

Everest

PROCHEM®

Mobile Cleaning Unit

Operating Instructions (ENG)

MODELS: EVEREST 650
HIGH PRESSURE
1.001-145.0

EVEREST 650
LOW PRESSURE
1.001-146.0

EVEREST 408
HIGH PRESSURE
1.001-151.0

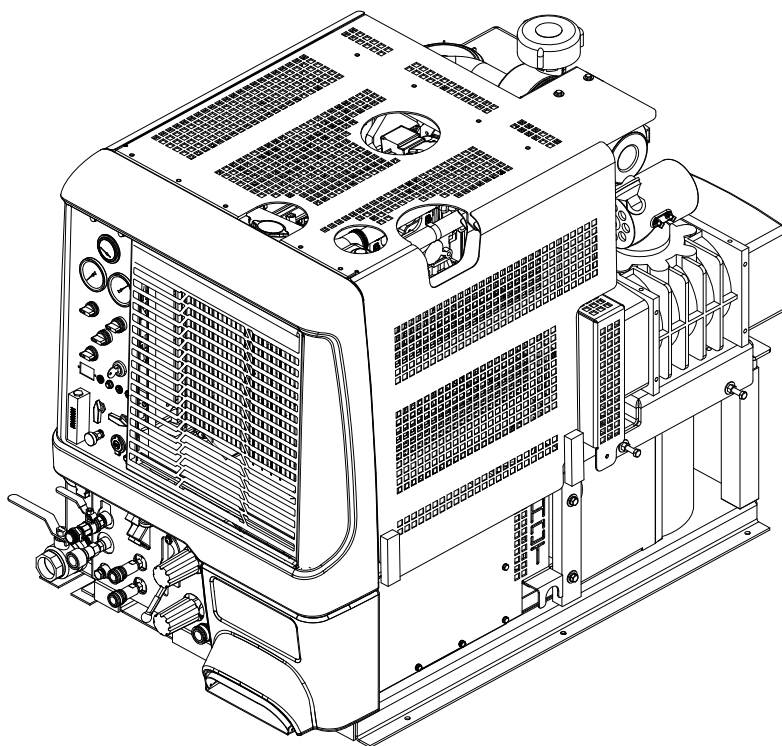
EVEREST 408
LOW PRESSURE
1.001-152.0

EVEREST 650 E-IDLE™
HIGH PRESSURE
1.001-158.0

EVEREST 650 E-IDLE™
LOW PRESSURE
1.001-159.0

EVEREST 408 E-IDLE™
HIGH PRESSURE
1.001-160.0

EVEREST 408 E-IDLE™
LOW PRESSURE
1.001-161.0



From Serial Number (Ref No1*)
*See Serial Number Page in spare
parts list or call manufacturer



Model: _____

Date of Purchase: _____

Serial Number: _____

Dealer: _____

Address: _____

Phone Number: _____

Sales Representative: _____

Overview

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

This unit offers you personal convenience. All of your instrumentation and controls have been positioned to give you easy access for operation and daily maintenance.

Proper operation and service are essential to the efficient functioning of this unit. When maintained correctly, this unit will have a long, trouble-free life.

The service methods described in this manual are explained in such a manner that servicing may be performed accurately and safely. Proper service varies with the choice of procedure, the skill of the mechanic, and the tools or parts available. Before attempting any repair, make certain that you are thoroughly familiar with this equipment and are equipped with the proper tools. Any questions pertaining to operating or servicing this unit should be directed to your nearest dealer.

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

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

Warranty Registration

Thank you for purchasing a Prochem Legend Group 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 :

<http://www.prochem.com/WarrantyRegistration.aspx>

For customer assistance:

1-800-444-7654

PROCHEM

Receive a complementary package of Prochem Detergents valued at \$250 with registration.

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Acceptance Of Shipment

Every part of your cleaning unit was carefully checked, tested, and inspected before it left our manufacturing plant. Upon receiving the unit, make the following acceptance check:

1. The unit should not show any outward signs of damage. If damaged, notify the common carrier immediately.
2. Check your equipment and packing list. The cleaning unit should arrive equipped with the following items (unless otherwise specified) and any optional accessories which were ordered.

NOTE: Do not modify unit without written permission from manufacturer.

Equipment List:

1. Console.
2. Waste tank.
3. Fuel Pump Assembly, Power and Regulator Cord.
4. Filter box.
5. 150 ft. of 2" vacuum hose.
6. 2 vacuum hose connectors.
7. 150 ft. of 1/4" solution pressure hose with quick connects.
8. 50 ft. water supply hose with quick connect.
9. Installation bolting kit.
10. Installation mounting plates.
11. Operation and service manuals for engine, solution pump, and vacuum pump.
12. Hose clamps for vacuum hoses.

This manual contains the following sections:

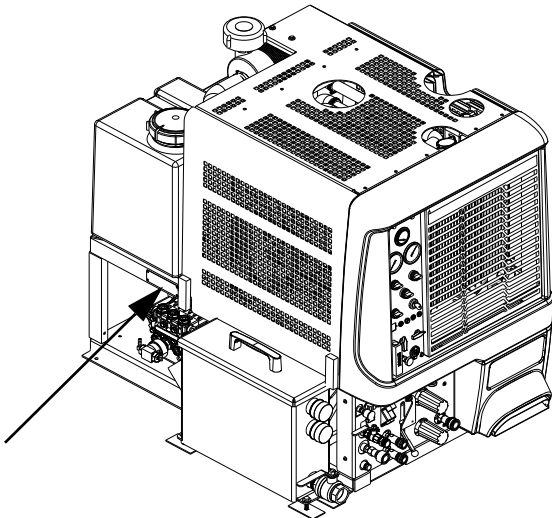
- How To Use This Manual
- Safety
- Installation
- Operations
- Maintenance & Service

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

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 page 1 of this manual.

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

The model and serial number of your machine is on the side approximately where shown.



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 OPERATIONS 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. They are listed in this general order:

- Engine
- Vacuum Pump
- Solution Pump
- Drive Belts, Pulleys & Hub
- Chemical Pump
- Hoses
- Vac/Exhaust Heat Exchanger
- General Service Adjustments
- Troubleshooting

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.

NOTE: The part number for this manual is in the lower right corner of the cover page.

IMPORTANT SAFETY INSTRUCTIONS

**When using this machine, basic precaution
must always be followed, including the following:
READ ALL INSTRUCTIONS BEFORE USING THIS MACHINE.**

WARNING:

These symbols mean **WARNING** or **CAUTION**. Failure to follow warnings and cautions could result in fatality, personal injury to yourself and/or others, or property damage. Follow these instructions carefully!

CAUTION:

Read the operator's manual before installing or starting this unit. Failure to adhere to instructions could result in severe personal injury or could be fatal.

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 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.

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

DO NOT store any type of flammable material in the vehicle.

This unit must be operated with all vehicle cargo area or trailer rear doors open in order to ensure adequate engine ventilation.

DO NOT operate engine if gasoline is spilled. Avoid creating any ignition source until the gasoline has been cleaned up. Never use gasoline as a cleaning agent.

DO NOT place hands, feet, hair, or clothing near rotating or moving parts. Avoid any contact with moving parts! Rotating machinery can cause injury or fatality.

Never operate this unit without belt guards or heat guards. The high speed moving parts, such as belts and pulleys, should be avoided while this unit is running. Severe injury, damage, or fatality may result.

DO NOT service this unit while it is running. The high-speed mechanical parts as well as high temperature components may result in severe injury or severed limbs.

Never touch electrical wires or components while the engine is running. They can be sources of electrical shock.

Engine components can get extremely hot from operation. To prevent severe burns, **DO NOT** touch these areas while the engine is running - or immediately after the engine is turned off.

DO NOT touch the exhaust system while this unit is running. Severe burns may result.

Before servicing this unit, allow it to cool down. This will prevent burns from occurring.

Water under high pressure at high temperature can cause burns, severe personal injury, or fatality. Shut down machine, allow to cool down, and relieve system of all pressure before removing valves, caps, plugs, fittings, filters, and bolts.

DO NOT leave the vehicle engine running while operating this unit.

Dangerous Acid, Explosive Gases! Batteries contain sulfuric acid. To prevent acid burns, avoid contact with skin, eyes and clothing. Batteries produce explosive hydrogen gas while being charged. To prevent a fire or explosion, charge batteries only in well ventilated areas. Keep sparks, open flames, and other sources of ignition away from the battery at all times. Keep batteries out of the reach of children. Remove all jewelry when servicing batteries.

Before disconnecting the negative (-) ground cable, make sure all switches are OFF. If ON, a spark will occur at the ground cable terminal which could cause an explosion if hydrogen gas or gasoline vapors are present. When disconnecting the battery, ALWAYS disconnect the negative (-) terminal FIRST.

DO NOT smoke around the unit. Gas fumes may accumulate and be ignited. The battery is also extremely flammable. This will prevent possible explosions.

DO NOT damage the vehicle in any manner during installation. When routing fuel lines DO NOT place the hose in any location where damage may occur to the hose or vehicle. Avoid any contact with moving parts, areas of high temperature, brake lines, fuel lines, muffler, catalytic converter, or sharp objects.

DO NOT cut or splice any of the vehicle fuel lines during fuel line installation. This may result in fuel leaks and potentially dangerous conditions. There is no fuel solenoid shut off on this unit. Use only the provided fuel hose for fuel lines. When traversing the vehicle floor with fuel lines, always use a bulkhead adapter. This will prevent leakage and ensure that the hose is not punctured by vehicle vibration abrasion.

DO NOT exceed your vehicle's weight limit: The console with empty 100 gallon waste tank and accessories weighs approximately 1300 lbs. Make certain to account for any additional accessories in your weight and balance calculations. Make certain that the vehicle has the correct axle rating, to prevent unsafe vehicle driving conditions.

We require high-back seats on all vehicles in which units are to be installed for head and neck protection. We recommend using a metal partition between the seats and equipment.

DO NOT operate this unit without the water supply attached and turned on. The solution pump and other vital components may be seriously damaged if this unit is permitted to operate dry without water. Running with out adequate water supply could damage solution pump. Ensure always to have an adequate water supply.

DO NOT operate this unit without the filter installed in the waste tank.

Keep your vehicle work area clean. Wands, stair tools, and other accessories must be securely fastened before driving the vehicle.

All high pressure hoses must be rated for 3000 PSI at 250°F. Thermoplastic hoses do not meet these specifications and should not be used. Severe burns and injury may result if the hoses do not meet these requirements. Pressure wash hoses must be rated at 4000 PSI.

The winterizing loop hose assembly, is for winterizing use only. If used improperly, live steam may escape from this hose, causing it to whip around. Burns or injury may result.

Make certain that you receive complete training by the distributor from whom you purchased this unit.

This unit uses high pressure and temperature. Improper or irresponsible use may result in serious injury.

Do not modify this unit in any manner. Improper modification can cause severe personal injury or fatality.

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

READ AND SAVE THESE INSTRUCTIONS

MESURES DE SÉCURITÉ IMPORTANTES

Lors de l'utilisation d'un appareil à batteries, il est nécessaire de respecter systématiquement des mesures de sécurité de base, comme suit :

PRENEZ NOTE DE TOUTES CES MESURES AVANT D'UTILISER CETTE MACHINE.

AVERTISSEMENT:

ATTENTION:

Ces symboles signifient **AVERTISSEMENT** ou **MISE EN GARDE**. Le non-respect des avertissements et le non-respect des mises en garde pourraient entraîner la mort, causer des blessures à vous-même et/ou à autrui ou encore des dommages matériels. Veuillez suivre attentivement ces instructions!

Lire le manuel d'utilisation avant d'installer ou de démarrer cet appareil. Le non-respect de ces instructions pourrait causer des blessures graves ou pourrait avoir des conséquences fatales.

Utiliser cet appareil et cet équipement uniquement dans un endroit bien ventilé. Les gaz d'échappement contiennent du monoxyde de carbone qui est un gaz inodore et mortel pouvant causer des blessures graves ou entraîner la mort. **NE PAS** faire fonctionner cet appareil dans un endroit clos. **NE PAS** utiliser cet appareil dans un endroit où les gaz d'échappement risquent de pénétrer dans une entrée de porte, une fenêtre, un évent ou toute ouverture d'un édifice.

L'essence est extrêmement inflammable et ses vapeurs pourraient exploser lorsqu'elles sont enflammées. Entreposer l'essence uniquement dans des contenants approuvés, dans un bâtiment bien ventilé et non occupé, à l'écart des étincelles ou des flammes. Ne jamais transporter de l'essence ou des substances inflammables dans le véhicule. Les vapeurs pourraient s'accumuler à l'intérieur du véhicule et s'enflammer, causant une explosion.

N'entreposer AUCUN type de substance inflammable dans le véhicule.

Cet appareil doit être utilisé avec la porte du véhicule ou de la remorque ouverte afin de garantir une bonne ventilation du moteur.

NE PAS utiliser le moteur si du carburant a été renversé. Éviter de créer une source d'inflammation jusqu'à ce que le carburant ait été nettoyé. Ne jamais utiliser d'essence en tant qu'agent de nettoyage.

NE PAS placer les mains, les pieds, les cheveux ou les vêtements à proximité des pièces rotatives ou mobiles. Éviter tout contact avec les pièces mobiles! Les machines tournantes peuvent entraîner des blessures ou la mort.

Ne jamais utiliser cet appareil sans garde-courroie ou capot en place. Les pièces se déplaçant à haute vitesse, comme les courroies et les poulies, devraient être évitées durant le fonctionnement de cet appareil. Cela pourrait causer des blessures graves, des dommages ou la mort.

NE PAS réparer cet appareil pendant qu'il est en marche. Les pièces mécaniques se déplaçant à haute vitesse de même que les composantes à température élevée peuvent causer des blessures graves ou des amputations.

Ne jamais toucher aux fils ou composants électriques pendant que le moteur est en marche. Ils peuvent provoquer des chocs électriques.

Les composants du moteur peuvent devenir extrêmement chauds durant le fonctionnement. Pour éviter les brûlures, **NE PAS** toucher à ces zones pendant que le moteur est en marche - ou immédiatement après son fonctionnement.

NE PAS toucher au système d'échappement lorsque l'appareil est en marche. Cela pourrait causer des brûlures.

Laisser refroidir l'appareil avant d'en effectuer l'entretien. Cela permettra de prévenir les brûlures.

De l'eau sous haute pression dont la température est élevée peut causer des brûlures, des blessures graves ou la mort. Mettre l'appareil hors tension, le laisser refroidir et décompresser tout le système avant de retirer les soupapes, les capuchons, les bouchons, les raccords, les filtres et les boulons.

NE PAS laisser tourner le moteur du véhicule lors de l'utilisation de cet appareil.

Acide dangereux, gaz explosifs! Les batteries contiennent de l'acide sulfurique. Pour prévenir les brûlures par acides, éviter tout contact avec la peau, les yeux et les vêtements. Les batteries produisent du gaz hydrogène explosif pendant la charge. Pour empêcher tout incendie ou toute explosion, charger les batteries uniquement dans des endroits bien ventilés. Garder la batterie à l'écart des étincelles, de la flamme nue et de toute autre source d'inflammation en tout temps. Garder les batteries hors de la portée des enfants. Enlever tous les bijoux au moment de procéder à l'entretien des batteries.

Avant de débrancher le câble de terre négatif (-), s'assurer que tous les commutateurs se trouvent en position OFF (arrêt). S'ils se trouvent en position ON (Marche), une étincelle au niveau de la borne du câble de terre pourrait causer une explosion si du gaz hydrogène ou des vapeurs d'essence sont présents. Au moment de déconnecter la batterie, **TOUJOURS** déconnecter d'ABORD la borne négative (-).

NE PAS fumer à proximité de l'appareil. Des émanations pourraient s'accumuler et prendre feu. La batterie est également extrêmement inflammable. Cela permettra de prévenir toute possibilité d'explosion.

NE PAS endommager le véhicule de quelque façon que ce soit durant l'installation. Lors de l'acheminement des conduits de carburant, **NE PAS** placer le flexible dans un endroit où le flexible ou le véhicule risquerait de subir des dommages. Éviter tout contact avec les pièces mobiles, les zones à température élevée, les conduites de frein, les conduits de carburant, le silencieux, le convertisseur catalytique ou les objets tranchants.

NE PAS couper ou relier les conduits de carburant du véhicule durant l'installation des conduits de carburant. Cela risquerait de causer des fuites et des conditions potentiellement dangereuses. Cet appareil ne comporte pas de dispositif d'arrêt pour le solénoïde du carburant. Utiliser uniquement le flexible de carburant fourni comme conduits de carburant. Au moment d'acheminer les conduits de carburant dans le plancher du véhicule, toujours utiliser un adaptateur passe-cloison. Cela permettra de prévenir les fuites et de s'assurer que le flexible ne soit pas perforé par les abrasions causées par la vibration du véhicule.

NE PAS excéder la limite de poids du véhicule. Le poids de la console avec le réservoir à décharge de 379 litres (100 gallons) et les accessoires est d'environ 590 kg (1300 lbs). S'assurer de tenir compte de tout accessoire supplémentaire au moment du calcul du poids et de l'équilibre. S'assurer que le calibre des essieux du véhicule est adéquat afin d'éviter des conditions de conduite dangereuses.

Nous exigeons des sièges baquets dans tous les véhicules dans lesquels des appareils sont installés pour une meilleure protection de la tête et du cou. Nous recommandons d'utiliser une cloison métallique entre les sièges et l'équipement.

NE PAS utiliser cet appareil si l'alimentation en eau n'est pas attachée et ouverte. La pompe à solution et les autres composants essentiels risqueraient d'être sérieusement endommagés si l'appareil fonctionne à sec sans eau. Le fonctionnement sans un approvisionnement en eau adéquat pourrait endommager la pompe à solution. S'assurer également que l'alimentation en eau est adéquate.

NE PAS utiliser cet appareil sans avoir installé le filtre dans le réservoir à décharge.

Garder la zone de travail du véhicule propre. Les lances, les outils pour marche d'escalier et les autres accessoires doivent être fermement attachés avant de conduire le véhicule.

Tous les flexibles de haute pression doivent avoir une capacité d'au moins 3 000 PSI à 121 °C (250 °F). Les flexibles thermoplastiques ne répondent pas à ces spécifications et ne devraient pas être utilisés. Des brûlures et des blessures graves peuvent être causées si les flexibles ne satisfont pas à ces exigences. Les flexibles pour le lavage à la pression doivent avoir une pression nominale de 4000 PSI.

