



# ***OWNER'S MANUAL***

***MODEL  
410EC***

**PART NUMBER  
837601**

**SERIAL NUMBER**

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**PURCHASED**

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Record Model Number and Serial Number Here  
Always include them in Service Correspondence

**MACHINE RECORD**

<b>SERIAL NUMBER</b>	<b>DATE OF PURCHASE</b>	<b>PLACE OF PURCHASE</b>
<b>MONTH / DAY / YEAR</b>	<b>OPERATING HOURS</b>	<b>MAINTENANCE PERFORMED</b>

**NOTES**




# MODEL 410EC

## SPECIFICATIONS

P/N 837601

### PERFORMANCE

DISCHARGE VOLUME.....4.0 GPM / 15.1 LPM  
PUMP HEAD PRESSURE.....1000 PSI / 69 BAR

### GENERAL

MINIMUM INLET WATER PRESSURE.....40 PSI / 0.68 BAR  
WEIGHT (DRY) .....190 LBS / 86 KG  
PRESSURE HOSE ..... P/N Y01-00027  
SPRAY TIP..... (#5.5-0DEG) P/N J00-00055-2  
SPRAY TIP..... (#5.5-25DEG) P/N J00-25055-2  
HOSE, DISCHARGE.....3/8" X 50' P/N K02-03150E1  
WAND & TRIGGER GUN ..... P/N J06-00106  
BELT - ENGINE TO PUMP..... P/N R02-00231

### PUMP MOTOR

MOTOR HORSEPOWER..... 4.0 HP / 3.0 KW  
MOTOR SPEED..... 3450 RPM  
MOTOR VOLTAGE..... 208V / 230V 60HZ 1PH  
MOTOR AMPS .....208V (17.8 AMPS) / 230V (16.6 AMPS)  
MOTOR PART NUMBER..... F02-00087-U  
MOTOR PULLEY..... R03-00132

### ELECTRICAL

MACHINE VOLTAGE .....230V 1PH 60HZ  
POWER CORDSET ..... P/N F04-00185  
CAM SWITCH ..... P/N F04-00735A

### PUMP & UNLOADER

PUMP..... P/N N07-00080  
PUMP PULLEY..... P/N R03-00664  
PUMP PULLEY BUSHING..... P/N R04-00001  
WATER FILTER..... P/N C04-00120



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# SAFETY, INSTALLATION, AND OPERATION

## ELECTRIC DRIVEN COLD WATER CLEANER

### MACHINE UNPACKING


ALL CLEANERS ARE CAREFULLY INSPECTED AND CARTONED TO PROTECT AGAINST SHIPPING DAMAGE. IF THERE IS DAMAGE OR MISSING PARTS, THE TRANSPORTATION COMPANY AGENT SHOULD MAKE A NOTATION TO THAT EFFECT ON THE BILL. REFER TO THE PARTS LIST IN THIS MANUAL AND ADVISE WHAT PARTS ARE MISSING OR DAMAGED. IF AVAILABLE, GIVE THE INVOICE NUMBER ON ALL ORDER BILLS. THIS PROCEDURE WILL ENABLE NEEDED PARTS TO BE SHIPPED QUICKLY.


**READ ALL** Installation, Operation, and Maintenance instructions before operating the machine.


**NOTE:** Refer to CLEANER MODEL for **SERIAL NUMBER** location.


**NOTE:** Dimensions are in inches unless otherwise note.

### IMPORTANT SAFETY INSTRUCTIONS

The safety alert symbol.  This symbol is used to identify safety information about hazards that can result in personal injury. A signal word (DANGER, WARNING, or CAUTION) is used with the alert symbol to indicate the likelihood and the potential severity of injury. In addition, a hazard symbol may be used to represent the type of hazard

 **DANGER** indicates a hazard which, if not avoided, will result in death or serious injury.

 **WARNING** indicates a hazard which, if not avoided, could result in death or serious injury.

 **CAUTION** indicates a hazard which, if not avoided, might result in minor or moderate injury.


**CAUTION**, when used **without** the alert symbol, indicates a situation that **could result in damage to the equipment**.

**Read and understand this “OPERATOR’S MANUAL” and “LABELS ON THE MACHINE” before starting.**



### GENERAL SAFETY

1. Before operating this machine, read and observe all safety, unpacking, and operating instructions. Failure to comply with these instructions could create a hazardous situation.
2. The operator of this equipment should not operate this equipment when fatigued or under influence of alcohol or drugs.
3. The operator of this equipment should be thoroughly familiar with its operation and trained in the job to be accomplished.
4. The operator of this equipment should wear protective face shields and other protective clothing as required for safe operation.
5. Keep all protective covers and shields in place. Operating this machine with moving parts could allow operator or bystander serious injury or even death.
6. Do not operate the machine if any mechanical failure is noted or suspected. Keep all shields in place.
7. Always point the gun assembly in a safe direction and do not direct spray on the cleaner.


 **WARNING:** RISK OF INJECTION OR SEVERE INJURY. KEEP CLEAR OF NOZZLE. DO NOT DIRECT DISCHARGE STREAM AT PERSONS. THIS EQUIPMENT IS TO BE USED ONLY BY TRAINED OPERATORS.

**AVERTISSEMENT:** RISQUE D'INJECTION ET DE BLESSURES GRAVES. SE TENIR À L'ÉCART DU JET. NE PAS DIRIGER LE JET DE SORTIE VERS D'AUTRES PERSONNES. CONFIER L'UTILISATION LE JET DE SORTIE VERS D'AUTRES PERSONNES. CONFIER L'UTILISATION DE CE MATÉRIEL À UN OPÉRATEUR QUALIFIÉ.


**ADVERTENCIA:** RIESGO DE LA INYECCIÓN O SEVERO LESIÓN. CLARO DE LA SUBSISTENCIA DEL INYECTOR. NO DIRIJA LA CORRIENTE DE LA DESCARGA EN LAS PERSONAS. ESTO EL EQUIPO DEBE SER UTILIZADO SOLAMENTE POR LOS OPERADORES ENTRENADOS.

8. Do not leave this machine unattended when it is operating
9. All installations must conform to all applicable Local codes. Contact your electrician, plumber, utility company or seller for details.
10. If a water leak is found, **DO NOT OPERATE THE MACHINE**. Shut off the motor and repair.
11. Follow instructions on how to stop the machine and bleed pressures quickly. Be thoroughly familiar with the controls.
12. When starting a job, survey the area for possible hazards and correct before proceeding.
13. If chemicals are used in conjunction with this equipment, read and follow the product label directions.
14. Do not start the machine unless the gun assembly is firmly gripped by the machine operator. Failure to do this could result in injury from flying hose and gun assembly.

### **MECHANICAL SAFETY**

1. All guards, shields, and covers must be replaced after adjustments are made to prevent accidental contact with hazardous parts. 
2. Drive belts must be inspected and tightened periodically to operate at optimum levels.
3. Inspect machine for damaged or worn components and repair or replace to avoid potential hazards. Do not operate the machine if any mechanical failure is noted or suspected.
4. Always use the correct size spray tip specified in the GENERAL section of the **MODEL SPECIFICATIONS** or **MODEL EXPLODED VIEW**.
5. Do not start the machine until you have observed all safety instructions and operating found in the operating manual.

### **ELECTRICAL SAFETY**

1. **This machine must be electrically grounded. Failure to have the machine grounded may result in the operator being electrically shocked and even death.** 
2. **Do not plug-in or un-plug machine with wet hands.**
3. **Keep power cords and connections (connectors) out of water.**
4. **If an extension cord must be used to operate this machine, it should be as short as possible. The extension cord must be properly sized and fitted with a grounding type plug and receptacle.**

5. All wiring and electrical connections should comply with the National Electrical Code (NEC) and with local codes and practices.
6. Fuses or circuit breakers should be compatible with machine requirements. (See ELECTRICAL section of **MODEL SPECIFICATIONS** for power requirements.)
7. High voltage may be present within this machine. Servicing should only be performed by properly trained personnel.

## **SAVE THESE SAFETY**



### **INSTRUCTIONS**

#### **INSTALLATION**

1. **BARRIER:** We recommend a barrier be installed between the machine and wash area to prevent moisture from coming in direct contact with electrical controls, motors and transformers. This will increase the machine's life and lessen electrical problems.
2. **WATER SUPPLY:** This machine must have a water supply meeting or exceeding the maximum discharge volume specified in the PERFORMANCE section, and a minimum water inlet pressure specified in the GENERAL section of the **MODEL SPECIFICATIONS**.
3. **WATER CONDITIONS:** Local water conditions affect the coil adversely more than any other element. In areas where troublesome conditions may exist with like equipment (such as water heaters), we recommend the use of a water softener.
4. **FREEZING:** This machine must be protected from freezing according to STORAGE section of **MACHINE MAINTENANCE**.
5. **CHEMICALS:** Mix chemicals per the chemical manufacturers printed directions. Follow all mixing, handling, application, and disposal instructions. Wear gloves, boots, goggles, and protective clothing appropriate for the chemical being used.

## ELECTRICAL INSTALLATION

- ELECTRICAL:** Connect the machine to an electrically grounded circuit that is fused or circuit breaker protected. The circuit must match that specified in the ELECTRICAL section under MODEL SPECIFICATIONS.

	<b>WARNING: ELECTRICAL SHOCK HAZARD</b>
	<b>AVERTISSEMENT: LE DANGER ELECTRIQUE DE CHOC</b>
	<b>ADVERTENCIA: CHOQUE ELÉCTRICO PELIGRO</b>

**WARNING:** To reduce risk of electrocution, keep all connections dry and off the ground. Do not touch plug with wet hands.

