

City Water Booster Pump

TRAINING MODULE



1/2 and 1 HP , 115 V

Pressures from 26 to 112 PSI

Flow rates from 3 to 27 GPM



Trust runs deep™

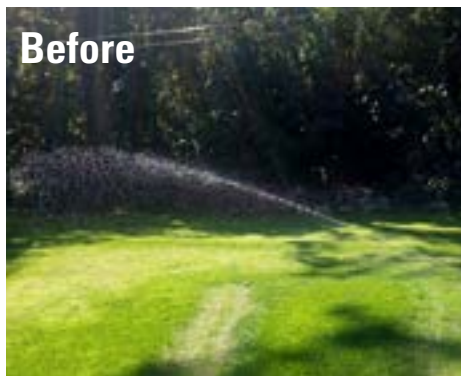
City water booster pumps are available in two models:

- VP05 (1/2 HP)
- VP10 (1 HP)

Both models require 115V outlets.



There are many applications suited for the city water booster pumps. Perhaps the single largest application is for home irrigation systems. Amazing results occur when a pump is properly installed, achieving a much more impactful “rain curtain” as seen below.



SYSTEM COMPONENTS

City water pressure booster pumps have many key components. Here, we will identify the most significant of these components, beginning at the front of the pump and moving towards the rear.

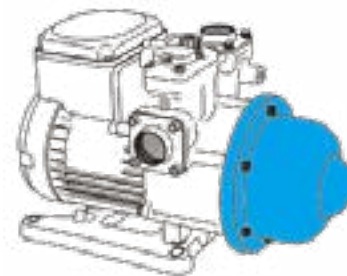
Pressure Tank

Located in the front of the pump is a small integral stainless steel pressure tank. This tank will store approximately 8-12 oz. of water and is equipped with a Schrader or “air” valve, which is positioned just below the black plastic cap on the front of the tank. Here, air can be added to ensure a proper tank air charge (PSI).

The pre-charged air pressure in this tank should be determined for proper operation.

Additionally, the amount of pre-charged air in the tank (when the tank is empty) varies by model number of the pump as follows:

- VP05 (1/2 HP) should have a 25 PSI air charge
- VP10 (1 HP) should have a 35 PSI air charge



Pressure Tank

Pump Housing (body)

The pump body contains a durable, high-flow stainless steel impeller.

In addition to the impeller, a thermal sensor has been embedded in the pump housing. This thermal sensor will detect heat-rise due to dead head, rapid cycling or run dry situations.

All of these scenarios create heat rise within the pump housing and associated pipe, valves and fitting. The thermal sensor will shut the pump down so that the pump can protect itself, due to excessive heat-rise from any of these conditions, should they occur.

Inlet & Outlet

The 1" FPT Inlet fitting is located on the left side of the pump with a stainless-steel suction screen in place. The suction screen (only on the inlet side of the pump) protects dirt and debris from entering the pump inlet and disrupting the flow switch and/or internal check valve.

The outlet fitting is located on the top right side of the pump. Both, inlet and outlet flanges are constructed of stainless steel and use a 4-bolt pattern to attach the flanges to the pump housing unit.

The inlet and outlet flanges are tightened to the pump housing before shipment. For new pump applications do not remove flanges from pump body.

Flow Switch

This housing contains the flow switch and internal check valve. There are two ways in which the pump will be activated:

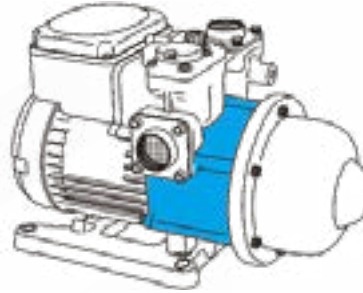
- When water flow reaches a demand for a minimum of 0.7 GPM
- When the system pressure drops below the threshold established for the pump as indicated here.

< 25 PSI (VP05)

< 35 PSI (VP10)

Internal Check Valve

The replaceable internal check valve prohibits the reverse flow of water through the pump and maintains pressure within the pump housing.

