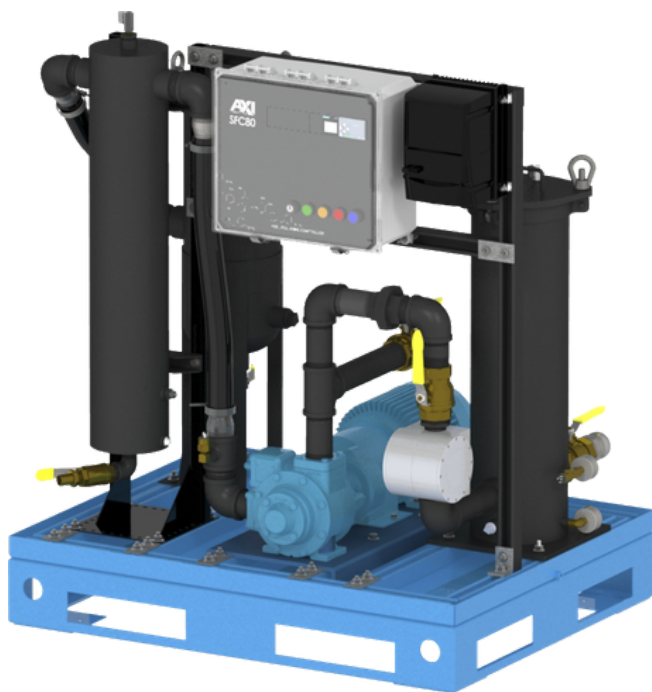


AXI MTC HC-90

INTERNATIONAL



The MTC HC-90 is a high capacity mobile fuel polishing system designed to efficiently remove water, sludge, and other contaminants from fuel storage tanks. Once on site, the MTC HC-90 can be operated to ensure fuel reliability through routine servicing of the fuel tank(s). The system's fuel polishing process stabilizes diesel and bio-fuels by eliminating various contaminants, ensuring the fuel remains clean. These mobile systems feature a skid-based design that allows for maximum portability and ease of transportation between the various fuel tanks that require routine servicing.



MTC HC-90 SPECIFICATIONS:

Nominal Flow Rate	10 - 90 GPM (37.9 - 340.7 LPM)
Primary Filter	Bag Filter Vessel, Liner Basket for use with 1-800µ Filter Bags
Water Separator	FP-90 Mechanical Water Separator
Secondary Filter	Cartridge Filter Vessel, 2-30µ Particulate, 10-30µ Water Block Filters, or 3-10µ Micro-glass Filters
Fuel Conditioner	LG-X 4000 Inline Magnetic Conditioner
System Controller	SFC70 or 80 Smart Filtration Controller with Safety and Alarm Features 3 HP Sliding Vane Pump
Pump	208-230V/60Hz/1Ph, 230V/50Hz/1Ph, 240V/60Hz/3Ph, or 480V/60Hz/3Ph
Power	Black Iron
Plumbing	2" Cam & Groove In 2" Cam & Groove Out
Ports	Clear, 25ft (7.6 m), 2" Diameter 25ft (7.6 m), 2" Diameter
Suction Hose	≈ 59" x 36" x 45" (H x W x D)
Discharge Hose	(150 x 91 x 114 cm)
Dimensions	≈ 710 lbs (286 kg)
Weight	
Not for use with fluids that have a flash point below 100°F (37.8°C).	

MTC HC-90 SYSTEM FEATURES:

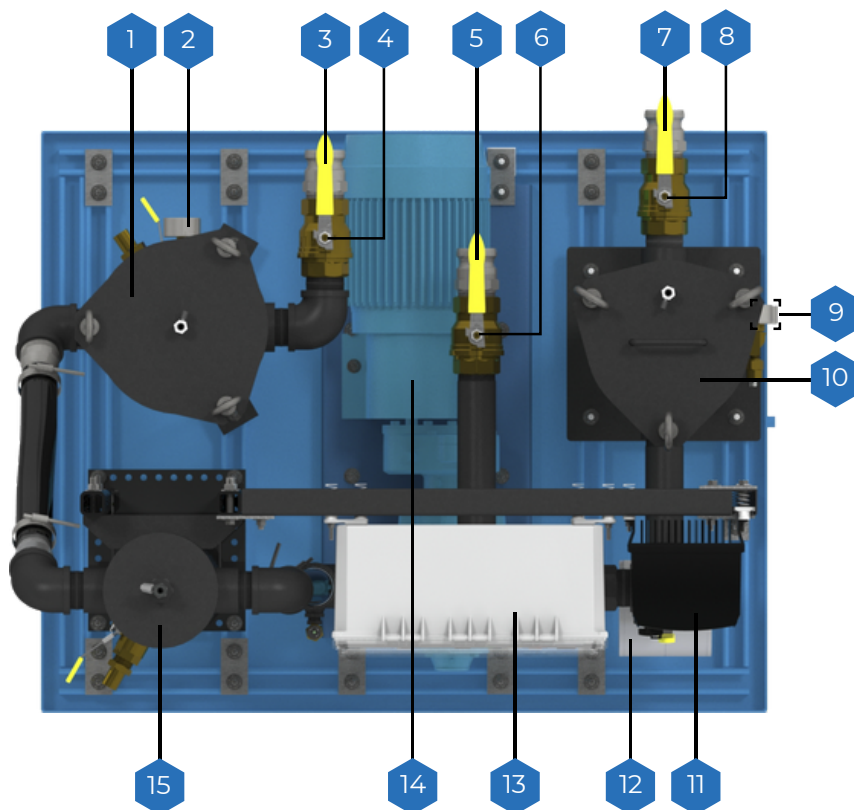
- Multi-Stage Fuel Filtration
- Adjustable Flow Rate (VFD Controller)
- Portable System Design
- Locking Cam and Groove Connections
- Fine Filter Bypass Capability
- Smart Filtration Controller
- Unique Safety & Alarm Features
- Remote Pendant Operation

REPLACEMENT FILTER OPTIONS:

Primary Filter	Part No.	Secondary Filter	Part No.
1µ Filter Bag	PFB-30-1	2µ Particulate	2-W 618-10-
5µ Filter Bag	PFB-30-5	10µ Particulate	W WA618-
10µ Filter Bag	PFB-30-10	10µ Water Block	10-W 618-30-
25µ Filter Bag	PFB-30-25	30µ Particulate	W WA618-
75µ Filter Bag	PFB-30-75	30µ Water Block	30-W G618-
250µ Filter Bag	PFB-30-250	3µ Micro Glass	3-SR
800µ Filter Bag	PFB-30-800	7µ Micro Glass	G618-7-SR
		10µ Micro Glass	G618-10-SR

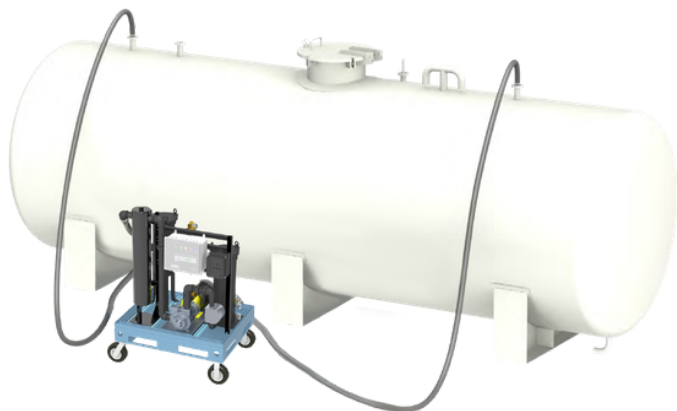
**Standard-issue filter element unless requested otherwise*

AXI MTC HC-90



- 1.Primary Bag Filter Vessel
- 2.Vacuum Gauges
- 3.Fuel Inlet (From Tank)
- 4.Inlet Ball Valve
- 5.Fuel Discharge Port 1
- 6.Outlet Ball Valve (Discharge Port 1)
- 7.Fuel Discharge Port 2
- 8.Outlet Ball Valve (Discharge Port 2)
- 9.Pressure Gauges
- 10.Secondary Fine Filter Vessel
- 11.Variable Frequency Drive (VFD)
- 12.Fuel Conditioner
- 13.Smart Filtration Controller
- 14.Motor with Coupled Vane Pump
- 15.Mechanical Water Separator