L'ensemble du flexible de boucle d'hivérization sert à l'hivérization uniquement. Si elle n'est pas utilisée de façon adéquate, de la vapeur vive pourrait s'échapper de ce flexible et l'amener à fouetter l'air tout autour. Cela risquerait de causer des brûlures ou des blessures.

S'assurer de recevoir la formation complète par le distributeur auprès duquel l'appareil a été acheté.

L'appareil utilise des pressions et des températures élevées. Une utilisation inappropriée ou irresponsable pourrait causer des blessures graves.

Ne pas modifier cet appareil de quelque manière que ce soit. Toute modification inappropriée pourrait causer des blessures graves ou la mort.

AVERTISSEMENT EN VERTU DE LA PROPOSITION 65 DE L'ÉTAT DE LA CALIFORNIE : L'échappement du moteur de ce produit contient des agents chimiques connus, dans l'État de la Californie, comme pouvant causer le cancer, des anomalies congénitales ou d'autres problèmes liés à la reproduction.

CONSERVER CES INSTRUCTIONS

The following symbols are used throughout this guide as indicated in their descriptions:

Hazard Intensity Level

There are three levels of hazard intensity identified by signal words - **WARNING** and **CAUTION** and **FOR SAFETY**. The level of hazard intensity is determined by the following definitions:



WARNING - Hazards or unsafe practices which COULD result in severe personal injury or death.



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

FOR SAFETY: To Identify actions which must be followed for safe operation of equipment.

Report machine damage or faulty operation immediately. Do not use the machine if it is not in proper operating condition. Following is information that signals some potentially dangerous conditions to the operator or the equipment. Read this information carefully. Know when these conditions can exist. Locate all safety devices on the machine. Please take the necessary steps to train the machine operating personnel.

FOR SAFETY:

DO NOT OPERATE MACHINE:

Unless Trained and Authorized.

Unless Operation Guide is Read and understood.

In Flammable or Explosive areas.

In areas with possible falling objects.

WHEN SERVICING MACHINE:

Avoid moving parts. Do not wear loose clothing; jackets, shirts, or sleeves when working on the machine. Use Prochem approved replacement parts.

Les symboles ci-dessous sont utilisés à travers ce manuel comme illustré dans leurs descriptions :

DEGRÉS DE RISQUES EN CAS DE DANGER

Il existe trois degrés de risques identifiés par les termes signalétiques –**AVERTISSEMENT** et **ATTENTION** et **POUR VOTRE SÉCURITÉ**. Le degré de risque est défini de la manière suivante:

AVERTISSEMENT:

AVERTISSEMENT - Dangers ou méthodes dangereuses qui POURRAIENT provoquer de graves blessures ou entraîner la mort.

ATTENTION:

ATTENTION - Dangers ou méthodes dangereuses qui pourraient provoquer des blessures légères ou une détérioration du produit ou des biens immobiliers.

POUR VOTRE SÉCURITÉ: ce signe permet d'identifier les mesures de précaution à prendre pour assurer un bon fonctionnement du matériel.

Rendre compte immédiatement d'une défaillance ou d'une détérioration de la machine. Ne pas utiliser la machine si celle-ci ne fonctionne pas correctement. Lire soigneusement les informations ci-dessous signalant certains dangers potentiels pour l'opérateur de la machine. L'opérateur doit être absolument au courant de ces dangers potentiels. Localiser tous les dispositifs de sécurité sur la machine. Il est conseillé de prendre les mesures nécessaires pour former le personnel opérateur.

POUR VOTRE SÉCURITÉ:

NE PAS MANOEUVRER LA MACHINE:

Lorsqu'on n'est pas expérimenté ou qualifié.

Lorsque le guide d'utilisation n'est pas été lu ou compris.

Dans des zones inflammables ou explosives.

Dans des zones où des objets peuvent tomber.

LORS DE L'ENTRETIEN DE LA MACHINE:

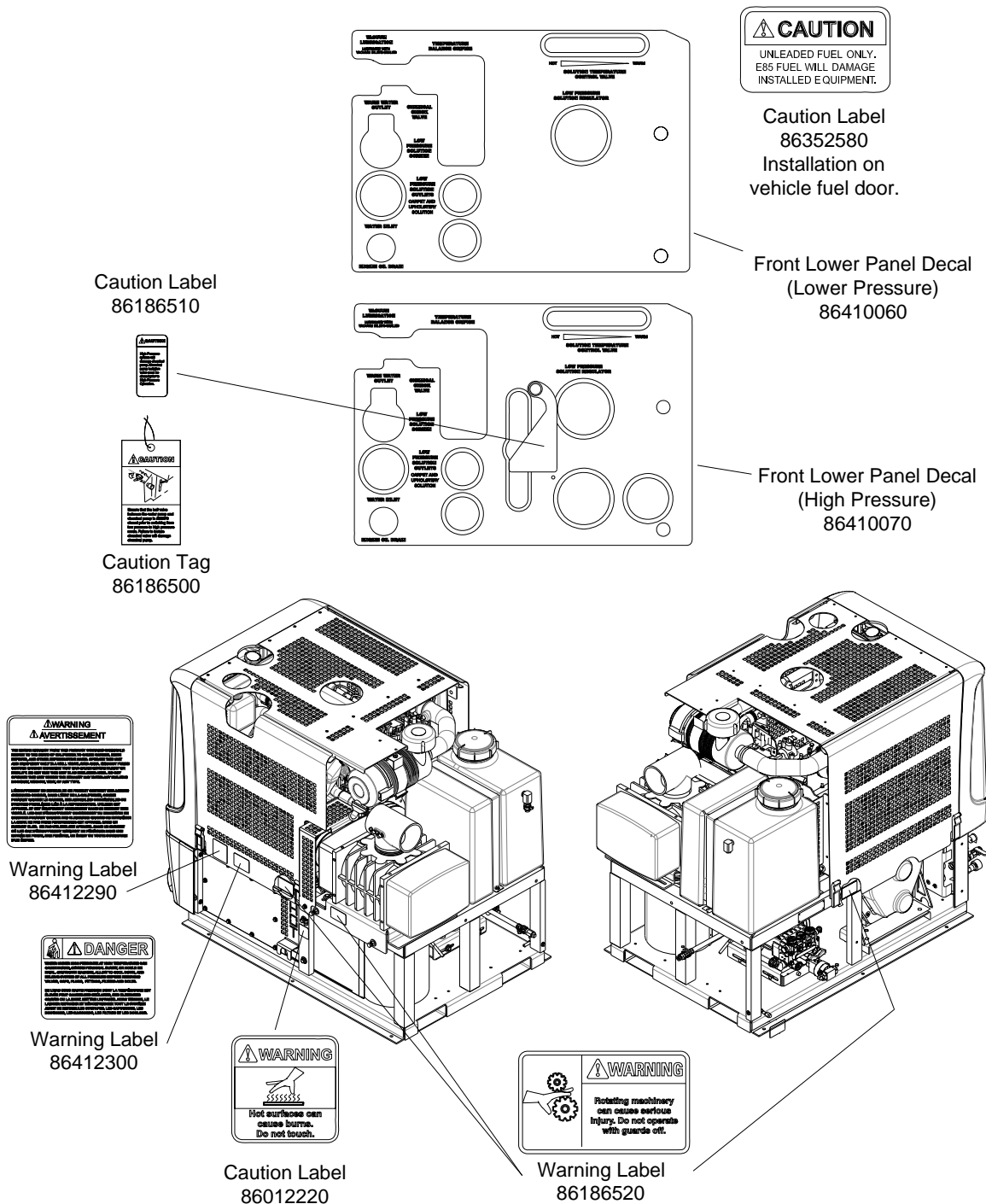
Éviter les parties amovibles. Ne pas porter de vêtements amples, tels que des vestes, des chemises ou des vêtements avec manches lors de l'utilisation de la machine. Utiliser les pièces détachées homologuées.

Safety Labels

The following WARNING LABELS are found on your cleaning unit. These labels point out important Warnings and Cautions which should be followed at all times. Failure to follow warnings and cautions could result in fatality, personal injury to yourself and/or others, or property damage. Follow these instructions carefully! DO NOT remove these labels.

NOTE: If at any time the labels become illegible, promptly replace them.

REMARQUE: Les schémas ci-dessous indiquent l'emplacement des plaques de sécurité. Si les plaques deviennent illisibles, les remplacer immédiatement.



Dealer Responsibility

Your distributor from whom you purchased this mobile cleaning unit is responsible for correct installation of this machine. The dealer is also responsible for initial training of your operators and maintenance personnel in proper operation and maintenance of this unit.

Vehicle Requirements

1. The unit should NOT be mounted in any motor vehicle of less than 3/4 ton capacity.

CAUTION:

DO NOT exceed the vehicle's axle weight limit. Include the console, full tanks, accessories, and operators in calculations.

ATTENTION:

NE PAS excéder la limite de poids des essieux du véhicule. Inclure la console, les réservoirs pleins, les accessoires et les opérateurs au moment d'effectuer les calculs.

2. If mounting in a trailer, make certain that trailer is rated for the total weight of UNIT AND TRAILER. Electric or hydraulic brakes should be provided, and a strict compliance with any State and Federal vehicle laws must be maintained.
3. The vehicle tires should have a load rating above the combined vehicle and unit weight.
4. We do not recommend using flooring materials that absorb water. This could result in rust and corrosion of the vehicle floor.
5. Padding under rubber floor mats should be removed before installing this unit.
6. We highly recommend using a drip tray under console (Part #86055040).
7. If using a trailer, console should be positioned so that it balances properly with respect to axle. Ten percent (10%) of the overall unit weight should be on tongue.

Example: If loaded trailer weight is 2,000 lbs., tongue weight needs to be a minimum of 200 lbs. to tow properly.

Lifting Unit Onto Vehicle

Since the console weighs approximately 1150 lbs., we recommend using a forklift to lift unit onto vehicle. Position forks under unit from front and make CERTAIN that forks are spread to insert into frame slots.

Positioning Unit In Vehicle

Because vehicles vary in size and openings, individuals have their own preference as to where they want their units installed. We strongly recommend a side door installation for this and DO NOT recommend a rear door installation.

1. Enough space should be provided to assure adequate engine ventilation and room for service and maintenance.
2. The unit with waste tank and accessories must NOT exceed vehicle's axle weight limit. An empty 100 gallon waste tank and console weighs 1300 lbs.
3. DO NOT position the console closer than 12" from bottom of driver and passenger seats.

NOTE: For individuals who wish to make an engineering layout prior to positioning unit, refer to "Dimensional Data" illustrations for waste tank and console dimensions.

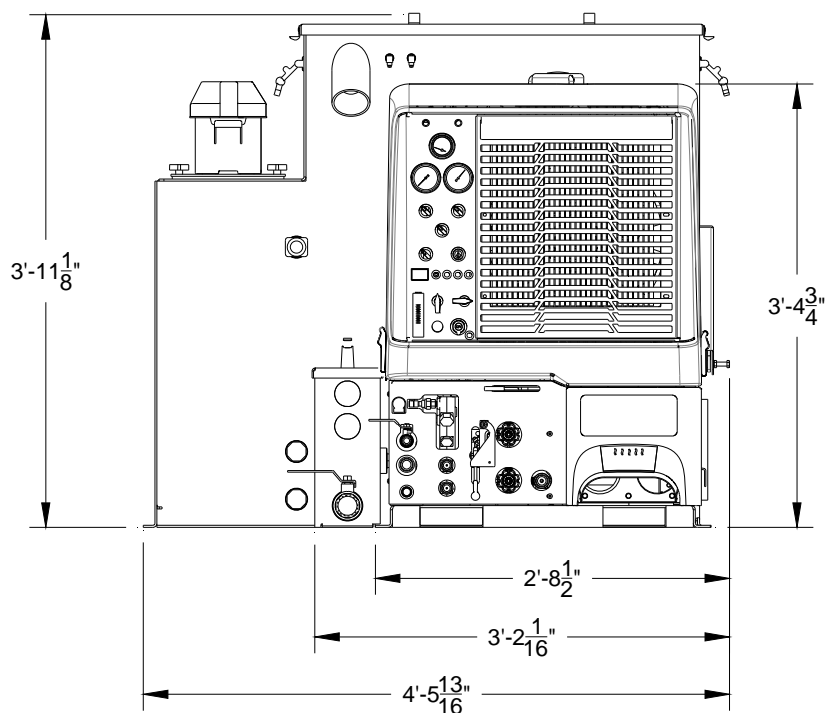
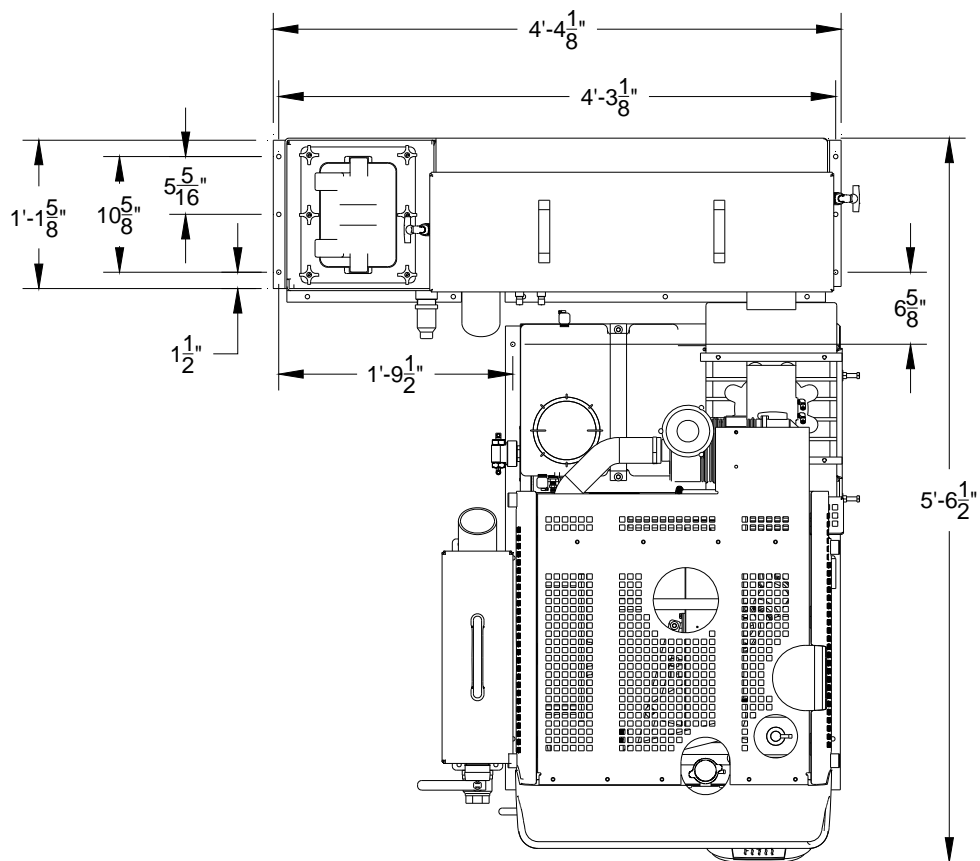
Bolting Down Unit And Waste Tank

When positioning waste tank with respect to console, hook up the vacuum hose from blower to waste tank. This will ensure that waste tank is positioned correctly. Proceed once unit and waste tank are positioned in vehicle in desired location.

Before drilling any mounting holes in vehicle floor, make certain that when drilling, you will not do any damage to fuel tank, fuel lines, or any vital component which might affect operation or safety of vehicle.

1. Using console and waste tank mounting holes as a template, drill six 13/32" diameter holes for mounting console and six more 13/32" diameter holes for mounting waste tank.
2. Using installation hardware kit:
 - a. Insert six 3/8-16 x 2" hex head cap screws with flat washers through mounting holes in console, and six 3/8-16 x 2" hex head cap screws with flat washers through mounting holes in waste tank.
 - b. Install mounting plates underneath vehicle floor.
 - c. Screw 3/8-16 hex head locknuts on mounting screws and tighten them until console and waste tank are firmly secured to vehicle floor.

Layout with 100 Gallon Waste Tank



Waste Tank To Console Connection

NOTE: Before connecting any hoses to the waste tank, make certain the hose clamps are on each hose.

1. Connect the section of 4.5" I.D. internal vac hose to the 4.5" diameter vac outlet tube on the waste tank and to the vacuum pump relief valve on the console. It may be necessary to cut this hose to fit. Tighten the hose clamps.
2. Connect the 2" I.D. waste removal hose to the 2" diameter tube at the bottom of the waste tank. Connect other end to 2" tube on the Pre-Filter Box. Tighten the hose clamps.
3. Connect the 3/16 blue hose from the water box temperature relief valve to the 1/4 fitting (pointed downward) on the waste tank that does not have a spray jet installed inside the tank.
4. Connect the console engine shut-off cord to the waste tank level sensor cord.
5. Connect the 3/16 blue hose from the Flow Setup Valve to the other 1/4 fitting (pointed downward) on the waste tank that has a spray jet installed inside the tank.

Fuel Pump Assembly Installation

WARNING:

Before drilling the fuel line holes in the vehicle floor, make certain that when drilling you will not do any damage to the fuel tank(s), fuel lines, brake lines, heat shields, or any other vital component which might affect the operation or safety of the vehicle.

AVERTISSEMENT:

Avant de percer les trous de ligne de carburant dans le plancher du véhicule, assurez-vous que lorsque vous percez vous ne serez pas faire des dommages au réservoir de carburant (s), les conduites de carburant, les conduites de frein, boucliers thermiques, ou tout autre élément essentiel qui affectent le fonctionnement ou la sécurité du véhicule.

WARNING:

Do not mount this assembly, any hoses or components near the catalytic converter, exhaust, or any areas of high temperature. Avoid any contact with moving parts, areas of high temperature, brake lines, fuel lines, muffler, catalytic converter, or sharp objects.

AVERTISSEMENT:

Ne pas monter cet ensemble, les flexibles ou les composants à proximité du convertisseur catalytique, de l'échappement ou de toute zone où la température est élevée. Éviter tout contact avec les pièces mobiles, les zones à température élevée, les conduites de frein, les conduits de carburant, le silencieux, le convertisseur catalytique ou les objets tranchants.

