



Please read and save these instructions. Read carefully before attempting to assemble, install, operate, or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

HIGH-PERFORMANCE UPGRADE KITS FOR PLUNGER PUMPS

PERFORMANCE FEATURES

- Long Life
- High Pressure
- High Efficiency
- Serviceability
- Design Flexibility
- Chemical Compatibility
- Compact Design
- Enhanced Priming

Pumptec High-Performance Upgrade Kits allow professional cleaners to upgrade their low performance extractors to high pressure agitation without investing thousands of dollars in new extractors. These upgrade kits are complete with everything needed to convert to a high-performance extractor in about an hour. High-performance extractor pumps provide the professional with less time on each job, more jobs per day, less downtime, more heat from the internal heater, faster dry time, greater customer satisfaction, and more profit.



114 T | 80655



205 V 207V | 80657



112 T | 80656



348 U 350U 356U | 80717



205 V 207V | 80719



348 U 350U 356U | 80718

UNPACKING

Remove all packing materials. Carefully remove the upgrade kit from the shipping carton. Inspect for any damage that may have occurred during transit. Check for any loose, missing, or damaged parts. See individual kits in the parts list section.

GENERAL SAFETY INFORMATION

Please read this manual before installing or operating pump to provide safe operation and prevent equipment problems. Observe the following symbols and definitions:

Note: Indicates important instructions which are not related to hazards.

IMPORTANT: Indicates factors concerned with assembly, installation, operation, or maintenance which could result in damage to the machine or equipment if ignored.

CAUTION! Warns about hazards that MAY cause minor personal injury or property damage if ignored.

WARNING! Warns about hazards that COULD cause serious personal injury, death or major property damage if ignored.

DANGER! Warns about hazards that WILL cause serious person injury, death or major property damage if ignored.

PLEASE READ, SAVE, AND REFER TO SAFETY INSTRUCTIONS BELOW:

CAUTION! Pumps build up heat and pressure during operation. Allow time for pumps to cool before handling or servicing. Only qualified personnel should install, operate, and repair pump.

IMPORTANT: For pumping liquids other than water, contact your supplier.

DANGER! Do not pump hazardous materials (flammable, caustic, etc.), unless the pump is specifically designed and designated to handle them.

WARNING! To reduce risk of electric shock, always disconnect pump from power source before handling or servicing.

WARNING! Any wiring of pumps should be performed by a qualified electrician.

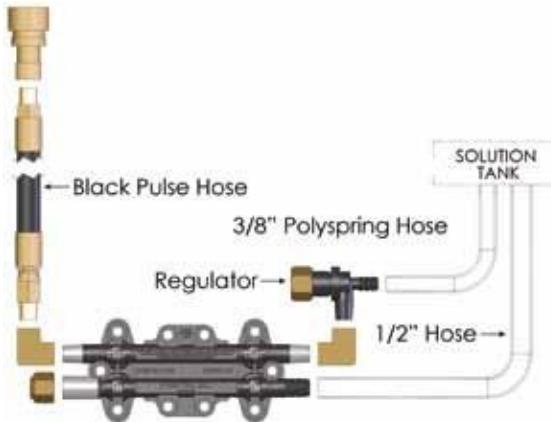
CAUTION!

These pumps are not intended to be submerged.

Pumptec, Inc. is not responsible for losses, injury, or death resulting from a failure to observe these safety precautions, misuse or abuse of pumps or equipment.

ASSEMBLY OF UPGRADE KIT

Refer to Pages 8-12 for unit specific assembly. Below is a basic system diagram for assembly reference.



1. Attach elbows to each side of "outs" on pump.
2. Attach black pulse hose to left elbow.
3. Attach black plug to left "in".
4. Attach regulator to right elbow.
5. Place 3/8" clamps to each end of 3/8" poly spring hose. Attach 3/8" hose to regulator and tighten clamp.
6. Place 1/2" clamps to each end of 1/2" hose. Attach 1/2" hose to right side pump inlet.

INSTALLATION OF UPGRADE KITS

The pumping system can be mounted where it is visible, but it must be protected from rain, dirt and chemical spray or splashing. The pump must never be installed on a vertical surface with the pump head higher than motor; for example: like a capital letter "T".

PRE-OPERATION

INLET CONDITIONS

CAUTION!

DO NOT STARVE THE PUMP OR RUN DRY. Temperatures above 130°F will require pressurized inlet to avoid cavitation and seal damage.

DISCHARGE CONDITIONS

Open all valves in system prior to operation to avoid excessive load on motor and system from a pressure spike. Follow the instructions of proper system design. Refer to supplier if assistance is needed.

PRESSURE REGULATION

Verify pressure regulation devices are operating correctly.

NOZZLES

Nozzles create pressure in most systems, and they become larger with use. Larger nozzles decrease system pressure. Verify the quality of nozzles prior to operation.

MOTOR SHAFT ROTATION**CAUTION!**

Motor shaft rotation must always be counterclockwise in order to assure proper function of pump or warranty may be void.

PUMPED LIQUIDS

Some liquids may require a flush between operations or before storing. For pumping liquids other than water, contact your supplier.

CAUTION!

If the pump is used in extremely dirty or humid conditions, it is recommended pump be enclosed. Do not store or operate in excessively high temperature areas or without proper ventilation.

OPERATION**GENERAL OPERATING INFORMATION**

Pressure is often created by forcing a volume of fluid (flow) through a specific size hole (nozzle). Additionally, pressure can be created by pumping into a non-expanding chamber. Pressure is measured and stated in PSI – pounds per square inch.

