

Installation, Operating and Maintenance Manual

SMART FPS MX

SMART Fuel Polishing System



- Fully Automated & Programmable
- Integrates with Vessel Monitoring Systems
- Modular “Plug & Play” Flexibility
- Unique Safety & Alarm Features
- Continuous-Duty Pumps, Viton Seals
- UL508A SMART PLC Filtration Controller

Optimal Fuel Quality • Reliable Power

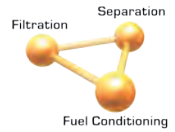
INSTALLATION, OPERATING AND MAINTENANCE MANUAL

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SMART FPS MX

SMART Fuel Polishing Systems



SMART Fuel Polishing Systems are programmable, fully automated Fuel Optimization Systems that remove water, sludge and contaminants. They condition and stabilize fuel, keeping it dry and free from microbial contamination. SMART FPS Systems keep your tanks clean and your fuel in "Clear & Bright" pristine condition at all times. AXI's LG-X Fuel Conditioner reverses fuel deterioration and sedimentation to sub micron levels, preventing clogged filters, extending injection system service life, and reducing smoke, emissions and downtime.



SMART FPS Systems feature:

- SMART Filtration Controllers
- Fully Automated and Programmable Operation
- Integration with Vessel Monitoring Systems
- Modular "Plug & Play" Flexibility
- Unique Safety & Alarm Features
- Continuous-Duty Pumps, Viton Seals

For safe operation, the **SMART FPS MX** is equipped with an automatic pump shut-down and indicators when filter elements require service. Also included are indicators for high pump vacuum, pressure exits and leaks.

Generators and pumps operating in remote locations are ideal applications for SMART FPS Systems. Fuel has a limited shelf-life and even "fresh fuel" could contain water, sediment and microbes upon delivery. Fuel filters should last thousands of hours. However, frequent filter changes, tank cleaning and replacing fuel have become common maintenance practices instead of serious warning signs of fuel problems.

SMART FPS Systems reverse fuel deterioration while decontaminating, cleaning and optimizing the fuel for guaranteed continuous, uninterrupted service.

SMART FPS MX SPECIFICATIONS

| | |
|--|---|
| Flow Rate | 250 GPH |
| Primary Filter/ Water Separator | Separ 10 or 30 μ |
| Fuel Conditioner | LG-X 1500 |
| Smart Filtration Controller | SFC-50 |
| Pump | 1/3hp Internal Gear Pump |
| Power | 110V 60Hz 15A or 230V 50Hz 15A |
| Plumbing | Stainless Steel |
| Ports | 3/4" 37° Flare In 1/2" 37° Flare Out |
| Construction | Powder Coated Aluminum Back Plate |
| Dimensions | 22" x 20" x 9" (56 x 51 x 23 cm) |
| Weight | 60 lbs System 10 lbs SFC-50 |
| Not for use with fluids that have a flash point below 100°F. | |



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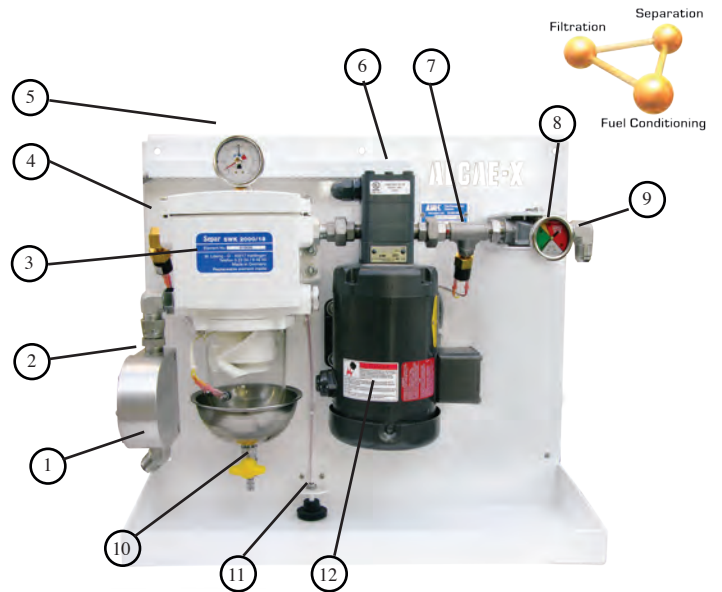
Global Fuel Quality Ingenuity

The system is automatically operated by the programmable UL508A **SMART Filtration Controller with text readout**. The controller's alarm functions and pump shut-down are triggered if filter elements require service, if high pump vacuum or pressure occurs, if system flow rate varies or if there is water in the separator. The wiring harness with plugs easily connects the SMART Filtration Controller with the FPS allowing for greater flexibility in installation and access where it's most convenient.

The **principal components** are a continuous-duty pump with primary filter/water separator with vacuum sensor and gauge, an **ALGAE-X Fuel Conditioner** and a SMART Filtration Controller.

