

AXI STS 6020

INTERNATIONAL



The STS 6020 is a programmable, fully automated, fuel maintenance system that removes water, sludge, and other contaminants from fuel storage tanks. Once installed, the STS6020 system operates independently to ensure fuel reliability through routine fuel filtration. The system's fuel polishing process stabilizes diesel and bio-fuels, eliminates microbial contamination, and ensures fuel remains clean. The STS system's NEMA rated enclosure allows for both outdoor and indoor installations by protecting the system from falling rain, sleet, snow, and external ice formation.



STS 6020 SPECIFICATIONS:

Nominal Flow Rate	20 GPM/1200 GPH (75.7 LPM/4,542 LPH)
Primary Filter	Mechanical Water Separator
Secondary Filters	3, 10 or 25µ Fine Filter or 3, 10µ Water Block
Fuel Conditioner	LG-X 4000 Inline Magnetic Conditioner
Pump	1.5 HP Spur Gear Pump
System Controller	SFC70 Smart Filtration Controller with Safety and Alarm Features
Power	120V/60Hz/1Ph or 230V/50Hz/1Ph*
Plumbing	Black Iron
Ports	1.5" NPT In, 1.5" NPT Out
System Enclosure	NEMA 3R Rated Powder Coated (Standard), NEMA 4, or NEMA 4X Rated Stainless Steel
Controller Enclosure	NEMA 4 and UL508a Rated
Dimensions	≈ 37" x 60" x 12" (H x W x D) (94 x 152 x 31 cm)
Weight	≈ 620 lbs (281 kg)
Not for use with fluids that have a flash point below 100°F (37.8°C).	

**At 50 Hz, nominal flow rate decreases from 20 GPM to 16 GPM*

STS 6020 FEATURES:

- Smart Filtration Controller
- Fully Automated and Programmable
- Operation Integration with External Monitoring
- Systems Unique Safety & Alarm Features
- Continuous-Duty Pump, Viton Seals
- System Upgrade Options

For safe operation, the STS 6020 is equipped with an automatic pump shut-down feature and alert indication to notify users of when the system requires servicing.

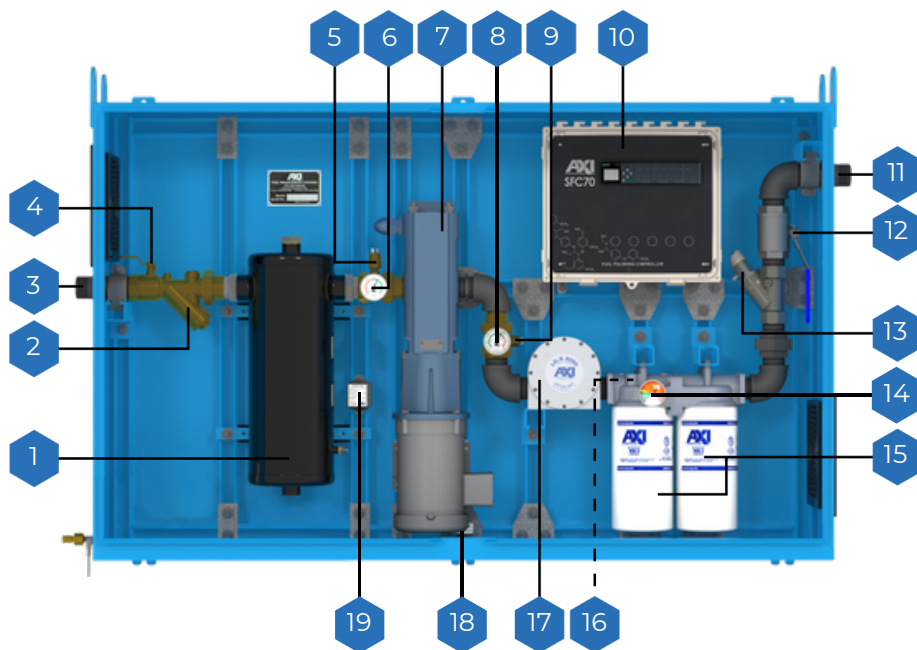
REPLACEMENT FILTER OPTIONS:

Secondary Filters	Part No.
3µ Water Block Filter	WB-3
10µ Water Block Filter	WB-10
3µ Fine Filter*	FF-3
10µ Fine Filter	FF-10
25µ Fine Filter	FF-25
3µ X-Glass Media Fine Filter	FFZ-3

**Standard-issue filter element unless requested otherwise*

AXI STS 6020

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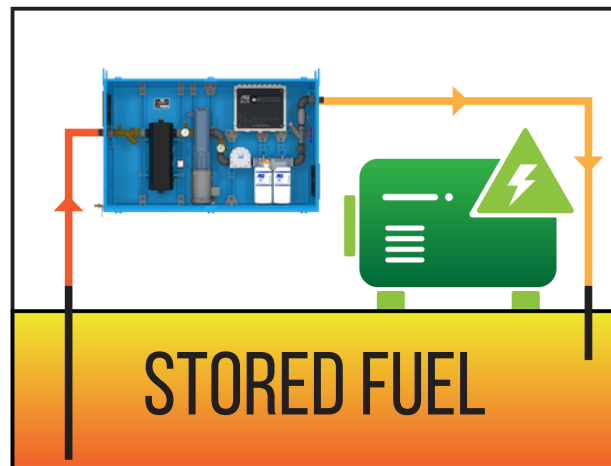
- 1.Primary Filter/Water Separator
- 2.Wye Strainer
- 3.Fuel Inlet (From Tank)
- 4.Inlet Ball Valve
- 5.Vacuum Switch
- 6.Vacuum Gauge
- 7.Motor with Coupled Gear Pump
- 8.Pressure Gauge
- 9.Pressure Switch
- 10.Smart Filtration Controller
- 11.Fuel Outlet (Discharge)
- 12.Outlet Ball Valve
- 13.Flow Switch
- 14.Pressure Gauge
- 15.Fine Filters
- 16.Pressure Switch (Not Visible)
- 17.Fuel Conditioner
- 18.Leak Detector
- 19.Water Detection Alarm Module

STS 6020 SYSTEM OPTIONS*:

NEMA 4 Rated Enclosure	Gain additional protection against falling dirt, windblown dust, and splashing and hose-directed water
NEMA 4X Rated Enclosure	Gain additional protection against corrosion with a stainless steel enclosure
Manual Additive Injection	Manually draw additive into the polisher with a dedicated supply port and ball valve
Enclosure Heater	Prevent the build up of condensation inside the system enclosure due to temperature changes
Auto Water Drain (AWD)	Automatically drain water separator of collected water for decreased frequency of maintenance
Pressure Transmitter	Replace standard pressure switch for detailed monitoring of pressure levels in the system
Flow Transmitter	Replace standard flow switch for detailed monitoring of flow rate in the system
Multi-Tank Polishing/Transfer	Polish and transfer fuel between multiple fuel storage tanks
Fuel Heater	Warm up circulated fuel to resist gelling in low temperatures

*System upgrade may be required for certain combinations of options

STS SYSTEM INTEGRATION:



AXI STS 7020

INTERNATIONAL

The STS 7020 is a programmable, fully automated, fuel maintenance system that removes water, sludge, and other contaminants from fuel storage tanks. Once installed, the STS7020 system operates independently to ensure fuel reliability through routine fuel filtration. The system's fuel polishing process stabilizes diesel and bio-fuels, eliminates microbial contamination, and ensures fuel remains clean. The STS system's NEMA rated enclosure allows for both outdoor and indoor installations by protecting the system from falling rain, sleet, snow, and external ice formation.



