



# **CaviBlaster 2022-E**

## **Operation & Maintenance Manual**





**CAVIDYNE, LLC IS NOT RESPONSIBLE FOR DAMAGES OR INJURY RESULTING FROM FAILURE TO COMPLY WITH INSTRUCTIONS IN THIS MANUAL. PLEASE READ THE ENTIRE MANUAL CAREFULLY BEFORE USE.**



**COMMERCIAL DIVER'S GEAR SHOULD BE USED TO OPERATE THE CAVIBLASTER SYSTEM.**



**THIS EQUIPMENT GENERATES HIGH PRESSURE WATER AND IS INTENDED FOR UNDERWATER USE ONLY. SERIOUS PERSONAL INJURY OR DEATH MAY RESULT FROM IMPROPER USE.**



**THE CAVIBLASTER 2022-E MUST ONLY BE OPERATED AND MAINTAINED BY TRAINED PERSONNEL.**



**ELECTRIC SHOCK CAN CAUSE SEVERE BURNS OR DEATH. GROUND SYSTEM BEFORE CONNECTING POWER SUPPLY. USE DEDICATED CIRCUIT INSTALLED BY A LICENSED ELECTRICIAN. CIRCUIT SHOULD SUPPLY ADEQUATE VOLTAGE AND AMPERAGE UNDER LOAD.**

## Unit Specifications:

The CaviBlaster 2022-E Power Unit consists of a 40HP (29.9 kW) electric motor and an AR-RTX-100.120 N Plunger Pump.

Detailed performance and specifications are listed below:

| CaviBlaster 2022-E/60 Specifications |                                                                                                                                   |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Nominal Pump Flow                    | 24.6 GPM (93 LPM)                                                                                                                 |
| Nozzle Operating Pressure            | 2,200-PSI (151 BAR)                                                                                                               |
| Motor                                | 40 HP 3PHASE 230/460V @ 60Hz                                                                                                      |
| Installation Environment             | Indoor or Outdoor<br><i>See Section 4 for installation requirements</i>                                                           |
| Water Inlet Pressure Limits          | 0-PSI (Atmospheric Pressure) to <b>50-PSI Maximum</b><br>(0 BAR to <b>3.5 BAR</b> ) <i>See Section 4 for further requirements</i> |
| Overall Unit Dimensions (L x W x H)  | 50" x 40" x 42" (127 cm x 101 cm x 107 cm)                                                                                        |
| Maximum Pressure Hose Length         | 300 LF (100 meters) of 3/4" diameter thermoplastic                                                                                |
| Power Unit Weight (Dry)              | 1,225 LBS (557 KG)                                                                                                                |
| Zero-Thrust Gun Weight               | 11 LBS (5 KG)                                                                                                                     |

**Figure 1.1 – CaviBlaster 2022-E60 Specifications**

| CaviBlaster 2022-E/50 Specifications |                                                                                                                                   |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Nominal Pump Flow                    | 24.6 GPM (93 LPM)                                                                                                                 |
| Nozzle Operating Pressure            | 2,200-PSI (151 BAR)                                                                                                               |
| Motor                                | 40 HP 3PHASE 230/460V @ 50Hz                                                                                                      |
| Installation Environment             | Indoor or Outdoor<br><i>See Section 4 for installation requirements</i>                                                           |
| Water Inlet Pressure Limits          | 0-PSI (Atmospheric Pressure) to <b>50-PSI Maximum</b><br>(0 BAR to <b>3.5 BAR</b> ) <i>See Section 4 for further requirements</i> |
| Overall Unit Dimensions (L x W x H)  | 50" x 40" x 42" (127 cm x 101 cm x 107 cm)                                                                                        |
| Maximum Pressure Hose Length         | 300 LF (100 meters) of 3/4" diameter thermoplastic                                                                                |
| Power Unit Weight (Dry)              | 1,225 LBS (557 KG)                                                                                                                |
| Zero-Thrust Gun Weight               | 11 LBS (5 KG)                                                                                                                     |

**Figure 1.2 – CaviBlaster 2022-E50 Specifications**

## **General Description:**

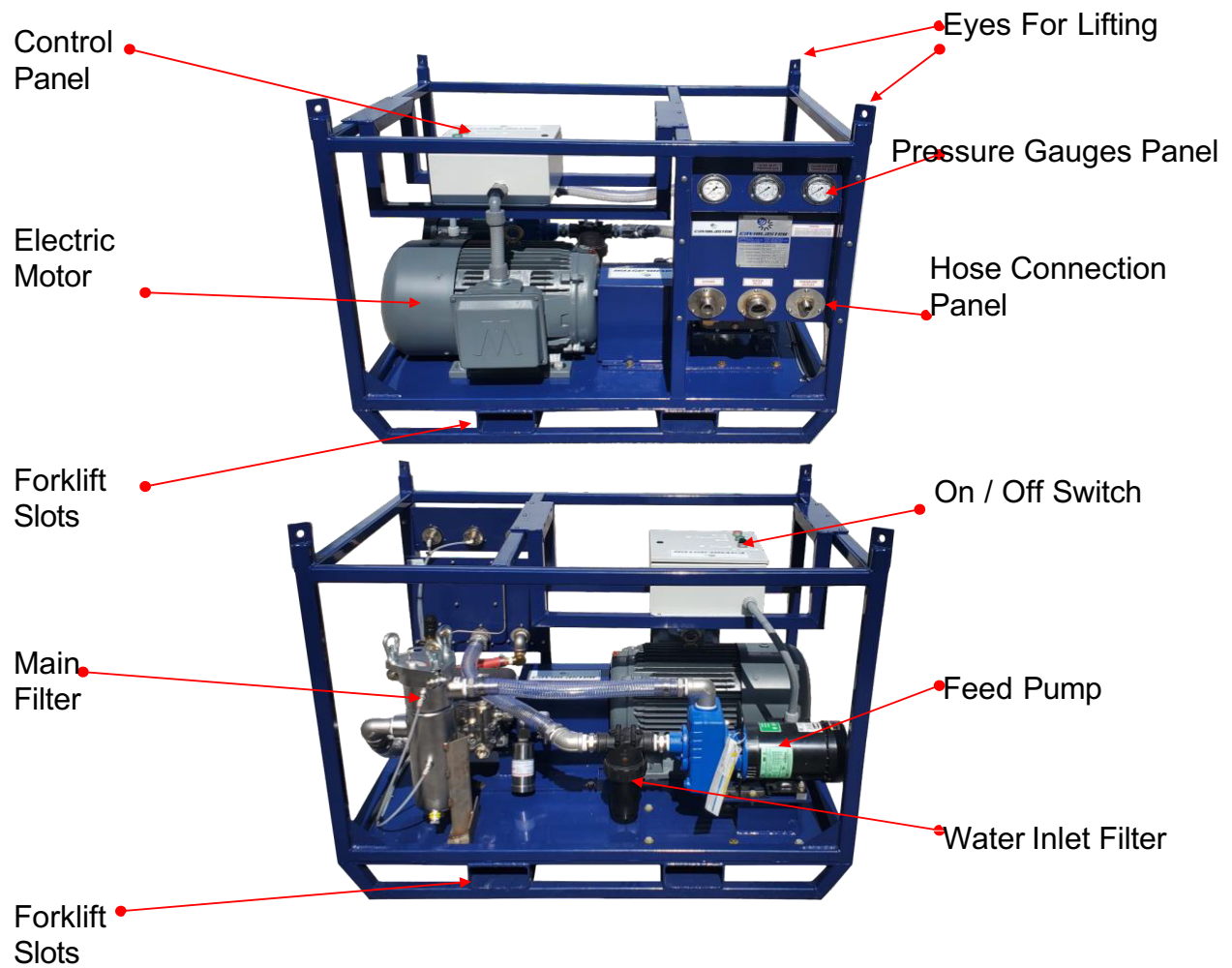
The CaviBlaster 2022-E high-pressure waterpower unit is designed to use water flow and pressure to generate cavitation at the end of the proprietary nozzle.

