

INSTALLATION & PREPARATION

QUICK-CONNECT NOZZLES:

Various nozzles may be quick-connected into the end of the dual lance to change the spray pattern. The detergent nozzle has been pre-installed at the factory. When using quick-connects (Q.C.), be certain the connection is securely locked as shown at right. If not, the high pressure water may shoot the nozzle from the lance, causing severe injury or serious damage. To determine spray fan, refer to the actual number stamped on the nozzle. The first two digits indicate the spray fan degree: 00=0°, 15=15°, 25=25°, 40=40°, 65=65°.

1. The 0° nozzle (RED):

This is a blasting nozzle. It delivers a very concentrated stream of water. Be cautious when using the straight narrow stream. It is not recommended for use on painted or wood surfaces or items attached with adhesive backing. Uses: Removing weeds from sidewalk cracks, stubborn stains from concrete, masonry, aluminum and steel, caked mud from equipment, and cleaning lawn mower undersides.

2. The 15° nozzle (YELLOW):

This is a chiseling nozzle. The spray should be directed at a 45° angle to the surface and used like a scraper to remove paint, grease and dirt. Uses: Surface preparation (removing mildew stains and paint chips).

3. The 40° nozzle (WHITE):

This is a wash nozzle. This wide spray pattern disperses the water pressure over a large area and is recommended for moderate washing. Uses: Washing aluminum siding, cleaning windows, washing vehicles, spraying sidewalks, driveways, and patios.

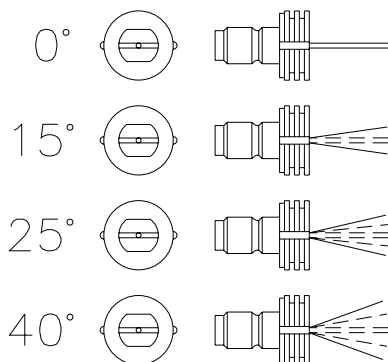
4. The 25° nozzle (GREEN):

This is a flushing nozzle. This pattern is best suited for flushing dirt, mud, and grime. Uses: Wet sweeping leaves from walks, curbs and driveways, cleaning stable floors, washing swimming pool bottoms, degreasing engines.

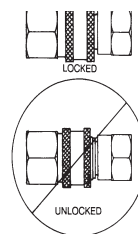
5. The 65° nozzle: (included in dual lance.)

This is a detergent nozzle. The broad spray pattern distributes solution over vast areas. Uses: Detergent application, misting or rinsing.

NOZZLES



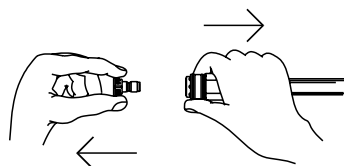
NOZZLE LOCK



NOZZLE CONNECTION:

1. Ensure the trigger gun is locked in the OFF position.
2. Quick-connect nozzles can be connected or disconnected from the dual lance assembly by retracting the locking ring on the quick-connect fitting. When connecting the desired nozzle, push the locking ring over the quick connect nozzle to secure connection.

NOZZLE CONNECTION



INSTALLATION & PREPARATION

WATER SUPPLY:

PRESSURIZED SUPPLY:

1. Select a water supply hose which is a quality grade of garden hose measuring at least ¾" ID and no longer than 50 feet.
2. Ensure the water strainer is clean and free of obstructions. If water flow becomes restricted to the pump, cavitation can occur which will cause premature failure of the pump packings.
3. Connect one end of the water supply hose to the swivel with filter inlet and connect the other end to the pressurized water supply.

NOTE: *If there is a high mineral content in your water, it is recommended that a water softener be used to prevent the possibility of excessive scale buildup inside the heat exchanger coil.*

4. Follow the incoming water requirements listed below:
 - a. Water pressure must be between a minimum of 40 PSI and a maximum of 65 PSI.
 - b. Incoming GPM must be approximately one gallon more per minute than the outgoing GPM stated on the machine nameplate. (You can check the GPM of your source by timing the filling of a 5 gallon container.)
 - c. Incoming water temperature must not exceed 125°F. Excessive pump damage may result if the water temperature exceeds this level.
5. Never allow the unit to operate without the incoming water line attached and the water supply completely turned on.