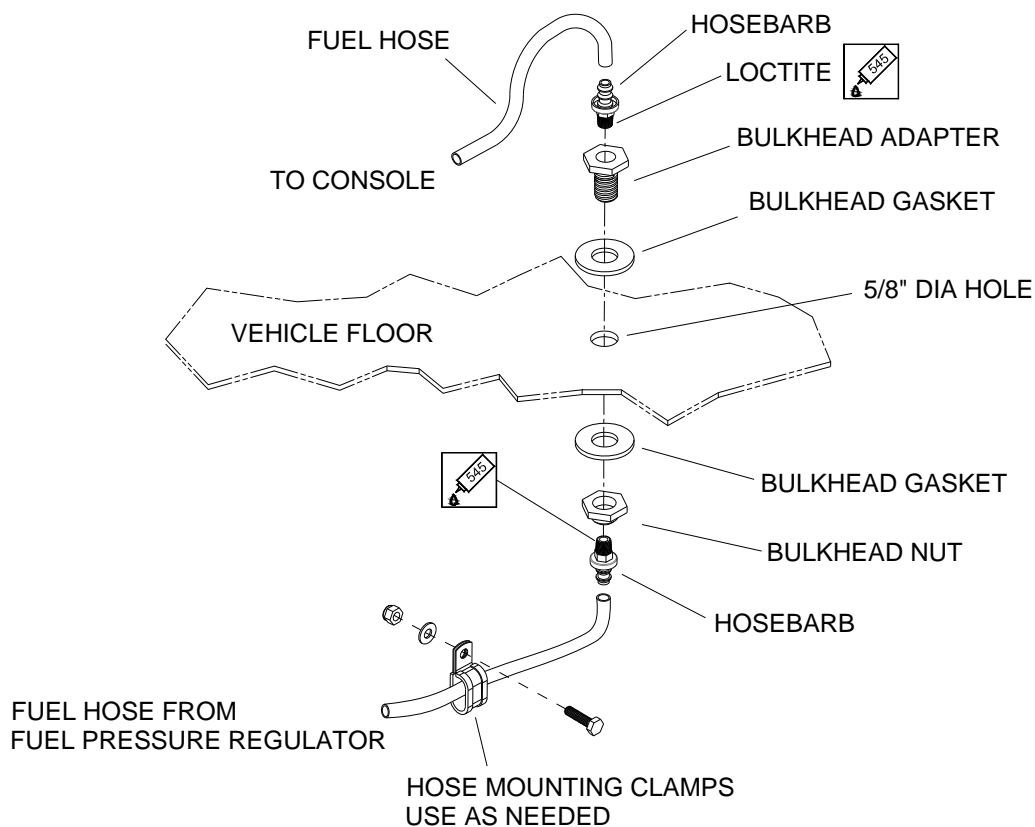
1. Determine the mounting location of the fuel system assembly. **Mount bottom of box parallel to the ground and side perpendicular.** Ensure that the power cord length will support the mounting location. Mount the pump as low as possible while still being protected by the frame from road hazards. The pump end with the electrical connections is the discharge end. Additional mounting holes are provided to allow for different mounting options.
2. Cut a 6" piece of 5/16 fuel hose and connect from the outlet side of the fuel filter to the inlet side of the fuel pump. Use supplied hose clamps and fasten securely.

NOTE: On the high-pressure pump supplied with the EFI unit, add 2-3 drops of lubricating oil to the inlet side of the fuel pump to protect the pump during initial startup.

3. Prior to drilling, check to ensure that the cord length will support the location of the hole. Drill a 5/8" hole in the vehicle floor for routing the fuel pump power cord to the truckmount console and install the hole grommet. Drill a 1-3/8" hole in the vehicle floor for routing the electronic fuel pressure regulator cord to the truckmount console.
4. Do not connect the power cords to the truckmount console wiring harness until installation is complete.

Van Bulkhead Installation

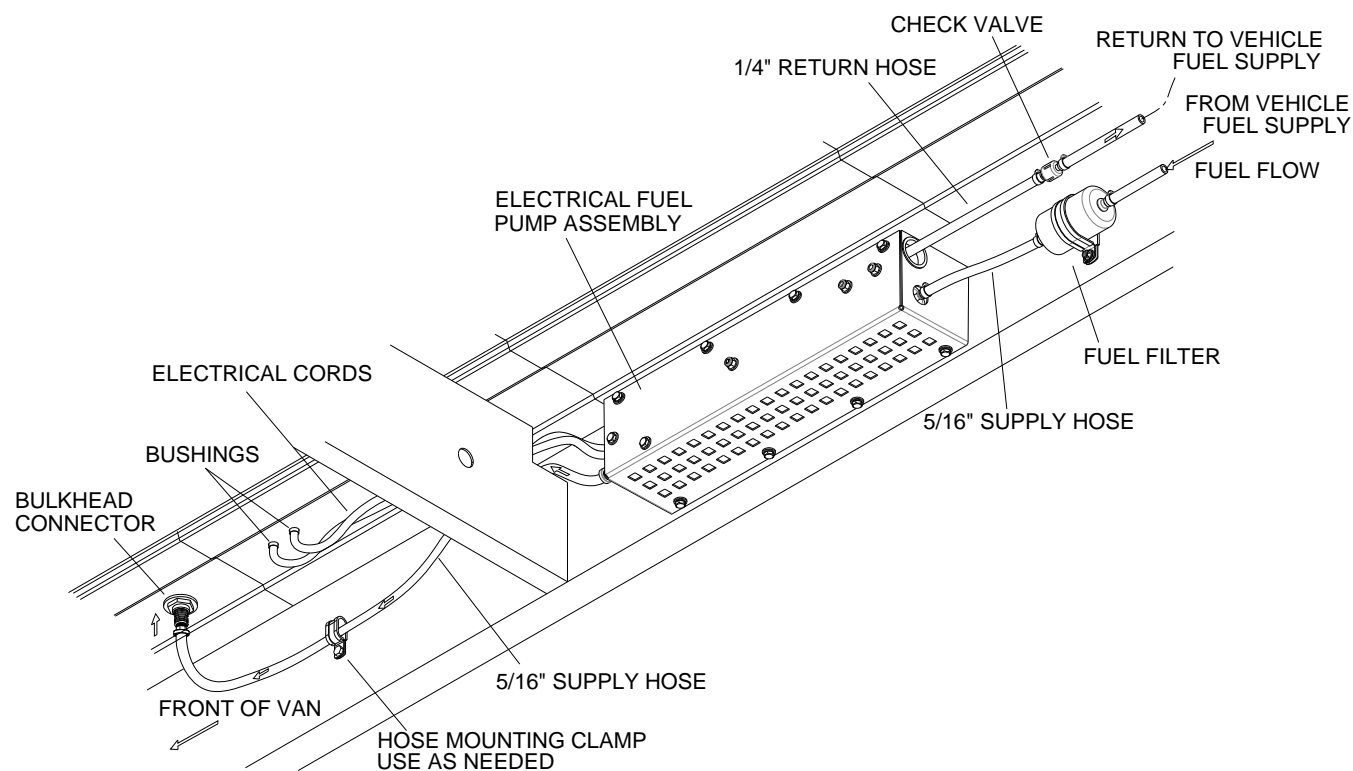
1. Select a location on the vehicle floor to drill the hole for the bulkhead adapter. This location should be situated in a position that eliminates the possibility of fuel line contact by either the operator(s) or accessories during the working hours or maintenance periods. Make certain that the supplied hoses will reach the location and work with the configuration you choose.
2. Drill a 5/8" (.625) diameter hole through the vehicle floor at the installation point chosen for the bulkhead.
3. Install the 1/8 NPT bulkhead adapter by inserting the adapter and tightening the nut on the opposite side of the van floor.
4. Install (1) 1/8P x 5/16 push-on hosebarb fitting on to the bulkhead (inside van).
5. Attach the 5/16" fuel hose from the console to the hosebarb fitting on the bulkhead. **DO NOT USE HOSE CLAMPS AT THIS CONNECTION.**



Fuel Supply & Return Line Installation (Underneath Van)

1. Spray the inside of the supplied 90 degree plastic barbed fitting with water displacing lubricant. Push plastic fitting onto the return tube on filler neck adapter tube until fitting securely snaps into place.
2. Measure and cut a length of 5/16" fuel hose and connect to the plastic barbed fitting on the return tube of the filler neck adapter tube. Connect other end of hose to 1/4 x 5/16 brass hose adapter and attach adapter to 1/4" fuel hose from electronic fuel pressure regulator. Fasten securely using supplied hose clamps.
3. Install (1) 1/8P x 5/16 push-on hosebarb fitting on to the bulkhead adapter.
4. Measure and cut a length of 5/16" fuel hose and connect between the outlet side of the electronic fuel pressure regulator and the 1/8P x 5/16 push-on hosebarb fitting at the bulkhead. **DO NOT USE HOSE CLAMPS AT THIS CONNECTION.**

NOTE: Fuel tap kit installation instructions are found with appropriate fuel tap kit. Refer to Fuel Tap Kit Information Sheet (86349940)



Battery Connection

⚠ WARNING:

Dangerous Acid, Explosive Gases! Batteries contain sulfuric acid. To prevent acid burns, avoid contact with skin, eyes, and clothing.

Batteries produce explosive hydrogen gas while being charged. To prevent a fire or explosion, charge batteries only in well-ventilated areas. Keep sparks, open flames, and other sources of ignition away from the battery at all times. Keep batteries out of the reach of children. Remove all jewelry when servicing batteries.

Before disconnecting the negative (-) ground cable, make sure all switches are OFF. If ON, a spark will occur at the ground cable terminal which could cause an explosion if hydrogen gas or gasoline vapors are present. When disconnecting the battery, ALWAYS disconnect the negative (-) terminal FIRST.

⚠ AVERTISSEMENT:

Acides dangereux, gaz explosifs! Les batteries contiennent de l'acide sulfurique. Pour prévenir les brûlures par acides, éviter tout contact avec la peau, les yeux et les vêtements.

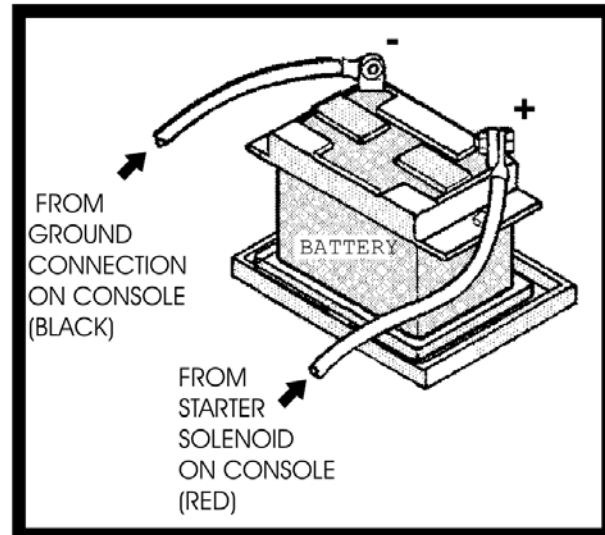
Les batteries produisent du gaz hydrogène explosif pendant la charge. Pour empêcher tout incendie ou toute explosion, charger les batteries uniquement dans des endroits bien ventilés. Garder la batterie à l'écart des étincelles, de la flamme nue et de toute autre source d'inflammation en tout temps. Garder les batteries hors de la portée des enfants. Enlever tous les bijoux au moment de procéder à l'entretien des batteries.

Avant de débrancher le câble de terre négatif (-), s'assurer que tous les commutateurs se trouvent en position OFF (arrêt). S'ils se trouvent en position ON (Marche), une étincelle au niveau de la borne du câble de terre pourrait causer une explosion si du gaz hydrogène ou des vapeurs d'essence sont présents. Au moment de déconnecter la batterie, TOUJOURS déconnecter d'ABORD la borne négative (-).

1. Attach the red positive (+) battery cable from the console starter solenoid to the positive (+) terminal on the battery and tighten the holding nut.

2. Next, attach the black negative (-) battery cable from the console ground to the negative (-) terminal on the battery and tighten the holding nut.

BATTERY HOOK-UP



Electrical Wiring

Ensure all electrical wiring and battery cables are free from contact with any metal edge. Engine vibration could cause metal edge to cut wiring and possibly result in a fire. Be aware of where battery cables are run.

Fire Extinguisher

We recommend that a fire extinguisher, preferably rated for A, B, & C type fires, be installed inside the vehicle.

Technical Specifications

Item	Dimension / Capacity	
Engine speed	2200 rpm (high speed) 900 rpm (idle speed)	
Solution pump rpm	1357 rpm	
Vacuum pump rpm	3125 rpm	
Water flow rate	5 GPM (maximum)	
Solution pump pressure (low pressure)	1200 PSI (maximum)	
Solution pump pressure (high pressure) (Optional)	3000 PSI (maximum)	
Vacuum relief valve	13" Hg	
Waste tank capacity	100 gallons	
Console weight (Model 408 & HP 408)	1065 lbs	
Console weight (Model 650 & HP 650)	1150 lbs	
Console weight (with waste tank & waste tank accessories) (Model 408 & HP 408)	1215 lbs	
Console weight (with waste tank & waste tank accessories) (Model 650 & HP 650)	1300 lbs	
Torque Values		
Engine pulley	360 inch lbs	30 foot/lbs
Vacuum pump hub	300 inch/lbs	25 foot/lbs

Water Requirements

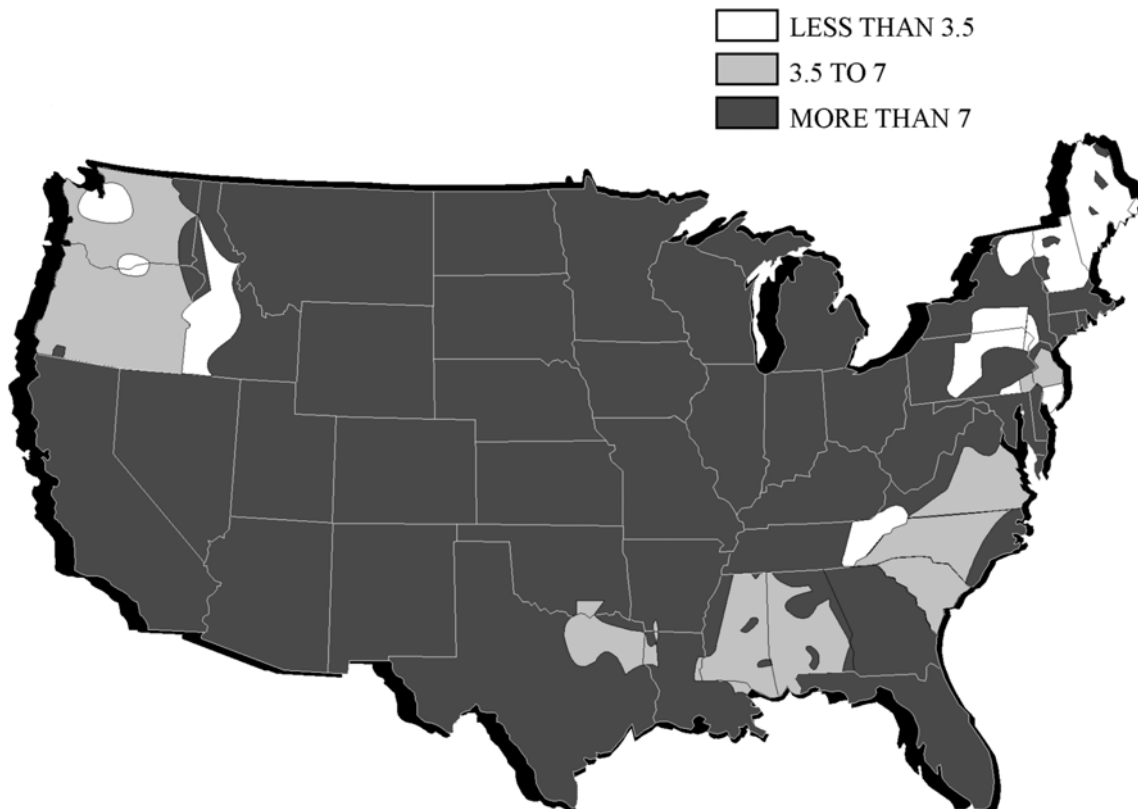
Hard water deposits will adversely affect the plumbing and heat exchange systems on this unit. The map below will give you an idea of where areas of high water hardness may occur. However, any water supply obtained from a well is almost always hard water and a water softener will be needed to protect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

NOTE: Equipment malfunction or component failure caused by hard water scaling is NOT covered under the warranty.

If you are operating this unit in an area where the unit will be using water in which the hardness exceeds 3-1/2 grains, we highly recommend a suitable water softener be installed. If using a water softener, it must have a five (5) GPM (or greater) flow capacity without any hose constrictions.

Using a water softener will reduce maintenance and decrease down time caused by hard water scaling. It will also allow cleaning chemicals to be more effective 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.



Fuel Requirements

Use unleaded gasoline ONLY. DO NOT use any gasoline additives. We recommend the use of clean, fresh, unleaded gasoline intended for automotive use. High-octane gasoline should NOT be used with the engine on this unit. This unit is not compatible with E-85 fuel.

Engine Oil Requirements

Use high quality detergent oil of at least API (American Petroleum Institute) service class SH. NOTE: Using less than service class SH oil or extending oil change intervals longer than recommended can cause engine damage. The recommended SAE viscosity grade is 10W-40 or 15W-40 for regular oil. It is recommended that a good quality synthetic oil be used after the first 25 hour break-in period to extend the service interval to 150 hours. Oils rated for high mileage engines have been shown to help keep internal engine components clean and keep seals and other rubber components pliable, increasing service life. Synthetic oils of the following viscosities are recommended: 10W-30, 10W-40, 15W-50 and 20W-50. Higher viscosity oils should be used in high temperature operating conditions and lower viscosity oils should be used in cooler temperature operating conditions.

Chemical Requirements

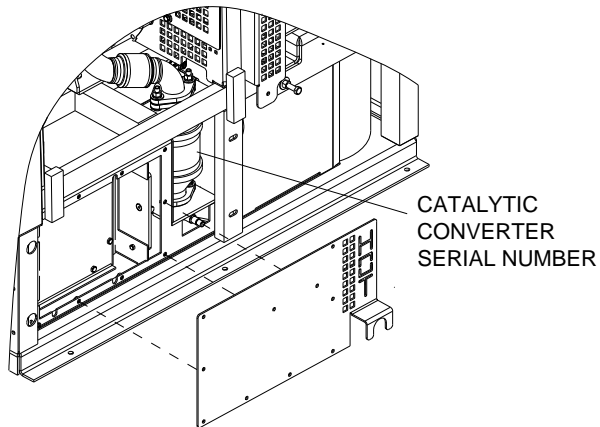
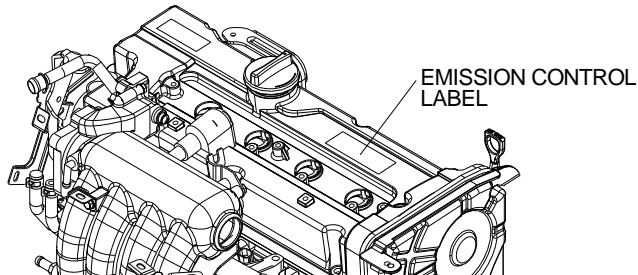
This cleaning unit, due to its chemical injection pump design, can be used with a variety of water-diluted chemical compounds (either acidic or alkaline), depending on the job to be done. However, to obtain optimum results with this unit, we recommend using the PROCHEM line of chemicals. For information on using the cleaning compounds, refer to the PROCHEM chemical manual.