CORRECT WIRE SIZE MINIMUM AWG	MACHINE AMP DRAW 3 CONDUCTOR WIRES	MACHINE AMP DRAW 2 CONDUCTOR WIRES
18	10	13
15	--	--
14	17	18
12	20	25
10	25	30
8	30	35
6	40	55
4	50	70
3	1	45

CHART FIGURES ARE BASED ON NOT MORE THAN 100 FOOT

(Based on Ambient Temperature of 86°F (30°C)).

\*Use Amp Draw indicated the same or higher than your machine output.

**EXAMPLE:** Machine Amp Draw 51, use 55 (2 Conductor). The thermostat type of cord shall be C, PD, E, EO, EN, S, SO, SRD, SJ, SJO, SV, SVO, SP.

The thermo set plastic types shall be ET, ETT, ETLB, ETP, ST, STO, SRDT, SJT, SJTO, SVT, SVTO, and SPT.

- EXTENSION CORD:** The use of an extension cord that has undersize wire compared to the amp draw of your machine will adversely limit the starting load carrying abilities of the motor and machines performance. Use only 3-wire extension cords that have 3-prong plugs and 3-pole cord connectors that accept the plug from the product. Use only extension cords that are intended for outdoor use. These extension cords are identified by a marking "Acceptable for use with outdoor appliances; store indoors while not in use." Use only extension cords having an electrical rating not less than the rating of the product. Do not use damaged extension cords. Use an extension cord in good repair free of frays or cracks in the outer covering. Do not abuse extension cord and do not yank on any cord to disconnect. Keep cord away from heat and sharp edges. Always disconnect the extension cord from the receptacle before disconnecting the product from the extension cord.

## OPERATING INSTRUCTIONS

### PRE START-UP

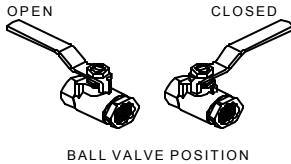
- The first time the machine is operated, after repairs have been made, or if the machine has set for a period of time (30 days or more) follow the following procedures.
  - Check the tension of the belt (if so equipped) per instructions in **MACHINE MAINTENANCE**.
  - Flush the machine per instructions in **MACHINE MAINTENANCE**.
  - Install float tank drain plug (if so equipped).
  - Open float tank ball valve (if so equipped).

**CAUTION:** Always use the factory supplied wash hose with your machine. **Do not** substitute other hoses as a potential safety problem may develop.

**CAUTION:** If machine has been exposed to sub-freezing temperatures, it must be thoroughly warmed to above freezing before operating. Failure to warm machine can cause damage to the pump packings and other components.

- Read and observe all items in "CLEANER INSTALLATION".
  - ◆ Refer to the **MAINTENANCE SCHEDULE** for any maintenance to be performed before operation.
  - ◆ **ELECTRICAL:** Connect the machine to an electrically grounded circuit that is fuse or circuit breaker protected. Do not use any type of adapter. If the correct type of receptacle is not available, have one installed by a qualified electrician.
  - ◆ **OIL LEVEL:** Check the oil level in the water pump.
  - ◆ **BELT:** Make sure belt tension and condition is as specified in **MACHINE MAINTENANCE**.
  - ◆ **METERING VALVE ( if so equipped):** Make sure the metering valve is closed before operation. If air enters the system through this valve, poor performance and machine damage will occur. Refer to the metering valve insert for proper operation.
  - ◆ **WATER SUPPLY:** This machine must have a water supply meeting or exceeding the maximum discharge volume specified in the **PERFORMANCE** section, and a minimum water inlet pressure of 40 PSI /12.1KGM.
  - ◆ **LIME:** Water containing large amounts of lime, calcium or other similar materials can produce a coating on the inside of the spray tip, impact nozzle and coil pipe.

- ◆ **FLOAT TANK:** Check the float tank (if so equipped) to assure it is full and the float valve shuts off securely.
- ◆ **BALL VALVE:** Check the position of the ball valve on the outlet side of the float tank (if so equipped) that it is in the open position.
- ◆ **SPRAY TIP:** Choose the correct spray tip for the job to be performed.



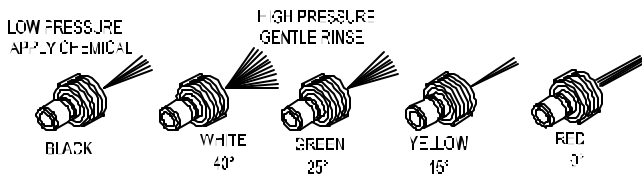
**Quick-Connect spray tips** have fixed spray patterns that are more consistent than those produced by an adjustable nozzle. Each tip is color-coded for easy identification.

**White (40°):** produces a wide-fan spray for general cleaning and rinsing.

**Green (25°):** provides a narrower-fan spray for tough stains in cleaning applications.

**Yellow (15°):** maintains a tight-fan spray with intense cleaning power for heavy-duty cleaning and paint preparation.

**Red (0°):** creates a concentrated pinpoint water jet for stubborn stains on concrete, masonry, or steel, and for stripping paint.



## START-UP

1. With the gun assembly in hand (on trigger gun models hold the trigger gun valve in open position) and with a good flow of water turn the switch to the “pump” position.

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**WARNING:** Use of pressure washer can create puddles and slippery surfaces. High pressure spray could cause you to fall if you are too close to the cleaning surface.

- Keep spray nozzle between 8 to 24 inches away from cleaning surface.
- Operate this unit on a stable surface.
- The cleaning area should have adequate slopes and drainage to reduce the possibility of a fall due to slippery surfaces.
- Be extremely careful if you must use the pressure washer from a ladder, scaffolding or any other relatively unstable location.
- Firmly grasp spray gun with both hands when using high pressure spray to avoid injury when gun kicks back.

**CAUTION:** A good flow of water must be flowing from the end of a gun for 30 seconds, before proceeding. Lack of water can cause damage to the water pump and like components.

**CAUTION:** On a machine equipped with a trigger gun valve, if the trigger gun valve remains in the closed position for more than 3 minutes, water pump damage may occur.

**CAUTION:** Do not operate with the trigger gun valve closed for more than 3 minutes or water pump damage may occur.

### 2. TO CLEAN:

- A. Start on the lower portion of the area to be cleaned and work up using long, even, overlapping strokes.
- B. Dirt is generally removed easily if grease and/or oil are not present. However if grease and/or oil are present, hot water and chemical will accelerate in the cleaning process.

### 3. TO APPLY CHEMICAL:

**CHEMICAL:** Use factory recommended chemicals for best cleaning action and for extended pump life. Contact your dealer for chemicals available. Follow instructions on chemical container.

**Note :** If the valve is **open without** the chemical line in a source the water pump will **draw air** causing the system **not to** pressure up.

Mix chemicals per label instructions. Use necessary safety precautions.

When chemical is desired, the system must be switched over to the low pressure nozzle to draw chemical.

- A. Insert chemical screen into chemical container.
- B. Adjust metering valve or injector. Install your injector tip.
- C. If the gun assembly is equipped with variable or multiple nozzle assembly, adjust to low pressure, multiple nozzle assembly, adjust as desired.



### UPSTREAM CHEMICAL INJECTION:

When injecting chemicals “upstream” what you are doing is introducing chemicals to the water flow as it enters the actual pump inlet and requires a float tank. The popularity of this type of chemical injection is due to the fact that this allows chemicals to be applied at **full pressure** a major advantage for productivity.

**CAUTION: You cannot draw an abrasive product such as an aluminum brightner. It will cause an non-warrantable premature pump failure.**

### DOWNSTREAM CHEMICAL INJECTION:

Mounted to the outlet of the pump or the coil a downstream injector introduces chemicals to the water flow AFTER it leaves the pump or the coil. This effectively eliminates the major risks of exposing the inner workings of a pump to harsh chemicals. When chemical is desired, the system must be switched over to the low pressure nozzle to draw chemical.

- A. Engage the trigger safety latch on the spray wand. Pull back the Quick-Connect collar on the end of the wand and remove the tip. Now insert “black” tip into the fitting, and release the collar. You can draw chemical only with the “black” low pressure nozzle. Tug on spray tip to make sure the connection is secure. Rotate to desired spray angle. For most effective cleaning, keep spray tip from 8 to 24 inches away from the cleaning surface.
- B. Insert chemical screen into chemical container.
- C. Turn the **burner switch to the “off”** position. There will be air in the chemical line. Air heats very quickly and needs to be eliminated before the burner can be turned on. Open the metering valve counter clockwise with the trigger gun open allowing the chemical to come up the chemical line. Chemical should begin moving up the chemical line. Once the chemical line is completely full, trigger the gun on and off numerous times to break any possible air locks. Turn burner system switch to “on” position.
- D. If the gun assembly is equipped with variable or multiple nozzle assembly, adjust to low pressure.
- E. If the gun assembly is equipped with a dual lance wand open the valve.  
Do not allow the detergent to dry on the surface (prevents streaking).

### TO RINSE:

- A. If the machine is equipped with a panel mounted metering valve, close the chemical metering valve (if so equipped). NOTE: It is advisable to dip the chemical screen in a container of clean water and open the valve 1 minute to clean the valve of any remaining residue.
- B. If the gun assembly is equipped with variable or multiple nozzle assembly, open and close to clean nozzle of any remaining residue.
- C. After a clear flow of water is noted from the end of the wand, start from the top, working downward using long, overlapping strokes.

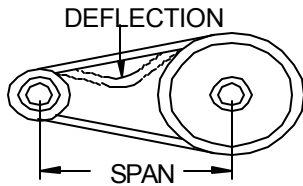
## **SHUT-DOWN**

1. Turn the switch to the pump off position.
2. Turn off the water supply.
3. If freezing conditions may exist, refer to STORAGE in **MACHINE MAINTENANCE**.