◆ MTC HC-90 SYSTEM INTEGRATION





MTC HC-90 Instruction, Operating, & Maintenance Manual

HIGHCAPACITYMOBILEFUELPOLISHINGSYSTEM

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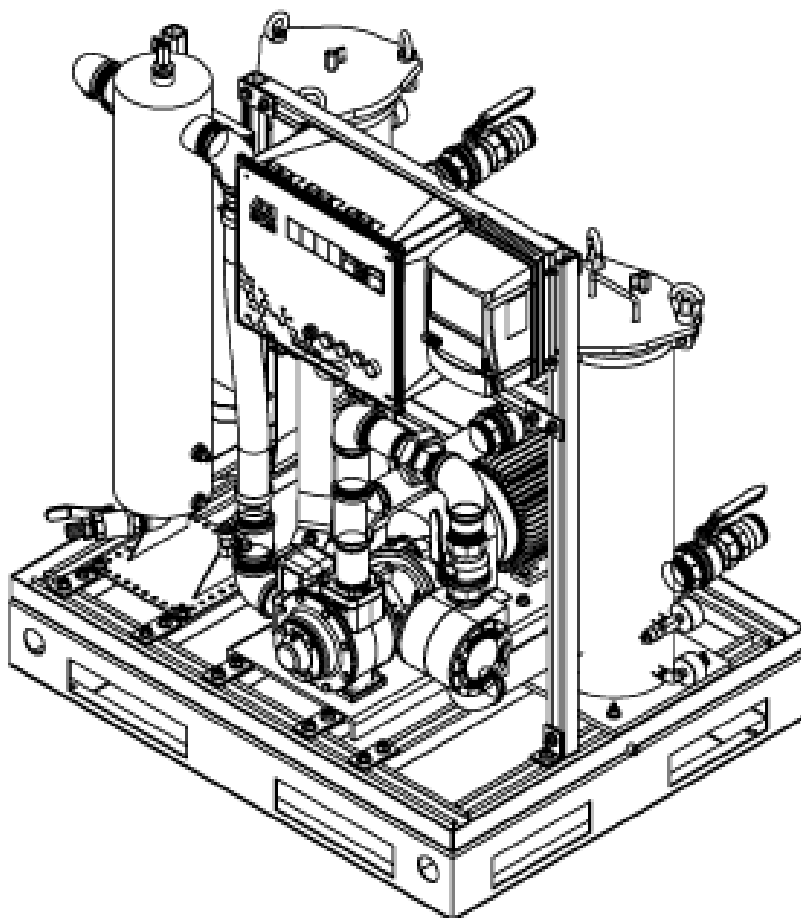


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General Overview

MTC HC-90 Specifications

Nominal Flow Rate.....	10 - 90 GPM (37.9 - 340.7 LPM)
Primary Filter.....	Bag Filter Vessel, Liner Basket for use with 1-800µ Filter Bags
Water Separator.....	FP-90 Mechanical Water Separator
Secondary Filter.....	Cartridge Filter Vessel, 2-30µ Particulate, 10-30µ Water Block, or 3-10µ Micro-glass Filters
Fuel Conditioner.....	LG-X 4000 Inline Magnetic Conditioner
Plumbing.....	Black Iron
Inlet Port.....	2" Cam & Groove In
Outlet Port.....	2" Cam & Groove Out
Operating Temperature.....	41 - 104°F (5 - 40°C)
Controller.....	SFC70 Smart Filtration Controller
Electrical.....	208-230V/60Hz/1Ph, 230V/50Hz/1Ph, 240V/60Hz/3Ph, or 480V/60Hz/3Ph
Pump/Motor.....	3 HP Sliding Vane Pump
Suction Capability (Primed).....	15ft. vertical lift or 100ft. horizontal run (2" line, primed)
Maximum Fluid Viscosity.....	5 cSt
Clear Suction Hose.....	2", 25 ft. (7.6m)
Discharge Hose.....	2", 25 ft. (7.6m)
Outline Dimensions.....	59" x 36" x 45" (150 x 91 x 114 cm) (H x W x D)
Weight.....	≈710 lbs. (322 kg)

!WARNING! This system is not meant for use with gasoline or any other flammable liquids having a flash point less than 100°F (37.8° C). Use with gasoline or any flammable liquids at a temperature exceeding their flash point presents an immediate explosion and fire hazard.