Electronic Fuel Injection System

This unit is equipped with the latest port fuel Electronic Fuel Injection (EFI) technology. The EFI technology provides more effective fuel distribution and improved power management through the use of an electronic "brain" called the electronic control unit (ECU). The ECU also provides improved engine emissions through more effective combustion of the fuel/air mixture. The fuel system, engine set up, and exhaust system are systems approved by the Environmental Protection Agency (EPA). Any alteration or modification to the system must receive approval from the EPA.

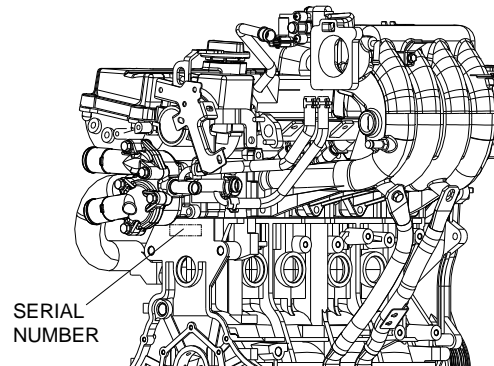
Emission Control Information

The Zenith Power Products (ZPP) Emission control labels are located on the valve cover of the engine near the oil fill cap, and on the side of the catalytic converter. The catalytic converter is located behind the heat shield cover.



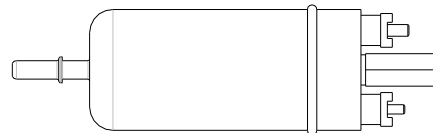
Date Stamp Location

When referring to an engine for assistance from your dealer, Prochem, or ZPP please identify your engine by the serial # and date code stamped on the surface on the back of the engine block, approximately where indicated.



Fuel Pump And Filter

Your Everest console was shipped to the dealer with a specific fuel pump and fuel filter. Ensure that **ONLY** these items are used in the installation of your unit. The system is much more sensitive to unwanted material in the fuel stream. Contamination of the fuel stream may clog the injectors and adversely affect performance. Please be sure to adhere to the filter maintenance schedule located in the Operations Section of this manual.



FUEL PUMP



FUEL FILTER

Trouble Codes

A feature of the ZPP 416 ECM is that DTC's (Diagnostic Trouble Codes) can be displayed to a technician to indicate what historic faults are present without requiring the use of a personal computer. The DTC's can be flashed over the MIL output while the RS232 serial receive input (PC RX) is grounded. This input may be grounded at the diagnostic connector (pin A-brown/white wire). This connector is located behind the intake manifold near the front cylinder. Once the ECM recognizes that the user is requesting flash codes, ignition key on-engine off, it will flash or blink a leader code (111) x 3 times in a row. If the machine has been shut down due to a full waste tank you will also observe flash code 552 (DTC1552) and 554 (DTC1554). After the leader code has been flashed for 3 times, the first flash code in the active faults category will be flashed at the same rate. This will repeat depending on the number of faults retained in memory. Once all faults have been flashed the leader flash code (111) will be repeated. The codes are retained in memory. Once any issue is resolved and the machine started-run-stopped for 3 times without a fault detected the light will go out on the 4th start. If an issue has not been resolved the light will remain on and another code stored in history.

History faults will clear automatically after 20 start-run-stop cycles if the fault has not been detected.

#	DTC/ Pcode	Fault Description	CAN SPN	CAN FMI	Turnson MIL?	MIL Flash Code
		Leader/Trailer Code				111
1	P0016	CRANK or CAM could not synchronize during start	636	8	Yes	216
2	P0091	Fuel Pressure low voltage	94	4	Yes	291
3	P0092	Fuel Pressure high voltage	94	3	Yes	292
4	P0107	MAP Signal open or shorted to ground	106	4	Yes	127
5	P0108	MAP signal shorted high	106	16	Yes	128
6	P0112	IAT signal Low/Shorted to GND	105	4	Yes	112
7	P0113	IAT signal High/Open	105	3	Yes	113
8	P0116	ECT higher than warning threshold	110	15	Yes	116
9	P0117	ECT Sensor Low/Shorted Input	110	4	Yes	117
10	P0118	ECT Sensor High/Open Input	110	3	Yes	118
11	P0121	TPS1 voltage lower than TPS2 voltage	51	1	Yes	121
12	P0122	Throttle Position Signal 1 low voltage	51	4	Yes	122
13	P0123	Throttle Position Signal 1 high voltage	51	3	Yes	123
14	P0134	Pre-Cat O2 Signal No Activity	724	10	Yes	134
15	P0154	Post-Cat O2 Signal No Activity	520208	10	Yes	154
16	P0171	Gasoline bank 1 A/F is lean (adaptive learn)	520200	0	Yes	171
17	P0172	Gasoline bank 1 A/F is rich (adaptive learn)	520200	1	Yes	172
18	P0182	Gasoline Fuel Temp Low Voltage	174	4	Yes	182
19	P0183	Gasoline Fuel Temp High Voltage	174	3	Yes	183
22	P0217	ECT higher than engine shutdown threshold	110	0	Yes	217
23	P0219	Engine Over speed Condition	515	15	Yes	219
24	P0221	TPS1 voltage higher than TPS2 voltage	51	0	Yes	221
25	P0222	Throttle Position Signal 2 low voltage	520251	4	Yes	222

#	DTC/ Pcode	Fault Description	CAN SPN	CAN FMI	Turns on MIL?	MIL Flash Code
26	P0223	Throttle Position Signal 2 high voltage	520251	3	Yes	223
27	P0261	Injector 1 Low/Open	651	5	Yes	261
28	P0262	Injector 1 High/Short	651	6	Yes	262
29	P0264	Injector 2 Low/Open	652	5	Yes	264
30	P0265	Injector 2 High/Short	652	6	Yes	265
31	P0267	Injector 3 Low/Open	653	5	Yes	267
32	P0268	Injector 3 High/Short	653	6	Yes	268
33	P0270	Injector 4 Low/Open	654	5	Yes	269
34	P0271	Injector 4 High/Short	654	6	Yes	271
35	P0326	Knock signal excessive or erratic	731	2	Yes	326
36	P0327	Knock signal open or not present	731	4	Yes	327
37	P0336	CRANK signal noise	636	2	Yes	336
38	P0337	No CRANK signal	636	4	Yes	337
39	P0341	CAM signal noise	723	2	Yes	341
40	P0342	No CAM signal	723	4	Yes	342
41	P0420	Catalyst inactive on gasoline	520211	10	Yes	421
42	P0524	Engine Oil Pressure Too Low	100	1	Yes	524
43	P0562	Battery Voltage Low	168	17	Yes	562
44	P0563	Battery Voltage High	168	15	Yes	563
45	P0601	Microprocessor failure - FLASH	628	13	Yes	621
46	P0604	Microprocessor failure - RAM	630	12	Yes	624
47	P0606	Microprocessor failure - COP	629	31	Yes	626
48	P0615	Starter relay coil open	1321	5	Yes	615
49	P0616	Starter relay control short to GND	1321	4	Yes	616
50	P0617	Starter relay coil short to 12V	1321	3	Yes	617
51	P0642	5V Reference #1 voltage low	1079	4	Yes	642
52	P0643	5V reference #1 voltage high	1079	3	Yes	643
53	P0650	Malfunction Indicator Lamp open	1213	5	Yes	651
54	P0652	5V Reference #2 voltage low	1080	4	Yes	652
55	P0653	5V Reference #2 voltage high	1080	3	Yes	653
56	P0685	Power relay coil open	1485	5	Yes	685
57	P0686	Power relay short to GND	1485	4	Yes	686
58	P0687	Power relay short to 12V	1485	3	Yes	687

#	DTC/ Pcode	Fault Description	CAN SPN	CAN FMI	Turns on MIL?	MIL Flash Code
63	P1155	Closed-loop gasoline bank 1 A/F is too lean	520204	0	Yes	155
64	P1156	Closed-loop gasoline bank 1 A/F is too rich	520204	1	Yes	156
86	P1551	Aux Digital Input 1 High (Float Switch Voltage High)	-	-	Yes	1551
87	P1552	AUX DIGITAL INPUT 1 low voltage-force idle-waste tank full.	520222	3	Yes	552
88	P1553	Aux Digital Input 2 High (Float Switch Voltage High Engine Shut Down) 1553	-	-	Yes	1553
89	P1554	AUX DIGITAL INPUT 2 low voltage-after 15 seconds-engine shut-down-waste tank full	520223	4	Yes	554
94	P1612	Watchdog processor blocked outputs (RTI 1)	629	31	Yes	712
95	P1613	Microprocessor failure - RTI 2	P0629	P0031	Yes	713
96	P1614	Microprocessor failure - RTI 3	P0629	P0031	Yes	714
97	P1615	Microprocessor failure - A/D	P0629	P0031	Yes	715
98	P1616	Microprocessor failure - Interrupt	P0629	P0031	Yes	716
99	P1644	MIL control short to GND	P1213	P0004	No	644
100	P1645	MIL control short to 12V	P1213	P0003	No	645
101	P2111	Unable to reach Lower TPS	P0051	P0007	Yes	211
102	P2112	Unable to reach higher TPS	P0051	P0007	Yes	212
110	P2300	Ignition coil A low current	P1268	P0005	Yes	411
111	P2301	Ignition coil A high current	P1268	P0006	Yes	412
112	P2303	Ignition coil B low current	P1269	P0005	Yes	421
113	P2304	Ignition coil B high current	P1269	P0006	Yes	422

OBD = On Board diagnostics (Nomenclature)

DTC = Diagnostic Trouble Code

MIL = Malfunction Indicator Light

TPS1 = Throttle Position Sensor

EGO = Exhaust Gas Oxygen

ECT = Engine Coolant Temperature

CAM = Cam Sensor Input

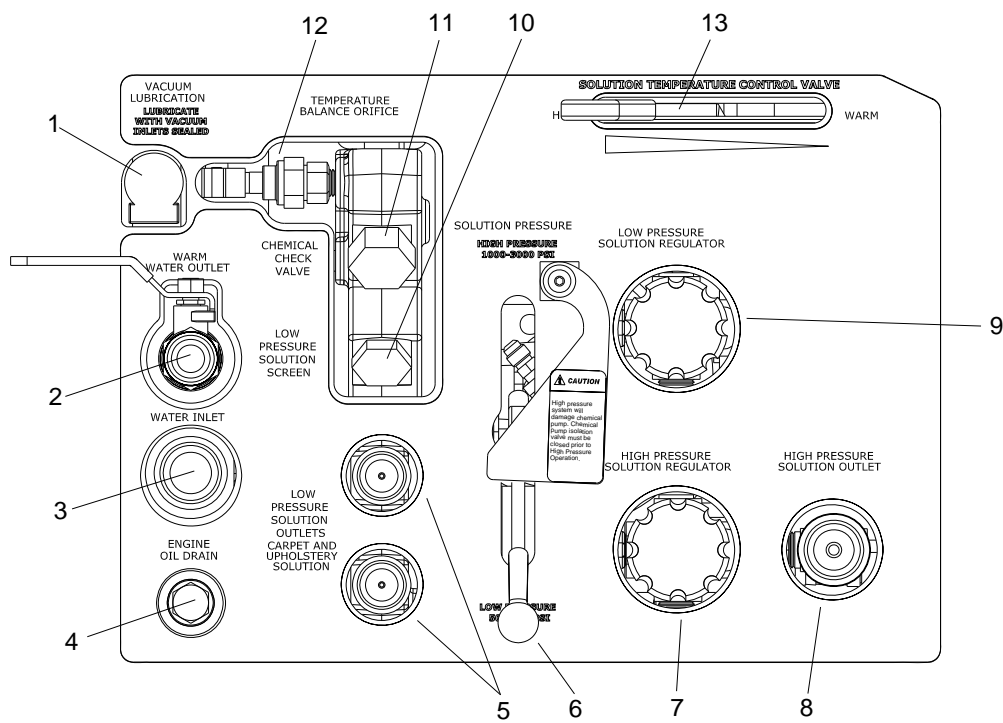
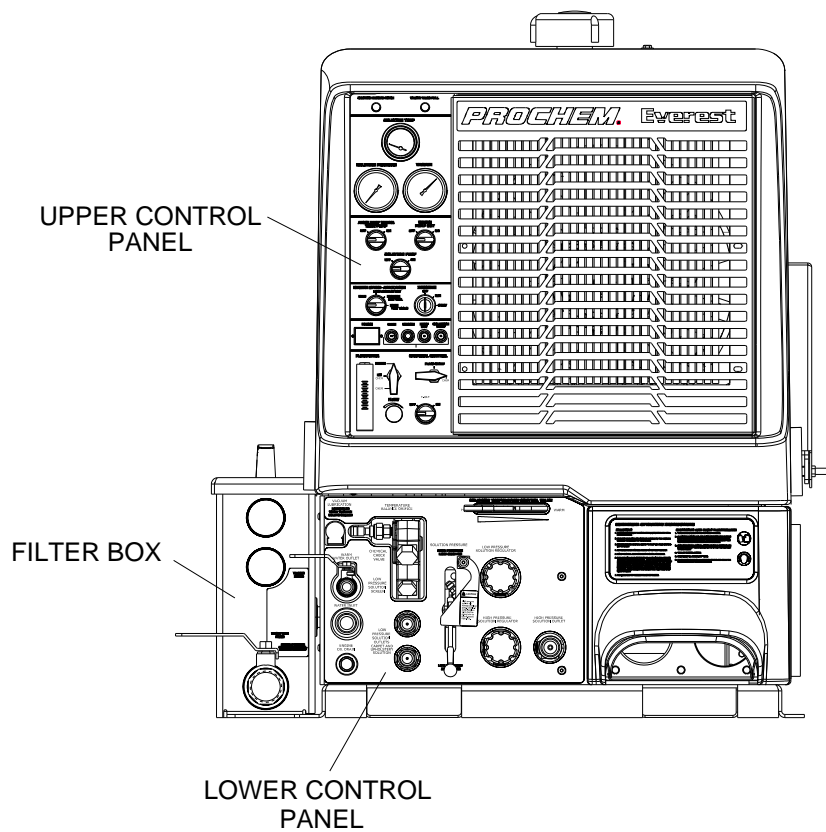
CAN = Controller Area Network

CPS = Crank Position Sensor

MAP = Manifold Absolute Pressure

Pcode= Powertrain Code

Components



LOWER CONTROL PANEL

Lower Control Panel

1. Lubrication Cup

The lubrication cup allows lubricant spray to reach the vacuum blower.

2. Warm Water Outlet

The warm water outlet allows the cleaning technician to drain warm water from the water box for mixing chemical.

3. Water Inlet

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

4. Engine Oil Drain

The engine oil drain plug is removed to allow the engine oil to be drained.

5. Solution Outlets

The solution outlets are the connecting point for the high pressure solution hoses. These outlets are quick disconnects that allow hoses to be plugged into the unit.

6. Pressure System Valve (Option)

This lever when in the up position actuates the high-pressure system and regulator. When in the down position the low pressure cleaning system and regulator are actuated.

7. High Pressure Solution Regulator (HP Only)

The high pressure regulator sets the pressure of the pressure washing circuit. 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 this manual's maintenance table.)

8. High Pressure Solution Outlet (Option)

The high-pressure solution outlet is the connecting point for the high-pressure washing hose. This outlet is a quick disconnect that allows the pressure washing hose to be plugged into the unit.

9. Low Pressure Solution 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 this manual's maintenance table.)

10. Solution Screen

The solution screen is located on the front of the machine. The function of this screen is to trap foreign particles from exiting the machine and plugging the orifices of the cleaning tools. This screen is part of the machine maintenance cleaning.

11. Chemical Check Valve

The chemical check valve allows chemicals to enter the system and travel in a singular direction to the wand. The chemical check valve prevents chemicals from traveling upstream into the solution system of the unit.

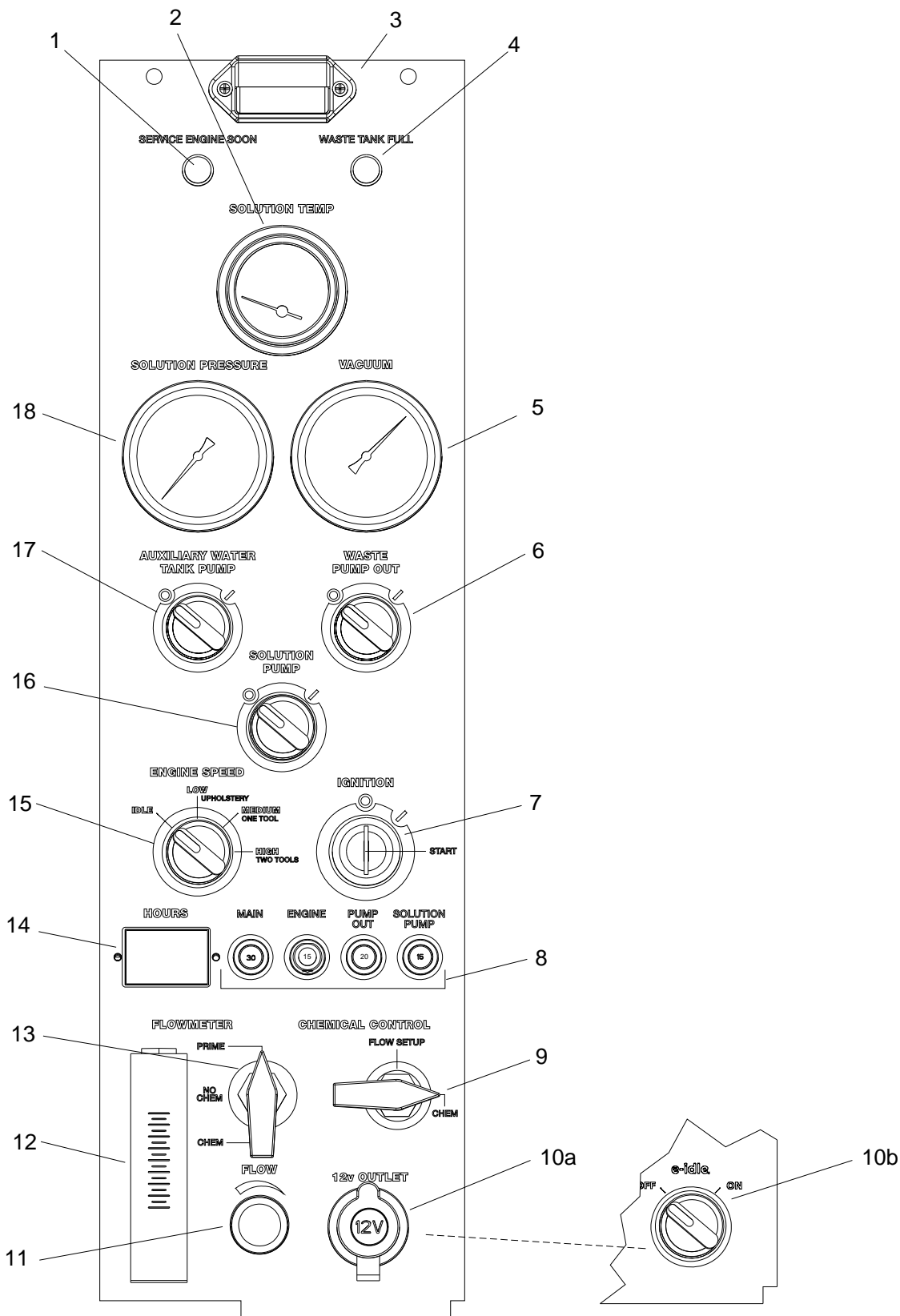
12. Temperature Balance Orifice

The temperature balance orifice helps to balance and stabilize the solution temperature within the system.