The **SEPAR primary filter** protects the pump, coalesces and removes water and particulate. The patented **ALGAE-X Fuel Conditioner** prevents and reverses fuel degradation, agglomeration and microbial contamination.

Implementing SMART FPS Fuel Polishing and Transfer Systems will guarantee **Optimal Fuel Quality for Reliable Power At All Times**. SMART FPS Systems prevent downtime, periodic tank cleaning, replacing out-of-spec fuel and fuel-quality related injection system repairs.

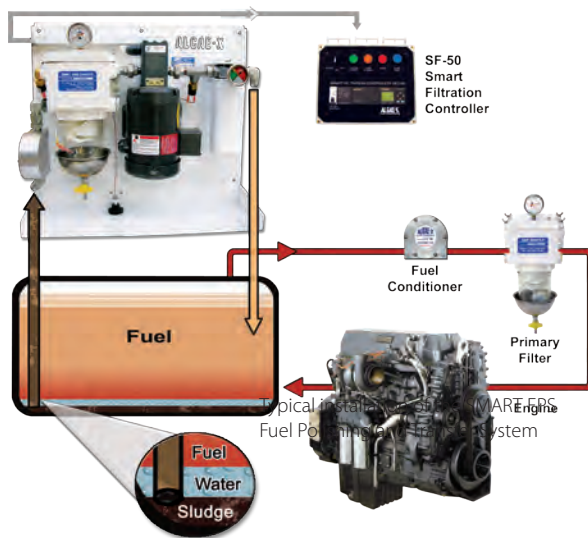


Inside the SMART FPS

1. Fuel Inlet (From Tank)
2. ALGAE-X® Fuel Conditioner
3. Separ Primary Filter / Water Separator
4. Vacuum Switch
5. Vacuum Gauge
6. Motor
7. Pressure Switch
8. Pressure Gauge
9. Fuel Outlet (To Tank)
10. Drain Valve
11. Leak Detector (Float Switch) in Spill Tray
12. Pump

SMART FPS Accessories:

- AFC-705 Fuel Catalyst
- Wide range of filter elements
- Fuel Sampling Pump Kit
- Microbial Contamination Testing Kit



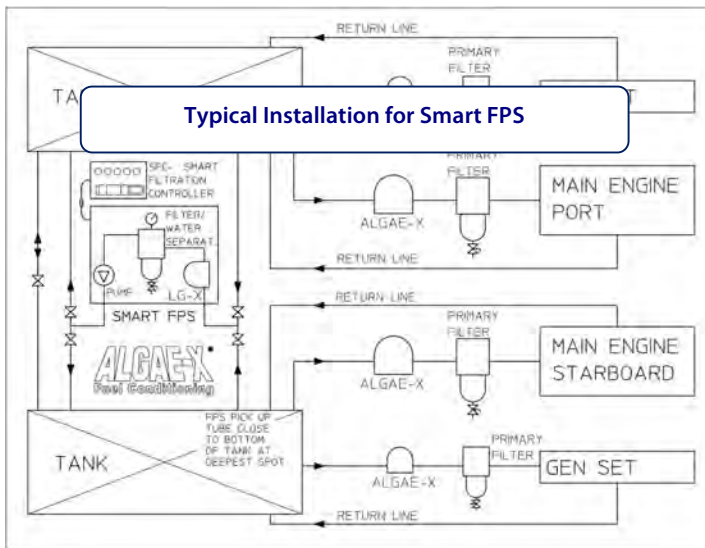


Smart FPS MX Fuel Polishing Systems are equipped with a plug and play **SFC-50 Smart Filtration Controller** with text display.

AXI International FPS systems and "Smart Filtration Controllers" are modular, fully automated and programmable fuel polishing systems. The wiring harness with plugs easily connects the Smart Controller box with the FPS allowing for greater flexibility in installation and access to the control box where it's most convenient for you.

FPS Systems:

- **remove water** and sludge to keep your tanks clean and your stored fuel in "pristine condition" at all times
- **decontaminate**, clean and optimize the condition of the "fresh" fuel you take on board
- **transfer** fuel from one tank to another and fill your day tank



Smart FPS Accessories:

AFC-705 Fuel Catalyst, Wide Range of Filter Elements, Rotor Sight Glass, Foot Valve, Digital Flow Meter

Larger, high-capacity FPS systems are available.

We work with ship yards, naval architects and engineering firms, to support and represent our customers in designing and manufacturing custom built, innovative automated fuel conditioning systems.

AXI International SFC-50 Smart Filtration Controller

The SFC-50 is a fully automated filtration controller with digital text readout of alarm and system status. The system's operating functions are easy to program for scheduled periodic fuel maintenance. The three color-coded lights give an instant visual status report of system power (green), pump running (orange), and alarm (red). The alarm reset is the easily accessible large (blue) push button. The selector switch provides the option of manual operation or running the fully automated program.



