACCEPTANCE OF SHIPMENT

Your unit was thoroughly tested, checked and inspected in its entirety prior to leaving our manufacturing facility. When receiving your unit, please make the following acceptance check:

1. The unit should not show any signs of damage. If there is damage, notify the deliverer immediately.
2. Carefully check your equipment against the packing slip to make sure everything you ordered has arrived.

STANDARD EQUIPMENT LISTING

- Console
- Waste tank with shut-off switch
- 100 ft. of 2 in. vacuum hose
- 1 2-inch vacuum hose connector
- 100 ft. of 1/4 in. high pressure solution hose with quick disconnect fittings
- 50 ft. water supply hose with quick connect
- 12-inch low-profile wand
- Waste tank mesh filter
- Waste tank strainer basket
- Fuel pump and filter assemblies
- Installation mounting plates and hardware
- Operation and Service Manual

OPTIONAL EQUIPMENT

- Automatic waste pump kit
Part No. 124982
- Demand pump system
Part No. 107273
- 50 ft. 2-inch vacuum hose
Part No. 106318
- 50 ft. 2-1/2-inch vacuum hose
Part No. 117418
- 2-inch vacuum hose coupler
Part No. 105289
- 50 ft. high-pressure solution hose with qd fittings (no valve)
Part No. 117482
- 100 ft. high-pressure solution hose w/valve and qd fittings
Part No. 117480
- 50 ft. water hose w/qd fitting
Part No. 106322

FUEL HOOK-UP KITS BY VEHICLE

- Chevy 2004+ Hook-Up Kit 107439
- Chevy Box Truck 2004+ 117802
- Ford 2011+ 108605
- Ford Transit 2014+ 107279
- Nissan NV 107363
- Dodge ProMaster 108708

SECTION TWO: INSTALLATION

WARNING!!!

This unit must be installed in the vehicle by an authorized Legend Brands distributor.

Prior to beginning the installation, read the **ENTIRE** Installation section of this manual.

VEHICLE REQUIREMENTS

Because of the overall weight of the console and tanks, this unit should **NOT** be installed in any motor vehicle rated less than 3/4 ton capacity.

CAUTION!

DO NOT exceed the vehicle's payload capacity. This will prevent unsafe or hazardous driving conditions. Before installing any components into the vehicle, check with the vehicle manufacturer for the Gross Vehicle Weight Rating (GVWR). GVWR is the maximum allowable combined weight of the vehicle, including all passengers, fuel, fluids, tools and cargo.

1. If installing the unit in an enclosed utility trailer, the trailer must have dual axles, 2800 lb. load capacity and electric trailer brakes. Fuel tanks cannot be mounted in an enclosed space. Strict compliance with all State and Federal laws must be maintained.
2. If mounting in a trailer, the console must be positioned so that it balances properly with respect to the trailer axle. Ten percent (10%) of the unit's total overall weight (w/o accessories or water) should be on the tongue. This unit has an air cooled engine, and adequate ventilation must be provided to prevent overheating.
3. At the time of publication, Legend Brands does not recommend or approve of installation of this unit in electric vehicles/vans as there is currently no approved fuel storage tank available for EV applications.
4. Legend Brands does not recommend using any type of flooring materials that absorb water. This condition will result in rust and corrosion of the vehicle floor.
5. Insulation under rubber mats should be removed prior to installation of the unit.

LIFTING THE UNIT INTO THE VEHICLE

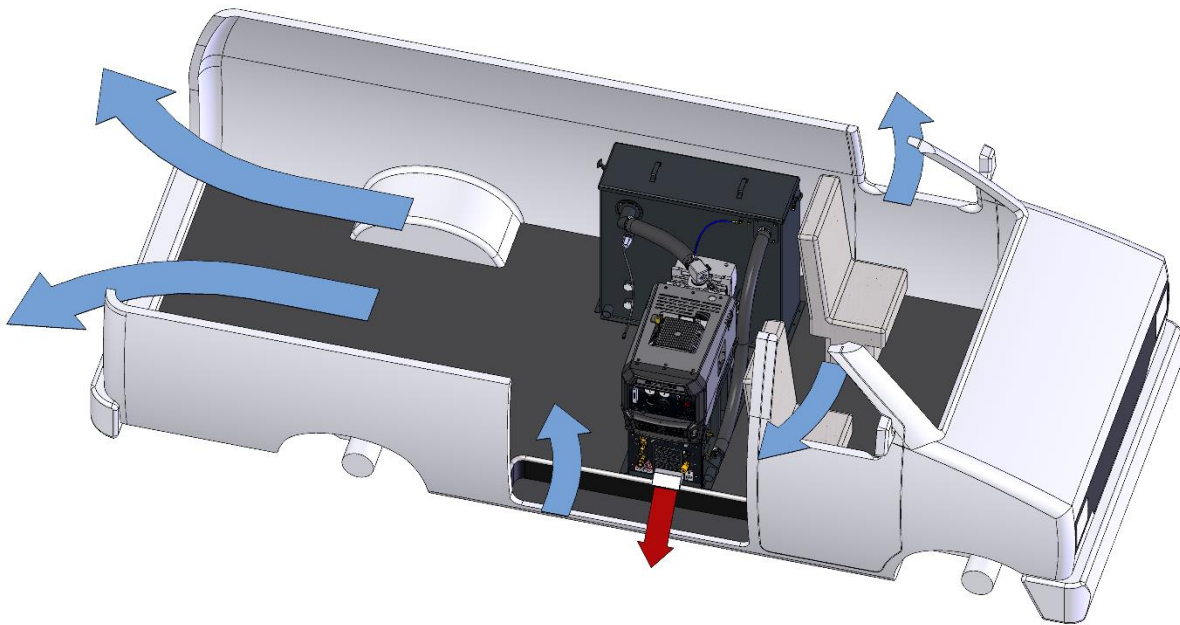
Because of the weight of the console, a forklift is necessary to place the unit into the vehicle. Position forks under the unit from the front. Once the console is positioned on the forks, use two "C" clamps to secure it before transporting. Carefully move the unit into the desired position.

SECTION TWO: INSTALLATION

POSITIONING THE UNIT INTO THE VEHICLE

Vehicles vary in size and openings. Owners have different preferences on where in the vehicle they want their units positioned. Legend Brands strongly recommends a side door installation. We DO NOT recommend a rear door installation.

1. Ensure that enough space is provided to assure adequate engine ventilation as well as room for service and maintenance.



2. Operating weight of the complete installation (which includes water weight) with waste tank and ALL accessories MUST NOT exceed the vehicle's axle weight limit. Please refer to SPECIFICATIONS in Section One for standard unit and waste tank operating weight.
3. Be aware of heat generated by components of the unit. On vehicles without a solid bulkhead, DO NOT position the console frame closer than twelve inches from the bottom of the driver and passenger seats.
4. Consider all accessories, the required space, hose and electrical routing prior to positioning the console and waste tank.

NOTE: Please refer to the dimensional data illustrations provided in Section One of this manual for console and tank dimensions.

FASTENING DOWN THE UNIT AND WASTE TANK**⚠ CAUTION**

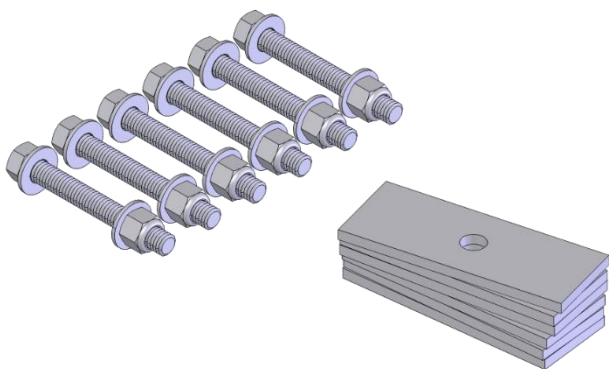
Prior to drilling any holes in the vehicle floor, ensure that while drilling, you will not damage the fuel tank, fuel lines, or any other vital components which could affect the safety or operation of the vehicle.

A. The console and waste tank mounting holes will serve as a template. Drill six (6) 13/32-inch diameter holes for the console and six (6) to eight (8) 13/32-inch diameter holes for the waste tank.

B. Using the provided mounting hardware kit:

Insert 3/8-16 × 2-inch hex head cap screws with flat washers through the console and waste tank mounting holes. The two 5/16-18 × 6-inch hex head cap screws are provided for the two front waste tank holes if the unit is being installed into a Ford Transit. Bolts that lie over or near a fuel tank or any other sensitive areas must be installed from the underbody with the threads facing up into the vehicle interior.


Install the provided mounting plates underneath the vehicle floor. Use the larger plates where space is available.



Screw the provided 3/8-16 hex head lock nuts on to the mounting bolts and tighten until the console and waste tank are firmly attached to the vehicle floor.

⚠ WARNING! Do not alter or modify your unit in any way. Use only replacement parts authorized by **Legend Brands**. Modifications or use of unapproved parts could create a hazard and will void your warranty. Contact your authorized Legend Brands dealer for assistance.

INSTALLATION OF FUEL LINES

 **WARNING!** The Vehicle fuel lines should **NOT** be spliced under **ANY** circumstances. Severe injury or fatality could result.

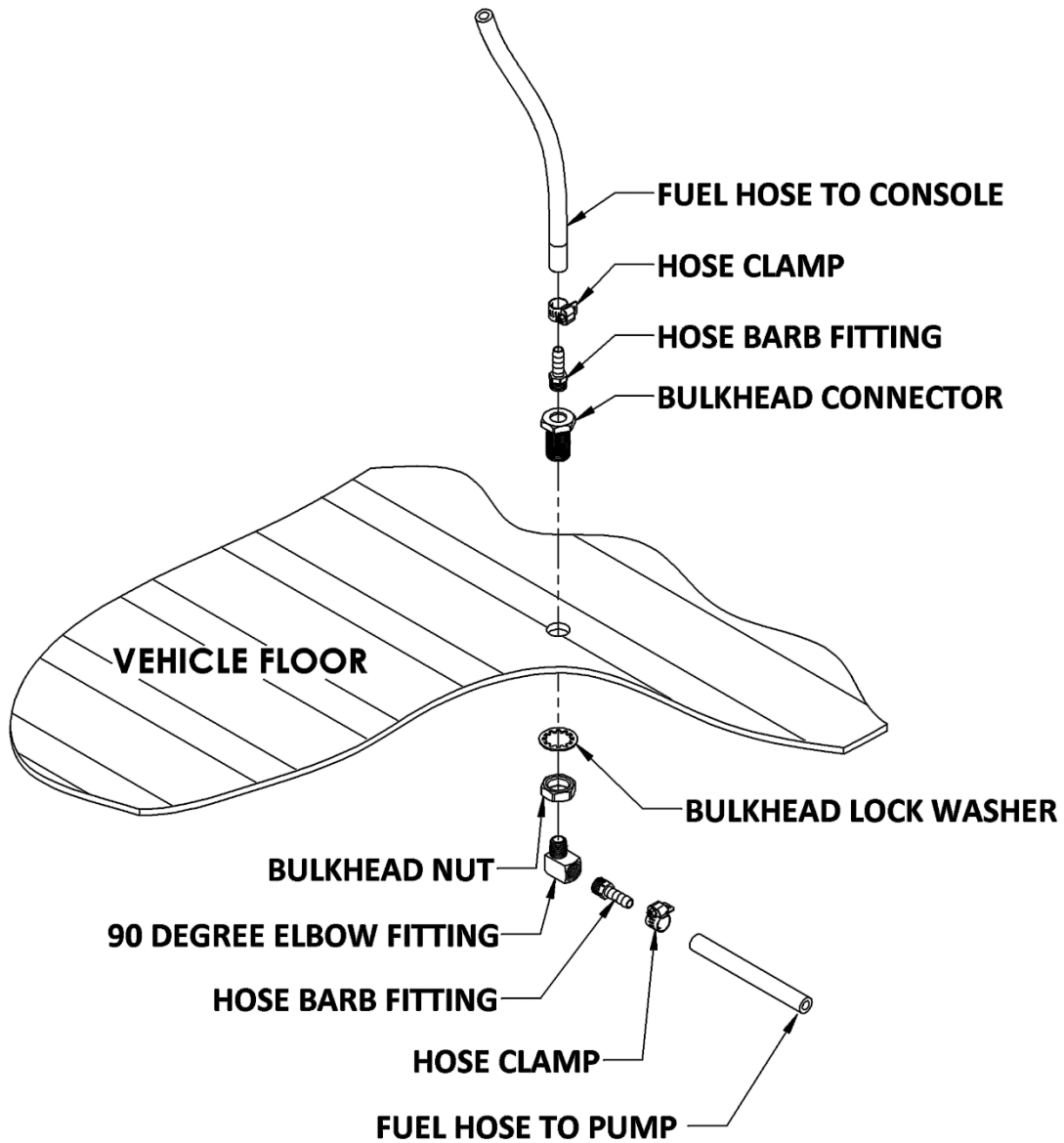
- When routing fuel lines, DO NOT configure the hoses in any location where the hoses, or vehicle could be damaged.
- All fuel lines must meet CARB TIER III and EPA PHASE 3 low permeability requirements.
- Avoid contact with moving parts, areas of high temperature, brake lines, fuel lines, catalytic converters, exhaust pipes, mufflers or sharp objects.
- Fuel pump must be mounted in a vertical position as near as possible to the fuel supply, and not located near any heat sources.
- Excess heat from exhaust or other heat sources may cause the fuel pump to work improperly.

FUEL LINE BULKHEAD INSTALLATION

1. Inside the vehicle, select an appropriate location on the vehicle floor away from operator or maintenance traffic and away from contact with any accessories or tools while in use or transit. Make sure your hole is within adequate reach of the supplied hose in the finished assembly.
2. Drill a 3/4 inch hole through the vehicle floor at the location chosen for the bulkhead connector.
3. Install the bulkhead connector by inserting the fitting and tightening the nut and lock washer on the opposite side of the vehicle floor.
4. Inside the vehicle, attach the hose barb fitting and connect the fuel line from the console.
5. Drill a 1/2 inch hole nearby the bulkhead fitting for the fuel pump electrical extension harness to pass through.