The CaviBlaster cleans the surface of any underwater structure using the energy released by the implosion of the bubbles created during the cavitation process. When directed at the surface being cleaned, the energy released by the collapsing bubbles causes marine growth to be removed from the surface.

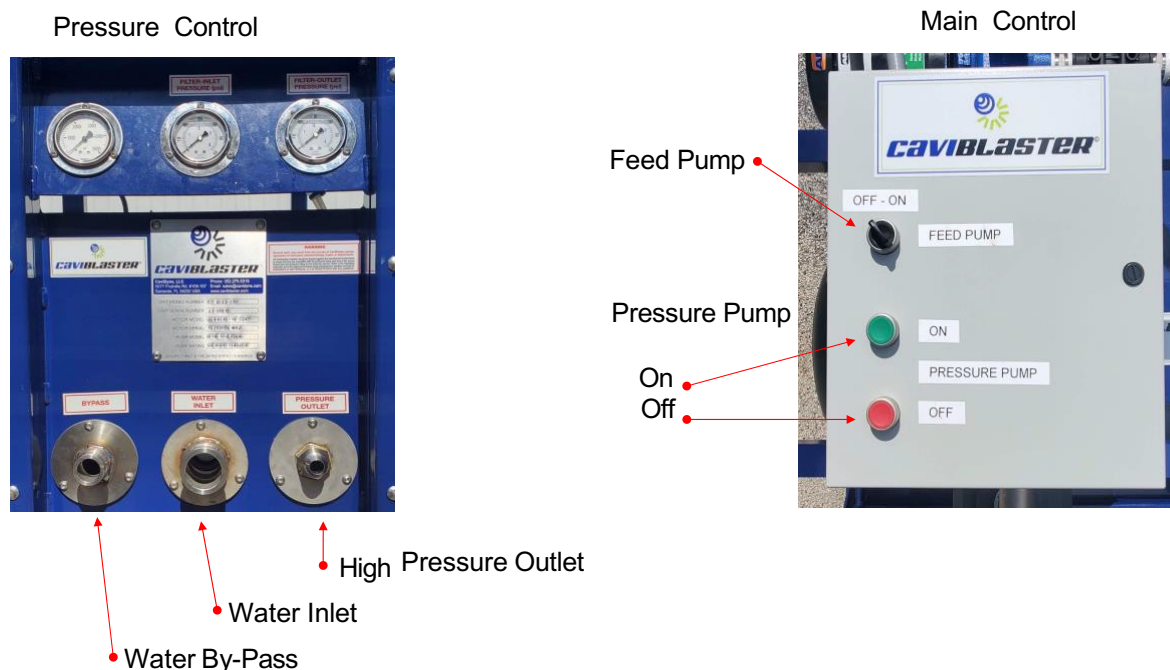
The system consists of a portable, zero-thrust gun, connecting high-pressure hose and an electric motor-powered, high-pressure pumping unit. The zero-thrust gun uses a trigger-operated valve to control the water stream off and on. If the valve is closed, the power unit goes into bypass mode unloading the engine and the pump.

The CaviBlaster 2022-E Power Unit is a complete “plug and play” system built into a self-supporting frame that allows quick deployment and/or installation of the unit. Water can be supplied from either a pressurized source, directly from the natural source via an electric booster pump supplied with the power unit, or from a gravity feed storage tank.

The unit is equipped with many features to maintain operator safety while operating at pressures of 2,200-PSI (151 BAR).



**Figure 2.1 – CaviBlaster 2022-E General Features**



**Figure 2.2 – CaviBlaster 2022-E Control Panel**

## Using This Manual:

Every attempt has been made to ensure that this documentation is complete and accurate at the time of publication. It is imperative; however, that anyone attempting to use this manual must have good comprehension of how this equipment operates. Further, this manual can in no way replace the common sense of an individual. If at any time this manual seems to contradict itself, or common sense, discontinue the procedure, re-read the section, and seek assistance from CaviDyne, LLC or other personnel familiar with the operation of this equipment.

## Safety Information:

The CaviBlaster 2022-E Power Unit is an inherently powerful and potentially dangerous piece of equipment; however, with proper care and training it can be operated safely. The 2022-E must only be operated by personnel that have read and understand this manual. It is intended to reinforce and review safety techniques to prevent personal injuries and property damage.

Users must comply with all local, state, and national laws concerning high-pressure water jetting equipment as well as all underwater work regulations.

It is strongly recommended that this entire manual be reviewed in-depth before operating or servicing this equipment. Service work should only be performed by individuals who are proficient in using this equipment. Refer to the applicable section in this manual for the correct procedures prior to any installation, setup, or maintenance work.

## Personal Safety:

Operation of the CaviBlaster 2022-E underwater cleaning system must only be attempted by commercial divers or other personnel who have been trained in its use. Appropriate protective equipment should always be worn. Operation of the system without the proper equipment and training can result in personal injury.



