BUFFALO TURBINE

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BUFFALO TURBINE'S
MODEL CSM3 SPRAYER/DUSTER
OPERATOR'S MANUAL AND PARTS BOOK

12/19-BT MAN

BUFFALO TURBINE SPRAYERS
MODEL CSM3

WARRANTY REGISTRATION FORM & INSPECTION REPORT

WARRANTY REGISTRATION

This form must be filled out by the dealer and signed by both the dealer and the customer at the time of delivery

Customer's Name _____ Dealer Name _____

Address _____ Address _____

City, State, Code _____ City, State, Code _____

Telephone Number _(___)_____

Email Address _____

Sprayer Model _____ Circle one:

Serial Number _____ Commercial Use

Delivery Date _____ Private Use

DEALER INSPECTION REPORT

_____ Tire Pressure Check – Trailer Model

_____ Wheel Bolts

_____ Belt Tension

_____ Lubricate Machine

_____ Checked all connections (no leaks)

SAFETY CHECKS

_____ All Decals Installed

_____ Review Operating and Safety Instructions

_____ Guards in Place and secure

_____ Fasteners Tight

I have thoroughly instructed the buyer on the above described equipment which reviews the included Operator's Manual content, equipment care, adjustments, safe operation and applicable warranty policy.

Date _____ Dealer's Rep. Signature_____

The above equipment and Operator's Manual has been received by me and I have been thoroughly instructed as to the care, adjustments, safe operation and applicable warranty policy.

Date _____ Owner's Signature_____

FAX A COPY OF THIS FORM TO BUFFALO TURBINE AT 716 592 2460 or Email – service@buffaloturbine.com

MAINTENANCE OF THE BUFFALO TURBINE SPRAYER/DUSTER

The proper care and operation of the Buffalo Turbine Sprayer/Duster will increase the likelihood of obtaining satisfactory control and will largely eliminate the frustration that results from malfunctioning of the machine when time is critical and the machine is most needed.

GENERAL INFORMATION

1. **NEVER operate or start machine when pump is dry**. You will overheat and seriously damage the pistons and seals by doing so. Make sure liquid is in the tank at all times and the liquid line from tank to pump is open. There is a ball valve under the tank that needs to be open.
2. **NEVER engage dust- bin clutch when dust gates are in a closed position.**
3. When using dusts, granules, or pellets it is best to fill the dustbin after reaching the application area, as the jarring from traveling will pace some dust solid.
4. **NEVER try to move or lift entire machine if tank is full.** Either drain tank or shut off valve under tank and disconnect tank from machine (undoing connecting bars) and move separately.
5. **Warning**: Nozzle hose could get entangled on the vehicle that the machine is attached too. Make sure all loose components are clear of hose. Rotate nozzle before running to make sure there are no snag points on vehicle.

DAILY MAINTENANCE

1. Check inside of blower, tank, and dust-bin to insure that there are no foreign objects to interfere with moving parts.
2. Check belt tensions.
3. Check for loose nuts or bolts.
4. All lubrication points should be checked to see that they are lubricated. **DO NOT OVER GREASE**.
5. **NEVER LEAVE INSECTICIDE IN THE SPRAYER OVERNIGHT**. Some of the insecticides in use are highly corrosive and will cause damage to the sprayer if they remain in the lines, pump, etc., overnight. Spraying operations should continue until all the solution in the tank has been used. Then the tank should be partially filled with water and the liquid sprayed from the machine until clear water emerges from the nozzles. This flushing operation usually takes 10-15 minutes and **MUST** be carried out at the end of each day's spraying. While this flushing operation is being carried out, the hopper and blower should be washed.

The liquid line strainer (liquid filter) should be removed at the end of each day and the screen cleaned before replacing and tightening (always check for leaks). Failure to carry out this procedure may result in plugging up the lines completely or inconsistent spray output.

Installation of Nozzle

Initial (Left):

- **Look for mark on the Elbow, Clamp Band, and Base ring.**
- **Alignment the marks when clamping the Elbow and Base Ring together.**

When marks fade (Right):

- **Measure Approx. 1" between the seam of the elbow and the tab on the ring.**
- **NOTE: Make sure the Clamp Bolt is always in the narrow distance of the tabs.**

SERIAL NUMBER LOCATION

Always give your dealer the serial number of your Sprayer and/or optional Duster when ordering parts or requesting service or other information.

The serial number plate(s) is located where indicated in the picture below. Please document the number in the space provided for easy reference.

Model CSM3 Sprayer

Serial number location (sitting in the operator's seat)

Serial Number _____

CSM3 Sprayer / Duster

WARRANTY

Buffalo Turbine warrants the CSM3 to be free from defects in material and workmanship, under normal use and service. Obligation under this warranty shall extend for a period of 1 year (12 months) and shall be limited to, at the option of Buffalo Turbine, replacement of any parts found, upon inspection by Buffalo Turbine, to be defective.

Buffalo Turbine reserves the right to incorporate improvements in material and design of its products without notice and is not obligated to make the same improvements to equipment previously manufactured.

WARRANTY CLAIMS- Buffalo Turbine Must be Notified Prior to Performing any Warranty Repairs:

The purchaser claiming under this warranty shall submit a warranty claim in the prescribed form to Buffalo Turbine or an Authorized Dealer for inspection by an authorized company representative.

Factory ordered Buffalo Turbine parts must be used when filing a warranty claim.

LIMITATIONS OF LIABILITY

This warranty is expressly in lieu of all other warranties expressed or implied and all other obligations or liabilities on our part of any kind or character, including liabilities for alleged representations or negligence. We neither assume nor authorize any other person to assume on our behalf, any liability in connection with the subsequent sale of the **CSM3 Sprayer / Duster**.

This warranty shall not apply to any CSM3 unit, which has been altered outside the factory in any way so as, in the judgment of Buffalo Turbine, to affect its operation or reliability, or which has been subject to misuse, neglect, or accident.

This warranty does not cover parts and accessories, which are under separate guarantee from the manufacturers and service can be, obtained from their service facilities. No warranty is extended to regular service items such as lubricants, belts, paint and the like.

OPERATION MANUAL

The Purchaser acknowledges having receiving training in the safe operation of the CSM3 Sprayer / Duster and further acknowledges that Buffalo Turbine does not assume any liability resulting from the operation of the CSM3 unit in any manner other than described in the Operator's Manual supplied at the time of purchase.

WARRANTY VOID IF NOT REGISTERED

If there are any questions regarding any of our products call Buffalo Turbine at 716 592 2700.

DO NOT SPLIT THE TURBINE HOUSING FOR ANY REASON.

DO NOT ATTEMPT TO SERVICE OR DISASSEMBLE THE TURBINE ASSEMBLY.

DO NOT USE THE TOP OF THE TURBINE HOUSING TO STRAP OR TIE DOWN CSM3 UNITS.

Unauthorized service work on the CSM3 unit will null and void all warranties.

1 INTRODUCTION

Congratulations on your choice of a Buffalo Turbine CSM3 Sprayer and/or Duster. This equipment has been designed and manufactured to meet the needs of the Crop & Vector Control Industry.

Safe, efficient and trouble-free operation of your Buffalo Turbine Unit requires that you and anyone else who will be operating or maintaining this unit, read and understand all of the safety, operation, maintenance and troubleshooting information contained within this Operator's manual.

This Manual covers the Model CSM3.

Keep this manual handy for frequent reference and to pass on to new operators or owners. Call your Buffalo Turbine dealer or distributor if you need assistance, information, or additional copies of the manuals.

OPERATOR ORIENTATION – The directions left, right, front and rear, as mentioned throughout the manual, are as seen from the driver's seat and facing in the direction of travel.

2. SAFETY SAFETY ALERT SYMBOL

This safety Alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**

The Safety Alert symbol identifies important safety messages on the Buffalo Turbine Sprayer or Duster and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

Why is SAFETY important to you?

3 Big Reasons: Accidents Disable and Kill
Accidents Cost
Accidents Can Be Avoided

SIGNAL WORDS: Note the use of the signal words **DANGER, WARNING** and **CAUTION** with the safety messages. The appropriate signal word for each message has been selected using the following guidelines:

1. **DANGER –** An immediate and specific hazard which WILL result in severe personal injury or death if the proper precautions are not taken.
2. **WARNING-** A specific hazard or unsafe practice which COULD result in severe personal injury or death if proper precautions are not taken.
3. **CAUTION** – Unsafe practices which COULD result in personal injury if proper practices are not taken, or as a reminder of good safety.

YOU, the owner / operator, are responsible for the **SAFE** operation and maintenance of your Buffalo Turbine Sprayer or Duster. **YOU** must ensure that you and anyone else, who is going to operate, maintain or work around the Buffalo Turbine unit be familiar with the operating and maintenance procedures and related **SAFETY** information contained in this manual. This manual will take you step-by-step through your working day and alerts you to all good safety practice while operating this unit.

Remember **YOU** are the key to safety. Good safety practices not only protect you but also the people around you. Make these practices a working part of your safety program. Be certain that **EVERYONE** operating this machine is familiar with the procedures recommended and follows safety precautions. Remember most accidents can be prevented. Do not risk injury or death by ignoring good safety practices.

- Sprayer/Duster owners must give operating instructions to operators or employees before allowing them to operate this unit, and at least annually thereafter per OSHA (Occupational Safety and Health Administration) regulation 1928.57.

- The most important safety device on this equipment is a **SAFE** operator. It is the operator's responsibility to read and understand ALL Safety and Operating instructions in the manual and to follow these. All accidents can be avoided.

- A person who has not read and understood all operating and after instructions is not qualified to operate the machine. An untrained operator exposes themselves and bystanders to possible serious injury or death.

- Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety and could affect the life of the equipment.

- Think **SAFETY**! Work **SAFETY!**

2.1 GENERAL SAFETY

1. Read and understand the Operator's Manual and all safety signs and safety labels before operating, maintaining, and adjusting.
2. Provide a first-aid kit for use in case of an accident. Store in a highly visible place.
3. Provide a fire extinguisher for use in case of an accident. Store in a highly visible place.
4. Wear appropriate protective gear. This list includes but is not limited to:

    - A hard hat
    - Protective shoes with slip resistant soles
    - Protective glasses or goggles
    - Heavy gloves
    - Wet weather gear
    - Hearing protection
    - Proper Breathing Apparatus
      (during chemical spraying and dusting)

5. Do not operate without shields and guards in place.
6. Do not allow riders.
7. **Wear appropriate ear protection for prolonged exposure to excessive noise.**
8. Stop engine, set park brake, remove ignition key and wait for all moving parts to stop before attempting to service or adjust.
9. Clear the area of people, especially small children, before starting the unit.
10. Review all safety related items annually with all personnel who will be operating or maintaining this Buffalo Turbine unit.
11. Keep Hands, feet, hair and clothing away from moving parts.

2.2 OPERATING SAFETY

1. Read and understand the Operator's Manual and all safety signs before operating, servicing or adjusting.
2. Before servicing or repairing the Model CSM3, **Turn Off Engine and Disconnect Battery Terminals**

2.3 MAINTENANCE SAFETY

1. Read and follow ALL operating, maintenance and safety information in the manual.
2. Support the machine with blocks or safety stands when changing tires or working beneath it.
3. Do not adjust any of the belts when the unit is running and engaged.
4. Make sure all guards are in place and properly secured when operating or maintaining the Sprayer.

