SIMPLEX®

Insight Onsite

SMARTFILTER

STATIONARY FILTRATION UNIT

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Last Revision Date: June 8, 2021

For the most up-to-date information for this product and others, please contact Simplex, Inc. at (800) 637-8603 or visit us on the web at http://www.simplexdirect.com.

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1 WARNINGS AND CAUTIONS

Safety Information Symbols

The following images indicate important safety information:

This **General** warning symbol points out important information that, if not followed, could endanger personal safety and/or property.

This **Explosion** warning symbol points out potential explosion hazards.

This **Fire** warning symbol points out potential fire hazards.

This **Electrical** warning symbol points out potential electrical shock hazards.

Cautions

Improper operation of this equipment such as neglecting its maintenance or being careless can cause possible injury or death. Permit only responsible and capable persons to install, operate, and/or maintain this equipment.

- Potentially lethal voltages and amperages are present in these machines. Ensure all steps are taken to render the machine safe before attempting to work on the equipment.
- All hardware covered by this manual have dangerous electrical voltages and can cause fatal electrical shock. Avoid contact with bare wires, terminals, connections, etc., on the hardware, if applicable. Ensure all appropriate covers, guards, grounds, and barriers are in place before operating the equipment. If work must be done around an operating unit, stand on an insulated dry surface to reduce shock hazard.
- Do not handle any kind of electrical device while standing in water, while barefoot, or while hands or feet are wet. DANGEROUS ELECTRICAL SHOCK MAY RESULT.
- If trained personnel must stand on metal or concrete while installing, servicing, adjusting, or repairing this equipment, place insulative mats over a dry wooden platform. Work on the equipment only while standing on such insulative mats.
- The National Electrical Code (NEC), Article 250 requires the frame of the equipment to be connected to an approved earth ground and/or grounding rods. This grounding will help prevent dangerous electrical shock that might be caused by a ground fault condition or by static electricity. Never disconnect the ground wire.
- Wire gauge sizes of electrical wiring, cables, and cord sets must be adequate to handle the maximum electrical current

(ampacity) to which they will be subjected.

- Before installing or servicing this (and related) equipment, make sure that all power voltage supplies are completely turned off at their source. Failure to do so will result in hazardous and possibly fatal electrical shock.
- In case of accident caused by electric shock, immediately shut down the source of electrical power. If this is not possible, attempt to free the victim from the live conductor. AVOID DIRECT CONTACT WITH THE VICTIM. Use a nonconducting implement, such as a dry rope or board, to free the victim from the live conductor. If the victim is unconscious, apply first aid and seek immediate medical attention.
- Never wear jewelry when working on this equipment. Jewelry can conduct electricity resulting in electric shock or may get caught in moving components causing injury.

- Keep a fire extinguisher near the hardware at all times. Do NOT use any carbon tetra-chloride type extinguisher. Its fumes are toxic, and the liquid can deteriorate wiring insulation. Keep the extinguisher properly charged and be familiar with its use. If there are any questions pertaining to fire extinguishers, please consult the local fire department.

- The illustrations in this manual are examples only and may differ from your unit.
- Main Disconnect to be provided by installer, rated 600V maximum, sized 150% maximum of rated current.
- The system shall be for use with fuel oil as described by NFPA321, "Basic Classification of Flammable and Combustible Liquids." As defined by this standard, the fuel supply system shall be for use with "combustible liquids," those having a flash point at or above 100°F and further defined as Class II or Class III liquids. In no case shall a liquid having a flash point less than 100°F be used. In every case, the system shall not be used or applied at a temperature in excess of the flash point of the contents. Electrical equipment used in the system shall be in accordance with NFPA30, section 5-7, wherein it states "For areas where Class II or Class III liquids only are stored or handled at a temperature below their flash points, the electrical equipment may be installed in accordance with provisions of NFPA70, National Electrical Code, for ordinary locations..."
- It is the site's responsibility to accommodate for thermal expansion. Failure to install relief valves will void your warranty, as well as risk a fuel oil spill.

