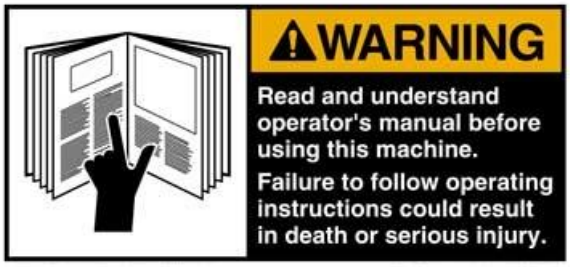
CUSTOMER:

MANUFACTURER: **EBBCO INC.**

51536 INDUSTRIAL DRIVE,
NEW BALTIMORE, MICHIGAN,
48047, USA
TEL: (800)991-4225

MODEL #: GRS-0250-B-CC-SL

OPERATION AND MAINTENANCE MANUAL



IMPORTANT!

Failure to install Ebbco Inc. brand Filter Cartridges in any Ebbco Inc. Filtration System, housings and/or units requiring Filter Cartridges for necessary operation, will cause Ebbco Inc.'s standard warranty to be null and void.

Table of Contents:

Section 1: **Introduction**

1.1 Introduction

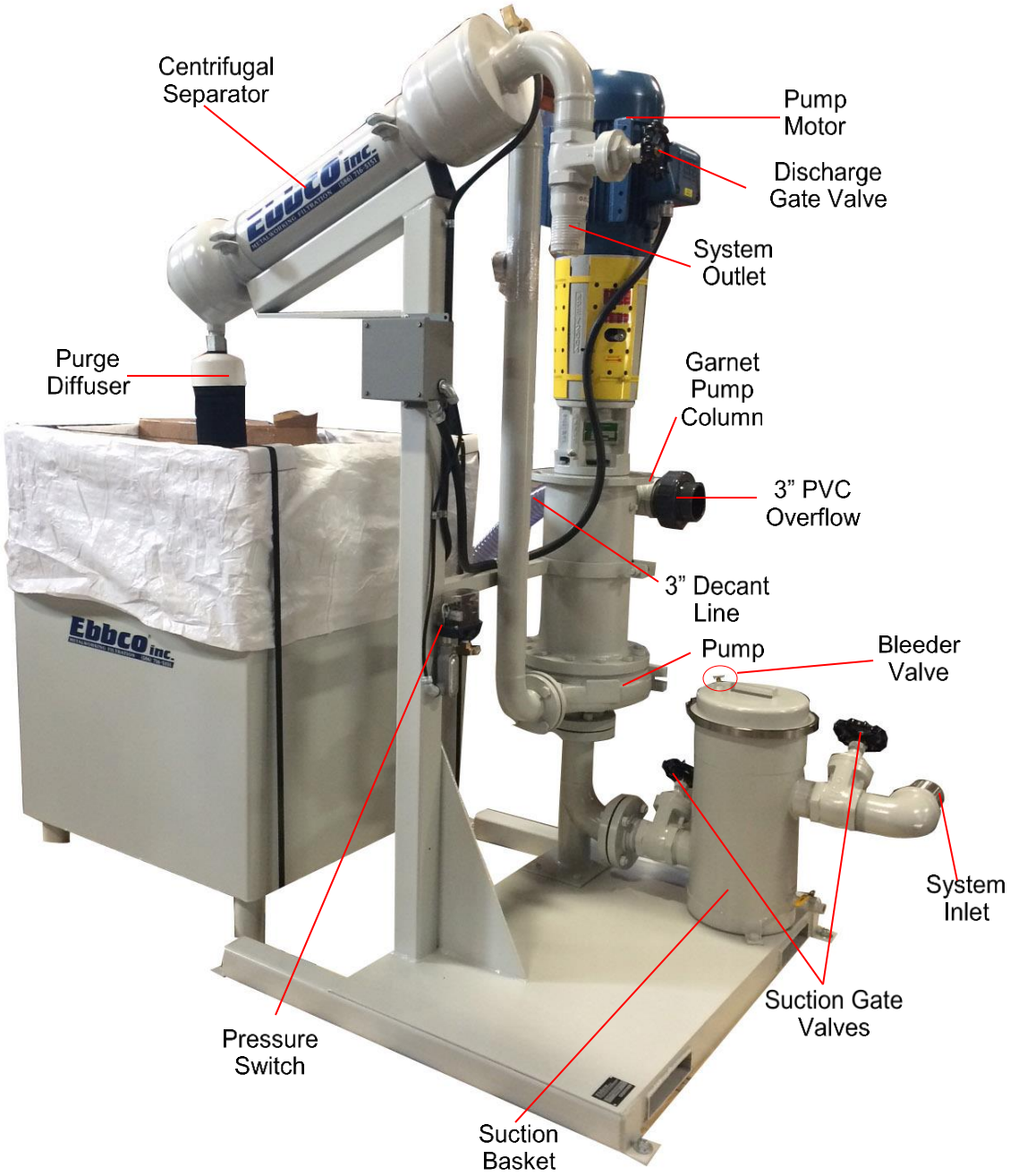
This Service Manual provides technical instruction on installation and operation of the Garnet Removal System manufactured by Ebbco Inc. With regular maintenance and proper operation, the Garnet Removal System will keep garnet abrasive from building up within the customer's waterjet catch tank, thus increasing production by eliminating down-time for tank shoveling maintenance. The Garnet Removal System will require some on-site assembly, which includes sweeper package assembly and installation, connecting any necessary gate valves and/or hose barbs to the customer's catch tank, and connecting the Garnet Removal System to the customer's waterjet catch tank. The Garnet Removal System is manufactured using quality materials by a highly experienced production staff. The Garnet Removal System is tested by Ebbco Inc. to ensure that it meets all customer specifications. The Garnet Removal System is inspected and all test data is documented prior to shipment.

