

# OPERATION and MAINTENANCE MANUAL

**CW Series**  
**CPD Series**  
**CPS Series**  
**HD Series**  
**HE Series**  
**HN Series**  
**HP Series**  
**SS Series**  
**SC Series**  
**SCU Series**  
**SS Series**  
**HOT LINK Series**



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**HYDRO TEK**  
*CLEANING EQUIPMENT MFG.*

Certified to  
ISO 9001:2008



ETL Listed  
Certified to UL 1776  
Certified to  
CAN/CSA B140.11

**IMPORTANT: TO REDUCE RISK OR INJURY, READ OPERATING  
INSTRUCTIONS CAREFULLY BEFORE USING**

Cold Water



## POWER WASHERS

Hot Water  
Electric



Self-contained Skids



Natural Gas



## HOSE REELS

Trailers



## SURFACE CLEANERS

## WASTEWATER SOLUTIONS

Portable  
Recovery



Stationary Water Treatment



Mobile Recovery with Filtration



Phone  
Website

800.274.9376 or 1.909.799.9222  
[www.hydrotek.us](http://www.hydrotek.us)

Business Hours

Mon - Fri 7:30am - 4:00pm pacific

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**USE ONLY HYDRO TEK CERTIFIED ORIGINAL EQUIPMENT REPLACEMENT PARTS, FAILURE TO DO SO COULD LEAD TO WARRANTY EXCLUSION AND SEVERE BODILY INJURY**

**THANK YOU:** The employees and management of HYDRO TEK SYSTEMS, INC. thank you for selecting our products. The production and quality assurance team have taken the greatest care to ensure that your new pressure washer exceeds the standards set by you, the customer, by Hydro Tek engineering and ISO9001:2008 quality management standard, and by UL1776 safety certification.

**YOUR RESPONSIBILITY:** This operator's manual was compiled for your benefit. By studying and following the safety, installation, operation, maintenance, and troubleshooting information contained within, you can look forward to many years of trouble-free service from your equipment. Every person who will operate the equipment must read and follow the safety warning and operating instruction sections of this owner's manual prior to use. You are responsible for operating the product properly and safely. You are also responsible to follow the maintenance schedule on the back page of this manual to keep your warranty active.

**FREIGHT DAMAGE:** If delivered by a trucking company, please inspect for any concealed freight damage and note this on the paperwork from the trucking company before signing. Should you find damage has occurred during shipping, do not return the damaged merchandise to Hydro Tek, but file a claim immediately with the freight carrier involved.

**QUESTIONS:** Help us provide you with the fastest service. Please locate the enclosed warranty registration card and return it to Hydro Tek to register your machine.

If problems occur, contact the dealer you bought your machine from, a local authorized Hydro Tek service center, or call Hydro Tek at 1-(909) 799-9222 option 4 or ask for technical services.

**GETTING STARTED:** If your dealer has not prepared the machine for startup, you may need to connect the hose to the pressure outlet on the washer and connect the other end of the hose that swivels to the trigger gun inlet and tighten. Mobile Wash Skids are engine powered and shipped from the manufacturer with the fuel tanks empty and without the battery. Connect the battery cables (positive lead first) and follow the operation instructions for starting. High Pressure Steamers are electric powered and will require an appropriate electric outlet or disconnect box and an electric plug that is rated for your machine's voltage and amperage and matches to your electrical socket. Smaller machines are equipped with a ground fault interrupter on the electrical cord and you will need to press the reset button after it is plugged in. (See Operating Instruction section and enclosed page on Installation Guidelines).

**ONE YEAR PARTS & LABOR WARRANTY:** Hydro Tek Systems, Inc. (Hydro Tek) promises to repair Hydro Tek branded power washers if defective in materials or workmanship for one year from the date of original retail purchase including the cost of PARTS and LABOR, but you must pay transportation/shipping costs and travel time.

**LIFETIME PARTS/ONE YEAR LABOR WARRANTY:** The Spiralast™ heating coil on the Hydro Tek branded product line includes a lifetime parts warranty and a replacement coil will be provided as long as you own the machine.

**ONE YEAR PARTS WARRANTY:** Hydro Tek will provide replacement parts on accessories and on all other product brands including Hot2Go power washers, Hydro Vacuum, or Hot Link heaters. (Labor is not included)

#### **Items and Conditions Not Covered:**

1. Normal wear items such as discharge hose, guns, wands, spray arms, nozzles, quick couplers, o-rings, motor & generator brushes, filters, fuses, belts, & tires.
2. Cost of regular maintenance/adjustments, damage from lack of maintenance or correct operation
3. Damage due to freezing, abrasive fluids, chemical deterioration, scale build-up, or water ingress.
4. Damage from fluctuation in electrical or water supply.
5. Any product or part that has been altered, modified, over pressurized, misused, or has been in an accident.
6. Dealer installation or damage from improper installation of the machine or alteration by a dealer or promise of additional warranty from dealer. The manufacturer warranty is not transferable from the dealer to the retail purchaser on used or rented equipment.
7. Labor is not paid if the dealer that serviced your machine is not an authorized service center.
8. Labor is not paid on added accessories such as surface cleaners, hose reels, wastewater recovery, hot link water heaters, and filtration.

**WARRANTY PROVIDED BY OTHERS:** Gasoline and diesel engines and some electric motors are warranted by the manufacturer of the component and their warranty is provided through the manufacturer's service centers. Contact your authorized distributor for the closest repair center. Additional extended warranties from 3 to 5 years may be provided by engine or pump manufacturer.

**GENERAL CONDITIONS:** Hydro Tek's responsibility with respect to claims is limited to making the required repairs or replacements to the original retail user, and no claim of breach of warranty shall be cause for any cancellation or rescission of the contract of sale of any



Hydro Tek product. Hydro Tek reserves the right to change or improve the design of any of its products or illustrations without assuming any obligation to modify any product previously manufactured.

This supersedes any and all previous warranty statements for products purchased after April 2014. Hydro Tek is not liable for indirect, incidental or consequential damages including any cost of substitute equipment, loss of revenue, pecuniary expense or loss, or inability to use a Hydro Tek product. Hydro Tek disclaims all implied warranties, including those of merchantability and fitness for use for a particular purpose. Some states do not allow exclusions or limitations on how long an implied warranty lasts, so the above exclusions may not apply to you. It is the buyer's responsibility to ensure installation and use of Hydro Tek products conforms to local codes.

**INTERNATIONAL END USERS:** Warranty is furnished by authorized Hydro Tek dealers or distributors only; and the warranty may vary depending on the dealer or distributor and may be different from Hydro Tek's warranty; please consult distributor for details.

## HOW TO OBTAIN WARRANTY SERVICE:

1. List washer model#\_\_\_\_\_.  
List serial #\_\_\_\_\_ (on base plate of machine near the motor/engine).
2. Contact your local service dealer and return the Hydro Tek washer or part within the warranty period along with your sales receipt. To locate service, call customer service at Hydro Tek or go to: [www.hydrotek.us](http://www.hydrotek.us) and enter your zip code.
3. You also have the option to obtain a return goods authorization and ship the questionable part freight prepaid directly to the manufacturer. The part will be evaluated upon receipt. If found defective, Hydro Tek will repair or replace part under the conditions of warranty and return to you.
4. If the defective component is an engine or motor made by another manufacturer, we, or your authorized Hydro Tek dealer, can help you obtain warranty service through the specific manufacturer's local authorized service center.
5. If you are unable to resolve the warranty claim, write to Hydro Tek Systems, Inc. 2353 Almond Ave. Redlands, CA 92374 USA, Attn.: Technical Services. Please enclose a copy of the dated purchase receipt and explain the nature of the defect.

## ELECTRICAL PRECAUTIONS:

1. **Observe all State, Local, and National codes for the installation of your electrically powered washer.**

## WARNING

**THIS EQUIPMENT CAN BE HAZARDOUS TO THE OPERATORS SAFETY AND ONLY AUTHORIZED PERSONNEL WHO HAVE READ AND UNDERSTOOD THE OPERATION MANUAL SHOULD BE PERMITTED TO OPERATE THIS UNIT. NEVER ALLOW CHILDREN TO PLAY ON OR AROUND THIS EQUIPMENT.**

2. For a grounded product rated 250 volts, single phase, or less: This product is provided with a ground fault circuit interrupter built into the power cord plug. (8hp single phase excluded; order GFCI separately). If replacement of the plug or cord is needed, use only identical replacement parts.

### 3. GROUNDING INSTRUCTIONS:

Cord Connected, Grounded Products:

**This product must be grounded.** If it should malfunction, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. The product is equipped with a cord having an equipment-grounding conductor. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.

**DANGER** – *Improper connection of the equipment-grounding conductor can result in electrocution.* Check with a qualified electrician or service personnel if you are in doubt as to whether the outlet is properly grounded. Do not modify the plug provided with the product, do not cut off the ground pin – if it will not fit the outlet, have a proper outlet installed by a qualified electrician. Do not use any type of adaptor with this product.

4. To comply with the national electric code, this pressure washer should only be connected to a receptacle that is protected by a ground fault circuit interrupter (GFCI).

5. **EXTENSION CORDS:** Use of extension cords is not recommended.

6. **NEVER** operate an electrically powered washer after it has tripped a breaker or a ground fault device without having the reason for the trip determined by an authorized service engineer or competent electrician.

7. Use only in a dry area. Do not handle electrical cords and plugs when they are wet, when your hands are wet, or when standing in water. Do not spray high-pressure water on to the machine.

8. Disconnect power supply before making any repairs or adjustments.

9. Transformer on burner is 20,000 volts. Disconnect battery cable before servicing burner or engine on 12-volt systems.

## FIRE PRECAUTIONS:

1. **DO NOT** use improper fuels or solvents in this equipment, and only fill with the correct fluids when the unit is in an OFF condition, main power is disconnected, and engine and burner are cool.

2. If equipped with a diesel heated burner system, fill the diesel burner fuel tank with #2 diesel fuel, kerosene, or approved alternate fuel. NEVER use gasoline. Do not confuse gasoline and diesel fuel tanks.

3. NEVER operate this equipment in the presence of flammable vapors, dust, gases, or other potentially combustible materials.

4. AVOID contact with the exterior of the coil/heat exchanger assembly, mufflers, and exhaust port or stack to prevent burns.

5. DO NOT store fuel or other flammable materials near the burner or any other open flame.

6. Diesel fired or gasoline power units are designed for outdoor use and installation only.

7. HE Series (all electric) is designed for indoor use.

8. Natural Gas/propane heated units are for indoor use only. Venting is required. Outdoor use must be protected from wind intrusion.

9. Burner on/off switch must be placed in the OFF position when the pressure washer is not being used. Do not depend on engine run switch to turn the burner off – this may cause a safety hazard.

10. Warning: Burner (water heater) should start only when water is sprayed. Stop the system/engine immediately if burner continues to fire when trigger gun is off.

**Warning: FIRE OR EXPLOSION HAZARD CAN CAUSE PROPERTY DAMAGE, SEVERE INJURY OR DEATH.**

## VENTILATION PRECAUTIONS:

1. The HE Series (all electric) functions without the use of fuel and combustible materials utilizing electricity for heat generation. Ventilation is only needed for keeping the eliminating heating build around the machine

2. Use diesel heated and/or engine powered products only in well ventilated areas. Exhaust gases contain carbon monoxide, an odorless, deadly poison.