2.4 TRANSPORT SAFETY

1. Make sure you are compliant with all local DOT regulations regarding transporting Buffalo Turbine equipment on public roads and highways. DOT APPROVED TRAILERS ARE AVAILABLE FROM BUFFALO TURBINE.
2. Ensure that the **SMV** (Slow Moving EMBLEM) and all reflectors and lights required by the local highway and transport authorities are in place and are clean and visible by overtaking and oncoming traffic.
3. The rectangular tubing at the base of the sprayer unit must be used to load and unload the Sprayer unit onto a vehicle. Use caution when directing the lift forks into the rectangular tubing due to the 100 gallon tank. DO NOT OVERLOAD LIFT TRUCK.

2.5 STORAGE SAFETY

1. Store the Sprayer (or optional duster) on a firm, level surface.
2. Store away from areas of human activity. Do not permit children to play on or around the stored machine.
3. Make sure the unit is sitting, or blocked up firm and solid and will not tip or sink into a soft area.
4. Cover with a weatherproof tarpaulin and tie down securely.

2.6 SAFETY DECALS

Keep safety decals and signs clean and legible at all times.

1. Replace safety decals and signs that are missing or have become illegible.
2. Replaced parts that displayed a safety sign should also display the current sign.
3. Safety decals or signs are available from your Dealer Parts Department.

How to Install Safety Decals:

- Be sure that the installation area is clean and dry.
- Decide on the exact position before you remove the backing paper.
- Remove the smallest portion of the split backing paper.
- Align the decal over the specified area and carefully press the small portion with the exposed sticky backing in place.
- Slowly peel back the remaining paper and carefully smooth the remaining portion of the decal in place.
- Small air pockets can be pierced with a pin and smoothed out using the piece of decal backing paper.

2.7 SIGN-OFF FORM

Buffalo Turbine recommends that anyone who will be operating and/or maintaining the Buffalo Turbine CSM3 Sprayers or Dusters must read and clearly understand ALL Safety, Operating and Maintenance information presented in this manual.

Do not operate or allow anyone else to operate this equipment until such information has been reviewed. Annually review this information before the season start-up

Make these periodic reviews of SAFETY and OPERATION a standard practice for all of your equipment. We feel that an untrained operator is unqualified to operate this machine.

A sign-off sheet is provided for your record keeping to show that all personnel who will be working with the equipment have read and understand the information in the Operator's Manual and have been instructed in the operation of the equipment.

SIGN-OFF FORM

DATE	EMPLOYEES SIGNATURE	EMPLOYERS SIGNATURE

2.8 SAFETY DECALS

The types of decals on the Sprayer unit are shown below. For locations of each label, see parts reference in the back of this manual.

Good safety requires that you familiarize yourself with the various Safety Decals, the type of warning and the area, or particular function related to that area that requires your **SAFETY AWARENESS.**

*** THINK SAFETY! WORK SAFELY!**

!ATTENTION!

1. **KEEP HANDS, FEET AND CLOTHING AWAY FROM POWER DRIVEN PARTS.**
2. **STOP ENGINE AND REMOVE KEY BEFORE LEAVING OPERATOR'S POSITION.**
3. **MACHINE MUST COME TO A COMPLETE STOP BEFORE ANY MAINTENANCE, TO INCLUDE ADJUSTING, LUBRICATING OR CLEANING, IS PERFORMED.**
4. **KEEP PEOPLE AND PETS AT SAFE DISTANCE FROM MACHINE.**
5. **KEEP ALL GUARDS AND SHIELDS IN PLACE.**

REMEMBER – If safety decals have been damaged, removed, become illegible or parts replaced without decals, new decals must be applied. New decals are available from your authorized dealer.

3. OPERATIONS

3.1 TO THE NEW OPERATOR OR OWNER

Buffalo Turbine Sprayers and optional dusters are designed to quickly and efficiently apply concentrated sprays and/or dust, giving a thorough and wide-ranged coverage never before possible. Being adjustable allows a desired degree of agitation to the foliage, with enough velocity to completely carry through the tops of trees as well as through row after row of heavy thick leaf cover in row crops.

Many of the features incorporated into the machine are the result of suggestions made by customers like you. Read the manual carefully to learn to operate the machine safely and how to set it to provide maximum efficiency. The manual will take you step-by-step through your working day. By following the operating instructions in conjunction with a good maintenance program, your Buffalo Turbine Unit will provide many years of trouble-free service.

3.2 BREAK-IN

Although there are no operational restrictions on the Sprayer or optional Duster when it is used for the first time, it is recommended that the following mechanical items be checked:

A. Operating for first ½ hour
1. Retorque all wheel bolts and axle nuts. (Trailer Models)
2. Re-torque all other fasteners and hardware.

B. Operating for first 5 hours
1. Retorque all hardware and fasteners.
2. Check the drive belt tension. Adjust as required.
3. Go to the normal servicing and maintenance schedule as defined in the Maintenance Section.

3.3 PRE-OPERATION CHECKLIST

Efficient and safe operation of the Buffalo Turbine Sprayers and Dusters require that each operator reads and understands the operating procedures and all related safety precautions outlined in this section. A pre-operation checklist is provided for the operator. It is important for both personal safety and maintaining the good mechanical condition of the machine that this checklist is followed.

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Before operating the Sprayer and each time thereafter, the following areas should be checked off:

1. Lubricate the machine per the schedule outlined in the maintenance section.
2. Prime the Hypro pump especially when the liquid tank was drained and cleaned.
3. Use an appropriate vehicle designed to handle this type of equipment.
4. Ensure that the machine is properly attached and anchored to the vehicle.
5. Make sure all guards and shields are in place, secured and functioning as designed.
6. Check the belts and pulleys for proper tension and alignment.
7. Ensure all bearings turn freely.

3.4 REPAIR PARTS

Use Buffalo Turbine repair parts only to ensure safe and efficient operation of the sprayers and dusters. Warranty will be void if substitute replacement parts are used.

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Before Operating the Sprayer (optional duster) and each time thereafter, the following areas should be checked off.

1. For fuel, oil, and operating information of the Kohler Engine, refer to the manufacturers specs included with this manual.
2. The DOT trailer models must have proper tires, warning signs and lights when on public highways and roads. Check your local Motor Vehicle Dept. or law enforcement for restrictions. **Maximum speed is 45mph!**
3. Insure the Trailer Unit and Towing Vehicle has the proper receiver and coupler.
4. Make sure all guards and shields are in place, secured and functioning as designed.
5. Always use eye and hearing safety protection when operating this or any other equipment.

3.5 FIELD OPERATION

OPERATION SAFETY

1. Review the Operator's manual before starting.
2. Do not allow riders unless seat is provided.
3. Keep all guards in place when operating equipment.
4. Stop engine, set park brake, remove ignition key and wait for all moving parts to stop before dismounting to service, adjust or repair.
5. Do not direct air stream towards people, pets or other animals or in congested areas.

3.6 Operating RPM

The Model CSM3 may be run at maximum RPM. This recommendation is made to insure maximum coverage necessary. The Sprayer (optional duster) can operate at a slower RPM if shorter distance or less coverage is required. All Liquid and dry chemical mixtures have specific coverage ratings. Ground travel speed, engine RPM of the model CSM3, wind speed and acreage to be covered, has to be calculated and manually measured for proper coverage. The Dustbin opening and / or nozzle tip orifice size will greatly affect coverage. Adjusting pressure settings & nozzle tip sizes will determine droplet size.

When operating the machine, follow these procedures:

1. Start and operate the Sprayer/Duster according to owner's manual.
2. Make sure Sprayer (optional duster) accessories are disengaged before starting.
3. Clear the area of bystanders before starting.
4. The Model CSM3 is equipped with an electric remote nozzle, liquid, optional dust bin and throttle cab control box: (12v system)
   a. Pressing the toggle switch marked "NOZZLE" on the hand held cab control box changes the air stream direction. The nozzle will stop turning by releasing the toggle switch (momentary switch). Use caution and always check clearances around nozzle rotation (260-degree rotation). **Release toggle switch when positive stops have been contacted.**
   b. The toggle switch marked "LIQUID" turns the solenoid on and off. Flow rate has to be adjusted at the pressure relief valve. Have the nozzle in position before turning pump on. *The nozzle tips have a .036 orifice opening (6502).* A variety of sizes are available.
   c. The momentary toggle switch marked "THROTTLE" will raise and lower the RPM of the Kohler engine. Pressing or releasing the toggle switch in either direction will either raise or lower the engine's RPM. Adjustment is from an idle to maximum RPM.
   d. OPTION: The momentary toggle switch marked "DUST (OPEN / CLOSE)" will open and close the dust feed gates and will adjust for variable feed rates of chemical dust into the air stream.
   e. OPTION: The toggle switch marked "DUST (ON/OFF)" will engage the clutch of the dustbin. The dust feed shafts and the dust agitators will be turning when the toggle switch is in the on position. **Never engage dustbin when dust/granular gates are closed!**

Cab control box

NOTE: Make sure the remote cable is clear of all moving parts.

3.7 Transporting the Model CSM3

1. The Model CSM3 with the trailer package may be transported on a flatbed truck. Be sure to block the wheels and fasten securely. **NEVER ANCHOR THE SPRAYER OVER THE TOP OF THE TURBINE.**
2. **When mounting the unit on a flatbed or pickup truck, securely STOP and CLAMP in the 8 corners of the frame ONLY**.

3.8 STORAGE

Daily cleaning is recommended especially if corrosive materials are being used.

At the end of the working season or storing the unit for a period of time, prepare the machine by following this procedure:

1. Select a storage area that is dry, level and free of debris.
2. Thoroughly wash the machine, including the tank, with a water hose to remove all debris and residue.
3. Lubricate all grease fittings with one shot of grease to displace any accumulated water.
4. Run the machine at low RPM to dry the Blower Components
5. Touch up all paint chips and scratches to prevent rusting.
6. Inspect for worn or failed components. Order the replacement parts now and repair when the time allows, eliminating unnecessary down time at the start of next season.
7. Store in an enclosed building. If space is not available, cover with a waterproof tarpaulin and tie it down securely.
8. Store the machine away from the areas of human activity.
9. Do not allow children to play around the stored unit.

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Wash the Blower unit, then run at lower rpm's to dry blower and engine. Change oil per manufacturer's specs. Spray a lubricant on the nozzle base to ensure smooth operation and the prevention of rust. Park and block unit so the tires clear the ground.

4. SERVICE AND MAINTENANCE

! MAINTENANCE SAFETY

1. Set the unit on a level surface, stop engine, set park brake, remove ignition key and wait for all moving parts to stop before attempting to service, adjust or repair.
2. Reinstall and secure all shields removed for servicing before starting to use machine again.
3. Securely support machine with blocks or safety stands when changing tires or working beneath it.

4.1 FLUIDS AND LUBRICANTS – (Reference page 31)

1. **Grease** (Models CSM3)
   Use SAE multi-purpose high temperature grease for all applications. SAE multi- purpose lithium base grease is also acceptable.
   USE ONLY CLEAN LUBRICANTS and a hand-held grease gun for all greasing. Air powered greasing systems can damage the seals on bearings and lead to early bearing failure.