Flow is created based upon the pump displacement and speed (RPM) of the motor. Pump plunger size affects flow based upon the same RPM. The faster the motor speed, the greater the flow. Flow is measured and stated in GPM – gallons per minute.

The pump, driven by a motor or engine, draws fluid through a set of valves into the pumping chamber and the fluid is then forced out of a set of valves to exit the pump. The back-and-forth movement of the plunger in the sealed pumping chamber creates the suction and discharge actions.

Once the fluid has exited the pump it must be controlled until it exits the nozzle or reaches the place it needs to go. This

control is achieved via the use of system components such as an unloader or regulating valve. The pumps are positive displacement pumps providing a specific amount of fluid constantly while operating. This volume of fluid must be directed out thru a nozzle or back to a tank because it cannot be stopped completely without creating excessively high pressure and risk of damage to pump, components, property, and person. It is recommended a safety device such as a regulating valve be installed directly on pump head as protection in case of a failure of another component. Pressure switches can be used to automate pump operation, but they must have a pressure regulating device installed as a safety device.

Fluid can enter a pump either from a filtered tank or pressurized fluid line.

It is common to use a tank with pumps that are mounted above the pump. Filtration is important to maintain proper function of the pump and system. The extent of filtration may be greater based upon some uses such as misting with ultra-fine nozzles.

INLET CONDITION CHECKLIST

Inadequate inlet conditions can cause serious malfunctions in the best designed pump. Surprisingly, the simplest of things can cause the most severe problems or go unnoticed to the unfamiliar or untrained eye. REVIEW THIS CHECKLIST BEFORE OPERATION OF ANY SYSTEM. Remember, no two systems are alike so there can be no ONE best way to setup a system. All factors must be carefully considered.

INLET SUPPLY should exceed the maximum flow being delivered by the pump to assure proper performance.

- Open inlet shut-off valve and turn on water supply to avoid starving the pump. DO NOT RUN PUMP DRY.
- Avoid closed loop systems especially with high temperature, ultra-high pressure, or large flows. Conditions vary with regulating/unloader valve.
- When using an inlet supply reservoir, size it to provide adequate liquid to accommodate the maximum output of the pump, generally a minimum of 6-10 times the GPM (however, a combination of system factors can change this requirement).

INLET LINE SIZE should be adequate to avoid starving the pump

- Line size must be a minimum of one size larger than the pump inlet fitting. Avoid tees, 90-degree elbows or valves in the inlet line of the pump to reduce the risk of flow restriction and cavitations.

- The line MUST be a FLEXIBLE hose, NOT a rigid pipe, and reinforced on SUCTION systems to avoid collapsing.
- The simpler the inlet plumbing the less the potential for problems. Keep the length to a minimum, the number of elbows and joints to a minimum (ideally no elbows) and the inlet accessories to a minimum.
- Use pipe sealant to assure airtight, positive sealing pipe joints.

INLET PRESSURE should fall within the specifications of the pump.

- High RPM, high temperatures, low vapor pressures or high viscosity may increase acceleration loss of liquids.
- Optimum pump performance is obtained with +20 PSI (1.4 BAR) inlet pressure. With adequate inlet plumbing, most pumps will perform with flooded suction.
- After prolonged storage, pump should be purged of air to facilitate priming. Disconnect the discharge port to allow liquid to pass through pump and measure flow.

BYPASS TO INLET – care should be exercised when deciding the method of bypass from control valves. See Misting on pages 4 and 5.

- It is recommended that the bypass be directed to a baffled reservoir tank, with at least one baffle between the bypass line and the inlet line to the pump.
- Although not recommended, bypass liquid may be returned to the inlet line of the pump if the system is properly designed to protect your pump.
- A low-pressure, flexible hose should be used from the bypass connection to the inlet of the pump.
- Caution should be exercised to avoid under sizing the bypass hose diameter and length.
- Check the pressure in the bypass line to avoid over-pressurizing.

USING CHEMICALS

Chemicals can be mixed into the fluid, and it is necessary to understand whether these chemicals will damage the pump or other system components. Another way to put chemicals into the fluid is with a downstream injector.

An injector works as a result of the difference of pressure between the inlet side of injector and discharge side. In most cases, the pressure on the discharge side cannot exceed 1/2 of the inlet pressure. For example, 1000 PSI into an injector should allow up to 500-600 PSI spray pressure on discharge side. There are dual-function nozzles that permit high pressure, chemical

free rinse and low pressure, chemical spray. These are convenient for the operator and will not harm a properly designed system. The advantages of an injector are:

- Fewer items come in contact with chemical
- Chemical injection rate can be controlled
- Applying chemical at lower pressure increases chemical use efficiency.

HEATING FLUID

The pumps may sometimes be used with downstream heaters and precautions need to be taken to protect the system and persons from harm. Refer to the skilled staff at the equipment manufacturer for guidance and proper system care. Please be aware that heated water expands, and additional pressure release safety devices may be required.

SYSTEM DESIGN

A pump is the heart of every system and proper selection is critical to equipment function and durability. If a pumping set with excess flow is chosen, then energy and fluid is wasted. If excess pressure results, then equipment effectiveness can decrease and so can pump life.