SFC-50 Smart Filtration Controller

GENERAL SPECIFICATIONS

Smart FPS MX

| | |
|-----------------------------------|---|
| Smart Filtration Controller | SFC-50 (connected with plugs / wire harness to filtration unit) |
| Operating Temperature | 32 - 104° F; 0 - 40° C |
| Electrical | 115 V / 60 Hz / single phase (standard) 230 V / 50 Hz also available |
| Pump | Gear Pump |
| Suction capability (primed)..... | 15 ft vertical or 100 ft. horizontal lift (lines >3/4", primed) |
| Motor | Single phase, continuous duty, thermally protected |
| Timer | Programmable Digital Timer |
| Max. Fluid Viscosity | 5 cSt |

Note: The Smart FPS MX is designed to meet environmental standards for safe operation. (NOT for use with fluids that have a flash point below 100°F (38°C), e.g.: gasoline, alcohol...)

SYSTEM COMPONENTS

Control and Safety Devices

AXI International "Smart Filtration Controller" SFC-50 in electrical sub enclosure, modular "Plug & Play" system
Programmable Digital Timer – Memory backup to retain program memory during power outages
Pump control switch (Auto-Off-Manual), selector switch
Alarm Reset - push button
System power indicator
Pump running indicator
Alarm indicator
External remote shut-down feature
Dry contacts for remote monitoring
Leak sensor and alarm indicator (system shutdown)
Primary filter / water separator high vacuum alarm indicator and system shutdown (vacuum sensor)
Primary filter / water separator high water alarm indicator and system shutdown (water sensor)
Pump motor starter with single-pole circuit breaker and contactor

Pump / Motor:

Positive displacement gear pump - Relief valve
Motor – UL listed - Thermal overload protection

Primary Filter / Water Separator

Fuel filter with water separator
Drain valve on the bottom
Analog vacuum gauge
30-micron filter cartridge (other filter elements available)

Fuel Conditioner

Inline Fuel Conditioner breaks down naturally forming sediments and solids found in diesel fuel to submicron levels

Powder-coated, corrosion-resistant, aluminum back plate and spill tray

Stainless steel plumbing

PRIMARY INSPECTION

Upon arrival, the Smart FPS MX Fuel Polishing 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:

- ☐ If the packing crate shows signs of damage inspect the Smart FPS MX for damage. Check the cover, back plate and electrical enclosure (SFC 50) for damage that could indicate internal mechanical or electrical problems.
- ☐ Inspect filter for cracks or missing parts.
- ☐ Check gauges for spilled liquid.
- ☐ Check all plumbing connections for tightness.
- ☐ Check all electrical terminals and connections for tightness.

INSTALLATION



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

MOUNTING

The Smart FPS MX (and SFC-50 Smart Filtration Controller) should be **permanently wall mounted on a hard, level surface**. Use provided **mounting holes for proper fastening**. This unit is designed for well-ventilated **indoor use** within specified temperature range and should be located as close to the tank as possible. Please allow sufficient space on top of the unit to change the filter element comfortably.

ELECTRICAL



WARNING! To avoid the risk of electric shock make sure that the power supply to the system is disconnected and ensure that the system is at zero volts, before working on any of the system's electrical parts.

Make sure that the systems power requirements and rated voltage / frequency match your electrical system (See wiring diagram and / or marking on SFC-50). The Smart FPS MX may only be connected to properly grounded power sources for operator safety. Do not run over, crush or pull the power supply cable and wiring harness otherwise it may be damaged. Protect the cables from oil, heat and sharp edges.



WARNING! The system must be properly grounded for operator safety.

Depending on length of run, use #12 AWG or larger copper wiring and connect system to a separate UL listed breaker (not included) appropriate for branch circuit protection.

Connect the SFC-50 Smart Filtration Controller to the filtration unit with the two provided plugs and wiring harnesses.

Note: Wiring and electrical installation must be in accordance with all applicable Federal, State and Local rules, laws, standards and regulations.

Remote Pump Shut-Down Feature:

If required, connect the **“external pump shut down input terminal”** (see SFC-50 wiring diagram) for customers use per specification on electric diagram to disable pump (e.g.: remote shut down, remote pump control...). Please note that the contact needs to be supplied with +24V DC from the power supply of the SFC-50 Smart Filtration Controller.

REMOTE MONITORING - DRY CONTACTS:

The SFC-50 provides two NO (normally open) dry contacts for remote alarm monitoring. Please see wiring diagram for contact rating, connection and location.

“Summary Alarm” – dry alarm contact for high vacuum, high pressure or water detection

“Leak Detection” – dry alarm contact for leak detection

PLUMBING

Use **proper quality approved fuel line materials with at least 3/4” inner diameter on the suction side from the tank and at least 3/4” inner diameter on the return / discharge side back to the tank.** Do not put any stress on the plumbing connection and use a backing wrench when connecting.