System Components

Control and Safety Devices

- SFC-70Smart Filtration Controller
 - Control Circuit Breakers (CB1, CB2)
 - Smart Filtration PLC with LCD Display
 - Pump Control Selector Switch (Manual/Off/Auto)
 - System Power Indicator Light
 - Pump Running Indicator Light
 - Alarm Indicator Light
 - Alarm Reset Push Button
- Vacuum & Pressure Switches
- Vacuum & Pressure Gauges
- Water Detection Alarm Module
- Inlet and Outlet Ball Valves
 - Inlet Ball Valve
 - Outlet Ball Valve (Discharge Port 1)
 - Outlet Ball Valve (Discharge Port 2)
- Remote Pendant Switch
- VFD Motor Control Device

Pump/Motor

- 3HPSlidingVane Pump
- Internal Pressure Relief

Primary Filter

- Bag filterelement (purchased separately)
- Water Detection Sensor Probe
- Drain Valve

Mechanical Water Separator

- Water Separator
- Drain Valve

Fuel Conditioner

- InlineMagneticFuel Conditioner

Secondary Filters

- Cartridgefilterelement (purchased separately)

Plumbing

- Black Iron



System Operation

WARNING: The whole system must be properly grounded for operator safety.

Note: It is recommended that only qualified, experienced personnel, familiar with this equipment, who have read and understood all the instructions in this manual should operate and maintain the system.

Setup Procedures

To establish either fuel polishing mode, the user must attach both system hoses to the system in the proper configuration. The Intake/Suction Hose is clear and see-through while the Discharge Hose is black and opaque. Both hoses are equipped with quick disconnect cam & groove couplings.

1. First, attach the quick disconnect end of the clear Suction Hose to the Inlet Port of the system.
2. We highly recommend attaching a straight wand or pipe (cut at an angle) to the end of the Suction Hose in order to reach the lowest part of the tank bottom.
3. The straight wand or pipe should be no less than the inner diameter of the Suction Hose.

Note: Never restrict the flow on the suction side of an MTC; e.g. by using a smaller ID hose or pipe attachment. This will lead to excessive pump load, noisy operation, and ultimately pump damage.

Bypass Mode:

Inbypass mode, the fuel bypasses the system's Secondary Filter only to be ran through the Primary Filter and Water Separator for the bulk removal of water, sludge, and particulate. To establish bypass mode:

1. Attached the quick disconnect end of the black Discharge Hose to Discharge Port 1 (located in the center of the system over the pump).
2. Before running the pump, ensure the Inlet Ball Valve and proper Discharge Ball Valve (Discharge Port 1) are in the open position.
3. Also, ensure the other Discharge Ball Valve (Discharge Port 2) and the Water Separator drain ball valve are in the closed position.

Fine Filtration Mode:

Infinefiltrationmode, the fuel is run through the system's high efficiency Secondary Filter element to remove free water and fine particulate as small as 1 micron. To establish fine filtration mode:

1. Attached the quick disconnect end of blue/black Discharge Hose to Discharge Port 2 (last port to the left of the pump).
2. Before running the pump, ensure the Inlet Ball Valve and proper Discharge Ball Valve (Discharge Port 2) are in the open position.
3. Also, ensure the other Discharge Ball Valve (Discharge Port 1) and the Water Separator drain ball valve are in the closed position.

Pump Operation

To startup the system, you must first apply control power to unit. Place the control breakers for the System Controller in the "ON" position.

Remote Mode:

Place the Selector Switch in the "AUTO" position. To activate the pump simply press the Remote Pendant Switch. The pump will now run until either the Remote Pendant Switch is pressed again, the Selector Switch is placed in the "OFF" position, or a system alarm has been tripped.

Manual Mode:

Place the Selector Switch in the “MANUAL” position. The pump will now run until either the Select Switch is placed in the “OFF” position or a system alarm has been tripped.

Note: See the Controller – Variable Frequency Controller (VFD) section for information on adjusting the system's flow rate with the VFD Controller.

Phase 1

AXI recommends 3 phases to successfully polish a fuel tank. This will ensure all contaminants are removed and the fuel is in optimal condition.