TYPICAL APPLICATIONS AND THEIR PERFORMANCE CONSIDERATIONS

PRESSURE CLEANING

The optimal combination of PSI and GPM for cleaning is a ratio of 1 GPM for every 300-400 PSI. This combination maintains sufficient droplet size for cleaning force and distance. If the flow is increased without an increase in pressure, the cleaning impact does not increase with the increased use of fluid. If pressure increases, and flow does not, then the water droplet size reduces and has less impact force, requiring closer cleaning distances and increased risk of surface damage.

PEST SPRAYING

This application can have specific chemical usage requirements and application pressure limits, so use the included information as a guide only. Refer to label requirements for each specific chemical.

LINE LOSS

When choosing a pump for spraying, pressure loss in the hose must be considered. The pressure is greatest at pump and decreases over the length of the hose. Typically, these systems utilize very long hoses, 200-300 ft. is common, and requires a certain minimum amount of performance to move the flow through the lengths of hose. For example, a 3 GPM system will

require (lose) 50 PSI per 50 ft. of 3/8" ID hose. A pump with only 60-70 PSI may not provide the desired performance at the end of the hose. See reference charts to assist in system design.

MISTING

It is critical to size the pump correctly in a misting application. If insufficient flow is chosen, then proper atomization and droplet size will not result. If excessive flow is chosen, then unnecessary wear and wasted energy will occur in this very demanding application.

Another consideration for misting concerns the routing of the bypass fluid. DO NOT return bypass fluid from regulating valve directly back to inlet of pump. The returned fluid will contain large amounts of air bubbles that will cause cavitation and damage in the pump head. Also, the small amount of returned fluid can heat up rapidly and lead to further cavitation and component damage. It is recommended to route bypass back to inlet of filter to allow air bubbles to dissolve and water to cool prior to entering pump.

Please use the following charts as a guide to understand the basic system requirements.

NOTE: Nozzle sizes in the performance chart are additive. For example, 2 pieces of '02 nozzle equals the performance of 1 piece of '04. Nozzles create restriction (pressure) in the system. If unsure of the nozzle size needed for desired performance, refer to Nozzle Performance Chart. If you are sure of your nozzle size, but unsure of which pump set to choose, then use the Nozzle Performance Chart along with the Horsepower Chart on our website to determine your required pump specification.

An example of how to use these charts together: when you have 2 pieces of an '02 nozzle and you want 500 PSI, the Nozzle Chart will tell you that 2 pieces of an '02 nozzle has a flow equal to 1 piece of an '04 nozzle. At 500 PSI, an '04 nozzle has a flow of 1.4 GPM. The performance specification is 1.4 GPM at 500 PSI.

NOZZLE PERFORMANCE CHART FLOW RATE VS. PRESSURE

SS TIP #	GPM (GALLONS PER MINUTE) @ PSI (POUNDS PER SQUARE INCH)						
	60	80	100	200	300	400	500
2	0.25	0.28	0.32	0.45	0.55	0.64	0.71
3	0.37	0.42	0.47	0.67	0.82	0.96	1.10
4	0.49	0.57	0.63	0.89	1.10	1.26	1.40
6	0.73	0.85	0.95	1.34	1.64	1.90	2.10
8	0.98	1.13	1.26	1.79	2.20	2.52	2.80
10	1.22	1.41	1.58	2.24	2.74	3.16	3.50
12	1.47	1.70	1.90	2.68	3.29	3.79	4.24
15	1.84	2.12	2.37	3.35	4.11	4.74	5.30
20	2.45	2.83	3.16	4.47	5.48	6.32	7.07
30	3.67	4.24	4.74	6.71	8.22	9.49	10.61

MAINTENANCE

Each system's maintenance cycle will be unique. If the system performance decreases, investigate it immediately. If no wear at 500 hours, check again at 1000 hours and each 500 hours until wear is observed. Valves typically require changing at every seal change. Duty cycle, temperature, quality of pumped liquid and inlet feed conditions all affect the life of a pump's parts and service cycle. Remember to service the regulator/unloader at each seal servicing. Check all system accessories and connections before resuming operation.

STORING

For extended storing, or between use in cold climates, drain all pumped liquids from pump and flush with antifreeze solution to prevent freezing and damage to the pump. DO NOT RUN PUMP WITH FROZEN LIQUID.

NOTE: For pump disassembly and reassembly instructions and pump specifications, refer to pump-specific manual.

PREVENTATIVE MAINTENANCE CHECKLIST

Check	Daily	Weekly	50 Hrs.	500 Hrs.	1500 Hrs.	3000 Hrs.
Clean Filters	X					
Water Leaks	X					
Descale Pump		X	X			
Cam & Bearing				X	X	
Seal Change				X	X	
Valve Change				X		X