A full flow, **shut-off ball valve** should be installed on the inlet and outlet port / line of the Smart FPS MX system

The **pick-up tube/line(s)** should originate from the **lowest point of the tank** (to remove all water), should be connected directly to the system’s inlet port (Algae-X® Fuel Conditioner) located on the left hand side and **kept as short as possible.** For optimal performance, insure that the inlet (suction) line(s) are free and nothing is restricting their flow.

It is recommended to install an **oversized, low restriction foot valve** to keep the system primed, especially if the inlet port of the system is located above the lowest possible fuel level in the tank.

If the Smart FPS MX Fuel Polishing System is mounted below tank top level, a priming tee should be installed on the highest point of the suction line to be able to easily prime the systems delivery line.

The **return line(s)** should be plumbed to the outlet port (on the right side of the system) and enter the tank **as far as possible from the pick up tube** close to the tank bottom. For optimal performance, insure that the outlet (discharge or return) line(s) are free and nothing is restricting their flow.

Multiple suction and/or return lines may be connected to a manifold.

Anti-Siphon or other external plumbing devices may be required – please check local regulations / code.

The system capabilities are 15 ft suction (vertical) or 100 ft horizontal lift, when connected to piping of 3/4” ID or more with no additional flow restrictions such as valves, 90-degree connectors or other plumbing accessories. For continuous optimal performance, make sure suction and discharge lines are free and that nothing is blocking the flow of fuel and that the **suction line always stays primed.**

Note: Plumbing and Installation must be in accordance with all applicable Federal, State and Local rules, laws, standards and regulations.

IMPORTANT INSTALLATION PRECAUTIONS

The **suction line** of the system should be independent and separate from the suction line of the engine. If that is not possible, appropriate valves must be installed to completely separate the Smart FPS MX from the engine fuel system to prevent any possible interference with safe engine operation.

It is highly recommended to plumb the **discharge line** independent and separate of the engine's fuel return line back to the tank. If the return line from the engine and the discharge of the Smart FPS MX must be combined in any way, adequate valves should be installed to prevent any possible interference with safe engine operation.

Note: If any of the Smart FPS MX system's fuel lines are used in combination with the engine's fuel system, the Smart FPS MX should be disabled during engine operation (use the provided "remote pump shut down" feature as shown in the electrical drawing and described above).

PRIMING THE SYSTEM

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



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

PRIMING PROCEDURE:

The pump head of the Smart FPS MX unit is shipped from the factory filled with Diesel #2 to facilitate initial lubrication. This will not eliminate the necessity to prime the complete system. The Smart FPS is primed by using the externally installed priming tee (not provided) or by removing the lid of the primary filter and filling the complete filter housing and suction plumbing. The primary filter as well as the suction line(s) must be completely filled with fuel (no trapped air) prior to the initial system start-up.

SMART FPS ALARM FEATURES

The system is equipped with a compound vacuum gauge on the inlet side of the pump. The gauge should read 0 to 15" HG vacuum maximum under normal conditions. Vacuum gauge readings reaching 16" HG vacuum indicate excessive debris in the primary filter/ water separator (or a flow restriction or too high suction height and therefore pressure drop in the suction line) and will result in pump shutdown and activate the high vacuum alarm.

Note: 16" HG vacuum = clogged primary filter or suction line flow restriction / excessive lift.

The system's pressure gauge on the secondary filter (MX-F only) should show 22 PSI maximum pressure under normal conditions (.433 PSI = 1' vertical head pressure). Pressure gauge readings in excess of 22 PSI pressure indicate excessive filter or fuel line restrictions and/or friction.

System pressure over 22 PSI indicates a high-pressure alarm and will automatically shut down the pump.

The pressure relief valve has a 35-40 PSI set point. System pressure in excess of 35-40 PSI will cause the pressure relief valve to open and vent fuel back to the fuel transfer pump inlet side.

INITIAL START-UP / COMMISSIONING CHECKLIST

INITIAL TEST PROCEDURE

- With breakers and power turned on and pump running **check all alarms** for proper operation:
 1. Manually raise float switch located in drip/spill tray. Pump should immediately turn off and "FUEL LEAK" should be displayed as well as the red indicator light will turn on. Reset alarm by pushing the "RESET ALARM" button on the control panel.
 2. Slowly partially close inlet ball valve. At 16"HG pump should turn off and "PLS. SERVICE PRIM. FILTER" should be displayed as well as the red indicator light will illuminate. Open inlet ball valve again. Reset alarm by pushing the "RESET ALARM" button.
 3. Slowly partially close outlet ball valve. At 22 PSI pump should turn off (after a delay of about 0.25 second) and "HIGH PRESS. ALARM" should be displayed as well as the red indicator light will illuminate. Open outlet ball valve again. Reset alarm by pushing the "RESET ALARM" button.
 4. Short the two water contacts with jumper on the bowl of the primary filter. Pump should turn off and "PLS. DRAIN WATER/BOWL" should be displayed as well as the red indicator light will illuminate. Reset alarm by pushing the "RESET ALARM" button on the control panel.

