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Fuel Dispensing and Transfer Filtration

For Clean Diesel Applications



ENGINEERING **YOUR** SUCCESS.

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FBO Fuel Pump Application



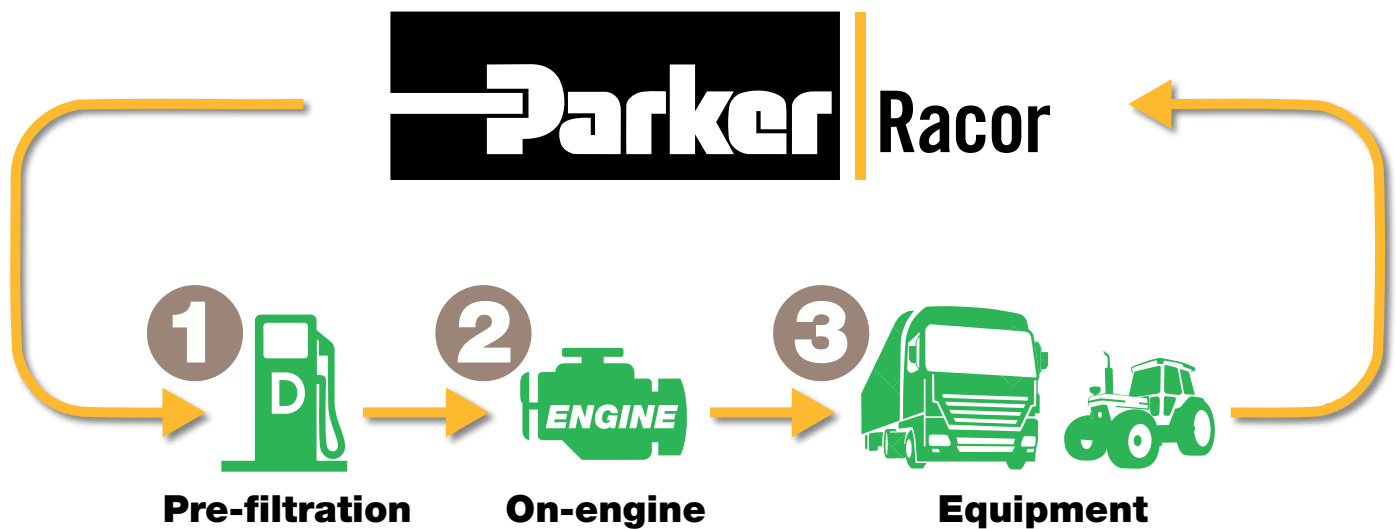
FBO Duplex Application



FBO Transfer Application



FBO Equipment Application



Why Pre-filtration?

Because of the difficulties of maintaining a clean supply of diesel at all times, more consideration should be applied to upstream sources of contamination as well as at the engine. Filtering recirculation systems can be applied to storage and onboard systems, along with high efficiency filters at the dispensing pump. Careful monitoring of fuel quality and filter performance is needed to protect sensitive diesel engine injection systems.

For example, the fuel used on a highway construction project may have travelled the following route: ***Refinery - piped to storage - tanker to distribution center - tanker to local retailer - tanker to on-site storage.***



Filtration in the fuel transfer process, fuel dispensing, on engine and equipment offers the best approach for clean diesel.



How it works.

Particulate Removing

A particulate removing filter system uses a single stage element. When contaminated fuel enters the vessel, particulate (rust, scale, dirt, and other contaminants) is removed, providing clean diesel to your engine and equipment.

Coalescer/Separator

A coalescer/separator system consists of two elements, creating a two stage filtration process. When contaminated fuel enters the vessel, particulate (rust, scale, dirt, and other contaminants) is removed and water is coalesced by the first stage filter (coalescing is when the water droplets collect on the media and then fall into the sump to be removed). Any free water is separated by the second stage element providing clean, dry diesel to your engine and equipment.

Bulk Filtration: RV Series

Parker Racor RV Series vessels are designed to be used in bulk fuel storage, fuel dispensing, fuel transfer, and large engine applications.