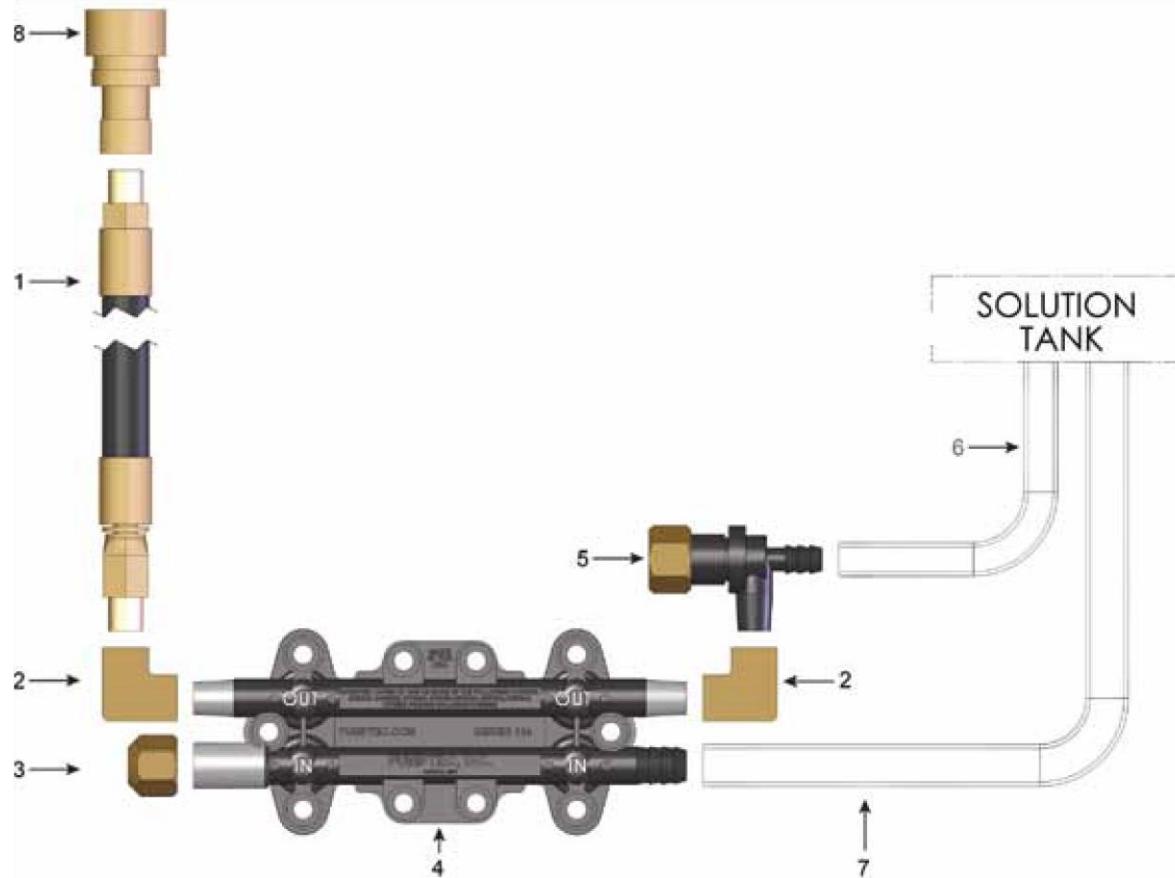
TROUBLESHOOTING CHART

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
No water flow	1. Tank is empty or water is not turned on 2. Filter clogged 3. Pump valves clogged or damaged 4. Pump has lost prime	1. Fill tank or turn on water supply 2. Clean filter 3. Examine valves and clean or replace 4. Follow priming procedure
Low pressure	1. Worn nozzle 2. Leak in high pressure hose or connections 3. Filter clogged 4. Pump valves clogged or damaged	1. Replace nozzle with new one of same size 2. Check hose and connections 3. Clean filter 4. Examine valves and clean or replace
Pump pulsates when spraying	1. Filter clogged 2. Pump valves clogged or damaged	1. Clean filter 2. Examine valves and clean or replace
Motor does not operate	1. Blown fuse or circuit breaker	1. Replace circuit breaker or fuse. Check circuit for wire damage or component damage
Leaks seen under pump	1. Worn pump seals 2. Abrasives in solution have damaged pump seals	1. Replace with new plunger and seals 2. Mix chemical thoroughly and improve filter
Regulator leaks fluid from cap	1. Pressure is set too low	1. Set pressure higher to keep internals from moving too much 2. Replace seal

For Repair Parts, call 763-433-0303

Please provide following information:

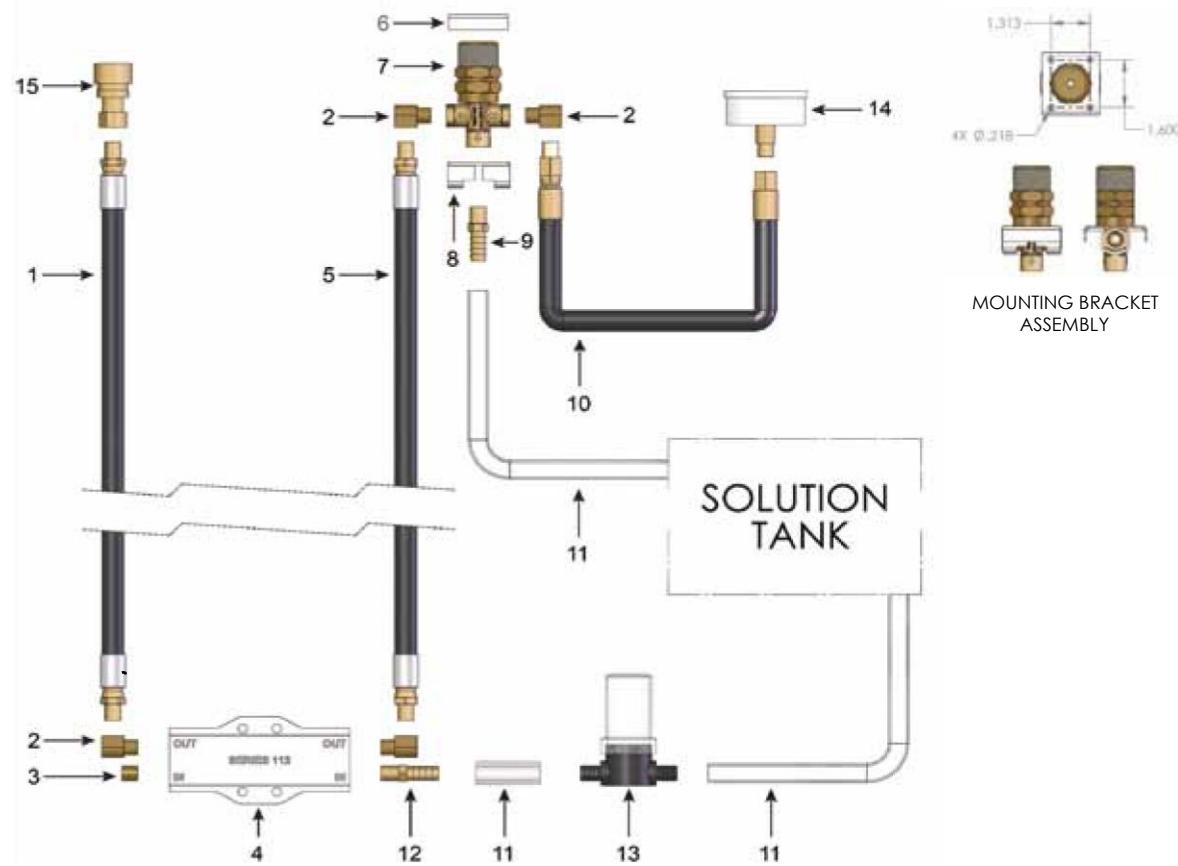
- Model number
- Serial number (if any)
- Part description and number as shown in parts list



