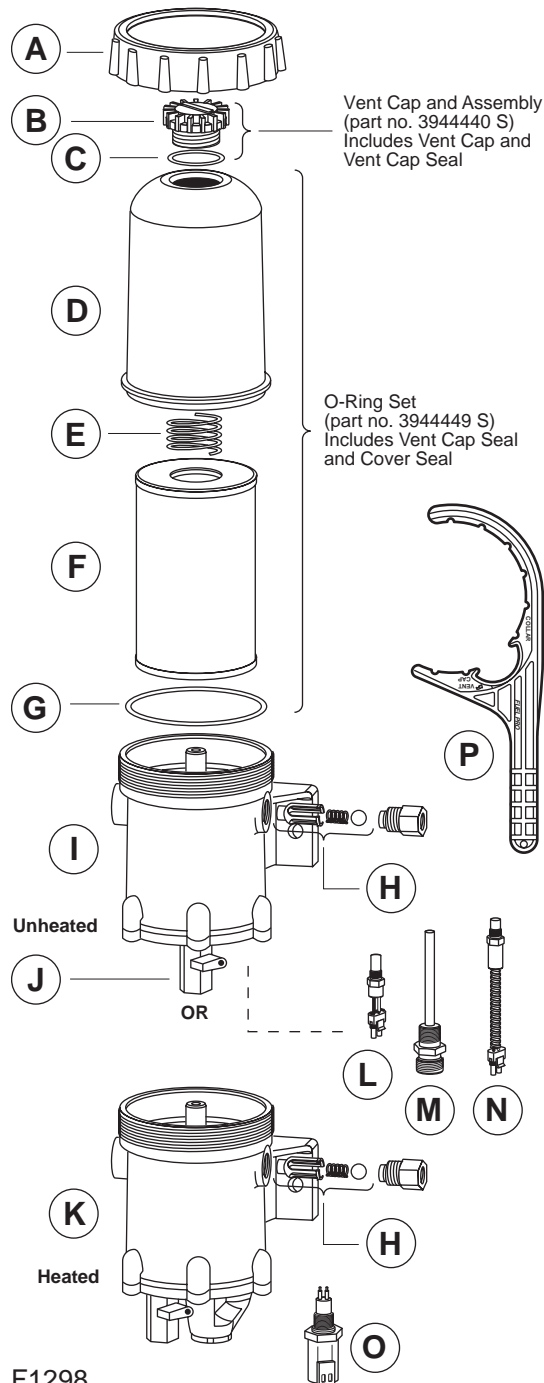




Fuel Pro[®] Installation Instructions

FH230 Series Filter / Separator / Warmer



- A. Collar (part no. 3946706 S)
- B. Vent Cap
- C. O-Ring
- D. Cover Assembly (part no. 3946705 S)
- E. Holddown Spring (part no. 3944441 S)
- F. Filter Element (Includes Grommet and O-Rings) (see Table 4 for ordering information)
- G. **O-Ring Pack** (part no. 3944449 S) – included with each replacement element;
Biodiesel Gasket Pack (part no. 3950445 S) – only required for >B5 fuel
- H. Check Valve Service Kit (part no. 3944447 S)
- I. Fuel Pro, Unheated (see page 7 for ordering information)
- J. Drain Valve (part no. 3944453 S)
- K. Fuel Pro, Heated (see page 7 for ordering information)
- L. 12 VDC / 24 VDC Electric Heater (see page 5 for ordering information)
- M. 120 VAC Electric Heater (see page 5 for ordering information)
- N. Thermo-Switch (see page 5 for ordering information)
- O. Water In Filter (WIF) Sensor (part no. 3911940 S)
- P. Collar Wrench (part no. 3944451 S (plastic) or 3944448 S (metal))

CAUTION: These instructions are intended for use by professional mechanics who are trained in the proper use of power and hand tools, using appropriate safety precautions (including eye protection).

Service Kit Installation

This system must be installed between the fuel tank and the transfer fuel pump. This system **can be used as the only fuel filter in the fuel system** by removing the existing filter and heads, or remove the filters only and replace with special Diverter Caps (sold separately - see Table 1).

Note: If the Fuel Pro is used as the primary filter and a secondary filter is required, secondary filter life may be extended.