The RV Series set up as a coalescer/separator (RVFS), will remove emulsified free water and solids from diesel fuel. When equipped with coalescer/separator filters, water can be **drained and removed** from the RVFS sump.

RV filter vessels offer economy, versatility, unparalleled **high efficiency**, and **low maintenance** solutions to many fuel delivery and industrial filtration applications. The vessels will accept particulate filters (RVMF) or coalescer/separator filters.

Filter vessels are used in the diesel and re-fueling industry on fuel dispensing locations, **providing clean diesel**.

RV Series vessels provide the required filtration for today's high-pressure common-rail engines.

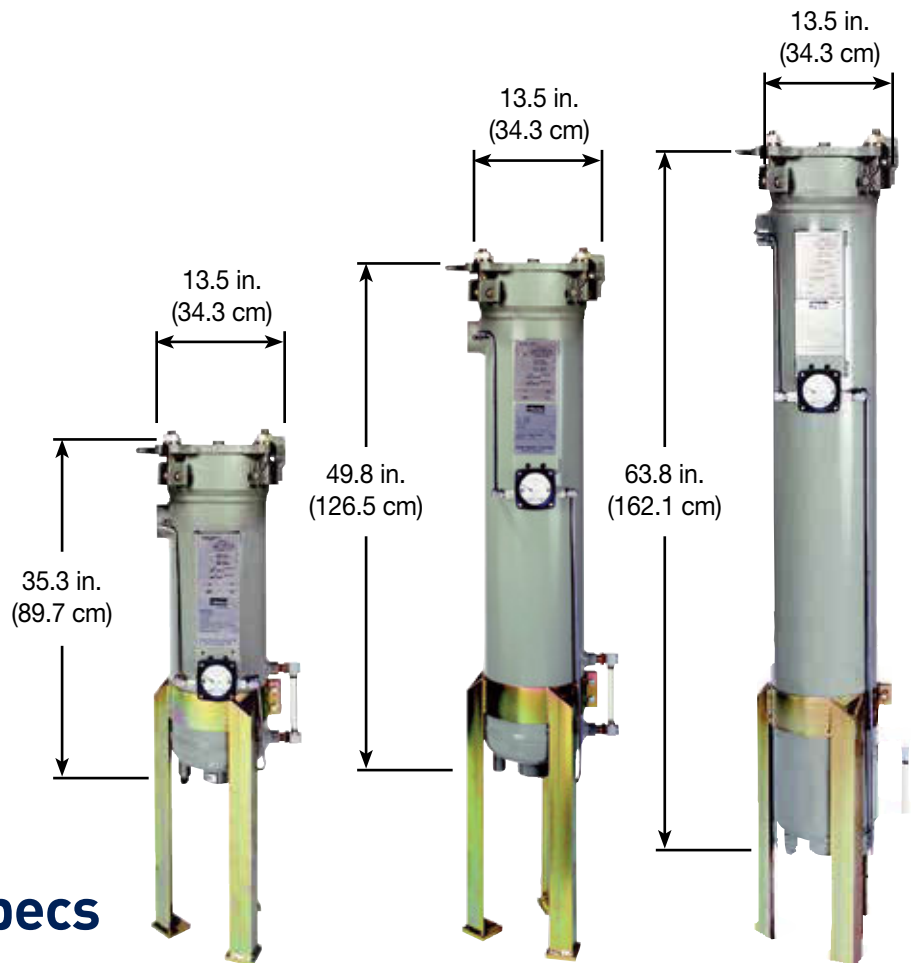


Product Features:

- Carbon Steel Construction
- ASME Code Stamped
- Interior: Epoxy Coated To MIL-C-4556E
- Exterior: Grey Primer Coated
- Hinged Cover
- Connections are 2" NPTF

Optional Features:

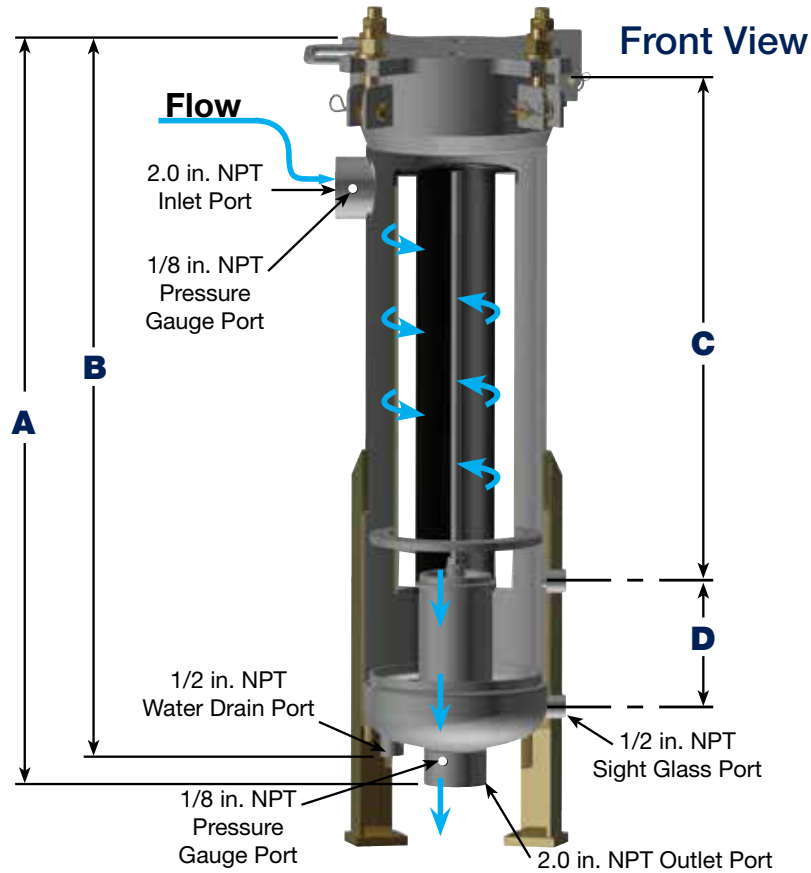
- Optional Accessories Include: pressure relief valve, automatic air eliminator, drain valve, water-in-fuel sight glass, leg mounts or wall mounts, and differential pressure gauge.



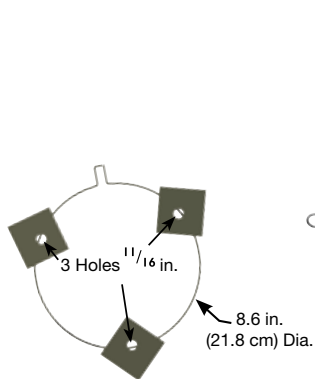
Bulk Filtration Specs

Specifications	RVFS-1/RVMF-1	RVFS-2/RVMF-2	RVFS-3/RVMF-3
Inlet and Outlet Ports	2 in. NPT	2 in. NPT	2 in. NPT
Vent and Relief Ports	3/4 in. NPT	3/4 in. NPT	3/4 in. NPT
Water Level Gauge Ports	1/2 in. NPT	1/2 in. NPT	1/2 in. NPT
Differential Gauge Ports	1/8 in. NPT	1/8 in. NPT	1/8 in. NPT
Pressure and Temperature	150 PSI @ 160°F (10.3 bar @ 71°C)		
ASME Code Stamped	Yes	Yes	Yes
Fuel Flow Rate - Diesel Fuel - RVFS	25 GPM (94.6 LPM)	50 GPM (189.3 LPM)	75 GPM (283.9 LPM)
Fuel Flow Rate - Diesel Fuel - RVMF	66 GPM (250 LPM)	133 GPM (503 LPM)	200 GPM (757 LPM)
Pressure Drop - Clean	2 PSID (0.14 bar)	2 PSID (0.14 bar)	2 PSID (0.14 bar)
Pressure Drop/Filter Change-out	15 PSID (1.0 bar)	15 PSID (1.0 bar)	15 PSID (1.0 bar)
Height	35.3 in. (89.7 cm)	49.8 in. (126.5 cm)	63.8 in. (162.1 cm)
Width	13.5 in. (34.3 cm)	13.5 in. (34.3 cm)	13.5 in. (34.3 cm)
Depth	13.2 in. (33.5 cm)	13.2 in. (33.5 cm)	13.2 in. (33.5 cm)
Dry Weight	100 lbs. (45 kgs)	115 lbs. (52 kgs)	130 lbs. (59 kgs)
Overhead Service Clearance	16.0 in. (40.6 cm)	32.0 in. (81.3 cm)	47.0 in. (119.4 cm)