SEE DIAGRAM ON NEXT PAGE

SECTION TWO: INSTALLATION
FUEL LINE BULKHEAD INSTALLATION DIAGRAM



SECTION TWO: INSTALLATION

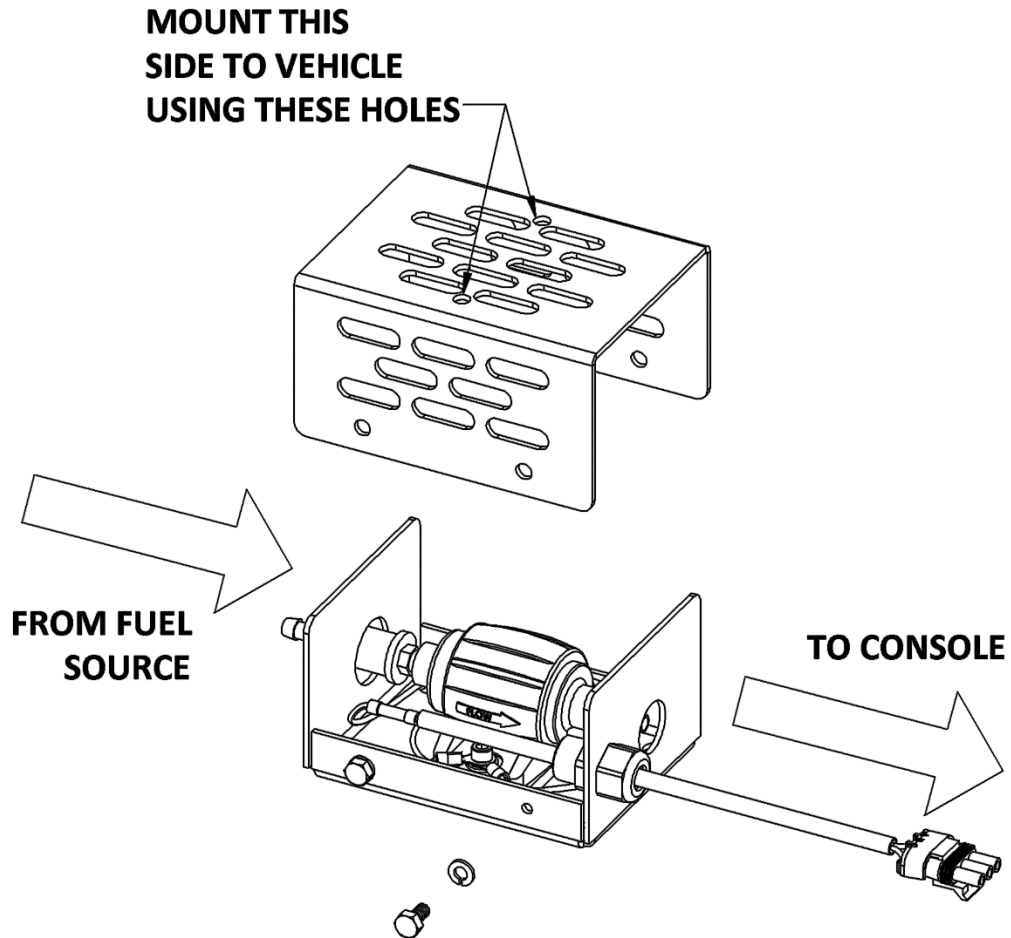
FUEL PUMP ASSEMBLY INSTALLATION

Locate an appropriate location for the fuel pump assembly housing to mount underneath the vehicle that will not cause damage to the vehicle or compromise the fuel line routing or components.

Remove the housing lid from the fuel pump assembly.

Use the supplied Tek screws to install the lid of the fuel pump housing to the vehicle.

NOTE: Install the fuel pump assembly close to the fuel source.



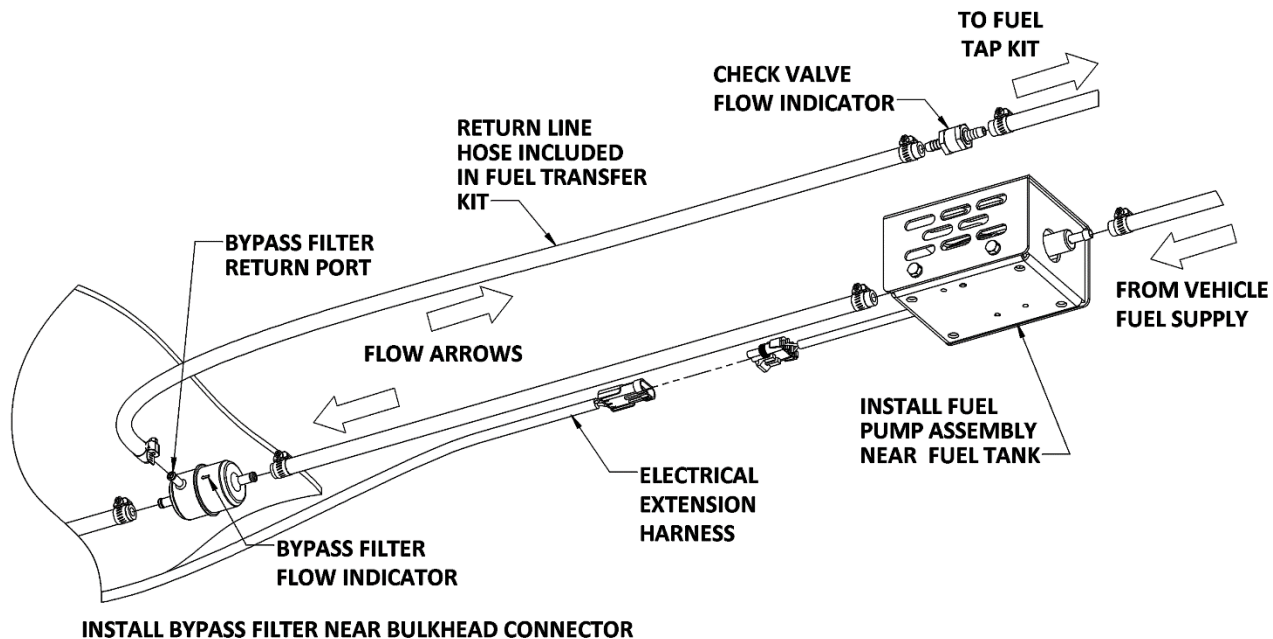
SECTION TWO: INSTALLATION

FUEL SUPPLY & RETURN LINE INSTALLATION

Refer to the transfer flow kit instructions found with the appropriate kit for your vehicle.

1. Connect the fuel line from the transfer flow kit to the inlet side of the fuel pump.
2. Connect the outlet side of the fuel pump to the inlet side of the fuel bypass filter.
3. Connect the return line from the bypass filter return port back to the vehicle fuel supply.
4. Connect the check valve inline (if not already installed).

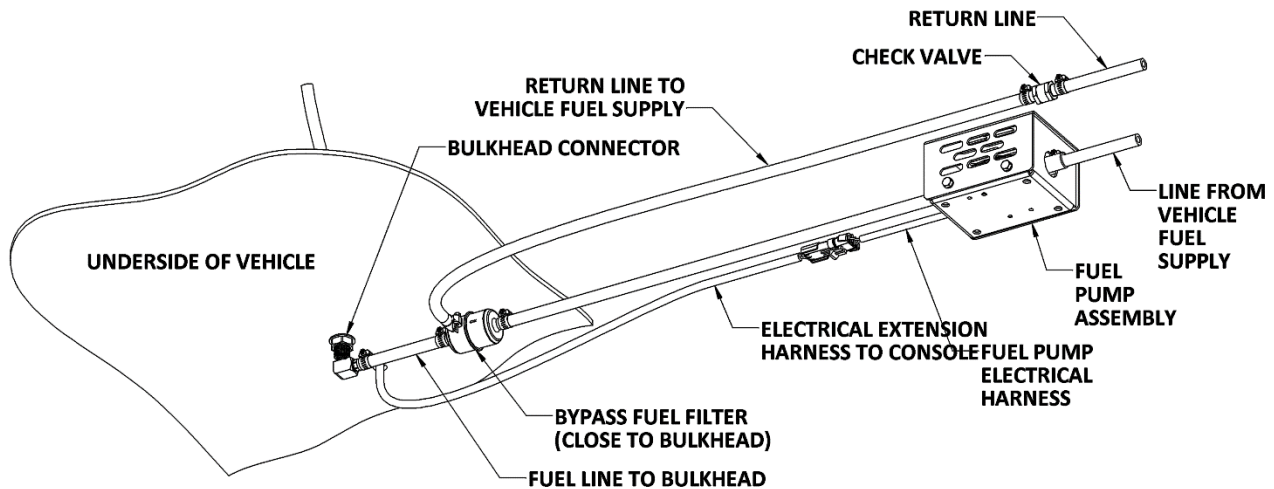
NOTE: Install the bypass filter away from the fuel source. If the bypass filter is installed too close to the fuel source, the return line will not have enough length to cool the fuel.



NOTE: To always ensure you have the right filter, we recommend only using the Napa Gold 3054 filter which can also be purchased directly from us with Legend Brands part number 116744.

SECTION TWO: INSTALLATION

5. Attach the 90 degree elbow and hose barb fittings to the bulkhead connector underneath the vehicle.
6. Connect a segment of hose between the outlet side of the fuel bypass filter to the hose barb fitting.
7. Ensure that all hose clamps are properly tightened.
8. Connect the electrical extension harness to the fuel pump harness, running the other end up through a hole in the floor of the vehicle, connecting to the console harness.



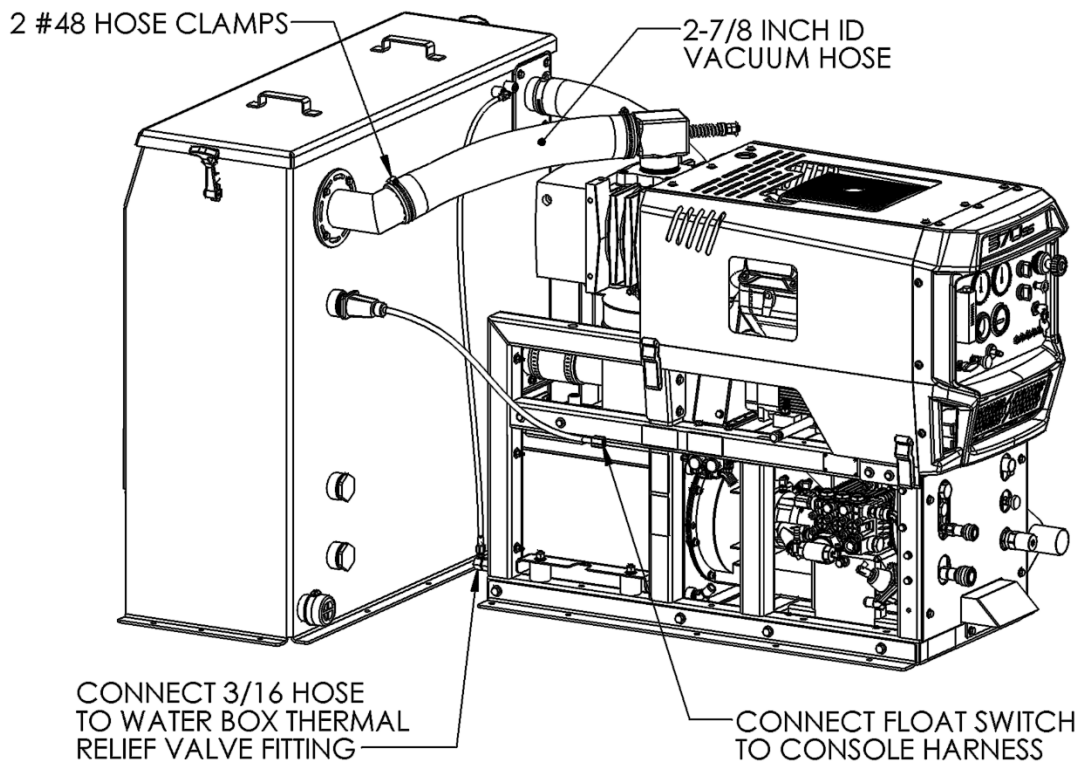
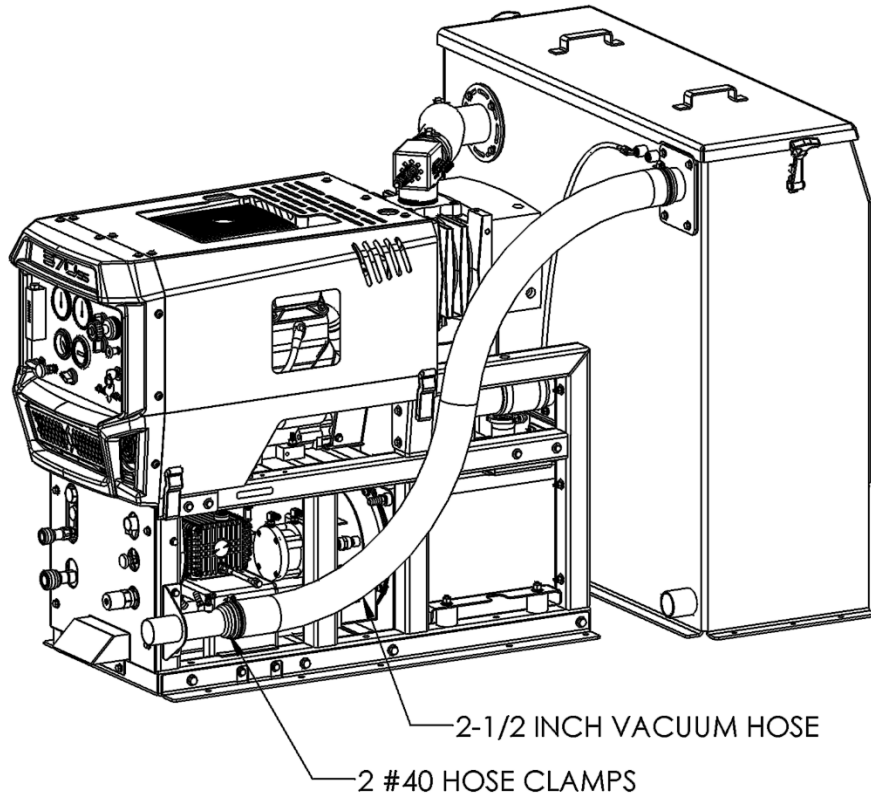
TRAILER FUEL TANK AND FUEL LINE INSTALLATION

The following are recommendations for trailer installations:

- Strict compliance with all federal and state laws must be maintained. **Tanks must meet CARB TIER III and EPA PHASE3 permeation and venting emissions requirements.**
- Use only fuel tanks that are manufactured specifically for gasoline, have proper vented filling caps, and outlet connections that are the same size as the inlet and return connections on the unit.
- **DO NOT** install fuel tanks inside any type of enclosed trailer or vehicle.
- **NEVER** carry gasoline or flammable materials in an enclosed trailer or vehicle.
- **NEVER** store any type of flammable material in an enclosed trailer or vehicle.
- Always mount fuel tanks where they will be protected from any vehicle collision.
- When installing fuel lines from the fuel tank to the unit, use the proper size fuel line.

SECTION TWO: INSTALLATION

CONSOLE TO WASTE TANK CONNECTIONS



BATTERY CONNECTION

WARNING!

Explosive gases, Dangerous gases!

Batteries contain sulfuric acid. To prevent acid burns, avoid contact with skin, eyes and clothing. Batteries also produce explosive hydrogen gases while charging. To prevent fire or explosion, charge batteries in a well-ventilated area only. Keep sparks, open flames, as well as any other sources of ignition away from batteries at all times. Remove all jewelry prior to servicing batteries. Keep batteries out of the reach of children.

- Before disconnecting the negative (-) ground cable, ensure that all switches are in the OFF position. If ON a spark could occur at the ground connection terminal, which could cause an explosion if hydrogen gas or gasoline vapors are present. ALWAYS disconnect the negative (-) terminal first.
- Attach the red positive (+) battery cable from the starter solenoid on the console to the positive (+) terminal on the battery and tighten down the nut.
- Attach the black negative (-) battery cable from the ground on the console to the negative (-) terminal on the battery and tighten down the nut

NOTE: If using an automatic pump-out, you must have a group 24 battery installed to maintain proper power.

FIRE EXTINGUISHER

Legend Brands, and many government agencies, recommend that a fire extinguisher rated for A, B, and C type fires be installed into any commercial vehicle.

