

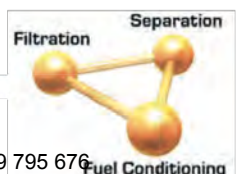
# Installation, Operating and Maintenance Manual

## STS 6000-10 GPM

Automated Fuel Filtration System



- UL508a SMART Filtration Controller
- Unique Alarm & Remote Monitoring
- NEMA Certified Powder Coated Cabinet
- Continuous-Duty Pump with Viton Seals
- Stainless Steel Plumbing
- Stand Alone, Reliable & Turn-Key
- Multi-Stage Water Removal and Particulate Filtration



# INSTALLATION, OPERATING AND MAINTENANCE MANUAL

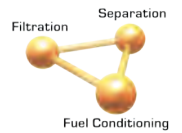
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# STS 6000-10 GPM

## Programmable Automated Fuel Filtration System



**STS 6000-10 GPM Programmable Automated Fuel Filtration Systems** are self-contained, stand-alone systems that remove and prevent the buildup of water, sludge and contaminants in tanks. They stabilize diesel and bio-fuels, eliminate microbial contamination to optimize and maintain fuel quality. STS systems guarantee **Optimal Fuel Quality for Reliable Power at All Times**.



### The STS 6000 Series feature:

- Multi-stage water removal and particulate filtration
- NEMA 12, 13, 4 Powder Coated or Stainless
- UL508A SMART Filtration Controller
- Unique Alarm Functions and Remote Monitoring
- Integrates with Building Management Systems
- Stainless Steel Plumbing
- **Stand-Alone, Reliable & Turn-Key**

For safe operation, the **STS 6000-10 GPM** triggers automatic alarms and shuts down the pump when filters need service; a leak is detected; high separator water level, high filter vacuum, or high pump pressure occurs; or when the fuel flow is out of range.

Preventive Maintenance Plans for mission-critical power are essential. However, most service agreements do not cover fuel-related engine failures. Fuel has a limited shelf-life and even "fresh fuel" could contain water, sediment, microbes and bio-fuel components upon delivery.

Periodic generator tests-runs are too short to determine if fuel quality is adequate for the demands of continuous, full-load operation. In fact, generator test runs significantly accelerate the fuel polymerization and degradation process by returning fuel that has been compromised by heat and pressure back to the tank.

Potential liabilities can easily be avoided by implementing an **AXI Fuel Quality Maintenance Program** as part of every disaster recovery plan. An STS 6000-10 GPM automatically maintains fuel quality and guarantees reliable emergency power whenever it is needed.

### STS 6000-10 GPM SPECIFICATIONS

Flow Rate	10 GPM
Primary Filter/Water Separator/Coalescer	10 or 30 $\mu$ Fine Filter or 60 $\mu$ SS Screen
Secondary Filter/Water Block	10 $\mu$ Fine Filter 3 $\mu$ Water Block
Fuel Conditioner	LG-X 3000
Smart Filtration Controller	SFC-10G
Pump	Internal Gear Pump
Power	110V 60Hz 20A or 230V 50Hz 15A
Plumbing	Stainless Steel
Ports	In 1" NPT Out 1" NPT
Weatherproof Cabinet	NEMA 12, 13, 4 Powder Coat or Stainless
Dimensions	37" x 60" x 12" (94 x 152 x 30 cm)
Weight	$\approx$ 400 lbs
Not for use with fluids that have a flash point below 100°F.	