3. Observe all State, Local, and National codes providing for indoor use or installation of this unit.

4. Provide adequate ventilation to prevent excess carbon monoxide levels, engine overheating and inefficient burner combustion (min. 2' air space). Do not restrict normal engine airflow.

5. For engine driven units mounted in a van or box truck type vehicles, provide an external engine exhaust line that is larger in diameter than the factory exhaust pipe and vent the exhaust to the outside of the vehicle, but not below the vehicle's interior floor height. Also, insure adequate fresh air circulation within the van for engine cooling purposes to prevent heat build-up and for engine fresh air intake. Clearance of at least 12" is recommended on all sides of the unit. Provide a burner exhaust vent, at least 8"

diameter, to the outside through the van roof, or through the side panel that is at least 10" in diameter, and position this vent to avoid water, dirt and debris collection. No flammable liquids, aerosols, or flammable materials should be stored within 24" of the unit and should not be stored under the unit. During refueling, ALL ignition sources and switches should be OFF and there should be a person with the proper fire extinguisher and training within the vicinity of the unit in case of fire. Unit should not be left running unattended or out of sight.

## SPRAY INJECTION PRECAUTION:

1. Fluid from high-pressure spray or leaks can penetrate the skin and cause serious injury. If any fluid appears to penetrate the skin, get emergency medical help at once. DO NOT treat as a simple cut. Tell the physician exactly what fluid was injected. For treatment instructions, have the physician call your local poison center. Without proper treatment, complications can develop.

2. WARNING – Risk of injection or severe injury to persons – Keep clear of nozzle. DO NOT direct discharge stream at people. This machine is to be used by trained operators. Keep operating area clear of all people. Use only 48" long wands on machines producing over 3000 PSI. Also, only use straight wands or wands with a bend of 10° or less. CAUTION: Hot discharge fluid – DO NOT touch or direct discharge stream at people. Gun kicks back – Hold with both hands. Stay alert – Watch what you are doing.

3. Always wear protective eye goggles when operating the equipment. Additional protective items such as a rubber suit, gloves, and respirators are advisable, particularly when using cleaning detergents with a corrosive content.

4. Know the detergents you are using. Read and follow the directions on the detergent labels.

## PERSONAL HAZARD:

1. Shut unit off and disconnect power before removing belt guards or electrical covers.

2. Shut unit off before moving it.

3. NEVER lock the trigger on the gun valve in the 'on' position.

4. Do not exceed recommended operating pressure or temperature.

5. Observe all regulations when towing trailer-mounted units.

6. Keep hands clear of belts: Some units equipped with auto-on may start at any time when power is connected.

7. Do not operate the product when fatigued or under the influence of alcohol or drugs.

## BEFORE START UP: Read all instructions

1. CHECK PUMP OIL: Check pump oil by locating the oil view window. Depending on your pump model, fill to the red dot or to center of the site glass window.
2. CHECK FLUID LEVELS: Check engine oil and coolant levels if unit is so equipped. (See the maintenance schedule on back page).
3. CONNECT HOSE AND GUN ASSEMBLY.  
CONNECT THE WATER SUPPLY & TURN WATER ON: Maintain an adequate supply of water using a 5/8" to 3/4" I.D. hose (or 3/4" steel pipe for Natural Gas HN models) with a pressure between 25 and 60psi.
4. Burner power switches should be "off" before starting. If tank fed, be sure there is water in the tank and the valve is switched for supply tank feed. Do not run dry.
5. BATTERY INFORMATION (when equipped):  
Batteries are available through your dealer or local auto parts store. Depending on the type of battery you purchase, you may have to fill it with electrolyte.

## WEAR EYE PROTECTION!

We recommend deep cycle batteries for machines equipped with 12vdc powered burners. If the opening on your battery box measures 9"x6", select U1L/GTH 235 CCA. If the opening measures 8"x12", use group 24 battery. Always connect the positive battery cable before the negative and coat the battery terminals with corrosion inhibitor to prevent corrosion. Do not reverse polarity.

6. If wheel kit, accessories, or discharge hose are not installed, see your local dealer for instructions & installation.

7. NATURAL GAS / PROPANE GAS – Connect gas supply using appropriate shut off cock and recommended gas plumbing procedures; including the use of a soap or lead detections solution on all fittings. (Contact your gas supplier) **A debris drop pipe is required before the inlet of gas valve.** Note that a draft diverter is not included as a standard feature with the machine. *Draft diverters are required on HN models for better heating efficiency and improved pilot ignition when cycling gun.* Gas regulator, gas and water supply lines are not included with the machine.

**WARNING**  
BE SURE TRIGGER  
ON SPRAY GUN IS  
OFF AND CHEMICAL  
VALVE IS CLOSED

**WARNING**  
DO NOT  
OVERINFLATE TIRES  
INFLATE TO MFG.  
SPECIFICATIONS

**WARNING**  
DO NOT OPERATE  
MACHINE WITHOUT  
ADEQUATE WATER  
SUPPLY

## OPERATION:

### 1. STARTING:

Electric Powered Units: Connect power supply and ensure that all wiring connections and voltages are of sufficient rating to comply with equipment requirement. Turn pump power switch on. If unit is equipped with auto-start, keep all power switches off when left

unattended. (Unit will only turn on when trigger gun is pulled.) Press the reset button to start motor if equipped with a wash station remote.

Gasoline Engine Units: Turn engine power switch to the on position, choke if necessary and turn key to start position only until engine starts. On units with a recoil starter, pull cord rapidly, until the engine starts.

Diesel Engine Units: Turn power key switch to the left till the red glow plug indicator light goes off and then release (maximum 30 seconds). Turn the power switch to the (right) start position only until engine starts. (Do not use starter fluids.)

### 2. PURGE AIR FROM SYSTEM:

Squeeze the trigger on the spray gun until a constant stream of water comes out. (Purging works best with nozzle removed from wand and/or dual wand in the low-pressure mode.)

### 3. SELECT DESIRED NOZZLE

Connect nozzle securely to spray wand. If equipped, close pressure-adjusting knob on dual wand. Hold gun firmly, squeeze trigger for high-pressure spray. CAUTION – Gun kicks back – hold with both hands.

WARNING – risk of explosion – DO NOT spray flammable liquids.

### 4. START HEATER / BURNER:

- a. Diesel heated: To create hot water on high pressure washers equipped with heat exchangers, release the trigger on the gun then turn the burner to the "on" position.
- b. Natural gas/Propane heated: equipped with an automatic lighting pilot with a 90 second lockout. If burner does not light within 90 seconds, turn burner switch off, then on again to start ignition sequence over.
- c. All electric HE Series: equipped with an automatic staged heater start up. Engage "HEAT 1" and "HEAT 2" switches ON. Heat 1 will engage first after 2 seconds allowing the amp load on the pump motor to stabilize, then after 3 seconds Heat 2 will engage. This staged startup reduces the high amp load on the power supply. Full heat rise is normally accomplished within 1½ to 2 minutes.
- d. Turn the thermostat to the desired temperature. Squeeze the trigger on the spray gun and the burner/heater will begin heating the water. It will stop heating whenever the water spray is off or if the temperature setting is exceeded. Heat rise will vary depending on the inlet water temperature and environmental conditions.

5. STEAM: (If Equipped) Insert steam nozzle and turn thermostat to 250° steam setting. The steam nozzle is sized for approximately 25% less water volume than the hot water mode.

6. WASH STATION REMOTE (if equipped): Install station on the wall at a convenient wash site. Control



switched in the wash station remote will override and operate the pump, burner, and soap functions. Soap (chemical) valve at machine must be preset before soap switch at remote is activated. **WARNING:** Do not leave soap switch in the 'on' position when soap is depleted. Pressure drop will occur due to air intake and harm system components. Remote systems have an "auto-off" feature with an adjustable time that can be set to your preference or come equipped with a windup timer.

**7. BYPASS MODE:** (if equipped): System will go into bypass mode when machine is left running and trigger gun is closed. Bypass mode is when the inlet water coming into the pump re-circulates through the unloader across the pump head. If left in bypass too long – more than five minutes – friction created by the movement of the water will begin to heat the water at a rapid rate. If equipped with a THERMAL DUMP VALVE, water exceeding 145°F will cause the valve to open allowing the cool water in to the pump. The valve will reset itself when water temperature comes down to a safe level. If equipped with a bulk water tank, water can be bypassed back through the tank allowing for a larger volume of water to be re-circulated through the pump head thus reducing heat on the pump seals. If equipped with By-pass-cool system, a small portion of the bypass water is routed back through the float tank to keep the pump cool. **Warning: Do not leave in bypass for longer than five minutes to prevent pump from overheating. Shut off unit when not spraying water.**

**8. SET CHEMICAL INJECTION:** If unit is equipped with inlet chemical injection, place chemical pickup tube in pre-mixed chemical solution and open chemical valve for desired chemical concentration. Rinse and close valve after use, do not use harsh chemicals through the inlet injector system. Drawing air into the chemical tube by leaving the chemical valve open will cause the pump to lose pressure and may cause pump damage.

If unit is equipped with a downstream chemical injector, connect the chemical injection assembly into the high-pressure discharge hose quick connects. Place the chemical pickup into chemical solution and turn brass collar to adjust concentration. The chemical will inject only when you drop the outlet pressure by opening the valve on the dual wand or changing to a low-pressure nozzle. Soap the surface from the bottom up. Rinse and close chemical valve when not in use.

## MAINTAIN PH BETWEEN 5 & 9

9. If equipped with an AF2 (2) gun operation, select "50%" nozzle from panel and insert into coupler on spray gun for full pressure output when using two guns at the same time. Flow can be reduced by

selecting flow reduction nozzles only when one operator is using the machine. Maximum temperature is 200°F.

**NATURAL GAS / LP HEATED MODELS:** Heat rise will vary depending on inlet water temperature and environmental conditions. Natural gas burners are preset from the factory for an inlet water temperature of 60-70 degrees and approximately 4" of water column natural gas pressure on the outlet of the gas valve for a 140° heat rise. If the water inlet temperature is 20° colder than the factory setting, the heat rise will be approximately 6% less. Adjustments can be made to the gas valve outlet pressure by a qualified gas technician to increase the outlet gas pressure to a 5" water column with the use of a manometer to gain higher heat rise and compensate for colder water inlet conditions if they persist year round. Inlet gas pressure when measured while the burner is on with a manometer placed right before the gas valve, needs to be between 6-7" water column, natural gas pressure (7-11" LPG) and properly sized gas piping is required to achieve full factory rated heat rise. **(See INSTALLATION GUIDELINES included with manual)** Protect gas valve from dripping water.

## WASHING TECHNIQUES

When washing, always start from the bottom up, and do the final rinse from the top down. This will keep the water from streaking the surfaces that are being cleaned. When applying chemicals, it is also best to start from the bottom and work up.

In areas where there is no grease or oil present, and the dirt is loose, cold water may be sufficient. When it comes to grease, oil, and hard to clean dirt; hot water and/or chemicals can make the job easier, and speed up the cleaning process. For applications that require even more heat and where water use/runoff must be minimized, switch to the steam mode (if equipped) and adjust the thermostat for up to 250° steam.