PRE-START INSPECTION PROCEDURES:

Before starting the unit, perform the following procedures:

1. Check the oil level in the pump.
2. Inspect the water inlet strainer. Clean or replace if necessary. See "Water Supply".
3. Check all hose connections to ensure they are securely tightened.
4. Inspect for system water leaks, oil leaks and fuel leaks. If a fuel leak is found, DO NOT START UNIT! See "Risk of Explosion or Fire" warnings. Be sure that all damaged parts are replaced and that the mechanical problems are corrected prior to operation of the unit. If you require service, contact Customer Service.
5. Inspect high pressure hoses for kinking, cuts and leaks. If a cut or leak is found, DO NOT USE HOSE! Replace hose before starting unit. See "Risk of Injection" warnings.
6. Be sure that all damaged parts are replaced and that the mechanical problems are corrected prior to operation of the unit. If you require service, contact Customer Service.

END OF PREPARATION INSTRUCTIONS



THE FOLLOWING PAGES CONTAIN OPERATING INSTRUCTIONS.

DO NOT ATTEMPT TO TOW YOUR HOT WATER TRAILER UNTIL YOU HAVE READ AND UNDERSTOOD ALL SAFETY PRECAUTIONS AND INSTRUCTIONS LISTED IN THIS MANUAL.

INCORRECT OPERATION CAN CAUSE SERIOUS INJURY!!

**DO NOT ALTER OR MODIFY THIS EQUIPMENT
IN ANY MANNER!**

OPERATING INSTRUCTIONS

WHILE TOWING TRAILER:



WARNING: NEVER ALLOW A PERSON TO RIDE IN OR ON A TRAILER THAT IS BEING TOWED. ALL STATES PROHIBIT PASSENGERS IN TOWED VEHICLES. A PERSON CAN FALL OFF AND BE STRUCK BY ANOTHER VEHICLE OR RUN OVER BY THE TOWED TRAILER. FAILURE TO OBSERVE THIS WARNING CAN RESULT IN DEATH.

SAFETY PRECAUTIONS DURING USE

Loading Trailer. The trailer should be loaded so that the downward tongue weight is approximately 10% of the gross trailer weight. Hitch only to the hitch points recommended by the tow vehicle manufacturer.

Following and stopping distance. The stopping distance increases when towing a trailer. A rule of thumb for the minimum distance that should be maintained between you and the preceding car on dry pavement is one car and trailer length (2 car lengths) for every 10 MPH you are traveling. The distance should be increased accordingly depending on road and weather conditions. Avoid sudden stops if possible. Operate tow vehicle smoothly - no jerky turns, starts or stops. When possible, avoid operating the tow vehicle near ditches, embankments and holes and reduce speed when crossing uneven or rough terrain.

Passing. Accelerating and passing should be done slowly to allow extra distance for passing. Signal well in advance when passing and returning to the proper lane. Allow for the extra length of the trailer before changing lanes. Never change lanes abruptly as this may cause the trailer to sway and push the tow vehicle into a "jack knife" condition.

Turning. Allow for the extra length of the trailer. Drive slightly beyond normal turning point to avoid running over curbs and soft shoulders. Turning radius increases when towing. Reduce speed when turning, crossing slopes and on rough, slick or muddy surfaces.

Uphill and Downhill Grades. Reduce speed and use a lower transmission gear for steep or long up or down hill grades. Maintain safe distance from other vehicles.

Parking. When tow vehicle is idle, engage brakes and park lock securely.

- Avoid parking on uphill or downhill grades.
- Place transmission in "PARK".
- Apply parking brake.
- Use wheel chucks.
- In parking lot, avoid parking close to other vehicles. Turning radius is greater and it may be impossible to get out of a parking space after a few other vehicles have parked around your vehicle.

ALWAYS TURN OFF TOW VEHICLE ENGINE BEFORE MAKING ADJUSTMENTS OR REPAIRS TO AN ATTACHED TRAILER.