2 NAMEPLATES AND PLACARDS

SUPPLY FROM TANK

RETURN TO TANK

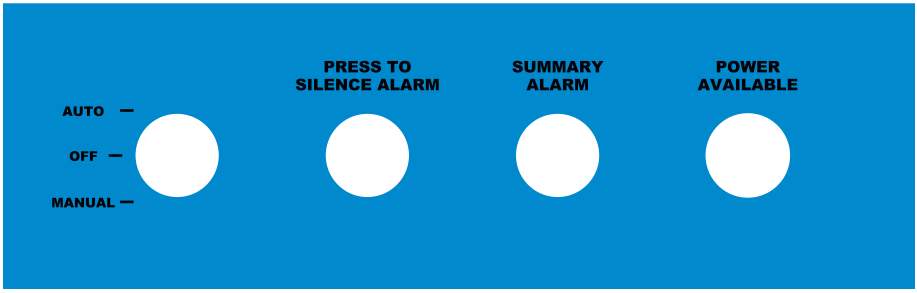
SIMPLEX®
(800) 637-8603
www.simplexdirect.com

W.O.#: XXXXX
MODEL: SF-XX
PUMP LIFT: XX FEET MAXIMUM
FLUID VISCOSITY: XXX SSU
SHORT CIRCUIT
CURRENT RATING: 5 kA
ENCLOSURE: TYPE 3R
PUMP M0TOR: XX HP, XXX FLA
VOLTAGE: XXXVAC, X-PH, XXHZ
FULL LOAD AMPS:
XXA-SYSTEM TOTAL

AFTER REPLACING FILTER, PRIME THE COALESCER CANISTER WITH WATER UP TO THE MIDDLE OF THE SIGHT GLASS.

REMOVE HATCH PIN BEFORE REPLACING FILTERS

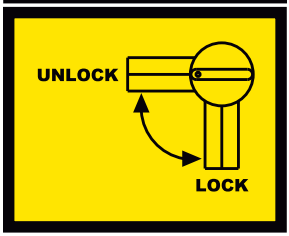
SmartFilter



DAMPER

**SUMMER,
PULL TO OPEN**

**WINTER,
PUSH TO CLOSE**



SIMPLEX®

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W.O.#: XXXXX

**REPLACE FILTER ELEMENTS
ANNUALLY OR WHEN INDICATED**

**PREFILTER ELEMENT:
SIMPLEX # XXXXX**

**COALESCER SEPARATOR:
SIMPLEX # XXXXX**

3 DESCRIPTION AND SPECIFICATION

Overview of use

The SmartFilter is a fuel oil filtration, conditioning, and maintenance system for tanks dedicated to diesel or turbine engine generator sets or with oil-fired boiler or process heat systems. SmartFilters are intended for use with fuel oil held in bulk, long-term storage, including underground and aboveground main supply tanks, large generator sub-base tanks and large day tanks. Typical tank capacities are in excess of 5,000 gallons, with 10,000-20,000 gallon or larger tanks being common.

The SmartFilter draws fuel from the bottom of the tank (25%- 33% of tank capacity) and returns the fuel with minimal disturbance of the settled strata, resulting in good filtration performance and removal of contaminants and water.

Capabilities

Most fuel contaminants will settle from still fuel, resulting in a stratification of fuel with contaminants concentrated in the lower strata. Therefore, it is necessary to circulate and filter the lower 25-33% of the tank contents. The SmartFilter draws fuel from the bottom of the tank and returns the fuel with minimal disturbance of the settled strata, resulting in good filtration performance and removal of contaminants and water.

It is recommended to size the SmartFilter to circulate and filter 25-33% of the tank capacity in a nominal 8-hour run period, once each week. Below is an example for a 20,000 gallon tank:

- 25% of 20,000g = 5000g to circulate and filter in an 8-hour period.
- 5000g/8 hours = 625 GPH or 10.4 GPM
- Use the Simplex SFG-10 SmartFilter
- For the same tank filtering 33%, or 6,600 gallons, run the SFG-10 for 11 hours or specify the SFG-20 and run for 5 hours

There is no absolute rule. If it is desired to filter greater than 33%, or even 100% of the tank, simply specify a larger SmartFilter or run the filtration system longer. These are continuous duty devices. The only limit to run time is filter condition, which is constantly monitored by the SmartFilter controller.