The goal of Phase One is to remove any free water and sludge from the bottom of the tank without mixing the water into an emulsified state within the fuel. The Pump will start pumping as long as the system is primed (See Priming the System section) and the suction lift is not excessive. The flow of the fuel can be observed in the see-through suction hose. Watch for a steady flow of fuel into the container.

1. Setup up the system in the Bypass Mode configuration (see Setup Procedures – Bypass Mode) and be sure to install a large micron (200µ or larger) filter bag in the Primary Filter vessel.

Note: Primary filter should always have some type of primary filter bag in place during operation to extend life of the pump vanes.

2. Place the Discharge Hose into a separate discharge waste container and ensure that the hose is secured and will not vibrate out of the container when the system is operating.
3. To remove as much of the free water and sludge as possible, the Suction Hose (with a straight wand or pipe attachment) should be placed at the deepest part of the tank.
4. Connect the system to an appropriate power source and switch the breakers on the System Controller to “ON”. The “System Power” Indicator should illuminate on the System Controller.
5. Set the Pump to run at a lower initial speed (10-20 Hz) by adjusting the knob on the VFD Controller and turn the Pump on via the Selector Switch on the System Controller.
6. Be prepared to immediately switch the pump off once the fluid begins to fill the discharge container in order to inspect the discharge fluid.
7. Resume pumping until the bulk water and sludge have been removed from the tank bottom and only fuel is primarily discharged from the return hose.
8. Switch off the Pump and drain all water and debris from the hose and the Water Separator (via the drain valve) into an appropriate waste bucket or container.

Phase 2

The goal of Phase Two is to remove any additional free water, sludge, and large contaminants within the tank. This phase will further clean the fuel and should be a precursor to using the more expensive fine filters. It should be noted that meeting required cleanliness codes is typically not possible with Phase One and Two alone. Phase Two is simply used to extend the life of the Secondary Filter's fine filter cartridges by removing the worst of the contaminants first.

1. Before turning on the Pump, ensure the system is still setup in the Bypass Mode configuration (see Setup Procedures – Bypass Mode).
2. Remove the Discharge Hose from the waste container and place it into the tank.
3. If possible, ensure the Suction and Discharge Hoses are placed as far apart as possible.

Note: In many cases, both hoses may have to be inserted through the same tank opening.

4. After verifying that both hoses are properly placed in the fuel tank and that the ball valves on the system are in the correct position, switch on the pump and watch the clear suction hose for fuel flow.

- 
5. While polishing, it is good practice to watch the fuel flow and regularly stop the pump to check for buildup of free water and sludge in the Water Separator (see Maintenance – Servicing the Water Separator). Should the water level rise and trip the Water Sensor Probe on the Water Separator, a High Water alarm will be triggered indicating that the Water Separator needs to be drained of water.
 6. It is also good practice to monitor the Vacuum Gauges to know when to service a clogged Primary Filter element in order to avoid flow restriction (see Maintenance – Servicing the Primary Filter). Should the Vacuum Switch detect a reading above the pre-established set point, a High Vacuum alarm will be triggered indicating that the Primary Filter bag needs to be changed.
 7. The system should be kept running until clean fuel samples can be drained from the Water Separator. Once this is achieved, switch off the pump to prepare for the final polishing phase.

Phase 3

Phase Three is the most important phase in meeting specific cleanliness codes. Unlike the Primary Filter and Water Separator, the Secondary Filter's fine filter cartridges typically uses an absolute rated media. Absolute filters have a very high efficiency and will ensure that fuel leaving the system is clean to specification.

1. Before turning on the Pump, ensure the system is setup in the Fine Filtration Mode configuration (see Setup Procedures – Fine Filtration Mode) and be sure to install both Primary and Secondary Filters with a bag and cartridge filter respectively.
2. After verifying that both hoses are properly placed in the fuel tank and that the ball valves on the system are in the correct position, start the pump and monitor the Pressure Gauges in addition to the Vacuum Gauges to also know when the Secondary Filter need servicing (see Maintenance – Servicing the Secondary Filter). Should the Pressure Switch detect a reading above the pre-established set point, a High Pressure alarm will be triggered indicating that the Secondary Filter cartridge needs to be changed.