IMPORTANT: Over-greasing can damage bearing seals. A damaged seal will lead to early bearing failure. Replace all damaged bearings with factory ordered parts. (Replace and repair broken fittings immediately. If a fitting will not take grease, remove and clean thoroughly. Also clean lubricant passageway. Replace fitting if necessary.)

2. **Model CSM3**: Change oil per Manufacturer's specs (provided with manual).

Use the Maintenance Checklist provided to keep a record of all scheduled maintenance.

4.2 SERVICE RECORD

See Lubrication and Maintenance sections for details of service. Copy this page to continue record.

CODE: LUBRICATE (L) / CHECK- (*) / CHANGE-(C) / REPLACE- (B) / CLEAN- (CL)

SCHEDULED MAINTENANCE HOURS

SERVICED BY

MAINTENANCE

8 hrs or daily

(*) Engine Oil- Follow Manufacturers Specs
(CL) Liquid Tank, nozzle tips and screens, strainer, Optional Dust Bin

40 hours

(CL) Remove debris from dust bin guards
(L) Bearing, End

(L) Pillow block bearings - greasing

(L) Nozzle base and nylon slides (spray, i.e. Teflon)

(*) Belt tension- SEE SECTION 5.2.1.

80 hours

(CL) General Filter Cartridge - nozzle tip screens or as needed
(CL) External engine fuel filter - see engine manual

100 hours

(L) Pump (Hypro 5210) Grease Fitting on cam bearing – Use Moly Lithium or equivalent grease. With a flat tool, apply a generous dab of grease to the outer diameter surface of the cam bearing at the top and bottom, where the bearing contacts the connecting rod. (see HYPRO pump insert)
(L) Dust Bin
(CL) Turbine Blades and Vanes

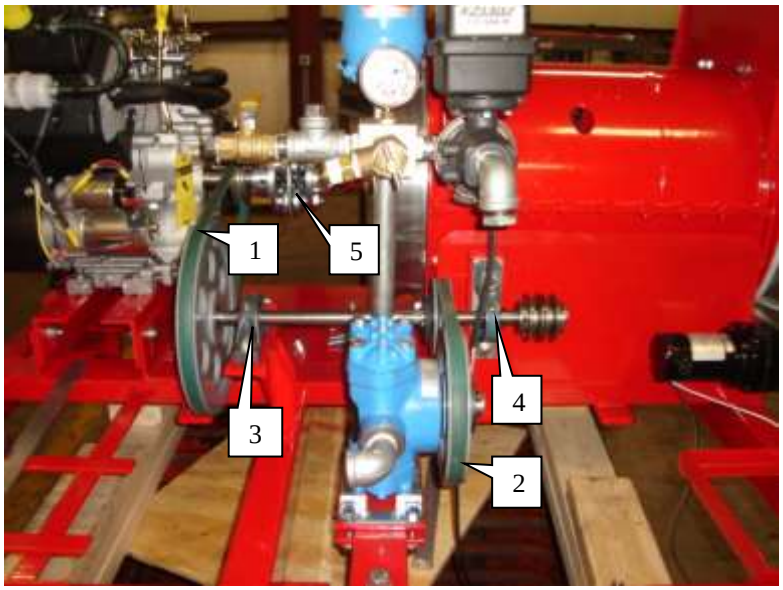
200hrs or annually

(CL) Machine—Clean Turbine blades and vanes - keep turbine free of debris and grime
(L) Grease and lubricate all fittings including nozzle base.
(L) Wheel Bearings (trailer model)

4.3 Belt Tension

Efficient machine operation requires that the belts always be properly tensioned.

V -belts 6930 and 6945 are used to drive the Hypro pump (shown below).



To adjust belt #1 (6945), loosen bolts on bearing #3 then move bearing in the direction of the arrow. Tighten bolts securely and check for proper tension.

To adjust belt #2 (6930), loosen pump mounting bolts at the base of the pump and move in the direction of the arrow. Tighten bolts securely and check for proper tension.

Always check the pulleys and jack shaft alignment after any adjustments are made. Replace belts that are broken, worn or stretched.

4.4 Changing the Belts

After using the Model CSM3 for a long period of time, the belts will stretch and wear. To change belts, follow this procedure:

1. Turn off engine and remove key for **SAFETY**. Remove the guards around belt and pulleys.
2. Refer to the picture section 4.3 for changing the belts. To replace belt #1 (6945), loosen bearing #3 then slide the bearing toward the output shaft of the engine. The center section of the coupling (#5) will have to be removed in order to remove the old belt and install a new one. Page 28 has a detailed picture of the coupling. The center section of the coupling must be disassembled and assembled with extreme care. Damage to the coupling can result in premature bearing failure in the turbine and engine. A new bolt kit for the coupling is recommended before reassembling the coupling. ALWAYS USE TOPLOC NUTS. Remove the bolts from the coupling (2 ea. side of flange). Loosen setscrews on one flange only. A thread lock material is used on the threads at assembly. Heat may be needed to break that bond. Clean all dirt and rust that has accumulated on the shaft (behind the flange) then slowly wedge the center section off of the flange. Note: The flanges are counter bored to match the flange bushings. Once the center section is removed, belt #1 can be removed and a new belt can be installed. DO NOT TENSION THE BELT UNTIL THE CENTER SECTION OF THE COUPLING IS INSTALLED. Bolt the center section per the picture on page 28.DO NOT TIGHTEN THE SET SCREWS AT THIS TIME. Note position of bolts and locking nuts. Once the coupling is installed and securely tightened, check to see if the key is in position on the shaft and in the keyway of the flange. Coat the setscrews with Loc Tite (red) and securely tighten. Re check all the setscrews and coupling bolts before proceeding.
3. To replace belt #2 (6930), loosen mounting bolts (#5) under the Hypro pump and slide toward the Turbine. Remove old belt then install the new belt. Adjust the belt tension by sliding the pump assembly away from the Turbine Assembly. See section 4.2.1. in the previous section for more information. Check the pulley alignment and recheck both belts and the tightness of all bolts and set screws. ASSEMBLE ALL GUARDS BEFORE OPERATING UNIT!
4. To replace (4L870) dustbin belts (optional dust bin models only) remove dustbin cover. Remove two 3/8" bolts on jackshaft right side bearing. Slide old belts off. Replace with new belts and reinstall two 3/8" bolts in pillow block, apply pressure straight down on jackshaft to give proper belt tension and tighten pillow block bolts. Reinstall guards.
5. **Install all guards before operating blower unit!**

6. **TROUBLE SHOOTING**

The Buffalo Turbine Model CSM3 uses a high volume and velocity of air to apply concentrated sprays and or dust. It is a simple and reliable system that requires minimal maintenance.

In the following section, we have listed many of the problems, causes and solutions to the problems that you may encounter.

If you encounter a problem that is difficult to solve, even after reading through this trouble shooting section, please call Buffalo Turbine, your local dealer or distributor**. Before you call, please have the Operator's Manual and the serial number from your Model CSM3 available.**

PROBLEM	CAUSE	SOLUTION
Blower does not turn	Engine not running Engine running Sheared key	Start Engine Replace broken belt Replace key on sheave
Engine will not start	Dead battery Battery cables dirty or disconnected Fuel valve shut off	Charge or replace battery Clean and connect terminals Turn on fuel valve
No liquid spray	Toggle switch not turned on Holding tank plugged or empty Loose or broken belt Pulleys slipping Defective solenoid Defective or worn pump Dirty cartridge filter or nozzle screens	Turn switch on from control panel Check hoses and fill tank Adjust or replace belts Tighten set screws on pulleys Replace solenoid Rebuild or replace pump Clean or replace mesh filters
Dust Bin troubles	Clutch not engaged Dust packing solid Loose or broken belts Pulleys slipping Inconsistent application	Turn switch on from control panel See form PB-82/check agitators Adjust or replace belts Tighten set screws on pulleys Check and clean control gates
Belts or pulleys overheat	Belts slipping	Adjust belt tension
No air flow	Blower fan not turning Blower fan turns Air intake or exhaust restricted	See solutions above Turn off engine and remove any debris restrictions
Machine vibrates	Bearing failure Out-of-balance	Replace bearings Check for damaged blades or vanes in the blower unit

7. **SPECIFICATION**

Model CSM3

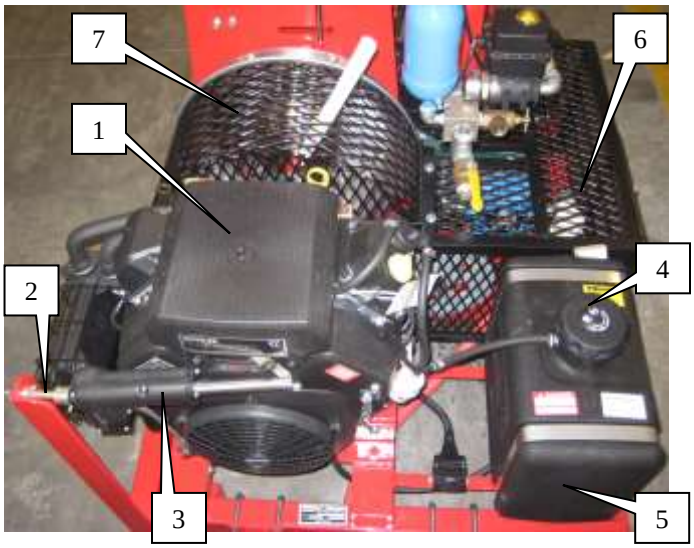
Length: (without trailer)	103" with nozzle assembly & 100 gallon tank attached
Length: (with DOT trailer)	155" with nozzle assembly & 100 gallon tank attached
Width: (without trailer)	40 1/2"
Width: (with DOT trailer)	80"
Height: (without trailer)	34" (with Dust Bin 53")
Height: (with DOT trailer)	54" (with Dust Bin 73")
Weight: (without trailer)	TBD
Weight: (with DOT trailer)	TBD
Weight: (with Dust Bin only & 100 Gallon Tank)	Approximately 820 lbs
Weight: (with Dust Bin and Trailer Pkg.)	TBD
Fuel Capacity:	6 Gallons
Electrical System:	12V Battery
Input Power:	CH740 Kohler Command PRO
Input RPM:	up to 3750 RPM
Outlet Size:	Approximately 12"
12 volt Control Valve	150 PSI (maximum)