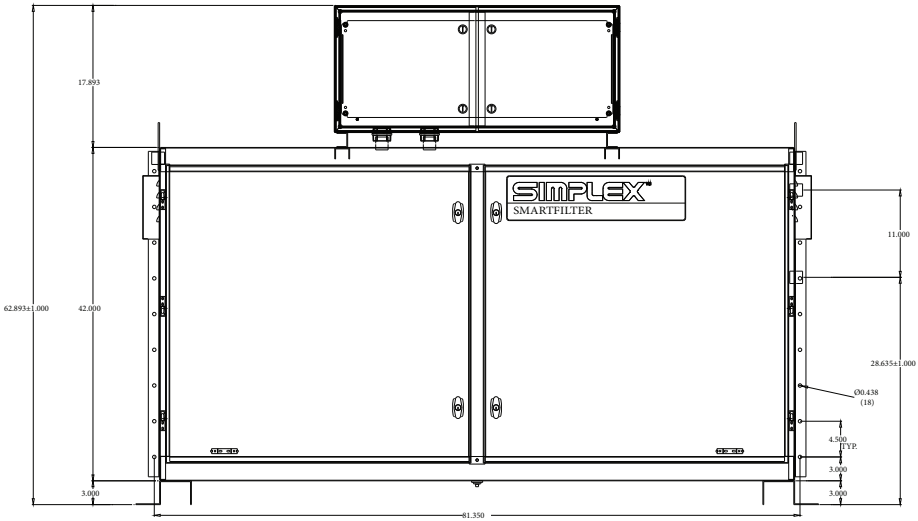


Figure 1 Dimensions

4 UNPACKING

Included components and parts

The following items are included with your SmartFilter. If any of the following are not included, please contact your Simplex representative or call Simplex Direct, Inc., at 800-637-8603.

1. SmartFilter
2. Manual
3. Electrical drawings package

Primary inspection

If any problems are observed during Primary Inspection, call Simplex 24 hours a day at 800-637-8603

Preventative visual inspection of the shipping crate and the SmartFilter is advised. Never apply power to a SmartFilter before performing this procedure. The following four-point inspection is recommended before installation and as part of a 6-month maintenance schedule:

1. If the crate shows any signs of damage, examine the SmartFilter in the corresponding areas for signs of initial problems.
2. Check the entire outside of the cabinet for any visual damage, which could cause internal electrical or mechanical problems due to reduced clearance.
3. Check electrical connections for tightness.
4. Examine all accessible internal electrical components.

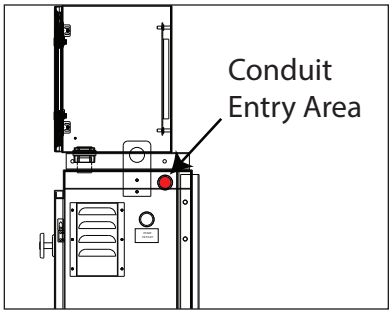
5 INSTALLATION

The SmartFilter should be installed on a concrete pad at the desired location, then wired to the power source and any other sensors or system integration connections.

INSTALLING WIRING

The SmartFilter must be completely wired prior to applying power. Failure to follow the wiring information and guide may result in product damage and loss of warranty coverage. If requested, startup services can be provided by Simplex Onsite, Inc. or Simplex, Inc. to check field wiring before applying power as well as assuring proper operation.

Figure 2 Conduit Entry Area



To bring cabling into the SmartFilter, pull a hole into the cabinet in the Conduit Entry Area (see **Figure 2**) and install a 3R-rated conduit connector for access.

INSTALLING CONTROL POWER

To install control power, connect a primary 120VAC, 60Hz, 30-amp power source to the SmartFilter's TB-PS-1-2. Ensure power source and SmartFilter are properly grounded.

INSTALLING BALL VALVES

Ensure that the Manual Override Switches on each ball valve are set to "(A) Auto." (See **"Manual Override Switch" on page 9**.)