INITIAL OPERATIONAL SETTINGS

NOTE: Due to temperature and altitude changes, the optimal setting for each truckmount must be adjusted after installation. Failure to make these adjustments may lead to poor unit performance and premature component failure.

VACUUM PUMP

The maximum vacuum pressure obtainable at full throttle should be 13”Hg. If the unit is drawing a stronger vacuum (at full sealed suction) than 13”Hg, adjust the vacuum relief spring until proper pressure is achieved.

ENGINE

Set RPM values as shown below. Refer to the engine operation manual for adjustment instructions.

THROTTLE	LOAD	RPM*
Idle	None	1550 RPM
Full	13”Hg. vacuum 500 PSI pressure	2850 RPM
Full	None	2950 RPM

*±50 RPM tolerance

SECTION THREE: OPERATION

UNDERSTANDING THE SYSTEMS

NOTE: Read and understand this section of the manual entirely before proceeding.

This portion of the manual divides the unit up into systems and describes how each system works. Prior to proceeding into the operations and maintenance sections of this manual it is recommended that you acquire a basic understanding of how the unit functions.

SECTION THREE: OPERATION

WATER HEATING SYSTEM

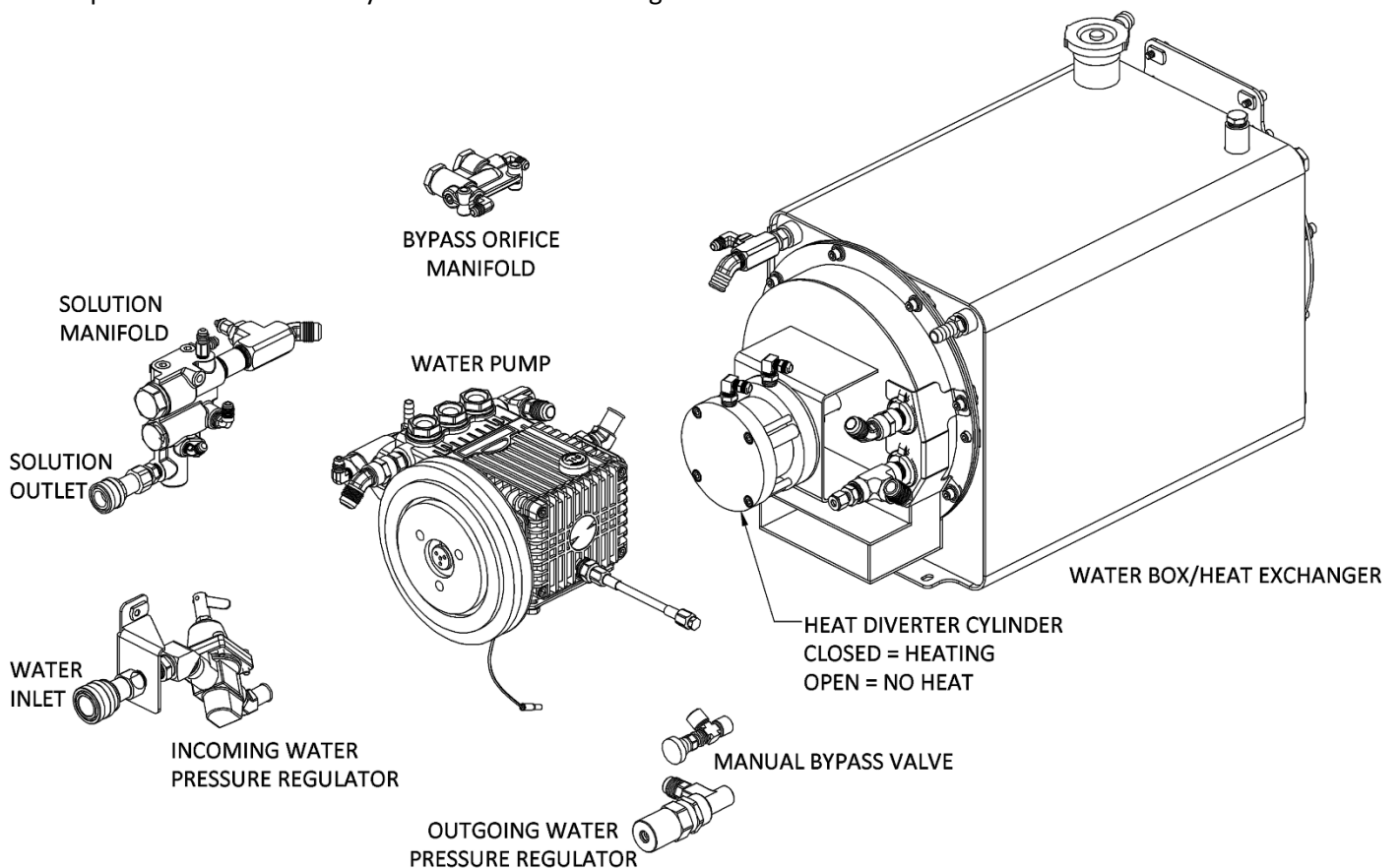
The water reservoir is a pressurized vessel. Cold water enters the console through the water inlet connection located on the lower left corner of the lower front panel. The water then flows through the Inlet Pressure Regulator (where incoming water pressure is reduced to 18-20 psi) and into the water box.

The water is pre-heated in the water box using radiant heat generated by the vacuum blower, engine and coil housing.

The water then flows to the water pump where pressure is increased. From there it flows to the heat exchanger where it travels through finned tubing and is further heated by the vacuum blower and engine exhaust.

The hot water then flows through the check valve manifold that contains a strainer and a check valve. At this point, the chemical injection takes place.

The hot solution mixture of water and chemicals then flows through the solution outlet manifold to the cleaning tool. Solution pressure is controlled by the Outlet Pressure Regulator.



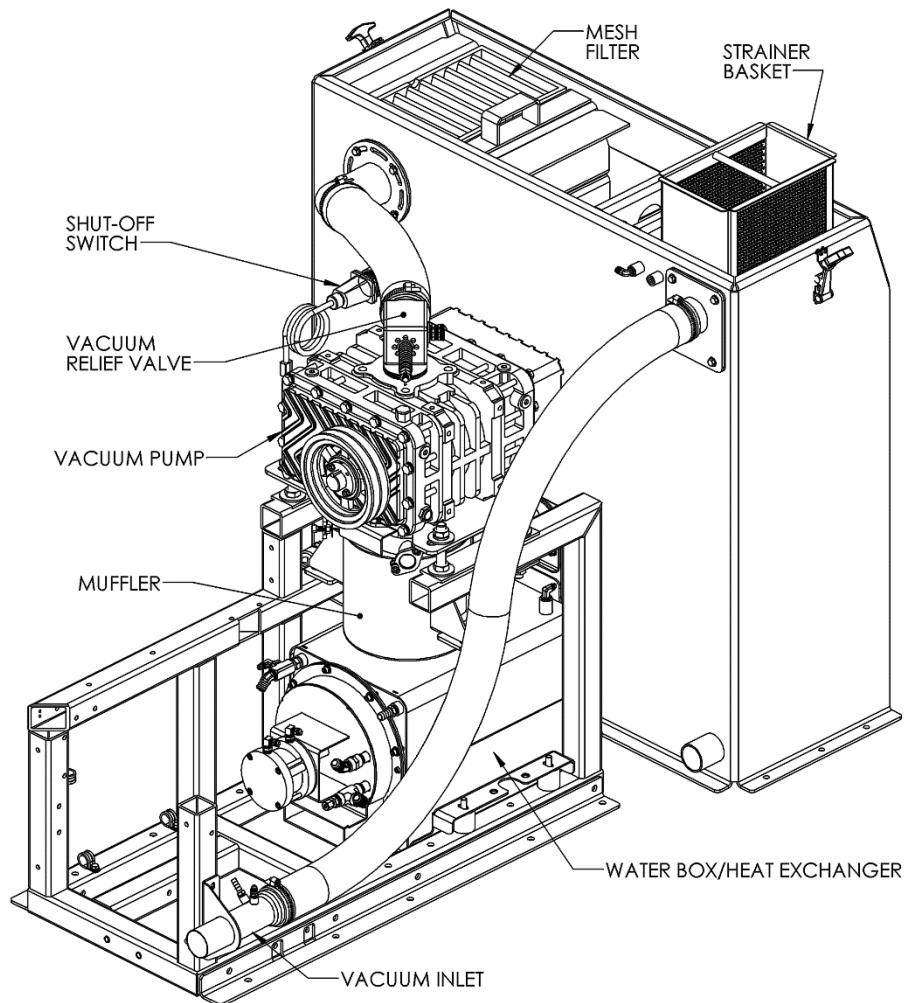
VACUUM SYSTEM

The engine turning a vacuum pump generates the vacuum. The air is channeled in one side of the vacuum pump, compressed and discharged on the opposite side, creating airflow. This airflow is used to do the work necessary for the extraction process. A vacuum nozzle applied to the carpet surface removes moisture, dirt and spent chemicals. These elements are conveyed back to a waste tank utilizing hoses and the force of air. Particles of moisture and dirt are separated in the waste tank using a series of changes in direction and velocity. The air is then filtered and rushes into the vacuum pump.

The vacuum pump heats incoming air as it is compressed. The hot discharged air is forced down-stream into a muffler for noise abatement. Engine exhaust is also fed into the muffler and mixes with the vacuum pump exhaust. Exiting the muffler, this hot air is directed through the heat exchanger

The vacuum pump speed is factory set to maximize vacuum pressure and provide sustained system life. Do not alter the vacuum speed outside the recommended range shown in the Technical Specifications section.

A level shut off switch is located near the top of the waste tank and will shut down the unit before the tank is at full capacity. This protects the vacuum pump from water damage. Note: Waste tank level shut off will not shut the unit off due to high levels of foam. The use of a quality de-foamer is recommended.



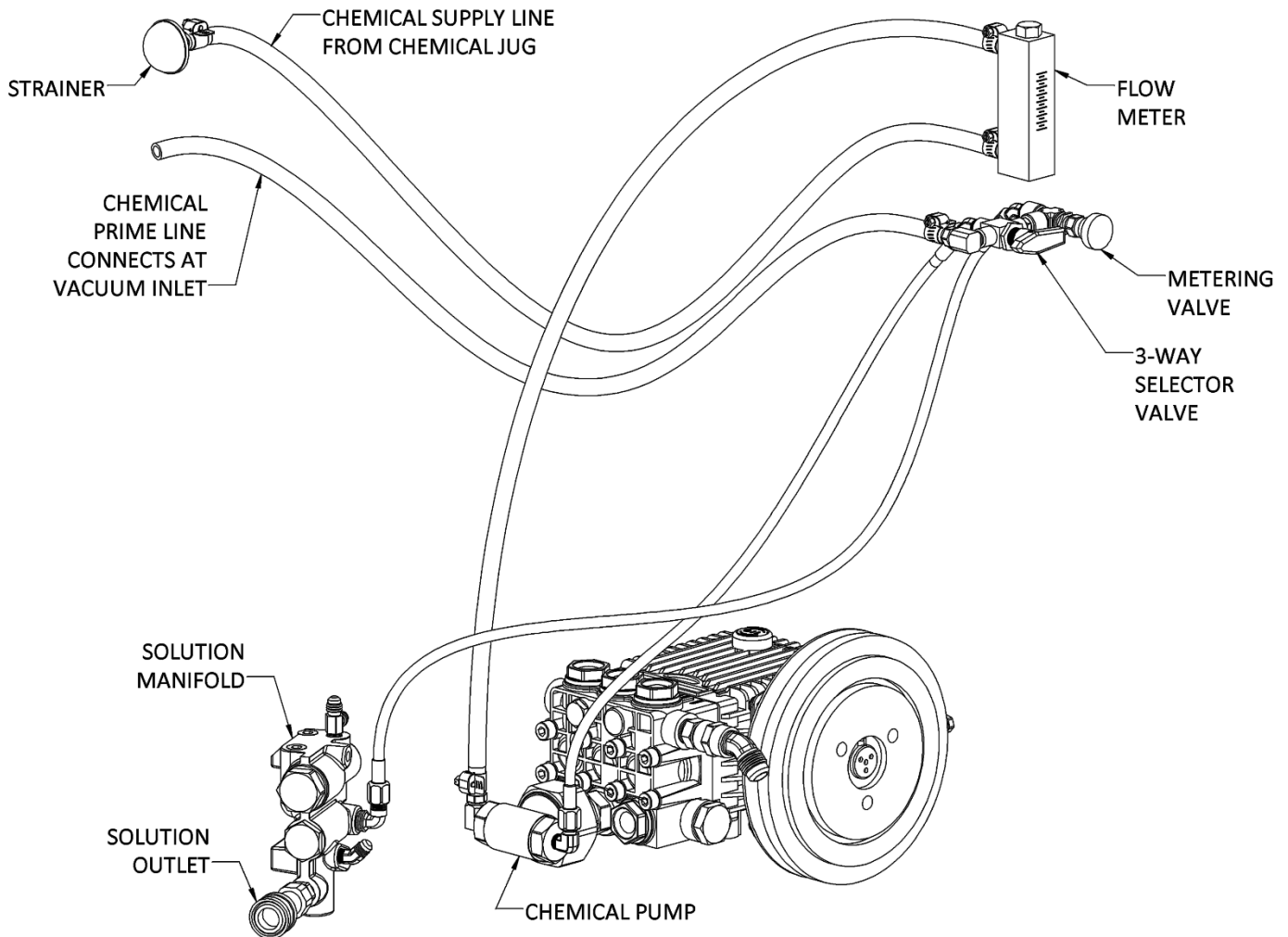
SECTION THREE: OPERATION

CHEMICAL PUMPING SYSTEM

The chemicals are drawn from the chemical container through a strainer into the flow meter mounted on the control panel. The flow meter indicates the rate of chemical flow.


The chemicals then flow through the stainless steel chemical pump, the chemical is then injected into a three way selector valve located on the front panel. This valve may be used to turn the chemical flow ON, OFF, or to PRIME the chemical pump.

The chemicals then flow through the chemical metering valve to the solution outlet. This valve controls the rate of flow of chemical into the cleaning solution, which is indicated on the flow meter.



PREPARATION AND OPERATION

This section of the operator's manual explains how to prepare, start, operate, shut down and maintain your mobile cleaning unit. This unit is easy to operate, however only trained operators should proceed.

 **WARNING** Operate this unit and equipment only in a well-ventilated area. Exhaust fumes contain carbon monoxide, which is an odorless and deadly poison that can cause severe injury or death. DO NOT run this unit in an enclosed area. DO NOT operate this unit where the exhaust may enter a building doorway, window, vent or any other opening.

PREPARATION

ENSURE THERE IS ADEQUATE FUEL

Check the fuel tank to ensure there is adequate fuel to complete the job and transport the vehicle. This unit consumes approximately 1 US gallons of fuel per hour, depending on the speed setting.

NOTE: See Section One in this manual for fuel requirements.

REMOVE TOOLS FROM THE VEHICLE

Remove any tools, accessories or hoses from the vehicle that you will require.

WATER SUPPLY CONNECTION

Prior to connecting your water inlet hose to any supply faucet, flush out the faucet until the water is free of any debris. Also, flush out any debris from your water inlet hose.

