



**IN-TANK TECHNOLOGY**



PLEASE NOTE OUR NEW STREET ADDRESS  
Custom Masters/Flo King Filter Systems  
401 Lake Bennett Ct.  
Longwood, FL 32750-6341 USA

# **FLO KING BX650 OPERATIONS MANUAL**

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**CUSTOM MASTERS, INC. • 401 LAKE BENNETT CT., LONGWOOD, FL 32750-6341 USA • 407-331-4634 FAX 407-331-0575**



# **BX650 OPERATIONS MANUAL**

## **WELCOME TO THE FLO KING EXPERIENCE!**

Congratulations on your purchase of the Flo King BX650 in-tank, sealless, centrifugal pump. This 4-in-1 unit can be used to pump, filter, agitate, and treat a wide variety of chemical- and metal-containing solutions. The BX650 has a maximum flow rate of 650 gallons per hour (2460 liters/hour).

Because of the unique design of the BX600 and our selection of high-quality reusable and disposable filter media, the life of process baths and associated pre- and post-treatment formulations can be extended while using fewer cartridges.

The excellent agitation and counterflow action produced by the BX650 also result in uniform solution temperature and chemical consistency, as well as continual recirculation to escort surface particulates down to the filter media for efficient removal.

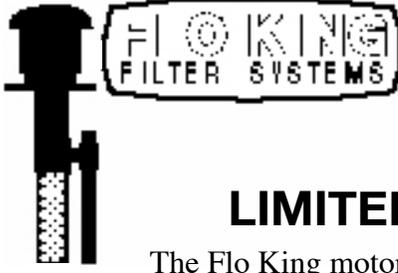
The BX650 also eliminates leaks and spills that can present environmental and safety problems.

Flo King pumps and filter systems are built to last. To maximize the performance and life of your Flo King system, it is important that you read and understand the instructions in this manual.

## **BEFORE UNPACKING YOUR UNIT**

Follow these instructions before unpacking your Flo King system:

1. Inspect contents before removing pump from shipping container to make certain that no damage has occurred during shipment.
2. Before removing pump from shipping container, plug pump cord into properly grounded ac outlet of the correct voltage for the unit you have ordered, and run pump to make sure damage has not occurred during shipping.
3. If unit seems to be damaged, notify carrier (UPS, etc.) at once, then notify CUSTOM MASTERS INC., manufacturer of the Flo King system, at 407-331-4634 (FAX 407-331-0575) for further instructions.



## LIMITED ONE-YEAR AND 90-DAY GUARANTEE

The Flo King motor is guaranteed for 90 days against defects in material and workmanship.

All other Flo King filter system components are guaranteed for one year from date of purchase against defects in material and workmanship.

This guarantee does not cover damage caused by misuse or negligence. If the Flo King filter system fails to operate during the guarantee periods, notify CUSTOM MASTERS for repair or replacement without charge at the manufacturer's option. If unit must be replaced, the transportation costs for returning the defective pump are the responsibility of the consumer.

Dismantling the motor from the pump in any way may void this guarantee.

## SAFETY PRECAUTIONS

All safety-related procedures must be followed to prevent injury or damage to personnel, the workplace, and the environment. These include the following:

1. Make sure only trained and qualified personnel install, use, and maintain Flo King equipment. Handling of any equipment by unauthorized personnel can be dangerous.
2. Always wear proper protective gear such as gloves, aprons, and goggles.
3. To avoid electrical shock, never handle this equipment when wet or standing in water. When handling equipment for any reason, make sure power supply is disconnected.
4. Do not grab unit by Motor. During normal operation, Motor becomes "hot to the touch."
5. Use only the power supply cord furnished with the BX650. Do not alter the factory-furnished power supply cord. Plug the cord into a properly grounded outlet of the correct voltage for the unit you have ordered. Do not use an extension cord!
6. Keep power supply cord out of contact with hot, sharp, highly corrosive and other potentially damaging objects and solutions.

## ELECTRICAL & ANTI-FIRE WARNINGS

1. Use only the power supply cord furnished with the BX650.
2. Do not alter the factory-furnished power supply cord.
3. Plug the factory-furnished cord into a properly grounded outlet of the correct voltage for the unit you have ordered.
4. Do not use an extension cord!
5. Keep factory-furnished power supply cord out of contact with hot, sharp, highly corrosive and other potentially damaging objects, materials, and solutions.

Failure to abide by these measures will void the Flo King warranty and relieve Custom Masters from any and all electrical and fire liability claims.

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## THE FLO KING BX650

The BX650 provides a maximum flow rate of 650 gallons (2400 liters) per hour. Use it stationary on one tank or move it from tank to tank. Multiple body lengths (4", 6", 8", and 10") enable use of the BX650 in tanks with varying solution levels and depths. The BX650 comes complete, preassembled, and ready to operate and includes the items shown in the labeled photograph below. For best results in most metal-finishing solutions, use the BX650 with our PMCA Permacore Magnum reusable or FK50 Poly-Spun disposable filter cartridges in the appropriate length.

### FLO KING BX650 SPECIFICATION

**PUMP MATERIALS:** Available in CPVC, polypropylene, PVDF (Kynar), and stainless steel as pump materials of construction. Standard shaft is made of Teflon-covered 303 stainless steel. Titanium and Hastelloy C276 alloy shafts available on special-order basis. Call for pricing.

**FLOW RATE:** 650 gallons per hour (2400 liters per hour) at 60 Hz. A flow-rate reduction of 18% (±3%) is typical when operated at 50 Hz.