# MACHINE MAINTENANCE

Electric Driven Cold Water Cleaners

## BELT TENSION



1. Correct belt tension will allow a 1/64- inch deflection for each inch of span between pulley centers with a 6-pound force applied in the middle of the span.

EXAMPLE: A 6-pound force applied at the middle of an 8 inch span should produce a deflection of 8/64 inch or 1/8 inch.

2. Belts can be tightened or loosened by loosening the nuts holding the pump assembly to the motor mount. Then tighten or loosen the j-bolt on the motor mount. Retighten the pump assembly after the desired tension is reached.

## SPRAY TIP MAINTENANCE

1. Remove the spray tip from the gun assembly.
2. Blow out debris with compressed air from the outside in. Any debris remaining in the inlet side of the nozzle should be cleaned out. If lime or chemical scale is present in the inlet side, the nozzle may be soaked in descaling solution or replaced. If the tip is worn, replace with one specified in the GENERAL section of **MODEL SPECIFICATIONS** or **MODEL EXPLODED VIEW**.
3. Before replacing spray tip flush the machine per "FLUSHING".
4. Reinstall Spray tip to gun assembly.

## FLUSHING

1. Connect machine to an electrically grounded circuit that is fuse or circuit breaker protected.
2. Connect machine to a pressurized water supply meeting the requirements specified in the GENERAL section of the **MODEL SPECIFICATIONS**.
3. Turn on the water supply.
4. Check the float tank (if so equipped) to assure it is full and the float valve shuts off securely.
5. Check the position of the ball valve (if so equipped) on outlet line of the float tank assuring it is in the open position.

6. Remove spray tip from gun assembly.
7. With the gun assembly in hand (on trigger gun models hold the trigger gun valve in open position) and with a good flow of water turn switch to the PUMP position

**CAUTION: DO NOT RUN PUMP WITHOUT WATER, AS THIS WILL CAUSE DAMAGE TO THE PUMP AND VOID WARRANTY.**

8. When clean water flows from the gun, turn switch to the "OFF" position. Reinstall spray tip.
10. With the gun assembly in hand turn on the switch. On trigger gun models hold the trigger gun valve in open position.)
11. When clean water flows from gun, turn switch off the PUMP position
11. If freezing conditions may exist, refer to "STORAGE" section.
13. Turn off and disconnect the water supply. Disconnect electrical supply.

## STORAGE

1. Rinse the chemical line by inserting the screen into a container of clear water and open the metering valve 1 minute to clean it of any remaining residue. Be sure the chemical metering valve is closed when finished.
2. Disconnect the water supply. Remove the spray tip nozzle from gun assembly and wire to machine.
3. Check the position of the ball valve (if so equipped) on the outlet of the float tank assuring it is in the closed position.
4. Attach an air chuck to the air valve stem on the pump assembly. With the trigger gun in the open position, apply air until a mixture of air and very little water is coming from the gun wand . Allow air to blow for 60 seconds. Turn switch to the "OFF" position. Remove the air chuck.
5. Fill a 1-gallon container with Ethylene Glycol type antifreeze. Minimum should be a mixture of ½ antifreeze and ½ water strength before each use, as the antifreeze will dilute with use.
6. Install a 2-ft garden hose to the water inlet. Insert the other end into a container of antifreeze solution.
7. With the gun assembly in hand turn on the switch. On trigger gun models hold the trigger gun valve in open position.)
8. Turn off the switch just prior to running out of antifreeze mixture.
9. Disconnect electrical supply, and the gun and hose.
10. Place machine in a dry place protected from weather conditions.

# MACHINE MAINTENANCE SCHEDULE

ELECTRIC DRIVEN OIL FIRED CLEANERS	DAILY	EACH HR 8 HRS	AFTER FIRST 50 HRS	EVERY 50HRS	EVERY 100 HRS	EVERY 500 HRS	YEARLY
<p><b><u>OIL BATH WATER PUMP:</u></b>  <b>Oil Level</b> - check and add as needed per PUMP SERVICE insert.</p> <p><b>Oil Change</b>- drain and refill per PUMP SERVICE insert. <b>CAUTION:</b> Used oil must be disposed into an enviromental safe container and brought to an oil recycling center.</p> <p><b>Oil contamination</b>- Milky color indicates water.</p>	●		●			●	
<p><b><u>HOSES:</u></b></p> <p><b>Blistering, Loose Covering</b></p> <p><b>Abrasion</b> of cover exposing reinforcement.</p> <p><b>Cuts</b> exposing reinforcement.</p>	● ● ●						
<p><b><u>BELTS:</u></b></p> <p><b>Cracks or fraying</b></p> <p><b>Belt Tension</b>- For correct tension, see MACHINE MAINTENANCE insert.</p>	●	●		●			
<p><b><u>LEAKS:</u></b></p> <p><b>Check</b> for water and buildup of scale at pipe connections.</p>	●						
<p><b><u>SCREEN-WATER:</u></b></p> <p><b>Check Inlet Hose Screen</b> for debris.</p> <p><b>Check float Tank Hose Screen</b> ( if so equipped) for debris.</p> <p><b>Check Water Filter</b> (if so equipped) for debris see breakdown elsewhere in this manual.</p>	● ● ●						
<p><b><u>SPRAY TIP:</u></b></p> <p><b>Check tip</b> for debris.</p>	●						
<p><b><u>GUARDS AND SHIELDS:</u></b></p> <p>Check that all guards and sheilds are in place and secure.</p>	●						
<p><b><u>PUMP MOTOR WITH GREASE FITTINGS:</u></b></p> <p>Remove drain plug. Use 1 or 2 full strokes of shell "DOBLIUM RB", Chevron"SR1 No.2" or Texaco "PREMIUM RB". Operate for 20 minutes and replace drain plug.</p>							●
<p><b><u>FREEZING TEMPERATURES:</u></b></p> <p>Freezing temperatures break coils and water pumps. See STORAGE in the <b>MACHINE MAINTENANCE</b> section for cold weather instructions.</p>	●						