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**IF MAINTENANCE OR REPAIR OF THE CAVIBLASTER GUN IS BEING CONDUCTED OUT OF THE WATER, REMEMBER THAT THE ZERO- THRUST GUN HAS FRONT AND REAR JETS. NEVER DIRECT THE JET STREAMS AT A PERSON OR ANIMAL, OR TOWARD POWER LINES OR OTHER HIGH VOLTAGE EQUIPMENT.**



**ENSURE THAT THERE IS A SAFE AREA TO WORK WHILE OPERATING THE CAVIBLASTER 2022-E.**



**SEEK IMMEDIATE MEDICAL ATTENTION IF THE OPERATOR SUFFERS AN INJURY AS THE RESULT OF CONTACT WITH THE HIGH-PRESSURE WATER STREAM. SERIOUS PERSONAL INJURY CAN RESULT FROM AN UNTREATED WATER INJECTION WOUND.**

## Personal Protective Equipment:

Always wear appropriate Personal Protective Equipment (PPE) when operating this equipment.

Personnel operating or working in the vicinity of the power unit should wear appropriate hearing protection when the CaviBlaster system is in use. If the diver is not wearing a diving helmet, hearing protection is recommended. CaviDyne, LLC recommends wearing vented earplugs such as “Doc’s Pro-plugs” for diver hearing protection.

The operators of the CaviBlaster system should always wear neoprene or heavy rubber gloves to provide protection to the hands and nails. The gloves will absorb most of the energy produced by bursting cavitation bubbles and prevent the cavitation bubbles from contacting the operators’ hands. The gloves will also protect operators’ hands from the initial shock wave when the Z/T-Gun / CaviDome is activated.



**FAILURE TO WEAR APPROPRIATE PPE MAY RESULT IN PERSONAL INJURY.**

## Modification to the Equipment:

Do not make any unauthorized modifications or repairs to this equipment. Components used throughout this assembly were specifically designed or selected to safely meet the unique high-pressure requirements. Only replace parts with those recommended by or supplied by CaviDyne, LLC. Any unapproved modifications will void the equipment warranty. Unauthorized modification or part substitution can result in serious personal injury or property damage.



**UNAUTHORIZED REPLACEMENT OF ANY PART MAY LEAD TO CATASTROPHIC EQUIPMENT FAILURE AND SERIOUS PERSONAL INJURY.**

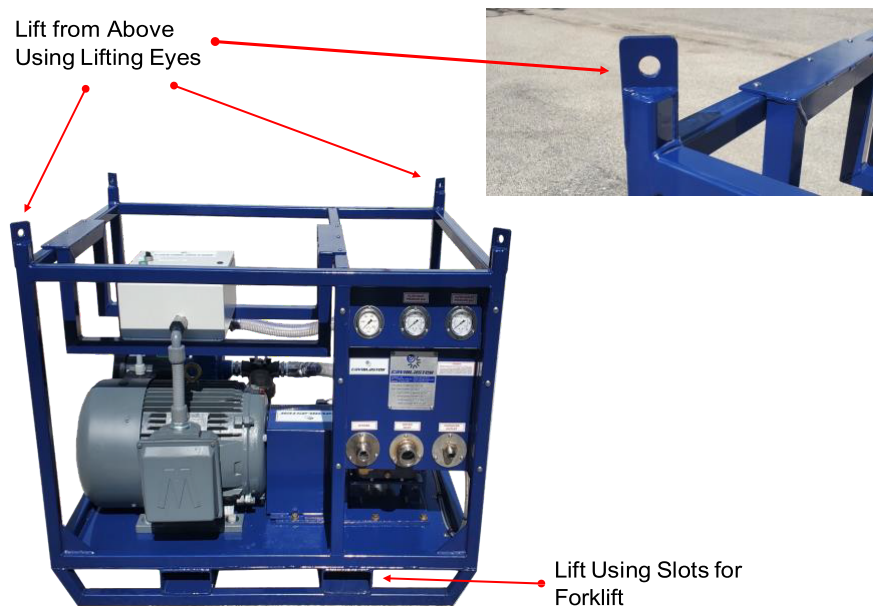
## Installation:

The CaviBlaster 2022-E must be installed in accordance with the requirements outlined below. The unit can be installed in a vehicle to allow for maximum mobility and flexibility.

## Uncrating and Lifting:

Unpack the equipment and inspect for damage. If damage is found, immediately contact CaviDyne and the shipping company. **If there are missing parts/spare parts, contact freight carrier or insurance company.** If the unit will not be installed immediately, provide adequate indoor storage to protect against damage.

The CaviBlaster Power Unit should be lifted from underneath the frame using the forklift channels or by using the lifting eyes provided on top of the frame. Verify that lifting equipment is rated for the weight listed in **Section 1.0 UNIT SPECIFICATIONS** and that the unit is stable before lifting.



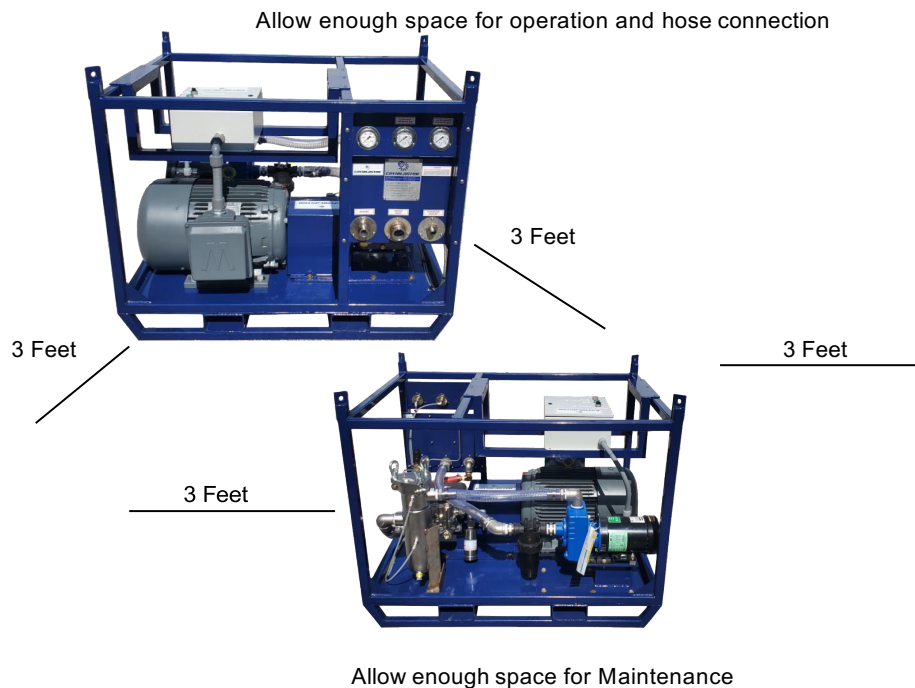
**Figure 4.1 – Lifting Guidelines**

## Installation Location:

For maximum flexibility the CaviBlaster Power Unit should be installed in an area where it can reach both its water source and anticipated cleaning targets within acceptable hose lengths. The CaviBlaster Power Unit can be installed in an enclosed or open environment.