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

OPERATION



! WARNING ! This System is not meant for use with gasoline nor with other flammable liquids having a flash point less than 100°F. Use with gasoline or use with any flammable liquids at a temperature exceeding their flash point, presents an immediate explosion and fire hazard. Never use the Smart FPS MX at a temperature exceeding the flash point of its contents.

PUMP OPERATION

Apply control power to unit. Place breaker in the AXI International SFC-50 Smart Filtration Controller in the "ON" position.

Automatic:

Place the selector switch in the "AUTO" position. When the programmable timer comes on, the pump will start and run until the timer setting has expired.

Manual:

Place the selector switch in the "MANUAL" position. The pump motor will run until the switch is returned to the "OFF" or "AUTO" mode positions or till an alarm or overload has been tripped.

PROGRAMMING THE TIMER

The programmable timer is part of the Micro PLC settings of the AXI International SFC-50 Smart Filtration Controller.

Note: The PLC uses military time – all times programmed must be in that format.

1. Please make sure the selector switch set to "OFF" and push the "ALARM RESET" button on the control panel.
2. When power is first applied to the system the display of the PLC will show (blinking) date and time.
3. We will now set current date and time (must be in military format):
4. Hit the "ESC" button
5. Select 'Stop' and press "OK"
6. Select 'Yes' (use down ▼ arrow key) and press "OK"
7. Select 'Setup' (use down ▼ arrow key) and press "OK"
8. Select 'Clock' and press "OK"
9. Select 'Set Clock' and press "OK"
10. Using the arrow keys set current day of the week, time and date as indicated in the display and press "OK"
(▼ or ▲ to change value, ◀ or ▶ to change between week day, time and date).
11. When finished entering press "OK" to confirm
12. Press "ESC"
13. Select 'Start' and press "OK" – correct time and date should be displayed
14. We are now ready to program the timer (military time format must be used):
15. Hit the "ESC" button
16. Select 'Set Param' (use down ▼ arrow key) and press "OK"
17. Push down ▼ arrow key till 'Timer 1' is displayed
18. Press "OK"
19. Use left ◀ and right ▶ arrow keys to select the day/days of the week the system should automatically turn on and the up ▲ or down ▼ arrow key to activate the selected day.
20. Use arrow keys in same manner to program the 'On' time – when the system will switch on (on the selected day/days)
21. Use arrow keys in same manner to program the 'Off' time – when the system will switch off (on the selected day/days)
22. Press "OK" to confirm entry when finished
23. If required you can set up to 3 Timers by using the up and down arrow key
24. Press "ESC" twice to return back to the time and date display

Please call AXI International with any questions.

GAUGE VENTING / ACCURACY

After shipment, pointer of gauges may not rest at zero due to internal case pressure buildup caused by temperature variations. **Accuracy may be significantly reduced.** To restore **gauge to operating condition, move yellow lever of fill plug to the "open" position** or remove small plug from top of gauge and leave open.

FUEL LINE LEAK

If fuel is detected in the spill / drip tray, the float switch will activate the fuel leak alarm. The pump motor will shut off and remain locked out of operation until the leak has been corrected and the "ALARM RESET" button has been pushed.

Before removing the spilled fuel from the basin, turn the selector switch to the "OFF" position. Always make sure to find the cause of the leakage and correct it. After removing the spilled fuel, allowing the leak switch to return to its normal position, the selector switch can be returned to the "AUTO" or "MANUAL" mode.

Note: Disposal of fuel and associated waste should be done in accordance with Federal, State and Local regulations.

STABILIZING AND OPTIMIZING FUEL QUALITY

We recommend treating the fuel with the **AXI INTERNATIONAL Fuel Catalyst (AFC-705)**. This will enhance and accelerate the tank cleaning process by breaking down and dissolving existing tank sludge. AFC-705 will decontaminate compartments of the tank that are out of reach of the suction line. Depending on the condition of the fuel and the amount of sludge build-up, it is recommended to initially use a double dose of one to twenty-five hundred (1:2500) instead of one to five thousand (1:5000) This has proven to be essential in accelerating the tank cleaning process. AFC-705 contains detergent, surfactant, dispersant, corrosion inhibitor, lubricity enhancer and combustion catalyst. It does not contain biocides. AFC-705 should always be used periodically in particular to stabilize fuel that is stored for longer periods of time.

Note: In cases of severe tank contaminant build-up (sludge) and high water level in bottom, it is recommended to clean the tank (vacuum bottom) and polish the fuel before initial use of a Smart FPS MX system.