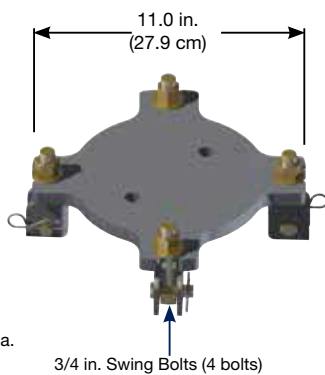
Mounting Information



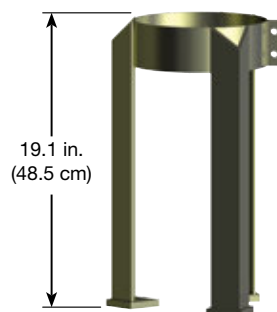
Specs	RVFS-1/RVMF-1		RVFS-2/RVMF-2		RVFS-3/RVMF-3	
	in.	cm	in.	cm	in.	cm
Dimensions						
A	35.3	89.7	49.8	126.5	63.8	162.1
B	34.0	86.4	48.5	123.2	62.4	158.5
C	24.8	63.0	39.3	99.8	54.0	137.2
D	6.0	15.2	6.0	15.2	6.0	15.2



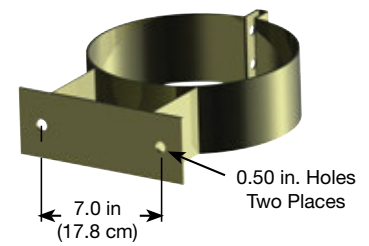
Bottom View



Top View



Mounting Legs



Bulkhead Mounting Bracket

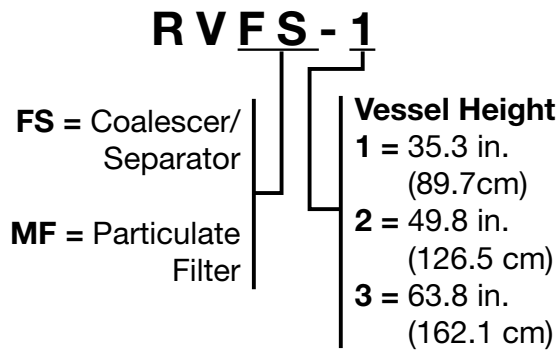
Ordering

A. Available for quick delivery.

Part#'s Supplied with Quick Delivery Vessels		
RVFS-1-10C	71330-150	Pressure Relief Valve (150 PSIG)
RVFS-2-10C	70906	Water Level Gauge, (290 PSIG)
RVFS-3-10C	72059	Differential Pressure Gauge Assembly
	72060-.75	1/2" NPT Stainless Steel Drain Valve
	71981	Mounting Legs
	72153-1, 2, or 3	Hold Down Plate Kit
	10 micron Filters	10 micron Coalescer/10 micron Separator Cartridge

B. Customization - the way you need it. *(Customized systems sold assembled or unassembled.)*

1: Select A Vessel



2: Select Accessories

Part Number	Description
71330-150	Pressure Relief Valve (150 PSIG)
70906	Water Level Gauge, (290 PSIG)
72061-RVFS	Water Level Gauge S.S. (300 PSIG)
71679	3/4" Stainless Steel Air Eliminator
72059	Differential Pressure Gauge Assembly
71943-.5	1/2" NPT Brass Drain Valve
72060-.5	1/2" NPT Stainless Steel Drain Valve
71943-.75	3/4" NPT Brass Vent Valve
72060-.75	3/4" NPT Stainless Steel Vent Valve
71981	Mounting Legs
71982	Wall Mount Bracket
72482	Inlet Check Valve