1.2 Sequence of Operation

The Ebbco Inc. Garnet Removal System (GRS) is designed to keep garnet from building up within the customer's waterjet catch tank. This is accomplished by "sweeping" the bottom of the waterjet catch tank via the sweeper package to be installed inside of the customer's waterjet catch tank. The sweeping action is accomplished by pumping water through the sweeper package, which contains numerous Eductor nozzles that are specifically located and directed in engineered locations to precisely agitate the bottom of the catch tank. Thus, garnet abrasive stays in suspension due to the agitation and is carried out of the catch tank via the Garnet Removal System heavy-duty centrifugal pump.

Once inside the Garnet Removal System, used work water is pumped through a centrifugal separator. The centrifugal separator concentrates the garnet in the fluid stream and separates it for disposal into the abrasive bag hopper (ABH). Excess water purged from the centrifugal separator into the ABH decants back into the catch tank, while all the purged abrasive settles into the bottom of the removable ABH hopper bag. This system comes complete with a suction basket. The suction basket will protect the heavy-duty centrifugal pump suction from drawing in any large objects (wrenches, rags, etc.) that may cause a catastrophic pump maintenance issue.

Figure 1.2
Garnet Removal Assembly



Section 2: **System Specifications**

2.1 System Utilities Requirements

Inlet connection:	3.0" steel hose barb
Outlet connection:	2.5" steel hose barb
Decant/Overflow connection:	3.0” flex hose/3.0” connection
Electrical Requirement:	460vac/3ph/60Hz
Full Load Amps for **Garnet Removal System**:	**13.0 Amps**
Full Load Amps Overall:	19.0 Amps

2.2 System Components

Pump Suction Basket – FSB-3x3-BC

- Carbon Steel housing with threaded inlet and outlet connections.
- Internal strainer basket is constructed of Perforated Stainless Steel.
- Stainless Steel band clamp.
- Buna-nitrile O-ring seal.

Separator Pump – EC-CL2X3-10SEL-CDM-ANP+6

- Close-coupled, all Iron construction, 316 Stainless Steel shaft sleeve, semi-open Impeller.

Motor:	460vac/3ph/60Hz
Horsepower:	10.0 HP
Full Load Amp @ 460vac:	12.4 Amps
Speed:	1760 RPM
Enclosure:	T.E.F.C.
Pump:	GRS-0250-EC-BPE
Impeller:	10.0” diameter

Centrifugal Separator – SDS-0250-B

- Carbon Steel construction, designed to remove 98% of particulate from liquid, sized at 74 micron and larger with a specific gravity of 2.6 or higher.