Table 1 - Diverter Cap Part Numbers

Diverter Cap Part Number	Required Filter Head Stud Size	Required Filter Head Seal ID	Required Filter Head Seal OD
3945182 S	1"-14	2.475"	2.895"
3945183 S	1"-14	3.225"	3.435"
3945184 S	M16 x 1.5	2.475"	2.895"
3945185 S	3/4" x 16	2.475"	2.895"
3945186 S	7/8" x 14	2.475"	2.895"
3945187 S	M18 x 1.5	2.475"	2.895"
3945188 S	13/16" x 12	3.225"	3.235"

WARNING: When diesel fuel is circulated through an operating engine, it can become very hot. To prevent personal injury:

- **Scalding hazard! Do not allow heated liquid fuel to come in contact with eyes or unprotected skin. Always allow the engine and fuel to cool to ambient temperature before replacing the fuel filter or performing service operations which could result in the spillage of fuel from the fuel system. If this is not possible, protective clothing (face shield, insulated hat, gloves, apron) must be worn.**
- **Heated diesel fuel can form combustible vapor mixtures in the area around the fuel source. To eliminate the potential for fire, keep open flames, sparks or other potential ignition sources away from the work area, and do not smoke during filter replacement or service operations which could result in the escape of diesel fuel or fuel vapors.**
- **Always perform engine or vehicle fuel system maintenance in a well ventilated area that is kept free of bystanders.**

Installing the Fuel Pro Service Kit

Step 1 - With the engine shut down and at ambient temperature, close the fuel shutoff valve (if equipped) and place a suitable container under the fuel filters.

Step 2 - Remove the primary fuel filter element assembly, sedimenter, and/or water separator. Drain the used element and dispose of it in an environmentally responsible manner, according to state and/or federal (EPA) or national recommendations. The fuel can be returned to the tank.

Step 3 - For a one-filter system, select the required secondary filter head diverter cap from those listed in Table 1. The required part number is determined by the size of the spin-on filter stud and the filter sealing surface diameter.

The Fuel Pro is designed to provide total engine filtration, when fitted with the appropriate filter to meet OEM engine specifications. Installation of the Fuel Pro should be on the suction side of the fuel system. Introducing the Fuel Processor to more than 30 psi (2.07 bar) at any time can cause unit failure or give false information regarding filter life.

Install the diverter cap on the secondary filter head as follows:

- Remove the secondary fuel filter element, drain and dispose of it in an environmentally responsible manner according to government regulations (i.e., state/province, federal, etc.). The fuel can be returned to the tank.
- Lightly lubricate the seal on the top of the diverter cap with clean engine oil.
- Thread the adapter onto the secondary filter stud and tighten by hand plus 1/2 turn further.
- Install the "Do Not Remove" sticker on the diverter cap.

Step 4 - Mount the Fuel Pro in the desired location keeping the following points in mind:

- Mounting the Fuel Pro directly on the engine is NOT RECOMMENDED.**
- Mount vertically with the cover and element pointing up.
- Make sure there is enough top and side clearance for the cover to be conveniently removed for filter replacement.

CAUTION: The Fuel Pro functions BEST when installed so that the Filter Element is above the "FULL" level of the fuel tank. The housing can be installed up to 6' (1.8 m) below the "FULL" level of the fuel tank. Installing below the "FULL" level

causes the starting level to be higher than normal. If mounted below full tank level, a shut off valve will be required at the inlet to allow filter changes without overflow of fuel. Mounting below 6' (1.8 m) eliminates the Seeing is Believing functionality.

Step 5 - Route the fuel supply line from the fuel tank to the Fuel Pro inlet (Figure 1). Route a fuel line from the Fuel Pro outlet to the fuel pump inlet.

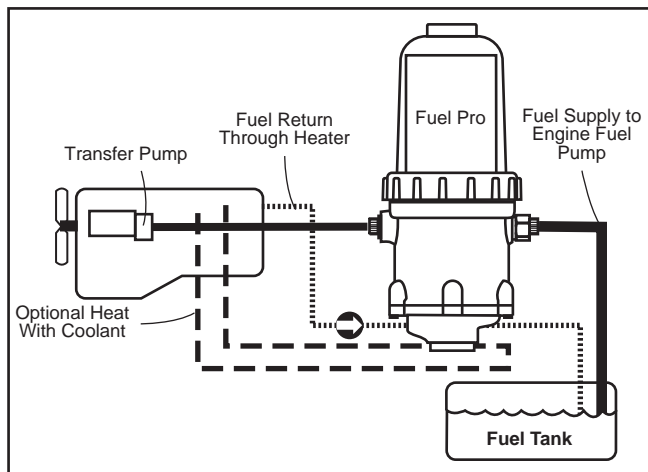


Figure 1 - Fuel Pro Connections

Step 6 - To minimize restrictions, observe the following guidelines when plumbing the system.