1. Connect the hose to the water supply faucet and flush out any debris from the faucet and hose.
2. Connect the hose to the water inlet fitting on the front of the unit.
3. Turn the water supply faucet on.

NOTE: Never use a waste pump outlet hose as a water inlet hose. Use only clean hoses for water supply.

NOTE: See Section One in this manual for water requirements.

CHECK YOUR DRAIN VALVES

Make sure the waste tank and pre-filter box drains are closed.

CONNECT HIGH PRESSURE SOLUTION HOSES

Before starting the unit, connect the high pressure solution hose(s) to the solution outlet connection(s) at the front of the unit. Connect the cleaning tool(s) to the opposite end of the pressure hose(s).

SECTION THREE: OPERATION

CHECK YOUR CHEMICAL LEVELS

Check your chemical container to make sure you have enough chemical mixed to finish the job.

NOTE: See Section One in this manual for chemical requirements.

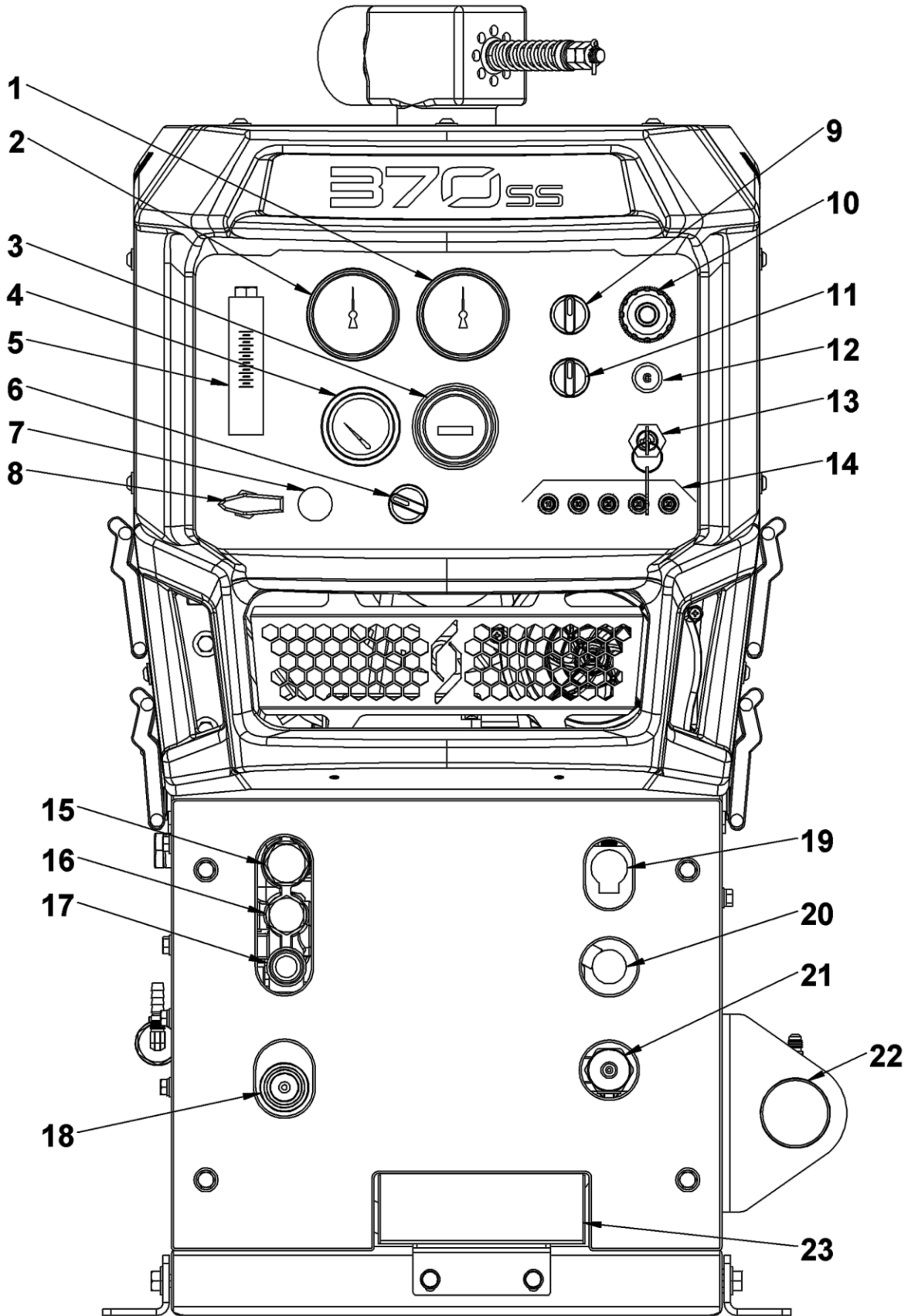
CHECK FILTERS

Inspect the vacuum inlet filter and strainer basket in the waste tank. Inspect the strainer basket inside the pre-filter box. See the Shut Down and Daily Maintenance section below for more information.



NEVER operate the unit with the waste tank air filter removed, damaged or not properly installed.

COMPONENTS



COMPONENTS

1. VACUUM GAUGE

This gauge indicates in inches of mercury how much vacuum the system is producing at any given time.

2. SOLUTION PRESSURE GAUGE

This gauge registers the amount of pressure in the system.

3. HOUR METER

The hour meter records the operating time of the machine. This information is used to calculate the water pump and vacuum pump oil change intervals as well as machine maintenance periods.

4. SOLUTION TEMPERATURE GAUGE

This gauge measures the temperature of the cleaning solution exiting the unit.

5. FLOW METER

The flow meter is a gauge to indicate how much chemical is being introduced into the solution flow.

6. SOLUTION TEMPERATURE CONTROL SWITCH

The temperature control switch provides multiple pre-set temperature settings. The OFF setting allows for continual heat diversion, providing no additional heat to the water through the heat exchanger.

7. CHEMICAL METERING VALVE

The chemical metering valve regulates the amount of chemical flow being injected into the cleaning solution. Counterclockwise rotation opens the valve for more chemical flow. Clockwise rotation closes the valve.

8. CHEMICAL PRIME CONTROL VALVE

The chemical prime valve allows the chemical to circulate through the system. It also purges out air that may be trapped in the lines and cavities of the chemical pump. By turning the valve clockwise the injection system is enabled. The prime setting uses the vacuum of the unit to initiate chemical flow.

9. PRESSURE PUMP SWITCH

This switch turns the clutch on the water pump on or off. Turn clockwise to activate the pump. The "OVERRIDE TO START ENGINE" setting is used to bypass the oil pressure switch when starting the unit. See "IGNITION SWITCH" below for more information.

10. THROTTLE CONTROL

The throttle control is used to set the speed of the engine (RPM). Turn counter-clockwise to open the throttle (for faster speed), clockwise to close the throttle (for slower speed). For emergency slow-down, depress the center button and push the throttle control in.

11. WASTE PUMP OUT

This switch actuates the optional waste pump if installed.

12. CHOKE CONTROL

The choke restricts air to the carburetor when pulled out. This enriches the fuel mixture primarily to assist starting the ignition in cold temperatures. Pull to open the choke for engine ignition. The choke is pushed in once the engine is running.



CAUTION DO NOT run the engine with the choke pulled out.

SECTION THREE: OPERATION

13. IGNITION SWITCH

The engine ignition switch provides ignition to start the engine when the key is inserted and turned. To turn the unit on, turn the Solution Pump Switch counterclockwise to the override position and hold while turning the ignition key clockwise to the start position. Release the ignition key when the engine starts. Wait five seconds then release the override switch.

14. CIRCUIT BREAKERS

These serve to protect the circuits from electrical spikes and overloads.

15. CHEMICAL CHECK VALVE

The chemical check valve allows for chemical injection into the water stream to form the cleaning solution.

16. SOLUTION OUTLET FILTER

The solution screen traps foreign particles from exiting the machine and plugging the orifices of the cleaning tools. This screen is part of the regular maintenance schedule.

17. SOLUTION OUTLET

The pressure outlet is the connection point for the solution hose that runs to the cleaning tool.

18. WATER SUPPLY INLET

This quick connect allows the water supply hose to be connected to the unit.

19. VACUUM LUBRICATION CUP

The vacuum lubrication cup is used to deliver lubrication to the vacuum pump. This prevents rust from building up inside the pump. See the shut-down and daily maintenance sections for more information.

20. MANUAL BYPASS VALVE

This valve allows the operator to manually bypass hot water to the waste tank to quickly reduce water temperature. Turning the valve counterclockwise opens the valve for cooler temperatures. Turning the valve clockwise closes the valve for normal operation.

21. SOLUTION PRESSURE REGULATOR

The pressure regulator sets the pressure of the solution system. This spring loaded valve can be adjusted up or down. The pressure is increased by turning the valve clockwise, or reduced by turning the valve counterclockwise. This valve must be maintained in accordance with the maintenance table in this manual.

22. EXHAUST

Exhaust fumes contain carbon monoxide which is an odorless and deadly poison that can cause severe injury or fatality. DO NOT run this unit in an enclosed area. DO NOT operate this unit where the exhaust may enter any building doorway, window, vent or opening of any type.

23. VACUUM INLET

The vacuum inlet serves as a connecting point for a two-inch vacuum hose.

STARTING THE UNIT

NOTE: Be sure to read and comply with the preparation section of this manual entirely before starting the unit.

1. Set throttle control, pull out engine choke, hold Solution Pump switch in override and turn ignition key to start.
2. Release ignition key and push in engine choke after engine has started.
3. Release Solution Pump switch after about five seconds.
4. Set throttle control to desired speed.
5. Turn the Solution Pump switch to the ON position.

NOTE: If the unit does not build water pressure after 5 seconds, check for adequate water supply. See "Loss of Water Pump Pressure in the Troubleshooting section of this manual.

VACUUM HOSE

Connect the vacuum hose(s) to the vacuum inlet connection at the front of the unit. Connect the opposite end of the vacuum hose(s) to the cleaning tool. Let the unit run for a few minutes with the vacuum inlets partially blocked off to warm up the cleaning solution.

PRIMING THE CHEMICAL PUMP

NOTE: It is recommended that the chemical pump be primed whenever the water pump is on. This eliminates possible pressure fluctuations and water pump pulsations related with running the chemical pump dry.

1. Fill chemical container and inspect chemical strainer for debris.
2. Insert the chemical prime tube and the chemical inlet tube into the chemical container.

NOTE: When inserting the chemical tube into the chemical container, ensure that it stays submerged, as the chemical pump will not function if air is allowed to enter the inlet line.

3. With the engine running, turn the 3-way chemical selector valve to the PRIME position. The chemical will then flow from the chemical container through the chemical prime tube into the vacuum system.

IF THE PUMP DOES NOT PRIME, THEN:

Seal off the vacuum port. The vacuum will quickly draw chemical from the chemical container. After the flow begins, turn the chemical selector valve off and turn the chemical selector valve back to the PRIME position and continue the procedure.

4. When the chemical flows with no air bubbles, priming has been achieved. Turn the chemical selector valve from PRIME to METER. With the cleaning tool open, check the flow meter and adjust the chemical metering valve until the desired rate of chemical flow is achieved.

AUTOMATIC WASTE PUMP

1. If the unit is equipped with an optional automatic waste pump, connect one end of the 5/8 in. or larger garden hose to the pump-out connection and the other end to an acceptable waste disposal.
2. Turn the pump-out switch located on the front console control panel to the ON position. The waste pump will now operate automatically throughout the cleaning period.

DO NOT use an outlet hose that is smaller than 5/8 in. I.D.

NEVER use a waste pump hose as a water inlet hose.

WARNING!

NEVER dispose of waste water in a storm drain, water way or on ground areas. Always dispose of waste in accordance with Local, State and Federal laws.

OPERATION

After you have completed the previous steps, proceed with the cleaning or restoration operation. Place the throttle control cable to a minimum of 50% of throttle control maximum for cleaning or restoration. A float shut-off switch is located inside of the waste tank. It will automatically shut down the unit if the tank reaches its full capacity. If this occurs, empty the waste tank before continuing. When doing flood extraction, the Solution Pump switch should be in the OFF position.

CLEANING

While cleaning, observe the following guidelines:

- Before cleaning, ensure that the wand nozzles are functioning properly.

Hold the wand approximately one foot above the surface to be cleaned and open the wand valve. A full even spray should emit from the cleaning nozzles. If the nozzles are not showing a full even spray pattern, adjust, clean, or replace the nozzles, if required.
- Usually, chemical solution is applied during the push stroke of the wand during cleaning, and extraction is done on the pull stroke. For heavily soiled carpets, the wand may be used in a scrubbing action, with chemical solution applied in both push and pull strokes, provided that the final stroke is a pull stroke with no chemical injection.
- While cleaning, keep the cleaning tool opening flat on the surface being cleaned. Keep the tool moving when the valve is open. **DO NOT** leave the tool flat on a surface when sitting idle with the unit running. This will cause unnecessary strain on the unit and build excessive heat in the water.
- The unit will automatically shut down when the waste tank is full. This prevents water being drawn into the vacuum pump. If shut-down occurs, empty the waste tank before proceeding. If shut-down is occurring due to foam, a de-foamer must be added to the tank.

SECTION THREE: OPERATION

UPHOLSTERY AND STAIR TOOL CLEANING

Upholstery and stair tools have a lower flow rate and smaller orifices. Run the engine at approximately 50% of full speed. Open the Solution Temperature Control valve on the lower front panel to reduce water temperature before cleaning sensitive upholstery fabrics.

FLOOD RESTORATION/EXTRACTION

Set the throttle control to a minimum of 50% of throttle control maximum. Set the pressure regulator to 100 PSI and make certain that the Solution Pump switch is in the OFF position. Proceed into the extraction process.

GAUGE READINGS AND SETTINGS

VACUUM PRESSURE GAUGE

With the unit running, the vacuum gauge should read near zero with vacuum hoses disconnected from the vacuum inlets. If the gauge shows a reading, check the filter in the waste tank and the strainer baskets in both the waste tank and pre-filter box for debris. With vacuum ports sealed, and machine running at high speed, the vacuum gauge should read 11 to 13 inches of mercury (in. Hg). This is preset by the factory for the maximum safe operation. Depending on elevation, this may need to be reset at time of installation.



DO NOT exceed 13 in. Hg vacuum pressure. This can cause damage to the vacuum pump.

WATER PRESSURE GAUGE

Water pressure is set by adjusting the pressure regulator valve on the lower front panel for the desired water pressure. Normal settings are as follows:

- 200 PSI for upholstery cleaning
- 450 PSI for carpet cleaning
- UP TO 1500 PSI maximum

If an upholstery tool is designed for truck mount operation, the pressure for upholstery cleaning can be set at the same level as for carpet cleaning.

CHEMICAL FLOW METER

The flow meter reads the flow rate from the chemical jug while the chemical is being drawn. The chemical adjustment should normally be set at 1 or 2 GPH for a normal job and at 2 or 3 GPH for an extremely dirty job.

NOTE: The setting is also dependent on the type of chemical used and the concentration ratio of chemical to water.

Always use the **LOWEST** flow rate that properly cleans the affected areas. Excessive chemicals can cause damage to the items being cleaned.

OVERHEATING PROTECTION

Air cooled engines rely on the flow of air over the engine for cooling operations. Ensure that there is sufficient air flow in the van. **NEVER** operate the unit with all vehicle doors closed and no alternative ventilation system. Keep the vehicle clean and airways between components unrestricted. For operation in extreme temperatures, the use of an air mover to assist with air circulation is recommended.