13. Solution Temperature Control Lever

This lever directs hot engine and blower exhaust gases through or around the heat exchangers.

Upper Control Panel



Upper Control Panel

1. Service Engine Soon (Amber)

This light, when flashing, signals a problem with the unit. When this occurs, troubleshooting is required.

2. Solution Temperature Gauge

This gauge measures the temperature of the cleaning solution as it exits the machine.

3. Panel Light

This light is useful if the machine is used in a poorly lit area or night use. It is helpful in reading the instruments and gauges.

4. Waste Tank Full Indicator Light (Red)

This indicator light is activated when the waste tank is full. This unit is equipped with a slow down feature. This feature will help to protect the engine from damage by causing a slow down for 15 seconds prior to shutting down the engine. When this indicator light is on, it indicates that the waste tank must be emptied before the unit can be brought back into service.

NOTE: Never dispose of wastewater in storm drains, waterways or on ground areas. Always dispose of waste in accordance with local state and federal law.

5. Vacuum Gauge

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

6. Waste Pumpout

This switch actuates the optional waste pumpout.

7. Ignition Switch

The ignition switch controls the power for the machine. To turn the machine on, rotate the key clockwise until the starter engages the engine. When machine is running let off the switch and engine will continue to run. To turn power off, rotate key counter clockwise to stop position, engine will then stop.

8. Circuit Breakers

These serve to protect the circuits from electrical spike and over loads and protects wires from damage and fire.

9. Flow Setup Valve

This valve allows solution to move through the machine and chemical to be injected simulating the cleaning process. This allows the operator to set the chemical flow level without connecting tools to the machine. It is also useful in troubleshooting.

10a. Hole Plug

Plug for machines without E-Idle™.

10b. E-Idle™ Switch

The E-Idle™ switch regulates the machine idle to save fuel when the wand is not in use for extended time. Turn the switch clockwise to activate the E-Idle™ and turn counter clockwise to deactivate it.

11. Chemical Metering Valve

The chemical metering valve regulates the amount of chemical that is injected into the system. Clockwise rotation of the knob closes the valve. Counter clockwise rotation opens the valve, allowing more chemical to enter the system.

12. Flow Meter

The flow meter is a gauge to indicate how much liquid chemical is being introduced in the water system. The quantity can be increased by turning the chemical metering valve knob counter clockwise.

13. Chemical Selector Valve

This valve allows the chemical to circulate through the chemical system with little or no restriction. It also purges out air that may be trapped in the lines and cavities of the chemical pump. By turning the valve counter clockwise the injection system is enabled.

14. Hour Meter

The hour meter records the number of hours the unit has run. This serves as a time recorder for servicing the machine.

15. Engine Speed Control

This serves to set the engine speed and operating parameters. The 'Low', 'Medium' and 'High' settings are set for upholstery cleaning, single wand cleaning, and dual wand cleaning respectively.

16. Solution Pump Switch

This switch serves to energize the magnetic clutch to turn the solution pump on or off. Turn clockwise for activating the pump and counter clockwise for deactivating the pump.

17. Auxiliary Water Tank Pump Switch

The Auxiliary Water Tank Pump Switch is used to actuate an optional fresh water demand pump

18. Solution Pressure Gauge

This gauge registers the amount of pressure in the system.

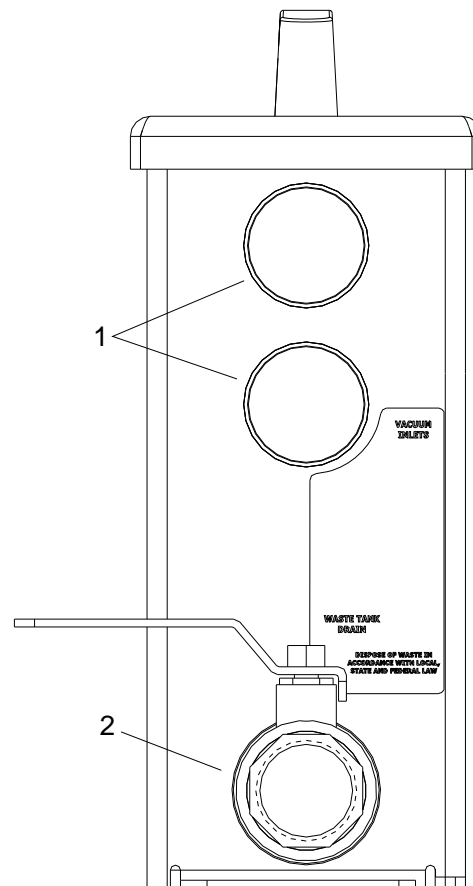
Filter Box

1. Vacuum Inlets

The vacuum inlets serve as the connecting point for vacuum hoses.

2. Waste Tank Drain

This allows the waste tank to be emptied. Must be closed for operation.



Water Pumping And Heat Transfer System

Cold water enters the console through the water inlet. When the water box is full the valve will automatically shut off.

Water then flows from the water box, through the strainer, into the solution pump. The water is pumped to the pressure regulator manifold, which provides and maintains the desired pressure setting.

A certain amount of water is by-passed from the pressure regulator due to over pumping capacity of the solution pump. Water that is not called for in the cleaning process is channeled through a copper heater core in the front of the heat exchanger box. This bypass water circulates several times through the heater core, pre-warming the water.

The next stage of heating and water flow is to the helicoil, when water is called for in the cleaning process it flows to the helicoil under pressure. Heat from the engine coolant is exchanged to the cleaning water through a series of coiled copper tubing. This allows the engine coolant to travel in a counter rotating direction to the cleaning water during the exchange process creating a very efficient transfer of heat out of the engine and into the cleaning water.

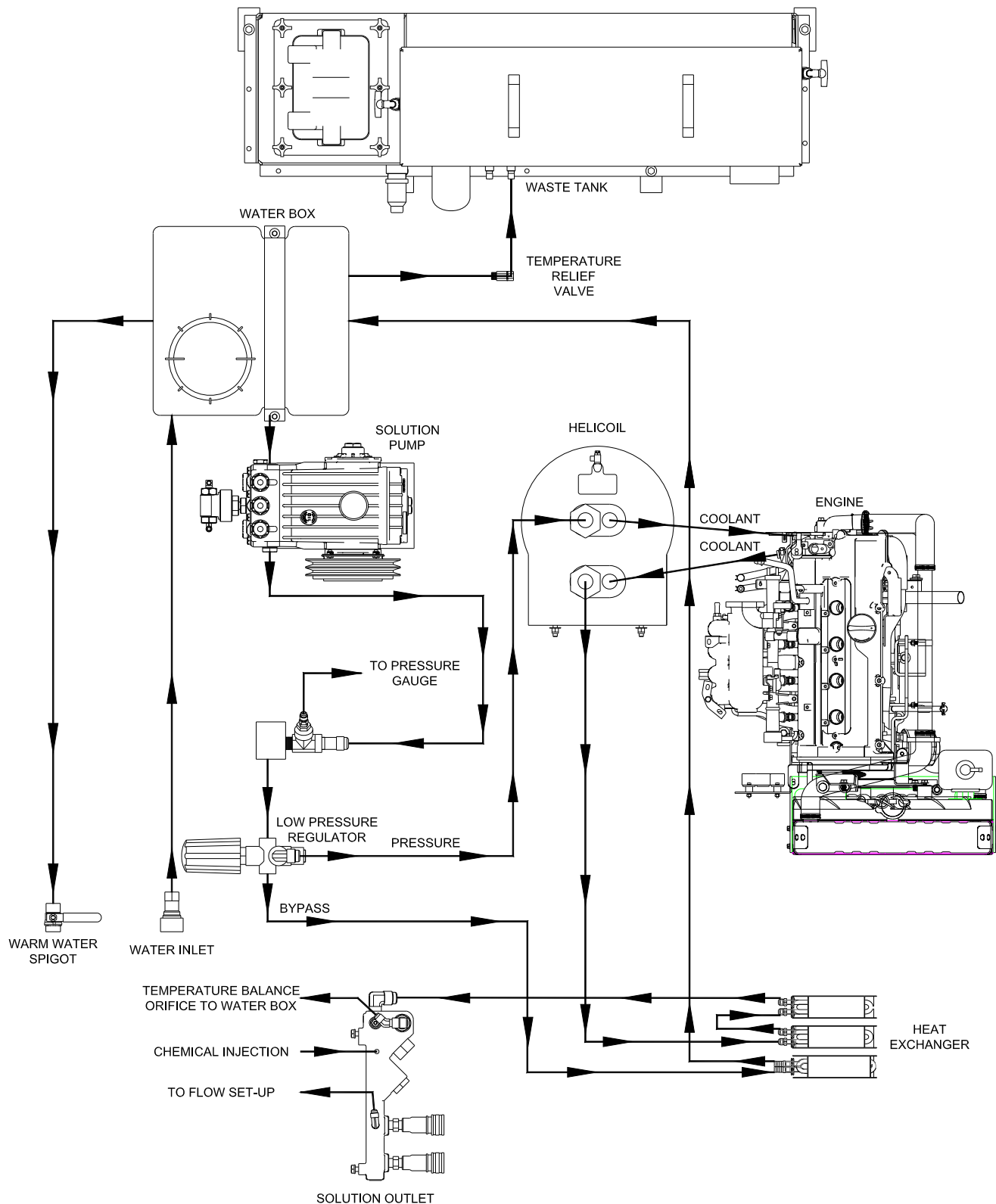
The third stage of plumbing and heat exchange takes place in the 2nd and 3rd heater cores located in the heat exchanger box. This is the hottest point of the gases coming from the vac pump and the engine exhaust. These hot gases are forced through the heater cores creating the third stage of heat transfer to the cleaning water.

Finally, the hot cleaning water passes to the solution outlet manifold where cleaning chemicals are injected from the chemical pulse pump. This manifold serves as a temperature sensing point and a connecting point for the solution hoses. Also a check valve is located in this outlet manifold prohibiting chemicals from backing up into the system.

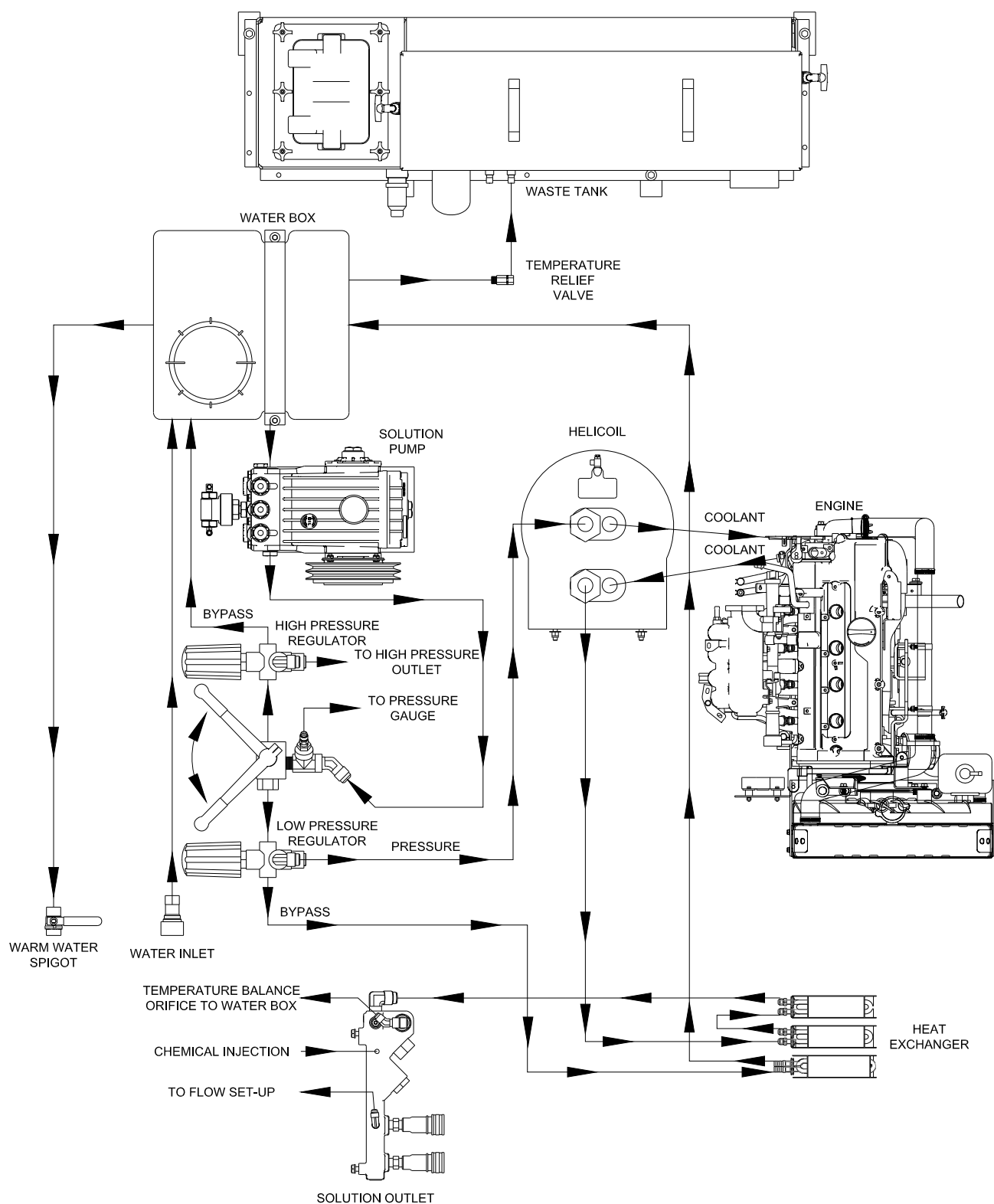
The cleaning solution then passes through high pressure solution hoses and is distributed by the cleaning tool to a surface that is being cleaned, completing the water pumping and heating cycle of the cleaning unit.

In the optional high-pressure model, water is routed directly to the high-pressure outlet through the regulator when the solution pressure lever is in the up position.

WATER FLOW DIAGRAM LOW PRESSURE



WATER FLOW DIAGRAM W/HIGH PRESSURE OPTION



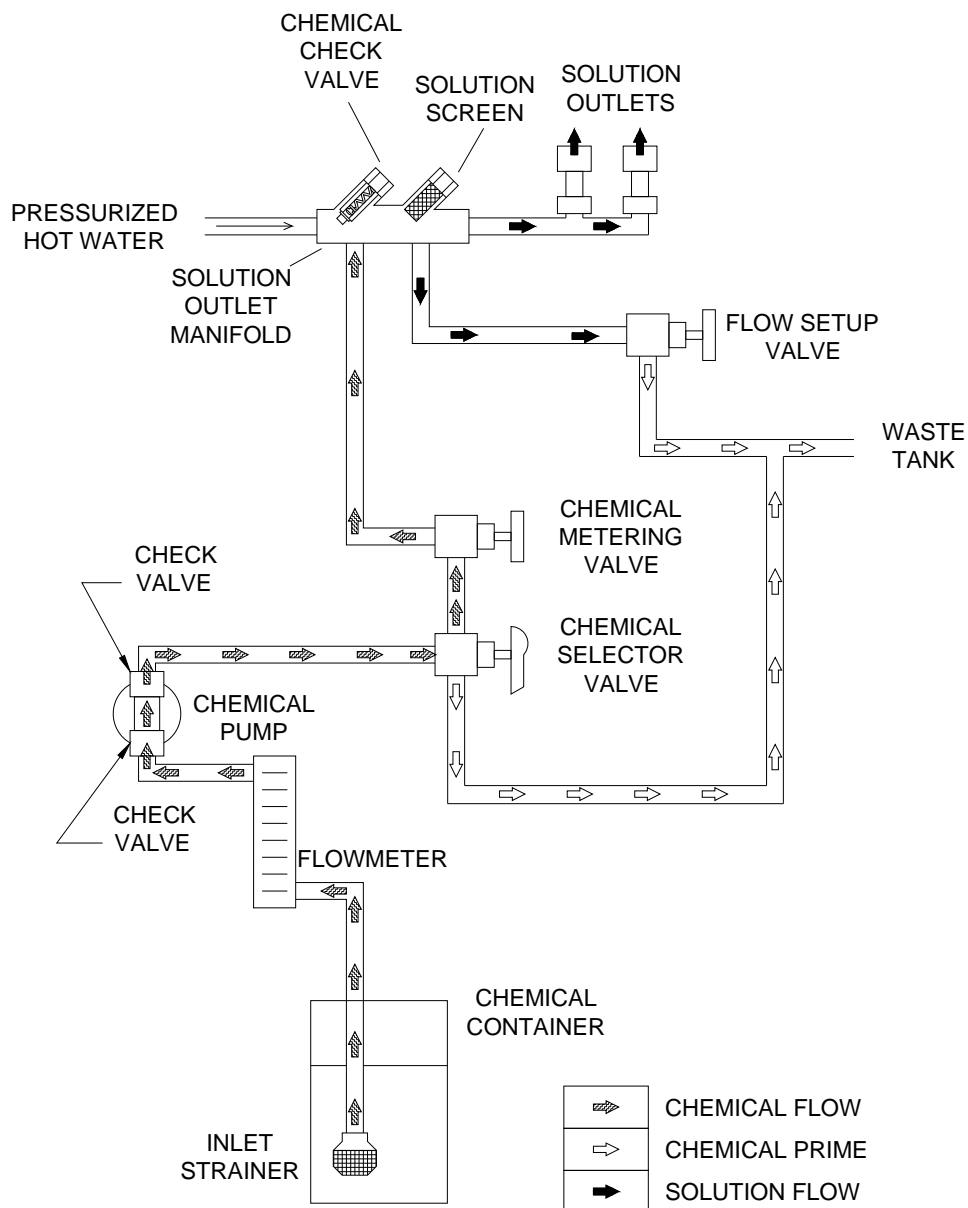
Chemical Injection System

The chemical injection system is unique in that it utilizes the pressure spikes generated by the high-pressure solution pump to move chemical into the main solution stream. The high pressure spikes move the diaphragm in the chemical pulse pump forcing small amounts of liquid chemical to be moved in a single direction of flow with the aid of two check valves.

