



Tsunami™ Dispensing Arch

Using

AQUA-LAB™

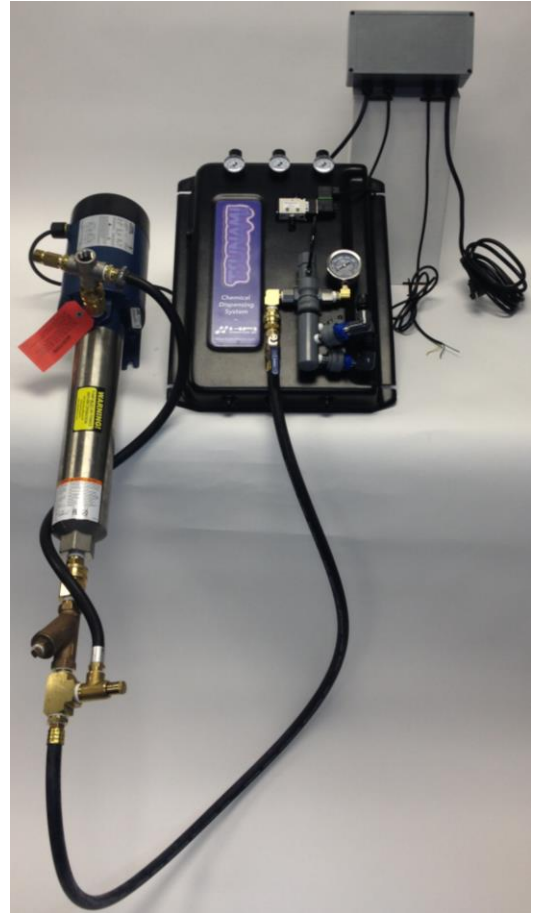
Chemical Dispensing System



REV A

Chemical Dispensing Specifications

1. Operating water pressure: 200 psi (Factory set)
2. Maximum water source temperature 140° F
3. Operating ambient temperature: 40-120° F
4. Electrical supply
 - a. 120 / 208 Single Phase
 - b. 1.5 hp pump 20 amps @ 120 volts or 10 amps @ 208 volts
5. Operate valves with 24VAC, 24VDC, 120VAC
 - a. < .5 amp
6. Water supply
 - a. 3/4" ID flooded inlet required
 - b. Inlet pressure: 2-60 psi
7. Air supply
 - a. Pneumatics inlet pressure: 60 - 100 psi
 - b. 3/8" feed per system
 - c. 20 CFM @ 100 psi supply
 - d. 3 x 3/8" poly lines to applicator
8. Chemical Solution lines
 - a. 3x 1/2" poly lines to applicator
9. Space requirements:
 - a. AQUA-LAB Systems
 - i. Valve panel – 1.5' wide x 2' tall
 - ii. Pump – 1' wide x 4' tall
 - b. Pump assemblies – pumps need to be within 6' of the system to allow connection with the connection hose included (longer connections can be run with customer supplied hose)
 - c. Electrical enclosures
 - i. Motor starter – 12" wide x 6" tall