STS 7020 FEATURES:

- Touchscreen Controller
- Fully Automated and Programmable
- Operation Integration with External Monitoring
- Systems Unique Safety & Alarm Features
- Continuous-Duty Pump, Viton Seals
- System Upgrade Options

For safe operation, the STS 7020 is equipped with an automatic pump shut-down feature and alert indication to notify users of when the system requires servicing.

STS 7020 SPECIFICATIONS:

Nominal Flow Rate	20 GPM/1200 GPH (75.7 LPM/4,542 LPH)
Primary Filter	Mechanical Water Separator
Secondary Filters	3, 10 or 25μ Fine Filter or 3, 10μ Water Block
Fuel Conditioner	LG-X 4000 Inline Magnetic Conditioner
Pump	1.5 HP Spur Gear Pump
System Controller	TSC70 Touchscreen Controller with Safety and Alarm Features
Power	120V/60Hz/1Ph or 230V/50Hz/1Ph*
Plumbing	Black Iron
Ports	1.5" NPT In, 1.5" NPT Out
System Enclosure	NEMA 3R Rated Powder Coated (Standard), NEMA 4, or NEMA 4X Rated Stainless Steel
Controller Enclosure	NEMA 4 and UL508a Rated
Dimensions	≈ 37" x 60" x 12" (H x W x D) (94 x 152 x 31 cm)
Weight	≈ 620 lbs (281 kg)
Not for use with fluids that have a flash point below 100°F (37.8°C).	

**At 50 Hz, nominal flow rate decreases from 20 GPM to 16 GPM*

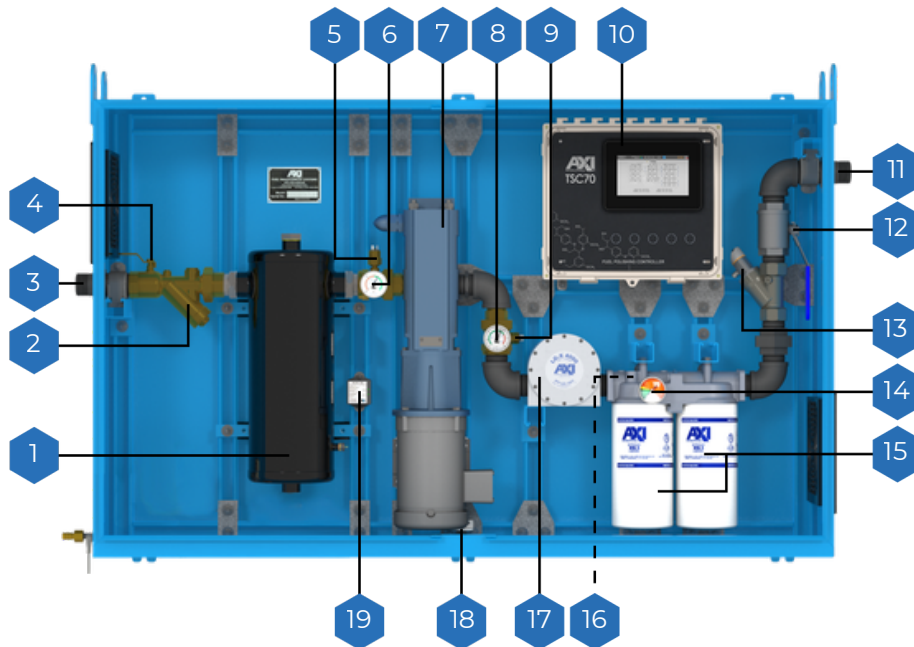
REPLACEMENT FILTER OPTIONS:

Secondary Filters	Part No.
3μ Water Block Filter	WB-3
10μ Water Block Filter	WB-10
3μ Fine Filter*	FF-3
10μ Fine Filter	FF-10
25μ Fine Filter	FF-25
3μ X-Glass Media Fine Filter	FFZ-3

**Standard-issue filter element unless requested otherwise*

AXI STS 7020

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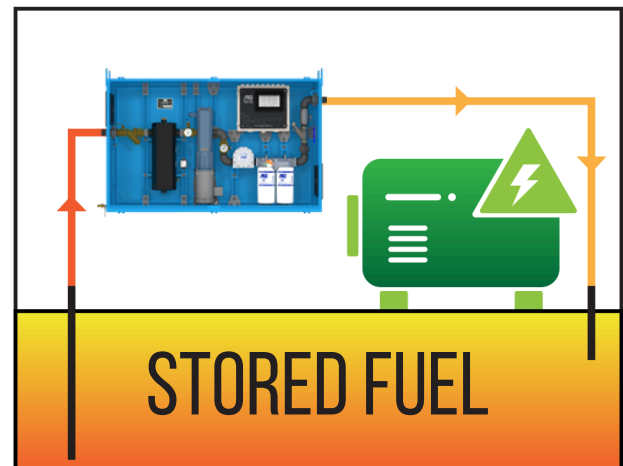
- 1.Primary Filter/Water Separator
- 2.Wye Strainer
- 3.Fuel Inlet (From Tank)
- 4.Inlet Ball Valve
- 5.Vacuum Switch
- 6.Vacuum Gauge
- 7.Motor with Coupled Gear Pump
- 8.Pressure Gauge
- 9.Pressure Switch
- 10.Smart Filtration Controller
- 11.Fuel Outlet (Discharge)
- 12.Outlet Ball Valve
- 13.Flow Switch
- 14.Pressure Gauge
- 15.Fine Filters
- 16.Pressure Switch (Not Visible)
- 17.Fuel Conditioner
- 18.Leak Detector
- 19.Water Detection Alarm Module

STS 7020 SYSTEM OPTIONS*:

NEMA 4 Rated Enclosure	Gain additional protection against falling dirt, windblown dust, and splashing and hose-directed water
NEMA 4X Rated Enclosure	Gain additional protection against corrosion with a stainless steel enclosure
Manual Additive Injection	Manually draw additive into the polisher with a dedicated supply port and ball valve
Enclosure Heater	Prevent the build up of condensation inside the system enclosure due to temperature changes
Auto Water Drain (AWD)	Automatically drain water separator of collected water for decreased frequency of maintenance
Pressure Transmitter	Replace standard pressure switch for detailed monitoring of pressure levels in the system
Flow Transmitter	Replace standard flow switch for detailed monitoring of flow rate in the system
Multi-Tank Polishing/Transfer	Polish and transfer fuel between multiple fuel storage tanks
Fuel Heater	Warm up circulated fuel to resist gelling in freezing temperatures

*System upgrade may be required for certain combinations of options

STS SYSTEM INTEGRATION:





STS 6020 | 7020 Instruction, Operating, & Maintenance Manual

ENCLOSED FUEL MAINTENANCE SYSTEM

REV03016720010220

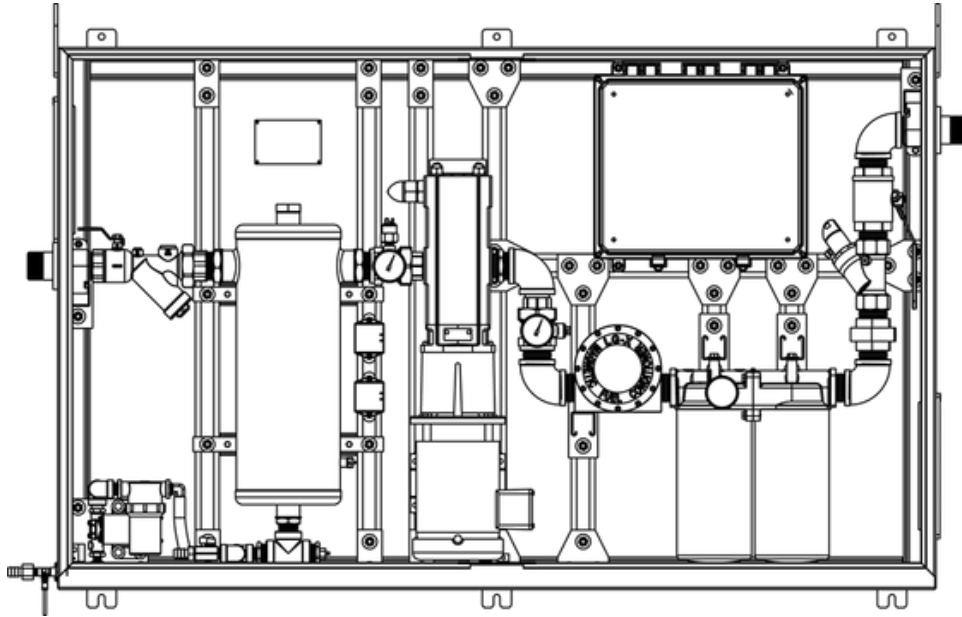


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General Overview

STS 6020 | 7020 Specifications

Nominal Flow Rate.....	20 GPM/1,200 GPH (75.7 LPM/4,542.5 LPH) 9,600 gallons (36,340 liters) per 8-hour shift 28,800 gallons (109,020 liters) per 24-hour shift				
Primary Filter.....	Mechanical Water Separator				
Secondary Filters.....	1, 3, 10, or 25µ Fine Filter or 3, 10µ Water Block				
Fuel Conditioner.....	LG-X	4000	Inline	Magnetic	Conditioner
Strainer.....	20		Mesh		Wye-Strainer
Plumbing.....	Black Iron				
Inlet Port.....	1.5” NPT				
Outlet Port.....	1.5” NPT				
System Enclosure.....	NEMA 3R Rated Powder Coated (Standard), NEMA 4, or NEMA 4X Rated Stainless Steel				
Operating Temperature (6000 Series).....	41 - 104°F (5 - 40°C)				
Operating Temperature (7000 Series).....	41	-	122°F	(5	- 50°C)
Electrical.....	120V/60Hz/1Ph		or	230V/50Hz/1Ph*	
Pump.....	1.5 HP Spur Gear Pump				
Suction Capability (Primed).....	15ft. vertical lift or 100ft. horizontal run (lines >1.5”, primed)				
Timer.....	Incorporated PLC-based timer				
Maximum Fluid Viscosity.....	5 cSt				
Outline Dimensions.....	≈ 37” x 60” x 12” (94 x 152 x 31 cm) (H x W x D)				
System Weight.....	≈ 620 lbs (281 kg)				

***Note: It is the user's responsibility to ensure safe operating conditions for the system to be ran.**

*At 50 Hz., nominal flow rate decreases from 20 GPM/1,200 GPH to 16 GPM/960 GPH.

!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

- System Controller
 - Incorporated PLC-based Timer
 - Memory retention during power outages
 - Alarm Indicator Light(s)
 - Control Circuit Breakers (CB1, CB2)
 - Pump Control Selector Switch {Hand (Manual) / Off / Auto}
 - Alarm Reset Push Button
 - Pump Running Indicator Light
 - System Power Indicator Light
 - Emergency Stop (E-Stop) Push Button
 - **6000 Series Controller:**
 - § Smart Filtration PLC with LCD Display
 - **7000 Series Controller:**
 - § HMI Touchscreen Control
- Water Detection Alarm Module
- Vacuum & Pressure Switches
- Flow Switch
- Leak Detection Float Switch
- Inlet and Outlet Isolation Ball Valves

Pump/Motor

- 1.5 HP Gear Pump

Mechanical Water Separator

- Water Separator
- Water Detection Sensor Probe
- Drain Valve

Fuel Conditioner

- Inline Magnetic Fuel Conditioner

Fine Filters

- Two standard-issue 3μ fine filter cartridges (other filter elements available)

Strainer

- 20 Mesh Wye-Strainer

Plumbing

- Black Iron

Multi-Tank Assembly – *If Applicable*

- External Straight Port Ball Valves
 - Enables system to service multiple tanks
- Tank Fuel Level Float Switches (**Customer provided**)



Auto Water Drain (AWD) Assembly – *If Applicable*

- Accessory Pump
- Additional Water Detection Alarm Module
- Additional Water Detection Sensor Probe
- Solenoid Drain Valve
- Basket Strainer
- Water Collection Drum
 - o High Water Level Float Switch

Manual Additive Injection – *If Applicable*

- System Ball Valve
- Additive Injection Port
- Injection Port Ball Valve

Auto Additive Injection Assembly – *If Applicable*

- Accessory Pump
- Flexible Suction/Return Lines
- Additive Injection Flow Sensor
- Solenoid Valve
- Additive Container
- Float Switch/Container Port Assembly

System Operation

Apply control power to unit. Place control breakers (CB1, CB2) for the System Controller in the “ON” position.