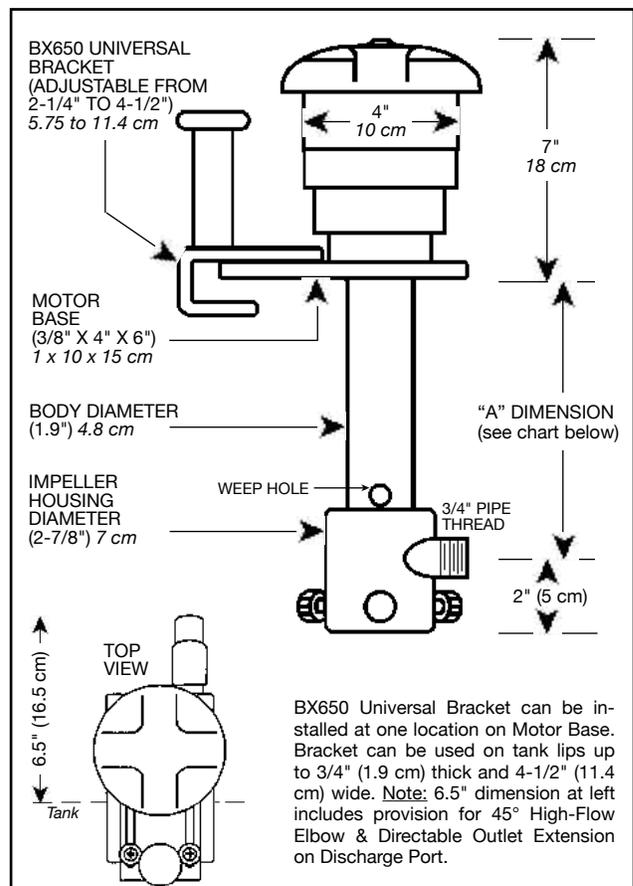
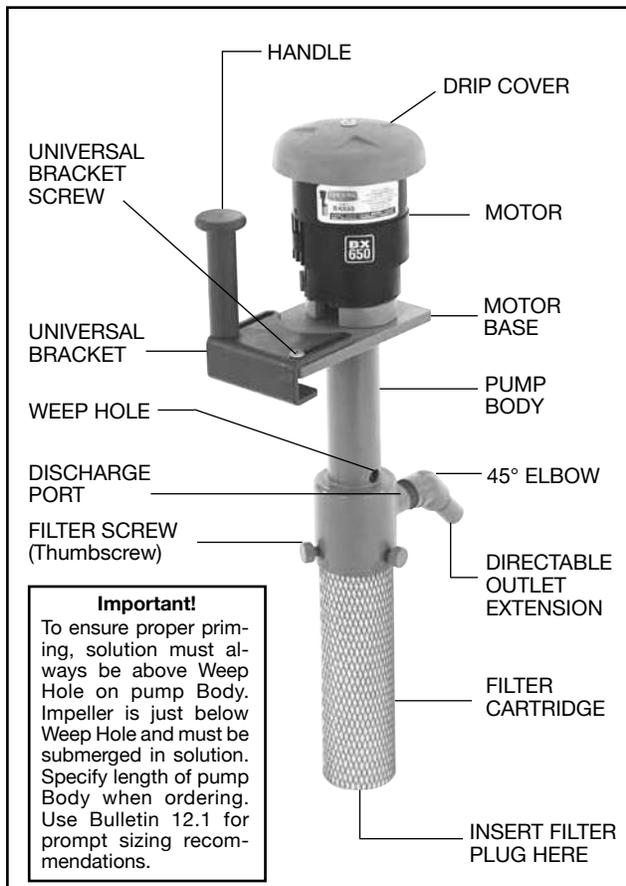
**PRESSURE:** 10 feet (3 meters) of head pressure

**WEIGHT:** About 9 pounds (4 kg), depending on pump body length

**MOTOR:** Epoxy coated, rated at 1/15th HP (50 watt), single phase, 3000 rpm, TEFC, thermally protected. When ordering, specify one of the following three motors:

- 115 volts, 60 Hz, 2.6 A
- 115 volts, 50/60 Hz, 2.0 A
- 230 volts, 50/60 Hz, 1.3 A

**RUNNING PUMP DRY DOES NOT DAMAGE MOTOR, PUMP, SEALS OR BEARINGS**



**MEASUREMENT FROM BOTTOM OF MOTOR BASE TO DISCHARGE PORT ("A" DIMENSION)**

PUMP MODEL	BX650-4	BX650-6	BX650-8	BX650-10
"A" DIMENSION	4-1/2" (11 cm)	6-1/2" (17 cm)	9-1/16" (23 cm)	10-3/4" (28 cm)