Draining and Storing the System

1. Set pump motor to operate at a low speed (10-15 Hz).
2. Remove the suction hose from the tank while the pump is still running and wait until system is purged of any remaining fuel as indicated by an audible change in the pump's operation.

!WARNING! DO NOT operate the vane pump dry for longer than 60 seconds to avoid significant mechanical damage.

3. Turn off the pump and place an appropriate container under the Water Separator and Discharge Port 1.
4. Open their respective ball valve and use the air purge valve on top of the separator to make sure all of the fluid can be drained from the system.

Alarms

Alarms featured on the system include:

- High Water (pump shutdown, alarm indication)
 - Activated when the water trips the Water Detection Alarm Module via the Water Detection Sensor Probe located on the Mechanical Water Separator. The system will go into an alarm state and the pump will not be allowed to run until the Water Separator has been serviced (see Maintenance – Servicing the Water Separator) and the alarm has been cleared via the Alarm Reset Button on the system controller.
- High Vacuum (pump shutdown, alarm indication)
 - Activated when the Vacuum Switch, placed on the suction side of the pump, detects a reading above the pre-established set point. The system will go into an alarm state and the pump will not be allowed to run



until the Primary Filter has been serviced (see Maintenance – Servicing the Primary Filter) and the alarm has been cleared via the Alarm Reset Button on the system controller.

- High Pressure (pump shutdown, alarm indication)
 - o Activated when the Pressure Switch, placed on the discharge side of the pump, detects a reading above the pre-established set point. The system will go into an alarm state and the pump will not be allowed to run until the Secondary Filter has been serviced (see Maintenance – Servicing the Secondary Filter) and the alarm has been cleared via the Alarm Reset Button on the system controller.



Primary Inspection

Upon arrival, the system and accessories must be visually inspected before installation. Improper handling during shipping may cause physical or electrical problems. Immediately report or note any damages (also concealed ones) to the shipper.

Checklist

- Check the entire system for damage that could indicate internal mechanical or electrical problems.
- Check pump/motor hardware and all plumbing connections for tightness.
- Check all electrical terminals and connections for tightness.

Controller

Smart Filtration Controller (SFC-55)

The System Controller is used to both operate the system and indicate/reset system alarms should they be triggered.

Pump Control Selector Switch (Manual/Off/Auto)

Turns the system on to either "Manual" or "Remote" operational modes (See Operation – System Controller)

Pump Running Indicator Light

Indicates the system pump is running

System Power Indicator Light

Indicates the system has power

Alarm Indicator Light

Indicates the labeled alarm (displayed on the Smart Filtration PLC) has been tripped

Alarm Reset Push Button

Resets the system alarm(s) once the alarm state(s) have been addressed

Variable Frequency Controller (VFD)

In normal operation the Variable Frequency Controller is used ONLY to change the speed of the pump. When the Smart Filtration Controller is set to run the pump will turn on and accelerate to the set VFD speed.

Output Frequency

The MFC HC-90 System has a Sliding Vane Pump that operates at 90 GPM when connected to a 230 or 480 VAC/60 Hz circuit. Manipulating the VFD to the following ratio can yield a range of desired flow rates.

Flow Rate as a function of Frequency:

$FFFFFFFF RRaaaaaa (GGGGGG) = 2/3 \times FFFFaa FFFFaa FFFFFFFF (HHHH)$

Example: $6.7 (GGGGGG) = 2/3 \times 10 (HHHH)$

Frequency Knob

Toggles the pump speed between 10 Hz to 60 Hz

Note: All other VFD Control Functions are disabled.



Priming the System

The pump supplied with the system is NOT automatically self-priming and must not be run dry.

!WARNING! If the pump is allowed to run without fuel, pump damage can occur.

Priming Procedure

Before turning on the pump, make sure the entire suction side of the system (suction hose, primary filter/water separator, plumbing, and pump) is primed and filled with oil/diesel fuel. Running the pump dry could cause pump damage and pump to not operate properly.