PARTS LIST FOR HIGH PERFORMANCE UPGRADE KIT

DESCRIPTION		QTY	DESCRIPTION		QTY
REF	UPGRADE KIT 114, 200PSI	80655	REF		
1	Pulse Hose, 29"	▲	1	5	Nylon 200 PSI Regulator
2	Brass Elbow	▲	2	6	Hose, 3/8" ID, 3ft.
3	Cap, 3/8", Poly, Black	▲	1	7	Hose 1/2" ID, 3ft
4	Pump/Motor	†	1	8	Quick Connect

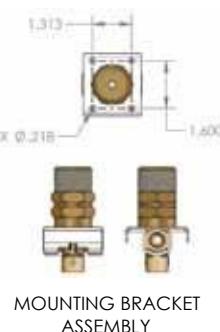
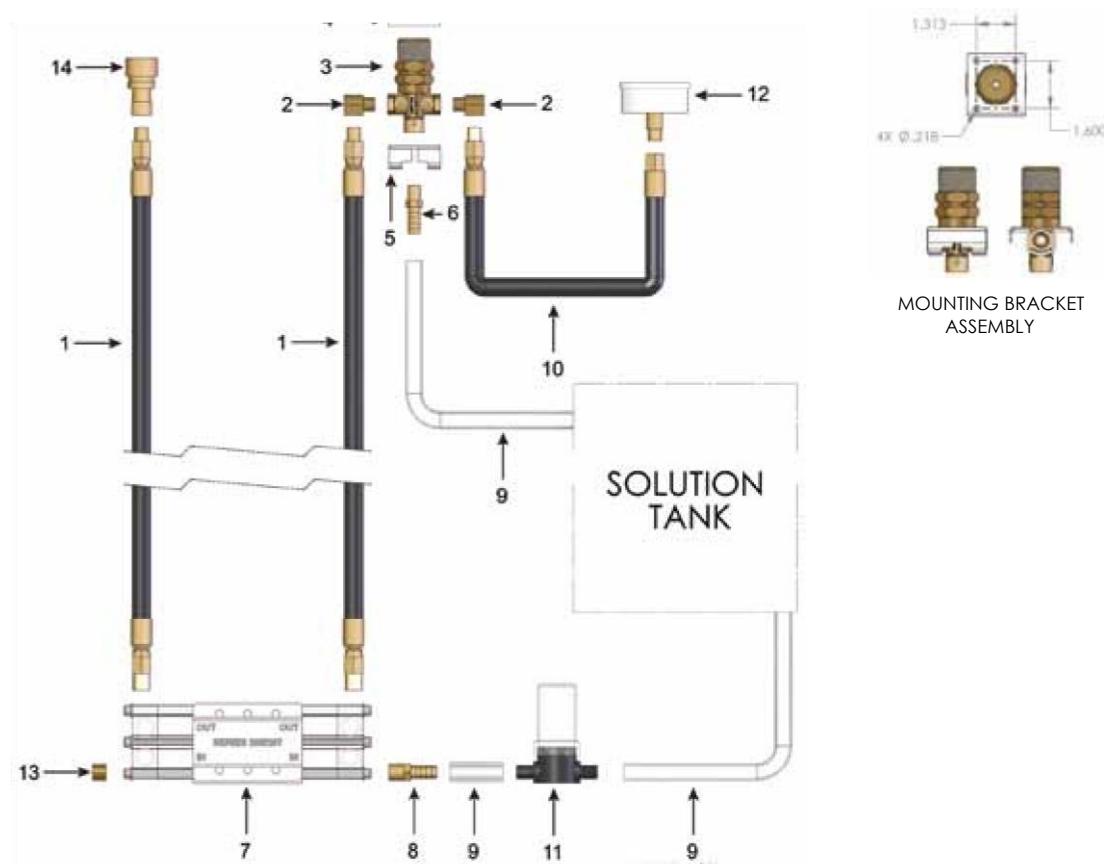
(▲) Sold as part of a kit | (Δ) Not Shown | (†) Not included in kit. For identification only.