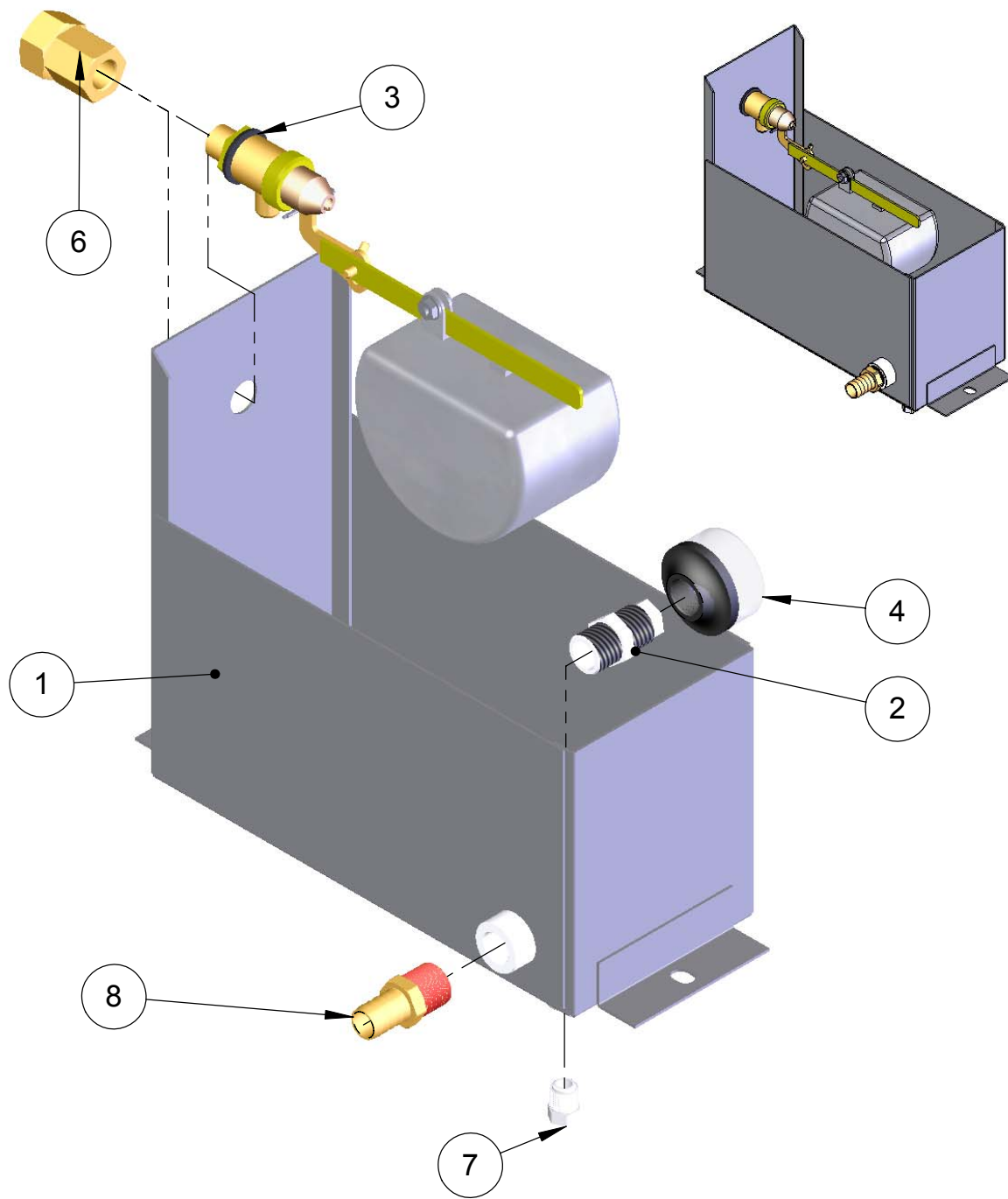
## CLEANER TROUBLESHOOTING

### ELECTRIC MOTOR DRIVEN COLD WATER CLEANERS

TROUBLE	POSSIBLE CAUSE	REMEDY
1. Poor cleaning action.	<ul style="list-style-type: none"> <li>A. Hard water.</li> <li>B. Low pressure.</li> <li>C. Little or no chemical being drawn.</li> <li>D. Improper chemical.</li> <li>E. Improper chemical mixture.</li> <li>F. Low discharge pressure.</li> </ul>	<ul style="list-style-type: none"> <li>A. Connect the machine to a water softner.</li> <li>B. See "Low operating pressure."</li> <li>C. See "machine will not draw chemical."</li> <li>D. Obtain proper chemical.</li> <li>E. Mix chemical per the label. Follow all the mixing, handling, application, and disposal instructions.</li> <li>F. See "Low operating pressure."</li> </ul>
2. Machine will not draw chemical.	<ul style="list-style-type: none"> <li>A. No chemical solution.</li> <li>B. Metering valve not open.</li> <li>C. Chemical line strainer clogged.</li> <li>D. Air leak in Chemical line.</li> <li>E. Metering valve clogged.</li> <li>F. Restrictor orifice too large or missing.</li> </ul>	<ul style="list-style-type: none"> <li>A. Replenish supply.</li> <li>B. Turn metering valve knob to open.</li> <li>C. Remove screen and clean.</li> <li>D. Tighten all fittings and hoses for the chemical line.</li> <li>E. Disassemble and clean.</li> <li>F. Install proper size orifice.</li> </ul>
3. Low operating pressure.	<ul style="list-style-type: none"> <li>A. Insufficeint water supply.</li> <li>B. Incoming water hose too small.</li> <li>C. Water supply hose too long.</li> <li>D. Belt slippage.</li> <li>E. Worn belt.</li> <li>F. Spray tip worn or wrong size.</li> <li>G. Dirty or worn check valves in water pump.</li> <li>H. Water supply hose kinked.</li> <li>I. Inlet filter screen clogged.</li> <li>J. Motor runs slow.</li> <li>K. Air leak in inlet plumbing.</li> <li>L. Defective water pump.</li> <li>M. Leaking discharge hose.</li> <li>N. Chemical metering valve open and sucking air.</li> <li>O. Defective unloader.</li> <li>P. Inlet ball valve not fully open (if so equipped).</li> </ul>	<ul style="list-style-type: none"> <li>A. The water supply must meet or exceed the maximum discharge volume specified in the PERFORMANCE section of the <b>MODEL SPECIFICATIONS</b> section , and minimum water inlet pressure of 10 PSI/0.68 BAR.</li> <li>B. Use larger water supply hose.</li> <li>C. Use shorter water supply hose.</li> <li>D. Tighten belt per instructions in <b>MACHINE MAINTENANCE</b> insert.</li> <li>E. Replace bely per <b>CLEANER EXPLODED VIEW</b>.</li> <li>F. Replace with spray tip specified in the GENERAL section of <b>MODEL SPECIFICATIONS</b>.</li> <li>G. See <b>PUMP TROUBLE SHOOTING</b>.</li> <li>H. Straighten hose.</li> <li>I. Clean water filter screen or hose inlet screen.</li> <li>J. See "Pump motor starts slow or overheats and stops."</li> <li>K. Tighten all fittings.</li> <li>L. See <b>PUMP TROUBLESHOOTING</b>.</li> <li>M. If a water leak is found, <b>DO NOT OPERATE THE MACHINE</b>. Disconnect the power and replace hose.</li> <li>N. Resupply chemical, place soap screen in water, or shut off metering valve.</li> <li>O. Repair or replace unloader valve.</li> <li>P. Open inlet ball valve completely. (Handle parallel w/ valve body).</li> </ul>
4. Excessive, unusual noise.	<ul style="list-style-type: none"> <li>A. Pump.</li> <li>B. Defective motor.</li> <li>C. Pulleys rubbing.</li> <li>D. Misalignment of pump &amp; motor</li> </ul>	<ul style="list-style-type: none"> <li>A. See <b>PUMP TROUBLESHOOTING</b>.</li> <li>B. Call service technician or take engine to Repair/Warranty station.</li> <li>C. Adjust shields or pulley(s).</li> <li>D. Realign pump and engine.</li> </ul>
5. Belts slipping.	<ul style="list-style-type: none"> <li>A. Belts too losse.</li> <li>B. Excessive back pressure.</li> <li>C. Defective water pump.</li> </ul>	<ul style="list-style-type: none"> <li>A. Tighten per instruction on <b>MACHINE MAINTENANCE</b>.</li> <li>B. See "Excessive Back Pressure."</li> <li>C. See <b>PUMP SERVICE</b>.</li> </ul>