- Keep the fuel line routing as smooth as possible with no low hanging loops which can trap water.
- Use 90° elbows only when necessary.
- If the fuel hoses are made up to length on the job, be sure that the inner liner of the fuel hose is not cut by the fitting, creating potential check valve effects. Also make sure hoses are clean and free of debris before installing.

CAUTION: To avoid damaging the aluminum fuel processor body, do not overtighten fuel lines or fuel line fittings.

Installing a WIF (Water In Fuel) Probe

Step 1 - Install the WIF Probe (3911940 S) into the bottom of the Diesel Pro (see Figure 2). Torque to 20-25 in-lbs (2.3-2.8 N·m).

Step 2 - Install the WIF wiring harness (3945151 S) on WIF Probe. The harness has the following connections: 12" (304.8 mm) black ground lead with a 3/8" (9.53 mm) diameter loop end and a 72" (1828.80 mm) green WIF wire.

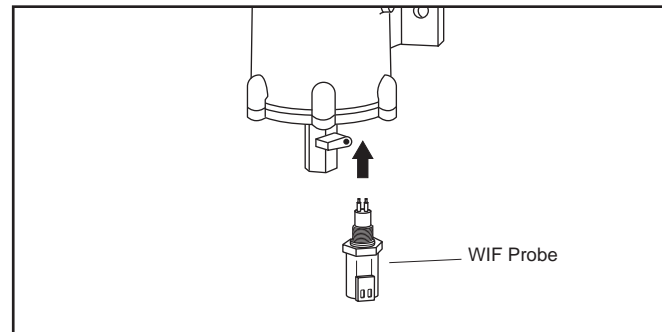


Figure 2 - WIF Probe Installation

Step 3 - Drill 1/2" (12.70 mm) hole in the dash or control panel where the WIF LED (3946670 S) is to be located.

- Installation must have 1.5" (38.10 mm) of clearance behind dash or control panel.
- Use caution not to damage nearby components when drilling.

Step 4 - Install WIF LED by pressing firmly into the drilled hole.

Step 5 - Connect the 4" (101.60 mm) black ground wire on WIF LED to a ground source. Attach additional black wire as needed.

Step 6 - Connect the 12" (304.8 mm) black ground lead with a 3/8" (9.53 mm) diameter loop end on the WIF wiring harness to ground source near Fuel Processor (if applicable).

Step 7 - Connect 72" (1828.80 mm) green signal wire on WIF wiring harness to 4" (101.60 mm) green signal wire on WIF LED. Use additional green wire as needed.

Step 8 - Locate 12 VDC or 24 VDC power source. Run red wire from power source to 4" (101.60 mm) red wire on WIF LED. Add a 10 A in-line fuse (not included).

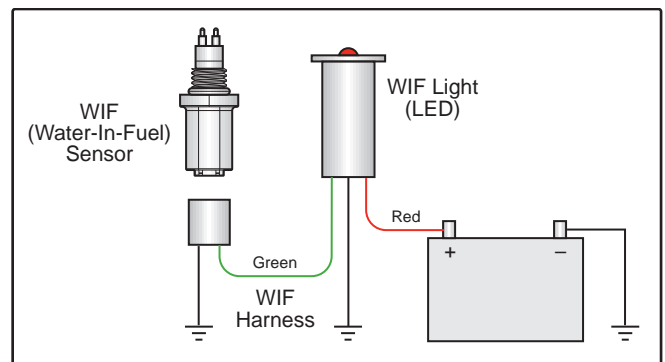


Figure 3 - WIF Wiring

Note: Use appropriate connectors to attach the wires. To test the WIF indicator, pour water into the body of the fuel processor until it covers the WIF probe. The WIF LED should illuminate. For unheated fluid, the volume of fluid necessary to turn the WIF indicator on is 6.15 oz ± .07 oz (182 mL ± 2 mL), for heated fluid the volume necessary is 3.08 oz ± .07 oz (91 mL ± 2 mL).