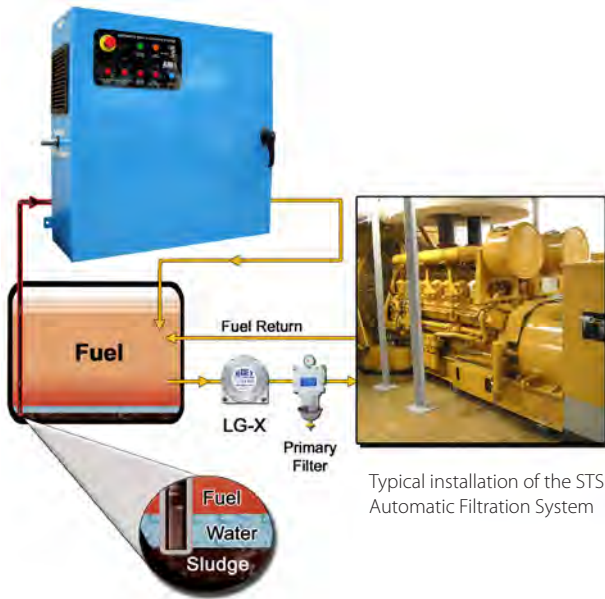
Wherever fuel is being used or stored

The system is automatically operated by the programmable UL508A **SMART Filtration Controller**. All components and control devices are contained within a fully enclosed, lockable, weatherproof, NEMA-rated cabinet.

The **principal components** are a continuous-duty motor with coupled gear pump, a strainer/primary coalescing filter with vacuum sensor and gauge, an ALGAE-X Fuel Conditioner and a secondary water block fine filter with pressure gauge and sensor.

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. The secondary filter is a quick-change spin-on filter designed to remove dissolved and emulsified water and contaminants down to 1  $\mu$ .

Implementing STS Fuel Quality Optimization & Maintenance Systems guarantee **Optimal Fuel Quality for Reliable Power At All Times**. STS 6000-10 GPM System prevents downtime, periodic tank cleaning, replacing out-of-spec fuel and fuel-quality related injection system repairs.



### Inside the STS 6000-10 GPM

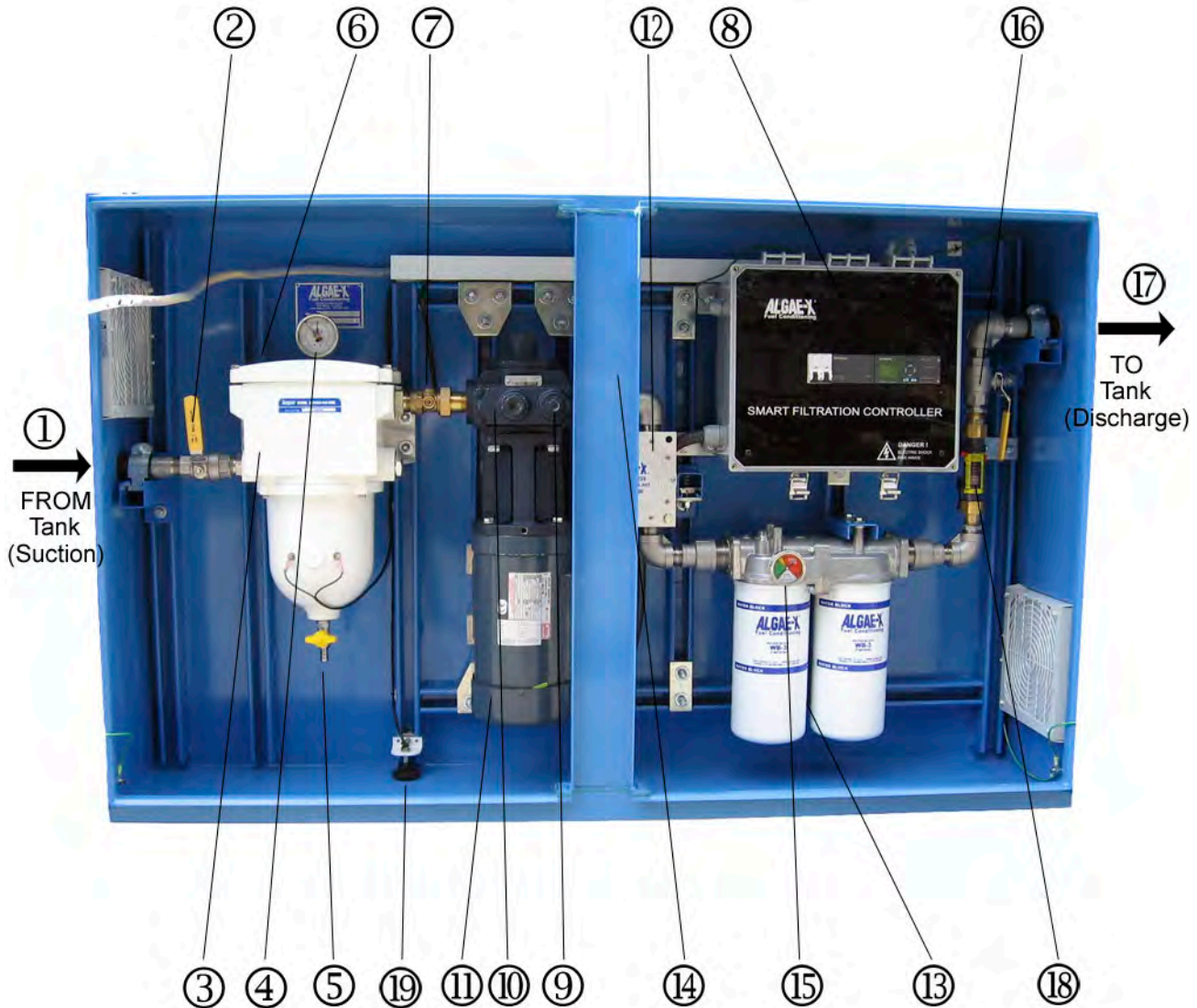
1. Fuel Inlet (From Tank)
2. Inlet Ball Valve
3. Separ Primary Filter / Water Separator
4. Vacuum Gauge
5. Drain Valve (push and turn open)
6. Man. Air Vent / Bleed Screw
7. Vacuum Switch
8. ALGAE-X® Smart Filtration Controller
9. Pressure Relief Valve
10. Gear Pump
11. Motor
12. ALGAE-X® Magnetic Fuel Conditioner
13. Secondary Filter
14. Pressure Switch
15. Pressure Gauge
16. Outlet Ball Valve
17. Fuel Outlet (To Tank)
18. Mechanical Flow Meter with Flow Switch
19. Leak Detector (Float Switch) in Spill Tray