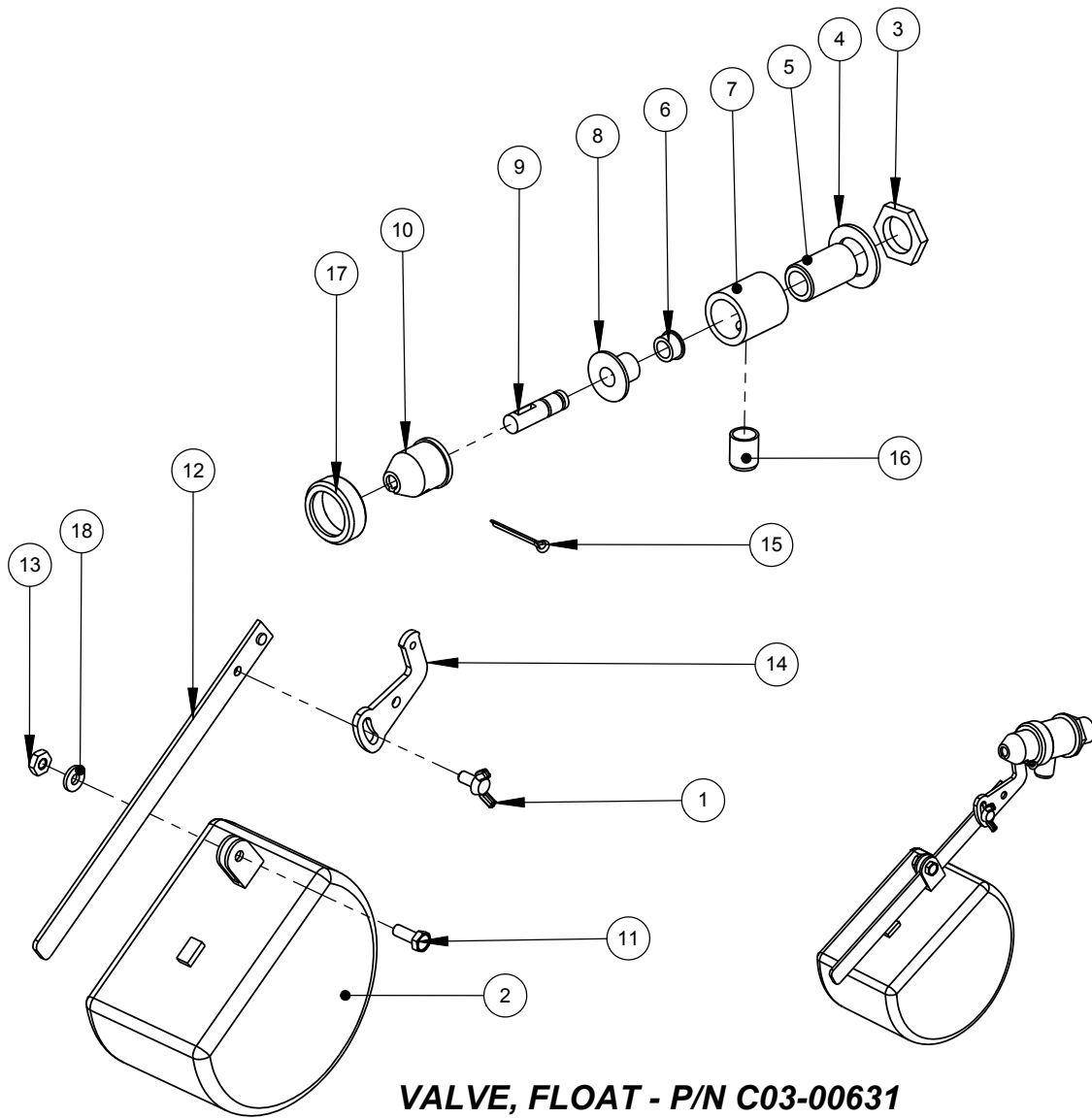
## CLEANER TROUBLESHOOTING (CONT.) ELECTRIC MOTOR DRIVEN COLD WATER CLEANERS

TROUBLE	POSSIBLE CAUSE	REMEDY
6. Excessive back pressure.	A. Spray tip built up with lime. B. Water pump turning too fast. C. Relief valve defective.	A. Remove and clean, or replace spray tip with tip specified in GENERAL section of <b>MODEL SPECIFICATIONS</b> . B. See <b>MODEL SPECIFICATIONS</b> . C. Remove and replace.
7. Excessive vibration.	A. Defective belt. B. Defective Pump. C. Defective accumulator.	A. Remove and replace using belt specified in CLEANER EXPLODED VIEW or the GENERAL section of <b>MODEL SPECIFICATIONS</b> . B. See <b>PUMP TROUBLESHOOTING</b> . C. Recharge/replace.
8. Pump motor will not start (motor does not hum).	A. No power. B. Defective motor starter or ON/OFF switch. C. Defective motor.	A. Use a different outlet, check fuses in main disconnect switch. Replace fuse if blown. B. Call service technician. C. Call service technician, or take motor to repair/Warranty station.
9. Pump motor will not start (motor hums).	A. Pump frozen B. Defective Motor. C. Defective water pump D. Excessive back pressure.	A. Machine must be thoroughly warmed to above freezing. B. Call service technician or take motor to Repair/Warranty station. C. See <b>PUMP SERVICE</b> . D. See "Excessive Back Pressure."
10. Pump motor starts slow or overheats and stops.	A. Low voltage. B. Excessive back pressure. C. Defective motor.	A. See "Low voltage." B. See "Excessive Back Pressure." C. Call service technician, or take motor to Repair/Warranty station.
11. Pump motor stops and will not start.	A. Motor starter "kicked out" (if so equipped) or thermal overload tripped. B. Excessive back pressure. C. Defective motor.	A. Turn motor starter off to reset, then turn on, or push thermal overload reset button on motor. B. See "Excessive Back Pressure." C. Call service technician, or take motor to Repair/Warranty station.
12. Low voltage.	A. Incoming voltage incorrect. B. Not large enough extension cord. C. Too long extension cord.	A. Have a qualified technician check motor terminal voltage. Correct voltage is in <b>MODEL SPECIFICATIONS</b> . B. Use an extension cord with amperes or watts rating as high or higher than that of the <b>MODEL SPECIFICATIONS</b> . C. Shorten extension cord.
13. Machine shocks operator.	A. Machine improperly grounded. B. Outlet not grounded. C. "Adapter" used. D. Defective extension cord.	A. STOP! Operating machine. call service technician. B. Have properly wired outlet installed. C. Discard "Adapter" and use grounded outlet. D. Replace extension cord with grounded type connectors and amperes or watts rating as high or higher in <b>MODEL SPECIFICATIONS</b> .



**ASSEMBLY, TANK - FLOAT**  
**p/n W410ec-01121**

ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	324S-04120	TANK, FLOAT	1
2	4120-10540	ASSEMBLY, RESTRICTOR	1
3	C03-00631	FLOAT VALVE	1
4	C04-00120	FILTER, SOAP SCREEN	1
5	C05-00271	WASHER, GARDEN HOSE	1
6	C05-00274	ADAPTER, GARDEN HOSE	1
7	E09-00002-P	PLUG, PIPE - NYLON	1
8	W02-10025-8	BARB, HOSE	1



**VALVE, FLOAT - P/N C03-00631**  
8/8/2008

**PARTS LIST**

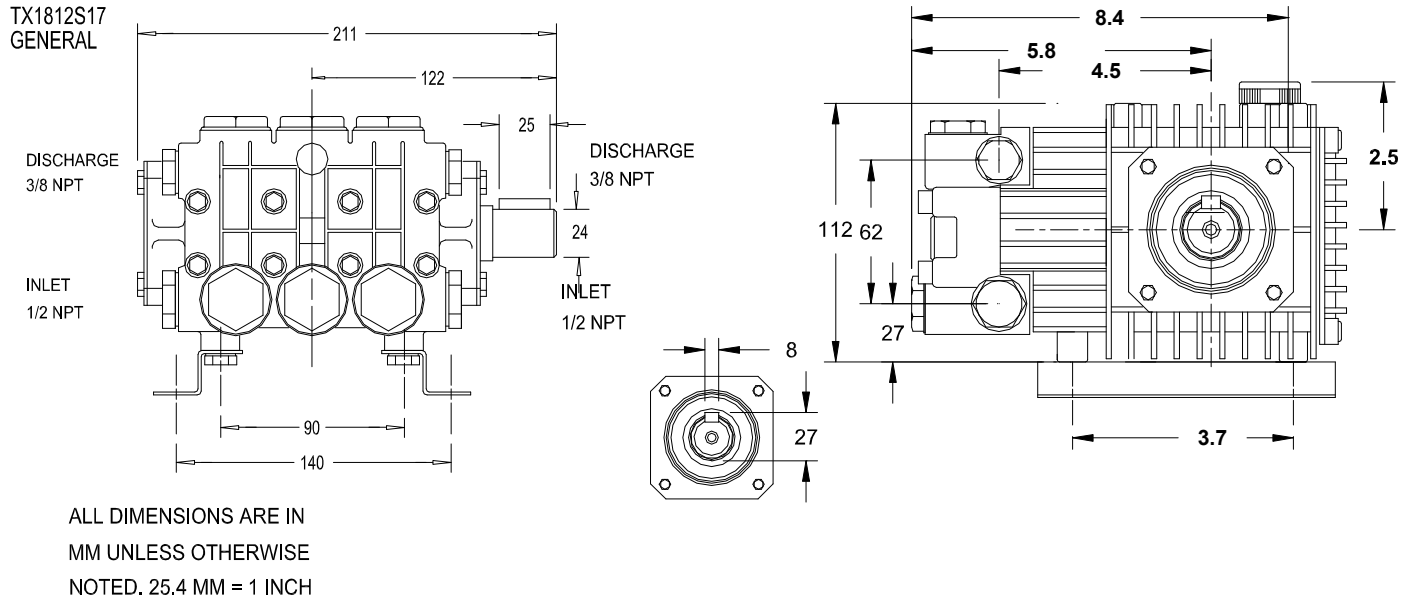
**SPECIFICATIONS**

ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	C03-00625-10	SCREW, WING - 10-32UNF	1
2	C03-00628	FLOAT, PLASTIC	1
3	C03-00631-01	NUT, HEX - 3/8FNPT	1
4	C03-00631-02	WASHER, FLAT - RUBBER	1
5	C03-00631-03	NIPPLE, BRASS - 3/8NPT	1
6	C03-00631-04	SEAT, VALVE-NYLON	1
7	C03-00631-05	HOUSING, VALVE	1
8	C03-00631-06	PISTON	1
9	C03-00631-07	ROD, PISTON-5/16CS X 1 1/4 PLASTIC	1
10	C03-00631-08	GUIDE, PISTON	1
11	C03-00631-10	SCREW, CAP	1
12	C03-00631-11	ARM, FLOAT	1
13	C03-00631-14	NUT, HEX - BRASS	1
14	C03-00631-16	LEVER - BRASS	1
15	C03-00631-17	KEY, COTTER	1
16	C03-00631-18	NIPPLE, TOE	1
17	C03-0631-09	NUT, RETAINER	1
18	H05-18700	WASHER, FLAT	1

**MAXIMUM VOLUME.....7 GPM / 26 LPM**  
**MAXIMUM PRESSURE.....140 PSI / 10 BAR**  
**MAXIMUM TEMPERATURE .....140° F/60° C**  
**PORT SIZE - INLET.....3/8" NPT**  
**DIMENSIONS...11.4 X 4.1 X 2.8 IN / 290 X 104 X 71MM**  
**WEIGHT.....0.6 LB / 0.3 KG**  
**HOUSING MATERIAL .....BRASS**  
**O-RING MATERIAL.....BUNA-N**

# BREAKDOWN, PUMP

## EXPLODED VIEW - P/N N07-00080



### SPECIFICATIONS

#### PERFORMANCE

DISCHARGE VOLUME.....3.8 GPM / 3.2LPM  
 PUMP HEAD PRESSURE..... 3000 PSI / 207 BAR

#### GENERAL

CRANKSHAFT ROTATION.....CLOCKWISE AND COUNTER CLOCKWISE  
 MAXIMUM SPEED..... 1450 / 1750 RPM  
 MAXIMUM PUMPED FLUID TEMPERATURE..... 165°F / 74°C  
 INLET PRESSURE..... -9 IN HG@75°F TO 116 PSI / -0.3 BAR@24°C TO 8 BAR  
 WEIGHT (WET)..... 19.0 LBS / 8.6 KG

#### LUBRICATION

OIL CHANGE INTERVAL...AFTER FIRST 50 HOURS THEN AFTER 500 HOURS  
 OIL TYPE .....SAE 20 OR SAE 30 (NON DETERGENT)  
 CRANKCASE CAPACITY ..... 14.0 FL OZ / 0.4 LT

#### TORQUE

VALVE PLUG (38) ..... 73.7 FT LBS / 100 KG M  
 MOUNT TO CRANKCASE (23).....14.7 FT LBS / 2.0 KG M  
 REAR CRANKCASE COVER TO CRANKCASE (12)..... 7.3 FT LBS / 10 KG M  
 BEARING RETAINER TO CRANKCASE (2)..... 7.3 FT LBS / 10 KG M  
 REAR CRANKCASE COVER TO PLUG (15)..... 14.7 FT LBS / 2.0 KG M  
 NUT TO CROSSHEAD (39)..... 11.0 FT LBS / 15 KG M  
 PLUG TO PUMP HEAD (29, 30)..... 29.4 FT LBS / 40 KG M  
 \*HEAD TO CRANKCASE (35).....14.7 FT LBS / 2.0 KG M

\*NOTE: When plunger nut is removed, it is important you install a new copper washer and flinger washer to ensure proper fit and seal of ceramic plunger. Each time plunger screw is torqued, copper washers conform to plunger. If same copper washers are used, plunger cracking or poor seal may result.