For general washing use a broad pattern spray nozzle such as the 40-degree nozzle. Backing away from the surface and using the broad spray nozzle works best to perform rinsing and delicate surface washing. In areas where the cleaning is more difficult and in smaller areas such as cracks and holes, use the narrow spray nozzles, 15 degree.

Chemicals can be applied in a couple of different ways. One way is with a hand spray pump. The other is with the chemical system on the equipment; either downstream or high pressure depending on the system you have. When using the high-pressure chemical system, do not use any caustic chemical as this may cause damage to the pump. For very harsh chemicals, it is best to use a hand sprayer. First wet the surface and wash off heavy debris. Test the



# OPERATING INSTRUCTIONS – SYSTEM INFORMATION 7

surface to be sure the chemical won't harm it. Then apply the chemical and let it work in for couple of minutes before rinsing. Do not allow chemicals to dry on the surface.

When rising off the chemicals always start from the top down. When you are finished using the chemical, be sure to rinse out the chemical line and valve with fresh water to prevent clogging.

**Warning: Cool down burner before shutting off.**

## SHUT DOWN

1. Turn burner switch to the 'off' position.
2. Rinse & close chemical valve. Turn off chemical solenoid switch, if equipped.
3. Squeeze the trigger on the spray gun until the water becomes cool.
4. Turn motor/engine switch off with the appropriate controls. Turn off diesel engine units by pulling the throttle kill lever, if not equipped with key shut-off.
5. Turn off water supply.
6. Squeeze trigger to release any trapped pressure in discharge hose.
7. Turn the main power supply off when not in use for any extended amount of time.
8. Turn gas valve off when not in use for an extended period for natural gas/propane heated machines.
9. Disconnect & store hoses.
10. Antifreeze / Winterize equipment:

In the event that the equipment is not to be used for an extended period, store in heated space or antifreeze the unit. Run the machine until the float tank is near empty, fill with a 50% mix of water and antifreeze and run until antifreeze appears at the high-pressure outlet. If unit is equipped with a blowout valve, it may be blown out with compressed air in addition to using antifreeze solution.

On direct feed units (no float tank), use a 5' garden hose to draw the antifreeze mix from a bucket or blow out the unit with compressed air until only air and no water comes out of the discharge.

## APPEARANCE:

To maintain appearance of the pressure washer, use stainless steel cleaner on the stainless steel panels



## POWER SYSTEMS:

**ELECTRIC MOTORS:** All single phase electric motors contain a manual or automatic thermal overload, which will shut down the

motor if it overheats. If the overload or starter shuts down the motor, have an electrician or an authorized Hydro Tek distributor check for electrical problems. Voltage reading under load should be +/- 10% of name plate voltage on motor. Wait for motor to cool

before re-setting. Depressing the red overload button located on either the motor or the starter can reset the motor. Use thumb pressure – do not force. If equipped with an automatic thermal overload, it will reset itself after the motor has cooled.

Never spray water on the unit, or damage to the electric motor(s) may occur.

**Consult the manufacturer if running an electric machine from a generator. Three times total system wattage is required.**

HORSE POWER	115v 1ph	WIRE SIZE	208v 1ph	WIRE SIZE	208v 3ph	WIRE SIZE	230v 1ph	WIRE SIZE	230v 3ph	WIRE SIZE	460v 3ph	WIRE SIZE
1.5	15a	12/3	--	--	--	--	10a	14	--	--	--	--
2	20a	10/3	--	--	--	--	12a	14	--	--	--	--
5	--	--	26a	10/3	--	--	24a	10/3	--	--	--	--
6.5 / 6	--	--	--	--	--	--	27a	10/3	22a	12/4	13a	14/4
7.5	--	--	40a	8	24a	8	34a	8	24a	8	12a	14
8	--	--	36.5a	8	--	--	33.5	8	--	--	--	--
10	--	--	50a	8	32a	8	50a	6	30a	10	14a	12
10 (HE)	--	--	--	--	--	--	--	--	--	--	93a	--
15	--	--	--	--	40a	8	--	--	38a	8	17a	12

A fused disconnect switch of sufficient ampere rating should be installed by an electrician to provide power to the machine. Note: Some dual rated 208-230 VAC washers include a control circuit power selector switch, located on the back of the control box. Switch it to the appropriate position to match your source voltage. Switches are set by manufacturer to match recorded test sheet voltage. Refer to the chart above for electrical requirements. If your unit is equipped with a ground fault interrupter, it will have to be reset whenever it is plugged in, or if a ground fault interruption occurs. Test regularly for proper operation.

**GASOLINE ENGINE:** With proper care and maintenance, your gasoline engine will give years of trouble free service. Please follow the Service and Maintenance Guide and the enclosed engine sheet or



contact your local authorized engine dealer for maintenance and repairs.

Use clean, fresh, unleaded gasoline with an octane rating of 87 or higher in the engine fuel tank. Up to 15% MTBE (methyl tertiary butyl ether) or 10% ethanol is acceptable. Do not

use unapproved gasoline such as E15, E20 or E85 ethanol blends. Any failures from use of these fuels will not be warranted. Consult engine manual for proper oil type and capacity. The engine manufacturer recommends a break-in period at which time the engine oil and filter should be replaced. Thereafter, change oil and filter as required by engine manufacturer. Refer to engine manual for preventative maintenance schedules and procedures. Do not rely on the low oil shutdown (if equipped) as a reminder to add oil. The engine manufacturer will typically not warranty engine damage from lack of oil even if the low oil system failed.

On machines with a 115V generator or a 12V burner, the throttle is preset by manufacturer (See Generator section). Some engines include backfire prevention solenoids.

**DIESEL ENGINE:** The diesel engine, although it has a higher initial cost, can save money with lower fuel consumption and longer life. Use clean diesel fuel #2 and do not allow engine to run out of fuel. Refer to engine manual for preventative maintenance schedules and procedures.

**Not covered by engine warranty:** Damage caused by contaminated oil, incorrect oil change intervals/incorrect oil viscosity, bad fuel, use of any starting agents, the use of greater than 50/50% antifreeze/water or rust corrosion of the engine or fuel system. Any normal replacement and/or service of injectors, or injector tips, the checking and/or replacement of parts that fail due to impurities in the fuel, routine fuel system maintenance and fuel filters. Damage caused by water entering the engine due to any cause.

## POWER TRANSMISSION:

**WARNING:** Shut off power supply before servicing.

**BELT DRIVE:** Check belt condition, alignment and tension periodically. Replace belts when they show signs of wear or cracking. Tighten belts by loosening the mounting bolts on the pump and generator to permit them to slide. Turn the horizontal rail adjusting bolts to tighten belts until they deflect 1/4" to 1/2" with finger pressure.

**DIRECT DRIVE:** Pump is bolted directly to the motor/engine. If pump needs to be removed, do not force off by prying or damage may occur. When reassembling, coat the entire motor shaft with heavy grease or a generous amount of anti-seize. Use "thread locker" or "lock tight" on mounting bolts and tighten set screw on key shaft.

## GENERATOR:

Some self-contained hot water units (SC and SCU Series) are equipped with a 115v, generator to power the diesel burner. Allow engine to warm up and operate before engaging burner switch or any device plugged into auxiliary outlet. Disengage burner switch or shut off plugged in devices prior to turning off engine. The generator output voltage must be between 110 to 130 Volts, (or between 59 to 63 Hz.), when the unit is under full load. If the generator voltage falls out of this range, the RPM of the engine will need to be adjusted to proper speed. If the engine cannot maintain the proper RPM, do not use the burner or any power from the generator until the engine is repaired.



An AUXILIARY OUTLET is available on some SC or SCU Series machines for running wastewater recovery systems, lights, or other accessories off of the generator. A maximum of 1500 watts of 115v power is available when the burner is on or 2000 watts when it is off. A switch/circuit breaker located on the control panel will need to be reset if the circuit is overloaded. Auxiliary outlet is GFCI protected. If tripped, check item plugged in and reset. To extend generator life, keep the generator head clean and clear of water, dust, sand, dirt, and oil.

**Warning:** Make sure the burner and all auxiliary power is off when the engine is started or stopped. Keep generator dry at all times.

## PUMPING SYSTEM:



**PUMP:** The pump is a positive displacement, oil bath crankcase, and triplex plunger type. It contains 3 plungers, which move forward and backward in a cylinder to propel

water past 3 inlet valves and 3 discharge valves into a high-pressure manifold. The crank case oil window should be checked for oil level and clarity and the pump for oil or water leaks before each use. The sight window is located at the rear (opposite the head) of the pump and should be filled to the red dot with specified pump oil, available at your Hydro Tek dealer (refer to maintenance schedule on back page). If the oil becomes milky in color, moisture is entering the crankcase. Change the oil and contact your authorized Hydro Tek dealer if the problem persists. Keeping filters clean and checking for air in pump feed lines can prevent cavitation and increase pump life. Do not run pump in the bypass mode (pump running with the trigger gun off), for a period of more than 5 minutes or the pump will begin to overheat (maximum water temperature is 145°F). Do not run pump dry. Protect from freezing. Do not run a frozen pump until it is completely thawed.

**UNLOADER AND PRESSURE RELIEF VALVE:** The unloader valve is preset by manufacturer to govern the proper output pressure of your machine. It will release the pressure of the pump back into the inlet if the trigger on the spray gun is released. NEVER increase the set pressure on the unloader to exceed the specifications for your machine.



All hot water machines are equipped with a **SAFETY PRESSURE RELIEF VALVE.** In the unlikely event that your unloader fails, or if the burner overheats and builds excessive pressure, the pressure relief valve will vent the pressure into the atmosphere. If this occurs, turn off the machine and have it checked



by an authorized dealer. The pressure relief valve will automatically reset itself.

**BURST DISC TECHNOLOGY:** This additional safety feature functions to protect the coil & heating system from the spikes of high pressure. If this component ruptures, take the machine in to an authorized Hydro Tek dealer. Do not plug off and continue to run.

**CHEMICAL INJECTION SYSTEM:** With an inlet chemical injection system, the chemicals are introduced at the inlet of the pump and controlled with a chemical metering valve. The pump is fed by a float tank to create a low vacuum, not to exceed negative 3psi, which draws up the chemical into the inlet manifold of the pump, mixes it with water, and sprays it out of the nozzle under high pressure. Open the chemical valve only when the pickup tube is submersed in a solution or air will enter the pump causing the pump to lose pressure and run rough. Do not use highly corrosive detergents or acid type cleaners. Be sure to rinse and close the chemical valve after each use or the chemical line and check valve may become obstructed. Chemicals should be between 5-9 PH. Consult Hydro Tek for chemical compatibility. Chemical abuse is not covered under warranty.

An optional **DOWNSTREAM INJECTOR** is available if harsh chemicals need to be applied. The downstream injector will apply chemicals only at low pressure, by installing black soap nozzle or opening spray wand valve if equipped. If equipped standard with downstream injection, adjust concentration level by turning brass collar on the injector, or the knob on pump or control panel. Read and follow all safety instructions on the detergent label.



**WATER SUPPLY:** An adequate water supply to the pump must be maintained at all times. If the inlet flow is too low or if there is air in the water supply, the pump will run rough, pulsate and lose pressure. Maximum inlet water temperature is 145°F. Do not restrict inlet water supply. If the pump is run dry, it can quickly overheat. The water is filtered by a garden hose adapter screen. Clean and replace as required or install a large capacity strainer to insure a clean supply of water.