*\* Enclosed installations will require provisions for adequate motor cooling air flow. See **Figure 4.2** below.*

Installation location must be a level surface able to safely support the unit weight listed in **Section 1.0 UNIT SPECIFICATIONS**. Position the unit to allow unrestricted access to the hose connection plate and control panel, located on the front of the unit. Allow a minimum of three feet behind the unit and access from above to conduct service and repair work. Take note of frequently serviced areas such as the in-line strainers and motor couplings.



**Figure 4.2 – Installation Guidelines**

## Initial Set-Up:

After first receiving the CaviBlaster Power Unit, the following must be checked and completed:

1. Check / Add pump oil.
2. Push in the Emergency Motor Shut Down (E-Stop) button.
3. Turn the main power switch to the “OFF” position.
4. Turn the motor switch to the “OFF” position.
5. Turn the feed pump switch to the “OFF” position.
6. Connect the power cable supplied by customer for the unit to the power source.
7. Close and lock the control panel door.
8. Set the pump unload ball valve to the “OPEN” position.
9. Connect the feed or suction hose (See **Section 4.3.2**).
10. Connect the bypass hose (See **Figure 2.2**).
11. Connect the pressure hose (See **Figure 2.2**).



**ENGINE AND/OR PUMP FLUIDS MAY HAVE BEEN REMOVED FOR SHIPMENT. CHECK FLUID LEVELS PRIOR TO STARTING.**

## Connecting the Water Source:

The CaviBlaster Power Unit can be used with seawater or fresh water. It must be flushed with fresh water for 1-2 minutes after each use in seawater to ensure long service life.



**THE CAVIBLASTER 2022-E MUST BE FLUSHED AND RINSED WITH FRESH WATER AFTER EVERY USE IN SEAWATER.**



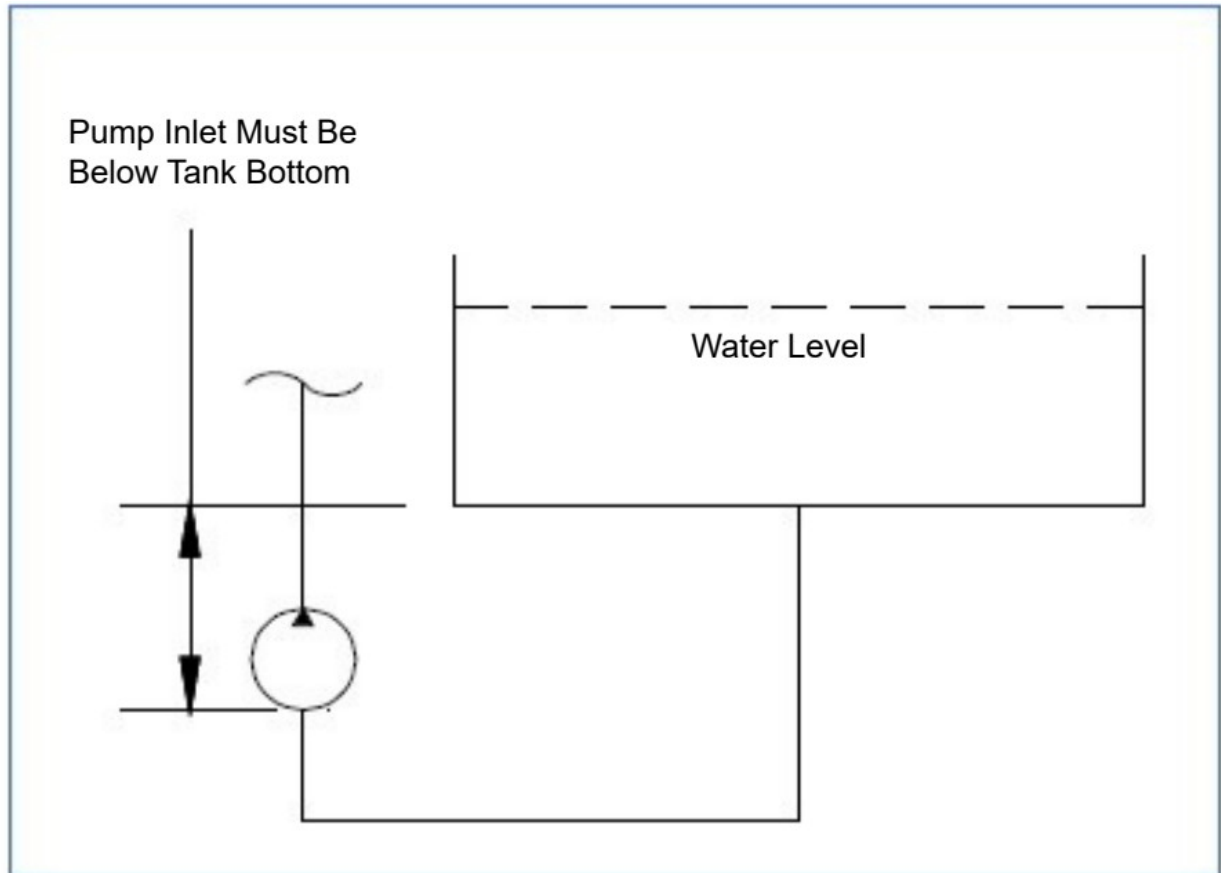
**FAILURE TO FLUSH AND RINSE THE POWER UNIT AFTER USE IN SEAWATER WILL RESULT IN INCREASED WEAR AND TEAR ON COMPONENTS AND IN DECREASED SERVICE LIFE.**



**FAILURE TO FLUSH AND RINSE THE UNIT CAN CAUSE THE PUMP VALVE(S) TO STICK IN THE OPEN POSITION. THIS WILL PREVENT THE SYSTEM FROM PRODUCING THE CORRECT OPERATING PRESSURE.**

The feed water inlet connection is located on the control panel (See **Figure 2.2**). An electric water pump is installed to provide positive inlet water pressure to the main pressure pump. Two water supply conditions are acceptable for the CaviBlaster Power Unit.

- Forced inlet water condition using the supplied electric water pump. An outside water source capable of supplying at least 40 GPM (152 L/m) at a maximum pressure of 50-PSI (3.5 BAR) is optional.
- Gravity feeding water source (See **Figure 4.3**). Use a hose with a diameter of at least 1-1/2" to connect the water tank to the power unit water inlet.