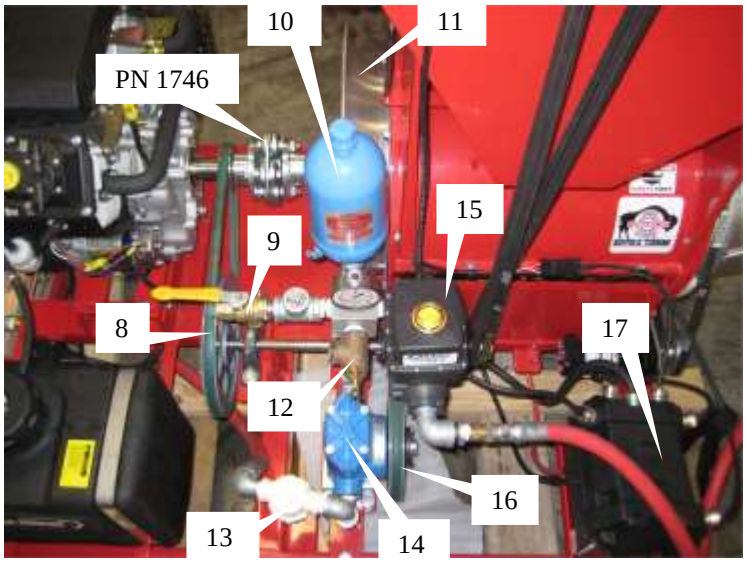
PARTS REFERENCE LIST			
Ref #	**PN**	**Description**	**QTY.**
	1100	3/8-24 X 1-1/4 HHCS ZINC GR 5	9
	1101	3/8-24 X 1-1/2 HHCS ZINC GRADE 5	9
	1102	3/8-24 X 1-3/4 HHCS ZINC	6
	1103	3/8-24 X 2 FACED HEAD SCREW MAKE FROM 1104	1
	1104	3/8-24 X 2 HHCS ZINC GRADE 5	5
	1105	3/8-24 HEX NUT ZINC PLATED GRADE 5	28
	1106	SPACER-3/8 X 3/16 THICK WASHER	36
	1107	3/8 LOCK WASHER ZINC PLATED	39
	1108	3/8 FLAT WASHER ZINC PLATED	16
	1109	3/16 X 1/2 ROLL PIN	4
	1110	KEY, 1/4 X 1-1/2	1
	1111	KEY, 3/8 X 1 1/2	1
	1112	7/16-20 TOPLOC NUT GRADE 5 ZINC PLATED	4
	1113	7/16-20 X 2-1/2 HHCS ZINC GRADE 5 (FOR MOREFLEX)	4
	1114	COUPLING FLANGE 1-1/4 BORE	1
	1115	COUPLING FLANGE 1-7/16 BORE -SEE DWG 1114	1
11	1119	14-221-D1 BELLMOUTH	1
	1120	4GA.,5/16 STUD CL456R	4
	1123	M8 X 1.25 X 3/4 HHCS PLATED	1
	1125	1/4-20 NYLOC NUT ZINC	15
	1130	5/16-18 X 3/8 SET SCREW	1
	1131	3/8-16 X 3/8 SET SCREW	1
	1132	300 CCA BATTERIES FOR KB'S UIL-4	1
	1135	AK25 X 3/4 SHEAVE FOR DUSTER	2
23	1138	PLASTIC SLIDES	2
	1139	3/8 NOTCHED WASHER	4
20	1142	A-54 V-BELT	1
19	1143	BISON SERIES 100DC GEARMOTOR	1
21	1144	ROTATION MOTOR BRACKET	1
22	1145	SHEAVE AK32 X 1/2	1
	1146	10-32 X 5/8 SHCS	4
	1156	SERIAL TAG, EMBOSSABLE ALUMINUM	1
	1158	GAS LINE SAE30R7, 1/4" LOW PERMATION	33
	1166	COV 1/2 X 1/4 WIRE CLAMP	1
	1167	COV 5/16 X 1/4 WIRE CLAMP	4
	1168	HC-4M SS HOSE CLAMP	4
	1169	1/4-20 X 1 HHCS ZINC	22
	1170	1/4-20 HEX NUT ZINC GR 5	4
	1171	ELBOW SEGMENT	2
	1173	CLAMP BAND W/ BOLT & NUT	3
	1178	3/8 BLACK HEAT SHRINK P/N: HS-3/8B-100' SPOOLS	16
	1181	QUART OF OIL PITT PENN 10W30	1.75
	1186	CAUTION DO NOT OPERATE DECAL	5
	1187	8 X 10 BT DECAL PURCHASED WITH OTHER SIZES	3
	1193	1/16 X 1/2 COTTER PIN ZINC PLATED	2
	1194	3/16 X 1-1/2 COTTER PIN ZINC PLATED	2
	1222	1/2 LOCK WASHER, ZINC PLATED	2
	1223	1 X 1/2 X 3/16 THICK WASHER	2
	1227	THROWN OBJECT DECAL	1
	1231	1/2-13 HEX NUT ZINC PLATED	2
	1236	3/16 X 1 ROLL PIN	3
Ref #	**PN**	**Description**	**QTY.**

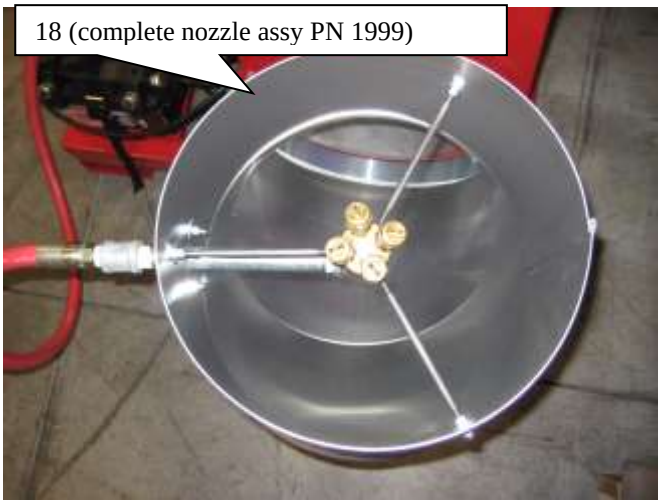
	1237	1/2-20 HEX NUT ZINC GR 5	2
	1239	FRAME, CSII SPRAYER	1
	1244	BALL VALVE SEAL CAP, FOR KZ CO BALL VALVE	1
	1247	3/4 PILLOW BLOCK BEARING, VPS-212	2
	1256	MOREFLEX 502 CENTER	1
	1258	1/4-20 X 3/4 HHCS GR5 ZINC	4
	1259	1/4 LOCK WASHER, ZINC	16
	1272	5/16-18 JAM NUT	3
	1285	BB161414R EYE CONNECTOR	2
	1286	2 AND 4 WIRE NUT	1
	1287	2 WIRE BUSHING	1
	1291	A-81 V-BELT FOR DUSTER	2
	1295	BOX FITTING	1
	1299	1/2" CONDUIT NUT	1
	1308	PUMP MOUNT PLATE FOR CSII SPRAYER & DUSTER	1
	1315	PUMP MOUNT PUSHOVER PLATE FOR CSII SPRAYER & DUSTER	1
	1356	DUST FEED WIRE SCREW, LONG	3
	1359	ENGINE RAIL	2
13	1363	STRAINER HOUSING, LSFTO34ES4NC	1
3	1409	LINEAR ACTUATOR - 4" STROKE	1
	1414	KB REMOTE THROTTLE PIN	2
	1415	1/4" FLAT WASHER	36
2	1451	ACTUATOR MOUNT, PIN	1
	1463	O-RING (320), BUNA-N MCMASTER P/N: 9452K207	1
	1464	DUST AGITATOR	9
	1487	MANIFOLD BLOCK, ALUMINUM	1
	1499	NUT PLATE, 3/8	4
	1510	PUMP MOUNT BAR FOR CSII SPRAYER & DUSTER	1
	1519	DUST FEED STUD, VERTICAL SHAFT BOLT	3
14	1520	HYPRO PUMP 5210C	1
12	1521	3/4" PRESSURE RELIEF VALVE 3330-0093 3/4M X 3/4F 300PSI	1
10	1522	HYPRO SURGE TANK 3375-0003	1
	1523	0-300 PSI PRESSURE GAGE 2640-0007 STAINLESS STEEL CASE BRASS INTERNALS	1
15	1524	F2E-60A-M, QX SA SERIES 2-WAY VALVE 3/4"-POLYCARBONITE, 150 PSI MAX	1
9	1525	3/4" BRASS BALL VALVE 171N-34 -PRESSURE ADJUSTABLE BALL VALVE	1
	3803	BK90H SHEAVE	1
	1528	3/4" GALVANIZED STREET ELL	6
	1529	3/4" X 2" GALVANIZED NIPPLE	1
	1530	3/4" X 1/2" GALVANIZED REDUCING BUSHING	1
	1533	3/4" X 9" GALVANIZED NIPPLE	1
	1534	3/4" GALVANIZED TEE	1
	1535	3/4" CLOSE NIPPLE	2
	1536	3/4" GALVANIZED PLUG	2
	1538	3/8-24 X 1 HHCS GR.5 ZINC PL.	4
	1540	5/16 LOCK WASHER, ZINC PLATED	15
	1542	LINEAR ACTUATOR - 2" STROKE 890-XXXX-S12-17A8-02 (9307-448-001)	1
	1555	SHEAVE, BK 100H	1
	1558	807-31 1/2" FEMALE COUPLAMATIC HOSE END	1
	1559	1204-41 3/4" MALE COUPLAMATIC HOSE END	2
	1560	1207-41 3/4" FEMALE COUPLAMATIC HOSE END	2
	1562	SHEAVE, BK 40H	1
	1563	H 3/4" BUSHING	2
	1568	5/8" SHAFT COLLAR, DUSTER	7
Ref #	**PN**	**Description**	**QTY.**

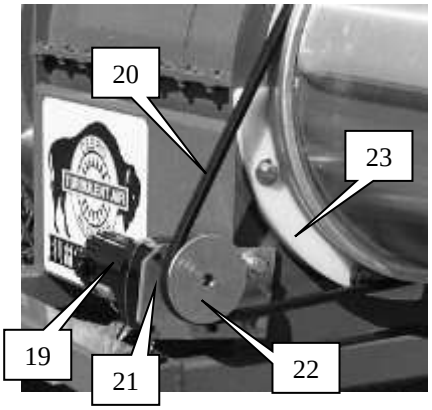
	1577	5/8" PILLOW BLOCK BEARING BROWNING VPS 210	3
	1578	GEAR BLANK FOR DUSTBIN GEAR HOBBING	3
	1579	WORM TO FIT 1578	3
	1586	3 3/8 X .850 WIDE, 1 7/16 BORE FOR B-SERIES BELT-USE ON CSII SPRAYER	1
16	3804	6934 GATES V-BELT	1
8	1589	6945 GATES V-BELT	1
	1593	3/4" BRASS HEX NIPPLE	2
	1594	1/2" BRASS HEX NIPPLE	1
	1596	3/16 SQUARE X 1-3/8 KEY	3
	1599	1/2-20 X 1-3/4 HHCS GR5 ZINC	2
	1644	DUST FEED SHAFT, HORIZONTAL	1
	1648	H X 1" BUSHING	1
	1664	5/16-24 X 1 1/4" HEX HEAD BOLT GRADE 5, ZINC PLATED-FOR DUST BIN	9
	1669	1/4-20 X .055 HEAD INSERT	15
	1692	BC-4B BLACK GRD. CABLE WITHOUT LUGS ATTACHED	53
	1693	BC-4R RED POS. CABLE WITHOUT LUGS ATTACHED	64
	1696	DUST FEED SHAFT, VERTICAL	3
	1717	WIRE BUSHING, 18-8 FOR CSII	1
	1720	1/2" GOODYEAR ORTAC HOSE, RED FOR CSII SPRAYER & DUSTER	60
	1723	5/16-18 X 1/2" CUP POINT SET SCREW	1
7	1731	SPRAYER GAURD, COUPLING/SHAFT	1
	1732	3/4" GOODYEAR ORTAC HOSE	74
	1767	LATCH AND CATCH, DUSTER	1
	1788	GAS TANK STRAP, FOR LARGER TANK-STARTING AT SERIAL # 9560	2
	1810	1/4" SPACER FOR 1" PILLOWBLOCK BEARING	1
	1819	BLACK CABLE TIES, 12" LONG	3
	1825	PUMP GUARD ACCESS PANEL	1
24	1835	CONTROL BOX ASSY, 5 SWITCH DUSTER SPRAYER FOR SKID UNIT	1
	1851	DUST FEED TUBE LONG	2
	1852	DUST FEED TUBE SHORT	1
	1896	DUST FEED AUGER	3
	1922	DUST FEED CONE	3
	1982	DUST BIN FOR DUSTER SPRAYER	1
	1983	DUST BIN MOUNT, FRONT	1
	1984	DUST BIN MOUNT, REAR	1
6	1985	SQUARE PUMP GUARD, (DUSTER/SPRAYER)	1
	1986	DUST FEED CHANNEL, DUSTER SPRAYER	1
	1987	DUST FEED CHANNEL COVER	1
18	1999	ROUND NOZZLE ASSY, SPRAYER, OLD	1
	2023	16/14 FULLY INSULATED MALE QUICK DISCONNECT-AMP# 3-520107-2	1
	2210	DUST FEED GATE, STAINLESS	3
	2211	DUST FEED GATE FLANGE, CASTING	3
	2212	DUST BIN GAGE BAR	1
	2213	GAGE BAR POINTER, DUSTER	1
	2214	WARNER ELECTRIC CLUTCH, SF400-5/8-12V	1
	2216	DOUBLE CLUTCH PULLEY	1
	2218	DUST FEED BUSHING, BRONZE	3
	2220	GATE CONNECTING BAR, DUSTER	1
	2221	VERTICAL BELT GUARD, DUSTER	1
	2222	JACK SHAFT, DUSTER	1
	2223	ACTUATOR MOUNT, DUSTER	1
	2224	HANDLE FOR DUSTER BIN	1
	2225	1/4-20 X 1/4" LONG SOCKET HEAD SET SCREW	6
Ref #	**PN**	**Description**	**QTY.**