Fuel Heating Options

Note: The Engine Return Fuel Heat and Engine Coolant Heat options apply **ONLY** to the heater base shown in Figure 4. If the bottom plate is flat with 1/2" NPT ports, only the Electric Preheater can be used.

Engine Return Fuel Heat

Electronic unit injected engines can use return fuel as the fluid heat for the Fuel Pro. Route the return fuel line from the engine into the Heater Base of the engine Fuel Pro (see Figure 4). Either heater port will work as an inlet. Connect a second fuel return line from the Heater Base to the fuel tank return port.

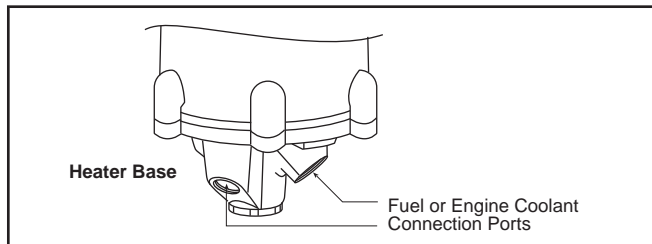


Figure 4 - Heater Base

Engine Coolant Heat

To use engine coolant as the Fuel Pro heating fluid, connect a hose (Braided #6 or #8 hose) from the high pressure side of the engine coolant system to the Fuel Pro Heater Base (see Figure 1). Either heater port will work as an inlet. Route another hose from the Heater Base to a low pressure port in the coolant system. **DO NOT route into the cab heater system.**

Optional Electric Preheater

The electric heaters available for the Fuel Pro FH230 have a separate Thermo-Switch. Refer to Figure 5 for installation parts. See Tables 2 and 3 for ordering information. See page 7 for preheater upgrade kit information.

Step 1 - If the Heater and Thermo-Switch (2) are not already installed, remove the 1/2" NPT plugs from the bottom plate of the Fuel Pro and install the Heater and Thermo-Switch. Torque to 15-30 ft-lbs (20.3-40.7 N-m).

Step 2 - Connect the Heater and Thermo-Switch with the Fuel Processor Harness (3).

Step 3 - Connect the Chassis-Ground Harness (4) to the Fuel Processor Harness.

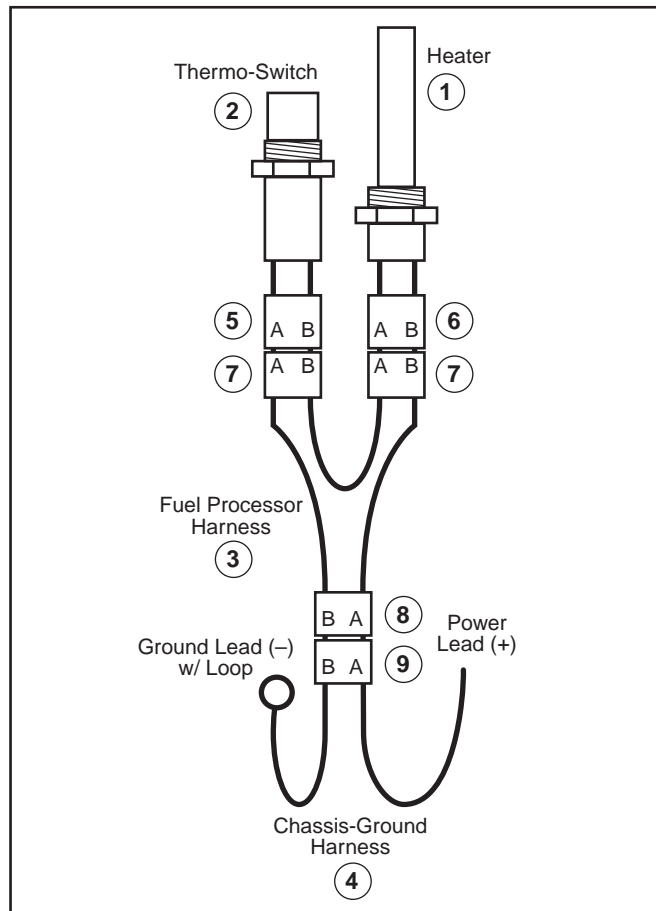


Figure 5 - Heater Installation Parts

Step 4 - Connect the Power Lead to the accessory side of the ignition switch. (Use of a 25 A fuse is recommended but not included in Fuel Pro kit. Use a relay if the equipment ignition circuit will not handle a minimum of 20 A. See Figure 6.)