**Figure 4.3 – Gravity Feeding Source**

## To Use the Feed Hose Supplied with the System:

1. Turn the main power switch, motor switch and feed pump motor to “OFF”.
2. Push “IN” the E-Stop button to ensure that the power supply has been disconnected. (See **Figure 2.2**).
3. Connect the cam-lock socket on the 1 1/2” clear PVC feed hose to the water inlet connection on the control panel (See **Figure 2.2**). Place the other end of the hose in the water supply.

## To Use Force Feed from an Alternate Source:

- Turn the main power switch, motor switch and feed pump motor to “OFF”.
- Push “IN” the E-Stop button to ensure that the power supply has been disconnected (See **Figure 2.2**).
- When feeding the CaviBlaster with an alternate water source, the source must supply water at a volume of greater than 30 gallons per minute (114 L/m) at a maximum pressure of 75-PSI.
- Connect a 1 1/2” cam-lock socket on the water supply hose to the water inlet connection on the control panel (See **Figure 2.2**).
- Be certain the unit is properly primed prior to starting the main pump motor.

## To Use Gravity Feed:

1. Locate the water supply tank so that the outlet of the tank is higher than the water inlet on the control panel (See **Figures 2.2 and 4.3**).
2. Turn the main power switch, motor switch and feed pump switch to “OFF”.
3. Push “IN” the Emergency Motor Shut-Down button to ensure power has been disconnected (See **Figure 2.2**).
4. Connect a minimum 1 1/2” hose to the water inlet 1 1/2” cam-lock plug.
5. Connect the other end of the hose to the water supply tank outlet.
6. Open any valves installed in the water supply line.
7. Make sure the lowest point in the hose line is the connection with the power unit.

**NOTE:** It is essential that adequate water is supplied to the water supply tank to maintain the water level several inches above the tank outlet. Failure to maintain an adequate water level in the supply tank could starve the pressure pump of water causing damage to the seals or other components of the pressure pump.

Ensure that the water source can reliably deliver the maximum pump flow of 40 GPM (76 L/m). A minimum flow of 30 GPM (152 L/m) is recommended to ensure that the pump is not starved of water. If connecting to a gravity feed tank, locate the tank outlet above the water inlet connection on the power unit to ensure a flooded suction line (See **Figure 4.3**).



**ENSURE THAT THE FEED HOSE IS CONNECTED TO THE INLET CONNECTION AND THE WATER SUPPLY IS ON PRIOR TO STARTING THE PRESSURE PUMP. FAILURE TO SUPPLY WATER TO THE PRESSURE PUMP WILL CAUSE DAMAGE TO THE PUMP.**

## **Operation:**

The CaviBlaster 2022-E should be operated by two (2) properly trained individuals. One, the diver, operates the zero-thrust gun, while the other operates the power unit. Both operators should be in audio or visual communication with each other.

**The CaviBlaster 2022-E should only be operated by properly trained personnel who are familiar with the contents of the manual. Review the safety requirements found in Section 3.0 before operating.**

## **Preparing the Unit for Operation:**

The following checklist should be completed in advance, so that the unit is always ready for immediate use. This should be completed after each use.

1. Inspect the CaviBlaster Power Unit, electric power cord, hoses, JIC fittings and zero-thrust gun for any signs of damage.
2. Check that the motor is clean, and ventilation openings are clear.
3. Inspect the inline strainer to ensure that it is not clogged (See **Figure 6.1**). Clean if necessary.
4. Check for proper pressure pump oil level (See **Pump Owner's Manual**). Add lubricating oil (SAE 30 non-detergent) if necessary.

## **Startup of the CaviBlaster:**

Before starting the CaviBlaster 2022-E Power Unit, review all safety requirements found in **Section 3.0 SAFETY INFORMATION**. This equipment should only be operated by individuals who have read and understand the CaviBlaster Operation and Maintenance Manual.

1. Verify that the unit has been properly prepared for operation as described in **Section 4**.
2. Unroll sufficient length of hose to reach the operating location and connect the zero-thrust gun to the high-pressure hose.
3. Ensure appropriate protective equipment (PPE) is worn by all personnel operating the unit. Once the unit is ready to commence cleaning operations, ensure that the zero-thrust gun is submerged in water.
4. Turn the E-Stop button and pull out to release (See **Figure 5.1**).
5. Turn the main power switch "ON".
6. Turn the feed pump switch "ON", the green light will turn on. Wait for feed pump to completely prime the system.
7. Turn the motor switch "ON" and wait for the blue light to turn on.

- a. **NOTE:** The motor is equipped with a “soft start” starter and may take 3-4 seconds for the motor to start after being turned “ON.”
8. The diver and operators must wear neoprene or rubber gloves to protect the hands when operating the unit. Follow all safety regulations that may be applicable to the work being performed.
9. With the zero-thrust gun submerged, pull the trigger to the open or “ON” position to release dead-headed pressure in unit while attempting start-up of the unit. Release trigger at once. (See **Figure 5.3**)
10. The system is now ready to operate.



**DO NOT THROTTLE UP THE ENGINE UNTIL THE DIVER IS READY FOR UNDERWATER OPERATION.**

## Normal Operation:

Normal operation of the CaviBlaster system is defined as user control of water flow via the zero-thrust gun trigger. Control of the power unit from the zero-thrust gun trigger is accomplished by a mechanical shut-off valve in the zero-thrust gun. Should a problem develop with the control valve, discontinue using the CaviBlaster until fixed.



**REVIEW THE SAFETY REQUIREMENTS FOR PPE AND SAFE OPERATION BEFORE PROCEEDING.**

1. Startup the power unit as described in **Section 5.2**.
2. Activate the cleaning cavitation stream by squeezing the trigger to the open or “ON” position (See **Figure 5.3**). Release trigger to stop the water flow and direct to bypass.
3. If the diver operating the unit must be replaced or the cleaning operation must be interrupted or terminated, turn the unit off and then release the water pressure in the hose(s) by squeezing the zero-thrust gun trigger to the open or “ON” position (See **Figure 5.3**) while under water. Revert to step 5.2 of the operating instructions when the diver or replacement is ready to continue cleaning.