MAINTENANCE



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



! IMPORTANT ! Always disconnect the system from the electric power supply before working or servicing it. Do not proceed with any maintenance unless the pressure or vacuum has been released, the system has been allowed to reach ambient temperature and all fluids have been drained.

PREVENTATIVE MAINTENANCE

The Smart FPS Automated Fuel Filtration System should be visually inspected and tested a minimum of every six 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 8 hours day and five days a week.

- Prior to performing the maintenance procedure ensure that:
 1. The electrical sub-panel mounted main disconnect switch is operating properly,
 2. the user supplied remote circuit breaker is in the "Off" position, and
 3. that all sources of power are isolated from the unit.
 4. Proceed only after this has been verified and properly tagged.
- Drain visible water and sediment from primary filter / water separator (see Servicing Primary Filter / Water Separator below).
- Check all parts for corrosion and rust.
- Check mounting hardware. Tighten as necessary.
- Check pump/motor hardware for tightness. Pump/motor hardware will loosen after normal operation due to vibration. This hardware is lock nutted, check all bolts for secure nuts.
- Check all electrical terminals and connections for tightness.
- All motors are permanently lubricated and do not require any lubrication.
- All pumps are self-lubricating and do not require any maintenance.
- Check all plumbing joints for leaks. Tighten fittings and joints as necessary. Remove accumulated fuel in drip tray as necessary.
- Inspect all filters and separators. See section below on filter inspection and service.
- With breakers and power turned on again and pump running check all alarms for proper operation:
 1. Manually raise float switch located in drip/spill tray. Pump should immediately turn off and "FUEL LEAK" should be displayed as well as the red indicator light will turn on. Reset alarm by pushing the "RESET ALARM" button on the control panel.
 2. Slowly partially close inlet ball valve. At 16"HG pump should turn off and "PLS. SERVICE PRIM. FILTER" should be displayed as well as the red indicator light will illuminate. Open inlet ball valve again. Reset alarm by pushing the "RESET ALARM" button.
 3. Slowly partially close outlet ball valve. At 22 PSI pump should turn off (after a delay of about 0.25 second) and "HIGH PRESS. ALARM" should be displayed as well as the red indicator light will illuminate. Open outlet ball valve again. Reset alarm by pushing the "RESET ALARM" button.

4. Short the two water contacts with jumper on the bowl of the primary filter. Pump should turn off and "PLS. DRAIN WATER/BOWL" should be displayed as well as the red indicator light will illuminate. Reset alarm by pushing the "RESET ALARM" button on the control panel.

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

Note: All filter elements should be replaced at least every six months.

SERVICING PRIMARY FILTER

Separ models: Set the telltale gauge pressure indicator (red pointer) to slightly above the black needle prior to operation. The gauge will indicate maximum vacuum pressure during system operation. Always keep the vent lever or plug on the gauge in the open position for accurate gauge reading.

Clogging filter elements restrict the flow of fuel and the system's vacuum gauge will indicate a pressure drop. The gauge is mounted on top of the primary filter. At a pressure drop of 16" HG, the pump will automatically shut off and activate the red indicator light and display "PLS. SERVICE PRIM. FILTER". The signal indicates that it is time to either back-flush (Separ only) or change the filter element.

Servicing and back-flushing (Separ only) primary filter:

1. Turn selector switch to the "OFF" position – make sure pump will not turn on
2. Close the inlet and outlet ball valve (not provided)
3. Open the brass colored bleed screw at the top of the filter cover (Separ only)
4. Place a fuel waste container below the drain valve on the bottom of the filter bowl
5. Open the drain valve (Separ models: push & turn counter clockwise)
6. Close after visible sediment, particles and water have been drained from the bowl
7. Prime the filter by removing the cover and pouring clean diesel fuel into the filter body until the fuel level reaches the top of the filter body
8. Replace the lid. Note (Separ models): Evenly tighten the wing bolts to ensure a good seal
9. Close bleed screw on top of the lid (Separ models)
10. Open the inlet and outlet ball valve
11. Push the "ALARM RESET" button on the control panel to acknowledge the alarm and reset it
12. Return the pump selector switch to "AUTO" or "MANUAL"
13. Check for leaks when re-starting and pressurizing the system. Your system is now ready to resume normal operation

Note: On Separ models the filter elements can be back-flushed up to 5 times before replacement is required

SERVICING WATER SEPARATOR

If the water level in the primary filter/water separator reaches a certain level in the bowl, the water sensor will trigger the high water alarm and shut off the pump. The signal indicates that it is time to drain the bowl on the water separator. Please follow procedures above – Service primary filter

Note: Disposal of fuel, associated waste and filters should be done in accordance with Federal, State and Local 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 fuel contains biocide type products.