### STS 6000-10 GPM Accessories:

- Multiple tank functions
- AFC-705 Fuel Catalyst
- Digital Flow Meter
- Foot Valve
- Wide range of filter elements

Wherever fuel is being used or stored

## OVERVIEW – BASIC SYSTEM COMPONENTS



- |   |  |
|---|--|
| 1) Fuel Inlet (From Tank)                 | 11) Motor                                      |
| 2) Inlet Ball Valve                       | 12) ALGAE-X® Magnetic Fuel Conditioner         |
| 3) Separ Primary Filter / Water Separator | 13) Secondary Filters (two in parallel)        |
| 4) Vacuum Gauge                           | 14) Pressure Switch (behind post)              |
| 5) Drain Valve (push and turn open)       | 15) Pressure Gauge                             |
| 6) Man. Air Vent / Bleed Screw            | 16) Outlet Ball Valve                          |
| 7) Vacuum Switch                          | 17) Fuel Outlet (To Tank)                      |
| 8) ALGAE-X® Smart Filtration Controller   | 18) Mechanical Flow Meter with Flow Switch     |
| 9) Pressure Relief Valve                  | 19) Leak Detector (Float Switch) in Spill Tray |
| 10) Gear Pump                             |  |

## GENERAL SPECIFICATIONS

### STS 6000-10GPM

Flow Rate .....	10 gpm / 600 gph 4,800 Gallons per 8 hour shift 14,400 Gallons per 24 hours
Outline Dimensions (Enclosure) .....	37" x 60" x 12" (H x W x D)
System Weight .....	approx. 400 lbs
Operating Temperature .....	41 to 104° F; 5 to 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 >1", primed)
Motor .....	1 hp single phase, continuous duty
Timer .....	Programmable Digital Timer
Inlet .....	1" NPT male port
Outlet .....	1" NPT male port
Max. Fluid Viscosity .....	5 cSt