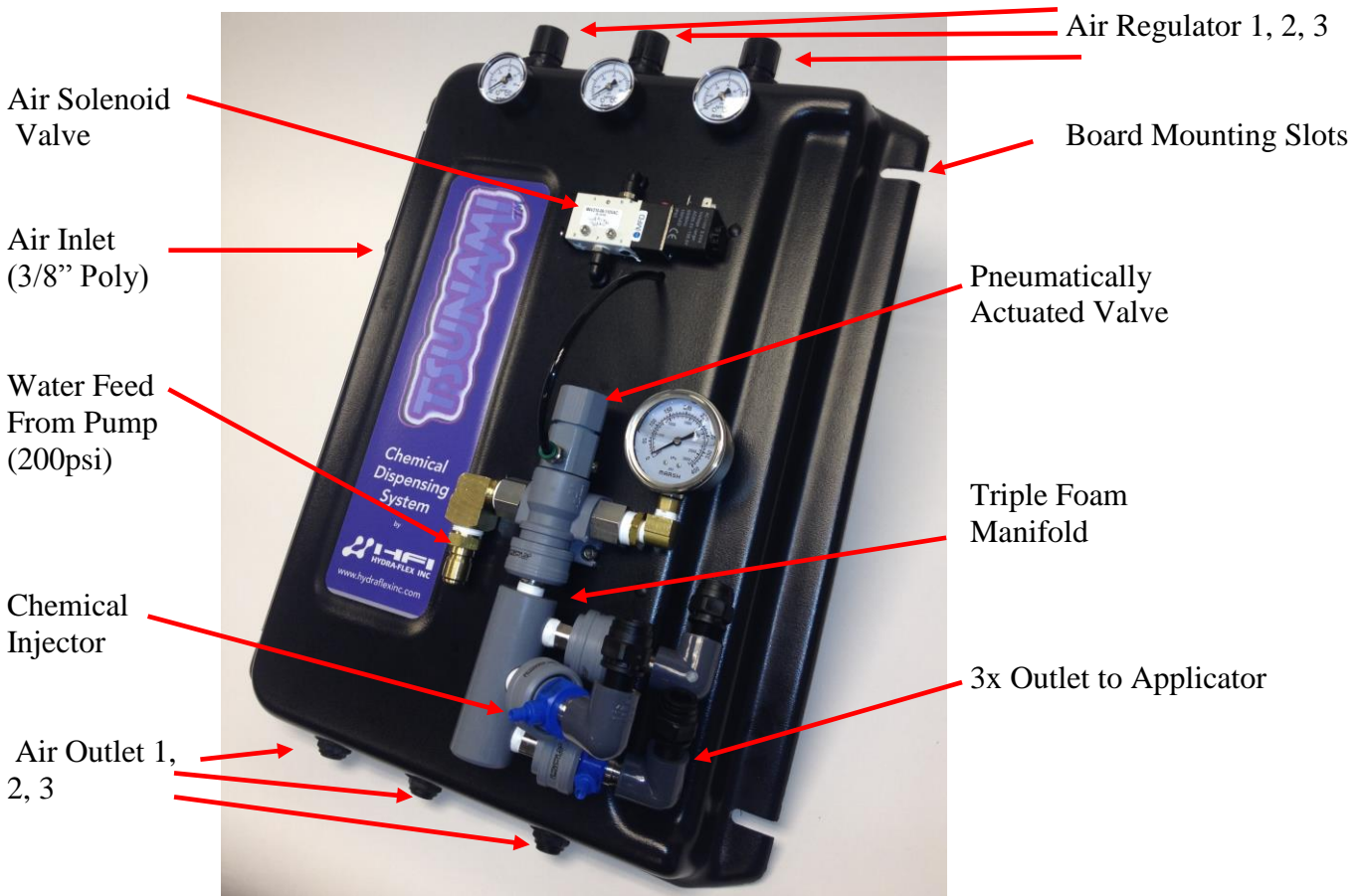


Tsunami Applicator Specifications

1. Operating water pressure: 100 psi max
2. Pneumatics inlet pressure: 0-60 psi
3. Maximum water source temperature 140° F
4. Operating ambient temperature: 40-120° F
5. Water supply
 - a. 4– 10 GPM
 - b. Inlet pressure: 10-65 psi
6. Air supply
 - a. 3x 3/8" feed per system
 - b. ~20 CFM
7. Solution lines
 - a. 3x 1/2" poly lines to applicator
8. Mounting requirements
 - a. This Applicator requires an arch to mount to
 - b. Must be level
 - c. Recommend roughly centering on car or slightly favoring the driver's side