**Direct water feed:** Maintain an inlet water pressure between 25 PSI and 60 PSI using a 5/8" to 3/4" I.D. hose. Install a back flow preventer on your supply hose if State or Local ordinances require it. Install a water regulator if your water pressure exceeds 60 PSI.



**Float tank water feed:** A float tank, if equipped, is usually used to regulate the incoming water supply to the pump and introduce chemicals into the inlet of the pump. The float tank and filter (located inside the tank) should be flushed out if debris accumulates in the bottom. If the float tank overflows or runs out of water, adjust or replace the float valve inside the tank and check the inlet water feed pressure.

**Bulk tank water supply:** Large capacity water supply tanks can be used with most units if water is not readily available at the washing site. Belt driven, low speed pumps (less than 1750 RPM) can draw from a tank if you ensure that the vacuum does not exceed negative 3psi. An 80 mesh, 200 micron strainer and a 3/4" I.D. or larger suction hose must be used to maintain a clean and adequate water supply. Larger flow (8-10gpm) machines require 1" feed and filtration. Be sure that the water supply is free from air or damage to the pump may result. Periodically you should clean out the strainer and water supply tank to remove debris that may accumulate on the bottom. If a water supply tank and a float tank are both utilized, a special three way valve can be used to switch between tanks.

**USING DE-IONIZED OR SOFTENED WATER IN YOUR PRESSURE WASHER:** Do not use de-ionized water through the coil on a hot water machine or coil corrosion will result. Water softeners, however, will reduce coil scale deposits and should be installed if your water is especially hard.

## HEATING SYSTEM: HEAT EXCHANGER SYSTEM:

### Spiralast™ Coil

The heat exchanger on diesel heated units contains a continuous coil of pipe which forms a cold water jacket around the outside of the heating area and multiple spiral wound layers to efficiently transfer heat to the water inside the pipe. It is double wrapped with ceramic blanket insulation and a stainless steel cover.

The outside of these coils can become covered with soot if the burner is out of adjustment or if it is fired by diesel fuel. This can be cleaned by removing both end caps on the coil enclosure and brushing or spraying off debris, or by adding a soot removal agent (Part #CB200) to the diesel fuel. Both a diesel fuel pressure gauge and smoke test device is required for proper burner adjustment on diesel heated units, and must be performed by a qualified technician.

When the water is heated, scale (calcium) will begin to form on the inside of the coil pipe depending upon the hardness of the water in your area. To remove buildup in the coil, use a scale remover (Part #CB100) available at your authorized Hydro Tek dealer.





Perform this descaling service only when a noticeable pressure drop is detected across the coil. Follow directions to avoid damage. Wear safety glasses.

It is important to be sure you prevent your coil from freezing or blockage caused by scale buildup or ice as this is excluded from your warranty. Ice can exert extreme pressure from the inside of the coil pipe and cause it to split and frozen flow switches or pressure switches can malfunction which control the burner.

These pictures show different reasons for coil pipe failure:



Failed weld or failed material covered under warranty



Failed pipe seam covered under warranty



Blow out from pipe weakened by freezing



Pipe rupture due to freezing or obstruction

The HE Series (all electric) contains multiple heating elements to generate significant temperature rise in the heat exchange process. The heat exchanger contains a tubular pipe system that directs the water flow through the heating elements.

**TEMPERATURE SWITCH:** The burner is equipped with a high temperature limit switch, which will shut off the burner when the water temperature becomes too hot. Hot water machines are equipped with an adjustable thermostat so that the operator can control the outlet water temperature. The burner will automatically cycle on and off to maintain the desired temperature.

**STEAM INSTRUCTIONS:** If your unit is steam capable, install the green steam nozzle, turn thermostat to 250° F.

**PRESSURE/FLOW SWITCH:** The heater/burner is equipped with either a pressure switch or a flow switch. When the trigger on the spray gun is squeezed, water begins to move through the coil and is pressurized. The flow/pressure switch turns the heater/burner on and begins to heat the water. Whenever the water spray stops or if the water is shut off, the burner will shut off. **WARNING: Burner should fire only when the trigger is squeezed and spraying water, if it comes on at any other time, shut off machine and have it serviced.**

**DIAGNOSTIC LIGHT:** The burner diagnostic light on the rocker switch (if equipped) can help in determining problems with the burner. The red light indicates that power is going to the fuel solenoid valve. The burner should be firing and heating the water whenever the red light is on. When the trigger on the spray gun is released or if the temperature set point is exceeded, the red light will go off and the burner will stop firing.

**NATURAL GAS/PROPANE GAS BURNER:** The gas burner uses a vertical coil with a natural draft aspirating type burner. It has electronic ignition for an auto-lighting burner pilot with a 90 second lockout for safety. If the burner does not light within 90 seconds, turn the burner switch off and on again to start the ignition sequence over.

The vertical coil can be connected to an exhaust flue and must have a draft diverter mounted at a maximum 30 inches above the unit.

The exhaust flue must never run horizontal. Check your local code for exhaust flue size requirements.

Pipe chart: For 450,000btu	
Length	Pipe Size
0-50'	1¼"
51-150'	1½"
151-200'	2"

**Do not store any flammable material under or near burner area!**

**NATURAL GAS / PROPANE IGNITION SENSOR / ROD:** After extended ignition arcing, insulating deposits may form on the ignition rod reducing the arc intensity. Also, because of the high heat zone beneath the burner, premature failure of the rubber insulation covering on the ignition wire may cause arcing to a ground before reaching the pilot ignition rod.

**Warning! When performing any tests on ignition systems, do not touch the ignition rod. Ignition circuit generates over 10,000 volts, electrical shock can result!**



**DIESEL FIRED BURNER:** The diesel-fired burner is a forced draft pressure-atomizing burner. Diesel fuel is sprayed out of an atomizing nozzle, mixed with air, and ignited by a high voltage spark. The flame is directed towards the coils of pipe, which in turn, heats the water flowing through it. Use clean #2 DIESEL FUEL for the burner or substitute #1 diesel, light fuel oil, or Kerosene if diesel is not available.

AIR BAND adjustments may need to be made to compensate for higher elevations, or if more than a trace of smoke is observed in the burner exhaust. The ELECTRODES may need to be cleaned and adjusted periodically. These adjustments have to be made precisely and should be performed only by qualified personnel. Set between #1 & #2 on the smoke gauge.





The FUEL PUMP, on diesel heated units, is a self-priming, low volume pump which is propelled by the burner motor. The fuel pump pressure is typically set at 125psi but can be

turned as high as 160psi during the winter when the incoming water temperature is lower. Before adjusting the fuel pressure, connect a fuel pressure gauge and an outlet water temperature gauge, turn the pump and burner on, and turn the fuel pressure screw clockwise until the desired water temperature is obtained. Air band adjustment may be needed to maintain a clean burn. Be sure not to exceed the recommended specifications of the machine.

The FUEL FILTER will need to be replaced often if the diesel fuel quality is poor. A fuel filter with a water separator is recommended if the fuel quality is consistently poor.

The FUEL SOLENOID is an electric fuel valve that shuts off the fuel whenever the trigger on the spray gun is released or if the set temperature on the heat switch is exceeded.

**Warning! When performing any tests on ignition systems, do not touch the ignition rod. Ignition circuit generates over 10,000 volts, electrical shock can result!**

The IGNITION TRANSFORMER provides a high voltage spark that travels down the electrodes to ignite the diesel fuel. Disconnect all power before servicing. The 12V burner operates from the battery on the SS Series (and a limited number of SC Series). The engine has a 10 to 25 amp charging system that keeps the battery charged which runs the burner. The transformer stops when the trigger gun is released and is controlled through a high amperage contactor. To help keep the battery fully charged, and for safely cooling down the burner, turn off the burner during the last minute of rinsing. When leaving the machine unattended, shut off burner and engine switch. Replace 12 VDC battery regularly (2 year maximum interval) on 12V burner systems to help ensure consistent performance.

### **PRESSURE DELIVERY SYSTEM:**

DISCHARGE HOSE: Use only a wire braid hose rated for the output pressure and temperature of the machine. Additional hose lengths can be added with quick twist couplers with a minimal loss in pressure of about .5 PSI per foot. Inspect hoses for wear and replace if necessary. Avoid kinking or running over the hose to extend the hose life.

**WARNING: Hydro Tek hot water machines require a special 250° rated hose. If the hose is not replaced when worn it may burst and serious injury and burns could result.**

QUICK COUPLERS: The swivel connectors on the high-pressure hose and quick couplers on the spray nozzle make it easy to change nozzles or hoses. When connecting hoses or nozzles, be certain that the collar on the quick couplers snap into the locked position to prevent them from becoming loose. If the quick connect begins to leak, replace the O-ring (specify Viton or EDPM material) located in the female socket coupler. Grease the coupler periodically to make it work smoothly. Replace if it becomes worn. Twist couplers are also used on most wands so they can be interchanged.



TRIGGER GUNS: The trigger gun is merely a valve that turns water spray on and off. If it begins to leak or fails to shut off, replace or repair the valve assembly. Machines that spray steam only are equipped with an open gun that does not shut off the water spray.

**Never lock any gun in the on position for any reason. Never point spray at a person or any part of the body.**

SPRAY WAND: Spray wands are available in different lengths (2 to 6 foot) and with variable pressure adjustment for various cleaning applications. The dual wand has a low-pressure and high-pressure nozzle. When the dual wand is installed on the machine, the output pressure can be lowered simply by turning the valve on the dual wand to divert water into the low-pressure nozzle. This lowers the pressure (psi) but has little or no impact on the flow (gpm) or outlet water temperature on hot water machines.

The short wands are ideal for washing in confined areas such as a car lot. The longer wands help to clean areas that could not normally be reached.

**WARNING wands less than 48" long should not be used with machines producing over 3200psi.**



NOZZLES: The spray nozzle is a precisely machined orifice made of hardened stainless steel. The orifice size is matched to the output of your machine to attain the proper flow and pressure in which your machine was designed. The orifice, or hole, of the nozzle will enlarge with wear. For optimum performance, replace the spray nozzle to maintain the full output pressure of your machine. The nozzle installed on your machine from the manufacturer is designed to allow only about 90% of the water being pumped to discharge out of the nozzle. The remaining 10% is bypassed back into the inlet water supply by the unloader/regulator valve. If an incorrect nozzle size is used, the maximum flow and pressure of the machine cannot be achieved and

the unloader valve can wear prematurely. When replacing the nozzle, match to one size under the flow and pressure output of the pump.

The nozzle is usually connected to the wand with a quick coupler. Be sure the collar on the quick coupler snaps into the locked position, or the nozzle could be lost when the trigger on the spray gun is squeezed. Never connect the spray nozzle directly to the trigger gun without a wand or injury could result. Never place hands or fingers over the nozzle tip.

The nozzles generally come in four different spray angles: 0°, 15°, 25°, and 40°. The different spray angles of a given size of nozzle do not change the output pressure of the machine, just the impact force and surface coverage of the water spray.

The optional 0° nozzle sprays a straight stream which impacts the surface very hard but does not cover a very wide area. Use the 0° red nozzle with care because it can damage the surface you are spraying with its high impact and long reaching spray.