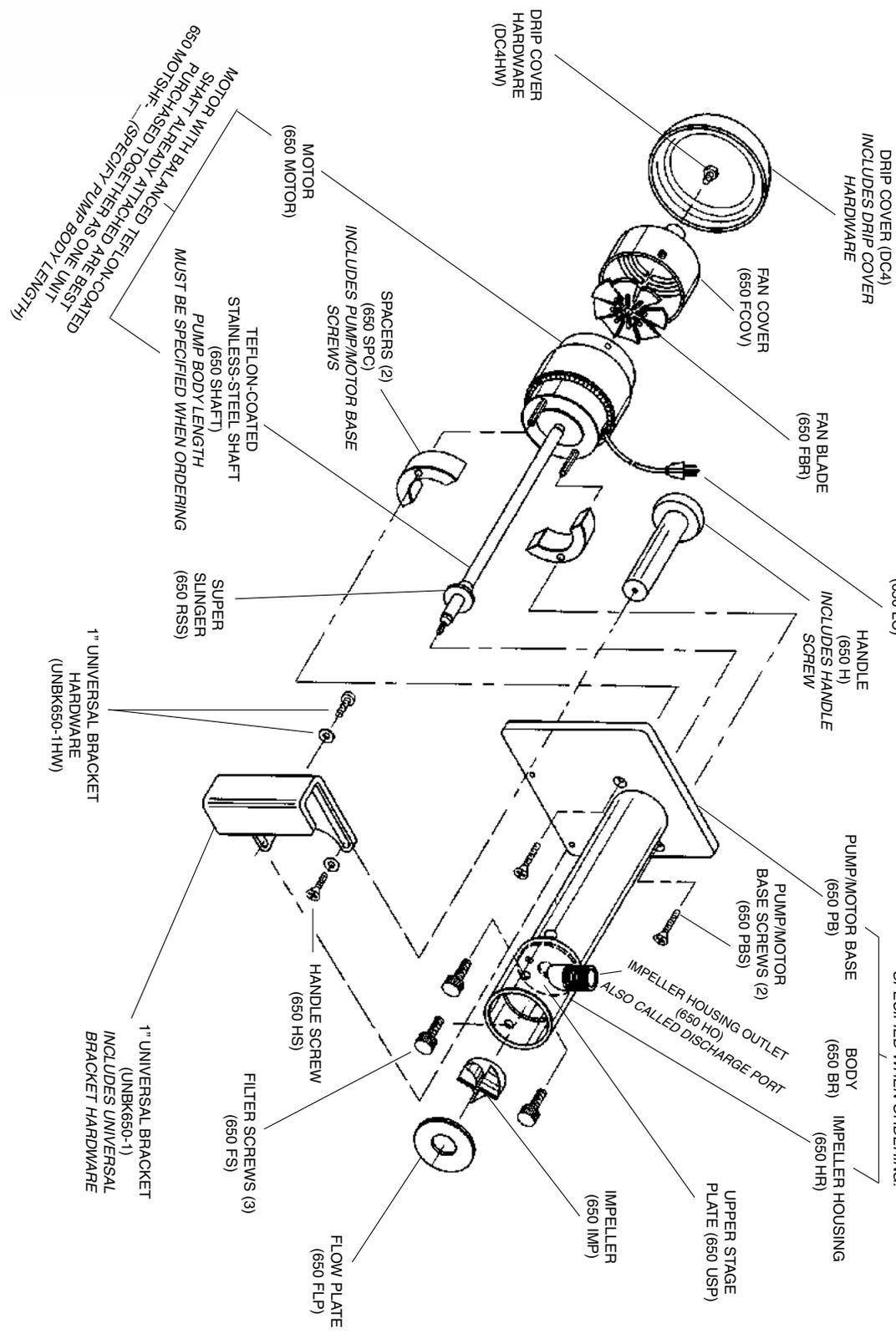
# IN-TANK TECHNOLOGY

The Original 4-in-1 FLO KING



## FLO KING BX650 EXPLODED VIEW

FOR FIELD REPAIRS, PUMP/MOTOR BASE, BODY & IMPELLER HOUSING ARE PURCHASED TOGETHER AS ONE UNIT (650 PBBH) PUMP BODY LENGTH MUST BE SPECIFIED WHEN ORDERING.





## **BX650 INSTALLATION**

The Flo King BX650 Filter System is preassembled and ready to operate after removal from the box. Referring to Page 4 for parts identification, just follow these instructions:

1. Screw Drip Cover onto top of Motor. (Unit can also be operated without Drip Cover.)
2. Insert filter cartridge into Impeller Housing. Then hand-tighten Filter Screws (thumb-screws) to hold filter cartridge in place. **CAUTION:** Do not over- or under-tighten Filter Screws. Just tighten snug enough to hold filter in place. (NOTE: If you have purchased Double Cartridge Holder accessory, you can use two filter cartridges on your BX650. Insert Double Cartridge Holder into Impeller Housing, tighten Filter Screws until snug, insert filter cartridges into Double Cartridge Holder, then tighten Filter Screws that hold filter cartridges in place.)
3. Insert Filter Plug into hole at bottom of filter cartridge.
4. Screw Elbow and Directable Outlet Extension onto Discharge Port and turn as necessary to achieve desired counterflow agitation pattern in tank. (Suggestion: Generally, it is advisable to slant Elbow and Directable Outlet Extension at a slight angle toward tank wall rather than toward center of tank.) Counterflow agitation is important to continually skim solution surface and keep particles in suspension so they can be captured quickly by filter media and not settle on tank bottom. This is achieved as natural byproduct of filtration with Flo King system as filtered solution is expelled through pump Discharge Port.

You are now ready to install the system in the tank you wish to filter.

5. Loosen screws on Universal Bracket to release sliding mechanism. Place pump in accessible area of tank to accommodate filter changes and maintenance. Then slide Universal Bracket against tank lip and tighten screws to secure pump to tank. (NOTE: The Universal Bracket can be moved to either side of the handle for desired positioning of the pump. So, for example, if the Directable Outlet Extension presents an obstruction in the tank, try moving the Universal Bracket to a new position.)

**CAUTION:** Motor should always be above tank lip. Otherwise, Motor life could be greatly diminished because of extremely corrosive environment closer to solution.

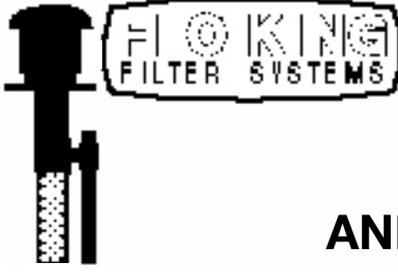
6. Check to make sure that “Weep Hole” on pump body immediately above Discharge Port is submerged at least 1 inch (25 mm) beneath solution. This will ensure that the Impeller is spinning in solution. The impeller must be submerged for the pump to function properly, to ensure self-priming operation, and to prevent aeration and/or foaming of solution.

7. Plug electrical cord directly into properly grounded ac outlet of the correct voltage for the pump you have ordered. (Do not use an extension cord!) The pump will begin operating as soon as it is plugged in.

8. If necessary, readjust Elbow and Directable Outlet Extension to modify counterflow agitation pattern in tank. Again, it is advisable to slant Elbow and Directable Outlet Extension at a slight angle toward tank wall rather than toward center of tank.

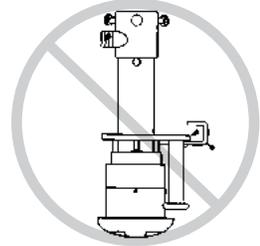
**IMMERSION WARNING:** Never immerse the Flo King Motor in any solution. The totally enclosed, fan-cooled Motor is resistant to most chemical sprays and vapors, but not to immersion. Immersion in any solution may cause Motor failure and will void the Flo King guarantee.

**IMPELLER PROTECTION WARNING:** To prevent foreign objects from getting trapped inside Impeller Housing, never run pump without either a filter cartridge or a strainer accessory (Pump Strainer Adapter). When using a filter cartridge, always remember to install Filter Plug at bottom of filter cartridge. When using pump without filter cartridge, always attach Flo King strainer accessory to prevent pump from drawing foreign objects into pump and damaging Impeller and other components.



## REMOVING BX650 FROM TANK AND CHANGING FILTER CARTRIDGES

Refer to Safety Precautions on Page 2.  
Solution Safety Procedures Must Be Followed  
To Prevent Injury or Damage to Personnel and Environment.



### **Warning! Do Not Turn Flo King System Upside Down!**

Do not turn Flo King system upside down when changing filters or any other time it has been exposed to corrosive solution. When pump is turned upside down, solution can drain onto Motor housing and be drawn into Motor by vacuum when Motor cools after power is turned off. Also, if laying pump on side to change filters, make sure solution does not drain onto Motor.

There are two ways to remove your Flo King from the tank (see Bulletin 18.2 in catalog). Here is the first procedure:

1. Unplug cord.
2. Hold handle firmly. (CAUTION: Do not grab unit by Motor; it can get hot during operation!) If necessary, grasp unit by Motor Base or pump Body.
3. Tilt pump back slowly. This will allow Universal Bracket to clear tank lip for removal.
4. Lift pump out of solution. Do so slowly to avoid dislodging sludge, particulates, and other debris captured by and adhering to filter media.
5. When removing pump from tank, it is advisable to set up a bucket or other receptacle near the tank. Let pump and filter cartridge drain into vessel to avoid dripping solution onto floor.
6. To change filters, loosen Filter Screws and allow spent filter cartridge to drop into receptacle.
7. Attach new filter cartridge.