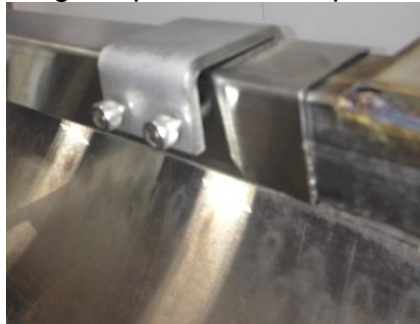


System Component Identification



1. Mount pump using 4x 3/8" wedge Anchors provided (3/8" hammer drill required)
 - a. Mounting slots 3.75"W x 3.38"H
2. Mount electrical box and delivery panel using Tapcon anchors provided (5/32" hammer drill required)
 - a. Electrical Box – Hole spacing 7.4"W x 3.5"H
 - b. Panel – Slot spacing 17.5"W x 15"H
3. Run 3/4" water line to the inlet of the pump
4. Close the ball valve on the pump outlet line and open the feed to the pump
5. Point the outlet line towards a drain or a container and open the ball valve until water is flowing freely to prime the pump.
6. Close the ball valve and attach the quick connect to the chemical delivery panel and re-open the ball valve
7. Run a 3/8" poly airline to the chemical panel and supply with at least 60psi of air pressure
8. Wire the signal wire from the provided electrical box to the box with the signal to fire the application
9. Connect the DIN I solenoid cable from the electrical box to the air valve.
10. Check that relay installed in the electrical box corresponds with the signal voltage from the car wash controller (120VAC relay is installed from the factory, 24 VAC and 24VDC relays are included inside the electrical box)
11. Plug 120VAC power cord into a circuit with 20 amp available capacity
12. Install or identify an existing arch to mount the Tsunami applicator to

IMPORTANT!! The Tsunami applicator requires a level sturdy arch or other mounting feature as it does not include one
13. Clamp the rain bar into the trough using the provided clamps as shown



14. Center the applicator on the largest vehicle that can safely pass thru the tunnel
15. Make sure that the applicator is level side to side
16. Securely attach the applicator to the arch using the mounting tabs and / or the included brackets.



17. Run and connect three 1/2" polyflow lines for the chemical solution and three 3/8" polyflow lines for the foaming air from the chemical delivery panel to the foam generators on the applicator.

18. Run chemical lines with foot valves from the chemical barrels to the hose barbs on the injectors and install metering tips according to desired chemical dilution (see chemical dilution ratio chart)
19. Using the car wash controller manually fire the signal for the application.
20. The pump, air valve and pneumatically actuated valve should all turn on.
21. Adjust the chemical ratio and air pressure until you get the desired results.



Optimizing the System

Consistently achieve the desired cleaning and presentation/performance using the least amount of chemical and water

Injectors vs. Metering Tips

*The key to optimizing the system is through trial and error.
Don't be afraid to try these steps to achieve your ideal performance.*

What do injectors do?

- Increases or decreases the amount of water in the solution

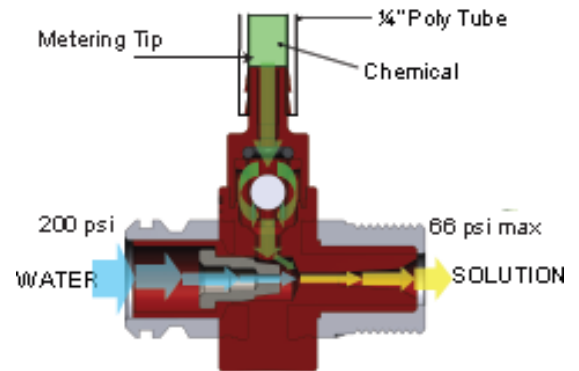
What do metering tips do?