**ALTHOUGH THE CAVIBLASTER SYSTEM IS SAFE TO USE WHEN SUBMERGED IN WATER, THE SYSTEM GENERATES A HIGH-PRESSURE (UP TO 2,200-PSI [151 BAR]) WATER STREAM, WHICH CAN CAUSE INJURY WHEN THE ZERO-THRUST GUN IS OUT OF THE WATER. ALWAYS KEEP THE ZERO-THRUST GUN SUBMERGED WHEN THE PRESSURE PUMP IS RUNNING.**

## Adjusting the CaviBlaster for Maximum Performance:

The pressure at the nozzle of the zero-thrust zero-thrust gun must be maintained within certain limits to achieve cavitation and for best performance results. If using a calibration pressure gauge situated between the pressure hose and the CaviBlaster zero-thrust gun, (See **Figure 5.2**) the water pressure should be 2,200-PSI (151 BAR) with the zero-thrust gun submerged and the zero-thrust gun trigger in the open or “ON” position. For best results, repeat this calibration procedure if cleaning performance degrades, or every 3 months.



**A CALIBRATION TEST GAUGE IS RECOMMENDED WITH EVERY UNIT. CONNECT BETWEEN THE END OF THE THERMOPLASTIC HOSE AND THE TOOL THE WHIP HOSE OR ZERO-THRUST GUN. SEE FIGURE 5.2.**

### To Calibrate the Pressure at The Zero-Thrust Gun, Follow the Procedure Below:

- Stop the Power Unit and pull the zero-thrust gun trigger to discharge any residual pressure in the hose lines.
- Disconnect the zero-thrust gun with its whip hose from the main pressure hose line.
- Attach the calibration gauge to the main pressure hose line and reattach the whip hose to the pressure gage. Tighten the JIC connections.
- Submerge the zero-thrust gun because of the danger of the operator encountering either of the water streams from the cavitating or zero-thrust nozzles, CaviDyne does **NOT** recommend calibrating the zero-thrust gun out of the water. Use extra care to avoid both water streams if doing so.
- Ensure that both the cavitation and zero-thrust nozzles are pointed away from the diver's or operator's hands, arms and body.
- Start the power unit (See **Section 5.2**).
- Pull the zero-thrust gun trigger to the open or “ON” position (See **Figure 5.3**).
- Hold the zero-thrust gun tight and observe the calibration gauge (See **Figure 5.2**).
- The power unit operator should turn the knob on top of the pressure regulating valve until pressure reads 2,200-PSI (151 BAR) on the calibration gauge. Turning the knob clockwise will increase the pressure and turning it counterclockwise will decrease the pressure.

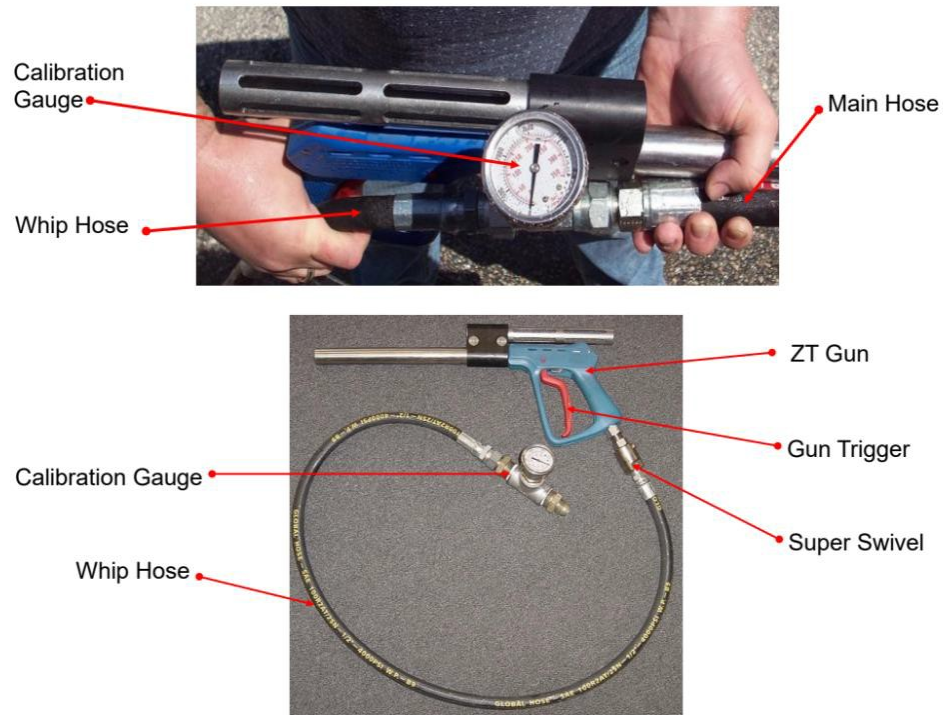
To calibrate the pressure at the CaviBlaster Power Unit, the water pressure at the power unit will need to be higher to account for sidewall friction loss in the pressure hose. The pressure at the pump should be 2,200-PSI (151 BAR) plus 0.5-PSI per foot (0.11 BAR per meter) of thermoplastic pressure hose. For example, if using the CaviBlaster with 100 feet (30 meters) of pressure hose, the pressure gauge located next to the pump should indicate 2,250-PSI (155 BAR). Pressure adjustments are made by turning the knob on top of the pressure regulating valve in the same manner as described above.



**DO NOT ADJUST THE PRESSURE AT THE ZERO-THRUST GUN TO MORE THAN 2,200-PSI. HIGHER PRESSURE WILL NOT IMPROVE PERFORMANCE.**



**HOSE LINES ARE RATED FOR 2,500 PSI. PRESSURES ABOVE 2,500 PSI COULD RESULT IN HOSE FAILURE.**



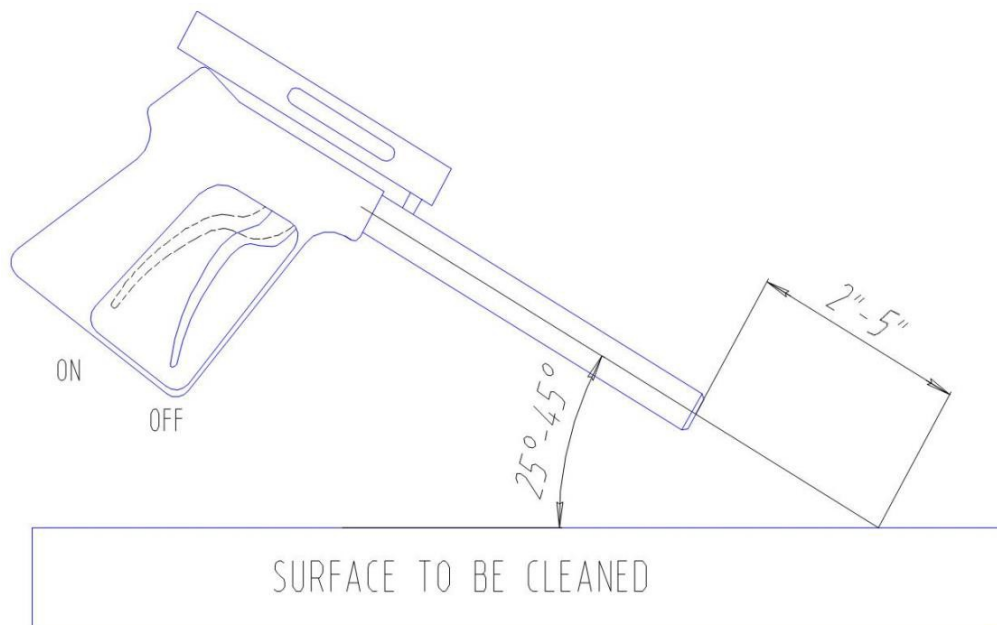
***Figure 5.2 – Zero-Thrust Gun Pressure Calibration***