	2226	5/16-24 X 3 1/4" LONG HEX HEAD CAP SCREW, GRADE 5, ZINC PLATED	4
	2227	5/16-24 X 1 1/2" LONG HEX HEAD CAP SCREW, GRADE 5, ZINC	2
	2228	1/4-20 X 3/4" LONG SET SCREW, SQUARE HEAD	15
	2233	3/16 X 1 1/4" LONG ROLL PIN	3
	3294	100 GALLON TANK ASSEMBLY	1
1	3073	KOHLER ENGINE W/O DLA-GCU SPEC# CH740-3180	1
	3243	BT-CSM3DB BLOWER ASSEMBLY KB WITH 3 HOLES	1
	3312	3/8-24 THREADED BASE STOP FOR SPRAYER ELBOW BASE 3-1/16"	1
	3313	ELBOW BASE W/ 2 TABS WELDED 100 DEGREES APART	1
4	3314	EPA APPROVED FUEL CAP	1
5	3316	6 GALLON FUEL TANK, EPA/CARB	1
	3319	BATTERY BOX WIRING ASSEMBLY, DUSTER	1
	3329	DUST BIN SUPPORT MOUNT	2
	3330	5/16-18 X 1/2" LONG HEX HEAD CAP SCREW	3
	3331	1/2" PIPE COUPLING, GALVINIZED	1









Part # 1835 – control box assy.
REF# 24

Dust Bin Parts not shown call Buffalo Turbine 716-592-2700 for parts

HYPRO Series 5200 Big Twin® Piston Pumps

Form L-0225P
6/11, Rev. B

Installation, Operation, Repair and Parts Manual

Description

SERIES 5200C

Cast Iron Big Twin Piston Pump

Max. Flow Rate: .... 8 gpm (5206) @ 800 rpm
10 gpm (5210)
Max. Pressure: .....400 psi
Max. Speed:.....800 rpm (5206)
600 rpm (5210)
Ports: ..... 3/4" NPT inlet
3/4" NPT outlet
Shaft: .....1" solid
1-3/8" hollow shaft

The Hypro Series 5200 Big Twin® piston pump is suitable for applications in high pressure washers for industrial and agricultural cleaning needs. It is also useful as a sprayer pump to apply a wide range of chemicals.

The Series 5200 is constructed of cast iron body and cylinder heads, unitized stainless steel valve assemblies and double row ball bearing supported crankshaft. Three cup materials are available to meet specific pumping needs. They are:

Leather–for pumping aromatic solvents and other chemicals damaging to rubber.

Fabric–for pumping most insecticides, herbicides and fertilizers.

Buna-N Rubber–for pumping soap and detergent solutions and some fertilizers.

Two crankshaft options are available—1" solid shaft for belt and pulley or flexible coupling drive, or 1-3/8" hollow shaft for direct mounting onto a 6-spline 540 rpm PTO shaft.

Safety Information

1. **Warning: Do not pump flammable or explosive fluids such as gasoline, fuel oil, kerosene, etc. Do not use in explosive atmospheres. The pump should be used only with liquids compatible with the pump component materials. Failure to follow this warning can result in personal injury and/or property damage and will void the product warranty.**
2. Be sure all exposed moving parts such as shafts,couplers and adapters are properly shielded or guarded and that all coupling devices are securely attached before applying power.
3. Pumps mounted directly on to PTO shaft or other power shaft must be prevented from rotating with the power shaft by use of a torque arm. Pump must float freely on the power shaft and must not be tied rigidly to equipment on which it is mounted.
4. **Do Not Exceed** recommended speed, pressure and temperature for pump and equipment being used.
5. **Before Servicing,** disconnect all power, make sure all pressure in the system is relieved, drain all liquids from the system and flush.
6. Secure the discharge lines before starting the pump. An unsecured line may whip, causing personal injury and/or property damage.
7. Check hose for weak or worn condition before each use. Make certain that all connections are tight and secure.
8. Periodically inspect the pump and the system components. Perform routine maintenance as required (see Maintenance section).
9. Protect pump from freezing conditions by draining liquid and pumping rust inhibiting antifreeze solution through the system, coating the pump interior.
10. Use only pipe, hose and fittings rated for the maximum psi rating of the pump.
11. Do not use these pumps for pumping water or other liquids for human or animal consumption.

Drive Source Installation

This manual will cover the installation of the basic drive configurations available for the Hypro Big Twin Piston pumps. Consult the manufacturer of your motor or engine for additional information. Read all instructions and general safety information before attempting to install or operate the pump.

Belt/Pulley Drive Installation

Mounting Belts and Pulleys

Mount pulleys as close to pump and motor engine shaft bearings as possible. Check alignment with a straight edge as shown in Fig. 1. Make sure that belt has proper tension. (Too much tension will cause bearing wear; too little will cause slippage.) See Fig. 2. Check with belt and pulley sources for specific recommendation.

To figure proper diameter of pump pulley, multiply the motor/engine rpm by the diameter of the motor/engine pulley and divide that figure by desired pump speed.

$$\text{Pump Pulley Size} = \frac{\text{Motor RPM x Motor Pulley Size}}{\text{Desired Pump Speed}}$$

Refer to the pump performance chart on Page 5 to determine the desired speed to obtain the desired maximum flow.

NOTE: Shaft rotation can be either clockwise or counter clockwise.

Four points of contact indicate alignment.

NOTE: Pump may be mounted in other orientations with respect to the motor or engine.

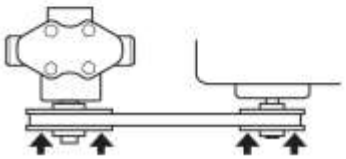


Figure 1

Push the belt midway between the pulleys, check the deflection (d) and adjust:

d = 0.016 x L

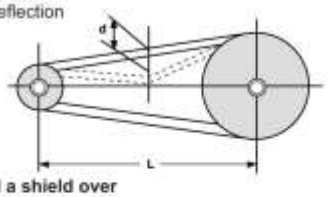


Figure 2

⚠ Caution:
For safety, always install a shield over rotating shafts and belts.

Direct Drive - Flexible Coupling Installation

First, slide coupling ends onto motor/engine and pump shafts as far as possible (Fig 3). Mount motor/engine and pump onto base, shimming pump or power unit so that shafts are aligned. Leave enough space between ends of shafts to allow coupling disc to be inserted. When alignment is made, slide coupling ends over coupling disc. Leave clearance between coupling ends and center disc. Tighten screws in both coupling ends. For electric motor drive, use couplings rated at least twice the horsepower required to operate pump. For gas engine drive, select couplings rated at three times the required pump horsepower.

⚠ Caution:
For safety, always install a shield over rotating shafts and couplings.

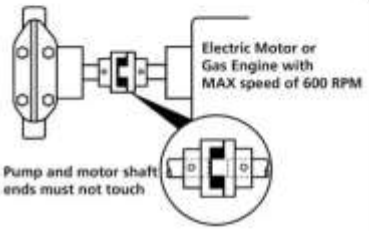


Figure 3

Direct Drive - Hollow Shaft Installation

Hollow shaft models may be mounted directly onto power shaft — motor or engine shaft, truck or tractor PTO shaft. **Important:** When direct mounting a hollow shaft pump, **Do Not** rigidly mount the pump base. The pump must be allowed to "float". Secure a torque arm with a chain or flexible fastener to the frame or base, directly below and in-line with the pump. This prevents the pump from rotating with the shaft. Always check to see if the pump will turn by hand to ensure that the pump rotates freely. **Do Not** apply power to a pump where the shaft doesn't rotate freely.

⚠ Caution:
For safety, always install a shield over rotating shafts and couplings.

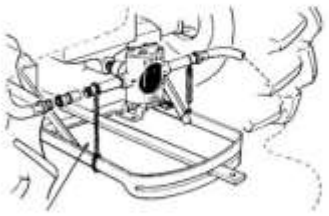
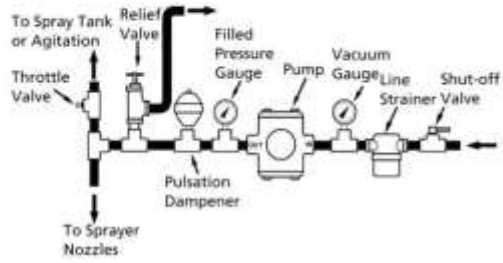


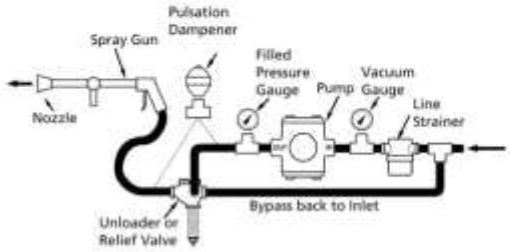
Figure 4

System Installation

Series 5200 Pump Hookup to Boom for Chemical Spraying



Series 5200 Pump Hookup for Pressure Washing



Note: A pulsation dampener such as our Model No. 3375-0017 or 3375-0015 must be installed on the outlet side for optimum performance and maximum life. For the proper operation of some unloader valves, it may be necessary to install a pulsation dampener downstream from the unloader valve; however, for optimum system dampening, it may be installed upstream from the unloader valve provided that the unloader valve will still function properly.