**Note: The STS 6000 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

- Algae-X "Smart Filtration Controller" in electrical sub enclosure – UL 508A listed Industrial Control Panel
- Programmable Digital Timer –Memory backup to retain program memory during power outages
- Pump control switch (Auto-Off-Manual), weatherproof, key operated
- Alarm Reset - weatherproof push button
- Power available indicator
- Pump running indicator
- External remote shut-down feature
- Inlet and outlet shut off ball valves
- Emergency stop button
- Pressure relieve valve
- 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)
- Secondary filter high pressure alarm indicator and system shutdown (pressure sensor)
- Flow meter with "no flow" alarm indicator and system shutdown (flow switch)
- Pump motor starter with single-pole circuit breaker, contactor and overload relay

### PUMP / MOTOR:

- Positive displacement gear pump  
Relief valve
- Motor – UL listed  
TEFC (Totally enclosed fan cooled)

## PRIMARY FILTER / WATER SEPARATOR

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

## FUEL CONDITIONER

- Inline Algae-X Fuel Conditioner eliminates and prevents microbial contamination and the formation of sediments that naturally occur in diesel fuel.

## SECONDARY FILTER

- Two 3 Micron water blocking spin on filter (other filter elements available)
- Pressure gauge (stainless steel, liquid filled)

## WEATHERPROOF DOUBLE DOOR WALL-MOUNTED ENCLOSURE WITH LOCKABLE HANDLES / LATCHES

- 14-gauge steel construction with continuously welded seams
- Concealed hinges
- Finished in polyester powder coat inside and out over phosphatized surfaces
- Spill tray with leak detection
- Louvered side panels
- Brackets for wall mounting
- Literature pocket

## STAINLESS STEEL PLUMBING

### **PRIMARY INSPECTION**

Upon arrival, the STS 6000-10GPM Automatic Fuel Filtration 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 STS-6000 cabinet for damage. Check the entire outside of the cabinet for damage that could indicate internal mechanical or electrical problems.
- Check locking handles, door and hinge operation.
- Check pump/motor hardware and 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 STS-6000 is a totally enclosed system and should be **permanently wall mounted on a hard, level surface**. Use provided **mounting feet for proper fastening**. This weatherproof unit is designed for well-ventilated indoor or outdoor use within specified temperature range and should be located as close to the tank as possible.

Please allow about 1 ft of space between the side louvers of the enclosure and nearby objects. This space is necessary to ensure sufficient ventilation of cooling air for the system and motor.

### 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). The STS 6000 may only be connected to properly grounded power sources for operator safety. Connect all components to the ground studs provided as shown on the electrical drawings.



**! WARNING ! The whole system (Enclosure, doors, plumbing, motor, electric sub panel) must be properly grounded for operator safety.**

Depending on length of run, use copper wiring according to specification in wiring diagram and connect system to a separate UL listed breaker (not included) appropriate for branch circuit protection.

**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 wiring diagram) and follow the specifications provided in the electrical wiring 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 STS 6000 Algae-X Smart Filtration Controller.

#### Remote Monitoring - Dry Contacts:

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

- 1) “Summary Alarm” – dry alarm contact for high vacuum, high pressure or water detection (as well as Emergency stop and overload relay triggered)
- 2) “Leak Detection” – dry alarm contact for leak detection

## PLUMBING

Use proper quality approved fuel line materials with at least 1" inner diameter on the suction side from the tank and at least 1" inner diameter on the return / discharge side back to the tank.

**Note: Do not put any stress on plumbing of STS 6000 and use a backing wrench when connecting the external plumbing. Where possible, use FLEXIBLE CONNECTIONS TO PREVENT STRESS caused by thermal expansion or plumbing misalignment.**

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 "PUMP INLET – SUPPLY FROM TANK" port located on the left hand side of the enclosure and **kept as short as possible**. It is recommended to install an **oversized, low restriction foot valve** to keep the system primed, especially if the "PUMP INLET – SUPPLY FROM TANK" port of the system is located above the lowest possible fuel level in the tank. A **priming tee should be installed on the highest point of the suction line** to be able to easily prime the lines and system.