- Increases or decreases the amount of chemical in the solution

Application Optimization (repeat for each application)

View Performance at Arch with Decision Maker

- Application too wet
 - Increase air
 - Reduce injector size (decreases water)
 - Increase metering tip (increases chemical)
- Application too dry
 - Decrease air
 - Increase injector size (increases water)
 - Decrease metering tip (decreases chemical)
- Too much chemical used
 - Decrease metering tip
 - Decrease metering tip and injector size (to maintain desired ratio)
- No chemical
 - Check vacuum of injector (see instructions on page 9)
 - Check foot valve
 - Check metering tip



Chemical Usage Measuring

Verify titration of chemicals before proceeding

1. Setup lab scale with small bucket of chemical to be measured.
2. Put the suction line into the bucket.
3. Run the application being tested to “prime” the line. (All air bubbles must be removed for accuracy)
4. Record the **Initial Weight** from the scale. (Tarring the scale with weight on the scale can affect accuracy)
5. Run the application for 6 vehicles (or manually for the same it would be on for 6 vehicles).
6. Record the **Final Weight** from the scale.
7. Subtract the Initial Weight from the Final Weight to determine the weight of used product.
8. Divide this **Used Weight** by 6 to get a per car weight.
9. Divide the **Per Car Weight** in grams by the specific gravity of the chemical to determine the milliliters of chemical used per vehicle.
10. Repeat for each chemical application.

Recommended Maintenance

The recommended service and maintenance on the AQUA-LAB System are as follows.

Monthly

- Check water filter and replace as needed (if installed)

Semi-Annually

- Check and replace injector metering tips
- Check and clean Y strainer
- Inspect and replace chemical lines as needed

Annually

- Clean water regulator
- Inspect motor starter for corrosion, if identified order replacement/spare parts

2 Years

- Inspect and replace injectors
- Rebuild valves
- Rebuild water regulator

Troubleshooting

Injector Vacuum Check (for troubleshooting injectors)

1. At the ChemFlex injector, remove the chemical feed line from the injector hose barb.
2. Attach the tubing of the vacuum gauge to the ChemFlex hose barb
3. With the pump(s) on, manually activate the chemical that is to be tested at the main car wash control cabinet. An injector that is working properly will have a reading greater than or equal to (\geq) 20 in Hg
4. If injector is not functioning:
 - a) Check metering tip for clogs (can be tested with no metering tip to ensure injector is performing)
 - b) Try smaller injector (this will produce less flow and thus less backpressure)
5. Repeat steps 2-4 for each chemical lane that a vacuum reading is needed for.
6. Once testing is complete, turn off the AQUA-LAB pump from the main car wash control cabinet.

There is a variation of performance in the injectors that comes from slight variations in the dimensions of the parts and in assembly that are unavoidable. It is common to see the resultant vacuum range from 20 in Hg all the way up to 28. There is also variation in the through hole size on the meter tips from Dema (within their manufacturing tolerances). Using the same tip color from site to site is a good starting point. However with the potential for variation from part to part it is reasonable to still need to do some adjustments from there.

Pump Operates, but delivers little or no water	Inlet Restriction	Check all in-line filters and inlet plumbing for restrictions. Check valves and backflow preventers
	Inadequate water supply	Check pressure on inlet side of pump to be sure positive pressure is maintained
	Undersized piping	Replace with larger piping
	Leak on the Inlet side	Make sure connections are tight
	Worn or defective pump parts	Replace worn parts or entire pump, Clean parts if required

Pump won't start or run at full speed	Blown fuse or circuit breaker	Replaced fuses or close circuit breaker
	Defective Motor Starter contactor	Replaced motor starter contactor
	Incorrect Motor Voltage	Voltage must be within 10% of motor rated voltage
	Defective motor	Replace motor
	Pump components damaged	Replace worn part or entire pump

Excessive Noise from Pump	Not Primed	Reprime pump
	Pump not secured firmly	Secure properly
	Restricted Inlet	Clean or correct restriction
	Water regulator fluttering	Try to adjust regulator down and then back up or replace regulator
	Cavitation (Sounds like marbles in pump)	Increase inlet size