3: Select a Filter

RVFS Coalescer/Separator Cartridge Options

Vessel Series	1 micron	5 micron	10 micron	25 micron	40 micron
***HOCP Coalescer Cartridge - Requires HSP filter					
RVFS-1	HOCP-15801	HOCP-15805	HOCP-15810	HOCP-15825	HOCP-15840
RVFS-2	HOCP-30801	HOCP-30805	HOCP-30810	HOCP-30825	HOCP-30840
RVFS-3	HOCP-44801	HOCP-44805	HOCP-44810	HOCP-44825	HOCP-44840
***HSP Separator Cartridge - Pleated Paper					
RVFS-1	HSP-15401	HSP-15405	HSP-15410	HSP-15425	
RVFS-2	HSP-30401	HSP-30405	HSP-30410	HSP-30425	
RVFS-3	HSP-44401	HSP-44405	HSP-44410	HSP-44425	

RVMF Particulate Cartridge Options

Vessel Series	1 micron	5 micron	10 micron	25 micron
HFP Particulate Cartridge - Pleated Paper				
RVMF-1	HFP-14601	HFP-14605	HFP-14610	HFP-14625
RVMF-2	HFP-28601	HFP-28605	HFP-28610	HFP-28625
RVMF-3	HFP-43601	HFP-43605	HFP-43610	HFP-43625

A RVMF system consists of one particulate filter.

For RVFS-1, 2, and 3, customer must order one HOCP and one HSP filter. A RVFS system consists of one coalescer and one separator filter.

Dispensing Filtration: FBO Series

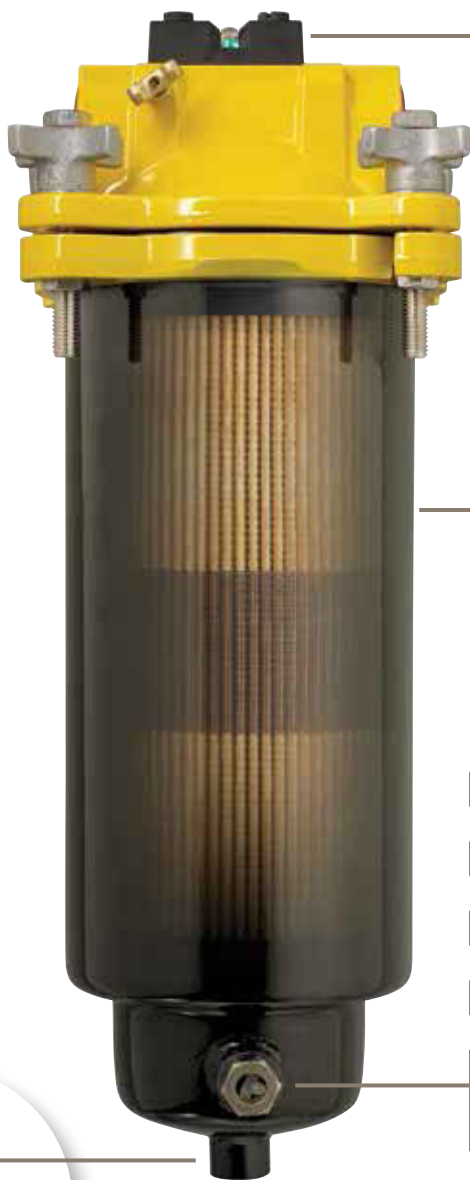
Parker Racor's FBO assemblies are specifically designed to meet filtration requirements of today's high-pressure common-rail diesel injection systems.

Common applications include: mobile refuelers, refueling cabinets, fuel dispensing pumps, large diesel engines, bulk fuel handling, and fuel transfer.

Filter Options

FBO filter systems have three filter options to meet various requirements: Particulate filter, coalescer/separator filter, or water absorber filter. For fuel dispensing applications, a coalescer/separator filter is recommended.