The 15° yellow nozzle sprays out a flat stream at a 15° pattern. It gives you less impact power than the above, but covers a wider area with one pass of the spray wand. As you back away, the spraying nozzle from the surface, the spray impact will decrease.

The 25° green nozzle is wider than the 15° and is most commonly referred to as the “steam nozzle”. The steam nozzles are sized to spray less water than the other high-pressure nozzles, so the water is discharged at a higher temperature. (Up to 250°F.)

The 40° nozzle spreads the water stream over a wide area to give you less impact for delicate surfaces.

**Never connect the spray nozzle directly to the trigger gun without a wand or injury could result. Never place hands or fingers over the nozzle tip.**

## OPTIONAL ACCESSORIES:

### HEATING COIL PROTECTION:

Protect your heating coil by removing debris or minerals from inlet water by adding a filter or anti-scale cartridge. The universal bracket and filter housing kit (p/n AF001) attaches to most 1” to 1½” tubing to fit most pressure washer frames, then choose the filter insert that will most benefit you.

- A 10-micron filter cartridge removes debris, ideal when using sandy, non-potable, or well water (p/n VFH11)
- The anti-scale cartridge removes minerals to prevent scale buildup (p/n VFD50)

WET SANDBLASTER: The wet sandblaster is a system that introduces sand (or other media such as baking soda) into the water stream for abrasive blasting. It is especially



effective for graffiti or paint removal. Performance of the unit is directly related to the output of your high-pressure washer. The sand is mixed with the water at the sand head in a tungsten carbide nozzle.

A vacuum is created in the sand nozzle, which draws a sand and air mixture up the sand hose. If the sand becomes wet or the sand nozzle becomes plugged, the vacuum will be lost and the sand will quit flowing. The sand probe can be poked directly into a bag or bucket of sand to draw it up the sand hose. Do not cover the air intake port on the top of the sand probe or the sand flow will be disrupted. Uncoil the sand hose completely before use to improve the sand flow and replace the sand hose when it becomes worn. The carbide sand-mixing nozzle can be unscrewed and replaced when worn.

Use bagged silica sand for best results through the sandblaster. Use 16 to 20 grit (course) sand for rust or concrete. Use 30 grit (fine) for fine metal surfaces or wood. Do not use wet sand or mix different grits of sand. A sand hopper is available for convenient sand storage. An air valve is available for adjusting feed rate on the hopper and should be fully open when using fine media such as baking soda. **Always use safety goggles and protective clothing when operating the wet sand-blaster.**



TURBO NOZZLE: (please note temperature limits) The turbo nozzle multiplies the power of your machine by rotating the spray jet and making the water impact a surface harder to give better cleaning results.

“Turbo Laser” type nozzles cannot be used with water over 190° or the life of the turbo nozzle will be greatly decreased and the warranty voided. The “Rotomax” type nozzle can be used up to 170°. Turn off burner or reduce temperature setting before using. Simply remove regular spray nozzle, replace with the turbo nozzle and squeeze the trigger on the spray gun. Do not point the turbo nozzle upward when starting.

EXTENSION HOSES: connecting additional hose lengths by means of twist couplers can extend the length of your high-pressure discharge hose. Hose extensions generally come in 50’ and 100’ lengths. Specify maximum pressure and temperature of your machine when ordering.

Low-pressure inlet garden hoses are available in 50’ and 100’ lengths. Premium quality, 200psi rated hoses are recommended. **WARNING! If your unit is equipped with 250°F steam option, only use minimum 250°F rated high-pressure hose.**



**HOSE REELS:** Hose reels are available for convenient and quick storage of both discharge and inlet hoses. Different hose reels options are available for trailer mounting, machine mounting, wall mounting, or as base mount options. To keep the hose from unreeling, lock the drum in place and secure the gun or the end of the hose or it may drag on the road. The low-pressure hose should be of sufficient quality that it will not flatten out when reeled up, or water supply to the machine will be cut off.

If the reel swivel begins to leak, replace or connect the hose directly to the machine until the leak is repaired. Hose reel swivels with lubrication are pre-lubricated by manufacturer. Additional lubrication intervals depend on application and frequency of use. However, a minimum for re-lubrication, with standard Moly Lith grease, at 40 hours is recommended. *Do not over grease.* Using a hand held grease gun, dispense one pump of grease into the grease fitting. Depress the ball bearing at the end of the grease fitting to allow the grease and air to escape.

## HYDRO TWISTER – Surface Cleaners:

The Hydro Twister® is a flat surface cleaner that connects to a pressure washer and uses a spray bar rotating at a high speed within 1" of the ground. It will clean concrete more consistently than an operator with a spray wand, with less fatigue, and 10-20 times faster. Simply



move the twister over the surface and watch a clean path appear behind the unit. The Hydro Twister can be used with hot water up to 250° on most models for extra stubborn grease or grime, eliminated the need for soap pretreatment in most applications. Rated to be used with a pressure washer up to 4000psi and up to 10gpm. See your dealer for proper nozzle size configurations to match your pressure washer.

Recovery surface cleaners are also available through the Hydro Vacuum® product line.

## HOT LINK™ HEAT EXCHANGERS:

The Hot Link™ attaches to your cold water pressure washer and converts it into a hot water pressure washer. The cold water pressure washer provides high-pressure water into the Hot Link™ which heats the water before delivering it through the spray gun and wand. The Hot Link™ is flow controlled so when the gun is pulled, the burner automatically starts and stops when the gun is released. Simply attach to the Hot Link™ with the jumper hose, provided, to almost any cold water pressure washer, and attach the pressure washers hose, gun, wand and nozzles to the outlet on the Hot Link™. The Hot Link™ system continuously heats at a 100°F temperature rise and pressure rating up to 4350psi. (Spray gun and hose must be rated for at least 200°F and pressure washer must not exceed 4350psi).

## HYDRO VACUUM® WASTEWATER RECOVERY

Hydro Tek manufactures Hydro Vacuum®, a product line of mobile wastewater recovery accessories. Starting with containment berms to divert wash water away from storm drains and toward a vacuum pickup device. The vacuum system can



be used to simply pickup and transfer the water to a bulk tank or choose a system to filter the water for washing reuse or sanitary sewer disposal.

Vacuum system choices are either fully portable (on wheels) or truck or trailer mount systems.

Dispose of collected wastewater properly: Permits can be obtained to dump wastewater into a sanitary sewer system if properly treated and tested. It is illegal to allow wash water to run into storm drains.





**TRAILERS:** Hydro Tek trailers are designed to match your Hydro Tek washer and increase productivity. Several trailer and tank skid configurations are available.



Every trailer comes with an electrical connection. Trailers with surge brakes or smaller trailers without brakes come with a 4 pole flat receptacle. Trailers with electric brakes include a 7-way electrical connection. Because of the vast array of different

connectors, you may need to have one installed by your dealer or purchase at a local auto parts store and install yourself. Electric brake trailers require an electric brake controller installed in the tow vehicle.



Be sure that the trailer you order conforms to your particular State Department of Transportation regulations, including but not limited to braking and lighting requirements. If water is being transported on the highway, trailer brakes are recommended. Adjust brake drums as required.

Before taking trailer on the road, be certain that the hitch on your tow vehicle is rated for the full trailer weight and of the proper height so that the trailer remains **level when hitched**, or wheel damage could result. Trailer tongue weight on the tow vehicle hitch should never be under 8% of the total trailer (loaded) weight. Insufficient tongue weight can result in “fishtailing” and loss of control of the trailer AND tow vehicle.

**BALANCING:** Keeping tires balanced will increase tire life and help trailer tow with more control.

TIRE PRESSURE			
T200	T300	T400	T500
14" tires	13" tires	14" tires	14" tires
50 psi	35 psi	50 psi	50 psi

**Before each use:** Check air pressure in tires. Check all bolts including the lug nuts for tightness and condition periodically. Double check safety chain and wire harness before departing. Check latch on coupler and adjust if required to fit your trailer ball properly. **Never tow without properly adjusted rear view mirrors, brake actuators, or lights.**

Grease wheel bearings as required.

TRAILER MAINTENANCE SCHEDULE				
ITEM	FUNCTION REQUIRED	3 MTH. OR 3000 MILES	6 MTH. OR 6,000 MILES	12 MTH. OR 12,000 MILES
Brakes	Test that they are operational	Before every use		
Brake Adjustment	Adjust to proper operating clearance	X		
Brake Magnets	Inspect for wear and current draw		X	
Brake Linings	Inspect for wear and contamination			X
Brake Controller	Check for correct amperage, modulation		X	
Brake Cylinders	Check for leaks / sticking			X
Brake lines	Inspect for cracks leaks or kinks			X
Trailer Brake Wiring	Inspect for bare spots, fray, etc.			X
Breakaway Systems	Check battery charge and switch operation	Before every use		
Hub/Drum	Check for abnormal wear or scoring			X
Wheel Bearings & Cups	Inspect for corrosion or wear: clean & repack			X
Seals	Inspect for leakage; replace if removed			X
Springs (if equipped)	Inspect for wear / loss or arch			X
Suspension Parts / Ball Hitch	Inspect for bending loose fasteners/ wear; Lubricate		X	
Hangers	Inspect welds			X
Wheel Nuts & Bolts	Tighten to specified Torque value (Lug = 70-90 ft. lbs.)		X	
Wheels	Inspect for cracks, dents or distortion	X		
Tire Inflation Pressure	Inflate to tire manufacturer's specs.	Before every use		
Tire Condition	Inspect for cuts, wear, bulging, etc.	X		
Tire Balancing	Inspect and balance tire and rim assembly			X



PROBLEM	PROBABLE CAUSE	REMEDY
	(The most recurring probable cause is listed first)	(Repairs should only be made by a qualified technician)
<b>Power System: Gasoline or Diesel Engine Powered</b>		
Engine will not start or crank over	Battery dead. Dirty battery connection. Battery cables disconnected. Engine, pump, or gearbox is seized. Key-switch, solenoid and starter on engine defective	Charge or replace battery, add electrolyte if battery is new. Clean connections / Carefully check polarity. Connect or replace damaged cables. Replace or repair seized part. Repair or replace.
Engine will not start but will crank over	Engine power switch is off or defective. Low oil shut down is activated. Low water switch engaged or defective (not on all models). Low on fuel. Fuel filter is clogged. Engine flooded or starved.	Check engine power switch. Add oil to engine, check more frequently. Add water to bulk tank feeding pressure washer. Fill with appropriate fuel, bleed injector pump on diesel engine. Replace or clean fuel filter Choke only as required.
Engine bogs down under load whenever spray gun is triggered	Engine needs to be repaired or replaced. Operating in high elevation. Carbon deposits on cylinder head	See engine manual or engine dealer. Lower the pressure on the unit and check for correct engine speed (RPM). Remove head and wire brush deposits.
Battery keeps losing voltage (For 12v systems)	Battery voltage low.  RPM too low. Engine charging system faulty. Electrodes misadjusted. Fuel pump pressure too high. Air band too far open.  Burner amp draw too high.	Have battery checked and load test, charge if low and replace if necessary. Allow water to cool 2 minutes before shutting off engine. Engine RPM should be 3600 RPM with no load. Check engine charging system – must have 10 to 25 amp output. Adjust electrodes to maximum 1/8" gap. Fuel pump pressure should be approximately 125 to 160 psi. Adjust for proper burn. Check amp draw of burner motor – should be 11 amp or less. Check amp draw of transformer – should be 4.8 or less.
<b>Power System: Electric Motor Powered</b>		
Electric motor does not start	No electric power. Thermal overload in the motor or starter has been tripped.  Power switch inoperative. Electric motor or wiring failure. No water to inlet.	Check cord, plug, socket, and breaker. Check voltage. Reset manual overload by depressing the thermal switch on the outside of the motor or starter after the motor has cooled. CAUTION! Automatic overload will restart the motor automatically when it has cooled. Check power switch. Replace or repair motor and/or wiring. Connect water supply.
Machine will not auto-start (if equipped with ETS or ITS)	Must have adequate water supply. Scale build-up in coil. Check filter screen & inlet pressure. Inlet flow switch defective / jammed with debris.	25 PSI minimum. De-scale coil for better water flow. Remove spray nozzle and pull trigger to check auto-start function. Check mechanical function & electrical signal to relay.