## Recommendations for Effective Results:

Once the unit is operating at normal speed and the zero-thrust gun trigger is pulled, the diver must find the most effective distance between the zero-thrust gun nozzle and the surface being cleaned.

When the diver is ready to commence cleaning operations, ensure that the zero-thrust gun trigger is in the open or “ON” position (See **Figure 5.3**), the zero-thrust gun is submerged in the water and the feed pump is operating prior to starting the electric motor. Ensure that the power unit operator and other people working in the vicinity of the power unit wear appropriate hearing protection when the unit is running.

1. Engage the pressure pump by turning the start-up by-pass valve to the “CLOSED” position (See **Figure 5.1**).
2. The most efficient operating technique is to hold the nozzle 2-5 inches (5-8 cm) away from the surface to be cleaned and at a 25-to-45-degree angle to the surface being cleaned (See **Figure 5.3**). The diver needs to observe the shape of the cavitating jet cone. At greater depths, the higher ambient pressure will cause the jet cone to be shorter. The widest zone of the cone is the most efficient part of the cavitating jet. Placing the nozzle closer than 2 inches (5 cm) from the surface being cleaned will not allow for efficient cavitation performance and will degrade the cleaning capability of the CaviBlaster system.
3. Follow all safety regulations that may be applicable to the work being performed.
4. If the diver operating the unit must be replaced or the cleaning operation must be interrupted or terminated, turn the unit off and then release the water pressure in the hose(s) by squeezing the zero-thrust gun trigger to the open or “ON” position (See **Figure 5.3**) while under water. Revert to step 5.2 of the operating instructions when the diver or replacement is ready to continue cleaning.



**Figure 5.3 – Zero-Thrust Gun Position for Best Results**



**CAUTION: DO NOT USE IT TO CLEAN SENSITIVE SURFACES AS LED LIGHTS, UNDERWATER LIGHTS, ELECTRONIC EQUIPMENT, ETC.**

## **Shutting Down the CaviBlaster:**

1. Stop the motor by turning the motor switch to the “OFF” position (See **Figure 2.2**).
2. Turn the feed pump switch to the “OFF” position (See **Figure 2.2**). If using force feed from an alternate source or if using gravity feed, shut off the supply of water to the pressure pump.
3. Turn the main switch to the “OFF” position.
4. Push in the E-Stop button.
5. Squeeze the zero-thrust gun trigger to the open or “ON” position (See **Figure 5.3**) to release the water pressure remaining in the hose(s) while the zero-thrust gun is submerged.
6. It is now safe to remove the zero-thrust gun from the water.
7. Flush the system and rinse the power unit with fresh water at the end of the day if the system has been used with seawater.

## **Maintenance:**

Maintenance on this unit should be restricted to authorized personal that have been properly trained. Review this manual, especially **Section 3.0 SAFETY INFORMATION**, prior to performing any service on this equipment.



**FAILURE TO FLUSH AND RINSE THE UNIT WILL RESULT IN PREMATURE WEAR AND TEAR ON THE COMPONENTS AND DECREASED SERVICE LIFE.**



**EQUIPMENT MUST BE “OFF” PRIOR TO ANY SERVICE WORK.**



**ONLY REPLACE PARTS WITH THOSE SUPPLIED OR APPROVED BY CAVIDYNE, LLC. USE OF ANY OTHER PARTS MAY LEAD TO EQUIPMENT FAILURE AND SEVERE PERSONAL INJURY**



**FAILURE TO FLUSH AND RINSE THE UNIT CAN CAUSE THE PUMP VALVE(S) TO STICK IN THE OPEN POSITION. THIS WILL PREVENT THE SYSTEM FROM PRODUCING THE CORRECT OPERATING PRESSURE.**



**THE CAVIBLASTER 2022-E MUST BE FLUSHED AND RINSED AFTER EACH USE IN SEA WATER.**

## Basic Preventive Maintenance Recommendations:

| Task                                                                   | Before and After Every Use | Every 6 Months or 125 Hours* | Every 6 Months or 500 Hours* | Every 12 Months or 500 Hours* | Every 1,000 Hours | Every 4 Years or 7,500 Hours* |
|------------------------------------------------------------------------|----------------------------|------------------------------|------------------------------|-------------------------------|-------------------|-------------------------------|
| Check pump oil level and add if low                                    | X                          |                              |                              |                               |                   |                               |
| Check in-line strainer cartridge and clean if necessary                | X                          |                              |                              |                               |                   |                               |
| Inspect hoses for wear or damage                                       | X                          |                              |                              |                               |                   |                               |
| Check zero-thrust gun trigger for leakage and repair if necessary      |                            | X                            |                              |                               |                   |                               |
| Check integrity of motor winding insulation with "megger" test         |                            |                              | X                            |                               |                   |                               |
| Replace pump oil                                                       |                            |                              |                              | X                             |                   |                               |
| Check pump valves and seals for wear & change if necessary             |                            |                              |                              |                               | X                 |                               |
| Lubricate motor bearings with high grade ball or roller bearing grease |                            |                              |                              |                               |                   | X                             |

\* Whichever occurs first.

- 1) If any hose damage is found, replace hose immediately.
- 2) Remove zero-thrust gun from water with system at operating pressure and trigger in the closed or "OFF" position. If water is leaking out of barrel or handle, the valve is worn and should be replaced.
- 3) The initial oil change is after 50 hours of operation. See pump manufacturer's literature in the Appendix for additional recommendations.

## Pump Service:

The high-pressure water pump requires minimal maintenance. The pump oil level should be checked on a regular basis. The pump crankcase holds 44 oz. (1.3 L) of SAE 30 viscosity non-detergent oil. See ***pump manufacturer's literature*** for further information.