Connect the two cables provided with Motorized Ball Valve 1 to the SmartFilter controller as follows (see **"Ball Valve" on page 9** for wire assignments:)

1. Neutral to TB-MBV-1
2. Open Valve to TB-MBV-10
3. Close Valve to TB-MBV-11
4. Actuator Ground to TB-MBV-4
5. Ground to TB-MBV-5
6. Valve Opened to TB-MBV-12
7. Valve Closed to TB-MBV-13
8. Status Common to TB-MBV-14

Motorized Ball Valve 2

1. Neutral to TB-MBV-2
2. Open Valve to TB-MBV-15
3. Close Valve to TB-MBV-16
4. Actuator Ground to TB-MBV-6
5. Ground to TB-MBV-7
6. Valve Opened to TB-MBV-17
7. Valve Closed to TB-MBV-18
8. Status Common to TB-MBV-19

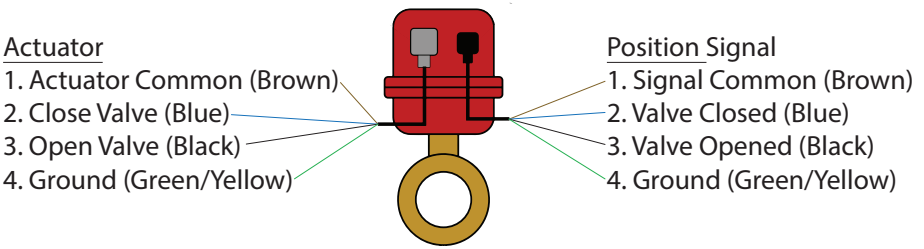
Figure 4 Manual Override Switch

Figure 5 Valve Connectors

Motorized Ball Valve 3

1. Neutral to TB-MBV-3
2. Open Valve to TB-MBV-20
3. Close Valve to TB-MBV-21
4. Actuator Ground to TB-MBV-8
5. Ground to TB-MBV-9
6. Valve Opened to TB-MBV-22
7. Valve Closed to TB-MBV-23
8. Status Common to TB-MBV-24

Figure 3 Ball Valve



Connecting Differential Pressure Switch

To connect the differential pressure switch to the SmartFilter, connect the normally open switch as follows: TB-B-15 and TB-B-4.

Installing BMS Monitoring

To connect the SmartFilter to your BMS/BAS setup, connect:

1. Wire Shielding to TB-C-1
2. RS485+ to TB-C-2
3. RS485- to TB-C-3

Installing Dry Contact Alarms

To connect the controller to external alarms, connect TB-R-1-15 to your system as follows:

For Summary alarm annunciation:

1. Common to TB-R-1
2. Normally Closed to TB-R-2
3. Normally Open to TB-R-3

For Not in Auto alarm annunciation :

1. Common to TB-R-4
2. Normally Closed to TB-R-5
3. Normally Open to TB-R-6

For High Water alarm annunciation:

1. Sensor common to TB-R-7
2. Normally Closed to TB-R-8
3. Normally Open to TB-R-9

For Fuel Line Leak alarm annunciation:

1. Sensor common to TB-R-10
2. Normally Closed to TB-R-11
3. Normally Open to TB-R-12

For Loss of Flow alarm annunciation:

1. Common to TB-R-13
2. Normally Closed to TB-R-14
3. Normally Open to TB-R-15

6 OPERATING INSTRUCTIONS

SETTING DATE AND TIME

1. On the System Status Screen (Figure 6), press the "MAIN MENU" button on the touchscreen.
2. Press the "SET TIME AND DATE" button (see Figure 7).
3. Select the current time, date, and day of the week and press the "ACCEPT" pushbutton. If the "ACCEPT" pushbutton is not pressed, the data will not be updated (Figure 8).

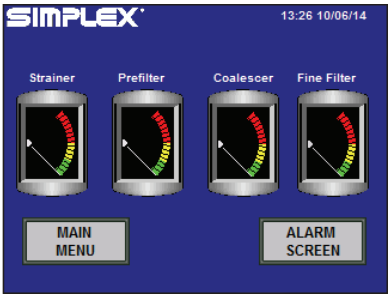


Figure 6 System Status Screen

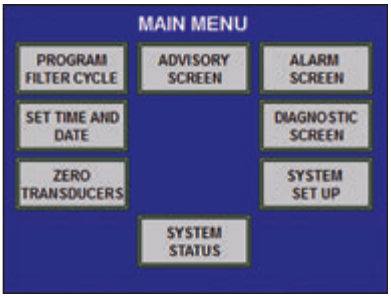


Figure 7 Main Menu

SCHEDULING AUTOMATIC FILTRATION CYCLES

1. At the main menu, press the "PROGRAM FILTER CYCLE" button.
2. Up to ten automatic filtration programs may be set by the user. Each program is set with a row of elements on this page (see Figure 9 on page 12).
3. Select the day of the week for your automatic program by pressing one of the elements in the "DAY" column. Press repeatedly to select the desired day of the week.