Pump Operation

Automatic Mode:

Switch the system to “Auto” mode via the Selector Switch on the system enclosure. During the time intervals set up by the user, the pump will start and run until the scheduled runtime has ended. See the Controller section for setting scheduled run times.

Manual Mode:

Switch the system to “Manual” mode via the Selector Switch on the system enclosure. The pump motor will run until the system is switched off, into “Auto” mode, or an alarm has been tripped.

Alarms

Alarms featured on the system include:

- Leak Detection (system shutdown, alarm indication)
 - Activated when the Float Switch in the system’s drip tray detects a raised liquid level. The system will go into an alarm state and the pump will not be allowed to run until the alarm is addressed and cleared.

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

- Low/No Flow (system shutdown, alarm indication)
 - Activated when the Flow Switch on the pressure side of the pump detects a flow rate not adequate for the pump. Once the alarm debounce timer is expired, the system will go into an alarm state and the pump will not be allowed to run until the alarm is addressed and cleared.
- High Vacuum (system shutdown, alarm indication)
 - Activated when the Vacuum Switch, placed on the suction side of the pump set, detects a reading above the factory set point. The system will go into an alarm state and the pump will not be allowed to run until the alarm is addressed and reset.
- High Pressure (system shutdown, alarm indication)
 - Activated when a Pressure Switch, placed on the pressure side of the pump set, detects a reading above the factory set point. The system will go into an alarm state and the pump will not be allowed to run until the alarm is addressed and reset.
- High Water (system shutdown, alarm indication)
 - Activated when water level trips the Water Detection Alarm Module via the Water Detection Sensor Probes located on the mechanical water separator.
- Pump Overload (system shutdown, alarm indication) – **If Applicable**
 - Activated when the amperage draw from the pump-motor assembly exceeds the factory set point (determined by the pump’s FLA) on the pump overload relay module.
- Auto Water Drain Float Switch (halts auto water drain functionality, alarm indication) – **If Applicable**
 - Activated when the float switch on the Auto Water Drain’s Water Collection Drum is triggered due to a high water level.
- Tank Overflow (system shutdown, alarm indication) – **If Applicable**
 - Activated when one of the customer provided tank fuel level float switches is triggered due to a high fuel level in one of the connected tanks of a multi-tank configuration.

Note: If the Pump Overload Alarm triggers, please contact AXI International.

Once triggered alarms are addressed, each alarm can be reset via the Alarm Reset button on the enclosure door panel.

Note: For information on factory set points or timer delays please refer to the “Accessories and Additional Configuration Parameters” subsection in the “Technical Assistance and Ordering” section.

Multi-Tank – *If Applicable*

1. From the Main Menu screen select “CONFIG”
2. Enter password (9999)
3. Enter the correct number of connected tanks in the box under “Number of Tanks”.
4. To see actual valve positions, select “VALVES”
 - a. Press the “Open” and “Close” buttons to manually test the valves. If the “Open” or “Closed” rectangular box is GREEN, that status is active. The opposite is true if said background is RED.
5. Return to Main Menu screen
6. To control Pump in Manual Mode, turn the selector switch on the enclosure door to the “MANUAL” position
7. Select “MANUAL CONTROL” from the Main Menu screen
8. Select the desired tank for manual operation
9. Pump will run when valves have reached correct positions
10. To stop pump operation, select “Cancel Manual” or turn the selector switch on the enclosure door to the “OFF” position
11. For automatic fuel cleaning, turn the selector switch on the enclosure door to the “AUTO” position
12. Select “AUTO TIMER CONFIG” from the Main Menu screen
13. Program the timer start and stop times for each tank.
 - a. Use the “Next” and “Prev” buttons in the bottom corners of the screen to navigate between timer screens for the tanks

Note: Please ensure the start and stop times for any of the tanks do not overlap or an error message will be displayed.

!WARNING! Do not start-up or operate system without high fuel level alarms from both tanks tied into the control panel. Frequently test overflow alarms for proper functionality and pump shutdown.

Auto Water Drain (AWD) – *If Applicable*

1. When the Water Separator’s High-Water Sensor is triggered, the system will shutdown
2. The system will remain shut down for 60 seconds, allowing water to be completely separated from the fuel
3. After 60 seconds, the Auto Water Drain Solenoid Drain Valve opens and the Auto Water Drain Accessory Pump turns on, draining the Water Separator
4. Once the water level has dropped below the Water Separator’s Low-Water Sensor, the system automatically turns back on and resumes normal operation

Manual Additive Injection – *If Applicable*

Note: Manual Additive Injection operation may vary depending on the vertical and horizontal distance between the additive holding container and fuel polishing system.

1. With the system running, place flexible hose between the Additive Injection Port and Additive Container
2. Ensure sufficient additive is present in the container and that the flexible hose reaches the bottom
3. Open the Injection Port Ball Valve to begin injecting additive
4. To start or increase flow of additive into the system, slowly close the System Ball Valve to create a higher vacuum as indicated on the vacuum gauge
5. Monitor the system’s vacuum gauge to avoid creating a vacuum higher than the system’s set point

Note: If a high vacuum alarm is triggered, return the System’s Ball Valve to the fully open position and reset the alarm by pushing the Alarm Reset button on the enclosure door panel

6. Monitor the additive level in the holding container to gauge proper dosing

- 
7. After injecting the desired amount of additive, close the Injection Port Ball Valve and return the System Ball Valve to the fully open position

Auto Additive Injection – *If Applicable*

1. To start Auto Additive Injection, navigate from the Main Menu to the Additive Injection screen on the HMI.
2. On the screen there are two fields to input information, Gallons to Treat and Treatment Ratio.
3. There are two other non-editable fields that show the last treatment date and also the amount of additive that was added from the last treatment.
4. Enter the gallons of fuel to treat.
5. Then enter the treatment ratio (For example: 5 Gallon Jug of AFC treats 25,000 gallons of fuel, so enter 1:5000)
6. Once this information is entered, press the START button to begin the injection process.
7. There is a progress bar that will display the total amount of additive to be added (full red bar), and as the additive is injected the red bar will decrease.
8. Once the bar is depleted, the process will stop.
9. If at any point the process needs to be manually stopped, press STOP on the screen.
10. After the injection is completed, the data is stored in the log, which can be accessed by pressing LOG on the Additive Injection screen.
11. When the additive level reaches low, a “LOW ADDITIVE WARNING” will be displayed.
12. In order to run the process again, the additive must be refilled and the alarm reset by clearing all alarms.