Here is the second, alternate procedure:

1. Unplug cord.
2. Loosen screws on Universal Bracket.
3. Pull bracket out (away from tank).
4. Lift pump straight up, out of solution. Do so slowly to avoid dislodging sludge, particulates, and other debris captured by and adhering to filter media.
5. When removing pump from tank, it is advisable to set up a bucket or other receptacle near the tank. Let pump and filter cartridge drain into vessel to avoid dripping solution onto floor.
6. To change filters, loosen Filter Screws and allow filter cartridge to drop into receptacle.
7. Attach new filter cartridge.

Another option for removing filter cartridges is to use the SLIDE-IN FILTER CARTRIDGE ADAPTER (SIFCA). This device enables the operator to change filter cartridges without moving the pump from the tank. See Bulletin 19 in the Flo King catalog for details.



## **BX650 OPERATING INSTRUCTIONS**

### **Continuous Operation & Shut-Down for Extended Life of Any Pump or Motor**

Your Flo King unit was designed for continuous operation—24 hours a day. If the unit is turned off for any reason, removing it from the tank immediately after shut-down will extend Motor life—especially in a highly corrosive environment (see Page 9). Removal will help prevent corrosive fumes and vapors from being sucked in through the bearings—a phenomenon that occurs on all pump Motors—no matter who the manufacturer—as the Motor cools. This is the cause of most bearing and subsequent Motor failures.

### **Immersion Warning**

Never immerse the Flo King Motor in any solution. The totally enclosed, fan-cooled Motor is resistant to most chemical sprays and vapors, but not to immersion. Immersion in any solution may cause Motor failure and will void the Flo King guarantee.

### **Drip Cover Options**

The Flo King 650-series pump has a blue, plastic Drip Cover that you may or may not choose to remove. The Drip Cover is positioned above the Motor and is easily removed by spinning it counterclockwise. Consider the following before making that decision.

**With Drip Cover:** If you have considerable over-the-tank activity and a lot of solution dripping from overhead (as you might have in automatic rack plating, for example), removal of the Drip Cover is not advised. In these cases, the Drip Cover prevents solution or objects from falling on the Motor cooling blades.

**Without Drip Cover:** When using your Flo King unit under hot, high-vapor or extremely corrosive conditions, it may be advisable to remove the Drip Cover (see Page 9). The reason: Residues from heavy fumes are likely to collect under the Drip Cover and deposit a sludge on the cooling fins of the Motor, thus diminishing the cooling capacity and shortening the life of the bearings. Removal of the Drip Cover under these circumstances allows cleaner, cooler air to pass down through the cooling fins, resulting in more efficient operation.

### **ATTENTION: Electroless Nickel Users**

The Flo King Drip Cover should be removed for all electroless nickel plating applications because the process creates a high-vapor environment that will cause a sludge-like residue to build up on the cooling fins of the Motor (see Page 9). Removal of the Drip Cover will allow cleaner, cooler air to pass down through the cooling fins, resulting in more efficient operation.

It is also advisable to strip the Flo King system periodically as electroless nickel deposits build up on pump parts such as Filter Screws and accessories. The Flo King filter system also aids in stripping electroless nickel deposits from tanks, heaters, racks, etc. When used with a Flo King FK50 or FK75 poly-spun filter cartridge, your stripping solution will last longer and your parts will be stripped faster and cleaner. The filter cartridge can be used many times before discarding.

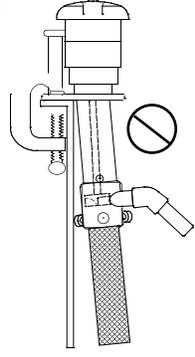
To maintain a Flo King unit used in electroless nickel operations, be sure to follow the BX650 Periodic Maintenance Procedure on Page 8.

*Operating Instructions Continued on Next Page*

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## **BX650 OPERATING INSTRUCTIONS (CONTINUED)**



### **Clamp Warning**

Special care must be taken when using a clamp (instead of the Flo King Universal Bracket) for mounting the pump to the tank. Overtightening of the clamp and failure to provide ample space between the pump Body and tank wall can result in warpage of the Motor Base, warpage of the pump Body, and damage to the Impeller and Shaft if they rub against the pump Body. Also make sure that the Filter Screws on the pump Body are not forced against the tank wall.

## **BX650 PERIODIC MAINTENANCE PROCEDURE**

Refer to Safety Precautions on Page 2.  
Solution Safety Procedures Must Be Followed  
To Prevent Injury or Damage to Personnel and Environment.

Whether you elect to use the Flo King BX650 Drip Cover or not, periodic inspection and maintenance of the Motor is highly recommended. As a rule of thumb, the more fumes your bath produces and the higher the corrosivity, the more frequent should be your inspections. The suggested Motor maintenance procedure is as follows:

1. Disconnect electrical power supply by unplugging Flo King unit.
  2. Remove pump from solution.
  3. Loosen the stainless steel screws on Motor to remove black Fan Cover.
- (CAUTION: Motor may be hot!)
4. Blow compressed air through cooling fins, which are located underneath Fan Blade and on outside rim of Motor. The compressed air should release most residue (sludge-like material) that has collected in cooling fins. (NOTE: Make sure to wear proper eye and face protection.)
  5. If necessary, use a wire probe or brush to dislodge any especially stubborn residues from cooling fins.
  6. Reassemble unit and resume operation.

**CAUTION:** Never plug in pump while Fan Cover is removed!

### **Exterior of Motor**

Make sure unit is unplugged. Then use damp rag to wipe down exterior of Motor as needed to prevent residue buildup. CAUTION: Motor may be hot.

## PRECAUTIONS WHEN USING THE BX650 IN A HIGHLY CORROSIVE ENVIRONMENT

Even though the Flo King BX650 Motor is sealed to the maximum extent practical, there may still be tiny microcracks or microcrevices that could serve as entrance points for corrosives under extremely adverse operating conditions! If you intend to use your BX650 in a hot, highly corrosive, splashing, misting, poorly ventilated or other hostile environment, please read and implement one or more of the following procedures.

1. The best way to increase Motor life is to improve the operating environment. Consider improving the ventilation and reducing the splashing or misting—at least in the area where the pump is mounted on the tank.