Maximum Particle Size:	3/8-inch
Maximum Pressure Rating:	150 PSI
Pressure Loss Range:	4 to 12 PSI
Performance:	200 GPM

Electrical Panel

- Disconnect supplied by others.
- Provide maximum upstream protection per NEC code 430-52 and table 430-152

Disconnect:	60 amp
Enclosure:	Steel, Nema 12
Transformer:	75va Primary/Secondary fused

Separator Pump starter module: PKZ-2	**Thermal overload/Internal short circuit**
Thermal overload set point @ 460vac:	12.4 (FLA of motor)

Section 2: **System Specifications**

Abrasive Bag Hopper – WJF-ABH

- All Carbon Steel constructed container, which collects disposed solids and water from Garnet Removal System's purge diffuser.

Material of Construction:	Carbon Steel
Capacity:	1 cubic yard
Decant Overflow coupler:	3.0" steel hose barb
Media Requirement:	A-24425-1

Pressure Gauge – WJF-GA-0-60

Range:	0-60 PSI
Face Diameter:	2"
Inlet Size:	1/4" NPT
Case Material:	Stainless Steel
Wetted Parts:	Brass

Vacuum Gauge – WJF-V-GA

Range:	-30 in Hg - 0 in Hg
Face Diameter:	2"
Inlet Size:	1/4" NPT
Case Material:	Stainless Steel
Wetted Parts:	Brass

Figure 2.1
Abrasive Bag Hopper

Section 3: System Installation and Start-Up Procedures

Carefully check each component against the enclosed packing list upon receipt of the system to ensure that everything has been received with the shipment. Immediately contact the freight company to file the appropriate claim if anything is missing or damaged. Remove the filtration system from the wooden skidding it was shipped in using suitable materials and proper handling equipment. It is recommended that at least three feet of additional space be allocated around the perimeter of the filtration system for operator service access, inspection, and routine maintenance.
Electrical: 460vac/3φ/60Hz

3.1 Installation Procedure

1) Position the Garnet Removal Filtration System on a level surface next to the customer's waterjet catch tank, as agreed upon with Ebbco Inc.
2) Install the provided sweeper package into the customer's waterjet catch tank per the enclosed sweeper layout drawing S-2214-058-001.
3) Have a qualified industrial electrician connect the dedicated electrical power supply to the filtration system electrical panel per the enclosed electrical drawing E-2214-058-001.
4) Install the hose barbs into the suction and discharge gate valves on the waterjet catch tank.
5) Using the black suction hose and clamps included in the installation kit, connect the suction hose barb on the waterjet catch tank to the 3.0" suction hose barb on the Garnet Removal System.
6) Using the black discharge hose and clamps provided in the installation kit, connect the discharge hose barb on the waterjet catch tank to the 3.0" discharge hose barb on the Garnet Removal System.
7) Fill the waterjet catch tank with water.
8) Place the abrasive bag hopper (ABH) under the purge diffuser outlet on the GRS.
9) Connect the supraflex overflow hose from the 3.0" decant port on the ABH to the garnet pump column 3.0" hose barb connection.
10) Connect the 3.0" PVC overflow piping from the garnet pump column to the waterjet catch tank.

3.2 Start-Up Procedure

1) Loosen and remove the band clamp and lid from the pump suction basket. Ensure the inner strainer basket is free from debris and is correctly installed inside of the basket. This component should be emptied prior to operating and every eight hours of continuous use thereafter. **Never allow the suction basket to reach –10 in Hg**. Reapply the lid and securely tighten the band clamp around it.
2) Fully open all of the suction and discharge gate valves on the Garnet Removal System and the customer's waterjet catch tank.
3) Ensure that the catch tank is full of water and that all unions and connections are properly tightened. Ensure they are leak free after initial start-up.

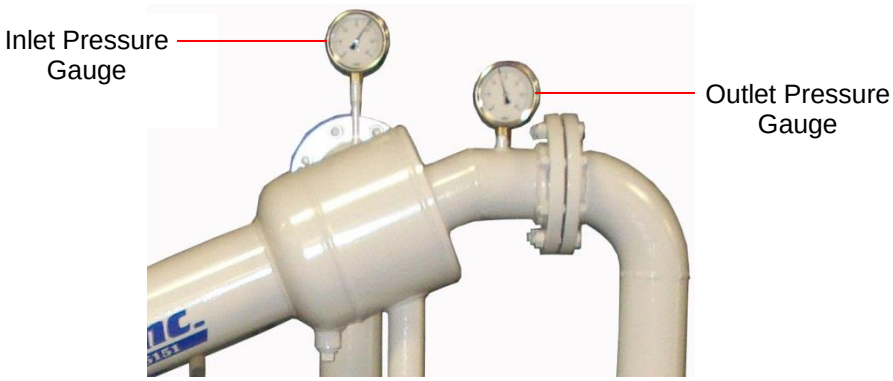
Note: While clockwise may typically be the normal factory set rotation, some motors do rotate counter-clockwise. Every pump leaves our facility with an arrow affixed to the motor correctly identifying the proper motor rotation direction.