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 to the shipper.

Checklist

- If the packing crate shows signs of damage inspect the system for damage.
- 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.

Installation

Note: 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 unit should be permanently wall mounted on a hard, level surface. Use provided mounting holes located on the enclosure for proper fastening (Refer to mechanical drawing(s) for Mounting Hole Diameter). Ensure the system is level and secure, enabling water to be more accurately sensed in the primary filter's sump. Be sure to secure the system in a location that allows all piping and electrical wiring to be safely routed to the system. This unit is designed for well-ventilated outdoor and indoor use within the specified temperature range and should be located as close to the tank as possible.

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 system's power requirements and rated voltage/frequency match your electrical system (see wiring diagram). The system may only be connected to properly grounded power sources for operator safety. Connect all components to the ground studs provided as shown on the provided drawings. After the initial wiring of the system, check operation to ensure that the motor is running in the correct direction. If the motor is running in the wrong direction, contact AXI International immediately.

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

Depending on length of run, use 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.

Field Connections – *If Applicable*

Remote Monitoring – Dry Contacts:

The System Controller provides two Normally Open (N.O.) 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, no flow, or water detection
2. "Leak Detection" – dry alarm contact for leak detection

Remote Shutdown – Interlocks:

The customer can provide interlocks connected to the System Controller in order to establish external shutdown capabilities of the system's pump.

Note: The 24 V DC provided by the power supply in the electrical box of the system must be used for remote shutdown.

Plumbing

Note: Please ensure to check all of the plumbing (joints, unions, miscellaneous fittings) for tightness prior to completion.



Use proper quality approved fuel line materials with similar inner diameter (ID) to the inlet/outlet of the system. For extended suction side plumbing runs, it is recommended to install oversized pipe, (1/4" to 1/2" increased ID) (Ref.: Page 4 – Suction Capability).

Note: Flexible plumbing is strongly recommended for system inlet and outlet connections to external plumbing in order to avoid issues with thermal expansion, prevent putting any stress on the internal fittings of the system, and enable ease of maintenance/installation.

The pick-up tube/line(s) should originate from the lowest point of the tank to ensure all water is removed. Also, it should be connected directly to the system's inlet port (located on the left-hand side of the system) and be kept as short as possible. It is recommended that an oversized, low restriction foot valve be installed to keep the system primed, especially if the inlet port of the system is located above the lowest possible level of fuel in the tank. Additionally, a priming tee should be installed at the highest point of the suction line to enable priming of the pipelines and system.

The return line(s) should be plumbed to the system's outlet port (located on the right-hand side of the system) and enter the tank as far as possible away from the pick-up tube, close to the tank bottom.

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

Note: Anti-Siphon or other external plumbing devices may be required by state and/or local regulations & code.

Cumulatively, the system capabilities are 15 FT. (4.57 m) suction (vertical lift) or 100 FT. (30.48 m) horizontal run, when connected to the minimum recommended piping size (Ref.: Page 4 – Inlet/Outlet Port), or more, with no additional flow restrictions. That includes valves, 90-degree connectors, or other plumbing accessories. For continuous optimal performance, make sure suction and discharge lines are free of contamination, nothing is blocking the flow of fuel, and the suction line always stays primed.

Note: Plumbing installation must be in accordance with all applicable federal, state, and local rules, laws, standards, and regulations.

Note: Additionally, if the system must share a fuel oil supply (FOS) line with a generator, we recommend check valves be installed after the split in the line, before the landing/entrance into the generator tank and the fuel polishing system. Also, it is highly recommended that the "External Shut Down" contacts on the PLC are utilized as well in this scenario.

Typical Plumbing Installation (Schematically)

See provided P&ID drawing(s).

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 system from the engine's fuel system to prevent any possible interference with safe engine operation (please see note above).

Also, 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 system must be combined in any way, adequate valves should be installed to prevent any possible interference with safe engine operation.

Multi-Tank Installation – *If Applicable*

Please connect each tank's dedicated supply and return lines according to the provided drawings. Use approved flexible lines to avoid issues with thermal expansion, prevent putting stress on plumbing connections, and enable ease of maintenance/installation. Additionally, please be sure to plumb each supply and return ball valve in parallel (on separate lines) leading to their respective tank(s). See provide P&ID drawing for more information.



Ensure all external electrical connections are linked to their corresponding ball valve as indicated by labels on the sides of the system's enclosure.

The provided external High Tank Fuel Level Alarm Inputs (see provided electrical drawings) must be wired to the Normally Closed High Level Alarm Contacts on each tank to avoid overfilling and potential spills. This is a very important safety feature that will shut the fuel polisher pump down in case a tank reaches an unsafe fuel level.

Controller

Setting the Current Date and Time (6000 Series Controller)

- Please make sure the selector switch is set to “OFF” and push the Alarm Reset button on the enclosure door panel.
- When power is first applied to the system, the display of the PLC will show (blinking) the date and time.
- Hit the “ESC” button.
- Select ‘Stop’ and press “OK”.
- Select ‘Yes’ (use down arrow key) and press “OK”.
- Select ‘Setup’ (use down arrow key) and press “OK”.
- Select ‘Clock’ and press “OK”.
- Select ‘Set Clock’ and press “OK” (**must be in military format**).
- Using the arrow keys, set the current day of the week, time and date as indicated in the display and press “OK”. Use the up and down arrow keys to change values, and use the left and right arrow keys to change between week, day, time, and date.
- When finished entering press “OK” to confirm.
- Press “ESC” until the base menu is displayed.
- Select ‘Start’ and press “OK” – correct time and date should be displayed (when prompted, select “YES” to proceed).

Programming the Timer (6000 Series Controller)

1. Hit the “ESC” button from the time and date display. If they are not shown, hit the down arrow button until they are displayed.
2. Select ‘Program’ and press “OK”.
3. Select ‘Set Param’ (use arrow keys) and press “OK”.
4. Use the arrow key to select the ‘Timer’ and Press “OK”.
5. Use the arrow keys to select the desired field and press “OK” to edit.
6. Use the 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.
7. Use the arrow keys in same manner to program the ‘On’ time for when the system will switch on (on the selected day/days).
8. Use the arrow keys in same manner to program the ‘Off’ time – when the system will switch off.
9. Press “OK” to confirm the entry when finished setting all desired parameters.
10. If required, you can set up to 3 Timers by using the up and down arrow keys.
11. Press “ESC” until the time and date screen is displayed.