Pump Leaks	Worn mechanical seal	Replace shaft seal
	Worn o-ring seals	Replace

Injector is not drawing chemical - Passes Vacuum Pressure check test	Clogged chemical feed	Check chemical hose, foot valve, metering tip and hose barb for debris or clogs
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Injector is not drawing chemical - Fails Vacuum Pressure check test	Too much back pressure on injector	Perform back pressure check test outlined in Section IV if this manual. If the result is higher than 66 psi then, use larger tubing, or use a smaller flow injector
	Clogged injector check valve	Blow compressed air through the chemical hose barb on the injector to remove debris
	Clogged injector nozzle	Remove injector and blow out any debris with compressed air
	Defective Injector	If Vacuum check fails but Back Pressure is less than 66 psi, replace the injector

PROBLEM	POTENTIAL CAUSES	SOLUTIONS
System won't regulate up to 200 psi	Pump not primed	Follow priming instructions
	Debris in regulator	Remove regulator and clean out debris
	Defective Check Valve	Replace check valve if broken
	Defective Regulator	Replace Regulator
	Defective Pump	Replace Pump
Flow at arch is too low	Incorrect Injector Flow Rate Selection	Replace with desired injector size
	System pressure too low	Ensure system pressure is set at 200 psi
	Foam Generator Plugged	Ensure cleaned and clear
	Downstream plumbing restrictive	Perform Back pressure test outlined in Section IV of this manual, if over 66 psi, increase tube size and reduce elbows, turns or other restrictive plumbing
No flow from injector	Valve malfunction	Ensure valve is receiving at least 60 psi
		Valve may be assembled incorrectly
		Disassemble valve and clean out debris (See valve replacement instructions)
	Clogged Injector	Remove injector and blow out debris with compressed air
No water supply	Check that the system has a supply of water	
Valve stuck open – Staying open when signal is off	Debris in valve seat	Remove and clean valve (See valve replacement instructions)
Starter Tripping	Incorrect Overload Setting	Verify overload setting versus settings found in specs page of this document

Appendix

ChemFLEX Injectors - Chemical Dilutions Ratio (Assumes feed pressure of 200 psi)

	Nozzle Size								
Flow Rate (GPM) at 200 psi	0.25	0.50	0.75	1.00	1.50	2.00	2.25	3.25	5.50
Metering Tip	0.029" (0.7 mm)	0.040" (1.0 mm)	0.051" (1.3 mm)	0.057" (1.4 mm)	0.070" (1.8 mm)	0.083" (2.1 mm)	0.086" (2.2 mm)	0.098" (2.5 mm)	0.125" (3.2 mm)
Copper	1: 57	1: 104	1: 155	1: 146	1: 281	1: 406	1: 468	1: 629	1: 1074
Pumpkin	1: 43	1: 82	1: 119	1: 126	1: 238	1: 348	1: 398	1: 554	1: 946
Burgundy	1: 34	1: 67	1: 97	1: 111	1: 207	1: 304	1: 347	1: 495	1: 845
Lime	1: 28	1: 57	1: 81	1: 100	1: 183	1: 270	1: 307	1: 447	1: 764
Tan	1: 28	1: 57	1: 81	1: 100	1: 183	1: 270	1: 307	1: 447	1: 764
Orange	1: 23	1: 44	1: 64	1: 78	1: 137	1: 196	1: 215	1: 314	1: 536
Turquoise	1: 17	1: 31	1: 45	1: 55	1: 91	1: 126	1: 134	1: 197	1: 336
Pink	1: 14	1: 24	1: 35	1: 42	1: 68	1: 93	1: 98	1: 143	1: 244
Light Blue	1: 11	1: 17	1: 24	1: 31	1: 47	1: 64	1: 66	1: 98	1: 166
Brown	1: 10	1: 15	1: 22	1: 28	1: 43	1: 58	1: 59	1: 88	1: 150
Red		1: 12	1: 17	1: 23	1: 34	1: 45	1: 46	1: 69	1: 116
White		1: 12	1: 16	1: 22	1: 31	1: 42	1: 43	1: 64	1: 108
Green		1: 11	1: 14	1: 20	1: 28	1: 37	1: 38	1: 55	1: 94
Blue		1: 10	1: 12	1: 17	1: 23	1: 30	1: 31	1: 46	1: 77
Yellow			1: 9	1: 12	1: 16	1: 20	1: 22	1: 31	1: 52
Black				1: 10	1: 13	1: 16	1: 17	1: 24	1: 40
Purple				1: 6.6	1: 8.3	1: 9.0	1: 10	1: 13	1: 21
Gray				1: 5.3	1: 6.7	1: 6.9	1: 7.6	1: 10	1: 16
Open				1: 4.9	1: 5.3	1: 5.2	1: 6.0	1: 6.1	1: 10