### PARTS PACKAGES

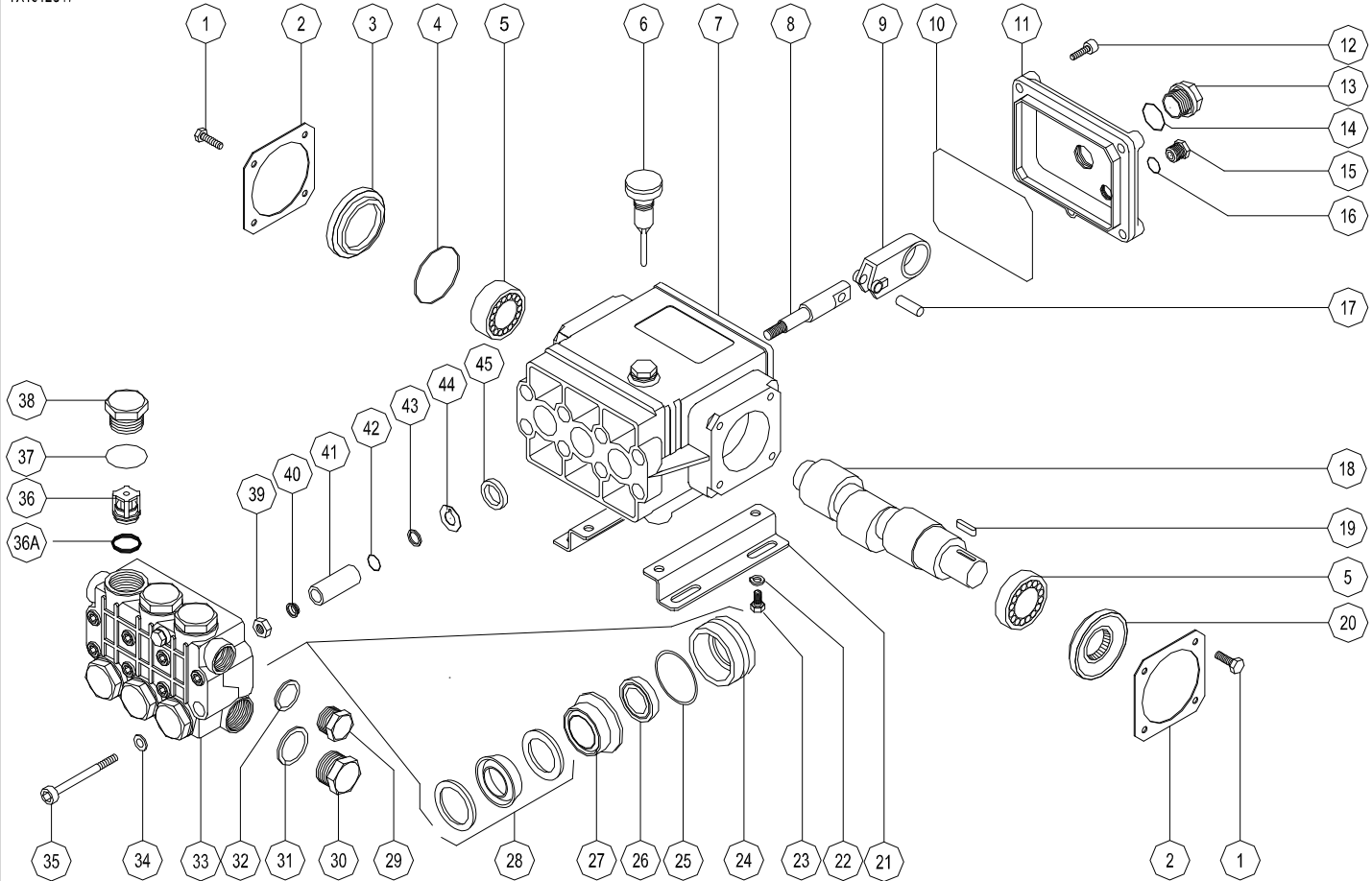
PART	DESCRIPTION	ITEM	QTY
<u>N07-99123</u>	<u>VALVE ASSEMBLIES</u>		
	ASS'Y, CHECK VALVE	36	6
	O-RING	36A	6
<u>N07-99124</u>	<u>VALVE PLUGS</u>		
	PLUG	38	6
	O-RING	37	6
<u>N07-99159</u>	<u>CROSSHEAD SEALS</u>		
	SEAL, CROSSHEAD	45	3
<u>N07-99161</u>	<u>RETAINER &amp; SEAL</u>		
	SEAL, WATER—18MM	26	3
	PACKING, V—18MM	37	3
<u>N07-99167</u>	<u>V-PACKING, ADAPTER &amp; SEAL</u>		
	RETAINER, SEAL—18MM	24	1
	O-RING	25	1
	SEAL, WATER—18MM	26	1
	ADAPTER—18MM	27	1
	V-PACKING—18MM	28	1
<u>N07-99165</u>	<u>ADAPTER, FEMALE</u>		
	ADAPTER, FRONT-FEMALE	27	3
<u>N07-99163</u>	<u>SEAL RETAINER</u>		
	RETAINER, SEAL	24	3



# BREAKDOWN, PUMP

## EXPLODED VIEW - P/N N07-00080

TX1812S17



### PARTS LIST

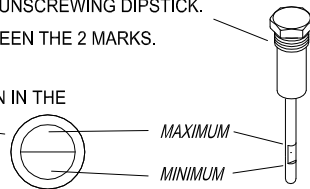
ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1	N07-20018	SCREW, CAP	24	N07-98083	RETAINER, SEAL
2	N07-20019	RETAINER, BEARING	25	N07-98016	O-RING
3	N07-40029	COVER, CRANKSHAFT	26	N07-82083	SEAL, WATER - 15MM
4	N07-20021	O-RING	27	N07-99164	ADAPTER, FEMALE - FRONT 15MM
5	N07-20022	BEARING, ROLLER	28	N07-82084	PACKING, V- HIGH PRESS 15MM
6	N07-20024	DIPSTICK, OIL	29	N07-20049	PLUG, PIPE
7	N07-98023	CRANKCASE	30	N07-20050	PLUG, PIPE
8	N07-98038	CROSSHEAD	31	N07-20051	WASHER, FLAT
9	N07-98034	ROD, CONNECTING	32	N07-20011	WASHER, FLAT
10	N07-29026	O-RING	33	N07-98001	HEAD, PUMP - BRASS
11	N07-98026	COVER, REAR	34	N07-20003	WASHER, FLAT
12	N07-20027	SCREW, CAP	35	N07-98002	SCREW, CAP - 8MM X 65MM
13	N07-98029	INDICATOR, OIL LEVEL	36	N07-99123	KIT, VALVE ASSEMBLY
14	N07-80009	O-RING	37	N07-20004	O-RING
15	N07-20030	PLUG, PIPE	37A	N07-20009	O-RING
16	N07-20028	O-RING	38	N07-47010	PLUG, PIPE
17	N07-98032	PIN, CROSSHEAD	39	N07-12056	NUT, HEX
18	N07-82031	CRANKSHAFT	40	N07-98085	ADAPTER, PLUNGER
19	N07-98033	KEY	41	N07-44040	PLUNGER - 18MM
20	N07-98045	SEAL, OIL	42	N07-20039	WASHER, FLINGER - COPPER
21	N07-20046	MOUNT, PUMP	43	N07-98028	O-RING
22	N07-20047	WASHER, LOCK	44	F04-76509	RING, ANTI-EXTRUSION
23	N07-20048	SCREW, CAP	45	N07-99159	KIT, CROSSHEAD

# GENERAL PUMP MAINTENANCE

## OIL LEVEL

CHECK THE OIL LEVEL BY UNSCREWING DIPSTICK. THE LEVEL SHOULD BE BETWEEN THE 2 MARKS.

OIL LEVEL IS ALSO SHOWN IN THE ROUND INDICATOR.



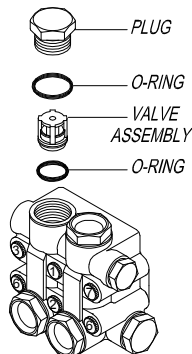
## TOOL KITS

PACKING EXTRACTION KIT ..... P/N Z09-00028

COMPLETE TOOL KIT ..... P/N Z09-00021

## VALVE SERVICE

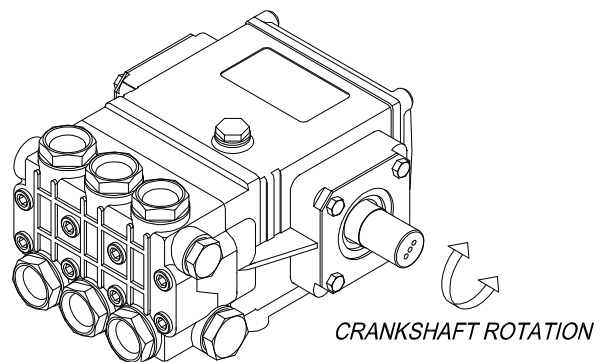
1. Remove the plugs holding the valve assemblies.
2. Remove and discard o-rings from the plugs. Clean plugs with solvent or soap and water. Allow to dry.
3. Using a needle nose pliers, fingers, or hook shaped tool, remove the valve assemblies from the head. Remove and discard the o-rings from the valve assemblies and/or head. Examine each valve assembly and discard damaged parts. Refer to the "PUMP BREAK-DOWN" for part numbers of any replacement items.
4. Clean any accumulated debris from the valve cavities and flush with water.
5. Wash the valve assemblies in clean water and rinse. While still wet, test each valve assembly by sucking on the valve seat. A properly sealing valve will allow a good vacuum to be developed and maintained, while a malfunctioning valve will not. Good valve assemblies should be set aside for installation in step 7.