<b>Water Temperature</b>		
Discharge water temperature exceeds recommended operating temperature	Burner input too high for conditions. Water flow restricted.  High temperature limit switch faulty or set too high.	Decrease fuel pump pressure and/or fuel nozzle size. Clean or replace nozzle of proper size. De-scale coil and clear obstructions. Replace or reset temperature limit switch.
Discharge water temperature not reaching maximum operating temperature	Burner input too low for conditions.	Increase fuel pump pressure and/or fuel nozzle size.

PROBLEM	PROBABLE CAUSE (The most recurring probable cause is listed first)	REMEDY (Repairs should only be made by a qualified technician)
<b>Pumping System</b>		
Trigger gun leaks or will not shut off	Debris in gun valve assembly.	Clean valve assembly or replace gun.
Pump runs but has low spray pressure	Water turned off. Nozzle is not installed, is plugged, or sized incorrectly Inlet chemical injection valve is open without the end of the pickup tube inserted into detergent. Coil on hot water machines is obstructed. Priming of pump after run dry. Dual wand valve is open. Leaky discharge hose or quick coupler. Water sprays out around nozzle. Inlet strainer clogged. Belt slippage. Unloader valve worn or improperly adjusted. Air leak in inlet plumbing. EZ start valve is leaking.	Turn water on. Install nozzle, clean or replace with proper size Close soap valve or submerge detergent pickup tube into solution.  Clean obstruction or scale deposits from coil with coil cleaner. Crack open fitting on high-pressure outlet of pump. Close dual wand valve and install high-pressure nozzle. Replace hose, quick coupler, or o-ring in the quick coupler.  Clean and check more frequently. Tighten or replace with correct belt Install pressure gauge on pump head to adjust pressure. Check valve seat on unloader. Reseal fittings and inspect inlet hoses for air leaks.
Pump runs but there is erratic, fluctuating pressure	Inadequate incoming water supply. Stuck inlet or discharge valves. Restricted inlet or air entering the inlet plumbing on pump. Leaking High Pressure seals Leaking Low Pressure seals	Remove hose to check for internal leaks. Increase water supply flow. Clean out or replace worn valves. Check fittings and hose for airtight seal, clean inlet strainer screen. Replace seals. Pressure feed the pump & replace seals if water leaks from pump head.
Excessive crankshaft play or loud, knocking noise in pump	Broken or worn bearing or connecting rod in crankcase	Replace pump or bearing.
Oil leaking from pump	Loose drain plug or damaged seal	Locate point of oil leakage and replace damaged o-ring/seal.
Water is emitted from the chemical pickup tube	Check-valve malfunctioning.	Repair or replace check-valve.
Inlet injection will not siphon chemical	Check valve in strainer clogged. Chemical valve not open or clogged. Strainer not submerged in solution. Detergent hose cut or kinked.	Clean or replace valve. Rinse after each use. Open chemical valve or clean. Submerge strainer and replenish chemical. Inspect hose, replace as necessary.
Downstream injector will not siphon chemical	Brass knob on injector is closed. Unit not in low-pressure mode. Soap solution is too thick. Detergent hose cut or kinked. Strainer plugged or not submerged. Internal injector parts corroded or stuck. Outlet water temperature too high.	Open by turning counter clockwise. Open dual wand or install low-pressure tip. Dilute or use different solution. Inspect hose, replace as required. Check screen on strainer pickup tube. Disassemble, clean or replace. Use with cold water (150° Maximum)
Pressure relief relieving water	Un-loader failure/Coil overheating/Excessive pressure.	Turn machine off, wait a few minutes and restart. If problem continues, take in for repair.
Burst disc relieving water	Excessive over-pressurizing and system spikes.	Take in for system check.

## Heating / Heater System – Electric Heated (HE Series)

Heater will not engage.	Heater switch is not on. Trigger not pulled. Thermostat not turned up. Defective pressure switch. Defective transformer. Defective flow switch. Defective thermostat. Faulty rocker switch.	Turn switch on. Press the reset switch. Pull trigger. Heater should engage <u>only</u> when the trigger is pulled. Adjust thermostat up. Check for 24v output. If no voltage, replace. Replace Replace Replace Replace
Discharge water temperature too high.	Water restriction. Worn spray nozzle. Faulty thermostat or scale probe.	Clean or replace spray nozzle, de-scale coil, & remove obstructions. Replace spray nozzle with proper size. Clean thermostat probe or replace thermostat.
Discharge water temperature not reaching maximum operating temperature.	Inadequate power supply. Faulty heater element. Faulty heater control circuit.	Verify incoming power is not below required 440v when operating. Check each heater element. Check each control circuit to verify both heater banks are on.
Heater continues to engage even when water is not being sprayed.	Faulty heater control circuit.	Turn machine off immediately. Replace flow, pressure, or temperature switches.

PROBLEM	PROBABLE CAUSE (The most recurring probable cause is listed first)	REMEDY (Repairs should only be made by a qualified technician)
<b>Heating / Burner System – Natural Gas or Liquid Propane Fired</b>		
Pilot will not light. Burner will not fire.	Burner switch is not on. Trigger not pulled. Thermostat not turned up. Poor ground. Gas valve turned off. No voltage to valve.  Pilot orifice plugged. Defective ignition module.  Defective pressure switch. Defective transformer. Defective flow switch. Defective thermostat. Faulty rocker switch. Igniter not working.	Turn switch on. Press the reset switch. Pull trigger. Burner should fire <u>only</u> when the trigger is pulled. Adjust thermostat up. Check & clean ground connections. Turn gas valve on. Check for 24 VAC between pilot valve (PV) & PV/MV. Valve will operate between 20.5 & 28.5 VAC. Remove orifice & clean. Check for 24 VAC incoming @ 24v & 24v ground. (If you detect voltage to module, but not through module, replace). Check for 24v output. If no voltage, replace. Replace. Replace. Replace. Replace. Test for spark. Test for continuity between ignition wire & ground. <b>WARNING! High voltage igniter can cause electrical shock.</b>
Pilot lights, but burner will not fire.	Check for 24 VAC between main valve (MV) & PV/MV when trigger pulled & unit on. Failure to complete circuit to main valve.  Damaged or loose pilot assembly. Insufficient or excessive gas pressure. Check for continuity between ignition module ground & pilot assembly ground.	If no VAC at the valve, replace module. If you get voltage, replace valve.  Check for controls continuity to main valve (thermostat, pressure switch, flow switch). Check for loose ignition wires. Refer to installation guidelines. (Consult with a qualified gas technician) Assure good ground.
Burner fires, but goes out.	Faulty ignition module. Excess draft. Gas leak ahead of valve.	Replace module. Protect from windy conditions. Install draft diverter. Turn gas off. Call gas supplier.
NG or LP odor is present. <b>WARNING! Check all NG connections with soap solution before operation.</b>	Lockout not working Valve stuck. Faulty thermostat.	Replace module. Turn main gas valve off. Replace valve. Replace.
Discharge water temperature too high.	Water restriction. Incoming gas pressure too high. Worn spray nozzle.	Clean or replace spray nozzle, de-scale coil, & remove obstructions. Lower gas pressure. Replace spray nozzle with proper size.
Discharge water temperature not reaching max. operating temperature.	Gas pressure too low. Draft under burner manifold.	Increase gas pressure or install additional jets. Prevent down draft with installation of down draft diverter. Prevent side draft with nonflammable barrier.
Burner continues to fire even when water is not being sprayed.	Faulty burner control circuit.  Main gas valve is stuck open.	Turn machine off immediately. Replace flow, vacuum, pressure, or temperature switches. Turn gas off. Replace main gas valve.
Valve/ Ignition module has been subjected to moisture, had water sprayed on it, or has been submerged in water & does not work.	Flood or accidental spraying.	Replace valve / module: Do not attempt to repair or clean.

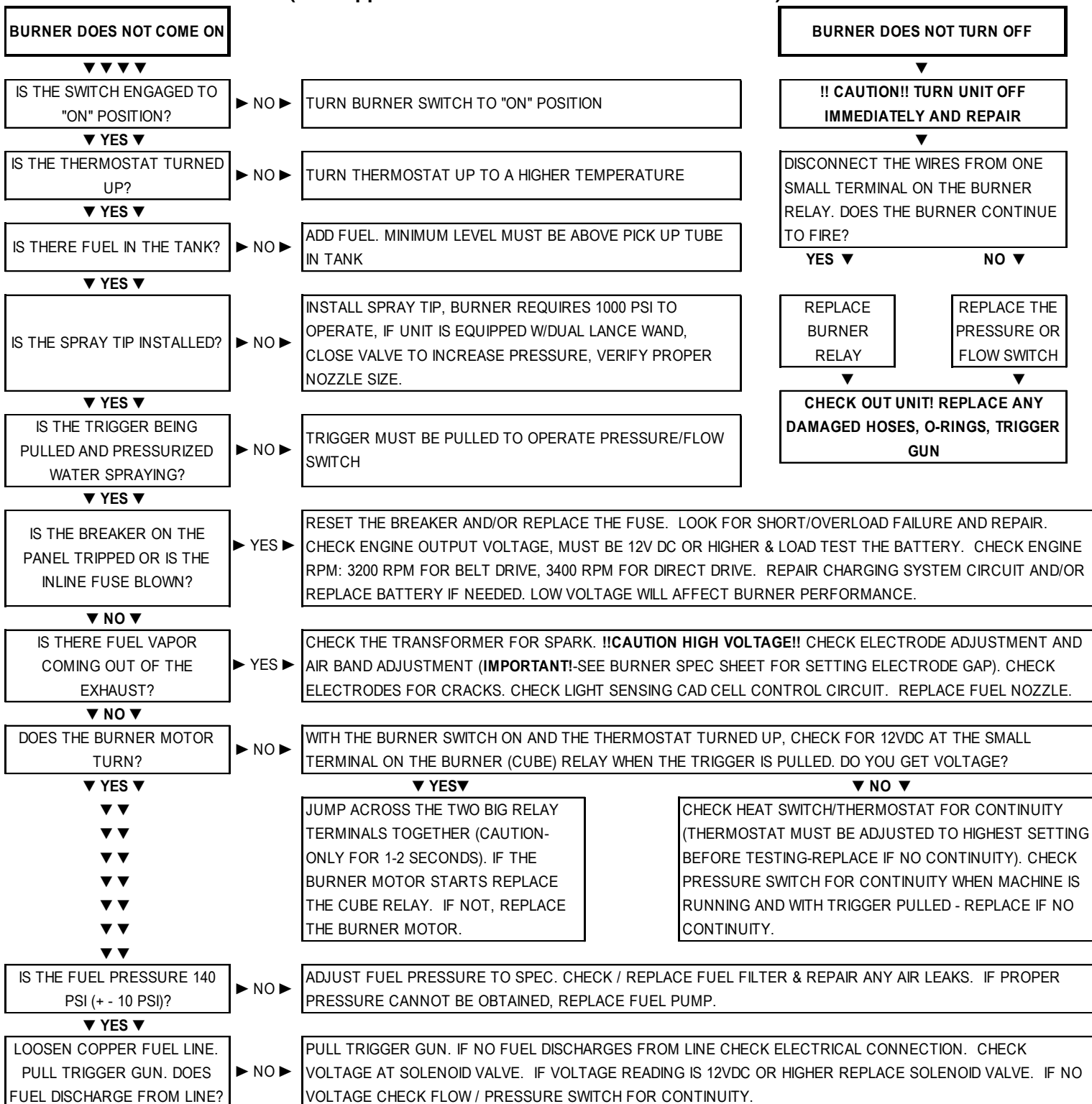
<b>Heating / Burner System – Diesel Fired</b> <b>(Additional Diesel Fired burner troubleshooting flow chart on next few pages)</b>		
Burner smokes	Elevation or altitude Soot on coil exterior Exhaust restricted Air intake restriction Improper voltage at burner motor	Adjust air band and fuel pressure to compensate Increase air or decrease fuel. Coil may need cleaning Remove restriction if obvious. Check for sooted coil Remove restriction if obvious. Adjust air bands. Check fan Check generator output if equipped. Check battery or charging system.
Excess carbon monoxide	Too much air Improper or restricted fuel nozzle Fuel gun assembly out of adjustment	Adjust air bands Replace fuel nozzle Adjust gun assembly location
Burner "Puffs" black smoke	Too much fuel pressure Not enough air flow	Adjust fuel pressure at fuel pump Adjust air bands