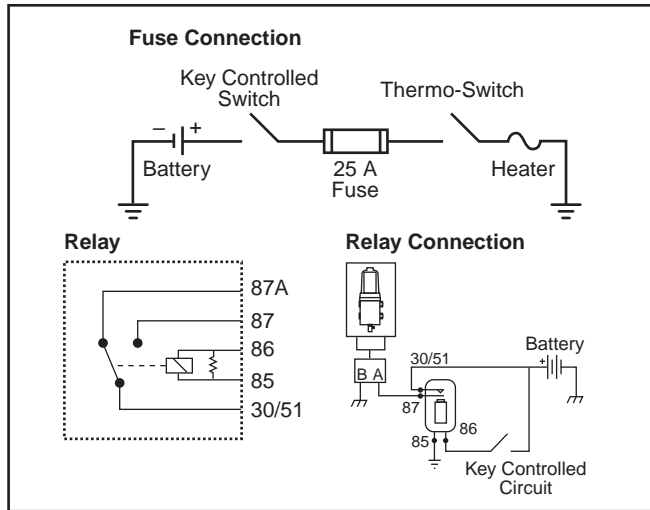


Figure 6 - Fuse and Relay Connections

Two types of cordsets are available for the 120 V heater. See Table 3 and Figure 7 for cordset information.

Table 2 - 12 V & 24 V Heater / Thermo-Switch Units

	Heater	3944450 S	3945136 S
1	Description	12 VDC	24 VDC
	Product	Fuel Pro	Fuel Pro
	Thermo-Switch	3946703 S	3946673 S
3	Fuel Processor Harness	3945120 S – Included with all Fuel Pro units	
4	Chassis-Ground Harness	3945123 S Power Lead – 180" (457.2 cm) Ground Lead – 24" (60.96 cm) Chassis-Ground Harness sold separately	
5	Connector	Packard 12015792	
6	Connector	Packard 12015792	Packard 12103584
7	Connector	Packard 12015793 – 2 pieces	
8	Connector	Packard 12103584 – 1 piece	
9	Connector	Packard 12010973	

Note: 25 A fuse is recommended but not included in Fuel Pro kits.

Table 3 - 120 V Heater Unit

Heater	3945121 S		
Description	120 VAC		
Product	Fuel Pro		
Connector	Part Number	3945126 S	3946716 S
	Type	Single Cordset	Y Cordset (Y cord to processor and block heater w/ locking ring)
	Plug	120 V Male Wall Plug	120 V Male Wall Plug
	Temp. Rating	221 °F (105 °C)	221 °F (105 °C)
	Cordset Length	72" (182.9 cm)	Straight Leg – 84" (213.3 cm) Long Leg – 120" (304.8 cm)

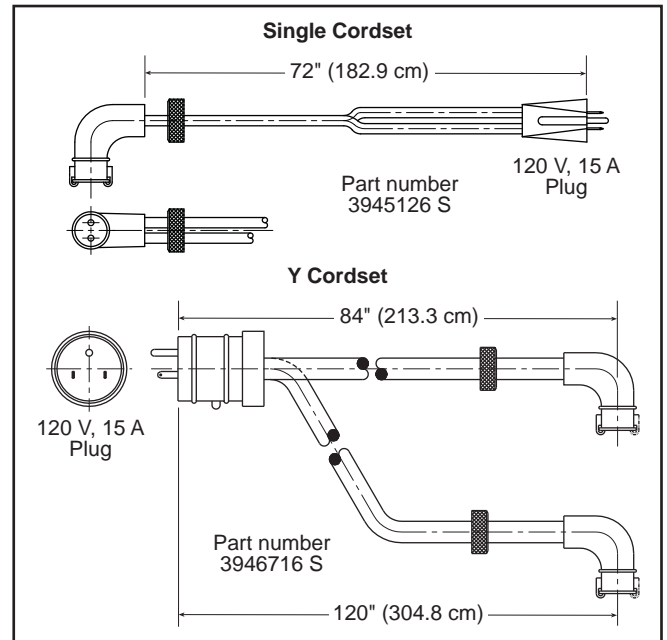


Figure 7 - Electric Heater Cordsets

Filter Change Procedure

- Step 1** - Turn off the engine. Loosen the vent cap to break the air lock in the filter
- Step 2** - Open the drain valve and drain the fuel level below the collar, then close the drain valve.
- Step 3** - Using the Collar/Vent Cap Wrench (part number 3944451 S (plastic) or 3944448 S (metal)), remove the clear cover from the fuel processor by