Setting the Current Date and Time (7000 Series Controller)

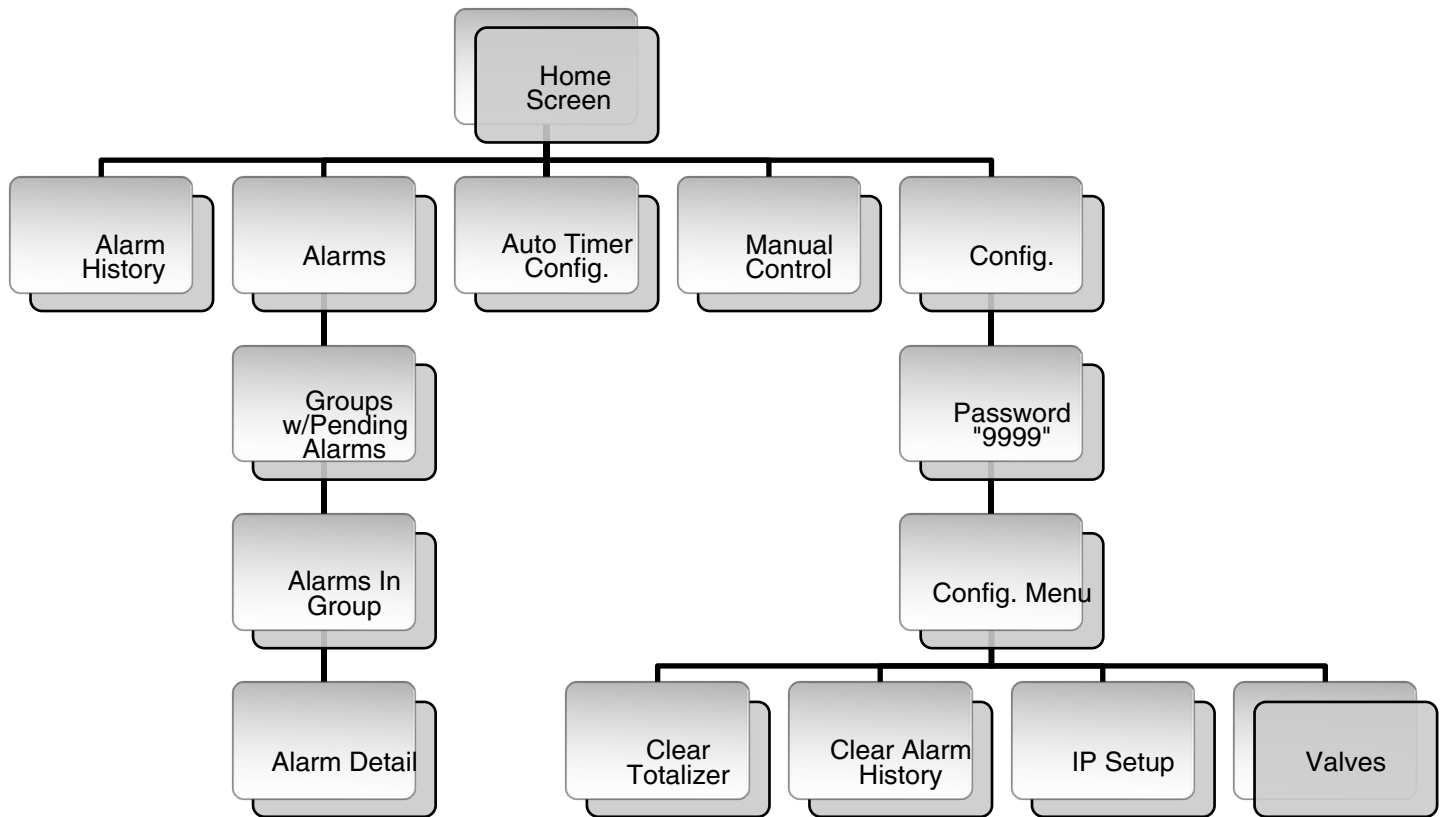
1. Please make sure the pump is set to “OFF”.
2. On the home screen, long-press (for a few seconds) to the right of the AXI logo until a new screen appears.
3. Select ‘Enter Info Mode’.
4. Once prompted, enter ‘1111’ for the password.
5. Select ‘Time and Date’.
6. Select and set the current time and date in military format.
7. Once finished, continually press ‘ESC’ until you are returned to the home screen. The updated information should be shown in the header of the touch screen pages.

Programming the Timer (7000 Series Controller)

1. From the home screen, select ‘Timers’.
2. Once on the ‘Timers’ screen, you can set up to 3 run timers for each day of the week.

3. To set up a runtime simply enter a 'Start' and 'Stop Time' (using military format) in one of three timer boxes for the desired weekday.
4. To toggle between weekdays, simply press the available buttons on the left or right of the screen labeled with the abbreviation for the previous or next day in the week (e.g. "MON", "WED").

Touchscreen Menu Structure (7000 Series Controller)



Modbus TCP/IP Communication (7000 Series Controller)

Setting up the IP Address:

1. From the Main Menu, press the "CONFIG" button.
2. Input "9999" and press the enter key ("↵").
3. Push "IP Config" and continue onto the next page.
4. Enter the desired values for the PLC IP Address, PLC IP Mask, PLC IP Gateway, PLC Remote IP, and Network ID.
5. Power cycle the touchscreen HMI/PLC.

Note: When communicating via Modbus TCP/IP (Port 3 – Ethernet Cable Slot), the PLC Remote IP and Network ID do not need to be utilized for the proper functionality.



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

The head of the pump on the system is shipped from the factory filled with No. 2 Diesel Fuel Oil in it to facilitate initial lubrication. This will not eliminate the necessity to prime completely the system. An externally installed priming tee (not provided) should be utilized to prime the system. The primary filter along with the suction line(s) must be completely filled with fuel (not trapped air) prior to initial system start-up.

The system is equipped with a vacuum gauge on the input side of the pump. The gauge should read no more than 15" HG vacuum maximum under normal conditions. Vacuum gauge readings reaching 16" HG indicate excessive debris in the strainer or mechanical water separator. Also, it could be derived from above average flow restriction or too high suction height. This will likely result in pump shutdown and activate the high vacuum alarm.

Note: 16" HG vacuum = clogged strainer or water separator or suction line flow restriction/excessive lift.

The system's pressure gauges 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 the need for filter replacement, 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 pump pressure relief valve has a 48-50 PSI set point. System pressure in excess of 48-50 PSI will cause the pressure relief valve to open and vent fuel back to the fuel transfer pump inlet side.

Commissioning/Initial Start-Up

Gauge Venting

After shipment, gauge pointers may not rest at zero due to internal case pressure build-up, which is caused by temperature and/or pressure variations. As a result, their accuracies may be significantly reduced. To restore the gauges to operating condition, move the yellow lever of the fill plug to the open position or remove the black rubber piece from top of gauge and leave it open to vent.