Commissioning/Initial Start-Up

Initial Test Procedures

With breakers and power turned on, and pump running, check all alarms for proper operation:

- **High Water Alarm** - Jump the Water Detection Sensor Probes by placing a conductor across the two horizontal contacts. The pump should turn off after 10 seconds and “High Water” alarm should be indicated on the System Controller. Remove the metal and reset the alarm by pushing the Alarm Reset button on the System Controller.
- **High Vacuum Alarm** - Slowly, partially close Inlet Ball Valve. At 16” HG, the pump should turn off and the “High Vacuum” alarm should be indicated on the System Controller. Open the Inlet Ball Valve again. Reset the alarm by pushing the Alarm Reset button on the System Controller.
- **High Pressure Alarm** - Slowly, partially close Outlet Ball Valve. At 22 PSI, the pump should turn off (after a delay of about 1 second) and the “High Pressure” alarm should be indicated on the System Controller. Open the Outlet Ball Valve again. Reset the alarm by pushing the Alarm Reset button on the System Controller.

Note: If any of the above described alarm test procedures fail or if any alarm trip value deviates, immediately contact AXI International.

Testing the VFD:

While the pump is running, incrementally toggle the VFD speeds from 10Hz to 60Hz via the Variable Frequency to ensure proper functionality of the VFD and system pump/motor assembly.

Maintenance

The system should be visually inspected and tested a minimum of every six (6) months according to the procedure below during light duty cycles. Monthly inspections are recommended for systems that are being used in excess of an average of eight (8) hours a day and five (5) days a week.

Preventative Maintenance

Prior to performing the maintenance procedure ensure that:

1. All sources of power are isolated from the unit

Note: Proceed only after this has been verified and properly tagged.

2. Check system and all parts for corrosion and rust.
3. Check bolts on the pump/motor hardware for tightness, as pump/motor hardware can loosen after normal operation for extended durations of time, due to vibration.
4. Check all plumbing joints for leaks, tighten fittings and joints as necessary.
5. Inspect all filter vessels and elements.

Servicing the Water Separator

It is recommended the Water Separator be periodically serviced to prevent excessive water buildup. A “High Water” alarm will indicate when the water separator needs to be drained.

Draining of Water Separator:

1. Ensure the system’s pump is turned off.
2. Close the inlet and outlet ball valves.
3. Place an appropriate container under the Water Separator’s drain valve.
4. Remove the top plug to allow air in and fuel to flow out.
5. Open the drain valve and allow the water and sludge to drain.
6. Close the drain valve when you begin observing clean fuel.

Note: Disposal of fuel, associated waste, and filters must be in accordance with all applicable federal, state, and local rules, laws, standards, and regulations.

!WARNING!: Some fuels may have been treated with biocides. Biocides are extremely toxic and may enter the body through the skin. It is recommended to use adequate protection and proper precautions if the fuel at-hand contains biocide type products.

Servicing the Primary Filter

A clogged filter element restricts the flow of fuel, resulting in the vacuum gauges indicating a pressure drop. A “High Vacuum” alarm will indicate when a filter change should be made on the Primary Filter.

Changing the Bag Filter:

1. Ensure the system’s pump is turned off.
2. Close the inlet and outlet ball valves.
3. Release all pressure in system by carefully opening the air vent valves.
4. Loosen the vessel’s lid screws and open the lid
5. Remove the old filter bag and check the inner housing for any debris or sludge.
6. Place the new filter bag into the housing.
7. Apply a film of lubricating oil to the lid gasket. Replace the O-Ring if worn or damaged.
8. Tighten the lid screws evenly to ensure the lid is fully seated on the O-Ring gasket.
9. Open the inlet and outlet ball valves.

10. Check for leaks when re-starting and pressurizing the system.

Servicing the Secondary Filter

A clogged filter element restricts the flow of fuel, resulting in the system's pressure gauges indicating a pressure spike. A "High Pressure" alarm will indicate when a filter change should be made on the Secondary Filter.

Changing a Fine Filter Cartridge:

1. Ensure the system's pump is turned off.
2. Close the inlet and outlet ball valves.
3. Release all pressure in system by carefully opening the air vent valves.
4. Loosen the vessel's lid screws and open the lid
5. Remove the old filter element and check the inner housing for any debris or sludge.
6. Place the new filter element into the housing.
7. Apply a film of lubricating oil to the lid gasket. Replace the O-Ring if worn or damaged.
8. Tighten the lid screws evenly to ensure the lid is fully seated on the O-Ring gasket.
9. Open the inlet and outlet ball valves.
10. Check for leaks when re-starting and pressurizing the system.