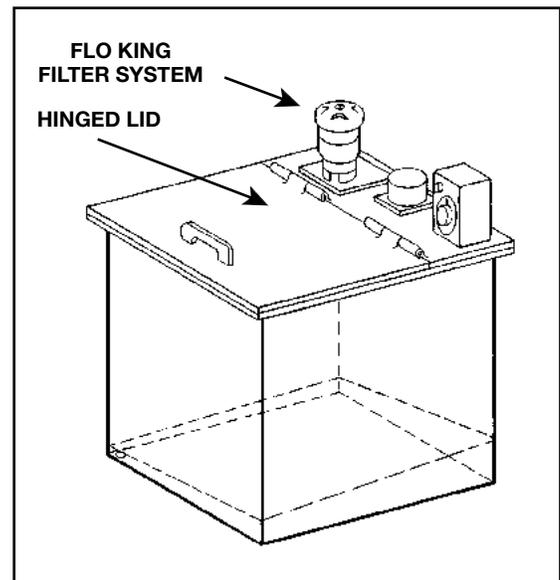
2. The addition of a tank top can also maximize BX650 Motor life. The illustration at right shows one excellent approach, with a hinged tank lid and cutaway area to mount the BX650 filter system. The hole should be made large enough to allow passage of the pump body and filter cartridge, but small enough so that the BX650 Motor base rests on top of the tank lid. The hinged lid also conserves energy, creates a safer working environment, and minimizes particulate entry to the tank. *(For electroless nickel baths, additional cutaway areas can be provided for the immersion heater and heater controller.)*

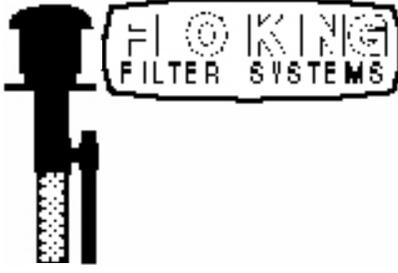
3. Motor life generally can be increased by running the pump continuously—24 hours a day. Turning the pump off can cause premature Motor failure in a hostile environment *(see #4 below)*.

4. If you prefer to turn the pump off rather than let it run continuously, make sure to remove the pump from solution as soon as the power has been turned off. As the Motor cools, a natural vacuum is created that can suck hot, corrosive fumes into the Motor, thus increasing the likelihood of Motor failure. Removal of the pump from the tank area immediately after turning off the power will ensure that the Motor does not draw in damaging fumes.

5. It may be advantageous to remove the blue, plastic Drip Cover. In hostile environments, condensation can build up inside the Drip Cover. This condensate may then drip and be sucked into the Motor when the pump is turned off *(see #4 above)*. Removal of the Drip Cover will prevent this occurrence. *(Exception: If there is significant dripping of solution on top of the BX650, the Drip Cap should be left on.)*

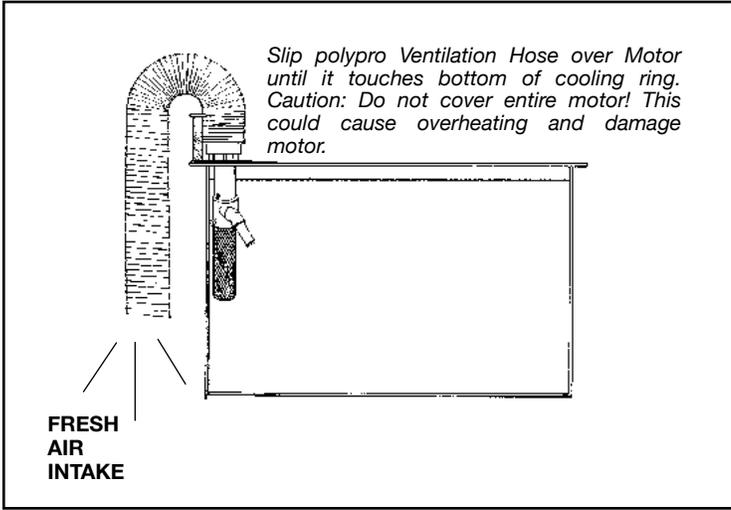
6. Do not turn the Flo King system upside down when changing filters or at any other time. When the pump is turned upside down, solution can drain onto the Motor housing and can be drawn into the Motor when a vacuum is created during shutdown *(see #4 above)*.





7. Clean the cooling fins on the Motor regularly or as needed. Dirty cooling fins cause overheating, which is one of the primary causes of Motor bearing failure. To clean the cooling fins: (a) loosen the stainless steel screws on the Motor to remove the black Fan Cover; (b) blow compressed air through the cooling fins, which are located underneath the Fan Blade on the outside of the Motor (*the compressed air should release most of the residue that has collected in the cooling fins*); (c) if necessary, use a wire probe or brush to dislodge any especially stubborn residues from the cooling fins; (d) reassemble unit and resume operation.

8. Consider using a piece of flexible polypropylene ducting on the Motor. Allow it to lay outside of the tank area and toward the floor (*see drawing at right*). This arrangement will keep the Motor continually purged with cleaner air than at the tank surface. (*Polypropylene hose can be purchased from our factory or from plastics suppliers.*) **Caution! It may be advisable to remove hose when Motor is turned off.** Depending on the operating environment, corrosive fumes could build up and become trapped inside the hose (and then the Motor) when power is turned off, as explained in #4 above.



9. Some customers brush the BX650 Motor exterior with one or more coats of a thin, quick-drying liquid maskant (stop-off). This helps protect the metal Motor housing from perforation corrosion as a result of extended contact with strong acids, caustics, and other corrosive materials. (*Caution! Do not use thick layers of maskant—this could cause the Motor to overheat.*)

10. Do not mount the Flo King pump in front of the ventilation exhaust. This will have the effect of exposing the Motor to a continuous draft of corrosive fumes that will shorten Motor life.



## FLO KING FILTER CARTRIDGES

Flo King offers both disposable and reusable filter cartridges in a variety of lengths and micron ratings for use with your BX650.

### Poly-Spun & Poly-Wound Disposable Filter Cartridges

**Poly-Spun:** This is our highest-quality and most popular disposable cartridge. It attaches directly to the Flo King pump and is especially recommended for the removal of fine to moderate-size particles. Our FK50 and FK20 cartridges provide outstanding filtration for most metal finishing solutions up to 200° F (93° C) while preserving the high flow rate and resulting agitation of the Flo King pump. Poly-Spun cartridges have a coreless, self-supporting structure and are made entirely of thermally bonded polypropylene fibers.

**Poly-Wound:** If disposable cartridges are preferred but are clogging too quickly, Poly-Wound is a candidate. This disposable cartridge is offered in 100, 200, and 400 microns for coarse filtration of solutions that generate considerable solids.

**Purity Information:** Because no resins, binders, lubricants or anti-static agents are used in manufacturing, no pre-wash is required for the Poly-Spun and Poly-Wound disposable cartridges.