Figure 5

Piston Pump Installation
Accessories should be installed with solid piping and be mounted as close to the pump as possible. Hose must be used right after accessories. **Note**: If remaining installation is solid piping, a two to four foot length of hose must be installed between accessories and solid piping.

Hose
Selection of the right size and type of hose is vital to good performance. Be sure to hook up to proper ports on pump (note markings "IN" and "OUT" on pump castings).

Suction Hose
Always use genuine suction hose of at least the same inside diameter as pump ports. Hose should have some elasticity, but not overly soft so that it collapses. Use 3/4" (ID) hose or larger for a Series 5200 pump. If suction hose is over 6 feet long on Series 5200 use next larger size hose. Keep suction hose as short as possible and restrictions such as elbows, check valves, etc. at a minimum.

Discharge Hose
High pressure pumps require the use of special high pressure discharge hose (2 rayon braid or equivalent). Use a hose rated at least 50% greater than the highest operating pressure required of pump. Example: If required pump pressure is 200 psi, use discharge hose rated at minimum of 300 psi working pressure.

Unloader or Relief Valve
The unloader or relief valve has a very important safety function in your piston pump hook-up. The valve protects the pump by unloading or bypassing the pump's flow when gun is shut off or discharge is otherwise blocked.

Strainers
Use a suction line strainer with an open screen area of at least 3 to 5 times the suction port area. For example, an area of approximately 2-1/3 to 4 square inches for a 1" suction port. Be sure the screen is suitable for the liquid being pumped. Keep filter clean. A clogged strainer will cause cavitation, which usually leads to a poor performance, wear and failure of pump parts.

Vacuum Gauge (Optional)
Pump should not be subjected to high suction line vacuums. To check on this, install a vacuum gauge at pump inlet. Generally, it should not read over 5 inches of mercury.

Suction Line Shut-Off
This suction line accessory allows the pump to be removed for service without draining the tank. Be sure valve is open before starting pump.

Pulsation Dampener
A Series 3375-0015 pulsation dampener is recommended for all models. This device absorbs the shock and smooths out the pump discharge pulsations, providing smoother operation. A charge of 50% of operating pressure is normally optimum.

Pressure Gauge/Dampener
Use gauge capable of reading double the pump working pressure. Use a filled gauge or a gauge dampener to protect the gauge needle against pressure surges to provide easier reading and longer life.

Spray Gun
Use a Model No. 3381-0010 spray gun or a 3381-0013 Turbo 400 spray gun with the correct nozzle. For 5206 models, use a 3385-3000 nozzle and for the 5210 models use a 3385-4000 to obtain a maximum pressure of 400 psi.

Operation

Priming

If liquid is below level of pump, some means should be provided in installation to prime pump - such as a riser pipe. If there is a suction lift, use a foot valve or check valve to hold prime. In general, keep suction lift to minimum and avoid unnecessary bends in suction line. Before starting pump, make sure air bleeder valve or spray gun is open - or unloader/relief valve is adjusted to its lowest pressure. After starting pump, open and close gun several times if necessary to aid priming the pump. If pump does not prime within a few seconds, stop motor and inspect installation for suction line leaks or obstructions. Make sure that strainer is not clogged. Be sure that suction line is not obstructed, kinked or blocked.

If pump is to operate hours at a time, check frequently for:

1. Adequate liquid supply. Pump must not run dry for more than 30 seconds.
2. Temperature rise. Overheating is harmful to bearings and piston cups.

Care of Pump

Your pump will last longer and give best performance when properly taken care of. Proper pump care depends a lot on the liquid being pumped and when the pump will be used again.

Generally, after each use, flush pump with a neutralizing solution for the liquid just pumped. Follow with a clear water rinse. This is especially important for corrosive chemicals. Then flush out pump with a 50% solution of automotive radiator anti-freeze (ethylene glycol-type such as Prestone, Zerex, etc.) containing a rust inhibitor.

While this flushing is not absolutely necessary for short periods of idleness (as over night) it is good practice to clean the pump after each use to prevent deposits from forming and damaging the pump. The antifreeze not only coats the interior of the pump with an inhibitor, but acts as a lubricant as well, keeping the valves from sticking and protecting against any remaining moisture freezing in cold weather.

For infrequent use and before long periods of storage, drain pump thoroughly. Open any drain plugs, remove suction hose from liquid and run pump "dry" from 0 to 30 seconds (not longer). Flush with a 50% solution of anti-freeze and water. Then, plug both ports to keep out air until pump is used again.

Lubrication

Use a small push-type grease gun to lubricate Hypro Series 5200 Piston Pumps. **Do not use airpowered or hand lever operated grease guns** as they develop too much pressure and may cause damage to the sealed cam bearing. Lubricate a minimum every 100 hours or when bearing appears to need grease. Use Moly-Lithium No. 2 wheel bearing grease.

Exception: In applications where FDA approval is required, use one of these greases: Chevron FM#2, Mobile FM#2 Keystone (Penwalt Corp.) Nevastane SP Medium.

Do not under-grease or premature bearing failure may result.

Do not grease excessively. Remove (do not **WASH** out) any excess grease from pump cavity to prevent grease buildup.

Repair Instructions

Recommended Repair Tools For Hypro Big Twin Piston Pumps

Ref.	Description	Part No.
A	Internal External Pliers (not shown)	3010-0084
B	Valve Seat Extractor	3010-0130
C	Valve Cage Extractor	3010-0052
D	Wire Brush	3010-0066
E	Wire Brush Holder	3010-0067
F	Allen Wrench	3020-0009
G	Allen Wrench	3020-0008
H	Sleeve Extractor	3010-0064
	Tool Box (not shown)	3010-0168

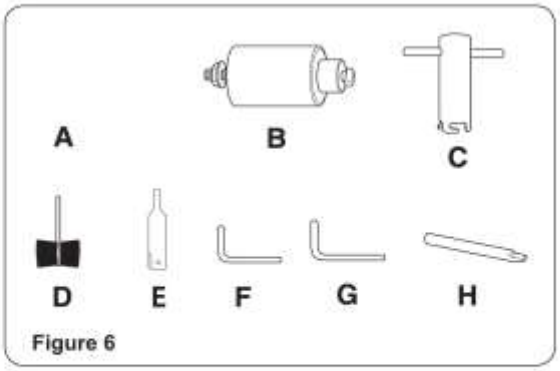


Figure 6

Model 5206C Performance

	25 PSI		100 PSI		200 PSI		300 PSI		400 PSI	
RPM	GPM	HP	GPM	HP	GPM	HP	GPM	HP	GPM	HP
400	3.9	.26	3.9	.40	4.0	.66	3.9	.89	3.9	1.1
500	4.9	.29	5.0	.46	5.0	.75	5.0	1.1	4.9	1.4
540	5.4	.31	5.4	.50	5.4	.81	5.3	1.2	5.3	1.5
600	6.0	.34	6.0	.56	6.0	.90	5.9	1.3	5.9	1.6
700	7.0	.40	7.0	.65	6.9	1.1	6.9	1.5	6.9	1.9
800	8.0	.46	7.9	.74	7.8	1.2	7.7	1.7	7.7	2.2

Model 5210C Performance

	25 PSI		100 PSI		200 PSI		300 PSI		400 PSI	
RPM	GPM	HP	GPM	HP	GPM	HP	GPM	HP	GPM	HP
400	7.3	.39	7.3	.69	7.2	1.2	7.2	1.7	7.2	2.1
500	8.9	.57	8.9	.87	8.8	1.5	8.8	2.0	8.7	2.6
540	9.4	.66	9.4	.94	9.3	1.6	9.3	2.2	9.2	2.7
600	10.0	.73	9.9	1.10	9.9	1.7	9.8	2.3	9.8	3.0

Disassembly

1. Remove nameplate and both cylinder heads with a 9/16" combination wrench or socket.
2. Remove both piston cap screws with 1/4" allen wrench.
3. Remove piston cup spreader seal ring with O-ring piston guide and support ring.
4. Place the body into a vise as shown in Fig. 7. With care, drive out the cylinder sleeves using the sleeve extractor tool and a hammer.
5. Remove connecting rod.

Figure 7

Figure 8

6. Remove the four valves, using the valve seat extractor to pry out the seat (See Fig. 8). Use a valve cage extractor tool to remove each spring retainer. Lift out the other parts, using penetrating oil as necessary to loosen parts.
7. Place the pump body onto an arbor press with the shaft end of the pump up. Press the crankshaft and bearing out of the pump body (See Fig. 9). The main bearing will come out with the crankshaft.
8. Sand the body ends and cylinder heads (mating surfaces) lightly to remove all foreign material. Use a belt sander, flat sanding block or flat file.
9. With wire brush mounted in an electric drill, clean all valve cavities, sleeve cavities and ports. Wash pump body out with solvent and let dry.

Inspection of Pump Parts

Before reassembling the pump, thoroughly inspect all parts, with special consideration given to following points:

a. Inspect the pump body for erosion at all O-ring seal points and in valve and sleeve holes. Check main bearing housing for proper bearing fit. Check for cracks at the ports.

b. Check for excessive wear in the cylinder heads. This can result from erosion and/or valve seat hammer.

c. Check crankshaft assembly for general wear. Rotate main and cam bearing to check for roughness due to moisture or lack of grease damage. If bearings do not turn smoothly or appear to be damaged, they should be replaced. See section on **replacing bearings** in this manual.

d. Carefully inspect cylinder sleeves. Polish sleeves not more than .008" — using No. 120 grit emery cloth. For final finish use a fine No. 320 grit emery cloth. If at this point all grooves have not been removed, replace the parts. **Note:** If there is some pitting only at the top of the sleeves, they can still be used. Grooves are more likely to be the problem here instead of pitting.

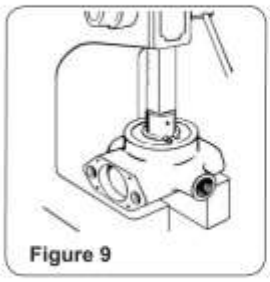


Figure 9

e. Inspect the piston guides for chips, cracks and score marks. Compare guides with new one, If there is noticeable amount of clearance between the guide and sleeve wall, the guide should be replaced.

f. Check for erosion on the underside of piston cup screw head. **Note:** The condition of the screws is very important - if there is erosion or grooves, leakage will occur.

Figure 10

g. Next check the connecting rod for wear. If there are visible signs of wear or damage to the hard coating, the connecting rod should be replaced. If there is more than .005" of wear, the connecting rod should be replaced. A worn connecting rod results in low volume, low pressure and a hammering sound. If not replaced, this situation will damage the cam bearing as well.

h. The valve seat, poppet, spring and guide in valve sets should be carefully inspected for cracks, pitting, etc. and replaced as necessary. Note in particular the seat and matching poppet; replace both - as a set - if one new part will not mate with other old part.

i. When repairing the Series 5200 pump it is usually a good idea to replace the piston cups. Piston repair kits are available with either leather, fabric (rubber-impregnated) or pure rubber (Buna-N) cups.

j. Inspect complete crankshaft assembly for general wear. If the pump has had as much as 500 hours of use, it is suggested to replace the assembly. If broken cam bearing is found - the reason is usually that the pump has been operating over the 400 psi maximum. Another possible cause is that the pump has not been equipped with the proper surge tank or pulsation dampener to smooth out the pressure surges inherent in a large displacement 2-cylinder pump.

k. Check all fittings - make certain that all sizes are correct for port size of the pump. Thoroughly inspect and clean before reinstalling.

l. At this point all parts should have been inspected and cleaned. All parts should now be oiled (particularly the o-rings) and placed on a clean work bench for reassembly.