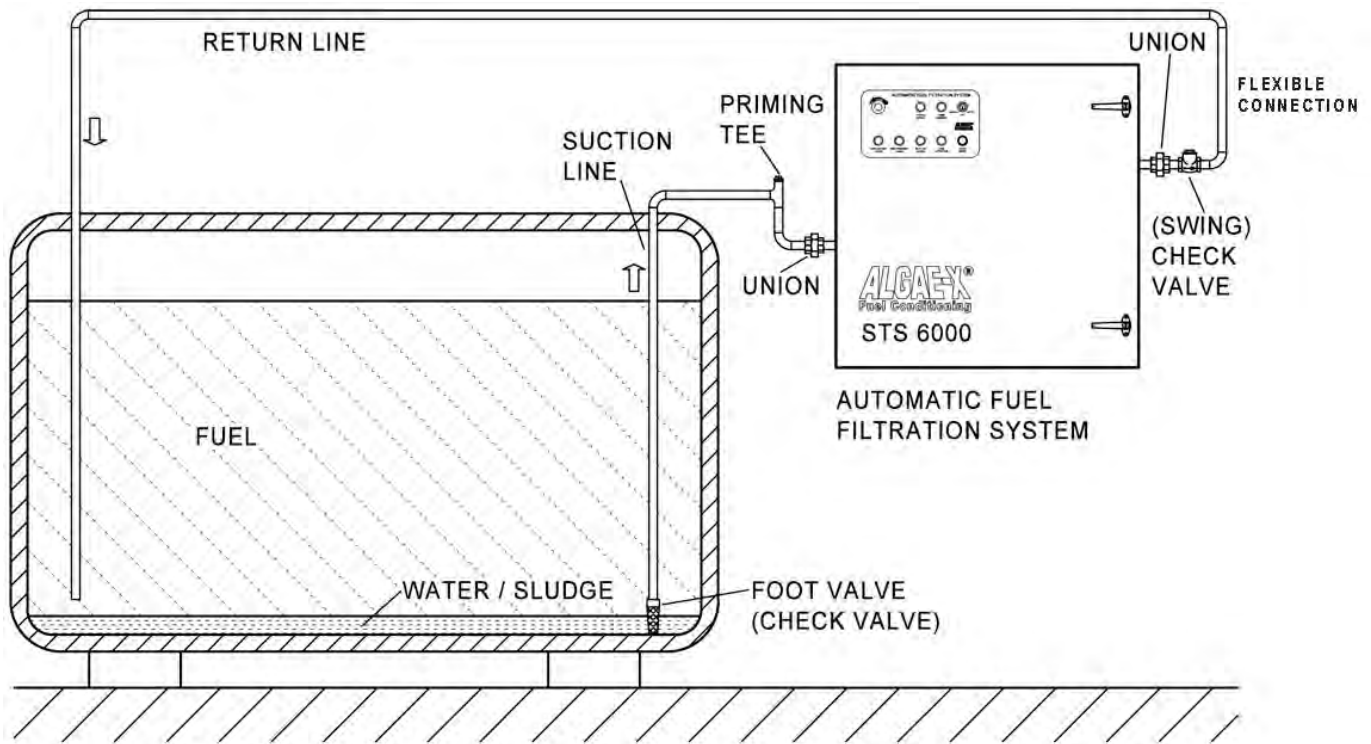
The **return line(s)** should be plumbed to the "PUMP OUTLET – RETURN TO TANK" port (on the right side of the system) and enter the tank **as far as possible from the pick up tube** close to the tank bottom. A (swing) **check valve may be required on the return line(s)** on some installations to prevent back flow pressure.

Multiple suction and/or return lines may be connected to a manifold outside the STS-6000 (see options list). 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 1" 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.**

## TYPICAL PLUMBING / ABOVE GROUND TANK INSTALLATION (SCHEMATICALLY)



### 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 STS-6000 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 STS 6000 have to be combined in any way, adequate valves should be installed to prevent any possible interference with safe engine operation.

**Note: If any of the STS 6000 system's fuel lines are used in combination with the engine's fuel system, the STS 6000 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 STS 6000 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.**

The pump head of the STS 6000 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 STS 6000 is primed by using the externally installed priming tee (not provided) on the suction side of the system. Also the primary filter as well as the suction line has to be completely filled with fuel prior to the initial system start-up.