Switch Adjustments

Note: Please contact AXI International before adjusting either the vacuum or the pressure switch to avoid voiding the system's warranty.

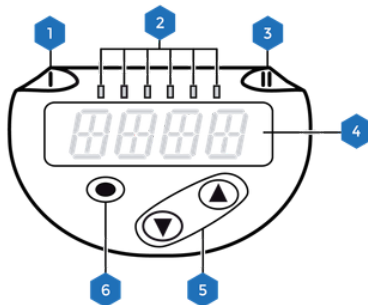
Vacuum and Pressure Switches

When the value exceeds the set point of the switches' rating, the switch will change state. Ensure you are working with a normally closed position (leads on opposite sides of the switch – across from one another are connected to the wire spades). If the set point is incorrect, adjustments can be performed in the field as follows:

1. Remove the two wires connected to the normally closed spades on the top of switch.
2. Pop off the "Rubber Plug" in between the spades on top of the switch.
3. Insert a 5/64" Allen Wrench/Key into the slot.
4. For a vacuum switch, adjust the Wrench/Key $\frac{1}{4}$ - $\frac{1}{2}$ turn at a time CCW to increase the vacuum alarm's set point. 5. For a pressure switch, adjust the Wrench/Key $\frac{1}{4}$ - $\frac{1}{2}$ turn at a time CW to increase the pressure alarm's set point. 6. After adjusting the settings, perform the testing procedure(s) for the switch(es) as outlined in the commissioning section.

Flow Switch

When the flow rate drops below the predetermined set point on the flow switch, the switch will trigger a signal to shut down the pump. The Set Point (SP1) on the flow switch should be set at the nominal flow rate of the system. There is also a Reset Point (rP1) which should be set to 5% less than the SP1 setting. If the set point is incorrect, an adjustment can be performed in the field as follows:



1. Status Indicator 1
2. Flow Rate and Temperature Indicators
3. Status Indicator 2
4. Alphanumeric Display
5. Up/Down Directional Arrows
6. Selection Button

1. To change the Set Point (SP1), press the Selection Button to display the current SP1 setting.
2. Press the Selection Button again, Status Indicator 2 should be illuminated and a GPM value will be displayed.
3. Hold the Up Directional Arrow for 2-3 seconds, then use the Up and Down Directional Arrows to change the SP1 value.
4. When finished, press the Selection Button to store that value as the adjusted Set Point (SP1).
5. To change the Reset Point (rP1), press the Selection Button to display the current SP1 setting and then press the Down Directional Arrow to display the current rP1 setting.
6. Press the Selection Button again, Status Indicator 2 should be illuminated and a GPM value will be displayed.

- 
7. Hold the Up Directional Arrow for 2-3 seconds, then use the Up and Down Directional Arrows to change the rP1 value.

Note: For information on factory set points or timer delays please refer to the “Accessories and Additional Configuration Parameters” subsection in the “Technical Assistance and Ordering” section.

Internal Pressure Relief Adjustment

Note: Please consult AXI International before performing any internal pressure relief settings to avoid warranty issues

The pump used on the STS systems come from the factory with a pre-set internal pressure relief bypass. If the pressure on the discharge of the pump rises past this set point, the internal bypass will open and recirculate the fuel in the head of the pump to protect the itself and any downstream components. When this happens, the discharge branch of the system will not see the proper fuel flow, most likely causing the system to fail on a low flow alarm.

By adjusting this Internal Pressure Relief to a point past the set point on the Pressure Switch, the system will fail on a High-Pressure condition before the relief begins to open, allowing fuel to flow fully while within the acceptable pressure range. The desired set point for pump Internal Relief Valve is around 48-50 PSI, which is higher than the pressure switch setting, and lower than the operational pressure limit on the system fine filter.

Tightening the Bypass Spring:

1. To tighten the spring in the pump head, remove the blue cover nut located on the left side of the pump head
2. Loosen the secondary nut to allow for screw adjustment
3. Using a flathead screwdriver, tighten the screw two full turns (clockwise)
4. Restore the secondary nut and blue cover, tightening them down to their original positions

Initial Test Procedures

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

- **Leak Detection** - Manually raise the float switch located at the bottom of the leak-basin. The pump should immediately turn off and the “Leak Detection” alarm should be indicated on the System Controller. Reset the alarm by lowering the float switch and pushing the Alarm Reset button on the enclosure door panel.
- **High Vacuum Alarm** - Slowly, partially close the inlet ball valve. At 16” HG, the pump should turn off and “PLS SERVICE PRIM. FILTER...” or “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 enclosure door panel.
- **High Pressure Alarm** - Slowly, partially close the outlet ball valve. At 22 PSI, the pump should turn off (after a delay of about 1 second) and “PLS SERVICE SEC. FILTER...” or “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 enclosure door panel.
- **Water Sensor** - 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” or “PLS. DRAIN WATER/BOWL...” should be indicated on the System Controller. Remove the metal and reset the alarm by pushing the Alarm Reset button on the enclosure door panel.

Note: Systems with the Auto Water Drain (AWD) functionality have two sets of water sensing probes on the primary filter bowl. Please refer to the AWD section on for additional information.

- **No Flow Alarm** – Ensure orange light indicator turns on when the system pump is on (moving fluid) and off when the system is not running. Disconnect the M12 connection on the back of the flow switch. The pump should turn off and the “No Flow Alarm” or “PLEASE PRIME SYSTEM / CHECK FLOW” should be indicated on the System



Controller up to 15 seconds after disconnection. Use Flow Switch Setting & Adjustment instructions to return the switch to the proper setting. Reset the alarm by pushing the Alarm Reset button on the enclosure door panel.

- **Auto Water Drain Float Switch (If Applicable)** - Manually raise the “HIGH” float switch located on the Auto Water Drain’s Water Collection Drum. An alarm should be indicated on the System Controller. Reset the alarm by pushing the Alarm Reset button on the enclosure door panel.
- **Tank Overflow (If Applicable)** – Manually raise the “HIGH” float switch located on each of the connected tanks. The pump should immediately turn off and the “Tank Overflow” alarm should be indicated on the System Controller. Reset the alarm by pushing the Alarm Reset button on the enclosure door panel.

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

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. The electrical sub-panel mounted main disconnect switch is operating properly.
2. The user supplied remote circuit breaker is in the "OFF" position.
3. All sources of power are isolated from the unit.

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

4. Drain visible water and sediment from the primary filter (see Servicing Primary Filter/Water Separator).
5. Check system and all parts for corrosion and rust.
6. Check mounting hardware – tighten as necessary.
7. 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.
8. The hardware uses lock nuts – check all bolts for secure nuts.
9. Check all electrical terminals and connections for tightness.
10. All motors are permanently lubricated and do not require any lubrication.
11. Check all plumbing joints for leaks, tighten fittings and joints as necessary, and remove accumulated fuel in leak-basin as necessary.
12. Inspect all filter(s) and separator(s).