Reassembly

1. Using bearing seat tool, press the crankshaft assembly into the pump body (see Fig. 11).

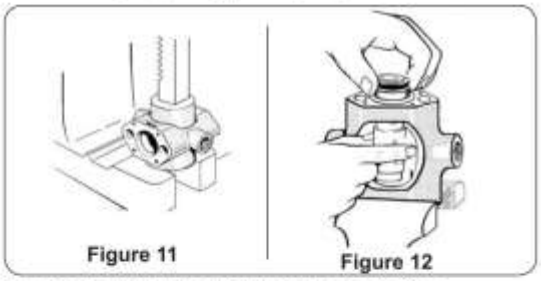


Figure 11

Figure 12

2. Insert connecting rod over the cam bearing.
3. Insert both cylinder sleeves with oiled o-rings in cylinder bores.
4. Place pump in vise with ports horizontal (See Fig. 12). Rotate crankshaft to raise connecting rod to its highest position. Place support ring over top of connecting rod.
5. Insert piston guide.
6. Place seal ring on top of guide.
7. Place cup backing plate with o-ring in place over seal ring.
8. Insert piston cup.
9. Insert cup spreader with new o-ring in place. Press into hollow of the piston cup.
10. Place a new copper washer gasket in the countersunk screw hole of cup spreader.
11. Tighten piston cap screw securely with 1/4" allen wrench.
12. Insert inlet and outlet valves with o-ring seals (See Fig. 13). These are identical, but in reverse positions.

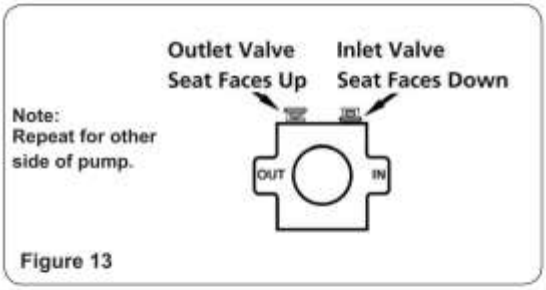


Figure 13

Note the pump ports which are the "IN" and "OUT" sides.

13. Install cylinder head with a new o-ring seal and tighten head bolts securely with a 9/16" wrench or socket.
14. Repeat steps 5 through 13 for assembling the other half of the pump.

Note: Follow proper lubrication procedures as listed in the Operating the Pump section of this manual.

15. Replace the nameplate. The pump can now be tested - pumping clear water.

Main Bearing Replacement

1. Remove set screws, bolts or keys from the shaft and smooth off any burrs or rough spots.
2. Remove retainer rings from shaft with external pliers. For convenience, you can remove just the one closest to the drive end of the shaft.
3. Support bearing in arbor press and press shaft out as shown in Fig. 14.
4. New bearing is pressed on in reverse manner. Front retainer ring (closest to cam bearing) should be in place to provide a stop for the bearing.
5. After bearing has been pressed into place, install the other retainer ring in shaft groove with the external pliers as before.

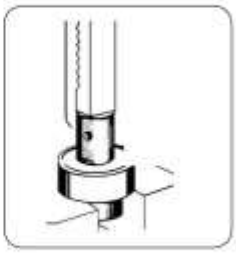
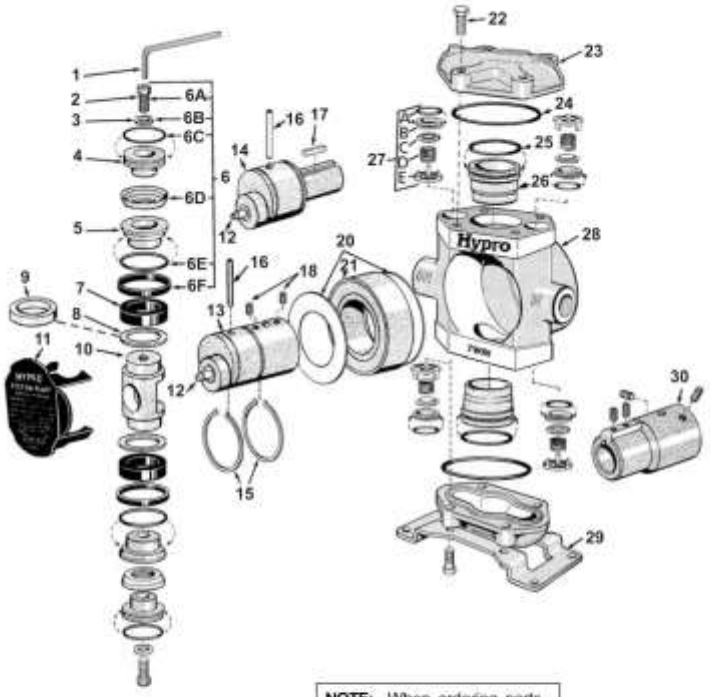


Figure 14



Piston Stack Parts Kits

Leather Cup Kit No. 3430-0037 (STD)
Consists of two each of the following parts: No. 2220-0013 Piston Cap Screw (Ref. 6A), No. 2270-0012 Washer (Ref. 6B), No. 1720-0030 O-Ring (Ref. 6C), No. 2150-0001 Leather Cup (Ref. 6D), No. 1720-0065 O-Ring (Ref. 6E) and No. 1440-0012 Seal Ring (Ref. 6F).

Fabric Cup Kit No. 3430-0039
Same as Leather Cup Kit except with two No. 2150-0012 Fabric Cups.

Rubber Cup Kit No. 3430-0189
Same as Leather Cup Kit except with two No. 2150-0042 Rubber Cups.

Crankshaft Assemblies

Sub-Assemblies
Include Grease Fitting (Ref. 12), Crankshaft with cam bearing (Ref. 13 or 14) and Crankpin Retainer (Ref. 16).

Complete Assemblies
Include Sub-Assembly components plus Retaining Rings (Ref. 15), slinger rings (Ref. 20) and Bearing (Ref. 21).

NOTE: When ordering parts, give **quantity, part number, description, and complete model number.** Reference numbers are used **ONLY** to identify parts in the drawing and are **NOT** to be used as order numbers.

Complete Sub-Assembly PART NO.	Pump Assembly PART NO.	Model Number
with 1-3/8" Hollow PTO Shaft (Ref. 13)		
5503-5206	5501-5206	5206C-H
5503-5210	5501-5210	5210C-H
with 1" Solid Shaft (Ref. 14)		
5003-5206	5001-5206	5206C
5003-5210	5001-5210	5210C

Ref. No.	Qty. Req'd.	Part No.	Description
1	1	3020-0008	Allen Wrench (Optional)
2	2	2220-0013	Piston Cap Screw
3	2	2270-0012	Washer
4	2	1830-0039	Piston Cup Spreader
5	2	1410-0054	Cup Backing Plate
6	1	3430-0037	Piston Stack Parts Kit with Leather Cups (Standard)
6	1	3430-0039	Piston Stack Parts Kit with Fabric Cups (Model 5200-F)
6	1	3430-0189	Piston Stack Parts Kit with Buna-N Cups (Model 5200-R)
7	2	1440-0005	Piston Guide
8	2	1410-0018	Support Ring For 5210 Models Only
9	2	1410-0020	Support Ring For 5206 Models Only
10	1	0503-5200	Connecting Rod
11	1	0602-5200	Safety Cover
12	1	2405-0006	Grease Fitting Assembly
13	1	See Listing	Crankshaft (Hollow Shaft Models)
14	1	See Listing	Crankshaft (Solid Shaft Models)
15	2	1810-0001	Retainer Ring
16	1	1600-0013	Crankpin Retainer

Ref. No.	Qty. Req'd.	Part No.	Description
17	1	1610-0005	Key (Solid Shaft Models)
18	2	2230-0003	Set Screw
20	2	1410-0006	Slinger Ring
21	1	2005-0002	Main Bearing
22	8	2210-0062	Cylinder Head Bolt
23	2	0203-5200CB	Cylinder Head
24	2	1720-0028	O-Ring – for cylinder head
25	2	1720-0019	O-Ring – for cylinder sleeve
26	2	3550-0007	Cylinder Sleeve
27	4	3400-0038	Valve Assembly—Consists of: O-ring (Ref. A), Valve Seat (Ref. B), Valve Poppet (Ref. C), Valve Spring (Ref. D) and Valve Spring Retainer (Ref. E)
28	1	0100-5200C	Body
29	1	1510-0024	Base
30	1	1320-0081	Adapter-Adapts 1" solid shaft to 1- 3/8" 6-spline PTO hollow shaft (Includes set screws.)

Hazardous Substance Alert

1. Always drain and flush pump before servicing or disassembling for any reason (see instructions).
2. Always drain and flush pumps prior to returning unit for repair.
3. Never store pumps containing hazardous chemicals.
4. Before returning pump for service/repair, drain out all liquids and flush unit with neutralizing liquid. Then, drain the pump. Attach tag or include written notice certifying that this has been done. Please note that it is illegal to ship or transport any hazardous chemicals without United States Environmental Protection Agency Licensing.

Troubleshooting

Symptom	Probable Cause(s)	Corrective Action(s)
Low Discharge	Pump not primed	See Priming section of this manual.
	Clogged suction strainer	Clear strainer screen.
	Suction hose collapsed	Replace suction hose with stronger wall hose.
	Excessive vacuum on inlet	Reduce inlet restrictions by eliminating items such as elbows, valves or too small of inlet hose.
	Pump running at wrong speed	Check speed of pump and adjust accordingly.
	Valves worn or hung-up	Inspect valves and replace if necessary.
Low Pressure	Unloader or Relief Valve set improperly	Readjust unloader or relief valve.
	Nozzle worn or damaged	Check nozzle and replace.
	Valves worn or hung-up	Inspect valves and replace if necessary.
	Insufficient power from gas engine or electric motor	Check performance chart to find proper HP needed for flow and pressure desired.
Liquid leaking from center of pump	Seals worn	Replace with new seal kit.

Limited Warranty on Hypro/SHURflo Agricultural Pumps & Accessories

Hypro/SHURflo (hereafter, "Hypro") agricultural products are warranted to be free of defects in material and workmanship under normal use for the time periods listed below, with proof of purchase.

- Pumps: one (1) year from the date of manufacture, or one (1) year of use. This limited warranty will not exceed two (2) years, in any event.
- Accessories: ninety (90) days of use.

This limited warranty will not apply to products that were improperly installed, misapplied, damaged, altered, or incompatible with fluids or components not manufactured by Hypro. All warranty considerations are governed by Hypro's written return policy.

Hypro's obligation under this limited warranty policy is limited to the repair or replacement of the product. All returns will be tested per Hypro's factory criteria. Products found not defective (under the terms of this limited warranty) are subject to charges paid by the returnee for the testing and packaging of "tested good" non-warranty returns.