PARTS LIST FOR HIGH PERFORMANCE UPGRADE KIT

REF	DESCRIPTION	PN	QTY	REF	DESCRIPTION	QTY	
UPGRADE KIT 112, 200PSI		80656					
1	Pulse Hose, 45"	▲	1	9	Brass Hose Barb, 1/4" M, 1/2" B	▲	1
2	Brass Elbow	▲	4	10	Pulse Hose, 32"	▲	1
3	Brass Counter Sunk Plug	▲	1	11	Hose, 1/2" ID, 7ft.	▲	1
4	Pump/Motor	†	1	12	Poly Hose Barb, 1/4" M, 1/2" B	▲	1
5	Pulse Hose, 32"	▲	1	13	Clear Bowl Line Strainer, 1/2" B	▲	1
6	Top Bracket	▲	1	14	600 PSI Pressure Gauge w/Bracket	▲	6
7	Regulator	▲	1	Δ	Hose Clamp, 3/8" - 7/8"	▲	6
8	Bottom Bracket	▲	1	15	Quick Connect	†	1

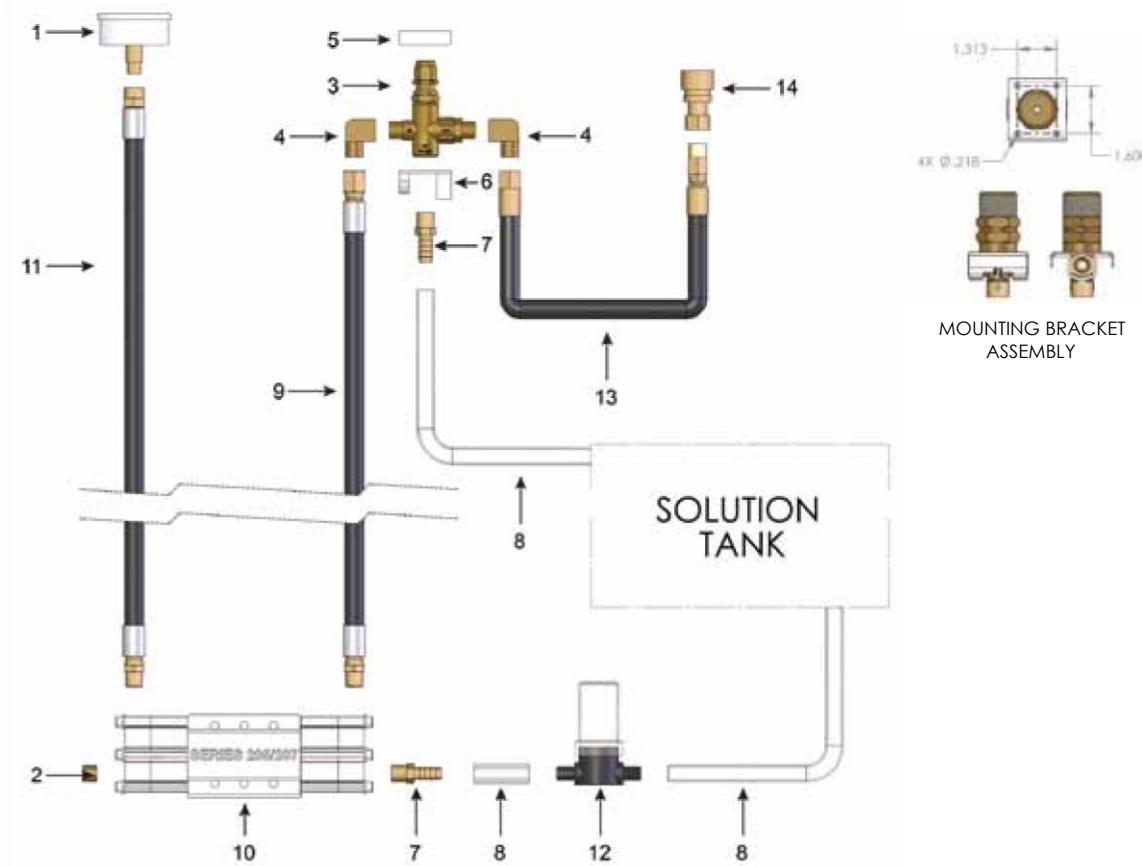
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PARTS LIST FOR HIGH PERFORMANCE UPGRADE KIT

REF	DESCRIPTION	PN	QTY	REF	DESCRIPTION	QTY
	UPGRADE KIT 205, 207 350PSI	80719		8	Brass Hose Barb, 3/8" M, 1/2" B	▲ 1
1	Pulse Hose, 45"	▲	2	9	Hose, 1/2" ID, 6ft.	▲ 1
2	Brass Elbow	▲	2	10	Pulse Hose, 36"	▲ 1
3	Regulator	▲	1	11	Clear Bowl Line Strainer, 1/2" B	▲ 1
4	Top Bracket	▲	1	12	600 PSI Pressure Gauge w/Bracket	▲ 1
5	Bottom Bracket	▲	1	13	Brass Counter Sunk Plug	▲ 1
6	Brass Hose Barb, 1/4" M, 1/2" B	▲	1	Δ	Hose Clamp, 3/8" - 7/8"	▲ 6
7	Pump/Motor	†	1	14	Quick Connect	† 1