The chemical is drawn from the container, and through the flow meter, which indicates rate of flow. The chemical then moves to the chemical pulse pump where it is pressurized.

The chemicals flow to the chemical selector valve, which can turn off the chemical flow or when set to "Prime" sends it into the waste tank to purge air from the system, or when "CHEM" the chemical can be directed to the metering valve. The metering valve controls the amount of chemical that enters the solution outlet manifold.

The manifold assembly's check valve will not allow the chemicals to travel upstream into the plumbing system of the unit. The chemicals are mixed there with hot pressurized water that makes a cleaning solution. The flow setup valve is set to "Setup" while adjusting the chemical mix. This causes incorrectly mixed solution to safely drain to the waste tank until the manifold has the correct solution mix. Setting to "CHEM" lets the solution flow to the outlets for cleaning.



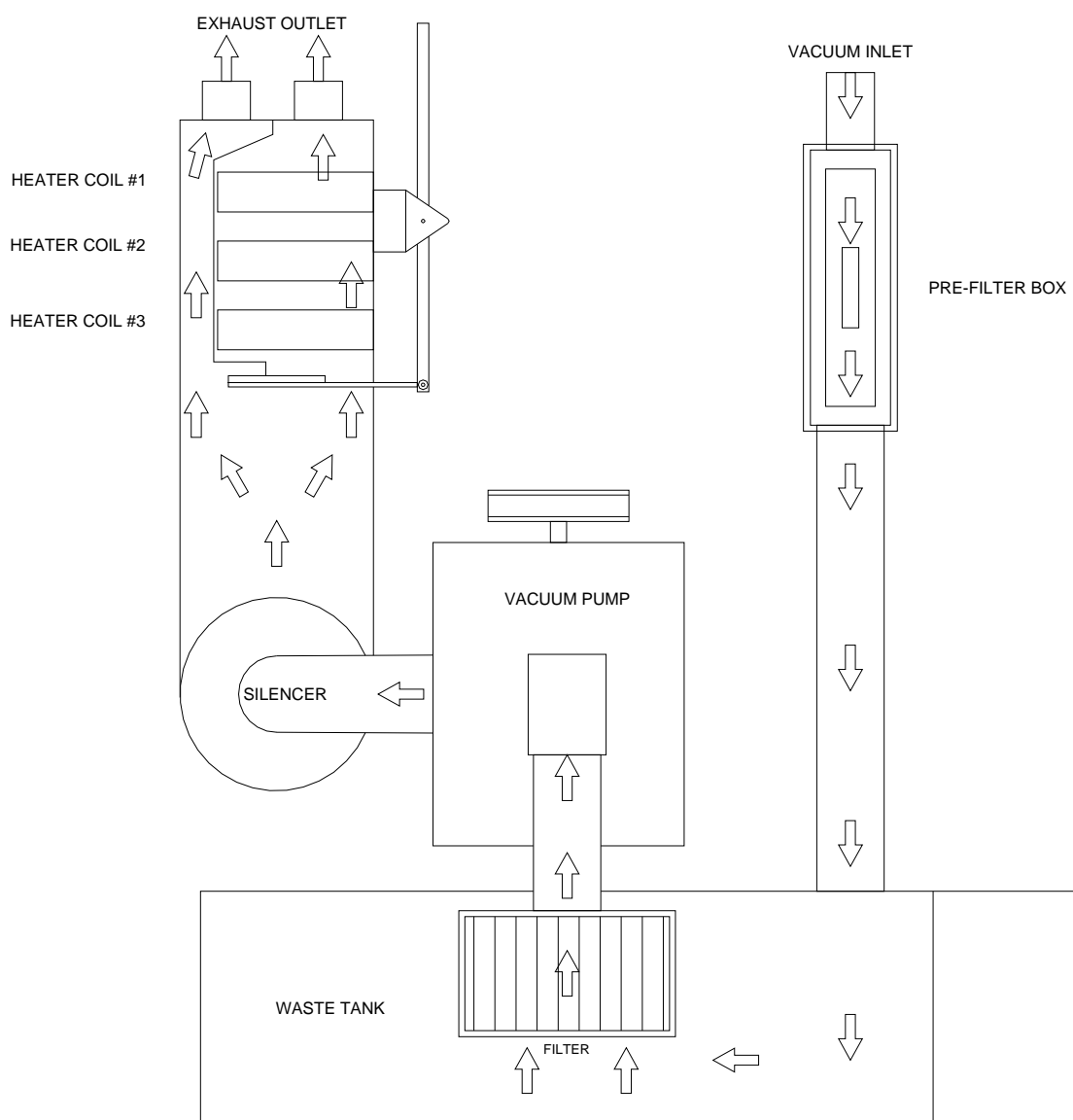
Vacuum System

The engine turning a vacuum pump that generates vacuum. The air is channeled in one side of the vacuum pump, compressed and discharged on the opposite side, creating airflow.

The movement of air is used to do the work necessary for the extraction process. A vacuum nozzle applied to the cleaning surface removes moisture, dirt and spent chemicals. These elements are conveyed back to a separating tank utilizing hoses and the force of air. Particles of moisture and dirt are separated in the vacuum tank using a series of changes in direction and velocity. The air is then filtered and rushes into the vacuum pump.

The vacuum pump compresses and heats the incoming air. The hot discharged air is forced down stream into a silencer for noise abatement. After exiting the silencer, this hot air is mixed with hot gases from the engine exhaust. This mixture of hot air and gases are then forced through 3 radiators serving as heat collectors. Heat from the engine and vacuum pump is then transferred into the plumbing system raising the water temperature for better cleaning.

VACUUM SYSTEMS



Pre-run Inspection / Setup

NOTE: Operation of this unit is simple. However, only trained personnel 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 fatality. **DO NOT** operate this unit where the exhaust may enter any building doorway, window, vent, or opening of any type.

! AVERTISSEMENT:

Utiliser cet appareil et cet équipement uniquement dans un endroit bien ventilé. Les gaz d'échappement contiennent du monoxyde de carbone qui est un gaz inodore et mortel pouvant causer des blessures graves ou entraîner la mort. **NE PAS** faire fonctionner cet appareil dans un endroit clos. **NE PAS** utiliser cet appareil dans un endroit où les gaz d'échappement risquent de pénétrer dans une entrée de porte, une fenêtre, un évent ou toute ouverture d'un édifice.

Check For Adequate Fuel

Check the fuel tank to be certain there is adequate fuel to complete the job. This unit uses approximately 1.00 to 1.50 gallons of fuel per hour, depending on the speed setting and vacuum load.

Remove Tools from Vehicle

Remove any tools or hoses from the van which you will require.

Water Supply Connection

NOTE: Before connecting your water hose to the supply faucet, flush out the faucet until the water is free of any debris. Flush out any debris that may be in your water inlet hose.

1. Connect the water supply hose to the water inlet quick-connect at the left front of the console. Connect the hose to the water supply faucet.

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

2. Turn the water supply faucet on. The water will fill the water box.

! CAUTION:

Don't run the solution pump dry, damage may occur and void the warranty.

In the event the pump is run dry, allow the pump to cool down to ambient temperature before reintroducing water. Otherwise major damage may occur and void the warranty.

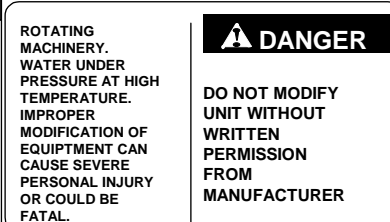
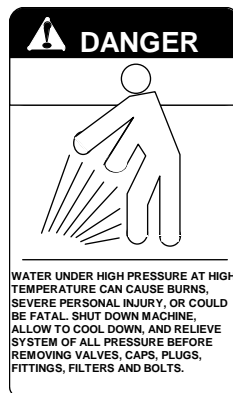
! ATTENTION:

Ne pas laisser la pompe à solution fonctionner à sec, cela risquerait d'entraîner des dommages et d'annuler la garantie.

Si la pompe venait qu'à fonctionner à sec, laisser refroidir la pompe à température ambiante avant de réintroduire de l'eau. Sinon, cela risquerait d'entraîner des dommages et d'annuler la garantie.

High Pressure Solution Hose

Before starting the unit, connect the high-pressure solution hose to the outlet connection at the front of the unit. Connect the cleaning tool to the pressure hose.



Vacuum Hose

Connect the vacuum hose to the vacuum inlet connection at the front of the Filter Box. Connect the other end of the vacuum hose to the cleaning tool.

Filters

Ensure all filters on machine and in waste tank are free of debris.

Priming The Chemical Pump

1. Fill chemical container and inspect chemical strainer.
2. Insert chemical inlet tube into chemical container.
3. Turn ignition key to start.
4. Set throttle to low speed.
5. Turn solution pump on.
6. Turn Chemical valve to prime and allow chemical to circulate. After all air bubbles have been removed from chemical tube, turn the valve to the Chem position.
7. Turn chemical flow setup valve to setup position. Use the chemical metering valve to set the chemical flow to the desired flow rate while observing the flow meter indicator. Turn the chemical flow setup valve to Chem position.
8. Set throttle to maximum position for quick unit heat up.

Once you have completed priming the chemical pump, proceed with the cleaning operation. Your unit should be in the correct throttle position for your cleaning operation or extracting.

E-Idle™ Operation

Connect and route the vacuum and water lines while the engine is warming up, following the normal set up procedure. When ready to start cleaning, the E-Idle™ switch should be turned on. The controller will automatically idle down the engine within 7 seconds, regardless of the pressure on the water or vacuum sensor. There will be a 2-3 second delay before the water trigger is recognized once the engine has idled down. After this delay the water switch on the wand can be triggered. This will return the engine to normal speed and cleaning can begin.

The engine can be idled down using the water trigger, following a wet stroke, with 3-4 pulls of the trigger within a 2 second window. Otherwise the engine will automatically idle down after 4-5 minutes if there is no change in water or vacuum pressure.

Apply 2-3 pulls of the trigger to return the engine to the cleaning speed.

Turn the E-Idle™ switch off when cleaning is complete.



NEVER dispose of waste in storm drains, waterways, or on ground areas. Always dispose of waste in accordance with Local, State, and Federal laws.

⚠️ AVERTISSEMENT:

NE JAMAIS éliminer les résidus dans les collecteurs d'eaux pluviales, les voies d'eau ou sur une surface au sol. Toujours éliminer les résidus conformément aux lois locales, provinciales et fédérales.

Waste Pumpout (Optional)

1. If your unit is equipped with an automatic waste pump, connect one end of a garden hose to the pump-out connection and the other end to an appropriate waste disposal.
2. Turn the pump-out switch on the control panel to the ON position. The waste pump will operate automatically throughout the cleaning operation.

We recommend that you use a 3/4" I.D. water hose as a waste pump outlet hose. DO NOT use a hose smaller than 5/8" I.D.

NEVER use your automatic waste pump outlet hose as a water inlet hose.

Cleaning

Observe the following guidelines, while cleaning:

1. Before proceeding make sure the spray tips are functioning properly.
 - a. To check, hold the wand about one foot above the surface to be cleaned and open the wand valve. A full spray should be observed from all of the cleaning spray tips.
 - b. If the spray tips are not showing a full spray pattern, adjust for proper pattern, clean, or replace spray tips, if required.
2. Normally chemical is applied on the push stroke of the wand, and cleaning and vacuuming is done on the pull stroke. For heavily soiled carpets the wand may be used in a scrubbing manner, applying chemical in both push and pull strokes. Always finish up an area with a vacuum stroke.
3. When cleaning, keep the working opening (mouth) flat on the surface being cleaned. Keep the wand moving when the valve is open.
4. The unit will automatically shut-down when the waste tank is full. This will prevent water being drawn into the vacuum pump. If shut-down occurs, empty the waste tank before proceeding. If shutdown occurs due to foam created by chemicals used, add Prochem defoamer.

Upholstery Cleaning

Upholstery tool (See Options Section)

1. Set engine speed control to "Low/Upholstery" setting to minimize excess heat.
2. Set temperature control lever to desired position.

Shutdown And Daily Maintenance

1. Turn chemical selector valve to "NO CHEM".
2. Allow the unit to run for 2 minutes with the vacuum hose disconnected to remove moisture. Spray water-displacing lubricant into the vacuum lubrication cup. This will prevent corrosion due to moisture.
3. Set engine speed control to idle position and allow the water temperature to cool down, utilizing the simulator valve in the open position to bleed off residual hot water left in the system.
4. Turn off ignition switch.
5. Disconnect all hoses and tools.
6. Drain waste tank.
7. Clean the filter box.

High Pressure (3000PSI) System (Optional)

CAUTION:

The high-pressure water system can produce water pressures in excess of 3000psi. Water at these pressures will cause severe injury. DO NOT direct any discharges at persons. If contact with a person does occur and penetration of the skin does seem possible, contact medical personnel immediately. This machine is to be used by trained cleaning professionals only. Ensure all operators are trained in the operation of this equipment. Keep cleaning area clear of all persons and objects.

Ensure that proper Personal Protective Equipment (PPE) is used during the operation of this equipment. Failure to use proper PPE could result in injury. Ensure required ventilation and/or breathing apparatuses are used with a chemical injection system. Check with your chemical vendor for proper safety requirements.

Prochem also recommends the use of Prochem high-pressure spray wands. Prochem offers a dual barrel wand. Contact your Prochem dealer for recommendations in your particular application.

The operation of the high-pressure system also requires a high-pressure hose capable of handling the increased pressure loads of the high-pressure system. NEVER use your low-pressure system hoses with the high-pressure system. Prochem offers a special high pressure hose rated for pressure washer activities. Only use Prochem approved hoses and fittings. Ensure that your hoses and fittings are rated for your operational pressures.

ATTENTION:

Le système d'eau à haute pression peut produire des pressions d'eau supérieures à 3 000 psi. De l'eau, à de telles pressions, peut causer des blessures graves. NE diriger AUCUNE décharge en direction d'autrui. En cas de contact avec une personne et qu'il y a possibilité de pénétration de la peau, contacter immédiatement du personnel médical. La machine doit être utilisée par des professionnels du nettoyage formés seulement. S'assurer que tous les utilisateurs ont reçu une formation sur l'utilisation de cet équipement. Garder la zone de nettoyage exempte de toute personne et de tout objet.

S'assurer qu'un équipement de protection individuelle (EPI) approprié est porté lors de l'utilisation de cet équipement. Le non-respect de la consigne d'utiliser l'EPI approprié pourrait causer des blessures. S'assurer que les appareils respiratoires et de ventilation requis sont utilisés avec un système d'injection chimique. Vérifier auprès de votre fournisseur de produits chimiques pour déterminer les exigences adéquates en matière de sécurité.

Prochem recommande également d'utiliser les lances d'arrosage à haute pression Prochem. Prochem offre une lance à double cylindre. Contacter votre revendeur Prochem pour des recommandations pour votre application particulière.

Le fonctionnement du système à haute pression nécessite également un flexible haute pression capable de gérer l'augmentation de pression de charge de système à haute pression. N'utilisez jamais votre basse pression flexibles avec le système haute pression. Prochem offre un flexible haute pression spéciale cotés pour les activités de nettoyeur sous pression. Utiliser uniquement de l'Prochem approuvé les flexibles et les raccords. S'assurer que votre flexibles et les raccords sont calibrées pour vos pressions opérationnelles.

Operation

The "HP" units are equipped with a solution pump and water delivery system that can support pressure-washing operations up to 5 gallons per minute at 3000 PSI. This system is normally used for high-pressure washing and hard surface cleaning.

1. Move the temperature control lever from the "hot" position to the "warm" position.
2. Allow water temperature to cool to below 160 deg F.
3. Close ball valve located between the chemical pump and the water pump.

CAUTION:

Failure to close this valve will result in severe damage to the chemical pump diaphragms.

ATTENTION:

Le non-respect de la consigne de fermer cette soupape risquerait d'entraîner des dommages graves aux diaphragmes de la pompe pour produits chimiques.

4. Connect HP hose to either a pressure wash gun or hard surface cleaning tool for high pressure cleaning. Connect other end of hose to high-pressure solution outlet.
5. Move the pressure selection valve from the "low pressure" position to the "high pressure" position.
6. Adjust high-pressure regulator to desired operational pressure.

High Pressure Shutdown & Return To Low Pressure System

1. Turn off solution pump and release pressure.
2. Bleed off excessive pressure build-up by operating pressure washer gun for 5 seconds.
3. Move solution selector control valve from "High Pressure" operations to "Low Pressure" operation.
4. Squeeze pressure washer gun trigger again to remove any residual pressure
5. Disconnect high pressure gun and hose from high pressure disconnect.
6. Open ball valve, located between the chemical pump and solution pump.
7. Operate under normal low-pressure instruction or follow normal shutdown procedures.

De-flooding Operations

De-flooding operations involve removal of water from carpet and flooring. This differs from normal cleaning operations in that no water or solution is required. An automatic waste pump-out is highly recommended for all de-flooding operations due to the large amount of water removal often required.

1. Move the solution temperature control lever from the "hot" position to the "warm" position.
2. Ensure that the solution pump switch is in the off position.
3. Operate with all side and rear cargo doors open.

Freezing Protection

CAUTION:

*If the unit is exposed to freezing weather the water in the unit may freeze, causing **SERIOUS DAMAGE** to the unit. To avoid this, the following is recommended during the cold weather season.*

When the unit is not in use, always park it in a heated building.

While in operation, avoid long shutdowns as the unit provides heat while running. Shut it down just prior to leaving for the next job.