removing the collar. Discard the o-ring from the base of the cover. (A new o-ring seal is supplied with the new filter.) For Biodiesel applications use gasket pack 3950445 S. Gasket color is green and **MUST** be changed with every filter change. Remove the filter element from the Fuel Pro by pulling upward and twisting slightly. Be sure the sealing grommet is removed from the center stud.

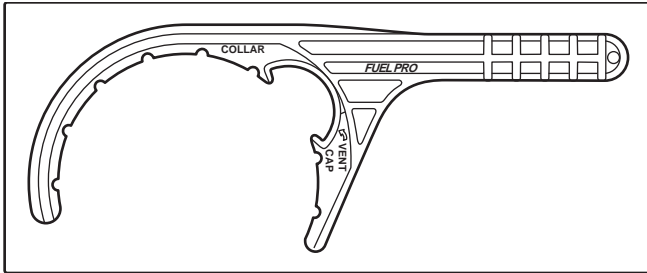


Figure 8 - Collar/Vent Cap Wrench

Step 4 - Install the new filter element (supplied with a Sealing Grommet already inserted into the element) on the processor center stud by pushing down and twisting slightly. After checking to make sure the new o-ring seal (supplied with the filter) at the base of the cover is in place, install the cover and collar. Hand tighten the collar until seated. **Do not use tools to tighten.**

Table 4 - Replacement Filters

Part Number	Description
FS19761	EleMax™ Stratapore™ 2 micron
FS19624	EleMax™ Stratapore™ 7 micron
FS19727	EleMax™ Stratapore™ 10 micron
FS19728	EleMax™ Stratapore™ 25 micron
FS19729	EleMax™ Cellulose 50 micron
FS19763	EleMax™ Stratapore™ 7 micron (plus size)
FS19764	EleMax™ Stratapore™ 10 micron (plus size)
FS19765	EleMax™ Stratapore™ 25 micron (plus size)
FS19766	EleMax™ Stratapore™ 2 micron (plus size)

Step 5 - Remove the vent cap from the top of the clear cover by turning the vent cap counterclockwise. Fill the clear cover with enough clean fuel to cover the bottom half of the filter element. Make sure the new o-ring (supplied with the filter) is installed on the vent cap. Reinstall the vent cap and **tighten by hand only.**

Step 6 - Start the engine. When the lubrication system reaches its normal operating pressure, increase engine RPM for one minute.

Note: The clear filter cover will not fill completely during engine operation. It will gradually fill over time as the filter becomes clogged. The filter element does not need to be changed until the fuel level has risen to the top of the filter element.

Priming the System

Step 1 - Check to make sure the drain valve at the base of the Fuel Pro is closed.

Step 2 - Remove the vent cap from the top of the clear cover. Fill the Fuel Pro full of clean fuel. Reinstall the vent cap and **tighten by hand only.**

Step 3 - Start the engine. When the lubrication system reaches its normal operating pressure, increase engine speed to high idle for one to two minutes. After the air is purged, loosen the vent cap until the fuel level lowers to just above the bottom of the collar. **Tighten the vent cap by hand only.**

Note: The clear filter cover will not fill completely during engine operation. It will gradually fill over time and the fuel level will rise as the filter becomes clogged.

Step 4 - Hand tighten the collar again while the engine is running. **To avoid damage, do not use tools to tighten the collar.**

CAUTION: To avoid damaging the aluminum fuel processor body, do not overtighten fuel lines or fuel line fittings.

Emergency Temporary Filter Replacement

Step 1 - Follow Steps 1 through 3 of the "Filter Change Procedure" on page 5.

Step 2 - If there is a filter grommet on the filter stud, remove it.

Step 3 - Install an engine spin-on filter (part number FF105, for example) on the threaded stud.

Step 4 - Install the cover, spring, seal and collar over the filter for later reuse and to guard against loss.

Step 5 - Start the engine. Raise the RPM for one minute to purge the air from the system.

Draining Contaminants

Step 1 - Turn off the engine and open the filter vent.