SHUT DOWN AND DAILY MAINTENANCE

1. Flush out the chemical system with fresh water to remove any chemical residue.
2. Remove as much moisture from the vacuum hose as possible to prevent spillage of wastewater in the vehicle when returning hoses. Disconnect the vacuum hose from the front of the unit.
3. Adjust the throttle cable to the idle position.
4. Switch the temperature control to the lowest setting.
5. Allow the unit to run for at least 5 minutes with the bypass valve open. This will also help to remove any excess moisture from the vacuum pump and cool the unit down.

NOTE: *If shutting down for the day: Plug the vacuum inlet on the front of the unit and set the throttle to high. Spray a quality silicone or Teflon/PTFE based lubricant into the vacuum lubrication cup for 5 seconds. Let machine run 2 minutes to disperse lube to blower.*

6. Unplug the vacuum inlet and remove load. Next, return the throttle control cable to idle position, and let idle for 3 to 5 minutes.
7. Turn the ignition switch to the OFF position.
8. Turn the water supply faucet off. Loosen the water supply hose at the water supply to bleed off any pressure. Unhook the water supply hose and return it to the vehicle.
9. Activate the valves on the cleaning tool. This will relieve any remaining pressure. Disconnect the cleaning tool and solution hose and return them to the vehicle.
10. Drain the waste tank, disposing of wastewater in a suitable and proper location.
11. Remove the strainer basket from the waste tank. Clean out any debris and re-install. Micro-ban QGC cleaner is the best product for cleaning and sanitizing the waste tanks as well as other parts of the system
12. Inspect the filter inside the waste tank daily. Remove and clean the filter if there is any lint or debris present.
13. At the end of the work day, rinse out the waste tank with fresh water. Microban QGC cleaner as the best product for cleaning and sanitizing the waste tanks as well as other parts of the system
14. Clean the vehicle interior, unit, tools, hoses etc., as needed. Inspect ALL equipment and accessories for any damage, leaks, wear, etc.

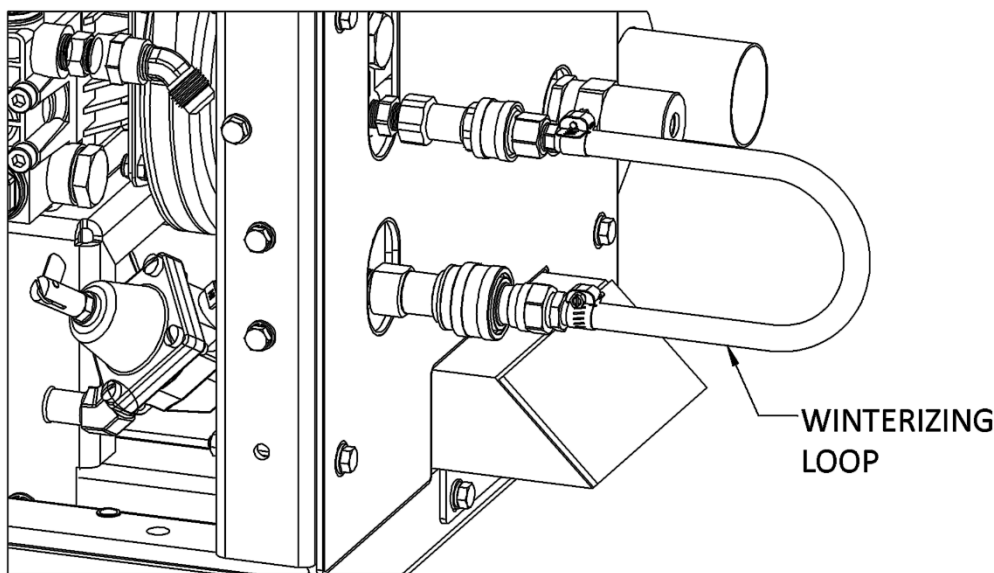
FREEZE PROTECTION

If the unit is exposed to freezing weather conditions, the water inside of the unit may freeze, resulting in **SERIOUS DAMAGE** to the unit. The following is recommended to prevent this from occurring during the cold weather season:

1. Always park the unit in a heated building when not in use.
2. While out in operation, avoid long periods of shut down as the unit generates heat while running. Keep the unit running just prior to leaving for the next job.
3. If a heated building is not available, winterize the unit with anti-freeze.
It is not possible to completely winterize units that have auxiliary water tanks. If the unit has an auxiliary water tank(s), it must be stored in a heated building.

WINTERIZING THE UNIT WITH ANTIFREEZE

1. Disconnect your water supply. If you have an on-board water supply, fully drain it when your unit is down for long periods. The components of the water supply cannot be fully winterized, only the console. Any pumps
2. Run the unit on low to extract as much water as possible. This can be done through the bypass valve or an open-ended hose connected to the solution outlet.
3. Add one gallon of a minimum dilution of 50/50 or 100% glycol based anti-freeze directly to the water box.
4. Attach a short 30-36" hose with a 1/4" male quick connect to the solution outlet and 3/8" male quick connect to the water inlet, making a loop in the system. If you don't wish to make the hose, you can purchase one pre-assembled from Legend Brands, part number 68-168.



5. Turn the pressure regulator all the way down. Start the unit in idle, turn the Solution Pump switch to the ON position and run coolant through the system. Allow the unit to run for about 3 minutes to fully circulate the anti-freeze.

SECTION THREE: OPERATION

6. Prime the chemical injection system with a minimum dilution of 50/50 or 100% glycol based antifreeze. Insert the chemical inlet and prime tube into the anti-freeze container. Turn the chemical valve to PRIME until anti-freeze comes out of the prime hose. Turn the chemical valve to the ON (chemical) position. Ensure that the flow meter indicates flow while the attached tools solution valves are opened. Ensure that all anti-freeze that comes out of the chemical hose goes into an approved container.
7. After 25 seconds, turn the chemical valve to the OFF position.

WINTERIZING THE HOSES AND TOOLS WITH ANTIFREEZE

1. To winterize your hoses and tools, connect all hoses to the solution outlet. Connect a tool to the hoses. Make sure that the tool will drain into an approved anti-freeze container.
2. Make sure the pressure regulator is turned all the way down. Start the unit in idle and turn the water pump on. Open the tool valve until anti-freeze begins to flow from the tool. Repeat this procedure with all hoses and tools as necessary. Disconnect and store the hoses and tools once they have been filled with anti-freeze.

REMOVING ANTI-FREEZE FROM THE UNIT

1. Connect the solution hoses to the unit, with a tool attached to the opposite end. Start the unit. Turn the water pump on. Open the tool valve and ensure that the anti-freeze goes into an approved container. Allow the anti-freeze to flow into the container until all anti-freeze has been drained.
2. Fill the water box with fresh water and repeat step 1.
3. Connect the water inlet hose to the unit and turn the water supply on. Connect all tools and solution hoses that were winterized to the solution outlet connection.
4. Open all tool valves and drain the anti-freeze into an approved container until the water runs clear and all of the anti-freeze is purged from the hoses and tools.
5. Insert the chemical prime hose into the approved container. Submerge the chemical hose into fresh water. Turn the chemical valve to the PRIME position until the water runs clear through the prime hose. Remove the prime hose from the container.
6. Turn the chemical valve to the ON (chemical) position and open attached tools solution valves. This will allow water to flow to the other side of the system.
7. After all of the anti-freeze has been removed, the unit is ready to operate.

The anti-freeze in your approved storage container will eventually become diluted with water. When the anti-freeze level drops below 40% of the total mixture, properly dispose of it and start over with fresh anti-freeze.

WARNING!

DO NOT drain used anti-freeze on the ground or into storm drains.

Dispose of anti-freeze only in an approved location. Observe Local, State and Federal laws when disposing of anti-freeze.

370 MAINTENANCE CHART

DAILY MAINTENANCE

Engine	Check engine oil level. (2) Fill to proper level.
Vacuum Pump	Check vacuum pump oil level. Fill to proper level. Do not overfill. (1)
Vacuum Pump	Spray silicone or Teflon/PTFE based lubricant into the lubrication cup for 10 seconds.
Water Pump	Check water pump oil level. (3) Fill to proper level.
Waste Tank	Inspect filter in the waste tank, clean and or replace if required. (1)
Waste Tank	Empty and clean stainless steel basket in the recovery tank.
Entire unit	Inspect for leaks (water, oil, fuel).
Entire unit	Remove any debris that could cause a fire and/or blocks airflow in any way.
Vacuum Hoses	Rinse with fresh water.
Waste Pump-Out	(Optional equipment) Inspect and remove any debris or sediment. (1)

WEEKLY MAINTENANCE

Float Switch(es)	Clean and inspect float switch(es) in the waste tank.
Visual Inspection	Check for leaks around the unit, check wires and hoses for wear.
Engine	Inspect air intake and cooling areas, clean if required.
Water Pump	Inspect and clean wye strainer screen
Battery	Check fluid level and battery terminals. (1)
Bypass Manifold	Inspect screen and orifice, clean or replace as needed.

MONTHLY MAINTENANCE

Engine	Check air cleaner for damaged, dirty or loose parts.
Engine	Inspect drive belts for wear. Replace as needed.(5)
Check Valve Strainer	Clean and remove debris (1, 4)
Check fasteners	Check fastener tightness on all components. Tighten as needed.

YEARLY MAINTENANCE

Check-Valve	Check seat for abnormal wear or debris. Replace as needed.
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To maximize the operating life and performance, use only recommended oils, filters and greases.

- (1) Or as often as required.
- (2) Change engine oil and oil filter after **first 8 hours** of operation and then **every 100 hours**.
- (3) Change water pump crankcase oil after **first 50 hours** of operation.
- (4) Inspect after **first week** of operation, and remove any debris present. Inspect again after **2 to 4 weeks**.
- (5) See Service Interval Chart for regular belt service intervals.

370 SERVICE INTERVAL CHART

SERVICE INTERVALS – EVERY 25 HOURS

High Pressure Hoses	Inspect hoses for wear, damage or impending rupture. Replace if damaged.
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SERVICE INTERVALS – EVERY 50 HOURS

Engine	Change engine oil. (5)
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SERVICE INTERVALS – EVERY 100 HOURS

Vacuum Relief Valve	Check and adjust vacuum relief valve up to 13” Hg if needed.
Pressure Regulator	Lubricate o-rings. Use only o-ring lubricant (Legend Brands P/N 13-003)
Belts	Check belts for wear and re-tension, check pulley alignment. (1)
Battery	Clean battery terminals.
Engine	Change engine oil filter.
Engine	Check spark plugs. Use only OEM spark plugs.
Diverter Valve	Lubricate diverter valve shaft with copper anti-seize
Diverter Valve	Remove vacuum tubes from Bimba cylinder and lubricate cylinder with WD-40

SERVICE INTERVALS – EVERY 200 HOURS

Engine	Check engine air filter elements and clean as needed.
Fuel Pump	Check hose connections.
Chemical Valves	Inspect packing nut on selector and metering valves. Adjust as needed.

SERVICE INTERVALS – EVERY 300 HOURS

Engine	Clean combustion chamber.
Engine	Check valve clearances. Adjust as needed.
Engine	Clean and lap valve seating surfaces.

SERVICE INTERVALS – EVERY 500 HOURS

Water Pump	Change crankcase oil (2)
Engine	Replace in-line fuel filter. (4)
Pulleys and Hubs	Check pulleys and hubs for proper torque. (3)
Chemical Pump	Change diaphragm and check valves. Inspect disc.
Vacuum Pump	Lubricate bearings on pulley end with grease

SERVICE INTERVALS – EVERY 1000 HOURS

Engine	Replace spark plugs. Use only OEM spark plugs.
Engine	Replace air filter paper element. (4)
Vacuum Pump	Drain, flush and replace gear end oil. (4)

SERVICE INTERVALS – EVERY 2000 HOURS

Belts	Replace all belts.
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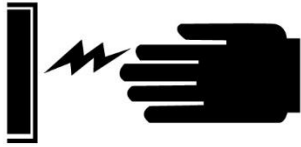
To maximize the operating life and performance, use only recommended oils, filters and greases.

- (1) Re-tension belts after **first 25 hours**, then every **100 hours** of operation after.
- (2) Change water pump crankcase oil after **first 50 hours** of operation.
- (3) Check pulley and hub set screws after **first 50 hours** of operation, and again at **100 hours** of operation.
- (4) Or **yearly**, whichever comes first.
- (5) Change engine oil after **first 8 hours** of operation.

MAINTENANCE AND SERVICE ADJUSTMENTS

This section of the operator’s manual contains service and maintenance information. A planned preventative maintenance program will ensure that this unit has optimum performance, long operating life, and a minimum amount of down time.

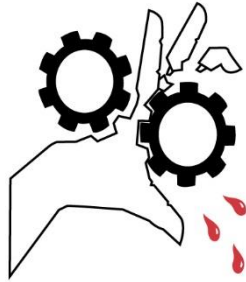
⚠ WARNING



**ELECTRICAL SHOCK
COULD CAUSE SEVERE
BURNS OR INJURY. DO
NOT TOUCH ELECTRICAL
WIRES OR COMPONENTS
WHILE THE ENGINE IS
RUNNING. DISCONNECT
THE BATTERY BEFORE
SERVICING THIS UNIT TO
PREVENT ACCIDENTAL
STARTING.**

44-066 A

⚠ WARNING



**ROTATING MACHINERY
CAN CAUSE INJURY OR
COULD BE FATAL.
KEEP ALL GUARDS
AND SAFETY DEVICES
IN PLACE.**

44-085 A

⚠ DANGER



**WATER UNDER HIGH PRESSURE AT
HIGH TEMPERATURE CAN CAUSE
BURNS, SEVERE PERSONAL
INJURY, OR COULD BE FATAL.
SHUT DOWN MACHINE, ALLOW TO
COOL DOWN, AND RELIEVE
SYSTEM OF ALL PRESSURE
BEFORE REMOVING VALVES,
CAPS, PLUGS, FITTING, FILTERS
AND BOLTS.**

44-083 A



44-084 A

⚠ WARNING

DO NOT attempt to service this unit while it is running. High speed parts as well as high temperature components may result in severe injury, severed limbs, or fatality.

NOTE: Refer to the hour meter as a guide for coordinating a maintenance schedule.

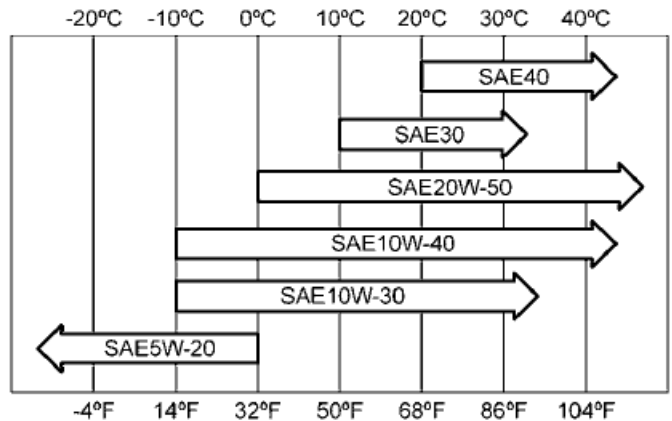
SECTION FOUR – SERVICE AND MAINTENANCE

ENGINE

- **Check engine oil daily.** Ensure that the proper oil level is maintained. Never overfill.
- Change the oil after the **first 8 hours** of operation. Thereafter, Legend Brands recommends changing the oil **every 50 hours** of operation and the oil filter **every 100 hours**. Use only OEM oil filters. Use of any other type of oil filter will void engine warranty. The filter rotates counterclockwise for removal.