If a heated building is not available, we recommend that you winterize the unit with anti-freeze. At present, it is only possible to winterize units, which do not have an auxiliary water tank. Units with auxiliary water tanks must be stored in a heated building when not in use.

ATTENTION:

*Si l'appareil est exposé au gel, l'eau dans l'appareil risque de geler, causant ainsi des **DOMMAGES MAJEURS** à l'appareil. Pour éviter une telle situation, il est recommandé de faire ce qui suit durant la saison froide.*

Lorsque l'appareil n'est pas utilisé, toujours l'entreposer dans un local chauffé.

Pendant l'utilisation, éviter les arrêts prolongés, car l'appareil fournit de la chaleur durant son fonctionnement. Mettre l'appareil hors tension juste avant de partir pour la tâche suivante.

Si aucun local chauffé n'est disponible, nous recommandons d'hivérifier l'appareil avec de l'antigel. À l'heure actuelle, il n'est possible d'hivérifier que les appareils qui ne comporte pas de réservoir d'eau auxiliaire. Les appareils avec des réservoirs d'eau auxiliaires doivent être entreposés dans un local chauffé lorsqu'ils ne sont pas utilisés.

Winterizing Your Unit

1. Shut off the water supply. Disconnect the water inlet hose from the front of your console.
2. Connect all solution pressure hoses and tools that may have water in them.
3. Start the unit and turn solution pump on. Open the tool valve until water pressure drops.
4. Turn solution pump off.
5. Fill the water box with approximately two gallons of 100% glycol base anti-freeze.
6. Turn the solution pump on.
7. Open the tool valve until anti-freeze begins to come out of the tool. Recover all anti-freeze that comes out of the tools into an approved container. We strongly recommend that you re-cycle and re-use the anti-freeze.

Repeat this procedure with all the remaining tools. After all tools and pressure hoses have been filled with anti-freeze, disconnect and store them.
8. Turn the solution pump switch OFF. Attach the winterizing loop hose with attachment (P/N 86260700) to the bottom solution outlet connection and the water inlet connection. Turn the solution pump switch ON.

Allow the unit to run for approximately 3 minutes with the winterizing loop hose attached.

9. Prime the chemical system with 50/50 anti-freeze/water mix. Insert the chemical inlet tube into the anti-freeze container. Turn the chemical valve to PRIME until anti-freeze is visible in flow meter.
10. Turn the chemical valve and Flow Setup Valve to the "CHEM" position. Make certain that the flow meter indicates flow and that all anti-freeze drains out of the chemical tube into an approved container. After 30 seconds, turn off both valves.

High Pressure (Optional)

Close ball valve between chemical pump and solution pump. Move pressure system valve to high-pressure position and key tool until antifreeze is visible. Recover all anti-freeze into an approved container. We strongly recommend that you recycle and re-use the anti-freeze.

After completing these procedures, shut the unit down. The unit is now winterized.

Removing Anti-freeze From The Unit

1. Connect the water inlet hose to the water inlet connection on the console. Turn the water supply on.
2. Start the unit and turn on solution pump.
3. Connect all solution hoses and any tools that require purging of anti-freeze to the solution outlet connection(s).
4. Open the tool valves and drain the anti-freeze into an approved container until the flow is clear and all anti-freeze is purged from the tools and hoses.

5. Submerge the chemical inlet tube in water. Turn the chemical valve to the PRIME position until clear water is observed in the Flow meter.
6. Turn the chemical valve to the Run position and turn Flow meter valve to vertical position. This will allow water to flow into the other side of the system.

High Pressure (Optional)

Close ball valve between chemical pump and solution pump. Move pressure system valve to high-pressure position. Open the tool valve and drain the antifreeze into an approved container until the flow is clear and all anti-freeze is purged from the tool and hose.

Once all of the anti-freeze is removed, the unit is ready to use.

Eventually, the anti-freeze in your storage container will become diluted with water. If the anti-freeze level drops below 50% of the total, dispose of it and start with fresh 100% anti-freeze.

WARNING:

When disposing of used anti-freeze, observe local laws and regulations. Do not drain onto the ground or into storm drainage systems.

AVERTISSEMENT:

Lors de l'élimination de l'antigel usé, respecter toutes les lois et tous les règlements locaux. Ne pas vider sur le sol ou dans des réseaux de collecte des eaux pluviales.

Service Schedule

Engine	Daily	Check engine oil level. *** Fill to proper level
Engine	Daily	Check coolant level in overflow bottle
Vacuum Pump	Daily	Spray water displacing lubricant in lubrication cup at front of console for 5 sec.
Solution Pump	Daily	Check oil level. ** Fill to proper level
Pre Filter and Filter In Waste Tank	Daily	Clean filter, inspect, replace if damaged
Vacuum Hoses	Daily	Wash out with clean water
Automatic Waste Pump	Daily	Inspect and remove any debris or sediment
Chemical Inlet Tube Strainer	Daily	Check strainer for blockage, remove any debris
Vacuum Pump	Weekly	Check oil level. Fill to proper level
Water Box Float Valve	Weekly	Check for proper seating and shut-off
Solution Pump Inlet Strainer	Weekly*	Check for debris and clean
Temperature Balance Orifice	Weekly	Remove, clean and check screen
Battery	Weekly*	Check for proper fluid level. Fill with distilled water only
Solution Outlet Screen	Bi-Weekly*	Inspect and remove any debris or blockage
High Pressure Hoses	100 hrs	Inspect for damage or impending damage
Pressure Regulators	50 hrs	Lubricate o-rings
Engine	100 hrs	Change engine oil and filter (regular oil)***
Engine	150 hrs	Change engine oil and filter (synthetic oil)***
Engine	100 hrs	Check fan belt tightness
Battery	100 hrs*	Clean battery terminals
Chemical Pump & Check Valves	1000 hrs	Replace diaphragm, plastic disc and check valves.
Float Valve Seal	200 hrs	Replace seal
All Belts	200 hrs	Inspect for damage - cracking and wear
Engine	200 hrs	Check radiator hoses and clamp tightness
Fuel Pump	200 hrs	Check hose connections and wire connections
Chemical Valves	200 hrs	Inspect and/or adjust packing nuts
Engine	250 hrs	Service air cleaner elements*

Service Schedule

Vacuum	50 hrs	Retighten belts
Vacuum	100 hrs	Check belt tension
Heat Exchanger Box	500 hrs	Inspect & clean door guides (as needed)
Solution Pump	500 hrs	Change oil**
Pulley Set Screws & Hub Cap Screws	500 hrs	Check for proper torque values. Re-torque, if required****
Drive Pulley	500 hrs	Inspect, clean and check for pulley groove wear****
Drive Pulley	500 hrs	Check pulley alignment****
Drive Belts	500 hrs	Replace
Drive Belts	500 hrs	Check belt tension****
PCV Valve/hoses	750 hrs	Inspect
Check Valve (Solution Outlet)	1000 hrs	Inspect, clean, and repair, if needed.
Vacuum Exhaust Heat Exchanger	1000 hrs	Inspect cores and remove debris.
Vacuum Pump	1500 hrs	Drain, flush, and replace oil *****
Fuel Filter	1500 hrs	Replace
Engine	2500 hrs	Replace spark plugs.
Engine	Yearly*	Replace air cleaner elements.
Waste Tank Filters/Strainers	Yearly	Check for damage and blockage. Replace if needed.
Engine	2 years	Flush radiator and change engine coolant.
Engine	2 years	Replace radiator hoses and hose clamps.
Engine	2 years	Replace timing belt. *****
Engine	5 years	Replace ignition wires.

* Or as often as required

** Change solution pump crankcase oil after the first 50 hours

***Change engine crankcase oil and filter after the first 25 hours

****Perform drive belt, pulley and hub maintenance after the first 25 hours of operation, and then again at 100 hours

*****If using AEON PD-XD synthetic lubricant, 1500 hours or every 2 years, whichever comes first.

***** Replace after 2 years or 2000 hours, whichever comes first.

Key Checkpoints

Note: Initiation of a planned preventative maintenance program will assure that your unit has optimum performance, a long operating life, and a minimal amount of "down" time.

Engine Coolant System (Radiator)

Your engine radiator coolant system is an important part of the power plant operation. In addition, the heat exchange system which is used to provide heat for cleaning operations is also highly dependent on the engine coolant system. Follow the recommended coolant system maintenance in the Maintenance Schedule in this manual and your ZPP416 engine owner's manual. Refer any additional questions to your dealer.

External Fuel Pump

The power plant for your unit receives fuel from the main fuel tank of your van/truck. An external fuel pump that provides this fuel is located on the underside of the van/truck. Loose fittings and hose connections will cause your unit to perform poorly. Follow the recommended fuel pump maintenance in the Maintenance Schedule in this manual. Refer any additional questions to your dealer.

Chemical Supply System

The chemical supply system pulls chemicals from your chemical bottle utilizing a pump that works off the water pump pulsing. Any clogged filters or loose connections will result in a chemical supply system malfunction or a malfunction at the cleaning tool. Maintenance of the solution outlet check valve and screen are vital to effective cleaning operation and minimal unit downtime. Additionally, the hoses related to supplying water and chemical to the outlet manifold are under high pressures and experience thermal expansion and contraction. Periodic inspections of these hoses for tears, cracks and failing connectors are necessary to avoid unwanted leaks. To keep your chemical system functioning properly, follow the chemical pump and solution outlet maintenance in the Maintenance Schedule in this manual. Refer any additional questions to your dealer.

Heat Exchanger System

The heat exchange system in your unit transfers energy between the heat of the engine exhaust and the blower discharge air, to the solution supply system. The heat transfer of this system is highly dependent on the surface area contact in the heat exchanger cores located in the heat exchanger box. This surface area amount is adversely minimized when the supplied water is not softened to recommended levels. Hard water will result in scaling on the inside walls of the heat exchanger tubes. It is recommended that you use a dealer-approved water softener to avoid premature heat exchanger core failure. Contact your local dealer for advice on the water hardness levels in your area.

Additionally, the heat exchanger tubes are very sensitive to freezing conditions. As the water freezes during cold conditions, it expands in the heat exchanger tubes and causes damage. Often the tubes are cracked and require replacement of the heat exchanger core. Refer to the Freeze Protection instructions section in this manual. Refer any additional questions to your dealer.

Vacuum Pump

The total function of the unit is based around the performance of the vacuum pump. Heat transfer used to raise the temperature of the solution is gained from the air drawn by the vacuum pump and solution is removed from the carpet with the vacuum suction of the vacuum pump. General maintenance actions for the vacuum pump as listed in this manual are vital to prolonged vacuum pump operations. Daily lubrication of the pump is required to avoid seizure of the system. Also, waste tank filters and pre-filter box strainers must be maintained to prevent unwanted debris from entering the vacuum pump.

Engine

WARNING:

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

AVERTISSEMENT:

NE PAS effectuer l'entretien de cet appareil pendant qu'il est en marche. Les pièces mécaniques à haute vitesse de même que les composants à haute température pourraient causer des blessures graves, des amputations ou la mort.

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

1. Check the engine oil level daily. Make certain that proper oil level is maintained. NEVER overfill.
2. Change the break-in oil and filter after the first 25 hours of operation. Thereafter, change oil and filter every 100 hours of operation (regular oil) or 150 hours of operation (synthetic oil). Use only approved ZPP416 filters.

Oil Recommendation. Use high-quality detergent oil of at least API (American Petroleum Institute) service class SH. The recommended SAE viscosity grades are 10W-40 or 15W-40 for regular oil. Recommended viscosity grades for synthetic oil are 10W-30, 10W-40, 15W-50 and 20W-50.

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

Engine oil capacity is approximately 3.5 quarts (3.3Liters) including filter.

3. Check the air cleaner element every 250 hours. Replace the element annually.
4. Check the coolant level in the radiator overflow container daily. If no coolant is seen, remove the cap and add coolant. Change the coolant with a 50/50 coolant to water ratio every 1000 hours or 2 years.
5. Replace the in-line fuel filter under the vehicle every 1500 hours.

NOTE: For additional engine service information, obtain a "ZPP416" service manual from any authorized Zenith Power Products Service Center. If service or repair is required, contact an authorized Zenith Power Products Service Center. You will need to provide the serial number of the engine.

Vacuum Pump

Refer to the Vacuum Pump Operation and Service Manual for specific instructions.

Lubrication We recommend that you use AEON PD-XD Synthetic Blower Lubricant in both ends of the vacuum pump for all operating temperatures. AEON PD-XD is formulated especially for positive displacement blower service to provide maximum blower protection at any temperature. One filling of AEON PD-XD will last several times longer than a premium mineral oil.

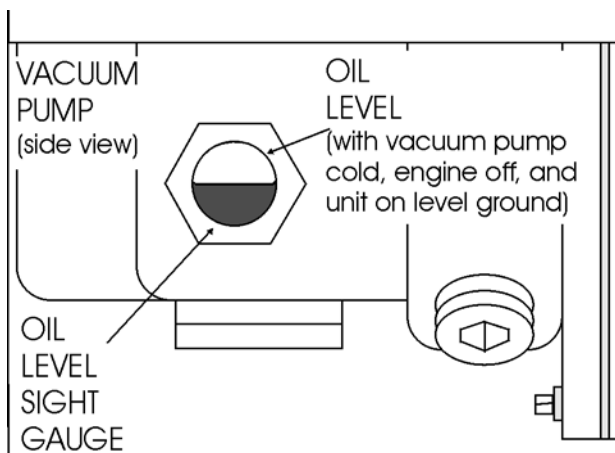
NOTE: AEON PD-XD is the oil that PROCHEM puts in the vacuum pump at the factory. Topping off or adding petroleum oil to synthetic oil is NOT recommended.

If not using AEON PD-XD synthetic blower lubricant, use oils with rust, oxidation inhibitors and anti-foam additives.

1. Check the oil level daily to assure the proper level. PROPER LEVEL cannot be overemphasized. Too little oil will ruin bearings and gears. Too much oil will cause overheating. Use the illustration as a guide when adding oil.

To prevent rust from building up inside the vacuum pump (if moisture exists) we have provided a lubrication cup on the front of the unit.

2. Run the unit at least 1 minute to remove any moisture from the vacuum pump.
3. Fill the lubrication cup with water displacing lubricant, for 5 seconds while the unit is running and the vacuum inlets are sealed. Do this at the end of each working day.



4. Drain, flush and replace oil every 1500 hours or yearly, whichever comes first. Change oil more frequently if inspection so indicates. With AEON PD-XD synthetic lubricant, perform the oil change maintenance every 4500 hours or every 2 years, whichever comes first.

Vacuum pump oil capacities are as follows:

Shaft end = 1.25 pints

Gear end = 2.0 pints

5. Vacuum pump lubrication is vital to performance of the pump. Failure to follow the maintenance schedule can lead to permanent damage to your blower.

Vacuum Inlet Filter (In Waste Tank)

1. The vacuum filter in the waste tank should be removed and cleaned daily. If this is done, the filter will last for a long period of time.

Vacuum Relief Valve

1. While the unit is running at full RPM, block the airflow at the vacuum inlet connection and read the vacuum gauge. If adjustment is required, shut the unit down and adjust the vacuum relief valve locking nut tension. Start your unit and repeat above procedure. Repeat this process until the relief valve opens at 13" Hg.

Vacuum Pump Drive Belts

To tighten the vacuum pump belts:

1. Loosen the four bolts that hold the adjusting plate to the frame and the 2 bolts at the back of the belt guard.
2. Turn the adjusting bolts until the proper belt tension is achieved (1/4" deflection in the center of the belt, halfway between the pulleys).
3. Retighten all bolts previously loosened.

NOTE: When adjusting belt tension, make certain that the engine shaft and vacuum pump shaft remain parallel, and the belt tension is equal on both belts.

4. Check belt alignment with straightedge.

! CAUTION:

Make certain that when you re-torque these screws, that you use a clockwise pattern and continue until proper torque is achieved.

! ATTENTION:

S'assurer, au moment de resserrer ces vis, d'utiliser un mouvement de rotation dans le sens des aiguilles d'une montre et de continuer jusqu'à ce que le couple souhaité soit atteint.

TORQUE VALUES		
COMPONENT	INCH/LBS	FOOT/LBS
Engine pulley	360	30
Vacuum pump hub	300	25

5. Check for pulley groove wear, clean belts and pulley grooves, check for worn belts, proper belt tension, and pulley alignment after the first 25 hours and then again at 100 hours.

Check for belt ride in the groove.

Solution Pump

Refer to the Solution Pump Operation and Service Manual for specific instructions.

1. Check the crankcase oil level daily to assure the proper level. Use the illustration as a guide when checking the oil level. If the level has dropped, check for the source of leakage and repair.
2. Remove yellow filler cap with attached dipstick. Oil level should be between marks on the dipstick or use the sight glass located on the non-shaft side of the pump.



3. Change the crankcase oil with GP Pump Crankcase Oil, after the first 50 hours of operation. Drain and refill the crankcase oil with General Pump Crankcase Oil every 500 hours thereafter.

Oil capacity is 40.6 ounces.

Solution Pump Drive Belt

To tighten the solution pump belt:

1. Loosen the bolts which hold the solution pump mount to base.
2. Adjust the position of the belt tension adjusting bolt until the proper belt tension is achieved. (1/2" deflection in the center of the belt, halfway between the pulleys).
3. While checking the alignment, tighten the bolts which hold the solution pump mount to base.

Solution Pump Clutch

⚠ CAUTION:

After removing or replacing solution pump clutch, make certain that set screws are tight.

⚠ ATTENTION:

Après avoir enlevé ou remplacé l'embrayage de la pompe à solution, s'assurer que les vis de calage sont bien serrées.

Float Valve (Water Box)

1. Check the float valve weekly for proper operation. If overfilling is a problem, check the plunger for a proper seal. Replace tip on plunger if needed.

NOTE: If the float ball has any water inside it must be replaced.

⚠ CAUTION:

When replacing float ball, **DO NOT** over-tighten, as the rod can puncture the ball. Make sure to tighten the nuts on the rod.