4) If the pump motor is running in reverse, have a qualified electrician swap over one of the incoming line powers in the electrical panel.
5) Turn the system on using the main panel.

Warning:
If the Filtration System does not prime after 5 seconds stop the system. Try three more times. If the system still will not prime call the Ebbco Inc. Service Department at (800)991-4225

6) Check the centrifugal separator inlet and outlet pressure gauges. Ensure the pressure differential is between 4 – 12 PSI. Subtract the outlet pressure from the inlet pressure to find the pressure differential (inlet pressure gauge reading – outlet pressure gauge reading = pressure differential).
7) Ensure that all of the GRS and catch tank connections and unions are leak free.

Figure 3.2
Inlet & Outlet Gauges



Warning:
If pressure differential is too low or is too high, call the call the Ebbco Inc. service department at (800)991-4225

Section 4: **System Maintenance**

Warning:
Always disconnect power and relieve pressure from the system before performing any maintenance on this Filtration System

Caution:
Always follow correct lock out procedures when working on this Filtration System

4.1 Garnet Removal System Daily Check List

1) Ensure the suction basket inner strainer basket is serviced (empty), every time, prior to starting the Garnet Removal System. The suction basket should then be checked for solids level every eight hours of continuous operation thereafter.
2) Ensure that all of the suction and discharge gate valves on the GRS and the waterjet catch tank are fully opened.
3) Start the Garnet Removal Filtration System by turning the 'HOA' control switch on the electrical panel to the 'HAND' position. The 'AUTO' position is for remote controlling only.
4) Check the suction basket vacuum gauge upon start up. This gauge should read approximately −3 in Hg. Service the suction basket inner strainer basket before the suction vacuum gauge reads −10 in Hg. −8 in Hg is the ideal service point for this component. Consult the maintenance section for instructions on servicing this component.

Warning:
Failure to keep suction above −10 in Hg could result in catastrophic pump failure

5) Check the inlet and outlet pressure gauges on top of the centrifugal separator. The centrifugal separator pressure differential must run between 4 and 12 PSI (inlet pressure gauge reading – outlet pressure gauge reading = pressure differential).

Warning:
This Garnet Removal Separator must run between these pressure differentials. If the Garnet Removal System does not maintain the proper differential pressure it will affect the Garnet Removals performance and can cause premature pump maintenance/failure.

6) Service the abrasive bag hopper when the solids level is approximately half way to two-thirds full. Collected solids should not reach the abrasive bag hopper 3" decant port. **NEVER** allow spent abrasive to reach the ABH decant port as this can cause a maintenance issue with the centrifugal pump.
7) There will be no garnet accumulation directly in front of the Eductors; however, there may be some quiet areas in the waterjet catch tank where garnet may collect. Monthly checking of garnet build up along the bottom of the catch tank is advised. Do this by using a stick tap on the bottom of the catch tank in various locations. Any garnet accumulation will show up on the stick and can then be easily removed. The garnet "pile" should not be allowed to exceed 6" in height.

Please call the Ebbco Inc. Service Department at (800)991-4225 if there are any questions regarding this Garnet Removal System!

Section 4: **System Maintenance**

Warning:

Always disconnect power and relieve pressure from the system before performing any maintenance on this Filtration System

Caution:

Always follow correct lock out procedures when working on this Filtration System

The system will require the following items to be maintained on a scheduled basis.

4.2 Pump Suction Basket Maintenance

Figure 4.1
Vacuum Gauge

The vacuum gauge (mounted to the pump suction basket) should be monitored every time the system is started. The suction basket inner strainer basket needs to be emptied **every time** prior to starting the GRS and approximately every 8 hours of continuous operation thereafter to ensure that the suction does not exceed −10 in Hg (**service to the suction basket is recommended at –8 in Hg**). It is important to check the condition of the O-ring gasket inside of the suction basket O-ring groove. Ensure it is free of dirt and is properly in place before returning the lid back into place and turning the system back on.