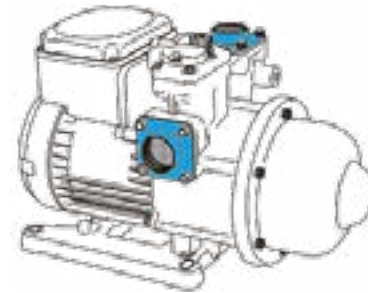


Pump Housing

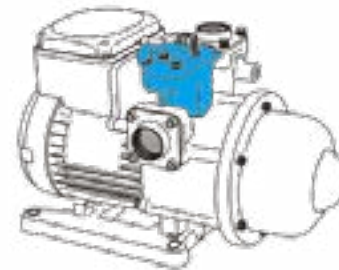


Thermal sensor

Max temp 120° F. Pump will not reactivate until internal temperature drops to 95°F or below. Do not use with water heaters.



Inlet & Outlet



Flow Switch

Air-Relief Plug

The air relief plug located on the top of the pump's flow switch housing is instrumental in priming the pump (which will be discussed later in this publication).



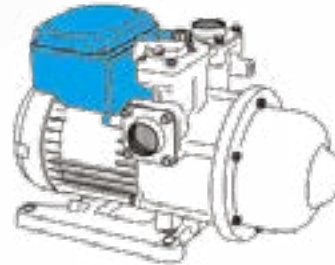
Air Relief Plug

Electronics

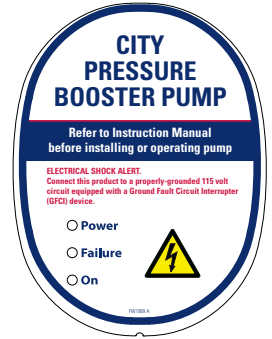
The fully encapsulated electronics module is home to the pump's diagnostic and protection system. The city water booster pump has on-board protection against the following:

- Dry Run
- Dead Head
- Rapid Cycling

Indicator lights (which will be discussed later in this publication) are located on the electronics housing unit.



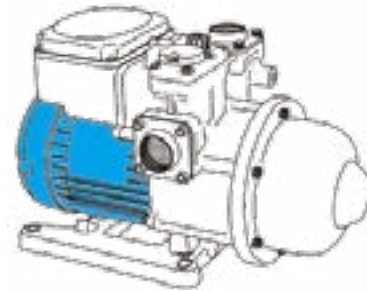
Electronics



Motor

The air-cooled 115 V motor and is rated for continuous operation.

Available in 1/2 HP or 1 HP.



Motor

Base

The pump foundation should be rigid enough to absorb any vibration from the motor.

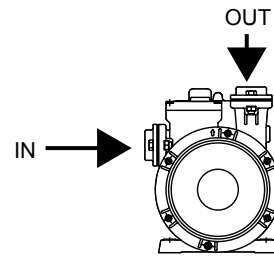
The 4-bolt pattern allows for the pump to be securely bolted to the foundation



Base

INSTALLATION

Standing in front of the pump, the inlet is on the left side pump. The outlet is located on the top right side



Inlet & Outlet Flanges

The stainless-steel inlet & outlet flanges consist of 1" female pipe thread (FPT).

FIG 1

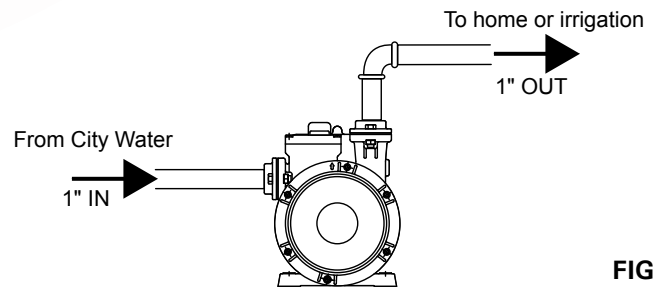


FIG 1

Ball Valves & Unions

It is strongly recommended to install ball valves & unions on the inlet and outlet side of the pump as shown above. Unions and ball valves allow the pump to be serviced, winterized or replaced more efficiently.