6. Malfunctioning valve assemblies must be replaced.
7. Lubricate a new o-ring with the pump crankcase oil and install into valve cavity in the head. Install a good valve assembly into the cavity as illustrated.
8. Lubricate a new o-ring with pump crankcase oil and place on a plug cleaned in step 2 above.
9. Install a plug into the pump head. Tighten plug by hand.
10. Torque the plug to the value indicated in the "TORQUE" section of the pump specifications.
11. Repeat steps 7 through 11 for remaining valve assemblies.

## HEAD REMOVAL

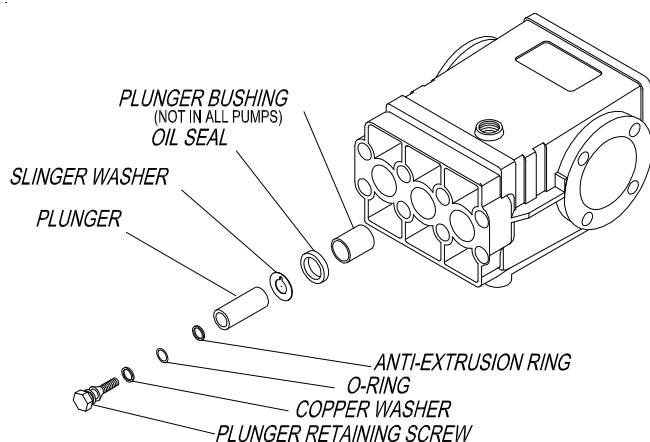
1. Remove the cap screws holding the pump head to the crankcase. A metric tool is required for this step. Be careful not to lose the washer on each cap screw.
2. Remove the head by rotating the crankshaft and tapping the head away from the crankcase with a soft mallet. Keep rear surface of the head parallel to the front surface of the crankcase to prevent binding on the plungers.
3. Once the head is removed, protect the plungers from damage.



## GENERAL PUMP MAINTENANCE

### PLUNGER SERVICE

1. Remove pump head per "HEAD REMOVAL".
2. Remove any packings and retainers left on the plungers by pulling them straight off.
3. Examine each plunger, looking for a smooth surface free of any scoring, cracks, or pitting. Any defective plungers should be removed per "PLUNGER REMOVAL".
4. Discard and replace any defective plungers.
5. Reinstall the plunger per "PLUNGER INSTALLATION".
6. Reinstall head per "HEAD INSTALLATION".



### PLUNGER REMOVAL

**NOTE:** When the plunger screw is removed, it is important to install new o-ring, anti-extrusion, and copper washers.

1. Remove the plunger screw is removed, it is important to install new o-ring, anti-extrusion, and copper washers.
2. Remove the plunger retaining screw by turning counterclockwise. Remove and replace copper washer.
3. Remove and discard o-ring and anti-extrusion ring from retainer screw.
4. Remove the plunger from the cross head and examine it for cracks, scoring, or pitting.
5. Remove and discard copper flinger washer, clean with solvent and allow to dry.

### PLUNGER INSTALLATION

1. Install the copper flinger washer onto the cross head.
2. Slide the plunger onto the crosshead.
3. Lubricate an o-ring with crankcase oil and install into the groove on the plunger screw. Install the anti-extrusion ring into the groove next to the o-ring. Note: The o-ring should be nearest the screw head and the anti-extrusion ring nearest the threads.
4. Apply a drop of thread sealant to the threads of the retainer screw.
5. Thread the plunger retainer screw into the cross head making sure the copper flat washer is installed onto the screw.
6. Torque the plunger retainer screw to the value indicated in the torque section of the pump specifications.

### PACKING SERVICE

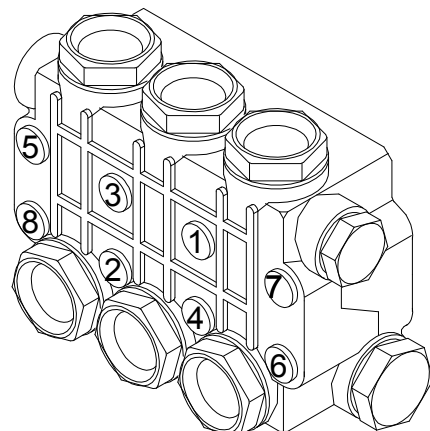
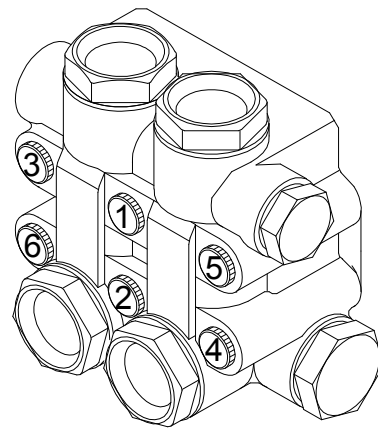
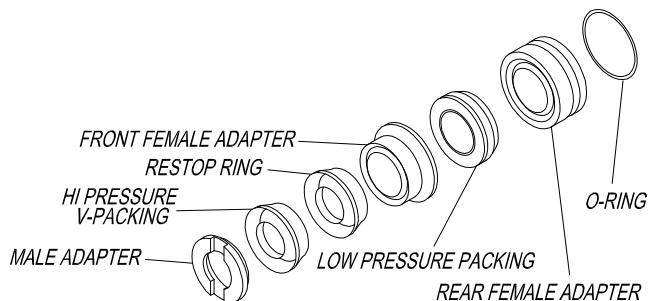
1. Remove the head per "PUMP HEAD REMOVAL".
2. Remove any packings and female adapters left on the plungers by pulling them straight off. Insert proper packing extractor onto the extractor hammer. Insert packing extractor and tool through the packings and adapters remaining in the head. Tighten the hammer and remove the remaining items in the head. Remove packings and o-rings from adapters. Discard the o-rings and packings.
3. Clean the packing canities in the head and rinse with clean water.
4. Clean exposed plungers. Clean male and female adapters with soap and water and allow to dry.
5. Examine male and female adapters, discard worn items. Trial fit the female adapters into the head checking for binding or damage. Discard and replace damaged items.
6. Lubricate packing cavities in the head and all packings and adapters with pump crankcase oil.
7. Lay head on the bench with packing cavities up. Install one male adapter in each cavity with the flat side down.
8. Install one v-packing into each cavity with the lips pointing down. A packing insertion too of the appropriate size is recommended for this operation.

## GENERAL PUMP MAINTENANCE

9. Install the restop ring with the lips pointing down.
10. Install a front female adapter into each cavity with the flat side up. Make certain the adapter goes all way down into the cavity.
11. Install the low pressure packing with the flat side down.
12. Install the rear female adapter into each cavity with the lips pointing down.
13. Lubricate o-rings with pump crankcase oil and install one into the groove of each adapter.
14. Install one adapter and o-ring into each cavity with the flat side up. Each adapter and o-ring assembly should push into the head to approximately 1/16 inch of being flush with the surface of the head. Only hand pressure should be required to perform this operation. This step is **VERY IMPORTANT**. If the rear female adapter does not fit almost flush, something is not properly positioned. If a proper fit is obtained, proceed to step 16. If a proper fit is not obtained, remove the female adapters from the offending cavity and reinstall items per steps 8 through 15.
15. Install head per "HEAD INSTALLATION".

## HEAD INSTALLATION

1. Prepare pump head per instructions in "PACKING SERVICE".
2. Rotate the plungers so the outer plungers are projecting the same distance from the crankcase.
3. Lubricate the exposed plungers with crankcase oil.
4. Start the head onto the plungers and using a soft mallet, tap the head evenly until it comes in contact with the crankcase.
5. Start the cap screws through the head and into the crankcase. Do not forget the lock washer on each screw.
6. Tighten all cap screws by hand.
7. Torque the cap screws to the value indicated in the "TORQUE" section of **PUMP SPECIFICATIONS**. Torque the cap screws in the order listed below.



## PUMP TROUBLESHOOTING

<b>TROUBLE</b>	<b>POSSIBLE CAUSE</b>	<b>REMEDY</b>
1. Oil leaking in the area of water pump crankshaft	A. Worn crankshaft seal B. Bad bearing C. Grooved shaft D. Failure of retainer o-ring	A. Remove and replace B. Remove and replace C. Remove and replace D. Remove and replace
2. Excessive play on crankshaft	A. Defective bearings B. Excess shims	A. See "Worn bearing" B. Set up crankshaft.
3. Oil leaking at the rear portion of the crankshaft.	A. Damaged or improperly installed oil gauge window gasket. B. Damaged or improperly installed rear cover. C. Oil gauge loosed D. Rear cover screws loose	A. Replace gasket or o-ring B. Replace gasket or o-ring C. Tighten oil gauge D. Tighten rear cover screws
4. Water in crankcase	A. May be caused by humid air condensing into water inside the crankcase. B. Worn or damaged plunger screw o-ring.	A. Maintain or step up lubrication schedule B. Remove and replace. See <b>PLUNGER SERVICE</b> in <b>PUMP MAINTENANCE</b>
5. Worn bearing	A. Excessive belt tension. B. Oil contamination.	A. See <b>BELT TENSION</b> in <b>MACHINE MAINTENANCE</b> B. Check oil type and change intervals per <b>PUMP SPECIFICATIONS</b>
6. Dirty or worn check valves.	A. Normal wear. B. Debris	A. Remove and replace B. Check for lack of water inlet screens
7. Presence of metal particles during oil change.	A. Failure of internal component. B. New pump	A. Remove and disassemble to find probable cause. B. New pumps have machine fillings and debris and should be drained and refilled per <b>PUMP SPECIFICATIONS</b>
8. Water leakage from under head.	A. Worn packing B. Cracked/scored plunger C. Failure of plunger retainer o-ring	A. Install new packing. B. Remove and replace plunger C. Remove and replace plunger retainer o-ring
9. Loud knocking noise in pump	A. Pulley loose on crankshaft B. Defective bearing C. Worn connecting rod D. Worn crankshaft E. Worn crosshead	A. Check key and tighten set screw B. Remove and replace bearing C. Remove and replace connecting rod D. Remove and replace crankshaft E. Remove and replace crosshead
10. Frequent or premature failure of the packing	A. Scored, damaged, or worn plunger B. Overpressure to inlet manifold C. Abrasive material in the fluid being pumped D. Excessive pressure and or temperature of fluid being pumped. E. Over pressure of pumps F. Running pump dry	A. Remove and replace plungers B. Reduce inlet pressure C. Install proper filtration on pump inlet pumping D. Check pressures and fluid inlet temperature; be sure they are within specified range E. Reduce pressure F. Do not run pump without water.