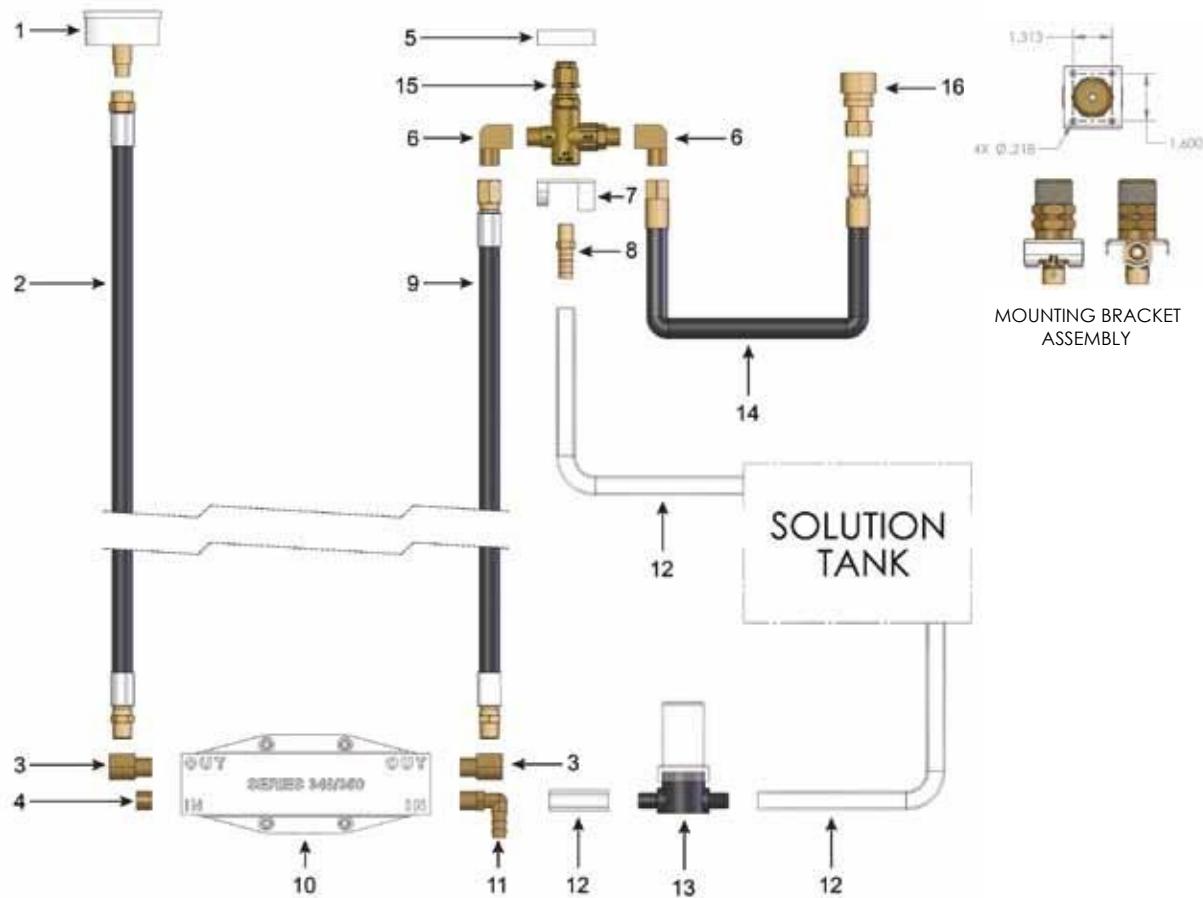
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PARTS LIST FOR HIGH PERFORMANCE UPGRADE KIT

REF	DESCRIPTION	PN	QTY	REF	DESCRIPTION	QTY
UPGRADE KIT 205, 207 500PSI		80657		8	Brass Hose Barb, 3/8" M, 1/2" B	▲ 1
1	Pulse Hose, 45"	▲	2	9	Hose, 1/2" ID	▲ 1
2	Brass Elbow	▲	2	10	Pulse Hose, 36"	▲ 1
3	Regulator	▲	1	11	Clear Bowl Line Strainer, 1/2" B	▲ 1
4	Top Bracket	▲	1	12	600 PSI Pressure Gauge w/Bracket	▲ 1
5	Bottom Bracket	▲	1	13	Brass Counter Sunk Plug	▲ 1
6	Brass Hose Barb, 1/4" M, 1/2" B	▲	1	Δ	Hose Clamp, 3/8" - 7/8"	▲ 6
7	Pump/Motor	†	1	14	Quick Connect	† 1