### PRIMING PROCEDURE:

1. Ensure the pump is filled with #2 Diesel fuel.
2. Ensure that the inlet ball valve is in the open and the outlet ball valve is in the closed position.
3. Slightly open the manual air vent valve (bleed screw) located inside the STS 6000 (position #6 – page 5).
4. Open the externally installed priming tee (located at the highest point of the suction plumbing), fill the line with fuel until fuel escapes from bleed screw (manual air vent), close the manual air vent, continue filling until all air is bled from the plumbing lines and system, close the priming tee. (for tanks situated on a lower level than the STS 6000, it is recommended that a foot valve is installed at the fuel tank to hold the fuel column).
5. Make sure to completely fill suction line to its highest point with fuel (no trapped air), in particular when the suction line exits the tank top and the STS 6000 is located below that level.
6. Open the outlet ball valve and ensure the inlet ball valve is also in open position.
7. Switch on the pump and observe fuel flow.

The system is equipped with a vacuum gauge on the input side of the pump. The gauge should read 0 to 11" HG vacuum maximum under normal conditions. Vacuum gauge readings reaching 12" 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 alarm "HIGH VACUUM ALARM".

**Note: 12" HG vacuum = clogged primary filter or suction line flow restriction / excessive lift.**

The system's pressure gauge on the secondary filter should show 25 PSI maximum pressure under normal conditions (.433 PSI = 1' vertical head pressure). Pressure gauge readings in excess of 25 PSI pressure indicate excessive filter, or fuel line restrictions and/or friction.

System pressure over 25 PSI indicates a high-pressure failure ("HIGH PRESSURE ALARM" indicator) 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.

## SMART FILTRATION CONTROLLER - ALARM FEATURES

The STS 6000 is equipped with an **Algae-X Smart Filtration Controller**. System and alarm status are displayed on the industrial control panel (on the door) via indicator lights and on the text display directly on the controller.

If **all red indicator alarm lights are illuminated** please see the text display for further info. One of the two situations will be present:

- 1) Emergency stop button depressed (Unlock E-Stop button by turning and push "ALARM RESET" button to return to normal operation.
- 2) Motor overload relay (OLR) tripped. Remove front panel of Smart Filtration Controller and push reset button on OLR relay, close panel again and push "ALARM RESET" button on door panel to return to resume operation.

**Note: All red indicator lights on the control panel illuminated at the same time indicates that either the Emergency stop button has been pressed or that the motor overload relay has been tripped.**

## INITIAL START-UP / COMMISSIONING CHECKLIST

### FLOW SWITCH SETTING / ADJUSTMENT ("NO FLOW ALARM")

**Note: Flow switch needs to be adjusted to actual flow rate for proper system operation.**

Please make sure system is properly primed and check when pump running for a steady stream of fuel without air bubbles in the mechanical flow meter (indicator) inside the STS 6000 enclosure. If the "NO FLOW ALARM" alarm light is blinking (and after 10 seconds illuminate continuously as the pump is turned off) the **flow switch located on the side of the mechanical flow meter needs to be adjusted to the actual flow rate.**

This can be easily done by sliding the black switch (with the wires attached) located on the side of the sight glass carefully up or down (while pump is running) and lining up the flow switch with the indicator ring inside the sight tube of the flow meter showing the actual flow rate. For further information please see enclosed instruction sheet.

You can reset the alarm by pushing the "ALARM RESET" button located on the control panel.

### 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.

## 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 "LEAK DETECTION" should illuminate. Reset alarm by pushing the "RESET ALARM" button on the control panel.
  2. Slowly partially close inlet ball valve. At 12"HG pump should turn off and "HIGH VACUUM ALARM" should illuminate. Open inlet ball valve again. Reset alarm by pushing the "RESET ALARM" button.
  3. Slowly partially close outlet ball valve. At 25 PSI pump should turn off (after a delay of about 1 second) and "HIGH PRESSURE ALARM" should illuminate. Open outlet ball valve again reset alarm by pushing the "RESET ALARM" button.
  4. Slide the flow switch located on the side of the mechanical flow meter slightly upwards away from the flow indicator inside the sight tube (mark original position before doing so). The "NO FLOW ALARM" indicator should start blinking for 10 seconds and then illuminate constantly as the pump is turned off. Slide flow switch back into original position and reset alarm by pushing the "RESET ALARM" button.