FIG 2

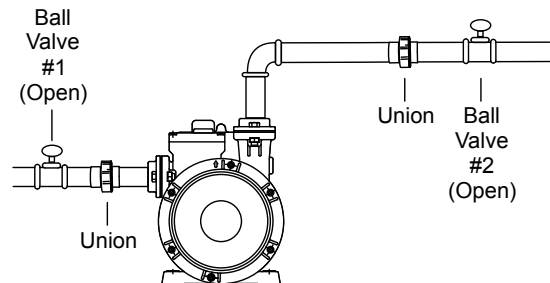


FIG 2

By-Pass Valve Assembly

Installing a by-pass w/ ball valve around the pump, will allow for continuous water flow at such times as power outages, when the pump has been removed for winterization and/or service.

Note: location of the "tees" to assemble a by-pass in drawing, in addition to the by-pass or ball valve. FIG 3

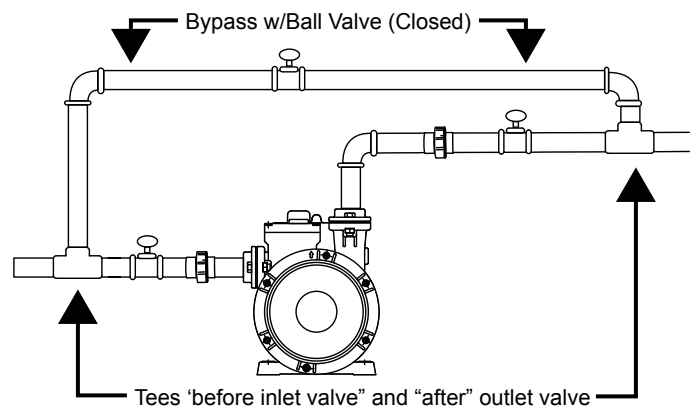


FIG 3

CAUTION!

PUMPS WILL NOT FUNCTION IF INCOMING CITY WATER PRESSURE IS TOO HIGH!

Inlet Water Pressure (PSI)

If incoming or inlet water pressure is too high, a pressure-reducing valve will be required for proper pump performance.

Maximum inlet water pressure is as follows:

- VP05 – Do not exceed 30 PSI
- VP10 – Do not exceed 50 PSI

FIG 4

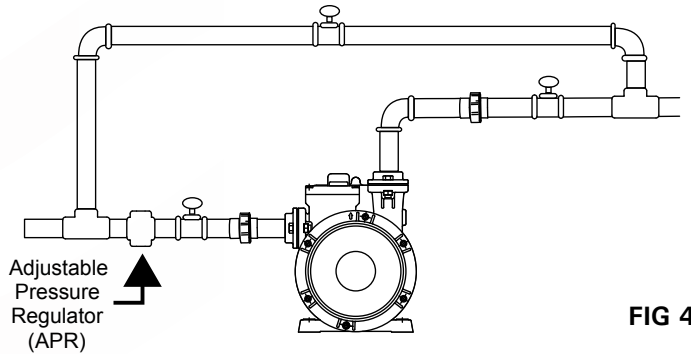


FIG 4

CAUTION!

An adjustable pressure regulator is required on the discharge to ensure maximum water pressure does not exceed local plumbing codes.

FIG 5

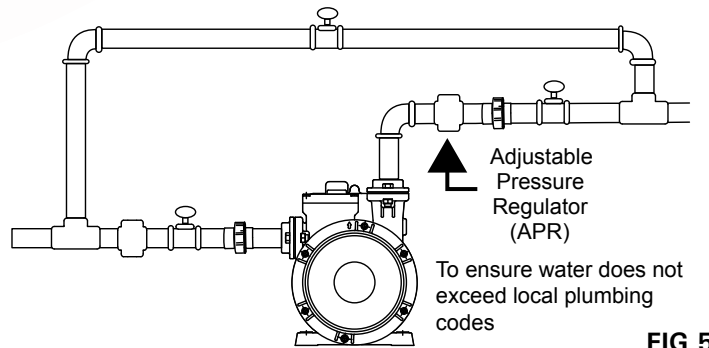


FIG 5

Additionally, a pressure relief valve connected to a drain is required to safe guard plumbing from exceeding maximum pressures. Typically, the pressure relief valve would be set for 5 PSI more than the adjustable pressure relief valve (APR) shown above. Typical household plumbing should have a 75 PSI pressure relief valve.