AFTER USE:

1. Inspect trailer for wear or damage.
2. Ensure that all fasteners and fittings are tight.
3. Verify the stop, tail and turn signals are working properly.
4. Check wires for good connections and possible fraying or wearing of insulation.
5. Check and properly maintain the trailer, hitch, jack, ball and coupler.
6. Inspect hitch and ball for damage. Ball or hitch can be damaged in parking, hitting curbs, dragging when crossing ditches or railroad tracks.
7. Check and properly tighten all bolts on trailer, hitch, ball and coupler (including wheels).
8. Check safety chains for wear and do not allow them to drag on ground or roadway.
9. Check tow vehicle tires for wear and proper inflation (check vehicle's owner manual for proper level of inflation of tires for towing a trailer).
10. Check trailer tires for wear and proper inflation. Replace only with a tire of the same size and capacity ratings.
11. For proper tow vehicle maintenance while towing a trailer, check vehicle's owner manual and manufacturer's specifications.

FLUSHING THE SYSTEM:

This unit has a steel coil which, after sitting, will cause the water remaining in the coil from the previous usage to turn brown or black. This water must be flushed from the system before start-up. This procedure should be performed WITHOUT the high pressure hose, gun and lance assembly installed.

1. Turn on the water supply.
2. Start engine on unit. Low pressure water will begin flowing from the water outlet. This allows the unit to flush any particles from the system. The unit is flushed when the water is clear.
3. Once the system is flushed, turn off engine and connect the high pressure hose to the water outlet of the unit.
4. Connect the trigger gun and dual lance assembly to the high pressure hose.
5. Install desired nozzle into dual lance assembly.

⚠ WARNING: CAUTION RISK OF UNIT DAMAGE. BE CERTAIN THE HOSE, GUN AND NOZZLE ASSEMBLY ARE NOT CONNECTED TO THE UNIT WHILE FLUSHING THE SYSTEM. FLUSHING ALLOWS MINERAL DEPOSITS TO BE RELEASED FROM THE SYSTEM WHICH WOULD OBSTRUCT OR DAMAGE THE GUN AND NOZZLE ASSEMBLY RESULTING IN COSTLY REPAIRS.

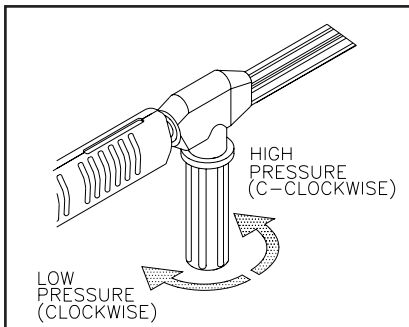
START-UP/COLD WATER OPERATION:

1. Refer to the Safety Warnings before starting the machine.
2. Locate the Safety Decals on your unit and heed their warnings.
3. Ensure the Burner Switch is in the OFF position.
4. Pointing the trigger gun in a safe direction, unlock the trigger gun and squeeze the trigger. Hold the trigger gun open while starting the engine according to the manufacturer's instructions in the engine manual accompanying the machine. Brace yourself for possible gun kickback when the engine starts.

⚠ WARNING: CAUTION RISK OF DAMAGE. DO NOT ALLOW SPRAY PATTERN TO REMAIN ON A FIXED AREA FOR AN EXTENDED PERIOD OF TIME. POSSIBLE DAMAGE MAY OCCUR TO THE AREA.

5. Once the engine has started, perform the following procedures with the gun open:
 - a. Inspect for system water leaks, oil leaks, and fuel leaks. If a fuel leak is found, TURN MACHINE OFF IMMEDIATELY! See "Risk of Explosion or Fire" warnings. Be sure that all damaged parts are replaced and that all mechanical problems have been corrected prior to operation of the unit. Contact Customer Service if necessary.
 - b. Inspect high pressure hoses for kinks, cuts, and leaks. If a cut or leak is found, TURN MACHINE OFF IMMEDIATELY! Replace hose before starting the machine. See "Risk of Injection" warnings. Be sure that all damaged parts are replaced and that all mechanical problems have been corrected prior to operation of the unit. Contact Customer Service if necessary.
6. The unit is now operating as a cold water pressure washer. Trigger the gun several times. Rotate adjustable grip on the dual lance for high and low pressure application. NEVER place hand or fingers in front of the nozzle or look directly into the nozzle!