Note: All filter elements should be replaced at least every six (6) months.

Servicing the Primary Filter/Water Separator

Clogged primary filter elements restrict the flow of fuel, resulting in the system's vacuum gauge indicating a pressure drop. The gauge reads the condition between the Primary Filter and the pump. At a pressure drop of 16" HG, the pump will automatically shut off and activate an alarm. This signal indicates that it is time to either back flush or change the filter element.

Servicing of Water Separator:

1. Turn the enclosure door panel selector switch to the "OFF" position – making sure the pump will not turn on.
2. Close the inlet and outlet ball valves.
3. Open the bleed screw at the top of the Water Separator.
4. Place a fuel waste container below the yellow safety drain valve on the bottom of the filter bowl (unless system is equipped with the Automatic Water Drain option – OPT-AWD).
5. Open the yellow safety drain valve (push & turn counterclockwise).
6. Close after approximately 2 seconds.
7. After approximately 10 seconds, reopen the drain valve, allowing water to settle out of the fuel.
8. Close after visible sediment, particles, and water have been drained from the vessel.
9. Open the inlet and outlet ball valves on the system.
10. Press the Alarm Reset button on the enclosure door panel to acknowledge the alarm and reset it, if needed.
11. Return the selector switch to its original position and check for leaks when re-starting and pressurizing the system.

Servicing the Fine Filter(s)

Clogged filter elements restrict the flow of fuel, resulting in the system's pressure gauge indicating a pressure spike. The gauge is mounted between the pump and the fine filter. At a pressure of 22 PSI, the pump will automatically shut off and generate a High Pressure Alarm. This signal indicates that it is time to change the filter element.

Changing the Fine Filter(s):

1. Turn the enclosure door panel selector switch to the "OFF" position – making sure the pump will not turn on.
2. Close the inlet and outlet ball valves.
3. Place an appropriate container underneath the filter.
4. Remove the old spin-on filter with a filter wrench.
5. Apply a film of lubricating oil to the gasket of the new filter. Screw the new filter canister to the filter head until the gasket is tight and secure (rotate the element an additional 0.5-1.0 turn after the filter makes contact with the gasket).
6. Open the inlet and outlet ball valves.
7. Push the Alarm Reset button on the enclosure door panel to acknowledge the alarm and reset it.
8. Return the enclosure door panel selector switch to its original position.
9. Check for leaks when re-starting and pressurizing the system.

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.

Replacement Filter Chart

STS SERIES FILTERS			ALL FILTERS ARE ABSOLUTE, UNLESS OTHERWISE NOTED WB: WATERBLOCK SS: STAINLESS STEEL SCREEN			
	3μ	3μ WB	10μ	10μ WB	25μ	3μ X-GLASS
STS 6020/7020	FF-3	WB-3	FF-10	WB-10	FF-25	FFZ-3
STS 6040/7040	FF-3	WB-3	FF-10	WB-10	FF-25	FFZ-3

Servicing the Wye-Strainer

Excessive debris in the Wye-Strainer will result in a pump shutdown and "High Vacuum" alarm. This indicates that it is time to clean the strainer basket.

Servicing the Wye-Strainer:

1. Turn the enclosure door panel selector switch to the "OFF" position – making sure the pump will not turn on.
2. Close the inlet and outlet ball valves.
3. Place an appropriate container below the drain valve bottom of the Wye-Strainer
4. Open the drain valve and allow all fluid to drain from the Strainer
5. Using an adjustable wrench, unscrew the cap on the bottom of the Strainer
6. Remove the strainer basket, clean, and replace
7. Replace the cap on the bottom of the Strainer and tighten securely
8. Close the drain valve
9. Open the inlet and outlet ball valves.
10. Push the Alarm Reset button on the enclosure door panel to acknowledge the alarm and reset it.
11. Return the enclosure door panel selector switch to its original position.
12. Check for leaks when re-starting and pressurizing the system.



Auto Water Drain (AWD) – *If Applicable*

Servicing AutoWaterDrainStrainer:

1. Turntheenclosedoorpanelselector switch to the “OFF” position – making sure the pump will not turn on.
2. Closethesystem’sInletandOutletIsolation Ball Valves.
3. Placeafuelwastecontainerbelowthe strainer and Manual Drain Port.
4. EnsuretheAWD’sIsolationBallValve is closed by opening the Manual Drain Port.
5. OpenthebleedscrewontopoftheWater Separator to break vacuum.
6. RemoveandcleantheAWD’sstrainer.
7. Reattachandsecurethestrainertothe AWD assembly.
8. Continueto“ServicingWaterCollection Drum”.

Servicing WaterCollectionDrum:

1. Keep afuelwastecontainerbelowthe Manual Drain Port (Please see Step 3).
2. RemovetheFloatSwitchfromtheWater Collection Drum.
3. ProperlydisposecontentsoftheWater Collection Drum in accordance with the proper AHJ.
4. ReplacetheFloatSwitchtoitsoriginal state on the Water Collection Drum.
5. Continueto“ManualServicingofWater Separator”.

Manual ServicingofWaterSeparator:

1. Keepafuelwastecontainerunderthe Manual Drain Port.
2. OpenthebleedscrewontopoftheWater Separator to break vacuum.
3. OpentheAWDIsolationBallValveand Manual Drain Port.
 - a. See“ServicingthePrimaryFilter/Water Separator” for additional info.
4. ClosetheManualDrainPortwhenall water has been drained from the Water Separator Vessel.
5. Openthesystem’sInletandOutletIsolation Ball Valves.
6. ConfirmthattheAWDIsolationBallValve and Manual Drain PORTs are returned to their original positions.
7. Returntheenclosedoorpanelselector switch to its original position.

Troubleshooting

Symptom Troubleshooting Guide

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. Intake or outlet valve closed
7. 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 for extended periods of time
3. 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 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. Liquid too viscous
2. Bent pump shaft, binding rotor
3. Misalignment of pump/motor coupler

Noisy operation

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

Alarm "NO FLOW ALARM" comes on or pump requires frequent re-priming

1. Inoperative foot valve
2. Inoperative check valve
3. Inoperative solenoid valve (optional)
4. Pump cavitation
5. Plumbing air leaks
6. Lift too high
7. Leaking pump seal
8. Pump's internal bypass/pressure relief valve cracking pressure is under 48-50 PSI.

Motor does not turn or turns intermittently

1. Control power not available
2. Supply voltage is too low and/or incorrect
3. Motor thermal overload condition
4. Pump failed and seized
5. 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

SALES CONTACT



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