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

## OPERATION



**! WARNING ! Do not use with gasoline. 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.**



**! WARNING ! Never use the STS 6000 at a temperature exceeding the flash point of its contents.**

## EMERGENCY STOP

**Note: In case of an emergency the pump can be turned off and disabled by depressing the red "EMERGENCY STOP" button on the control panel.**

To release the "EMERGENCY STOP" button located on the control panel turn the red knob in the direction indicated by the arrows on the mushroom button and push the "ALARM RESET" button to acknowledge.

## PUMP OPERATION

Apply control power to unit. Place breakers in the Algae-X Smart Filtration Controller in the "ON" position.

### Automatic:

Place the key switch in the "AUTO" position. When the timer contacts close, the pump will start and run until the timer setting has expired.

### Manual (Override):

Place the key switch in the "RUN" 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 Algae-X Smart Filtration Controller located inside the STS 6000 system.

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

1. Please make sure the Emergency Stop button is not engaged, the key 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, ◀ ▶ 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 Algae-X International with any questions.

## FUEL LINE LEAK

If fuel is detected in the spill / drip tray, the float switch will activate the fuel leak alarm illuminating the "LEAK DETECTION" indicator. 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 key 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 key switch can be returned to the "AUTO" or "RUN" 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 **ALGAE-X® 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 an STS 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 STS-6000 Automatic 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 enclosure and all parts for corrosion and rust.
- Check locking latches, door and hinge operation.
- Check cabinet 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 "LEAK DETECTION" should illuminate. Reset alarm by pushing the "RESET ALARM" button on the control panel.
  2. Slowly partially close inlet ball valve. At 12" HG pump should turn off and "HIGH VACUUM ALARM" should illuminate. Open inlet ball valve again. Reset alarm by pushing the "RESET ALARM" button.
  3. Slowly partially close outlet ball valve. At 25 PSI pump should turn off (after a delay of about 1 second) and "HIGH PRESSURE ALARM" should illuminate. Open outlet ball valve again Reset alarm by pushing the "RESET ALARM" button.
  4. Slide the flow switch located on the side of the mechanical flow meter slightly upwards away from the flow indicator inside the sight tube (mark original position before doing so). The "NO FLOW ALARM" indicator should start blinking for 10 seconds and then illuminate constantly as the pump is turned off. Slide flow switch back into original position and reset alarm by pushing the "RESET ALARM" button.

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

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

## SERVICING PRIMARY FILTER

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.

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 12" HG, the pump will automatically shut off and activate the "HIGH VACUUM ALARM" indicator light. The signal indicates that it is time to either back-flush or change the filter element.

### Servicing and back-flushing primary filter:

1. Turn key switch to the "OFF" position – make sure pump will not turn on
2. Close the inlet and outlet ball valve
3. Open the brass colored bleed screw at the top of the filter cover
4. Place a fuel waste container below the yellow safety drain valve on the bottom of the filter bowl
5. Open the yellow safety drain valve (push & turn counter clockwise)
6. Close after approximately 2 seconds
7. After approximately 10 seconds reopen the drain valve
8. Close after visible sediment, particles and water have been drained from the bowl
9. Prime the filter by removing the cover (4 wing bolts) and pouring clean diesel fuel into the filter body until the fuel level reaches the top of the filter body

10. Replace the lid. Note: Evenly tighten the wing bolts to ensure a good seal
11. Close bleed screw on top of the lid
12. Open the inlet and outlet ball valve
13. Push the "ALARM RESET" button on the control panel to acknowledge the alarm and reset it
14. Return the pump selector key switch to "AUTO" or "RUN"
15. Check for leaks when re-starting and pressurizing the system. Your system is now ready to resume normal operation

**Note: 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 alarm "HIGH WATER ALARM" and shut off the pump. The signal indicates that it is time to drain the bowl on the water separator.

#### **Draining water from the primary filter/water separator:**

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

### SERVICING SECONDARY FILTERS

Clogging filter elements and saturation of the water block filters restrict the flow of fuel and the system's pressure gauge will indicate a pressure drop.