**Mounting to Pump:** These disposable cartridges can be mounted directly to the Flo King pump or multiple cartridge holder. Alternatively, a Nut-Style Filter Holder is available—see PL26.21 in catalog

Disposal must be carried out in compliance with all federal, state and local regulations.

### Magnum & Super Magnum Reusable Filter Cartridges

This blanket-like reusable filter material minimizes the costs and complexities associated with filter cartridge consumption and disposal because it can be reused many times.

The Magnum cartridges are available in three micron ratings. The MCA material (10 micron) is the most commonly used grade and is for general-purpose filtration; the MCB material (5 micron) is for finer filtration; the MCC material (1 micron) is for extra-fine filtration. The Magnum blanket is made of thermally bonded polypropylene fibers and is rolled around a polypropylene core and held in place with a polypropylene web.

The reusable Super Magnum blankets are made of a high-solids-holding, non-polypropylene material (polyester) and are available in two micron ratings—XC (75 micron, coarse) and XF (30 micron, finer). The Super Magnum material is the only type recommended for hard chromium plating solutions and other chromic-acid-containing baths at high temperatures. It is also often used for iron phosphate and other baths with appreciable solids. Super Magnum is not suitable for high-temperature alkaline cleaners and other aggressive caustic solutions.

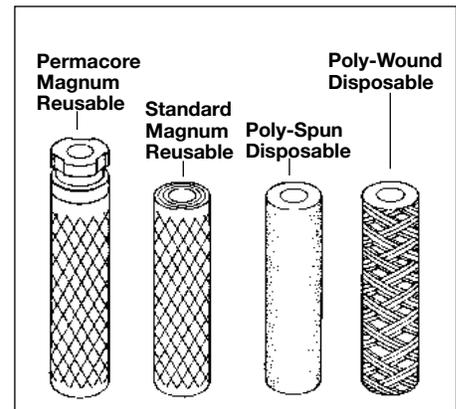
**Purity Information:** The reusable filter blankets may contain a surfactant or mineral oil at less than 1 percent. Immersion in boiling deionized water may be desirable for sensitive applications.

### Permacore vs. Standard Core

Two types of cores are available for the Magnum and Super Magnum reusable filters. One is a standard cartridge core. The second type, the Permacore, features at one end a hard, round piece of polypropylene, which fits snugly into the Flo King pump. The BX650 Filter Screws are tightened directly onto the Permacore head, thus alleviating wear and tear on the filter blanket. Either the standard or Permacore filters can be used with the BX650.

**Poly-Spun & Poly-Wound Note:** The Permacore is neither available for nor necessary with disposable filter cartridges.

(Also see Nut-Style Filter Holder—PL26.21 in catalog.)





# MAGNUM REUSABLE FILTER CLEANING & ASSEMBLY INSTRUCTIONS

Refer to Safety Precautions on Page 2. Solution Safety Procedures Must Be Followed To Prevent Injury or Damage to Personnel and Environment.

1. Remove Magnum filter cartridge from pump housing. Let drain and/or place in container.
2. Remove outside plastic Web. Stand cartridge assembly on flat surface in upright position. Grasp with both hands and slide web down about 2 or 3 inches (5 or 10 cm). Hold on to exposed filter blanket with one hand and pull web off Magnum assembly with twisting motion. (NOTE: If web is "locked on" with sludge, it may be necessary to spray outside of Magnum with water to "unlock" web.)
3. Unroll filter blanket from filter core. Most users then lay blanket on piece of grating over suitable tank, drum, reservoir or wastewater treatment pit and spray each side using an ordinary hose and spray nozzle (or, if available, pressure spray washer). Normally, this is sufficient for cleaning; however, some contaminants may build up and not flush out completely. In many applications, these contaminants can be removed easily by placing Magnum blanket in an appropriate chemical solution.

**CAUTION: Never mix cyanide-laden materials with acids; this combination produces hydrogen cyanide gas, which is lethal if inhaled! The process solution to which the Magnum has been exposed must be compatible with the acid from a SAFETY and USE standpoint.**

4. To wrap Magnum blanket around filter Core, lay blanket on flat surface. Blanket can be rolled while wet. Place core on blanket, making sure that top of blanket is even with core, and roll as tight as possible. (Note: If using PERMACORE filter element, allow PERMACORE head to lay off edge of flat surface while rolling blanket.)
5. Rest Magnum assembly in one plastic loading slat and place other loading slat on opposite side of Magnum filter to form a tube. Make sure plastic loading slats extend 2 inches (5 cm) beyond one end of Magnum.
6. Grasp Magnum about 4 inches (10 cm) from extended end. Slip plastic web over loading slats and pull down to end of assembly. Remove loading slats. Magnum is now ready to be used again.



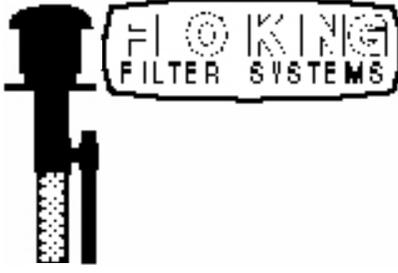
Clean blanket.



Re-roll blanket around core.



(L-r) Place plastic loading slats over filter. Then slide web over slats and pull down. Remove slats and cartridge is ready to reuse.



## **PREMATURE FILTER CLOGGING**

### **Filter Changes When Starting Up Your Flo King System**

When you install your Flo King in a previously unfiltered or poorly filtered bath, you may find that dirt, sludge, and other solids emerge from the bottom of the tank.

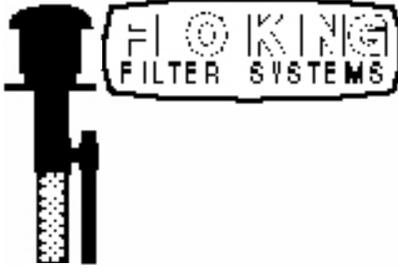
Consequently, until removed, these built-up solids may cause your Flo King filter cartridges to clog up quickly.

Do not be alarmed!

This is exactly what your Flo King system was designed to do. The counterflow action and quick-capture features result in efficient filtration by suspending and then capturing the solids.

A few simple changes of the reusable Magnum filter will normally put your bath in good condition. (See “Cleaning & Assembly Instructions for Flo King Magnum Filter Cartridges” on Page 12.)

However, if your bath has a considerable solids build-up and you wish to avoid filter clogging and get a fresh start on your filtration program, we suggest you follow the “DE-SLUDGE Procedure” outlined on Page 14.