FIG 6

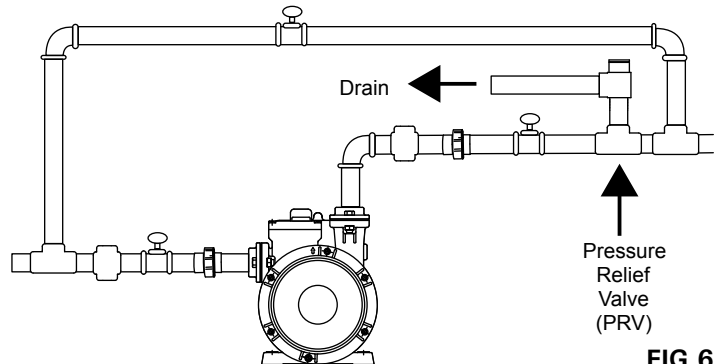


FIG 6

PRIMING

After Installation with the pump powered OFF:

- Un-thread the air relief plug (A).
- Close by-pass ball valve and open inlet (B) and outlet ball valves slowly (C) (D).
- Allow water to fill pump cavity and remove in-line air pockets.
- After pump cavity fills with water, re-tighten the air relief plug (A).

FIG 7

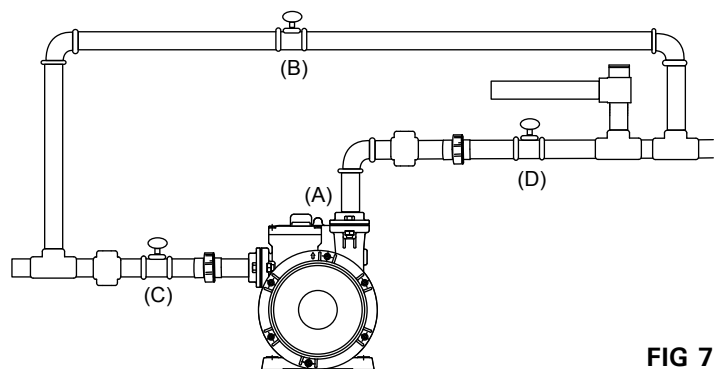


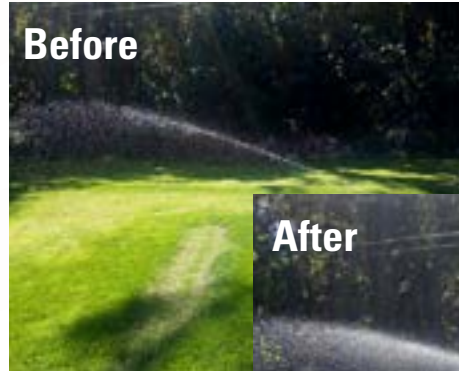
FIG 7



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PERFORMANCE

MORE PRESSURE WHERE YOU WANT IT . . . WHEN YOU NEED IT!



DO NOT EXCEED 30 PSI INCOMING PRESSURE

Inlet PSI	VP05 System Pressure (PSI) at Flow Rates (GPM)							HP
	3	6	9	12	15	18	21	
10	43	36	35	31	26	-	-	1/2
20	53	46	45	41	36	-	-	
30	63	56	55	51	46	-	-	

DO NOT EXCEED 50 PSI INCOMING PRESSURE

Inlet PSI	VP10 System Pressure (PSI) at Flow Rates (GPM)							HP
	3	6	9	12	15	18	21	
10	72	67	61	56	50	45	39	1
20	82	77	71	66	60	55	49	
30	92	87	81	76	70	65	59	
40	102	97	91	86	80	75	69	
50	112	107	101	96	90	85	79	

How to Read the Performance Chart

Looking at the VP10 chart, inlet pressures are indicated in the far left column. Various flow rates are shown across the top of the chart.