Use high-quality oil of at least API (American Petroleum Institute) service class SG or higher. **Do not use additives.** High quality 10W-30 or 10W-40 oil is recommended (**New units ship with 10W-30**). Using 20W-50 in higher ambient temperature conditions may reduce oil consumption. It is never recommended to extend oil change intervals past 200 hours.

NOTE: Using lower service class oil or extending oil change intervals longer than recommended can cause engine damage.



Engine Oil Capacity	1.4 L (1.5 US qt.) when oil filter is not removed 1.6 L (1.7 US qt.) when oil filter is removed
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- **Inspect daily** for oil or fuel leaks from all lines and for debris on or around the engine, including the air inlet screen. Remove any debris before running the unit.
- Check the engine air filter elements **every 200 hours**, clean as needed. Clean the foam element by using detergent and water, then allow to dry thoroughly before replacing. Clean the paper element by tapping gently to remove dust. Do NOT use pressurized air to clean the paper element. Replace the air filter paper element **every 1000 hours or yearly**, whichever comes first. Check and replace more frequently if operating in environments where the unit is exposed to high levels of air pollutants such as dust or other airborne debris.
- Replace the inline fuel filter **every 500 hours or yearly**, whichever comes first.
- Check the spark plugs every **100 hours** of operation. Clean and re-gap as needed or yearly. Replace the spark plugs **every 1000 hours**. Use only OEM specified spark plugs: NGK BPR4ES with a gap of 0.030 in (0.75mm).
- Adjust engine speed as needed.

THROTTLE	LOAD	RPM*
Idle	None	1550 RPM
Full	13”Hg. vacuum 500 PSI pressure	2850 RPM
Full	None	2950 RPM

*±50 RPM tolerance

DO NOT attempt to adjust without a tachometer and NEVER adjust the engine above 3000 RPM

SECTION FOUR – SERVICE AND MAINTENANCE

Clean combustion chamber, check and adjust valve clearances and clean and lap valve seating surface **every 300 hours** of operation.

Valve Clearances:	Intake - 0.004 to 0.006 in (0.10 ~ 0.15 mm) Exhaust - 0.004 to 0.006 in (0.10 ~ 0.15 mm)
Valve Seating Surface Angle	45°
Valve Seating Surface Width	Intake – 0.03 to 0.06 in (0.8 to 1.4 mm) Exhaust – 0.4 to 0.6 in (1.1 to 1.6 mm)
Valve Guide Inside Diameter	Standard Cylinder – 2.960 to 2.961 in (75.18 to 75.20 mm)

NOTE: Additional engine service information can be obtained from the manufacturer's Owner's and/or Service manuals. If service or repair is required, contact an authorized service center. They will require the serial number of the engine.

Kawasaki FH680D Service Parts:

- 120884 – OIL FILTER
- 120885 – SPARK PLUG, BPR4ES
- 126670 – CHARGING COIL
- 126671 – STARTER
- 126672 – VOLTAGE REGULATOR
- 126673 – IGNITION COIL
- 126674 – ROCKER COVER GASKET
- 126675 – PAPER AIR FILTER ELEMENT
- 126676 – FOAM AIR FILTER ELEMENT

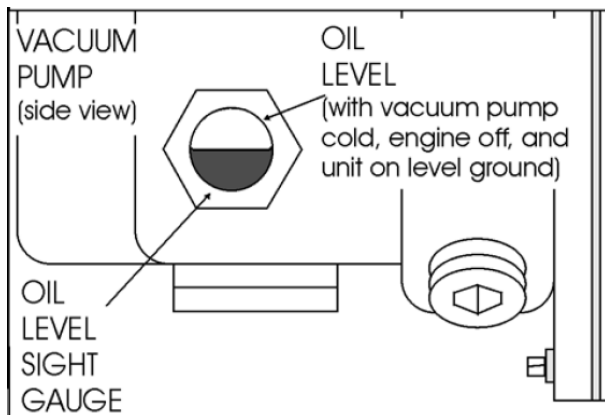
VACUUM PUMP

NOTE: Refer to the provided vacuum pump Operation and Service Manual for specific instructions.

- Check the oil level on the gear side **daily** to ensure the proper level is maintained. Too little oil will damage and ruin the bearings and gears. Too much oil will result in overheating.

Legend Brands requires that you use only AEON PD-XD Synthetic Blower Lubricant in both sides of the vacuum pump for all operating temperatures. AEON PD-XD is formulated specifically for positive displacement blower service to provide maximum blower protection at any temperature.

AEON PD-XD (Legend Brands Part # 118447) is the only oil that Legend Brands puts in the vacuum pump at the factory. Adding petroleum oil to synthetic oil is **NOT** recommended.

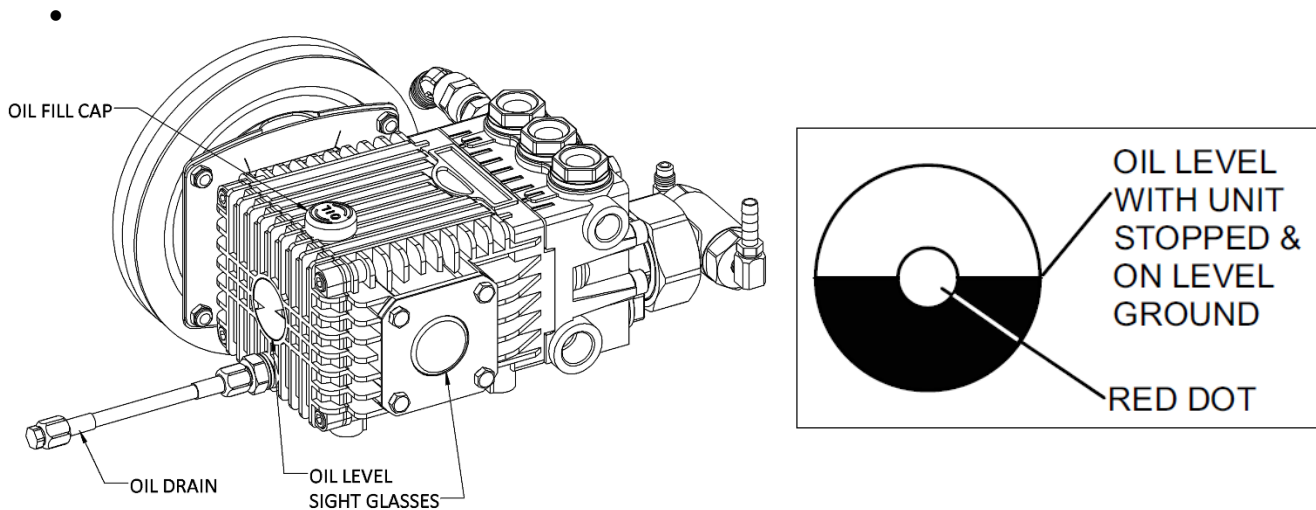


- A lubrication cup has been provided at the front of the console, to prevent rust from building up inside of the vacuum pump. Run the unit for at least 2 minutes to remove any moisture from the vacuum pump. Then, spray a quality silicone or Teflon/PTFE based lubricant into the lubrication cup for 2 seconds while the unit is running and the vacuum inlet port is sealed. This procedure should be done at the **end of every working day**.
- Drain, flush and replace the oil **every 1000 hours or yearly**, whichever comes first.

WATER PUMP

NOTE: Refer to the provided water pump Operation Manual for specific instructions.

- Check the crankcase oil level **daily** to ensure the proper level. If the level has dropped, check for the source of leakage and repair.



- After the **first 50 hours** of operation, change the crankcase oil Industrial Pump Oil, (Part # 118449). Change the crankcase oil **every 500 hours** thereafter.

DRIVE BELTS, PULLEYS and HUBS

Check pulley and hub screws after the **first 50 hours** and again at **100 hours** of operation. Re-torque these bolts with a torque wrench. Follow the torque values on the following table. Check pulley set screws and hub screws **every 500 hours** thereafter.

Re-tension belts after the **first 25 hours** of operation, then check for proper tension **every 100 hours**. Always check belt tension after checking the pulley and hub screw torque values. Use Gates EPDM belts and replace **every 2000 hours** of operation.

Use a clockwise pattern when re-torquing screws and continue until the proper torque is achieved.

Torque Values	
Engine Crankshaft / Blower Pulley	16 lbf-ft
Engine Front / Water Pump Pulley	9 lbf-ft

VACUUM PUMP BELT REPLACEMENT

1. Disconnect the negative battery cable.
2. Remove hose from waste tank to vacuum pump.
3. Remove left side hood and rear belt guards.
4. Loosen the hose clamp between the vacuum pump and heat exchanger muffler.
5. Loosen the tension adjustment screw on the front side foot of the blower.
6. Push the vacuum pump towards the center of the frame to loosen the belts.
7. Remove all belts. Install new belts.
8. Pull the vacuum pump towards the outside of the frame while tightening the tension adjustment screw. The rear adjustment screw may need to be moved in or out depending on how far the pump must move.
9. Check for proper tension and alignment. Do this using a belt gauge. Set deflection to 1/4"; 10-12 lbs tension.
10. Check pulleys for alignment using a straight edge (example: 1/2" key stock). Make sure pulley flange touches on 2 places on each pulley (4 total places).
11. Replace belt guards and side hood.
12. Reconnect the hose from the waste tank to the vacuum pump.
13. Reconnect the negative battery cable.

WATER PUMP DRIVE BELT REPLACEMENT

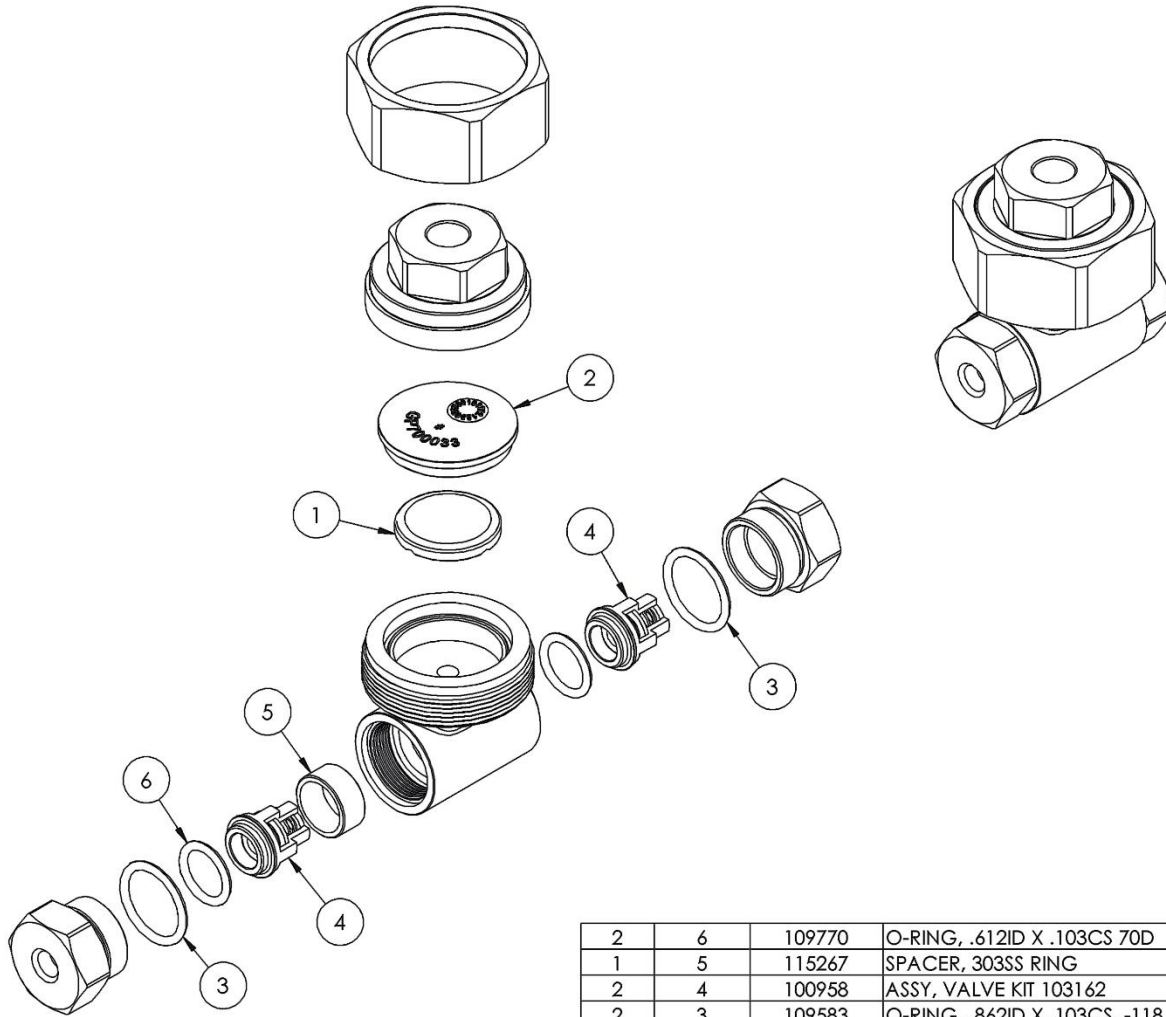
1. Disconnect the negative battery cable.
 2. Remove left side hood and front left-side belt guard.
 3. Loosen the four nuts that hold the water pump base to the frame.
 4. Adjust the position of the belt tensioning adjustment bolt until the belt is loose enough to slide off.
 5. Install new belt.
 6. Adjust the position of the belt tensioning adjusting bolt until the proper belt tension is achieved (1/2" deflection in the center of the belt, half way between the pulleys).
- NOTE:** Do not over tighten; damage to pump may occur.
7. While checking the alignment, tighten the nuts that hold the water pump to the base.
 8. Replace the belt guard and side hood.
 9. Reconnect the negative battery cable.

ONLY USE GATES EPDM BELTS

SECTION FOUR – SERVICE AND MAINTENANCE

CHEMICAL PUMP

The chemical pump should be rebuilt **every 500 hours**. This involves changing the diaphragm, check valves, and inspecting the disk. **DO NOT** attempt to reuse o-rings after the check valves have been removed. Replace all o-rings when servicing check valves.