TROUBLESHOOTING

No fuel delivery

1. Pump does not run
2. Pump is not primed
3. Fuel supply line blocked / no fuel in tank
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. Worn pump/motor coupler
2. Pump has been run dry or with insufficient fuel
3. Plumbing on inlet side not appropriately dimensioned

Alarm "PLS. SERVICE PRIM. FILTER" comes on with clean or new filter element installed

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

Alarm "HIGH PRESS. 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
7. Pump requires too much power
8. Air in plumbing lines
9. Liquid too viscous
10. Bent pump shaft, binding rotor

Noisy operation

1. Insufficient fuel supply
2. Air leaks in the inlet pipe
3. Air or gas in fuel on the suction side

Pump requires frequent re-priming

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

Motor does not turn or turns intermittently

1. No Power / power failure / low voltage or bad power connection
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

AUTOMATED FUEL FILTRATION SYSTEMS WARRANTY

LIMITED WARRANTY

AXI International makes every effort to assure that its products meet high quality and durability standards and expressly warrants the products described herein, against defects in material and workmanship for a period of one (1) year from the date of purchase. This warranty is not intended to supplant normal inspection, care and service of the products covered by the user, and shall not obligate AXI INTERNATIONAL to provide free service during the warranty period to correct breakage, maladjustment or other difficulties arising out of abuse, misuse, or improper care and maintenance of such products. Our express warranty is subject to the following terms and conditions:

This warranty shall only extend to and is only for the benefit of original purchasers who use the products covered hereby

Any warranty claim received by AXI INTERNATIONAL after one (1) year from the date of purchase will not be honored even if it is claimed that the defect occurred prior to one (1) year from the date of purchase.

This warranty shall not apply to products (1) which have been tampered with, altered or repaired by anyone other than AXI INTERNATIONAL without the express prior written consent of AXI INTERNATIONAL (2) which have been installed improperly or subject to misuse, abuse, accident, negligence of others, improper operation or maintenance, neglect or modification, or (3) which have had the serial number altered, defaced or removed.

The liability of AXI INTERNATIONAL under this warranty is limited to the repair or replacement of the defective product. AXI INTERNATIONAL assumes NO LIABILITY for labor charges or other costs incurred by any purchaser incidental to the service, adjustment, repair, return, removal or replacement of products. AXI INTERNATIONAL ASSUMES NO LIABILITY FOR ANY GENERAL, SPECIAL, INCIDENTAL, CONSEQUENTIAL, CONTINGENT OR OTHER DAMAGES UNDER ANY WARRANTY, EXPRESS OR IMPLIED, AND ALL SUCH LIABILITY IS HEREBY EXPRESSLY EXCLUDED.

AXI INTERNATIONAL MAKES NO WARRANTIES, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE, WITH RESPECT TO THE PRODUCTS COVERED BY THIS WARRANTY POLICY, EXCEPT AS EXPRESSLY PROVIDED FOR HEREIN. NO EMPLOYEE, AGENT, REPRESENTATIVE OR DISTRIBUTOR IS AUTHORIZED TO MAKE ANY WARRANTY ON BEHALF OF AXI INTERNATIONAL OTHER THAN THE EXPRESS WARRANTY PROVIDED FOR HEREIN.

AXI INTERNATIONAL reserves the right at any time to make changes in the design, material, function and specifications of its products. Any such changes shall not obligate AXI INTERNATIONAL to make similar changes in such products that were previously manufactured.

WARRANTY CLAIM PROCEDURE

To make a claim under this warranty, please call our AXI INTERNATIONAL at (239) 690 9589 or (877) 425-4239, and provide: Name and location where unit was purchased, the date and receipt of purchase, model number, serial number, and a detailed explanation of the problem you are experiencing. The Customer Service Representative may, at the discretion of AXI INTERNATIONAL, arrange for a Field Engineer to inspect your system. If the inspection discloses a defect covered by its limited warranty, AXI INTERNATIONAL will either repair or replace the defective parts or products. AXI INTERNATIONAL assumes no liability, if upon inspection, AXI INTERNATIONAL or its representative determines that there is no defect or that the damage to the system resulted from causes not within the scope of this limited warranty. For service and sales, please contact AXI INTERNATIONAL:

AXI International

5400 Division Drive, Fort Myers, FL 33905 • 877-425-4239 • Fax: 239-690-1195

Internet: www.axi-international.com • Email: info@axi-international.com

TECHNICAL ASSISTANCE AND ORDERING

PLEASE WRITE TO, FAX, EMAIL OR CALL:

AXI International
5400 Division Drive
Fort Myers, FL 33905

Tel: 239-690-9589
Fax: 239-690-1195
Email: info@axi-international.com
Internet: www.axi-international.com

PLEASE PROVIDE THE FOLLOWING INFORMATION:

Serial Number of your Smart FPS, the required part numbers and quantity.