## Inspection / Cleaning of Water Inlet Strainer and Main Filter:

The water inlet strainer should be inspected before and after each use of the CaviBlaster 2022-E. To inspect and clean this strainer, follow the procedure below:

1. Isolate or disconnect the water source from the inlet connection to the power unit.
2. Unscrew the filter bowl from the filter housing (turn counterclockwise) (See ***Figure 6.1***).
3. Pull filter bowl down and remove the strainer.
4. Inspect the strainer and flush any debris clean with clean water.
5. Push strainer back into housing and push the bowl back onto filter housing.
6. Thread the bowl clockwise onto the housing nut to hand tighten.



Unscrew the top.



Pull case down to reveal the filter.



Check filter. Clean if necessary



Place filter back in case.



Unscrew and remove 3 bow screws.



Pull lid up to reveal filter.



Check filter and change if necessary.



Place filter back in case, screw on top lid.



Secure the box screws. Place the lid back

**Figure 6.1 – Inspection / Cleaning Water Filter**

## Winterization:

The power unit should be winterized if stored at temperatures below 32 degrees Fahrenheit (0 degrees Celsius).

Total system displacement with 100 ft. of hose (optional): **4.3 gallons**

Total system displacement without hose: **2.0 gallons**

To winterize the CaviBlaster 2022-E Power Unit:

1. Fill a 5 gallon or larger container with appropriate antifreeze solution.
2. Connect a 1 ½" cam-lock socket with a minimum amount of 1 1/2" clear hose to the water inlet connection on the control panel (See **Figure 2.2**) and place the open end of the clear hose into the antifreeze solution.
3. Attach a minimal amount of pressure hose to the pressure connection on the control panel (See **Figure 2.2**) and direct the open outlet of the hose into the antifreeze tank.
4. Attach a minimum amount of hose to the start-up by-pass valve and place the open end into the antifreeze tank.
5. Open the start-up by-pass valve and start the unit and make sure the pump is primed.
6. Close the start-up by-pass valve and run the unit until antifreeze comes out of the open end of the pressure hose for 10 seconds.
7. Stop the unit and disconnect all hoses.

Following this procedure will ensure that all the critical system components exposed to water have been flushed with antifreeze.

## **Troubleshooting:**

### **MOTOR WILL NOT START**

- Usually caused by line trouble, such as single phasing at the starter
- Check sources of power
- Check overloads, fuses, controls, etc.

### **MOTOR HUMS EXCESSIVELY**

- Check input line connections for high voltage
- Check for eccentric air gap

### **MOTOR OVERHEATS**

- Overload – compare actual (measured) amps with nameplate rating
  - Locate and remove source of excessive friction in motor or load
- Single phasing – check current at all phases (should be approximately equal to isolate and correct the problem)
- Improper ventilation
  - Check external cooling fan to ensure air is moving across cooling fins
  - Excessive dirt build-up on motor – clean motor
- Unbalanced voltage – check voltage at all phases (should be approximately equal to isolate and correct the problem)
- Rotor rubbing on stator
  - Check air gap clearance and bearings Tighten “thru bolts”
- Over voltage or under voltage – check input voltage at each phase
- Open stator winding – check stator balance at all phases for balance
- Grounded winding – perform dielectric test and repair
- Improper connections – inspect all connections for proper termination, clearance, mechanical strength and electrical continuity

### **BEARING OVERHEATS**

- Misalignment – check and align motor and pump
- Excessive end thrust from pump
- Excessive or insufficient grease in bearing – cavity should be  $\frac{3}{4}$  filled
- Dirt in bearing – clean bearing and cavity and refill approximately  $\frac{3}{4}$  full

### **VIBRATION**

- Misalignment – check and align motor and pump
- Rubbing between rotating and stationary parts
- Rotor out of balance
- Resonance – tune system

### **GROWLING OR WHINING**

- Bad bearing – replace bearing and repack with correct grease

### **AFTER RELEASING THE MECHANICAL TRIGGER, WATER IS STILL LEAKING OUT OF THE ZERO-THRUST GUN**

- Replace the mechanical trigger valve assembly in the zero-thrust gun handle

### **MOTOR RUNS, BUT WATER DOES NOT COME OUT OF THE ZERO-THRUST GUN**

- Verify inlet water supply is functioning
- Ensure that the power unit is not located too far above the water level, exceeding the draw capacity of the feed pump
- Check that feed pump and inlet water strainers are clear
- Check for leaks in the water lines
- Check for an airlock in the water inlet lines
- Verify that the feed pump is delivering water Pump mechanical failure
- Bad electrical connections
- Check that pressure pump inlet and discharge valves are not stuck open (common problem if not flushed after use with sea water)
- Check for water going out of the bypass – (regulating unloader failure)

### **WATER IN CRANK CASE**

- Check the pump seals for damage (feeding water at greater than 50-PSI (3.4 BAR) can force water past the seals and damage the seals and starving the pressure pump of water can overheat and damage the seals)
- Check the plungers for cracks
- Check the plunger rod O-ring for damage

### **ZERO-THRUST GUN IS NOT CLEANING PROPERLY**

- Verify that the system is operating at the correct pressure (2,000-PSI)
- Remove the zero-thrust gun from water with the system at operating pressure and trigger in the closed or “OFF” position. If water is leaking out of the barrel or handle, the trigger valve assembly should be replaced.
- Check cavitation and zero-thrust nozzles for foreign particles
- Visual inspection
- **With the unit turned OFF**, insert a small wire into nozzle orifices to check for obstruction(s)
- Remove trigger valve assembly and “backflush” with compressed air or pressurized water.

### **Replacement Parts:**

| <b>CaviBlaster 2022-E Power Unit Replacement Parts:</b> |                           |                                         |                     |
|---------------------------------------------------------|---------------------------|-----------------------------------------|---------------------|
| <b>Recommended Order Qty.:</b>                          | <b>Qty. Per Assembly:</b> | <b>Part Description:</b>                | <b>Part Number:</b> |
| 1                                                       | 1                         | Main Filter/Strainer Cartridge - SS     | CD-CAR-0003         |
| 1                                                       | 1                         | Inlet Strainer Cartridge                | 3260.02             |
| 1                                                       | 1                         | Pump Seal Kit                           | UD-12               |
| 1                                                       | 1                         | Pump Valve Kit                          | UD-93               |
| 1                                                       | 1                         | Pump Brass Kit                          | UD-19               |
| 1                                                       | 1                         | Pump Plunger Rod O-Ring Kit             | UD-123              |
| 1                                                       | 1                         | Pressure Regulating Unloader Repair Kit | UB 502 / K          |
| 1                                                       | 1                         | Trigger Valve Repair Kit – Large Gun    | 203300490           |