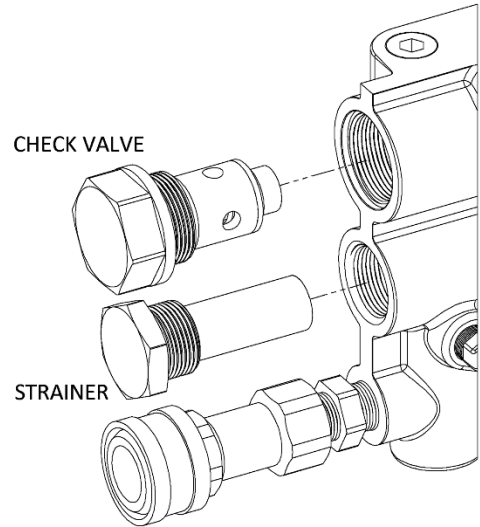
2	6	109770	O-RING, .612ID X .103CS 70D
1	5	115267	SPACER, 303SS RING
2	4	100958	ASSY, VALVE KIT 103162
2	3	109583	O-RING, .862ID X .103CS, -118
1	2	103630	DIAPHRAGM, RUBBER
1	1	114711	DISC, PLASTIC
QTY	ITEM NO.	PART NO.	DESCRIPTION

SOLUTION MANIFOLD CHECK VALVE AND STRAINER

Unscrew the screen and inspect the strainer after **the first week** of operation. Remove any debris present. Inspect again **after 2 and 4 weeks**. Thereafter, inspect the strainer and screen at least **monthly**. If a frequent build-up of debris is noticed, inspect and clean more frequently.

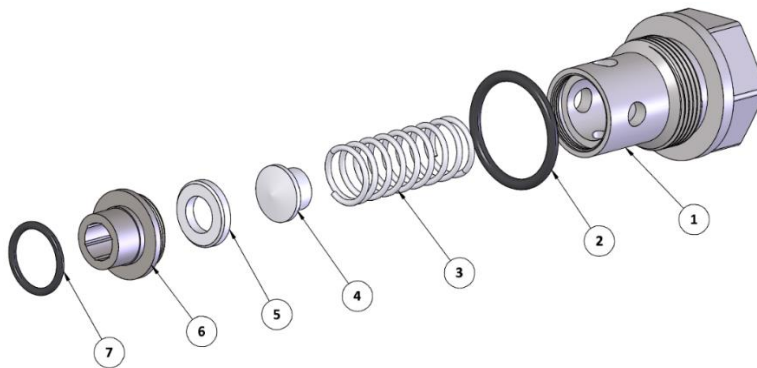
Always inspect the check valve and solution manifold strainer whenever performing service on the chemical pump or if flow problems are occurring in the chemical system.

1. Shut down Unit.
2. Remove and clean strainer mesh.
3. Remove the check valve, ensuring that the small o-ring on the seat comes out with it.
4. Next, remove the seat using a 5/16 in. Allen wrench.
5. Check the seat for wear or debris. Clean and replace the seat if necessary.
6. Inspect the poppet and the spring for wear or damage. Clean and replace as necessary.
7. Re-assemble the check valve. Thread the seat by hand until snug. Then tighten with a 5/16 in Allen wrench. **DO NOT** over-tighten.
8. Lubricate the new o-rings with o-ring lubricant (Part # 13-003) and re-install.



NOTE: New o-rings must be installed **anytime** the check valve is removed.

NOTE: Improper seating of the check valve seat, poppet, damaged spring or o-rings will result in poor performance of the chemical system.



102878 ASSEMBLY, CHECK VALVE MANIFOLD

Item #	P/N	Qty.	Description
1	103380	1	CAP, CHECK VALVE ASSY. SS
2	111554	1	ORING, 7/8 ID X 1-1/16 OD
3	115469	1	SPRING, CHECK VALVE ASSY.
4	110943	1	POPPET, CHECK VALVE ASSY
5	106693	1	INSERT, SEAT-CHK VLV ASSY TM
6	119482	1	SEAT, CHECK VALVE ASSY.
7	118471	1	ORING, 1/2 ID 5/8 OD

PRESSURE REGULATOR

The pressure regulator holds water pressure at a preset point and bypasses the excess water.

To adjust:

With the unit running, with the cleaning tool valve closed, the pressure gauge should read 0. With the tool valve open, adjust the pressure by turning the adjusting knob so that the pressure gauge reads between 400 - 1500 PSI.

WARNING

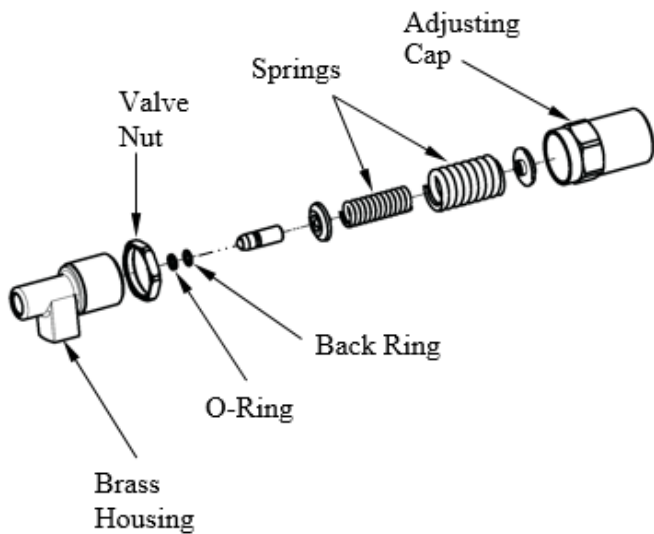
DO NOT loosen the adjusting body (cap) all the way (counterclockwise) or remove it while the unit is running.

Lubricate the o-rings in the pressure regulator **every 100 hours**.

Use only o-ring lubricant (Part #118154).

If you do not, the stem may become seized due to inadequate lubrication. If this occurs:

1. Shutdown the unit.
2. Relieve all pressure from the water system.
3. Remove the cap from the pressure regulator and remove the stem with long nose pliers.
4. Clean and lubricate stem.
5. Reassemble pressure regulator



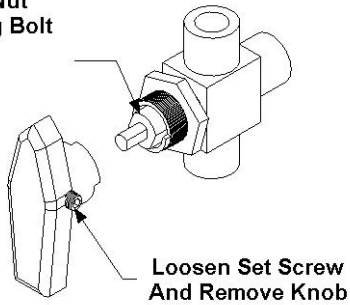
CHEMICAL METERING SYSTEM

Check and inspect the packing nut on the chemical selector and metering valves **every 250 hours**. Keeping the valve packing's properly adjusted will prevent leaks and add to the overall life of the valves.

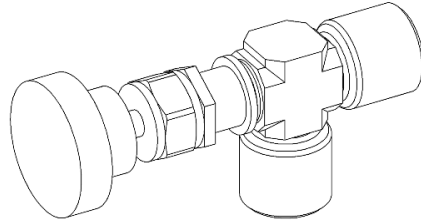
When turning the knob, there should be some resistance. If not, slightly tighten the packing nut. **DO NOT** over tighten. Keeping the packing properly adjusted will eliminate possible leaks and will add to the overall life of the valves.

CHEMICAL SELECTOR VALVE

Adjust The Packing Nut
By Turning The Packing Bolt
Clockwise In 1/16"
Increments.

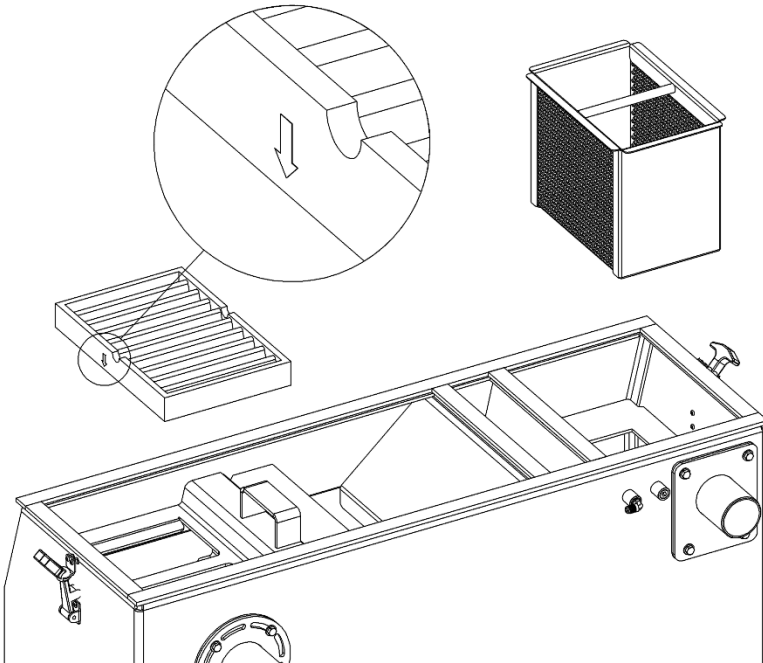


CHEMICAL METERING / TEMPERATURE CONTROL VALVE



WASTE TANK FILTER AND STRAINER BASKET

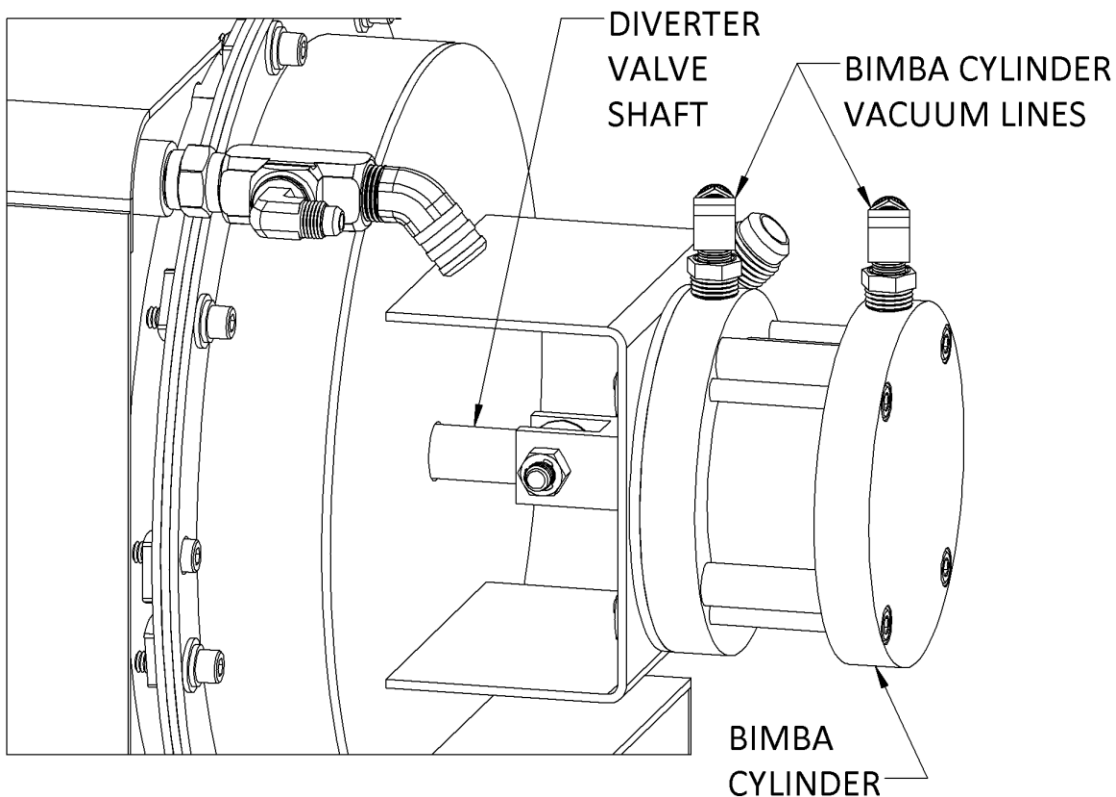
The waste tank filter and strainer basket should be removed, inspected and cleaned **daily**. When replacing the filter, ensure that the flow indicating arrow is pointing down.



HEAT EXCHANGER DIVERTER VALVE

Lube the diverter valve shaft **every 100 hours** with copper anti-seize using a small acid brush. Apply a thin coat to the shaft when it is in the open (heating) position, when the Bimba cylinder is moved forward.

Every 100 hours, remove the white vacuum tubes from the Bimba cylinder and add a 5-second shot of WD40 to each side of the cylinder. If the cylinder does not move freely, remove the cylinder by removing the four bolts at the front of the cylinder and take the cylinder apart. Clean the interior parts with a scotch-brite pad. Lube with WD40 and re-assemble the cylinder



BATTERY

Before disconnecting the negative (-) ground cable, ensure that all switches are in the OFF position. If ON a spark could occur at the ground connection terminal, which could cause an explosion if hydrogen gas or gasoline vapors are present. ALWAYS disconnect the negative (-) terminal first.

- If you do not have a maintenance free sealed battery, check the fluid level in the battery at least **once a week**. If low, fill to the recommended level ONLY with distilled water. DO NOT overfill the battery. Early failure or poor performance will result due to loss of electrolyte.
- Keep cables, terminals and external surfaces of the battery clean and dry. A buildup of corrosive acid or grime on the external surfaces could cause the battery to self-discharge.
- Battery terminals should be cleaned **every 100 hours** to prevent corrosion buildup. Wash the cables, terminals and external surfaces with a mild baking soda and water solution. Rinse thoroughly with fresh water. DO NOT allow baking soda to enter the battery cells, as this will destroy the electrolyte, resulting in battery failure.

WARNING!

Batteries contain sulfuric acid. To prevent acid burns, avoid contact with skin, eyes and clothing. Batteries also produce explosive hydrogen gases while charging. To prevent fire or explosion, charge batteries only in a well ventilated area. Keep sparks, open flames, as well as any other sources of ignition away from batteries at all times. Remove all jewelry prior to servicing batteries.

VACUUM HOSES

To ensure maximum hose life, Legend Brands recommends that you wash out the hoses with fresh water **daily**. Microban QGC cleaner as the best product for cleaning and sanitizing the wands and hoses as well as other parts of the system.

HIGH PRESSURE SOLUTION HOSES

Inspect your high-pressure solution hoses for wear after the **first 100 hours**. Thereafter, inspect **every 50 hours**. If the hoses show any signs of damage or impending rupture, replace the hoses.

WARNING!

NEVER attempt to repair high-pressure solution hoses. Repairing high-pressure solution hoses may result in severe burns and serious injury.

All high-pressure solution hoses must be rated for 3000 PSI at 250 deg. F. Thermoplastic hoses do not meet this requirement and should not be used. Severe burns and injury may result if the hoses do not meet these requirements.

VACUUM RELIEF VALVE

With the unit running at full RPM, block off the airflow at the vacuum inlet port and read the vacuum gauge. If adjustment is required, shut the unit down and adjust the locking nut tension on the vacuum relief valve. Re-start the unit and read the vacuum gauge. Repeat this process until the vacuum relief valve opens at 13" Hg. Always ensure the lock nut is retightened.

TROUBLESHOOTING

WARNING!

DO NOT attempt to service this unit while it is running. High-speed parts as well as high temperature components may result in severe injury, severed limbs or fatality.

This section of the operator's manual describes how to look for and repair malfunctions, which may occur.

Accurate troubleshooting is based on a thorough and complete understanding of the WATER, CHEMICAL, VACCUM, HEAT TRANSFER, SAFETY and WIRING systems featured in this unit.

If there are malfunctions occurring on this unit which you do not understand, refer back to the OPERATION section of this manual and review SYSTEM.

ENGINE TROUBLESHOOTING**ENGINE WILL NOT START (STARTER DOES NOT TURN OVER)**

PROBABLE CAUSE	SOLUTION
Main circuit breaker on the control panel has been tripped.	After inspecting the unit to determine the cause of the tripped breaker, press the reset button.
Loose or corroded battery connections.	Clean, tighten or replace the battery terminals.
Dead battery.	Recharge or replace battery
Defective ignition switch.	Test ignition switch for power going into the switch. If there is power going in, but none coming out, replace the switch.
Defective starter motor.	Test the starter motor. Replace if necessary.
Vacuum pump seized.	Refer to the vacuum pump manufacturer service and repair manual.