## BURNER TROUBLE SHOOTING SC/SCU Series - 120 VAC

BURNER DOES NOT COME ON			BURNER DOES NOT TURN OFF		
▼▼▼▼			▼		
IS THE SWITCH ENGAGED TO "ON" POSITION?	► NO ►	TURN BURNER SWITCH TO "ON" POSITION	!! CAUTION!! TURN UNIT OFF IMMEDIATELY AND REPAIR		
▼ YES ▼			▼		
IS THE THERMOSTAT TURNED UP?	► NO ►	TURN THERMOSTAT UP TO A HIGHER TEMPERATURE	DOES THE LIGHT ON BURNER SWITCH TURN OFF WHEN TRIGGER IS RELEASED ON SPRAY GUN?		
▼ YES ▼					
IS THERE FUEL IN THE TANK?	► NO ►	ADD FUEL. MINIMUM LEVEL MUST BE ABOVE PICK UP TUBE IN TANK.	YES ▼	NO ▼	
▼ YES ▼					
IS THE SPRAY TIP INSTALLED?	► NO ►	INSTALL SPRAY TIP, BURNER REQUIRES 1000 PSI TO OPERATE, IF UNIT IS EQUIPPED W/DUAL LANCE WAND, CLOSE VALVE TO INCREASE PRESSURE, VERIFY PROPER NOZZLE SIZE.	REPLACE BURNER RELAY	REPLACE THE PRESSURE OR FLOW SWITCH	
▼ YES ▼			▼	▼	
IS THE TRIGGER BEING PULLED AND PRESSURIZED WATER SPRAYING?	► NO ►	TRIGGER MUST BE PULLED TO OPERATE PRESSURE/FLOW SWITCH	THOROUGHLY CHECK OUT UNIT! REPLACE ANY DAMAGED O-RINGS, HOSES, TRIGGER GUN		
▼ YES ▼					
IS THE THERMAL O/L ON THE BURNER MOTOR OR BREAKER TRIPPED?	► YES ►	RESET THE BREAKER AND/OR REPLACE THE FUSE. LOOK FOR SHORT/OVERLOAD FAILURE AND REPAIR.			
▼ NO ▼					
DO YOU HAVE 110-120 VAC OUTPUT FROM THE GENERATOR?	► NO ►	CHECK BELT TENSION (ADJUST IF NEEDED). ADJUST ENGINE RPM TO RUN WITH IN SPEC, VOLTAGE OUTPUT CHANGES WITH GENERATOR SPEED. CHECK CAPACITOR FOR 16MFD (ARC TERMINALS WITH SCREW DRIVER BEFORE TESTING. IF ALL THESE TEST GOOD, REPLACE GENERATOR.			
▼ YES ▼					
DOES THE LIGHT ON THE BURNER SWITCH COME ON WHEN THE TRIGGER IS	► NO ►	CHECK HEAT SWITCH/THERMOSTAT FOR CONTINUITY (THERMOSTAT MUST BE ADJUSTED TO HIGHEST SETTING BEFORE TESTING-REPLACE IF NO CONTINUITY). CHECK PRESSURE SWITCH FOR CONTINUITY WHEN MACHINE IS RUNNING AND WITH TRIGGER PULLED-REPLACE IN NO CONTINUITY.			
▼ YES ▼					
IS THERE FUEL VAPOR COMING OUT OF THE BURNER EXHAUST?	► YES ►	UNPLUG THE FUEL SOLENOID AND CHECK THE TRANSFORMER FOR SPARK. <b>!!CAUTION HIGH VOLTAGE!!</b> CHECK ELECTRODE ADJUSTMENT AND AIR BAND ADJUSTMENT ( <b>IMPORTANT!</b> -SEE BURNER SPEC SHEET FOR SETTING ELECTRODE GAP). CHECK ELECTRODES FOR CRACKS. REPLACE FUEL NOZZLE. REPLACE INSULATION IF IT IS SATURATED WITH FUEL.			
▼ NO ▼					
IS THE FUEL PRESSURE 140 PSI (+ - 10 PSI)?	► NO ►	ADJUST FUEL PRESSURE TO SPEC. CHECK / REPLACE FUEL FILTER & REPAIR ANY AIR LEAKS. IF PROPER PRESSURE CANNOT BE OBTAINED, REPLACE FUEL PUMP.			
▼ YES ▼					
LOOSEN COPPER FUEL LINE. PULL TRIGGER GUN. DOES FUEL DISCHARGE FROM LINE?	► NO ►	PULL TRIGGER GUN. IF NO FUEL DISCHARGES FROM LINE CHECK ELECTRICAL CONNECTION. CHECK VOLTAGE AT SOLENOID VALVE. IF VOLTAGE READING IS 115VAC OR HIGHER REPLACE SOLENOID VALVE. IF NO VOLTAGE CHECK FLOW / PRESSURE SWITCH FOR CONTINUITY.			
TROUBLESHOOTING ENDS: REPEAT PROCEDURE UNTIL TROUBLE FREE OPERATION IS OBTAINED					



## BURNER TROUBLE SHOOTING SS SERIES 12V DC (Also applicable to SC Series with 12V DC burners)



TRUBLESHOOTING ENDS: REPEAT PROCEDURE UNTIL TROUBLE FREE OPERATION IS OBTAINED

# MAINTENANCE LOG

20

**MODEL#** \_\_\_\_\_

**SERIAL#** \_\_\_\_\_

[illegible]

While your pressure washer has been produced with quality materials and craftsmanship, you as the owner have certain responsibilities for the correct care of the equipment. Attention to regular preventative maintenance procedures will assist in preserving the performance of your equipment.

Contact your Hydro Tek dealer for maintenance. A small investment in preventative maintenance will add many hours to the life of your pressure washer. Perform maintenance more often under severe conditions. Do not spray high-pressure water onto the machine. **Not all maintenance items apply to all machines.**

## MAINTENANCE SCHEDULE\*\*

Engine Oil	Inspect	Daily
	Change	After first 5 hours then every 100 hours especially in high ambient temperatures
	Filter	Gas engine: every 100 hours / Diesel engine: refer to engine manual
Air Cleaner	Inspect	Every 50 hours
	Clean or Replace	Every 3 months
Diesel Engine Coolant		Check daily (maximum 50% antifreeze)
Battery Level		Check monthly 12V DC Burner Systems: Replace battery every 2 years
Engine Fuel Filter		500 hours or 6 months
Spark Plug Maintenance		500 hours or 6 months
Clean Fuel Tank(s)		Annually
Replace / Inspect Fuel Lines		Annually
Pump Oil	Inspect	Daily
	Change	After first 5 hours, then every 6 months or 500 hours
	Axial pumps come filled with synthetic oil, which does not require changing	
Clean/Replace Burner Filter		Monthly (More often if fuel quality is poor)
Remove Burner Soot		Annually
Burner Adjustment/Cleaning		Periodically (Check light sensing CAD cell control circuit and clean if needed) Annually (Burner adjustment must be set to #1 smoke setting)
De-scale Coil		Annually (More often if required)
Replace Spray Nozzle		Every 6 months, or earlier if needed
Replace Quick Connects		Annually
Clean Water Screen/Filter		Weekly (More often if required)
Clean Float/Supply Tank		Every 6 months
Replace HP Hose		Annually
Belts	Tighten	Every 6 months (more often if required)
	Inspect/Replace	Annually
Electric Motor	Clean Air Vent	Annually
Trailer Tires/Bearings		Monthly (Check tires for condition, tighten lug nuts, grease & check bearings)

## MAINTENANCE INFORMATION

DESCRIPTION	OIL TYPE	CAPACITY
Gas Engine	10w 30 motor oil **	.63 to 3 qt.
Diesel Engine	10w 30 API cc/cd	3.25 qt.
Pump, Cat	Cat Hydraulic, non-detergent 10w 40 ISO 68	11 – 42 oz.
Pump, AR	Hydraulic, non-detergent SAE 30w	10 – 41 oz.
Pump, General	General, non-detergent SAE 30w	11 – 42 oz.

\*\* Check the engine or motor manufacturer's service guide for additional maintenance items and specific high ambient temperature oil selection.