⚠ ATTENTION:

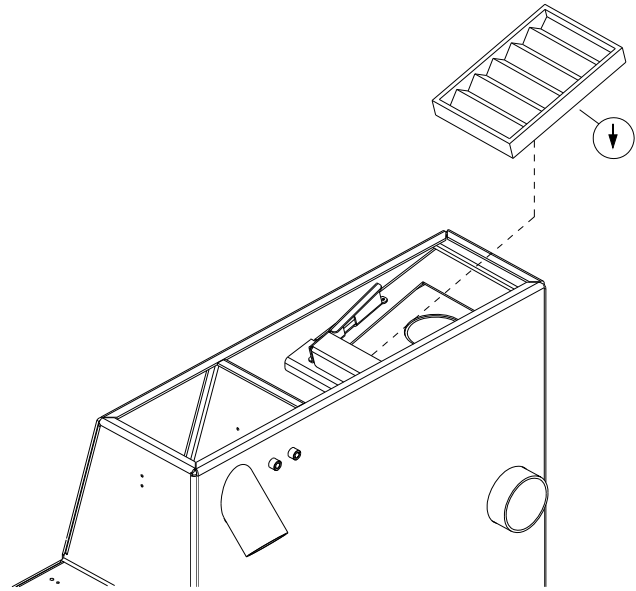
Au moment de remplacer le flotteur, **NE PAS** trop serrer, car la tige pourrait perforer le flotteur. S'assurer de serrer les écrous sur la tige.

2. Disassemble the valve and check the piston and seat for damage, replace if needed. See the "Illustrated Parts Listing" for a parts break-down.

Pre-filter Strainer

The strainer basket located inside the pre-filter box should be removed and cleaned whenever it is full of debris. This should be done at the end of each job.

To remove any water remaining in the pre-filter, run unit at medium or high speed for 10 seconds with strainer removed and box top open.



Waste Tank Vacuum Inlet Filter

The Vacuum Inlet Filter located inside the waste tank should be removed, cleaned and inspected at the beginning of each day. When replacing in tank ensure that flow indicating arrow is pointing down.

Solution Screen (Outlet)

Inspect the solution screen after the first week of running the unit by unscrewing the screen and remove any accumulated debris. Inspect the screen again at 2 and 4 weeks.

The solution screen should then be inspected every month. However, if the screen has a frequent build-up of debris it should be inspected and cleaned more often.

Temperature Balance Orifice

Weekly maintenance of the temperature balance orifice is required for proper machine operation.

1. Drain water box below half full.
2. Unscrew nozzle cap from the connector body.
3. Remove the adapter, orifice plate, and strainer.
4. Clean any debris from the strainer and orifice plate.
5. Reassemble as shown in Parts Section - Solution Outlet.

Check Valve (Outlet)

Inspect the check valve when rebuilding the chemical pump or as needed. Remove and disassemble the check valve. Check the Teflon seat for debris or abnormal wear. Clean or replace seat if needed.

NOTE: Improper seating of the check valve poppet, damaged spring, or o-rings will cause poor operation of the chemical system.

For the procedure, see the "General Service Adjustments" section in this manual for details.

Chemical Pump

Rebuild the chemical pump every 500 hours. This involves changing the diaphragm, plastic disk, and check valves.

For the procedure, see the "General Service Adjustments" section in this manual for details.

NOTE: Inspect chemical inlet tube strainer daily.

Pressure Regulator

Lubricate the o-rings every 100 hours. Use o-ring lubricant.

For the procedure, see the "General Service Adjustments" section in this manual for details.

Vacuum Hoses

To assure maximum hose life, we recommend that the hoses be washed out with clean water at the end of each working day.

High Pressure Solution Hoses

Inspect your high pressure solution hoses for wear after the first 100 hours of use. Inspect every 25 hours thereafter. If hoses show any signs of damage or impending rupture, replace the hose.

WARNING:

DO NOT attempt to repair high pressure hoses! Repairing high pressure hoses may result in severe burns and serious injury!

All high pressure solution hoses must be rated for 3000 PSI at 250°F. Thermoplastic hoses do not meet these specifications and should not be used. Severe burns and injury may result if the hoses do not meet these requirements. Pressure wash hoses must be rated at 4000 PSI.

AVERTISSEMENT:

NE PAS tenter de réparer les flexibles à solution à haute pression! Tenter de réparer des flexibles à solution à haute pression pourrait causer des brûlures et des blessures graves!

All high pressure solution hoses must be rated for 3000 PSI at 250°F. Thermoplastic hoses do not meet these specifications and should not be used. Severe burns and injury may result if the hoses do not meet these requirements. Pressure wash hoses must be rated at 4000 PSI.

Optional Waste Pump-Out

At the end of each work day, make certain that you remove any debris or sediment which may be inside the waste pump by pumping fresh water through the pump.

Engine Coolant Replacement

The coolant should be replaced every 2 years. This coolant is an integral part of the heating system and needs to be maintained as any other working part of the system. We recommend that this procedure be accomplished by the following steps.

Draining Coolant:

1. Add 5/16" hose onto the radiator drain petcock. Turn counter clockwise to open and drain coolant.

CAUTION:

Be sure that used coolant is collected in a proper container and disposed of in accordance with local laws.

ATTENTION:

S'assurer que le liquide de refroidissement utilisé est récupéré dans un contenant approprié et éliminé conformément aux lois locales.

2. After draining is complete, close the radiator petcock.

Replacing Coolant:

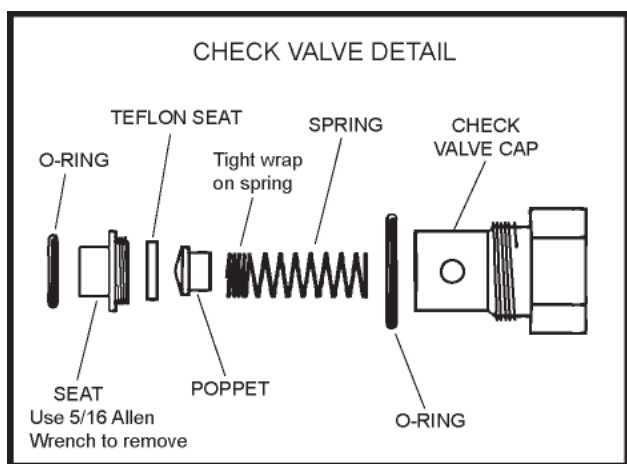
1. Fill radiator with 50/50 anti-freeze water mix.
2. Start unit and run on low speed.
3. As the unit warms up, maintain a full radiator with a 50/50 mix.
4. Open petcock slightly on helicoil to allow any trapped air to escape. When coolant runs out of helicoil, close petcock.
5. Top off radiator with 50/50 coolant mix.
6. Re-install radiator cap.
7. Shutdown unit.
8. Check radiator overflow bottle. Add coolant to proper "cold" level.

General Service Adjustments

Check Valve (Solution Outlet)

Inspect the check valve whenever doing service on the chemical pump or if flow problems occur in the chemical system:

1. Remove the check valve. Be sure the small o-ring for the seat comes out with the check valve.
2. Remove the seat, using a 5/16" Allen wrench.
3. Check the Teflon seat for debris or wear. Clean or replace Teflon seat if needed.
4. Clean the poppet and spring, inspect for wear or damage, and replace as needed.
5. Re-assemble the check valve. Start the seat by hand; tighten using a 5/16" Allen wrench. **DO NOT** over-tighten seat.



NOTE: Improper seating of the check valve poppet, damaged spring or o-rings will cause poor operation of the chemical system.

6. Lubricate the o-rings with o-ring lubricant and re-install.

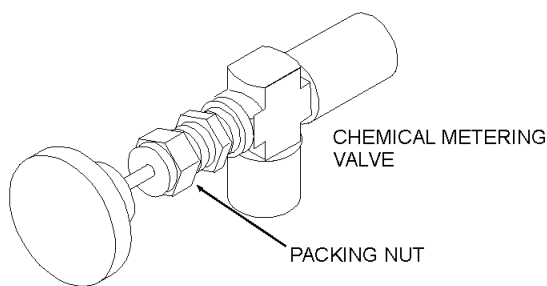
Chemical Pump

The only repairs that the chemical pump may require are the replacement of the diaphragm, plastic disk or check valves. To replace the diaphragm and plastic disk, disconnect hoses and unscrew the cover from the body. When replacing the diaphragm, lubricate the outer edges of the diaphragm with o-ring lubricant and reassemble. To replace the check valves, unscrew the check valve caps. Replace the check valves and reassemble, using new lubricated o-rings.

DO NOT attempt to re-use o-rings once the check valves have been removed. See the "Illustrated Parts Listing" for a parts breakdown on the chemical pump.

Packing Nut Adjustment For Chemical Valves

Examine the packing nut on all chemical valves for proper tension every 200 hours. When turning the knob, there should be a small amount of resistance. If not, slightly tighten the packing nut. DO NOT over-tighten. Keeping the valve packings properly adjusted will eliminate possible leakage from the valve stems and add to overall valve life.



Pressure Regulators

The pressure regulators serve to maintain water pressure at a preset point and to bypass water back to the water box.

Low Pressure Regulator

To adjust:

1. With your unit running, tool valve open and solution pump on, check the pressure gauge. We recommend setting the pressure regulator so that the pressure gauge reads 450 PSI with the tool valve closed.

When the tool valve is opened, there is an approximate drop of 100 PSI in pressure. If there is a pressure drop greater than 100 PSI, it may be necessary to lubricate the o-rings in the pressure regulator.

2. If the pressure regulator requires adjustment, turn the adjusting knob (while observing the pressure gauge on the control panel) until the desired pressure is obtained.

High Pressure Regulator (Optional)

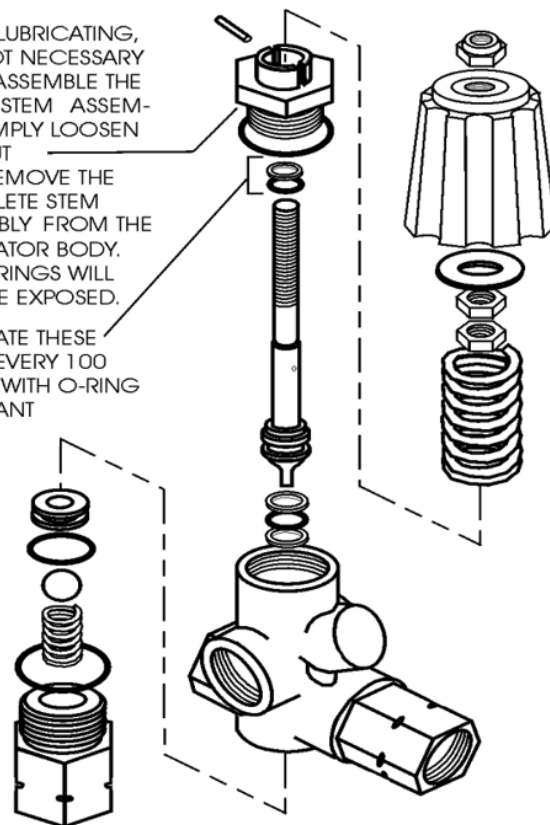
To adjust:

Set the high-pressure regulator to desired pressure, up to 3000 PSI. Adjust as necessary to meet your cleaning needs.

PRESSURE REGULATOR DETAIL

WHEN LUBRICATING, IT IS NOT NECESSARY TO DISASSEMBLE THE ENTIRE STEM ASSEMBLY. SIMPLY LOOSEN THIS NUT AND REMOVE THE COMPLETE STEM ASSEMBLY FROM THE REGULATOR BODY. THE O-RINGS WILL THEN BE EXPOSED.

LUBRICATE THESE RINGS EVERY 100 HOURS WITH O-RING LUBRICANT



Troubleshooting

Problem	Cause	Solution
<p>Loss of solution pump pressure.</p> <p>With the cleaning tool open, the solution pressure gauge reads below the normal operating pressure.</p>	Water supply is turned off or the float valve is stuck or improperly adjusted.	Turn the water supply on or up. Check for kinks in the water supply hose. Examine the float valve and adjust or replace.
	solution pump inlet supply line is plugged or drawing air.	Examine the water inlet strainer inside the water box. Remove accumulated debris and replace if required. Check for suction 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 2200 RPM. Idle engine speed is 900 RPM.
	Pressure regulator o-rings are dry.	Lubricate o-rings, using o-ring lubricant
	Pressure regulator has worn o-rings	Check o-rings. If necessary, replace.
	Pressure regulator is dirty, stuck open, or improperly adjusted.	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 seconds) at high speed.	Examine the check valves, plunger cups, and cylinder head on the solution pump. Repair, whenever required (refer to the solution pump service manual).
	Defective solution 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 solution pump
<p>Loss of solution volume at cleaning tool orifice.</p> <p>solution gauge reads normal.</p>	Plugged orifice and/or screen in the cleaning tool.	Unplug or replace orifice and/or screen
	Internal block between the pressure regulator manifold and the solution manifold, or the solution screen is clogged.	Inspect all lines, remove accumulated debris which is blocking proper 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-connect(s) on high pressure hose(s).
	Cleaning tool valve is malfunctioning.	Repair or replace valve.
	Hose inner lining is constricted.	Remove restriction or replace hose.

Troubleshooting

Problem	Cause	Solution
Loss of vacuum While cleaning, the vacuum is not up to specification. Engine RPM is normal.	Waste tank filter or pre-filter basket is plugged.	Clean or replace filter. Clean strainer basket.
	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(s) damaged, causing a suction leak.	Inspect hose(s), repair or replace.
	Pre-filter or Waste tank gaskets not sealing properly, not positioned properly.	Inspect the gaskets. Repair or replace as necessary. Re-position lid(s).
	Plugged vacuum hose or vacuum plumbing between pre-filter box and waste tank.	Unplug vacuum hose or inlet plumbing.
	Loose vacuum pump drive belts.	Tighten the drive belts
	Waste tank drain valve is damaged or left open, causing a vacuum leak.	Close drain valve, if open. Remove the drain valve and, after inspecting, replace the defective components.
	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 exchangers are plugged.	Remove and clean.
	Vacuum pump is worn out.	Replace the vacuum pump.
Loss of chemical With the cleaning tool valve open, no chemical	Chemical pump is improperly primed.	Refer to chemical pump priming instructions.
	The strainer at the inlet end of the chemical inlet tube is clogged.	Unclog the strainer. If damaged, replace.
	Suction leak in the inlet tube leading into the chemical pump.	Inspect inlet tube and flow meter for damage and replace, if required.
	Chemical pump check valve(s) is clogged or defective.	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 and plastic disk.
	Defective cylinder in the solution pump.	Measure the pump volume. If the pump volume is less than normal, refer to "Loss of Pump Volume" in the Troubleshooting section in this manual.
	HP model, chemical pump, ball valve is closed.	Open valve.
	Hose is kinked or damaged.	Inspect and/or replace hoses
Chemical flow meter indicates flow with the tool valve closed	External leak in chemical piping.	Tighten fittings. Re-apply thread sealant where required. If any fittings are damaged, replace.
	Outlet check valve is full of debris or damaged, not allowing it to close properly.	Close the chemical valve on the control 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 control panel. If the flow meter still indicates flow, replace the chemical pump diaphragm and plastic disk.
	Internal leak in chemical valve causing continual flow through prime tube returning to waste tank.	Tighten valve packing nut (see "General Service Adjustments" section in this manual). Replace valve, if necessary.
	Flow setup valve open.	Close valve.

Troubleshooting

Problem	Cause	Solution
Solution pump does not engage	Solution pump has not been activated	Turn solution pump switch to on.
	Solution pump circuit breaker has been tripped	Check the solution 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.
	Defective solution 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 solution pump belts.	Tighten or replace belts.
Engine will not start The engine does not turn over	Main circuit breaker on the control panel has been tripped.	After inspecting the unit to determine the cause of the tripped circuit breaker, press the reset button.
	Loose or corroded battery.	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 NO power going out, replace the switch.
	Defective starter motor.	Test the starter motor. If necessary replace.
	Vacuum pump seized.	Refer to Gardner Denver Service & Repair Manual, or dealer.
Starter turns over engine, but will not start	Waste tank is full.	Empty the waste tank.
	Defective fuel pump.	Replace the fuel pump.
	Out of fuel.	Add fuel.
	Engine is malfunctioning	Refer to ZZP416 Engine Operation and Maintenance Manual.
While doing normal cleaning, the engine stops running	Engine is out of fuel.	Add fuel to the fuel tank.
	Waste tank is full.	Empty waste tank.
	Main or engine circuit breaker on the control panel has been tripped.	After inspecting the unit to determine the cause of the tripped circuit breaker, press the reset button.
	Engine coolant temperature has exceeded 230°F, triggering the high temperature switch to shut the unit down.	Determine the cause of the overheating before restarting the unit. Refer to the ZZP416 Engine Operation and Maintenance Manual.
	Defective fuel pump.	Replace fuel pump.
	Defective float switch inside the waste tank.	Check switch for proper operation. Replace as necessary.
	Defective 230°F engine coolant high-temperature shutdown switch.	Test switch. If necessary, replace.
	Oil pressure switch on engine has shut down, due to insufficient oil pressure.	Refer to the ZZP416 Engine Operation and Maintenance Manual. DO NOT restart the engine until the cause is determined and corrected.
	No ignition in the engine or engine is malfunctioning.	Refer to the ZPP416 Engine Operation and Maintenance Manual.

Troubleshooting

Problem	Cause	Solution
Excessive heating	Flow restriction caused by hard water scaling.	Descale unit, repair or replace damaged plumbing components as necessary. Install water softener.
	Not enough water flow.	Check jet size of tool.
Heat exchanger leaks. <i>NOTE: The exhaust heat exchanger will produce water condensation discharge at times during normal operation. DO NOT confuse this with a leak.</i>	Engine/vacuum exhaust heat exchangers are damaged from frozen water.	Inspect heat exchangers for leaks. Visually inspect for damage. Pressure check after removing from the unit. (Maximum test pressure 1200 PSI).
Loss of temperature The heat output of the unit is LESS than normal.	Temperature relief valve on water box is stuck open.	Clean temperature relief valve and test. Replace, if necessary.
	Defective temperature gauge.	Test gauge and sensor. Replace failed component.
	Bypass orifice missing	Replace orifice
	Temperature control lever improperly set	Adjust lever
Automatic waste pump is malfunctioning or not operating normally <i>NOTE: When replacing the pump or float switch on internal (in tank) pumpout, use new electrical connectors and heat shrink. Inspect connection for watertight seal.</i>	Defective waste pump float switch.	Replace float switch.
	Broken diaphragm.	Replace diaphragm.
	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.
Engine remains in low idle, even when E-Idle™ Switch is off.	Loose/poor connection of red/white wire to 8 pin terminal block on PCB, E-Idle™.	Reconnect red/white wire per Wiring Diagram E-Idle™.
Machine idles down but will not return to normal speed.	Loose connections at 8 pin terminal block.	Reconnect any loose wires on terminal block.
	Loose connection of vacuum line	Reconnect vacuum hoses.
	Tear in vacuum hose.	Replace vacuum hose.
All wiring connections are done, vacuum line is connected and the E-Idle™ does not function.	Bad or faulty PCB.	Replace PCB.