STARTER TURNS OVER BUT ENGINE WILL NOT START

PROBABLE CAUSE	SOLUTION
Waste tank is full.	Empty the waste tank.
Defective fuel pump.	Replace the fuel pump.
Loose or broken wires leading to the waste tank float switch.	Repair or replace any broken electrical connections.
Defective float switch inside waste tank.	Check switch for proper operation. Replace if necessary.
Oil pressure switch (located on engine), fuel shut-off solenoid (located on engine).	Test these components. If any are defective, replace. Refer to the engine Operation and Maintenance Manual.
Engine is malfunctioning.	Refer to the engine Operation and Maintenance Manual.

ENGINE STOPS RUNNING DURING NORMAL OPERATION

PROBABLE CAUSE	SOLUTION
Engine is out of gasoline.	Check the fuel tank.
Waste tank is full.	Empty waste tank.
Main circuit breaker on the control panel has been tripped.	After inspecting the unit to determine the cause of the tripped breaker, press the reset button.
Defective fuel pump.	Replace fuel pump.
Defective float switch inside waste tank.	Check switch for proper operation. Replace if necessary.
Oil pressure switch on engine has shut down due to insufficient oil pressure.	Refer to engine Operation and Maintenance Manual. DO NOT restart the engine until the cause is determined and corrected.
No ignition in the engine or the engine is malfunctioning.	Refer to engine Operation and Maintenance Manual.

VACUUM PUMP TROUBLESHOOTING**LOSS OF VACUUM** (while cleaning, engine RPM is normal but vacuum is lower than expected)

PROBABLE CAUSE	SOLUTION
Vacuum gauge is giving an improper reading.	Examine the tubing between the vacuum relief valve and the vacuum gauge and remove any blockage.
Vacuum hose is damaged, causing a suction leak.	Inspect hose, repair or replace.
Waste tank gaskets not sealing properly, not positioned properly.	Inspect the gasket. Repair seal or replace Re-position lid.
Plugged vacuum hose or vacuum plumbing between vacuum inlet and strainer basket.	Unplug vacuum hose or inlet plumbing.
Waste tank filter or strainer basket is plugged.	Clean or replace filter. Clean strainer basket.
Loose vacuum pump drive belts.	Tighten the drive belts.
Waste tank drain valve is damaged or left open, causing a vacuum leak.	Drain the waste tank. Close drain valve, if open. Replace valve if defective.
Vacuum relief valve requires adjustment or has a vacuum leak due to damaged diaphragm.	Re-adjust the vacuum relief valve. If the vacuum does not increase, remove and inspect the relief valve diaphragm. If damaged, replace.
Vacuum exhaust heat exchanger plugged.	Remove and clean.
Vacuum pump is worn out.	Replace the vacuum pump.

EXCESSIVE VACUUM (while cleaning, engine RPM is normal but vacuum is higher than expected)

PROBABLE CAUSE	SOLUTION
Vacuum relief valve requires adjustment.	Readjust vacuum relief valve to 13" Hg.
Improper throttle adjustment.	Adjust throttle to set desired vacuum pressure.

WATER PUMP TROUBLESHOOTING**LOSS OF SOLUTION PRESSURE (CLEANING TOOL OPEN, SOLUTION GAUGE READS LOW)**

PROBABLE CAUSE	SOLUTION
Water supply is turned off.	Turn the water supply on or up. Check for kinks in the water supply hose.
Water pump inlet supply line is plugged or drawing air.	Examine all lines and filters along the water supply path and through the console. Remove accumulated debris and replace if required. Check for leaks and loose clamps or fittings. Tighten any loose fittings or clamps. Replace any ruptured hose(s).
Improper engine speed.	Using a tachometer, check the engine speed. Full throttle engine speed is 3000 RPM. Idle engine speed is 1550 RPM.
Pressure regulator o-rings are dry and/or worn. See instructions on regulator.	Check o-rings. Lubricate and/or replace as needed, using o-ring lubricant.
Pressure regulator is dirty, stuck open, or improperly adjusted. See instructions on regulator.	Clean or repair regulator. Adjust to working pressure. Lubricate o-rings, using o-ring lubricant.
Low pump volume. (Measure the amount of water being returned to the water box from the pressure regulator. It should fill a gallon container about every 17.6 seconds).	Examine the check valves, plunger cups, and cylinder head on the water pump. Repair, whenever required (refer to the water pump service manual).
Defective water pressure gauge.	Replace gauge.
Orifice (spray nozzle) in the cleaning tool is worn, defective or wrong size.	Replace Nozzle or change nozzle size.
Debris clogging water lines or water inlet disconnect.	Clean or replace as needed.
Belts loose or broken.	Re-tension or replace as needed.
Loss of pump prime.	Manually prime water pump.
Temperature Balance Orifice missing.	Replace Orifice.

LOSS OF SOLUTION VOLUME AT TOOL (PRESSURE GAUGE READS NORMAL)

PROBABLE CAUSE	SOLUTION
Plugged orifice and/or screen in the cleaning tool.	Unplug or replace orifice and/or screen.
Internal block between the inlet pressure regulator and the solution outlet manifold, or the solution screen is clogged.	Inspect all lines, remove accumulated debris which is blocking flow. Replace any defective hoses. Remove, inspect, and clean the solution screen. De-scale unit and install a water softener, if necessary.
Outlet check valve is plugged.	Examine the check valve, remove any debris.
Defective quick-connect on one or more of the high pressure hoses.	Replace defective quick-connects(s) on high pressure hoses(s).
Cleaning tool valve is malfunctioning.	Repair or replace valve.
Hose inner lining is constricted.	Remove restriction or replace hose.
Air leak in chemical supply line, priming valve or metering valve.	Check for air leaks. Replace faulty parts.

SECTION FOUR – SERVICE AND MAINTENANCE

WATER PUMP DOES NOT ENGAGE

PROBABLE CAUSE	SOLUTION
Water pump circuit breaker has been tripped.	Check the water pump circuit breaker on the control panel. Press the circuit breaker reset button.
Defective electrical connection in the console wiring or defective switch.	Examine switch, electrical connections, and wiring. Repair any defective connections. If there is power going to the switch but not going out, replace the defective switch.
Water pump has not been activated.	Turn water pump switch to on.
Defective water pump clutch.	If there is power in the switch, but not power at the clutch, replace the defective wire. If there is power at the clutch, replace the defective switch.
Loose or broken water pump belts.	Tighten or replace belts.

CHEMICAL SYSTEM TROUBLESHOOTING

CHEMICAL FLOW METER INDICATES FLOW WITH TOOL VALVE CLOSED

PROBABLE CAUSE	SOLUTION
External leak in chemical piping.	Tighten or replace fittings. Re-apply thread sealant where required.
Outlet check valve is full of debris or damaged, not allowing it to close properly.	Close the chemical valve on the instrument panel. If the flow meter does not indicate flow, remove debris or replace check valve, if necessary.
Chemical pump diaphragm is ruptured.	Close the chemical valve on the instrument panel. If the flow meter still indicates flow, replace the chemical pump diaphragm.
Internal leak in chemical valve causing continual flow through prime tube returning to container.	Tighten valve packing nut (see “General Service Adjustments”). Replace valve, if necessary.

LOSS OF CHEMICAL (CLEANING TOOL OPEN, NO CHEMICAL)

PROBABLE CAUSE	SOLUTION
Chemical pump is improperly primed.	Refer to chemical pump priming instructions.
The strainer at the inlet end of the chemical inlet line is clogged.	Unclog the strainer. If damaged, replace.
Suction leak in the inlet line leading into the chemical pump.	Inspect inlet lines and flow meter for air leaks or damage.
Chemical pump check valve(s) is clogged.	Remove any debris from the chemical check valve(s). Replace chemical check valve(s) or seals, if necessary.
Chemical prime/on-off valve or chemical metering valve is defective.	Replace valve(s).
Chemical pump diaphragm is ruptured.	Disassemble the chemical pump and replace the damaged diaphragm.
Defective cylinder in the pressure pump.	Measure the pump volume. If the pump volume is less than normal, refer to “Loss of Solution Volume” in this section.

HEAT EXCHANGER/TEMPERATURE RELATED TROUBLESHOOTING**EXCESSIVE HEATING**

PROBABLE CAUSE	SOLUTION
Flow restriction caused by hard water scaling.	Descale unit, repair or replace damaged plumbing components as necessary. Install a water softener.
Not enough water flowing during normal operation.	Check jet size of tool.
Orifice clogged.	Clean orifice.
Thermal relief valve on water box not opening.	Remove and replace thermal relief valve.

LOSS OF TEMPERATURE

PROBABLE CAUSE	SOLUTION
No vacuum hose is connected.	Connect vacuum hose to vacuum inlet port.
Temperature relief valve on water box is stuck open.	Clean temperature relief valve and test. Replace if necessary.
Engine RPM is low.	Reset engine RPM.
Defective temperature gauge.	Test gauge and sensor. Replace failed component.
Temperature balance orifice missing.	Replace orifice.
Temperature control valve left open.	Close valve, check for leaks. Replace if leaking.

HEAT EXCHANGER LEAKING

PROBABLE CAUSE	SOLUTION
Water is dripping from the exhaust port due to condensation build-up.	NOTE: The heat exchanger will produce water condensation discharge at times during normal operation. Do not confuse this with a leak.
Heat exchanger is damaged from frozen water.	Inspect heat exchanger for leaks. Visually inspect for damage. Pressure check after removing the unit (maximum test pressure – 1500 PSI).

WASTE PUMP (IF INSTALLED) TROUBLESHOOTING**WASTE PUMP NOT OPERATING NORMALLY**

PROBABLE CAUSE	SOLUTION
Defective waste pump float switch.	Replace float switch.
Broken diaphragm(s).	Replace diaphragm(s).
Weak battery.	Charge or replace battery if needed. Check charging station.
Pump-out circuit breaker on control panel has been tripped.	After inspecting waste pump to determine the cause of the tripped circuit breaker, press the reset button.
Inspect check valve for debris or damage.	Clean or replace if necessary. Ensure that check valves are seated correctly.

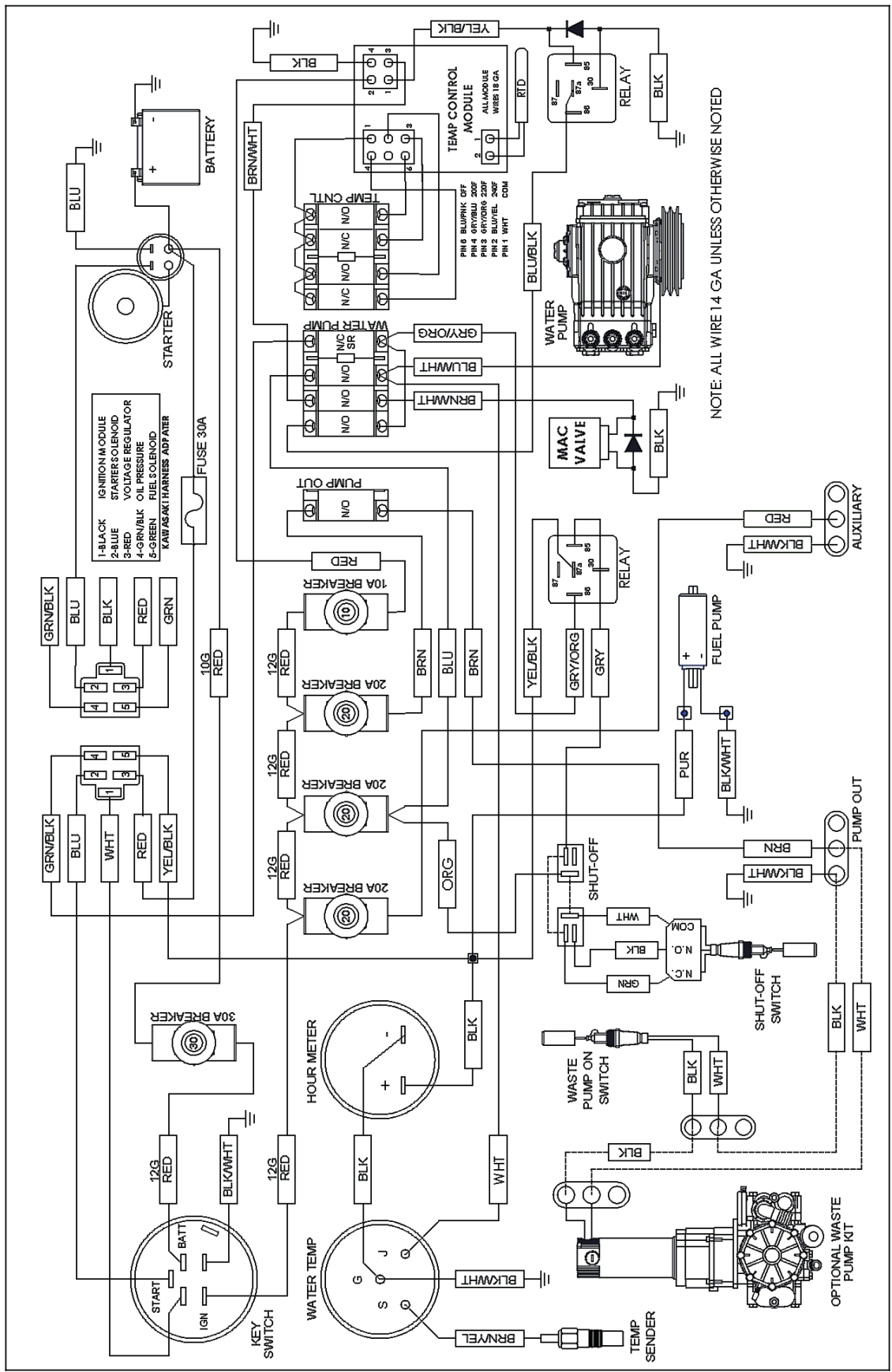
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SECTION FIVE: REFERENCE DIAGRAMS

WIRING DIAGRAM



SECTION FIVE: REFERENCE DIAGRAMS
HOSE ROUTING DIAGRAM

ID	PART NO.	HOSE REFERENCE		CLAMPS
		SIZE	LENGTH (IN)	
A	16-003	1/2	19.5	14-011 X2
B	16-005	5/8	8	14-012 X2
C	16-005	5/8	19	14-012 X2
D	16-006	5/16	28	14-007 X2
E	16-006	5/16	28	14-007 X2
F	16-006	5/16	60	14-007 X2
G	16-017	1/4	44	N/A
H	16-017	1/4	44	N/A
J	16-017	1/4	39	N/A
K	16-017	1/4	39	N/A
L	16-017	1/4	58	N/A
M	18-214-02	7/16	11	N/A
N	18-214-02	7/16	11	N/A
P	18-214-12	7/16	16	N/A
R	18-215-02	3/16	5	N/A
S	18-215-03	3/16	8.5	N/A
T	18-215-03	3/16	8.5	N/A
U	18-215-05	3/16	12.5	N/A
V	18-215-06	3/16	13.5	N/A
W	18-215-07	3/16	14.75	N/A
X	18-215-08	3/16	15.5	N/A
Y	18-215-23	3/16	20	N/A