## **DE-SLUDGE PROCEDURE**

### **For Cleaning & Purifying Dirty, Contaminated Solutions**

These instructions for cleaning and purifying dirty and contaminated solutions are recommended for most plating and associated process solutions in the finishing industry. These instructions are a guide, however, and depend on qualified personnel for proper cleaning and operation of filter media and carbon purification methods.

#### **Solids Removal**

1. De-Sludge: Let solution settle for 24 hours or until sediment has dropped to bottom of tank.
2. De-Cant: Remove solution from tank very carefully, without disturbing sediment on bottom of tank. Remove sludge, clean tank, and pump solution back into tank. (See Flo King Catalog Bulletin 32, "Special Applications")
3. Filter: Place one or two Flo King filter systems on side of tank with Directable Outlet Extension slanted slightly toward tank wall. This will start a counterflow agitation motion, which directs dirt and particles into filter media for solids removal.

Using Flo King Magnum or Super Magnum reusable filter cartridges or FK50 Poly-Spun disposable cartridges (see Catalog Bulletins 24 and 26), continue filtering until filter cartridges clog. This is determined visually by observing the solution; when there is little or no solution movement, the filter cartridges have clogged. Change or clean filter cartridges and continue filtering until filter cartridges are able to run several hours without plugging up. Ten turnovers generally produces a bath that filters particles in the range of 10 to 15 microns; 20 turnovers typically results in a 1- to 5-micron bath.

#### **Carbon Purification**

If solution is still cloudy after following the above procedure or if tests show the presence of organic contamination, carbon purification may be necessary. (Refer to Flo King Catalog Bulletin 28 for system size and method of carbon purification needed.)

1. Place carbon system in tank and run for several hours or overnight.
2. Test solution for organic contamination and continue until results are satisfactory.



## FLO KING BX650 TROUBLESHOOTING

### 1. Symptom: New pump appears to be running at less than full power.

**Possible Problem:** Bearing seals need longer break-in period. Turn pump off and remove from solution as outlined in “Removing BX650 from Tank . . .” on Page 6. Next, run pump dry for maximum of 10 minutes to break-in Motor seals. Turn pump off and re-install according to “BX650 Installation” instructions on Page 5.

### 2. Symptom: Little or No Agitation or Solution Circulation.

**Possible Problems:** (a) Solution level is not sufficiently covering “Weep Hole” immediately above Discharge Port on pump Body. In general, solution should be at least 1" (25 mm) above Weep Hole. This will ensure that the Impeller is spinning in solution. The Impeller must be submerged for the pump to function properly, to ensure self-priming operation, and to prevent aeration and/or foaming of solution. (b) Filter cartridge has air in it. Soak cartridge for a few minutes in solution to be filtered. (c) Filter is clogged. Refer to “Premature Filter Clogging” and “De-Sludge” sections on Pages 13 and 14, respectively. (d) If problem persists, wrong filter media may be in use. Refer to Flo King Bulletins 24 and 26 in catalog. Note: Filter cartridges that are too fine for the application can “choke” intake of pump, thus substantially reducing flow rate and agitation. Try a coarser cartridge (higher micron rating). (e) A foreign object has lodged inside Impeller Housing (also look for buildup of chemical residues). Turn pump off and remove from solution as outlined in instructions dealing with “Removing BX650 from Tank...”. Remove foreign object or residue from Impeller area, then re-install pump according to “BX650 Installation” instructions on Page 5.

**Important: To prevent foreign objects from getting trapped inside Impeller Housing, never run pump without either a filter cartridge or a strainer accessory.** When using a filter cartridge, *always* remember to install Filter Plug at bottom of cartridge. When using pump without filter cartridge, *always* attach Flo King strainer accessory to prevent pump from drawing foreign objects into Impeller.

### 3. Symptom: Excessive pump vibration.

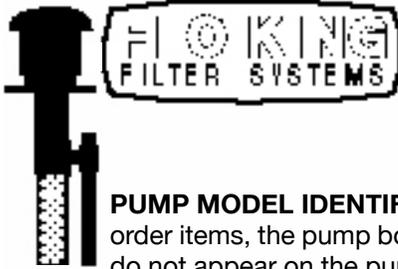
**Possible Problem:** Pump Shaft is out of alignment—normally due to excessively rough handling during shipping or use. If this occurs when unit is just received, immediately call the Flo King factory and shipper to report damage (see “Before Unpacking Your Unit,” Page 1.) In any case, Shaft realignment should be done at Flo King factory.

### 4. Symptom: Excessive solution aeration or foaming.

**Possible Problems:** (a) Solution level is not sufficiently covering “Weep Hole” immediately above Discharge Port on pump Body. In general, solution should be at least 1 inch (25 mm) above Weep Hole. (b) Filter cartridge is clogged. (Refer to “Premature Filter Clogging” and “De-Sludge” sections on Pages 13 and 14, respectively, as well as Flo King Bulletins 24 and 26 in catalog.) (c) Micron rating of filter cartridge is too fine for the application. Try a coarser filter cartridge (higher micron rating).

### 5. Symptom: Motor appears to be running hot.

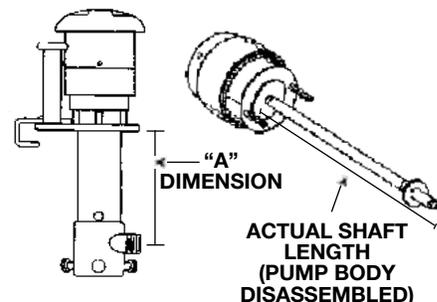
**Comment:** Under normal operation, Motor runs “hot to the touch.” This should not be considered a problem. **Suggestion:** Closely observe unit in operation for first week or so to familiarize yourself with operating characteristics.



## BX650 REPAIR INFORMATION

**PUMP MODEL IDENTIFICATION:** Before ordering parts, you must determine the pump model and, for many order items, the pump body length (see “Determining Pump Body Length” below). The model and body length do not appear on the pump body or motor. To identify the pump model, either: (1) check your original Flo King invoice; (2) write down the serial number, which appears on a silver sticker on the motor, then contact the Flo King factory for identification; (3) look for the horsepower rating on the motor: Unless the unit has been made for a special application, a 1/70th-hp motor is used on the Lab Series model; 1/15th hp on the BX650; 1/12th hp on the BX1200; 1/3 hp on the BX3000 and BXL2500; and 3/4 hp on the BX5000 and BXL5000; (4) compare your pump appearance and specifications with the photographs and specifications shown for each model in our catalog bulletins or on our website ([www.floking.com](http://www.floking.com)); or (5) contact the Flo King factory for further assistance.