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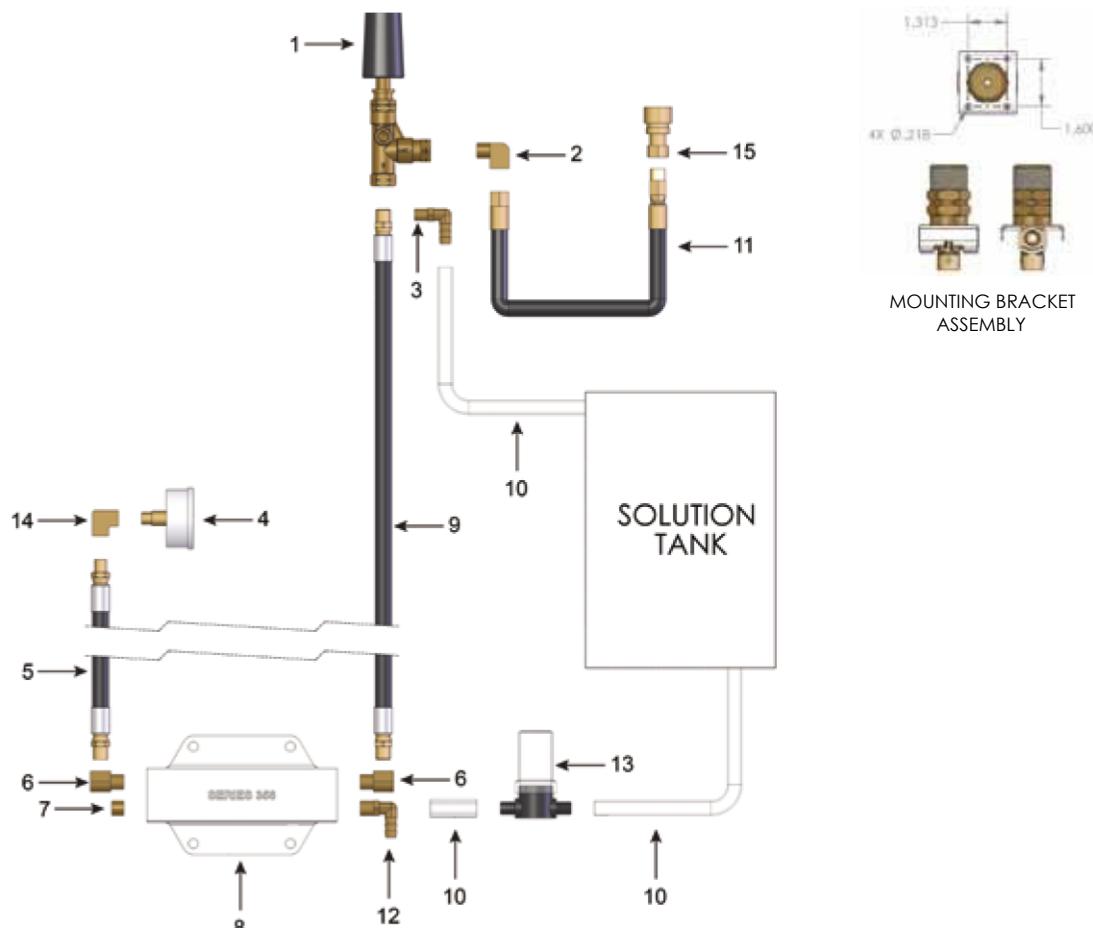


PARTS LIST FOR HIGH PERFORMANCE UPGRADE KIT

REF	DESCRIPTION	PN	QTY	REF	DESCRIPTION	QTY
	UPGRADE KIT 348, 350, 356 1000PSI	80717		10	Pump/Motor	† 1
1	2000psi Pressure Gauge w/Bracket	▲	1	11	Brass Elbow Hose Barb	▲ 1
2	Pulse Hose, 32"	▲	1	12	Hose, 1/2" ID	▲ 1
3	Brass Elbow, Close	▲	2	13	Clear Bowl Line Strainer, 1/2" B	▲ 1
4	Brass Counter Sunk Plug	▲	1	14	Pulse Hose, 29"	▲ 1
5	Top Bracket	▲	1	15	Unloader	▲ 1
6	Brass Elbow, Long	▲	2	△	Reducing Adapter	▲ 1
7	Bottom Bracket	▲	1	△	Hose Clamp, 3/8"-7/8"	▲ 6
8	Brass Hose Barb	▲	1	16	Quick Connect	† 1
9	Pulse Hose, 29.5, Brass Ends	▲	1			

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Brass Elbow Hose Barb



PARTS LIST FOR HIGH PERFORMANCE UPGRADE KIT

REF	DESCRIPTION	PN	QTY	REF	DESCRIPTION	QTY
	UPGRADE KIT 348, 350, 356 1200PSI	80718		9	Pulse Hose, 32"	▲ 1
1	Unloader	▲	1	10	Hose, 1/2" ID	▲ 1
2	Brass Elbow, Long	▲	1	11	Pulse Hose, 31"	▲ 1
3	Brass Elbow, Hose Barb, 1/4" M	▲	1	12	Brass Elbow Hose Barb, 3/8" M	▲ 1
4	2000 PSI Pressure Gauge w/Bracket	▲	1	13	Clear Bowl Line Strainer, 1/2"	▲ 1
5	Pulse Hose, 17"	▲	1	14	Brass Elbow	▲ 1
6	Brass Elbow, Close	▲	2	Δ	Reducing Adapter	▲ 1
7	Brass Counter Sunk Plug	▲	1	Δ	Hose Clamp, 3/8"-7/8"	▲ 6
8	Pump Motor	†	1	15	Quick Connect	† 1

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ADDITIONAL RESOURCES

[Pumptec Returns Authorization Request Form](#)

[Warranty Policy](#)

Prompt Disposition A good faith effort will be made for prompt correction or other adjustment with respect to any product which proves to be defective within limited warranty. For any product believed to be defective within limited warranty, first visit Pumptec's website, email, or call Pumptec. Pumptec will give additional directions. If unable to resolve satisfactorily, write to Pumptec at the address below, giving the serial number, invoice number and date, and describing the nature of the defect. Title and risk of loss pass to buyer on delivery to common carrier. If product was damaged in transit to you, file claim with carrier.

Manufactured by Pumptec, Inc. 700 McKinley St. NW, Anoka, Minnesota 55303 U.S.A.

Phone: 763-433-0303