Ebbco Inc. recommends that a preventive maintenance schedule be implemented for this component.

Suction Basket Maintenance Procedure:

1) Shut down the garnet removal system.
2) Close both of the suction basket gate valves (located before and after the suction basket).
3) Open the drain valve to allow all of the fluid inside of the suction basket to drain out. It is recommended that the drain is plumbed into a drain or a bucket so fluid does not spill all over the GRS or shop floor.
4) Open the bleeder valve on top of the suction basket lid to purge all of the trapped air from within the suction basket. Wait until the fluid has escaped the suction basket before moving to the next step.
5) Remove the lid from the suction basket by loosening the band clamp and removing it from the suction basket. Lift the lid off of the suction basket to gain access to the inner strainer basket.
6) Clean out the contents of the inner strainer basket. Reapply the inner strainer basket back inside of the suction basket.
7) Visually inspect the lid O-ring gasket. Ensure that the gasket is debris free and sitting flush inside of the basket O-ring groove. Replace the O-ring gasket with a spare gasket if it appears to be worn or damaged. Ebbco Inc. recommends keeping sufficient spare O-ring seal kits in stock at all times.
8) Reapply the suction basket lid and properly secure it with the band clamp.
9) Close both the suction basket drain and bleeder valves.
10) Open the suction gate valves closed in step 2.
11) Turn the filtration system back on. Slightly open the bleeder valve to purge any trapped air from the suction basket. Close the bleeder valve once all the air has been purged and fluid starts to escape out of the valve.

Note: The vacuum gauge should read approximately −3 in Hg upon system start-up. Service Basket before −10 in Hg. Make sure that both gate valves (located at the inlet and outlet of the strainer basket) are closed before any service of the Suction Basket takes place.

Warning:
Always disconnect power and relieve pressure from the system before performing any maintenance on this Filtration System

Caution:
Always follow correct lock out procedures when working on this Filtration System

4.3 System Pump Maintenance

The Centrifugal Pump has been tested and greased at the factory; therefore, lubrication is not necessary for a period of approximately six - eight months. Remember that over greasing will cause the bearing to run hot, so grease the bearings sparingly, and only when it is necessary. Ebbco Inc. recommends the use of Chevron SRI # 2 ball bearing grease. The pump may have to be inspected quarterly for wear on impeller and impeller Housing in applications where there is a high abrasion.

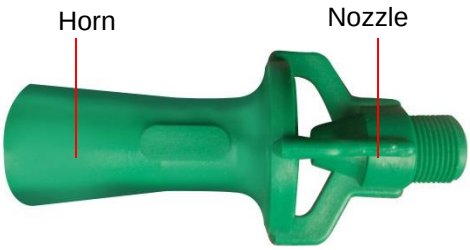
It is recommended that a routine maintenance schedule be set up, and followed, for the best service of the Centrifugal Pump. A periodic comparison of existing operating conditions and data against data taken when pump was initially started may indicate a problem developing. This allows for a planned maintenance check before a possible breakdown occurs.

4.4 Centrifugal Separator Maintenance

There is no scheduled maintenance on the separator itself; however, this component may require replacement after prolonged use. The amount of hours the GRS is ran and the material being cut all effect the longevity of this component.

4.5 Catch Tank Sweeper Package Maintenance

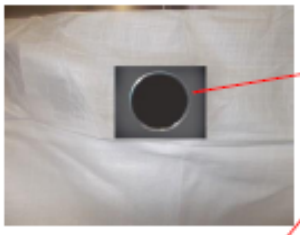
To ensure that the Garnet Removal System works at the designed performance, the catch tank sweeper package must be visually inspected every 12 months. If the sweeper package is damaged (broken Eductor(s), piping, or blocked suction) there will be a noticeable change in system performance. This may manifest itself as a Centrifugal Separator inlet pressure drop, a low differential across the Centrifugal Separator, or a high vacuum gauge reading. If any of these condition occur and, are not corrected the Centrifugal Pump and other components will become damaged. Once the catch tank has been drained of water:



- Check for damaged of broken piping and Eductors.
- Check for any garnet build up in front of any Eductor.
- Check for any material that may be wedged between the Eductor's nozzle and the horn.