Step 2 - Place a cup under the drain valve at the base of the Fuel Pro and open the drain valve.

Step 3 - Water will flow into the cup. When fuel begins to flow out of the drain, close the drain valve. (Drain the minimum amount of fuel possible.)

Step 4 - Close the filter vent.

Step 5 - Start the engine. Raise the RPM for one minute to purge the air from the system.

Ordering Information

Housing Part Number	Filter Element**	Pre-Heater 1	Pre-Heater 2	Fluid Heat	WIF	Fuel Flow
FH23027	FS19763	12 VDC	120 VAC	Yes	N/A	In Right / Out Left
FH23028	FS19763	24 VDC	120 VAC	Yes	N/A	In Right / Out Left
FH23029	FS19763	N/A	N/A	N/A	N/A	In Right / Out Left
FH23030	FS19729	N/A	N/A	N/A	N/A	In Right / Out Left
FH23031	FS19763	12 VDC	N/A	N/A	N/A	In Right / Out Left
FH23032	FS19763	24 VDC	N/A	N/A	N/A	In Right / Out Left
FH23038	FS19763	N/A	N/A	Yes	N/A	In Right / Out Left
FH23039	FS19763	N/A	N/A	Yes	Yes	In Right / Out Left
FH23040	FS19763	12 VDC	N/A	Yes	N/A	In Right / Out Left
FH23041	FS19763	12 VDC	N/A	Yes	Yes	In Right / Out Left
FH23042	FS19763	24 VDC	N/A	Yes	N/A	In Right / Out Left
FH23045	FS19763	120 VAC	N/A	Yes	N/A	In Right / Out Left
FH23049	FS19763	12 VDC	N/A	N/A	Yes	In Right / Out Left
FH23050	FS19763	24 VDC	N/A	N/A	Yes	In Right / Out Left
FH23054	FS19763	12 VDC	120 VAC	N/A	N/A	In Right / Out Left
FH23060	FS19765	N/A	N/A	N/A	Yes	In Right / Out Left
FH23061	FS19763	N/A	N/A	N/A	Yes	In Right / Out Left
FH23067 M*	FS19765	24 VDC	N/A	N/A	Yes	In Right / Out Left
FH23068 M*	FS19765	Ports Available	N/A	N/A	Yes	In Right / Out Left
FH23069 M*	FS19765	24 VDC	N/A	Yes	Yes	In Right / Out Left
FH23072 GM*	FS19763	N/A	N/A	Yes	N/A	In Right / Out Left
FH23076	FS19765	N/A	N/A	N/A	N/A	In Right / Out Left

* M designates metric connections of M22 x 1.5.

** For Biofuels above B5, the following gasket pack must be used to replace the standard gaskets that are provided with the filter element, 3950445 S.

Upgrade Kits:

3944456 S – 12 V-250 W Preheater Upgrade

Kit Includes: 3944442 S – Bottom Plate O-Ring
3944450 S – Heater
3946703 S – Thermoswitch
3945120 S – Fuel Pro Harness
3945123 S – Chassis-Ground Harness

3952119 S – 24 V-250 W Preheater Upgrade

Kit Includes: 3944442 S – Bottom Plate O-Ring
3495136 S – Heater
3946673 S – Thermoswitch
3945120 S – Fuel Pro Harness
3945123 S – Chassis-Ground Harness

Suggested Preventive Maintenance

Weekly - Drain water.

Every Filter Change - Change o-rings and grommet (included with new filter).

Every 12 Months - Check all electrical connections for corrosion. Check all fuel fittings for leaks.

Extreme winter or salt corrosion environments may require lubrication of the top collar threads with Loctite® 76747 antiseize every 180 days.