NOTE: Dilution Ratios given above are based on Drawing Water through the Metering Tips and are meant as a Starting point for System Configuration - Results are expected to vary when drawing chemicals due to differences in Viscosity and Temperature

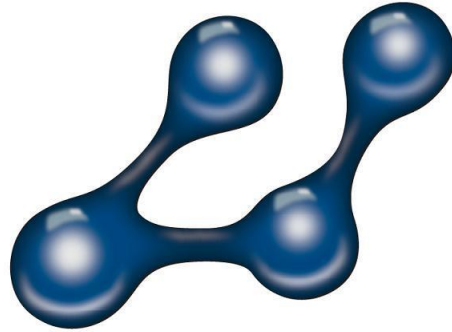
Chem-Flex Injector Listing



Aqua-Lab Chem Flex Injector Listing

Part Number	# Barbs	GPM
618029	1	0.25
618040	1	0.50
618051	1	0.75
618057	1	1.00
618070	1	1.50
618083	1	2.00
618086	1	2.30
618098	1	3.20
618125	1	5.40
629029	2	0.25
629040	2	0.50
629051	2	0.75
629057	2	1.00
629070	2	1.50
629083	2	2.00
629086	2	2.30
629098	2	3.20
629125	2	5.40





HFI
HYDRA-FLEX INC

AQUA-LAB WARRANTY

Factory Limited

Hydra-Flex Inc warrants its equipment to be free from defect in material or workmanship under proper normal proper use for a period of one (1) year beginning the date of purchase.

The Hydra-Flex Inc's liability shall be limited to repair or replacement of parts found to be defective within the warranty period and following Hydra-Flex Inc's inspection. Hydra-Flex Inc shall have the option requiring the return of defective material to establish the purchaser's claim. In the event of repair or replacement this limited warranty is non-cumulative. Neither labor nor transportation charges are included in this warranty.

This warranty is based upon the proper care and maintenance of the warranted equipment. Warranty does not apply if the merchandise is altered or modified in any way. Warranty does not apply to any equipment which has been subject to misuse, inappropriate use of tools, including exposure to harsh chemicals, neglect, lack of maintenance, freezing, fluid hammer, accident, third party damage, fluid impurities such as sand or minerals, acts of God or acts of war. Nor does it apply to any equipment which has been repaired or altered by anyone not so authorized by Hydra-Flex Inc. All equipment must be properly installed in accordance with specified plumbing, electrical, and mechanical requirements. The warranty does not apply to normal wear and tear or routine maintenance components as described in the equipment manual.

Except as expressly stated herein, Hydra-Flex Inc shall not be liable for damages of any kind in connection with the purchase, maintenance, or use of this equipment including loss of profits and all claims for consequential damages. This limited warranty is in lieu of all other warranties expressed or implied. Hydra-Flex Inc neither assumes nor authorizes any person to assume for it any other obligation or liability in connection herewith. This warranty is neither assignable nor transferable.

Transportation damage claims are to be submitted to the carrier of the damaged material.