The gauge and differential pressure indicator are mounted on top of the secondary filter head. At a pressure drop of 25 PSI (red dial area of the gauge) the pump will automatically shut off and activate the "HIGH PRESSURE ALARM" indicator light. The signal indicates that it is time to change the filter elements.

There are several types of Algae-X spin on fine filters available; we recommend using the WB-3 (3 micron water block fine filter). The Algae-X Water Block incorporates polymer technology to remove emulsified water from fuel.

Changing the secondary filters:

**Note: Both secondary spin on filters need to be replaced at the same time. Always use two of same type filter elements – never mix two different kinds or micron ratings.**

1. Turn key switch to the "OFF" position – make sure pump will not turn on
2. Close the inlet and outlet ball valve
3. Place an appropriate container underneath the filters
4. Remove both old spin on filters with the provided filter wrench by turning the cartridge counter clock wise seen from the bottom of the cartridge
5. Apply a film of lubricating oil to the gasket of the new filters. Screw the new filter canisters to the filter head until the gasket is tight and secure (an additional ½ to one turn after the filter makes contact with the gasket)
6. Open the inlet and outlet ball valve
7. Push the "ALARM RESET" button on the control panel to acknowledge the alarm and reset it
8. Return the pump selector key switch to "AUTO" or "RUN"
9. Check for leaks when re-starting and pressurizing the system
10. Your system is now ready to resume normal operation

**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
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 elements 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

**Noisy operation**

1. Insufficient fuel supply
2. Air leaks in the inlet pipe
3. Air or gas in fuel on the suction side
4. Worn out spider coupling
5. Pump coupler out of balance

**Pump requires frequent re-priming**

1. Inoperative foot valve
2. Inoperative check valve
3. Inoperative solenoid valve (optional)
4. Pump cavitations
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
5. Emergency Button depressed

**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

# **AUTOMATIC FUEL FILTRATION SYSTEMS WARRANTY**

## **LIMITED WARRANTY**

ALGAE-X® 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 ALGAE-X® 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:

1. This warranty shall only extend to and is only for the benefit of original purchasers who use the products covered hereby
2. Any warranty claim received by ALGAE-X® 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.
3. This warranty shall not apply to products (1) which have been tampered with, altered or repaired by anyone other than ALGAE-X® without the express prior written consent of ALGAE-X® (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.
4. The liability of ALGAE-X® under this warranty is limited to the repair or replacement of the defective product. ALGAE-X® 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. ALGAE-X® 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.
5. ALGAE-X® 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 ALGAE-X® OTHER THAN THE EXPRESS WARRANTY PROVIDED FOR HEREIN.
6. ALGAE-X® 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 ALGAE-X® to make similar changes in such products that were previously manufactured.

## **WARRANTY CLAIM PROCEDURE**

To make a claim under this warranty, please call our ALGAE-X® 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 ALGAE-X®, arrange for a Field Engineer to inspect your system. If the inspection discloses a defect covered by its limited warranty, ALGAE-X® will either repair or replace the defective parts or products. ALGAE-X® assumes no liability, if upon inspection, ALGAE-X® 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 ALGAE-X®:

## APPENDIX A - ABBREVIATIONS USED IN THIS MANUAL

Abbreviations of terms used with STS 6000 Automatic 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.

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

## **APPENDIX B – DRAWINGS**



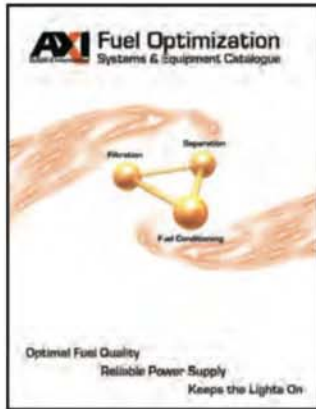
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Our scope of expertise covers fuel storage and fuel supply systems from single engine installations to power plants. AXI is your single source for all fuel conditioning related equipment and support available world-wide.

- 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.AXIFuelConditioning.net](http://www.AXIFuelConditioning.net).



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