### California Prop 65 Warning

Detectable amounts of chemicals known to the State of California to cause cancer, birth defects or other reproductive harm may be found in pressure washing equipment and accessories. California Health and Safety Code 25249.5

Hydro Tek Nozzle Chart

Nozzle Size	Orifice Size	Hydro Jet Nozzle Chart																												Nozzle Size		
		PSI	40	75	100	350	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700		2800	2900
2	0.034	0.20	0.27	0.32	0.59	0.71	0.77	0.84	0.89	0.96	1.00	1.05	1.10	1.14	1.18	1.22	1.26	1.30	1.34	1.38	1.41	1.45	1.48	1.52	1.55	1.58	1.61	1.64	1.67	1.70	1.73	2
2.5	0.039	0.25	0.34	0.40	0.74	0.88	0.97	1.05	1.12	1.19	1.25	1.31	1.37	1.43	1.48	1.53	1.58	1.63	1.68	1.72	1.77	1.81	1.85	1.90	1.94	1.98	2.02	2.05	2.09	2.13	2.17	2.5
3	0.043	0.30	0.41	0.47	0.89	1.06	1.16	1.25	1.34	1.42	1.50	1.57	1.64	1.71	1.77	1.84	1.90	1.96	2.01	2.07	2.12	2.17	2.22	2.27	2.32	2.37	2.42	2.46	2.51	2.55	2.60	3
3.5	0.048	0.35	0.48	0.55	1.04	1.24	1.36	1.46	1.57	1.66	1.75	1.84	1.92	2.00	2.07	2.14	2.21	2.28	2.35	2.41	2.47	2.54	2.60	2.65	2.71	2.77	2.82	2.88	2.93	2.98	3.03	3.5
4	0.052	0.40	0.55	0.63	1.18	1.41	1.55	1.67	1.79	1.90	2.00	2.10	2.19	2.28	2.37	2.45	2.53	2.61	2.68	2.76	2.83	2.90	2.97	3.03	3.10	3.16	3.22	3.29	3.35	3.41	3.46	4
4.5	0.055	0.45	0.62	0.71	1.33	1.59	1.74	1.88	2.01	2.13	2.25	2.36	2.46	2.57	2.66	2.76	2.85	2.93	3.02	3.10	3.18	3.26	3.34	3.41	3.49	3.56	3.63	3.70	3.76	3.83	3.90	4.5
5	0.057	0.50	0.68	0.79	1.48	1.77	1.94	2.09	2.24	2.37	2.50	2.62	2.74	2.85	2.96	3.06	3.16	3.26	3.35	3.45	3.54	3.62	3.71	3.79	3.87	3.95	4.03	4.11	4.18	4.26	4.33	5
5.5	0.060	0.55	0.75	0.87	1.63	1.94	2.13	2.30	2.46	2.61	2.75	2.88	3.01	3.14	3.25	3.37	3.48	3.59	3.69	3.79	3.89	3.99	4.08	4.17	4.26	4.35	4.43	4.52	4.60	4.68	4.76	5.5
6	0.062	0.60	0.82	0.95	1.77	2.12	2.32	2.51	2.68	2.85	3.00	3.15	3.29	3.42	3.55	3.67	3.79	3.91	4.02	4.14	4.24	4.35	4.45	4.55	4.65	4.74	4.84	4.93	5.02	5.11	5.20	6
6.5	0.064	0.65	0.89	1.03	1.92	2.30	2.52	2.72	2.91	3.08	3.25	3.41	3.56	3.71	3.85	3.98	4.11	4.24	4.36	4.48	4.60	4.71	4.82	4.93	5.03	5.14	5.24	5.34	5.44	5.53	5.63	6.5
7	0.067	0.70	0.96	1.11	2.07	2.47	2.71	2.93	3.13	3.32	3.50	3.67	3.83	3.99	4.14	4.29	4.43	4.56	4.70	4.82	4.95	5.07	5.19	5.31	5.42	5.53	5.64	5.75	5.86	5.96	6.06	7
7.5	0.070	0.75	1.03	1.19	2.22	2.65	2.90	3.14	3.35	3.56	3.75	3.93	4.11	4.28	4.44	4.59	4.74	4.89	5.03	5.17	5.30	5.43	5.56	5.69	5.81	5.93	6.05	6.16	6.27	6.39	6.50	7.5
8	0.072	0.80	1.10	1.26	2.37	2.83	3.10	3.35	3.58	3.79	4.00	4.20	4.38	4.56	4.73	4.90	5.06	5.22	5.37	5.51	5.66	5.80	5.93	6.07	6.20	6.32	6.45	6.57	6.69	6.81	6.93	8
8.5	0.074	0.85	1.16	1.34	2.51	3.01	3.29	3.56	3.80	4.03	4.25	4.46	4.66	4.85	5.03	5.21	5.38	5.54	5.70	5.86	6.01	6.16	6.30	6.45	6.58	6.72	6.85	6.98	7.11	7.24	7.36	8.5
9	0.076	0.90	1.23	1.42	2.66	3.18	3.49	3.76	4.02	4.27	4.50	4.72	4.93	5.13	5.32	5.51	5.69	5.87	6.04	6.20	6.36	6.52	6.67	6.82	6.97	7.12	7.26	7.39	7.53	7.66	7.79	9
9.5	0.078	0.95	1.30	1.50	2.81	3.36	3.68	3.97	4.25	4.51	4.75	4.98	5.20	5.42	5.62	5.82	6.01	6.19	6.37	6.55	6.72	6.88	7.05	7.20	7.36	7.51	7.66	7.81	7.96	8.09	8.23	9.5
10	0.080	1.00	1.37	1.58	2.96	3.54	3.87	4.18	4.47	4.74	5.00	5.24	5.48	5.70	5.92	6.12	6.32	6.52	6.71	6.89	7.07	7.25	7.42	7.58	7.75	7.91	8.06	8.22	8.37	8.51	8.66	10
12	0.087	1.20	1.64	1.90	3.55	4.24	4.65	5.02	5.37	5.69	6.00	6.29	6.57	6.84	7.10	7.35	7.59	7.82	8.05	8.27	8.49	8.69	8.90	9.10	9.30	9.49	9.67	9.86	10.04	10.22	10.39	12
15	0.096	1.50	2.05	2.37	4.44	5.30	5.81	6.27	6.71	7.12	7.50	7.87	8.22	8.55	8.87	9.19	9.49	9.78	10.06	10.34	10.61	10.87	11.12	11.37	11.62	11.86	12.09	12.32	12.55	12.77	12.99	15
20	0.109	2.00	2.74	3.16	5.92	7.07	7.75	8.37	8.94	9.49	10.00	10.49	10.95	11.40	11.83	12.25	12.65	13.04	13.42	13.78	14.14	14.49	14.83	15.17	15.49	15.81	16.12	16.43	16.73	17.03	17.32	20
25	0.125	2.50	3.42	3.95	7.40	8.84	9.68	10.46	11.18	11.86	12.50	13.11	13.69	14.25	14.79	15.31	15.81	16.30	16.77	17.23	17.68	18.11	18.54	18.96	19.36	19.76	20.16	20.54	20.92	21.29	21.65	25
30	0.141	3.00	4.11	4.74	8.87	10.61	11.62	12.55	13.42	14.23	15.00	15.73	16.43	17.10	17.75	18.37	18.97	19.56	20.12	20.68	21.21	21.74	22.25	22.75	23.24	23.72	24.19	24.65	25.10	25.54	25.98	30
40	0.156	4.00	5.48	6.32	11.83	14.14	15.49	16.73	17.89	18.97	20.00	20.98	21.91	22.80	23.66	24.49	25.30	26.08	26.83	27.57	28.28	28.98	29.66	30.33	30.98	31.62	32.25	32.86	33.47	34.06	34.64	40

Nozzle Size	PSI	GPM																														Nozzle Size
		40	75	100	350	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000	
2	0.034	1.76	1.79	1.82	1.84	1.87	1.90	1.92	1.95	1.97	2.00	2.02	2.05	2.07	2.10	2.12	2.14	2.17	2.19	2.21	2.24	2.26	2.28	2.30	2.32	2.35	2.37	2.39	2.41	2.43	2.45	2
2.5	0.039	2.20	2.24	2.27	2.30	2.34	2.37	2.40	2.44	2.47	2.50	2.53	2.56	2.59	2.62	2.65	2.68	2.71	2.74	2.77	2.80	2.82	2.85	2.88	2.90	2.93	2.96	2.98	3.01	3.04	3.06	2.5
3	0.043	2.64	2.68	2.72	2.77	2.81	2.85	2.89	2.92	2.96	3.00	3.04	3.07	3.11	3.15	3.18	3.22	3.25	3.29	3.32	3.35	3.39	3.42	3.45	3.49	3.52	3.55	3.58	3.61	3.64	3.67	3
3.5	0.048	3.08	3.13	3.18	3.23	3.27	3.32	3.37	3.41	3.46	3.50	3.54	3.59	3.63	3.67	3.71	3.75	3.79	3.83	3.87	3.91	3.95	3.99	4.03	4.07	4.10	4.14	4.18	4.21	4.25	4.29	3.5
4	0.052	3.52	3.58	3.63	3.69	3.74	3.79	3.85	3.90	3.95	4.00	4.05	4.10	4.15	4.20	4.24	4.29	4.34	4.38	4.43	4.47	4.52	4.56	4.60	4.65	4.69	4.73	4.77	4.82	4.86	4.90	4
4.5	0.055	3.96	4.02	4.09	4.15	4.21	4.27	4.33	4.39	4.44	4.50	4.56	4.61	4.67	4.72	4.77	4.83	4.88	4.93	4.98	5.03	5.08	5.13	5.18	5.23	5.28	5.32	5.37	5.42	5.47	5.51	4.5
5	0.057	4.40	4.47	4.54	4.61	4.68	4.74	4.81	4.87	4.94	5.00	5.06	5.12	5.18	5.24	5.30	5.36	5.42	5.48	5.53	5.59	5.65	5.70	5.76	5.81	5.86	5.92	5.97	6.02	6.07	6.12	5
5.5	0.060	4.84	4.92	5.00	5.07	5.14	5.22	5.29	5.36	5.43	5.50	5.57	5.64	5.70	5.77	5.83	5.90	5.96	6.02	6.09	6.15	6.21	6.27	6.33	6.39	6.45	6.51	6.57	6.62	6.68	6.74	5.5
6	0.062	5.28	5.37	5.45	5.53	5.61	5.69	5.77	5.85	5.92	6.00	6.07	6.15	6.22	6.29	6.36	6.43	6.50	6.57	6.64	6.71	6.77	6.84	6.91	6.97	7.04	7.10	7.16	7.22	7.29	7.35	6
6.5	0.064	5.72	5.81	5.90	5.99	6.08	6.17	6.25	6.34	6.42	6.50	6.58	6.66	6.74	6.82	6.89	6.97	7.05	7.12	7.19	7.27	7.34	7.41	7.48	7.55	7.62	7.69	7.76	7.83	7.89	7.96	6.5
7	0.067	6.16	6.26	6.36	6.45	6.55	6.64	6.73	6.82	6.91	7.00	7.09	7.17	7.26	7.34	7.42	7.51	7.59	7.67	7.75	7.83	7.90	7.98	8.06	8.13	8.21	8.28	8.36	8.43	8.50	8.57	7
7.5	0.070	6.60	6.71	6.81	6.91	7.02	7.12	7.21	7.31	7.41	7.50	7.59	7.69	7.78	7.87	7.95	8.04	8.13	8.22	8.30	8.39	8.47	8.55	8.63	8.71	8.79	8.87	8.95	9.03	9.11	9.19	7.5
8	0.072	7.04	7.16	7.27	7.38	7.48	7.59	7.69	7.80	7.90	8.00	8.10	8.20	8.29	8.39	8.49	8.58	8.67	8.76	8.85	8.94	9.03	9.12	9.21	9.30	9.38	9.47	9.55	9.63	9.72	9.80	8
8.5	0.074	7.48	7.60	7.72	7.84	7.95	8.06	8.18	8.28	8.39	8.50	8.61	8.71	8.81	8.91	9.02	9.12	9.21	9.31	9.41	9.50	9.60	9.69	9.78	9.88	9.97	10.06	10.15	10.24	10.32	10.41	8.