Ebbco Inc. can provide an experience service technician to service the tank sweeper package and inspect the complete system. Please call Ebbco Inc. for pricing and to schedule a service technician at (800)991-4225.

4.6 Abrasive Bag Hopper Maintenance



Abrasive Bag Hopper Service Instructions

The abrasive bag hopper (ABH) should be visually inspected every day to be aware of the solids levels as they accumulate in the bag. Change out the bag when the solids level reaches approximately one-half to two-thirds full. **NEVER** allow the spent abrasive to reach the 3" decant outlet as this can cause premature wear and damage to the centrifugal pump and other system components.

To replace Abrasive Hopper Bag:

1) Shut system off.

2) Drain excess water that is on top of garnet and transfer it to the work tank.

3) Undo cam lock on decant hose line.

4) Carefully slide Abrasive Bag Hopper out from under separator purge to a location convenient for removing hopper bag.

5) Remove stainless steel overflow baffle from hopper.

6) Fold over top duffle portion of the hopper bag to gain access to the four lifting straps.

7) Using the lifting straps on the bag, lift out of the hopper with hi-low forks or an overhead crane and place on a skid or pallet.

8) To install a new bag. Cut a hole in the duffle top section of the bag where the decant line connects to the hopper. A hole is needed on both the inside and outside of the bag.

9) Place the hopper back in position under the system and re-install hopper overflow baffle making sure that the cut opening stays in place and has not shifted.

10) Re-connect cam lock and fill the bag with available make-up water.

Section 5: **System Troubleshooting Guide**

5.1 System Troubleshooting

Warning:
Always disconnect power and relieve pressure from the system before performing any maintenance on this Filtration System

Caution:
Always follow correct lock out procedures when working on this Filtration System

Pump will not start:

a) Check the electrical hookup for proper direction and power requirements.

No flow/No pressure:

a) Check the electrical hookup for proper direction and power requirements. The Pump's Motor should run clockwise looking down from the top.
b) Check fuses in step-down transformer. Replace as necessary.
c) Check the motor for any foreign objects.

Decreasing flow and pressure during operation:

a) Check the pump protection strainer for fouling. If plugged, remove the contaminants.

Low flow/Low pressure (10 PSI or less):

a) Check the rotation of the pump motor. It should be running in the direction noted on the pump.
b) Check the pump protection strainer for fouling.

No flow/Maximum pressure (pegged gauges):

a) Check the Separator's purge area for blockage.
b) Check to make sure all valves are open on the Filtration System.

No Transfer of solids/Correct separator pressure/Correct separator flow:

a) Check for blockage in purge area.

Warning:
NEVER operate the pump without the inner strainer basket installed inside of the suction basket

Warning:

Always disconnect power and relieve pressure from the system before performing any maintenance on this Filtration System

Caution:

Always follow correct lock out procedures when working on this Filtration System

5.2 Separator Pump

For troubleshooting pumps, read symptom describing problem, and diagnosis problem accordingly.

No fluid delivered:

1) Pump not primed
2) Speed too low
3) Discharge head too high
4) Impeller completely clogged
5) Wrong Direction of rotation
6) Too much clearance between impeller and intake flange

Not enough fluid delivered:

1) Speed too low
2) Discharge higher than expected
3) Too much clearance between Impeller and intake flange
4) Impeller completely clogged
5) Not enough suction head for hot fluid
6) Mechanical defects:
   - Impeller is damaged
7) Impeller diameter too small
8) Suction opening not submerged enough

Not enough pressure:

2) Speed too low
3) Air in fluid
4) Mechanical defects:
   - Impeller is damaged
5) Impeller diameter is too small

Vibration:

1) Bent shaft
2) Pipe strain
3) Impeller clogged
4) Coupling alignment off

Pump suffers from suction loss:

1) Leaky suction line
2) Seal plugged
3) Impeller clogged
4) Air or gasses in fluid

Pump overpowered:

1) Speed too high
2) Head lower than rating, pumps too much fluid
3) Specific gravity or viscosity too high
4) Mechanical defects:
   - Shaft bent
   - Power frame binding
5) Impeller diameter too large
6) Pump delivering too many gallons