REPLACEMENT FILTER ELEMENTS

PRIMARY FILTER (MX):

| | |
|--------|---|
| 01860S | 60 Micron Stainless Steel re-usable, cleanable filter element |
| 01830 | 30 Micron replacement filter element |
| 01810 | 10 Micron replacement filter element |
| 30421 | Lid Gasket |

Also available:

- Larger or smaller capacity, custom designed systems for higher or lower flow rates
- Digital Flow Meter
- Foot Valves
- Rotor Sight Glass

SMART FPS SYSTEM IDENTIFICATION

Serial Number: _____ (e.g. B 070010 – FMX)

SYSTEM SPECIFICATION:

Voltage:

- 120 V AC / 60 Hz
- 230 V AC / 50 Hz

Inspected by: _____

Date: _____

APPENDIX A - ABBREVIATIONS USED IN THIS MANUAL

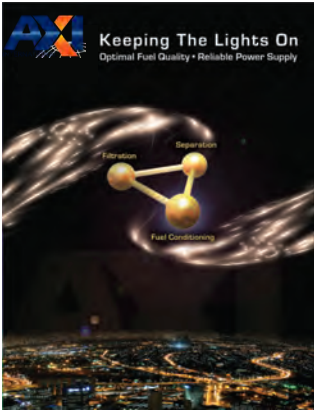
Abbreviations of terms used with Automated Fuel Filtration Systems. When following a drawing utilize this guide to define abbreviated system and component names. This is a master list. The drawings and text pertaining to your equipment may not contain all these terms.

| | | | |
|---------------|--------------------------------|-------------|--|
| AC | Alternating Current | N.C. | Normally Closed |
| AHR | Alarm Horn Relay | NEC | National Electric Code |
| AH | Alarm Horn | NEMA | National Electric Manufacturers Assoc. |
| BPRV | Back Pressure Regulating Valve | N.O. | Normally Open |
| BRK | Motor/Pump Bracket | NP | Nameplate |
| BV | Ball Valve | NPT | National Pipe Thread |
| C | Contactors | O.D. | Outside Diameter |
| CB | Circuit Breaker | OLR | Over Load Relay |
| CSR | Check Strainer Relay | OPT | Option |
| CV | Check Valve | PCB | Printed Circuit Board |
| DC | Direct Current | PCRX | Pump Control Relays |
| DPDT | Double Pole Double Throw | PG | Pressure Gauge |
| F | Fuse | PLR | Pipe Leak Relay |
| FLWS | Flow switch | PRV | Pressure Relief Valve |
| FS | Float switch | PRS | Pressure Switch |
| GA | Gauge | PS | Power Supply |
| GAL | Gallons | PSI | Pounds Per Square Inch |
| GPM | Gallons Per Minute | PSR | Pressure Switch Relay |
| HFL | High Fuel Level Relay | PRR | Pump Running Relay |
| HG | Mercury | SC | Swing Check Valve |
| HP | Horsepower | SOL | Solenoid |
| HZ | Hertz | TB | Terminal Block |
| I.D. | Inside Diameter | T | Control Transformer |
| JB | Junction Box | TDR | Time Delay Relay |
| " HG | Inches of Mercury | TEFC | Totally Enclosed, Fan Cooled |
| L L | amp | THR | Tank Heater Control Relay |
| L.E.D. | Light Emitting Diode | TS | Transducer Pressure Switch |
| LFF | Loss of Flow Relay | V | Voltage |
| LFL | Low Fuel Level Relay | VAC | Voltage, Alternating Current |
| LPR | Low Pressure Relay | VDC | Voltage, Direct Current |
| MDB | Main Distribution Block | VG | Vacuum Gauge |
| MDS | Main Disconnect Switch | | |
| MOT | Motor | | |

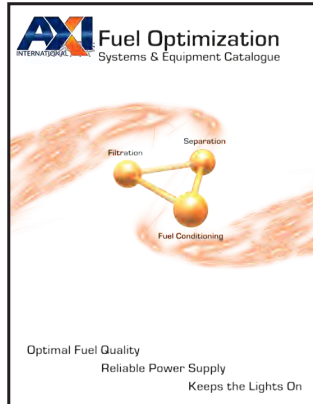
AXI designs and manufactures standardized and custom-engineered Automated Fuel Conditioning, Fuel Polishing and Transfer Systems, Tank Cleaning Equipment, Fuel Additives and In-line Fuel Conditioners to ensure optimal fuel quality at all times.

Our scope of expertise covers fuel storage and fuel supply systems from single engine installations to power plants. AXI is your single source for all fuel conditioning related equipment and support available world-wide.

- Peak Engine Performance
- Reliable Power Supply
- Lower Maintenance Costs
- Lower Exhaust Emissions



Read about the secret life of fuel and find solutions in the AXI Brochure, available at www.AXI-International.com



See the full product line in the AXI Systems and Equipment Catalogue, available at www.AXI-International.com



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