Example: If "Inlet" water pressure was 30 PSI, and a demand for flow was in the 15-18GPM range. Come down from 15 GPM or 18 GPM and across from 30 PSI. The resulting number shown in the intersecting boxes indicate what the Total System Pressure would be after the booster pump.

Maximum PSI output for both 1/2 and 1 HP models is 120 PSI.

FORMULA: INLET PRESSURE (PSI) + PRESSURE BOOST (PSI) = TOTAL SYSTEM PRESSURE



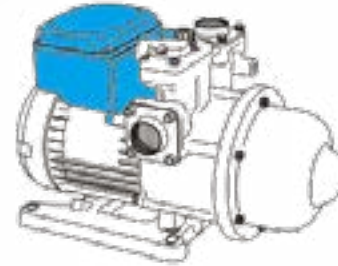
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PROTECTION

On-board diagnostics and protection will enable the pump to protect itself from the following conditions:

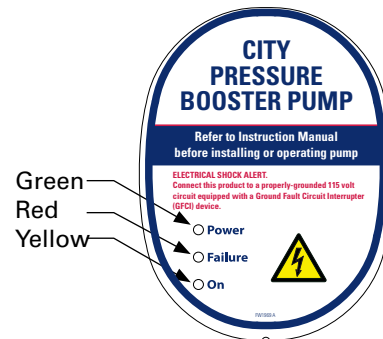
- **Dry Run** – After the unit recognizes continual low or no flow of water, the unit will shut down to protect itself from running dry. The pump will restart after 10 minutes to sample water flow requirements and will return to shut down if still running dry. It will repeat this process 3 times and then wait an hour to restart.
- **Dead Head** - If there is no water demand (discharge is shut off), the unit will shut down to protect the pump from damage. Once water flow is re-started, the pump will re-start automatically.
- **Rapid Cycling**- If the unit cycles repeatedly on/off, the unit will shut down to protect the pump. Hourly, it will turn on to sample the water flow requirements, and return to shut down if the problem persists.

Note: Unplugging the pump for 5 seconds, then plugging it back in will reset the pump.



INDICATOR LIGHT PANEL

- **POWER** - Always on when connected to power.
- **FAILURE** - Indicates a dry run if illuminated while pump is running.
- **ON** - Turns on when water is being used, indicates normal operation. Turns on intermittently when no water is being used; indicates a leak in the system.



OPERATING CONDITIONS

Power Supply: 115V Grounded Outlet
Ambient Temperature Range: 32°F - 104°F

Maximum Inlet Pressure:
Do not exceed 30 PSI for model VP05 (1/2 HP)
Do not exceed 50 PSI for model VP10 (1 HP)

FREEZING OR REMOVING PUMP FOR MAINTENANCE

- Unplug pump from power source
- Close inlet and outlet ball valves
- Open bypass valve
- Relieve pressure from the pump
- Remove pump using the union connections
- Store pump in heated area.

INSTRUCTION MANUAL

Read the Instruction Manual (packaged with each pump) completely, before commencing installation.



Troubleshooting



Before ANY work with the pump, SHUT OFF the electrical supply and ball valves #1 and #2 to prevent electrical shock and water damage.