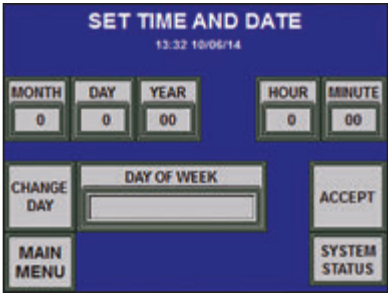


Figure 8 Time and Date Screen

4. Select the start time by pressing the hour and minute portions of the element in the "START TIME" column and entering the times on the popup keypad.
5. Select the duration of the automatic filter cycle by pressing

the hour and minute portions of the element in the "DURATION" column and entering the times on the popup keypad.

6. Select the tank number from which the fuel will be drawn by pressing the element in the "TANK" column and entering the number on the popup keypad. The maximum number allowed in this element is factory set to the number of tanks designed into your control system.
7. Press the "ACCEPT" pushbutton. If the "ACCEPT" pushbutton is not pressed, the data will not be updated.

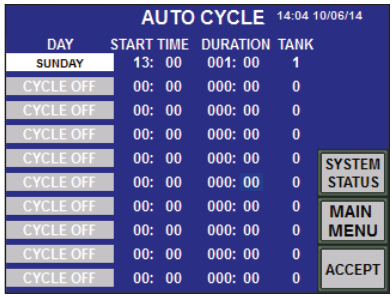


Figure 9 Program Filter Cycle Screen

When operating the SmartFilter, putting the physical Hand-Off-Auto switch on the control panel in Auto will set the filtration unit for Automatic Operation. Setting the switch in Hand mode enables Manual Operation and Fuel Transfer.

Automatic Operation

1. Place the Hand-Off-Auto switch in the auto position.
2. The conditioning system will now filter the fuel as programmed by the user on the "PROGRAM FILTER CYCLE" screen.
3. If run times overlap, and the overlapping programs are set for the same tank, the system will run the filter until the latest end time. Overlapping user programmed filter cycles is not recommended.

Manual Operation

1. Put the Hand-Off-Auto switch in Hand mode (Figure 10).
2. Press the "MANUAL" pushbutton.
3. The touchscreen will change to the Manual Filtration Screen (Figure 11).
4. Enter the number of

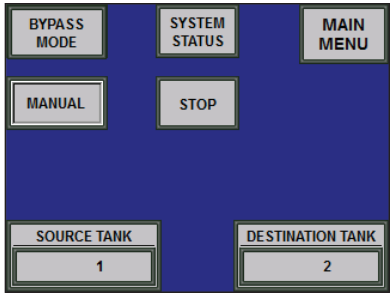


Figure 10 Manual Mode Screen

gallons to filter, or leave the field at 0 for unlimited filtration.

5. The pump will start and continue to run until the desired amount of fuel has been filtered, the "STOP" pushbutton is pressed, or a failure occurs. Most system alarm conditions are ignored when in manual.

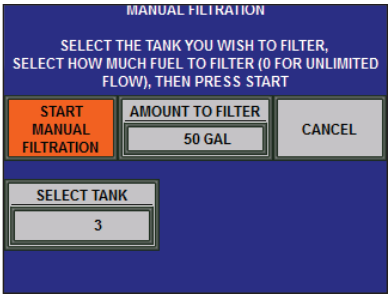


Figure 11 Manual Filtration Screen

TRANSFERRING FUEL

Fuel transfer from one tank to another is only available on multi-tank filtration systems.

1. Put the Hand-Off-Auto switch in Hand mode
2. Press the "TRANSFER" button.
3. Select the amount of fuel to transfer and the source and destination tanks.
4. Press the "START MANUAL FUEL TRANSFER" pushbutton.
5. The pump will start and continue to run until the desired amount of fuel has been transferred, the "STOP" pushbutton is pressed, or a failure occurs. Most system alarm conditions are ignored when in manual.