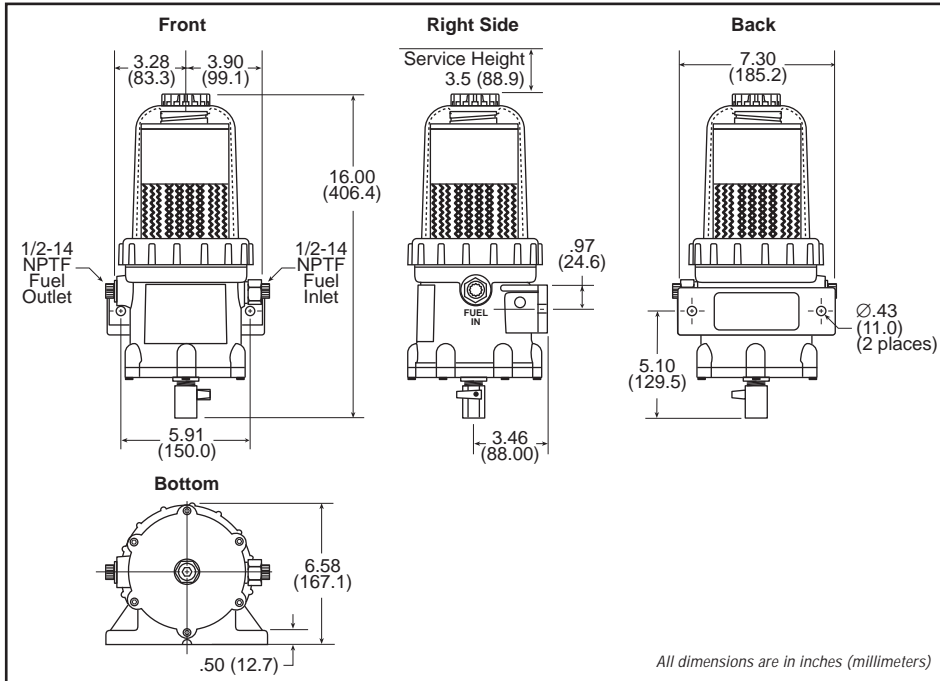
Items Not Shown, 12 V:

3945124 S – Harness Kit, Weather Pack

Kit Includes: 3944442 S – Bottom Plate O-Ring
3946703 S – Thermoswitch
3945120 S – Fuel Pro Harness

Contact Fleetguard Customer Assistance for proper part number information.

Dimensions

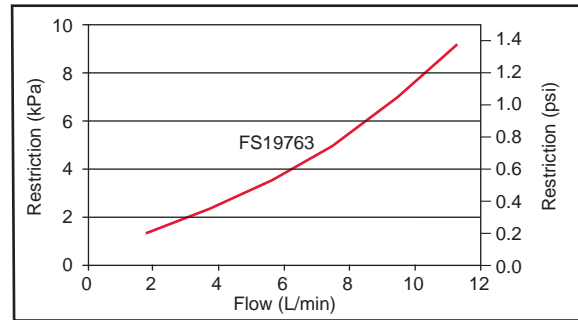


Fleetguard Fuel Pro[®] 230 Series Specifications

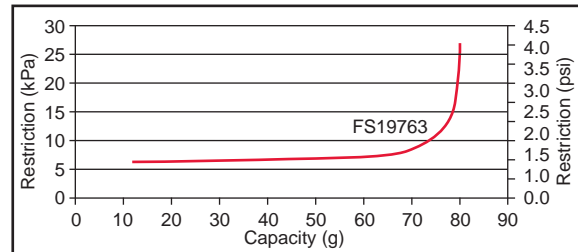
Height Overall	16.13" (409.7 mm)
Depth Overall	7.25" (184.15 mm)
Width, max	6.89" (175 mm)
Mount Bracket Centers	5.91" (150.11 mm)
Weight (Dry)	7.25 - 9.75 lbs (3.9 - 4.42 kg)
Fuel Connection (Inlet)	1/2"-14 NPTF (M22 x 1.5)
Fuel Connection (Outlet)	1/2"-14 NPTF (M22 x 1.5)
Fluid Heat Connection (Inlet)	1/2" NPTF (M22 x 1.5)
Fluid Heat Connection (Outlet)	1/2" NPTF (M22 x 1.5)
Fuel Capacity (w/ filter)	64.2 oz (1.9 L)
Operation Fuel Flow Rate	180 gph (681 lph)
Recommended Application	Heavy Duty Engines
Water Trap Capacity	33.8 fl oz (1.0 L)
Filter Replacement	FS19763*
Filter Service Clearance	Min. 3.5" (88.9 mm)
Electrical Heater	12 VDC, 250 W, 18 A ± 3 A 24 VDC, 250 W, 11 A ± 2 A 120 VAC, 75 W, 0.65 A ± .1 A

* Other filter options at different Micron Ratings are available. Specifications subject to change without notice.

FH230 Series Restriction vs Flow



Filter Restriction vs Capacity



Note: Tests run per SAE J905 standard.