No credit or labor allowances will be given for products returned as defective. Warranty replacement will be shipped on a freight allowed basis. Hypro reserves the right to choose the method of transportation.

This limited warranty is in lieu of all other warranties, expressed or implied, and no other person is authorized to give any other warranty or assume obligation or liability on Hypro's behalf. Hypro shall not be liable for any labor, damage or other expense, nor shall Hypro be liable for any indirect, incidental or consequential damages of any kind incurred by the reason of the use or sale of any defective product. This limited warranty covers agricultural products distributed within the United States of America. Other world market areas should consult with the actual distributor for any deviation from this document.

Return Procedures
All products must be flushed of any chemical (ref. OSHA section 1910.1200 (d) (e) (f) (g) (h)) and hazardous chemicals must be labeled/tagged before being shipped* to Hypro for service or warranty consideration. Hypro reserves the right to request a Material Safety Data Sheet from the returnee for any pump/product it deems necessary. Hypro reserves the right to "disposition as scrap" products returned which contain unknown fluids. Hypro reserves the right to charge the returnee for any and all costs incurred for chemical testing, and proper disposal of components containing unknown fluids. Hypro requests this in order to protect the environment and personnel from the hazards of handling unknown fluids.

Be prepared to give Hypro full details of the problem, including the model number, date of purchase, and from whom you purchased your product. Hypro may request additional information, and may require a sketch to illustrate the problem.

Contact Hypro Service Department at 800-468-3428 to receive a Return Merchandise Authorization number (RMA#). Returns are to be shipped with the RMA number clearly marked on the outside of the package. Hypro shall not be liable for freight damage incurred during shipping. Please package all returns carefully. All products returned for warranty work should be sent **shipping charges prepaid** to:

HYPRO
Attention: Service Department
375 Fifth Avenue NW
New Brighton, MN 55112

For technical or application assistance, call the **Hypro Technical/Application number: 800-445-8360**, or send an email to: **technical@hypropumps.com**. To obtain service or warranty assistance, call the **Hypro Service and Warranty number: 800-468-3428**; or send a fax to the **Hypro Service and Warranty FAX: 651-766-6618**.

*Carriers, including U.S.P.S., airlines, UPS, ground freight, etc., require specific identification of any hazardous material being shipped. Failure to do so may result in a substantial fine and/or prison term. Check with your shipping company for specific instructions.

Pentair
SPRAY & INJECTION TECHNOLOGIES GROUP
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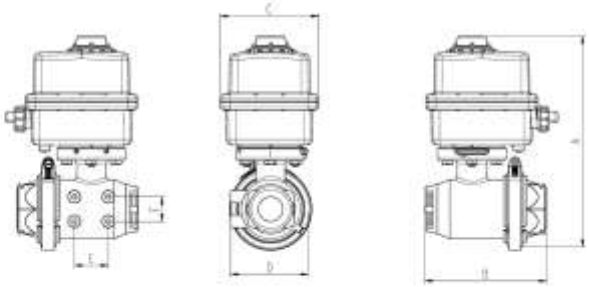
QX-SA SERIES VALVES

F2E33 Valve Kit
with EH3 Actuator

F2F33 Valve Kit
with EH3 Actuator

QX3 and QX4 2-Way

- ¾" and 1" Full Port Valves
- 150 PSI at 70F° (polypropylene)
- 300 PSI at 70F° (nylon)
- Wiring: 12/24V DC and 24V AC
- QX3 ¾" FNPT
- QX4 1" FNPT or QH Fittings
- 2" Standard Port Flange Optional
- QX3 Cv - 51 (51 GPM at 1 PSI drop, water)
- QX4 Cv - 68 (68 GPM at 1 PSI drop, water)
- Refer to Chart A on Page 7 for Cycle Times Available



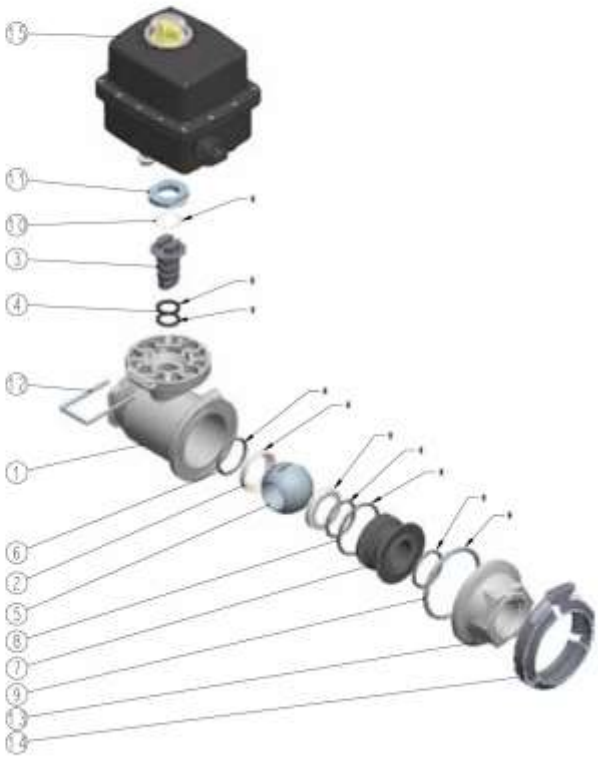
Valve	Weight*	Ø	A	B	C	D	E	F
E	3.6	¾"	8.6	5.0	4.0	3.3	1.4	1.0
F	3.6	1"	8.6	5.0	4.0	3.3	1.4	1.0

Dimensions may vary for flanged outlet. *Weights approximate in lbs.

Materials List

No.	P/N	Description	Qty
1	QX4-110* QX4-115 QX4-140 QX4-170	Valve Body, 2-Way 1" NPT QH 2-Way 2" SP Flange 2-Way 1" FNPT 2-Way ¾" FNPT	1
2	QX4-119	Seat, PTFE	2
3	207-0001	Stem, SS Inline	1
4	QC3-130	O-Ring, #113, VITON	2
5	QX4-130	Valve Ball, SS	1
6	QX4-161	O-Ring, #123, EPDM	3
7	QX4-118	Donut Seat	1
8	QX4-162	O-Ring, #132, EPDM	1
9	QC3-134	O-Ring, #229, EPDM	1
10	QC3-170	Thrust Washer, PTFE	1
11	QX4-121-3	Stem Retainer Bushing	1
12	QX-103	Hair Pin, SS	1
13	QX4-126 QX4-127* QX4-128	End Cap, 1" QH 1" FNPT ¾" FNPT	1
14	QX4-200	V-Clamp, SS	1
15		EH3 Actuator	1
16	QX-102**	Hair Pin, SS	1
*	QX4-RKT QX4-RKTV	Valve Repair Kit VITON Repair Kit	

Note: Polypropylene standard, nylon available
*Shown in assembly **Not pictured



DUST BIN DISASSEMBLY AND ASSEMBLY INSTRUCTIONS

1. Remove the (5) bolts on cover and remove cover.
2. Remove the (4) bolts and nuts on front and rear dustbin mounts.
3. Remove dustbin gate lever.
4. Remove belts from dust -bin clutch and lift dust- bin out of mounting.
5. After removing dust -bin from the sprayer, set dust- bin on a stand with dust- bin tubes pointing up.
6. Remove the (3) bolts on each dust –bin dust -cone assembly and lift off cones and tubes. Check tubes for wear and replace by loosening (2) setscrews in the neck of the cone. Make sure tube slots are at right angles of the air -flow when replaced.
7. Remove the dust twist springs by sliding sideways from holes on dust twist feed stud. Remove dust -twist feed studs and dust- gates.
8. The dust feed flange must remain in bottom of dust- bin. Use bolts to remove and bolt flange in place.
9. Turn dustbin bottom side down.
10. To remove dust clutch, loosen set -screw on collar next to clutch cam. Drive out spring pins and remove. Next remove ¼ x 1 Allen head screws from throw-out shaft and bronze shaft collar and remove shaft collar. Loosen set -screw on tandem plate cover and slide clutch from horizontal shaft. Check drive plates on clutch and replace as needed.
11. Loosen set-screws on pillow block bearings
12. Drive spring- pins from gears and shaft and remove gears. Check gears for wear and replace as needed.
13. Remove bolts from (2) end pillow block bearings and lift dust- bin channel from shafts. Check bronze bushings in channel and replace as needed.
14. Check vertical shafts for wear. Replace as needed.
15. Reverse procedures to re-assemble.
16. For lubrication, see general instructions for operation.

LUBRICATION

#1 - #2 - # - #4 - # 5 Dust Bin Bearings Lubrication
Use Grade NLGI #2 lithium grease.
Grease every 25 hours

#12 - #13 - #14 Dust Bin Gears
Open gear Hi-Low gear lubrication NLGI # 3
Grease every 25 hours

#7 - #8 - #9 Unit
Multi purpose grease
Grease every 25 hours

#15 Blower
Sealed bearing, no lubrication required

#16 Pump
Use Grade NLGI #2 Lithium grease. See pump instruction sheet.

Engine oil. Refer to engine manual.

MODEL CSM3

Horizontal Range-Liquid and Dust	125 Feet *
Vertical Range-Liquid and Dust	75-100 Feet *
Flow Rate of Dust	½ lb. per min (30 lbs. Hr) Minimum * 5 lbs. per min (300 lbs. Hr) Maximum *
Flow Rate of Granular (Coverage up to 80 Feet)	3-1/3 lbs. per min Minimum * 40 lbs. per min Maximum *
Flow Rate of Liquid	varies depending on pressure setting, size of nozzle tips(orifice opening) and number of nozzles being used. (See flow rate chart in the instruction manual).

* These are approximate figures only. Weather conditions, material concentration (powder, liquid and granular) and condition of sprayer/duster unit will determine actual disbursement of materials.

<u>USES:</u>
Vector Control- Fly, Mosquito, etc.
Row Crops
Orchards
Grasshopper Control
Weed Control
Fertilizing
Soil Stabilization
Growth Retardant
Fly Control
Mosquito Control
Odor Control
Feed Lots
Disinfecting Buildings, Etc.
Golf Course Work
Shade and Ornamental Tree Work
Odor and Fly Control at Dump and Landfill Sites

SUPPLEMENT A

The Nozzle and pressure guide chart for application of liquids using the Buffalo Turbine Model CSM3 Sprayer.

The descriptions below are based on the use of 4 nozzles*.

GALLONS PER MINUTE (using 4 spray nozzles)	NOZZLE #	PRESSURE (PSI)
.2	650067 - .021(orifice)	20
.24	650067	30
.28	6501 - .026	20
.32	6501	25
.4	6501	40
.48	6501	60
.5	6501	65
.44	65015 - .031	20
.6	65015	40
.72	65015	60
.56	6502 - .036	20
.68	6502	30
.8	6502	40
1.0	6502	60
.84	6503 - .043	20
1.04	6503	30
1.2	6503	40
1.48	6503	60
1.4	6504 - .052	30
1.6	6504	40
2.0	6505 - .057	40
2.4	6506 - .062	40
3.2	6508 - .072	40
4.0	6510 - .078	40
6.0	6515 - .093	40
8.0	6520 - .109	40

Above Information are approximate values only

Maximum recommended pressure – 150 PSI for KZ control valve, Part # 1524