Viewing Tank Status

At the main menu, press the "TANK OVERVIEW" button on the touchscreen to enter the "TANK OVERVIEW" screen (Figure 12). At this screen the user can monitor the tank and valve status, as well as important information about the time since the last filtration and reset.

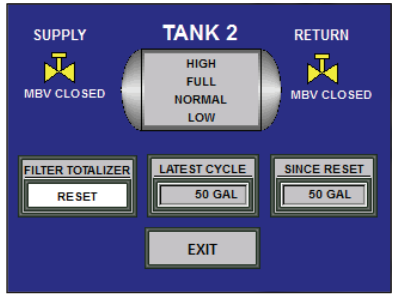


Figure 12 Tank Overview Screen

Automatic Water Drain

The automatic water drain and water tank (if purchased) operate based on three water sensors which distinguish between water and diesel fuel.

1. The safety water sensor (the lower sensor) must sense water for the water drain system to operate. If fuel is detected in the water line, an alarm is activated to alert the operator. To restore normal operation, the operator must manually drain the water line and prime it with water so that the safety water sensor detects water. Prime the water line by pouring water in the top of the dirty fuel side of the filter canister. This alarm usually indicates a fault with the solenoid valve (stuck open) or one of the three water sensors.
2. When the filter system is in normal operation and both the upper and middle water sensors detect water in the coalescer, the water drain solenoid valve opens.
3. The water drain solenoid closes when the lower water sensor in the coalescer stops detecting water, or when one of the following conditions occurs:
   a. The safety water sensor detects diesel (or air).
   b. An Emergency Stop is activated.
   c. Either of the water holding tank high level floats is triggered.
   d. The pump stops.

Water Sensor Operation

The water sensors provide a signal to the PLC when they detect water. For this reason, air and diesel both look the same to the water sensors. The safety water sensor must be flooded with water for the filter to operate; air or diesel in the water drain line will trigger a Fuel in Water Line alarm.

The power to the water sensors is pulsed to prolong the life

of the sensors:

- When the pump is running, the water sensors are powered for ten seconds out of every minute.
- The sensors are continuously powered during and for two minutes after a water drain cycle.

Priming the System with Water

For systems with automatic water drain, any time the water line is drained (changing the filter, etc.), it is necessary to prime the system with water. To prime the system, pour water into the top of the coalescer until it shows in the sight glass.

Filter Replacement Schedule

Replace filters annually or when indicated by Smart Filter "SERVICE PREFILTER" or "SERVICE COALESCER" alarms, whichever occurs first.

Simplex filter element reorder part numbers are displayed on the placard inside the door of the filter unit.

7 ALARMS AND WARNINGS

The SmartFilter can register a number of alarms. When an alarm is sounded, you can silence the horn on the SmartFilter by pressing the “Horn Silence” button. Address the issue and press the “Alarm Reset” button to clear the error.

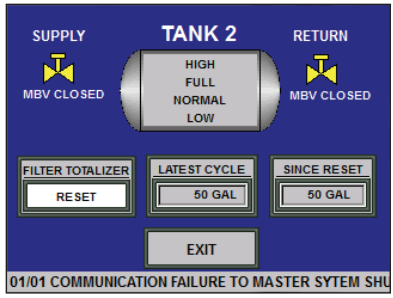


Figure 13 Alarm Banner

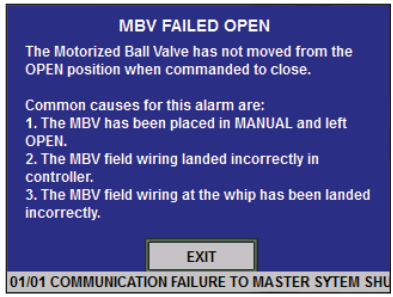


Figure 14 Alarm Help Screen

Do not ignore alarms and warnings, no matter how trivial they may seem. Doing so risks damage to your equipment and reduces reliability of your emergency power system.

To view information about the alarm, press the notification banner that appears at the bottom of the screen (Figure 13). This will open a help screen to explain the failure (Figure 14).

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