## PUMP TROUBLESHOOTING CONT.

<b>TROUBLE</b>	<b>POSSIBLE CAUSE</b>	<b>REMEDY</b>
11. Low Pressure	A. Dirty or worn check valves B. Worn packing	A. Clean/Replace check valves B. Remove and replace packing
12. Excessive vibration	A. Dirty or worn check valves	A. See "Dirty or worn check valves"
13. Scored plungers	A. Abrasive material in fluid being pumped.	A. Install proper filtration on pump inlet plumbing
14. Pitted plungers	A. Cavitations	A. Decrease water inlet temperature and/or water inlet pressure.
15. Cavitations	A. High inlet fluid temperature B. Low inlet pressure.	A. Lower inlet fluid temperature B. Raise inlet fluid pressure.
16. Loud knocking in pump	A. Loose connecting rod screws. B. Worn connecting rod. C. Worn bearings. D. Loose plunger bushing screw.	A. Tighten connecting rod screws per PUMP SPECIFICATIONS. B. Replace connecting rod per PUMP MAINTENANCE. C. Replace bearings per PUMP MAINTENANCE. D. Tighten plunger screw per PUMP SPECIFICATIONS.
17. Short bearing life	A. Excessive belt tension. B. Misalignments between pump and motor. C. Oil has not been changed on regular basis.	A. See BELT TENSION in MACHINE MAINTENANCE. B. Re-align pump and motor. C. Check oil type and change intervals per PUMP SPECIFICATIONS.
18. Short seal life	A. Damaged plunger bushing B. Worn connecting rod. C. Excess pressure beyond the pump's maximum rating. D. High water temperature.	A. Replace plunger bushing. B. Replace connecting rod. C. Match pressure stated in PUMP SPECIFICATIONS. D. Lower water temperature stated in PUMP SPECIFICATIONS.
19. Erratic pressure: pump runs rough	A. Dirty or worn check valves. B. Foreign particles in valve assemblies. C. High inlet water temperature.	A. Clean/Replace check valves. B. Clean/Replace check valves. C. See temperature in PUMP SPECIFICATIONS.

**PUMP MAINTENANCE RECORD**

**OIL CHANGE**

<i>MONTH / DAY / YEAR</i>	<i>OPERATING HOURS</i>	<i>OIL BRAND &amp; TYPE</i>

**NOTES**

<i>MONTH / DAY / YEAR</i>	<i>OPERATING HOURS</i>	<i>TYPE OF SEVICE</i>

## VALVE, METERING - P/N C03-00307

### OPERATION

#### **HANDLE**

Turning Chemical flow handle clockwise will shut off chemical flow.

#### **FLOW ADJUSTING SCREW**

Turning the flow adjusting screw clockwise lowers the chemical flow. Turning the screw counterclockwise lowers the flow.

### SPECIFICATIONS

Maximum Pressure.....4000 PSI / 276 BAR  
 Maximum Flow .....12 GPM / 45 LPM  
 Minimum Flow .....1.0 GPM / 3.8 LPM  
 MAXIMUM TEMPERATURE .....200F° / 93°C  
 WEIGHT.....0.75 LBS. / 0.33 KG  
 INLET.....1/4 FNPT  
 OUTLET .....1/4 FNPT  
 O-RINGS.....VITON  
 VALVE HOUSING MATERIAL.....BRASS

### MAINTENANCE

#### **VALVE STEM REMOVAL -**

1. Using screw driver remove cap (item 1A).
2. Holding handle and using socket remove nut (item 1B) and lock washer (item 1C) found inside handle.
3. Remove mounting nut (item 1E).
4. Holding valve housing (item 7), turn the valve retainer (item 2) counter clockwise be careful not to lose o-ring off bottom of retainer.
5. Holding the valve retainer (item 2) turn stem (item 4) counterclockwise until it comes out of the bottom of the retainer.

#### **VALVE STEM INSTALLATION -**

Reinstall in reverse order lubing o-rings before reinstallation.  
 Torque retainer (item 2) to 13 ft/lbs.

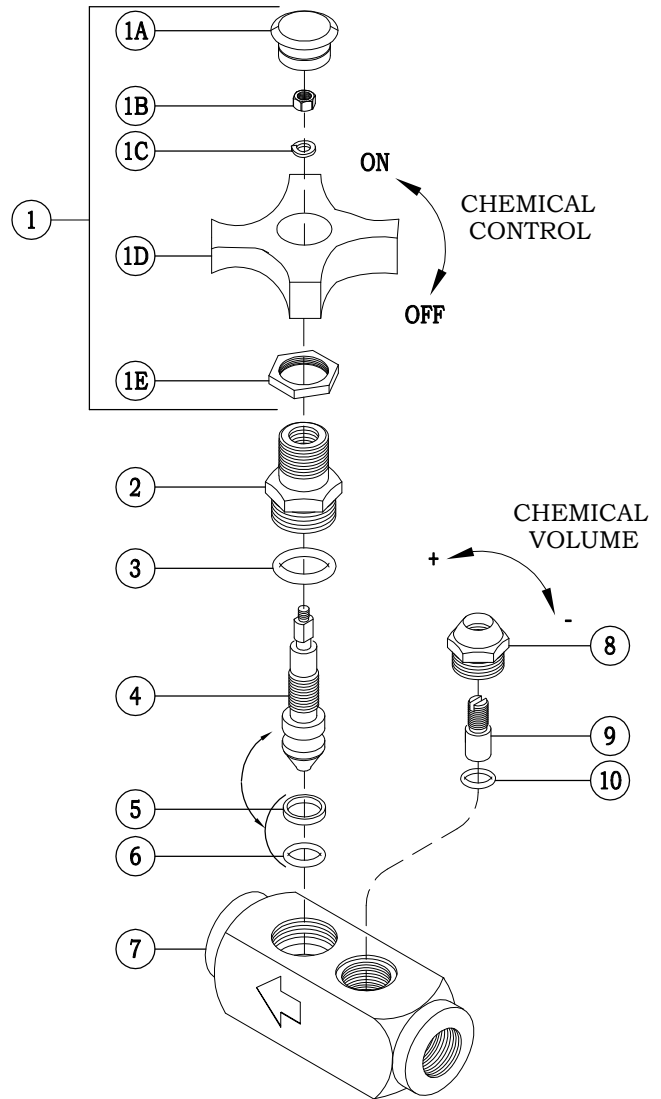
#### **REMOVE FLOW ADJUSTING SCREW -**

1. Remove the adjusting screw retainer (item 8) turning counter-clockwise.
2. Hold the retainer (item 8), using a screw driver turn the adjusting screw (item 9) clockwise until it comes out of the bottom.
3. Inspect screw for any nicks or scratches and replace as necessary.
4. Remove and replace o-ring (item 10).

#### **REINSTALL FLOW ADJUSTING SCREW -**

Reinstall in reverse order lubing o-rings before reinstallation.  
 Torque retainer (item 2) to 30 ft/lbs

### EXPLODED VIEW



### PARTS LIST

ITEM	PART NO.	DESCRIPTION
1	C07-00307-01	KIT, HANDLE
1A	-----	CAP, PLASTIC
1B	-----	NUT, HEX
1C	-----	WASHER, LOCK
1D	-----	HANDLE, ADJUSTMENT
1E	-----	NUT, HEX
2	-----	RETAINER, VALVE STEM
3	-----	O-RING - VITON 1/16CS X 3/16ID
4	-----	STEM, VALVE - SHUT-OFF
5	-----	RING, ANTI-EXTRUSOIN
6	-----	O-RING - VITON 3/32CS X 1/4ID
7	-----	HOUSING, VALVE
8	-----	RETAINER, ADJUSTING SCREW
9	-----	SCREW, ADJUSTING - FLOW
10	-----	O-RING - VITON 1/16CS X 1/8ID
	D01-00060	DECAL, METERING VALVE





# Warranty Policy

Machines are guaranteed to be free from defects in material or workmanship under normal use and service for a period of one year after delivery from the factory. Any part (other than vendor items) that is determined to be warranty will be repaired or replaced at **NO CHARGE** provided the warranty registration form is filled out in its entirety and the part is sent back freight prepaid.

All parts supplied to us by other manufacturers will be subject to their guarantee and warranty. Generators, motors, and engines are required by vendors to be repaired or replaced by authorized warranty repair stations. The manufacturer will assist you in locating warranty stations around the country in cases where that is necessary. Select items carry a six month warranty such as unloaders, trigger guns, etc.

The manufacturer, at its option, will repair or replace defective parts only, and does not allow for field labor charges for removal, installation, analysis, travel expense, or special freight expenses incurred for replacement parts.

Warranty does not apply to normal wear and tear including, but not limited to, freezing damage, freight damage, damage caused by misuse or misapplication, chemical related failures, contaminated filters and screens, moisture related fuel pump failures, stuck check valves, pump packings or seals, nozzles or orifices, paint, hoses, and gauges.