Problem	Cause	Correction
Pump does not start or shuts down.	No power supply.	Connect the electricity supply.
	Incorrect voltage.	Pump is 115 Volt only. It will not start with 230V supply.
	Incorrectly plumbed.	Confirm FIG 1 installation is correct. Confirm ball valves #1 and #2 are open in suction and discharge. Confirm ball valve #3 is closed on bypass.
	Blocked inlet.	Check if pump suction inlet screen is blocked. See FIG 10.
	Insufficient water supply	Ensure water source is providing sufficient water.
	Water temperature.	Pump will shut off if water temperature reaches 120°F. Pump will not turn on until water temperature drops below 95 °F.
Pump starts when no water is consumed.	Pipe leaking.	Ensure all threads have 3 wraps of Teflon tape + hand tight + 1/2 turn with wrench.
	Tank pressure is low.	See FIG 5 to check and add air pressure to the tank.
	Air in the system.	Ensure all threads have 3 wraps of teflon tape + hand tight + 1/2 turn with wrench. Re-prime unit.
Pump does not shut down when water is not consumed.	Blocked check valve.	See FIG 8. Confirm check valve is free of debris and functions freely.

Name: _____ Date: _____ Score: _____

Section 1: Fill in the Blank (8 points each)

1. The City Water Booster Pump has a _____ embedded in the pump housing that will detect heat rise and shut the pump off to protect itself.
2. An internal _____ prohibits the reverse flow of water through the pump while in operation or in standby mode.
3. _____ and _____ are strongly recommended on both the inlet and outlet piping to ease in the removal of the pump for winterization and/or service.
4. If inlet water pressure is too high, a _____ must be installed to reduce inlet pressure for proper pump performance.
5. A _____ installed on the outlet pipe will ensure that the pump cannot over-pressurize the system.

Section 2: Multiple Choice (5 points each)

6. City Water Booster Pumps are protected against:
 - a. Dry Run
 - b. Dead Head
 - c. Rapid Cycling
 - d. All the above
7. Located on the top of the pump, a _____ assists with priming the pump:
 - a. Union
 - b. Air Relief Plug
 - c. Flow Switch
 - d. Funnel
8. The #1 cause for leaks with a city water booster pump is:
 - a. By-Pass valve open
 - b. No power to the pump
 - c. Overtightening of inlet and outlet fittings
 - d. None of the above
9. The flow switch will activate the pump when the flow rate reaches:
 - a. 5 gallons per minute
 - b. 0.7 gallons per minute
 - c. Pressure drops below threshold established for pump
 - d. b and c
10. The correct pre-charged tank pressure (when empty) for model VP10 is:
 - a. 25 PSI
 - b. 50 PSI
 - c. Atmospheric Pressure
 - d. 35 PSI
11. It is recommended that a _____ be installed around the pump for a continuous flow of water during power outages:
 - a. Thermal-Sensor
 - b. Pressure-Reducer
 - c. By-Pass
 - d. None of the above
12. Maximum Inlet Pressure for Model VP10 City Water Booster Pump is:
 - a. N/A
 - b. 50 PSI
 - c. 15 PSI
 - d. 100 PSI
13. City water booster pumps must be powered with a _____ grounded outlet:
 - a. 115V
 - b. 230 V
 - c. a & b
 - d. none of the above
14. Total System Pressure (as indicated in performance charts), is the culmination the following:
 - a. Flow Rate + Inlet Pressure
 - b. Flow Rate + Pressure Boost
 - c. Inlet Pressure + Boost Pressure
 - d. All of the above
15. Fifty-Percent of all failures during initial start-up can be attributed to:
 - a. Improper installation
 - b. Over-tightening of inlet/outlet fittings
 - c. Pump not primed
 - d. All the above



Section 3: True or False (1 point each)

Two models of City Water Booster Pumps available are 0.5 hp and 1.0 hp

T F

There should be NO air charge in the tank when starting the pump up initially.

T F

Green indicator light will illuminate when power is on.

T F

Pressure Reducing Valves are NEVER required with City Water Booster Pumps.

T F

Intermittent Yellow indicator light, when no water is being used indicates a leak in system.

T F

If a Dead Head occurs and pump shuts down, it must be re-started manually.

T F

Drain lines should be connected to a Pressure Relief Valve directing water to drain.

T F

City Water Booster Pumps are NOT to be used on private WELLS.

T F

HOW DID YOU DO?

A = 90-100%

B = 80-89%

C = 70-79%