ADJUSTABLE GRIP



⚠ DANGER RISK OF INJECTION CAUSING SEVERE INJURY! KEEP CLEAR OF NOZZLE! NEVER PLACE HAND OR FINGERS IN FRONT OF NOZZLE! DO NOT DIRECT DISCHARGE STREAM AT PEOPLE OR PETS!

7. Do not allow the machine to operate in the bypass mode (with the trigger gun closed) for more than three minutes without triggering the gun. Failure to follow this simple rule can cause premature failure of the pump packings.

HOT WATER OPERATION:

⚠ WARNING: RISK OF BURN! THE WATER TEMPERATURE COULD BECOME VERY HOT DURING HOT WATER OPERATION. BE CAUTIOUS WHEN ADJUSTING PRESSURE OR CONTROLLING THE TRIGGER GUN/LANCE ASSEMBLY.

1. Follow preceding steps 1-7 for "Start-up / Cold water operation".
2. Move the Burner switch to the **ON** position.
3. Recheck the system for fuel leaks. If a fuel leak is found, **TURN MACHINE OFF IMMEDIATELY!** See "Risk of Explosion or Fire" warnings. Be sure that all damaged parts are replaced and that all mechanical problems have been corrected prior to operation of the unit. Contact Customer Service if necessary.

Note: Upon initial start-up, water will begin turning hot in approximately 20 seconds and will reach maximum temperature within 2-1/2 minutes providing that the trigger gun remains open. The burner will not fire when the trigger is released.

SHUTDOWN:

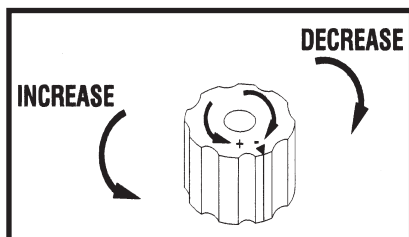
1. Move the Burner switch to the OFF position.
2. Squeeze the trigger and discharge the water for a period of three minutes to cool the heat exchanger and high pressure hose. Insufficient cool-down periods for the high pressure hose will cause excessive wear and eventual rupture of the hose.
3. Do not close the choke to stop the engine. Backfire or engine damage may occur.
4. Move the engine key switch to the OFF position.
5. Turn off the water supply and trigger the gun momentarily to relieve trapped pressure.

Disconnect and drain the high pressure hose, gun, and lance. Wipe the unit clean. Store in a non-freezing environment.

HIGH PRESSURE DETERGENT: (CLEANING WITH DETERGENTS)

NOTE: This feature is designed for use with mild detergents only. Since the cleaning solution travels through various parts of the pressure washer, do not use corrosives as they will cause extensive damage as well as pose a considerable safety hazard.

1. Refer to "Risk of Bodily Injury / Detergents". Be certain to wear protective safety attire as stated.
2. Prepare detergent solution according to label directions. (Never pump acids, alkalines, abrasive fluids or solvents through the unit. Due to the unknown and often corrosive characteristics of many detergents commonly used in the pressure washer cleaning industry, it is recommended to use only mild detergents with this unit.)



DETERGENT METERING VALVE

3. With the trigger gun locked in the "OFF" position, securely quick-connect the detergent spray nozzle (#6540° BLACK) into the end of the wand.

NOTE: This injection system is designed to apply detergents under low pressure only. It will not allow detergent solutions to be introduced into the system unless the nozzle assembly is in the low pressure detergent mode.

4. Fully immerse the strainer end of the clear vinyl detergent hose into the detergent solution.
5. To apply solution; unlock the trigger gun and squeeze the trigger. In a few moments a detergent/water mixture will exit the nozzle. Start spraying the lower portion of the surface being cleaned and move up, using long overlapping strokes. Applying from the bottom up helps avoid streaking. Allow to soak briefly. Avoid working on hot surfaces or in direct sunlight to minimize the chances of the detergent drying, which may result in damaging surfaces. Be certain to apply cleaning solution to a small section at a time.
6. To rinse; lock the trigger gun in the "OFF" position. Turn the detergent metering valve to the "OFF" position. Unlock the trigger gun and spray. It will take about 30 seconds to purge all detergent from the line. For best rinsing results, start at the top and work down.
7. Siphon a gallon of water through the detergent injection system after each use. This prevents the possibility of corrosion or detergent residue causing mechanical problems during the next use.

TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	REMEDY
Engine will not start.	Engine problems.	Refer to the Engine Manual accompanying your unit.
	Unit components are frozen.	Allow to thaw. If any part of the unit becomes frozen, excessive pressure may build up in the unit which could cause the unit to burst resulting in possible serious injury to the operator or bystanders.
No discharge at nozzle when trigger mechanism is squeezed.	Inadequate water supply.	Ensure hose is 3/4" diameter and incoming water supply is turned on.
Low or fluctuating pressure.	Kink in water inlet hose.	Remove kink.
	Water inlet screen obstructed.	Remove screen, clean or replace.
	Pump sucking air. (Prime eliminated)	Tighten all water intake connections. Eliminate leaks in intake line.
	Eliminate leaks in intake line.	Insert high pressure nozzle.
	Obstructed or worn spray nozzle.	Move adjustable grip on dual lance counter-clockwise to high pressure.
	Damaged or obstructed valve assembly on pump.	Remove, clean or replace.
	Pump packings worn.	Remove, inspect, clean or replace. Replace packings.
	Unloader/bypass valve not operating correctly.	Repair or replace.
Pump oil appears milky or foamy.	Water in oil.	Change pump oil. Fill to proper level.
Oil leaking from unit.	Worn seals or o-rings.	Contact Service Department.
Water is leaking at safety relief valve.	Unloader malfunction.	Detect and correct unloader problem.
	Pressure switch malfunction.	Detect and correct pressure switch problem.
	Safety Relief Valve is defective.	Replace safety relief valve. NEVER run unit without safety relief valve. Doing so can cause an explosion!
Water flows from the nozzle when the trigger gun is locked in the OFF position.	Trigger gun is malfunctioning.	Repair or replace.
Blower motor will not run. (Burner will not ignite without blower running)	Burner/Blower motor malfunction.	Repair or replace.
Blower runs, but burner will not ignite.	Trigger gun is closed.	Open gun for pressure.
	Out of fuel.	Refuel.
	Pressure switch override.	Pressure should be over 375 PSI to allow burner to come on.
	No voltage.	Consult Service Department.
	Poor or improper fuel supply.	Check fuel to ensure it is correct. Drain tank and filter if necessary and refill with proper fuel.
	Fuel pump sucking air.	Tighten all fuel intake connections. Eliminate leaks in intake line.

TROUBLESHOOTING

Blower runs, but burner will not ignite.	Dirty or clogged fuel filter or fuel water separator.	Drain or replace as necessary.
	Low fuel pump pressure.	Check fuel pump pressure, adjust or replace as necessary.
	Fuel pump inoperative.	Check pressure, replace if necessary.
	Flexible coupler broken.	Replace
	Fuel solenoid valve failure.	Replace.
	Dirty or clogged fuel nozzle.	Replace fuel nozzle.
	Improper burner air adjustment.	Adjust as shown on pg. 23
	Faulty ignition module.	Repair or replace. Consult your Customer Service.
Blower runs, burner ignites but will not heat	Poor or improper fuel supply.	Check fuel to ensure it is correct. Drain tank and filter if necessary and refill with proper fuel.
	Dirty or clogged fuel filter or fuel water separator.	Drain or replace as necessary.
	Low fuel pump pressure.	Check fuel pump pressure, adjust or replace if needed.
	Dirty or clogged fuel nozzle.	Replace fuel nozzle.
	Improper burner air adjustment.	Adjust.
	Scale build up in heat exchanger coil.	Consult the Service Department.
Burner runs erratically.	Water in the fuel oil.	Replace fuel filter or drain fuel water separator, drain fuel tank and replace with clean fuel.
	Dirty fuel filter or fuel water separator.	Replace element.
	Dirty fuel nozzle.	Replace.
	Improper air adjustment setting.	Adjust
	Fuel pump malfunctioning.	Replace.
	Low on fuel.	Refuel. If white smoke persists consult the Service Department.
Burner discharges white smoke.	Excessive air supply.	Adjust
Burner discharges black smoke.	Insufficient air supply.	Adjust.