Section 6: **Spare Parts List**

6.1 Replacement Spare Parts

Qty. req.	Delivery Time	Component Description	Part Number
1	2-4 Weeks	Separator Pump without Motor	GRS-0250-EC-BPE
1	2-4 Weeks	Centrifugal Separator	SDS-0250-B
1	2-4 Weeks	Pump Impeller	EP-WJF-IMP-25112
1	2-4 Weeks	Pump Impeller Housing	EP-WJF-IMH-27112
1	2-5 Days	Pump Case Gaskets	EP-WJF-10IG
1	2-5 Days	Pump Stem Plate with Bushing	EP-WJF-IMPHB-21111/62001-C
1	2-5 Days	Pump Strainer Basket's Internal Basket	WJF-FSB-3X3-BC-IB
1	2-5 Days	Pump Strainer Basket's Lid Gasket	WJF-SB-3-BC
1	2-5 Days	PVC Purge Diffuser	WJF-PD1.25
1	2-5 Days	Replacement Orifice Coupler (two parts included)	WJF-PD-1-OC
1	2-5 Days	Soft Rubber Boot after Purge Diffuser	WJF-PD-WRAP
1	2-5 Days	Cloth Sock after Purge Diffuser	WJF-HYRDROSOCK
1	2-5 Days	Soft Rubber Boot and Sock Assembly	WJF-PD-SKIRT
2	2-5 Days	0-60 PSI Liquid Filled Pressure Gauge	WJF-GA-0-60
1	2-5 Days	-30in Hg – 0 PSI Liquid Filled Vacuum Gauge	WJF-V-GA
12	2-5 Days	3/8" Poly Eductor	WJF-0MP
1	2-5 Days	Abrasive Bag Hopper Bag	WJF-ABH

6.2 Recommended Spare Parts

Rec. on site	Qty. req.	Delivery Time	Component Description	Part Number
3	1	2-5 Days	Pump Case Gaskets	EP-WJF-10IG
1	1	2-5 Days	Pump Stem Plate with Bushing	EP-WJF-21111/62001-C
3	1	2-5 Days	Pump Strainer Basket's Lid Gasket	WJF-SB-3-BC

6.3 Consumables

Rec. on site	Qty. req.	Delivery Time	Component Description	Part Number
5	1	2-5 Days	Abrasive Bag Hopper Bag	WJF-ABH

Section 7: General Policy & Limited Warranty

It is Ebbco Inc.'s policy to ship and charge for replacement parts, upon notification of a problem. Warranty will be determined upon inspection of said part, after it is returned to Ebbco Inc., freight pre-paid. A returned goods claim form will be sent with replacement part, and must be returned with defective part. Ebbco Inc. shall not be liable for incidental, consequential losses, and damages under this expressed warranty, and any applicable implied warranty or claims for negligence.

All products manufactured and marketed by Ebbco Inc., are warranted to be free of defects in materials and workmanship, for a period up to one year from date of delivery, or 2080 hours of operation, whichever comes first.

Equipment such as Pumps, Pump Bodies, Filter-Vessels, etc. will carry one-year manufacturer warranty. Pump seals; ninety-day limited warranty. Do not run pump dry, or overheat pump by not servicing filter when required. Any overheated seals do not qualify as a warranty, as seals are subject to normal wear. It is recommended that you keep a spare vessel seal kit, and pump seal in stock at all times. This limited warranty does not cover any products, damages, or injuries resulting from misuse, neglect, normal expected wear, chemical-caused corrosion, improper installation, or operation contrary to Ebbco Inc.'s recommendations. This limited warranty also does not cover equipment which has been modified, tampered with, or altered without authorization.

No other extended liabilities are stated, or implied, and this warranty in no way covers incidental or consequential damages, injuries or cost resulting from any such defected products.

Failure to install Ebbco Inc. brand Filter Cartridges in any Ebbco Inc. Filtration System, housings, and/or units requiring Filter Cartridges for necessary operation, will cause Ebbco Inc.'s standard warranty to be null and void.

Warning:

Do not add any chemicals, chlorine, oils, mop water, or any other liquids to any of the Water-jet's components. This includes but is not limited to worktables, Closed Loop Filtration Systems, Settling Weir, etc. Doing so will greatly reduce filter life and may cause catastrophic system failure on top of voiding all warranties.

Note:

Ebbco Inc. branded Filter Cartridges, Filter Bags, and Resins must be used in order to obtain maximum performance. Performance cannot be guaranteed unless approved consumables are used.