Replacement Filter Chart

MTC HC SERIES FILTERS

ALL FILTERS ARE ABSOLUTE, UNLESS OTHERWISE NOTED | WB: WATERBLOCK | SS: STAINLESS STEEL SCREEN

CARTRIDGE FILTERS

	2μ	10μ	10μ WB	30μ	30μ WB	3μ MICRO-GLASS	7μ MICRO-GLASS	10μ MICRO-GLASS
MTC HC-50	618-2-W	618-10-W	WA618-30-W	618-30-W	WA618-30-W	G618-3-SR	G618-7-SR	G618-10-SR
MTC HC-90	618-2-W	618-10-W	WA618-30-W	618-30-W	WA618-30-W	G618-3-SR	G618-7-SR	G618-10-SR
MTC HC-150	618-2-W	618-10-W	WA618-30-W	618-30-W	WA618-30-W	G618-3-SR	G618-7-SR	G618-10-SR
MTC HC-300	618-2-W	618-10-W	WA618-30-W	618-30-W	WA618-30-W	G618-3-SR	G618-7-SR	G618-10-SR

BAG FILTERS

	1μ	5μ	10μ	25μ	75μ	250μ	800μ
MTC HC-50	PFB-30-1	PFB-30-5	PFB-30-10	PFB-30-25	PFB-30-75	PFB-30-250	PFB-30-800
MTC HC-90	PFB-30-1	PFB-30-5	PFB-30-10	PFB-30-25	PFB-30-75	PFB-30-250	PFB-30-800
MTC HC-150	PFB-150-1	PFB-150-5	PFB-150-10	PFB-150-25	PFB-150-75	PFB-150-250	PFB-150-800
MTC HC-300	PFB-150-1	PFB-150-5	PFB-150-10	PFB-150-25	PFB-150-75	PFB-150-250	PFB-150-800

Troubleshooting

Nofuel delivery

1. Pump does not run
2. Pump is not primed
3. Fuel supply line blocked
4. Excessive lift
5. Air leak in fuel supply to pump
6. Pump rotation direction incorrect
7. Intake or outlet valve closed
8. Check valve installed backwards

Insufficient fuel delivered

1. Air leak at inlet
2. Defective pressure relief valve or check valve
3. Excessive lift
4. Pump worn
5. Inoperative foot valve
6. Piping improperly installed or dimensioned
7. Primary filter/water separator plugged

Rapid pump wear

1. Pipe strain on pump causing bind
2. Worn pump/motor coupler
3. Pump has been run dry or with insufficient fuel
4. Plumbing on inlet side not appropriately dimensioned

Alarm “HIGH VACUUM ALARM” comes on with clean or new filter element installed

1. Heavily contaminated fuel/excessive water in tank
2. Restriction in plumbing on inlet side too high
3. Excessive lift
4. Inoperative foot valve
5. Inlet ball valve not fully open
6. Suction line clogged

Alarm “HIGH PRESSURE ALARM” comes on with clean or new filter element installed

1. Heavily contaminated fuel/excessive water in tank
2. Restriction in plumbing on discharge side too high
3. Head (lift) on discharge side too high
4. Check valve stuck or defective
5. Outlet ball valve not fully open
6. Discharge line clogged

Pump requires too much power

1. Air in plumbing lines
2. Liquid too viscous
3. Bent pump shaft, binding rotor
4. Misalignment of pump/motor coupler

Noisy operation

1. Insufficient fuel supply
2. Air leaks in the inlet pipe
3. Air or gas in fuel on the suction side
4. Excessive pump load (vacuum > 15” HG)

Pump requires frequent re-priming

1. Inoperative foot valve
2. Inoperative check valve
3. Inoperative solenoid valve
4. Pump cavitation
5. Plumbing air leaks
6. Lift too high
7. Leaking pump seal

Motor does not turn or turns intermittently

1. Control power not available
2. Motor thermal overload condition
3. Pump failed and seized
4. Motor failure

Pump leaks fuel

1. Loose pump plumbing fittings
2. Worn pump shaft seal
3. Pump pressure relief valve failure
4. Fuel leak elsewhere and fuel dripping or running towards the pump
5. Excessive head from overhead storage tank
6. Worn pump O-rings or seals

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