**DETERMINING PUMP BODY LENGTH:** Flo King pumps are manufactured with different body lengths to satisfy the solution level from the top of the tank (freeboard) and, in many cases, the depth of the tank. You must therefore determine the length of your pump body and shaft before ordering certain parts. To determine the pump body length of the BX650, measure the “A” Dimension shown in the illustration at right. Then refer to the table below to find the corresponding pump model, such as BX650-4. Alternatively, if the pump to be repaired has already been disassembled, measure the length of the shaft, and refer to “Actual Shaft Length” in the table below to determine the corresponding pump model.



MEASUREMENT FROM BOTTOM OF MOTOR BASE TO CENTER OF DISCHARGE PORT (“A” DIMENSION)				
<b>PUMP MODEL</b>	BX650-4	BX650-6	BX650-8	BX650-10
<b>“A” DIMENSION</b>	4-1/2" (11 cm)	6-1/2" (17 cm)	9-1/16" (23 cm)	11-3/16" (28 cm)
<b>ACTUAL SHAFT LENGTH</b>	5-1/2" (14 cm)	7-1/2" (19 cm)	10" (25.5 cm)	11-3/4" (30 cm)

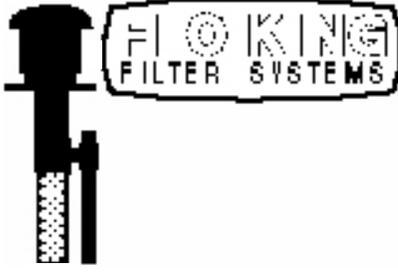
**PUMP MATERIAL OF CONSTRUCTION:** It is essential that you identify the pump material of construction before ordering parts. Most Flo King units are made from CPVC or polypropylene. If the pump body is gray in color, the unit is made of CPVC plastic; if white, polypropylene. Kynar (PVDF) plastic and stainless steel are also used, but less frequently. If you are uncertain, check your original invoice or contact the Flo King factory for further assistance.

**RECONDITIONED MOTORS:** A reconditioned motor cannot be purchased unless you exchange a motor that is capable of being reconditioned. Motors with excessive corrosion, unacceptable ohm readings or those that have been immersed in solution cannot be reconditioned. In these cases, you must purchase a new motor.

**PARTS AND SERVICE PRICES:** The prices shown in our catalog under “Factory Service & Parts” include both parts and installation by our factory. Prices are the same for parts alone.

**SERVICE:** Our Repair Department is staffed by trained technicians and provided strictly as a service to Flo King users. We encourage you to take advantage of this service program. You will receive warranty coverage on all repairs we make. Use of independent motor repair shops is strongly discouraged! In our experience, they will always be more expensive because (1) Flo King factory repair prices already include labor and (2) their unfamiliarity with the design of our products can result in even more damage and higher repair costs. For these reasons, we do not give technical assistance, drawings or parts information to independent motor repair shops.

**RETURN PROCEDURE:** Clean equipment in accordance with shipping regulations and send to REPAIR DEPT., FLO KING/CUSTOM MASTERS, 401 LAKE BENNETT CT., LONGWOOD, FL 32750-6341 USA. Make sure to include your name, address, and phone number so that the repair technician can contact you with an evaluation and estimate. A Return Authorization Number is not required. Use of the original Flo King box and packing will result in secure transport of your equipment.



## **BX650 DISASSEMBLY & REASSEMBLY INSTRUCTIONS**

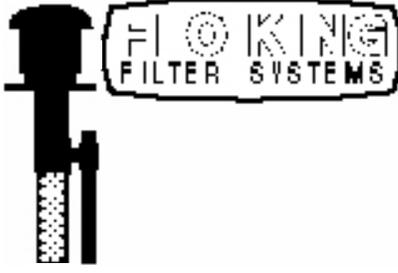
**FOR MORE COMPLETE REPAIR INFORMATION, WITH PHOTOS, VISIT OUR WEBSITE AT [WWW.FLOKING.COM](http://WWW.FLOKING.COM)**

### **DISASSEMBLY**

1. Referring to Exploded View of BX650 (Page 4), spin Drip Cover counterclockwise to remove from top of Motor.
2. Stand Pump upside down on table, so that Motor is supporting Pump.
3. Use screwdriver to pry out Flow Plate. (Note: On CPVC pumps, Flow Plate is lightly attached using CPVC cement. On polypropylene pumps, Flow Plate is simply a press fit. Both should pop out easily unless part distortion has occurred due to solution chemistry and temperature.)
4. Use needlenose pliers to grip Shaft between Spacers that separate Motor from Pump/Motor Base. While still gripping Shaft with pliers, use hand to remove Impeller by turning Impeller clockwise (left-hand threads).
5. Use Phillips-head screwdriver to remove the Pump/Motor Base Screws.
6. Lift pump Body to access Motor and Shaft assembly.

### **REASSEMBLY**

1. If you have received a new Motor/Shaft Assembly, stand Motor upside down and remove the two Phillips-head screws from Spacers.
2. Lower pump Body over Shaft.
3. Looking down into Impeller Housing, make sure Shaft is positioned in middle of Upper Stage Plate. (If not, it may be necessary to lightly sand Spacer closest to where Shaft is leaning.) When Shaft is centered in Upper Stage Plate, reinstall the two Phillips-head screws through the Spacers.
4. Use needlenose pliers to grip Shaft between Spacers that separate Motor from Pump/Motor Base. While still gripping Shaft with pliers, install Impeller by turning Impeller counterclockwise (left-hand threads).
5. Return Flow Plate to original position. (Note: If Flow Plate is made of CPVC, use a couple drops of CPVC cement to hold in place. If polypropylene, simply press-fit into place.)



## REPAIR NOTE: BX650 SHAFT DIFFERENCES

If you are replacing a Shaft or Impeller for your Flo King 650-series pump, you must first identify the pump material of construction. The most common are CPVC (gray in color) and polypropylene (white). Stainless steel and PVDF/Kynar are also used as the pump material of construction, but less frequently.

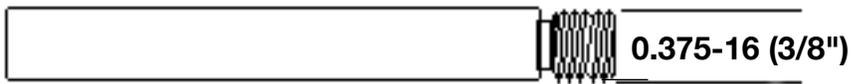
As shown below, the threaded end of the Shaft differs for the CPVC and polypropylene BX650s. This is because polypropylene is a softer plastic and requires a coarser, deeper thread to prevent stripping of the Impeller.

Also note that all 650-series Shafts have a left-handed thread where the Impeller screws on.

**Shaft for  
CPVC and  
Stainless Steel  
BX650**



**Shaft for  
Polypropylene  
and PVDF  
(Kynar)  
BX650**



The other end of the Shaft is not threaded and is attached to the Motor using a Loctite® product.