FBO filter systems are designed to meet the toughest diesel refueling conditions and feature easy cartridge filter change-outs.



Available Options

- *Differential Pressure Gauge*
(part# 72694) 0-15 PSID
(part# 72783) 0-30 PSID



- *Mounting Bracket*
(part# 73084)



- *Water Sensor Probe*

Steel - Adapter
(part# RK18-1656)
Steel - Water Sensor
(part# RK23191-01)



Plastic - Water Sensor
(part# RK30880E) - Not Shown

- *Sight Glass 1/2" NPT*
(part# 72710)



- *45 watt, 120 VAC Heater*
Available for Cold Climate Applications
(part# FBO-HTR-KIT)



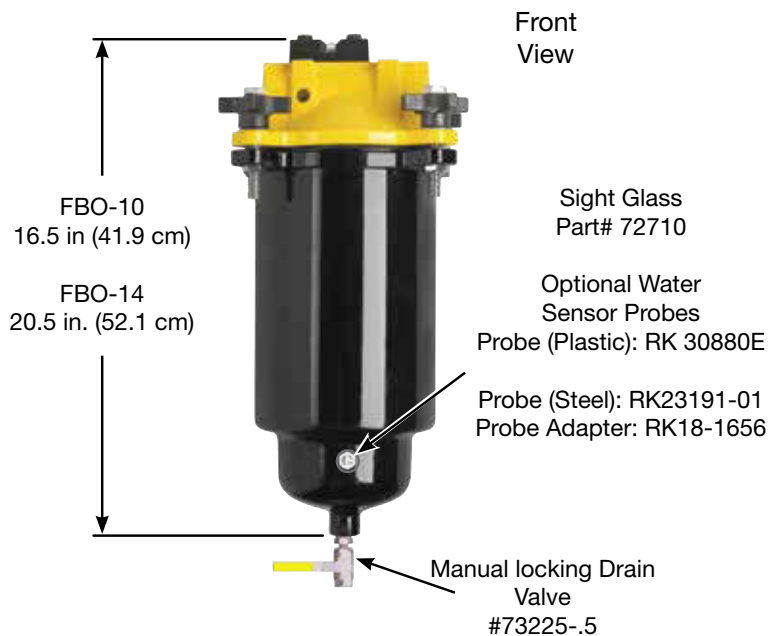
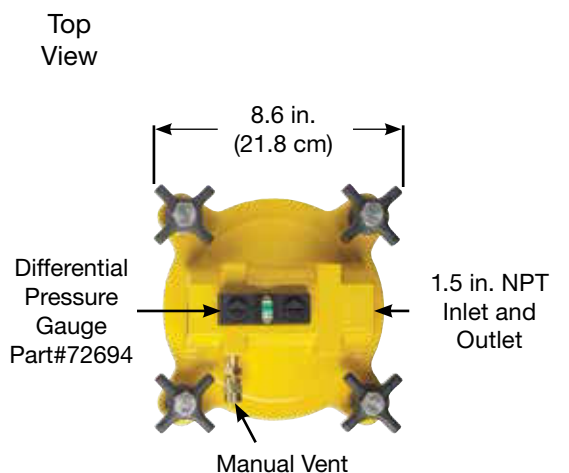
Technical Information

Product Features

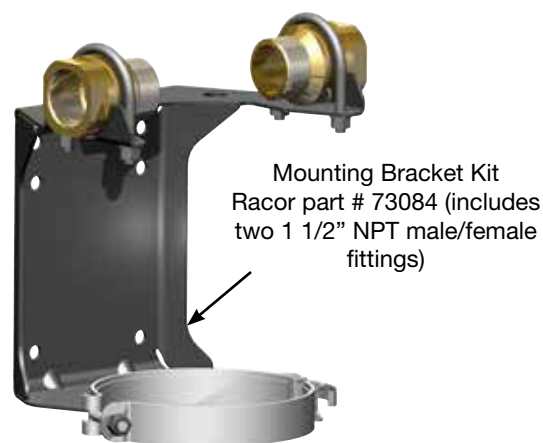
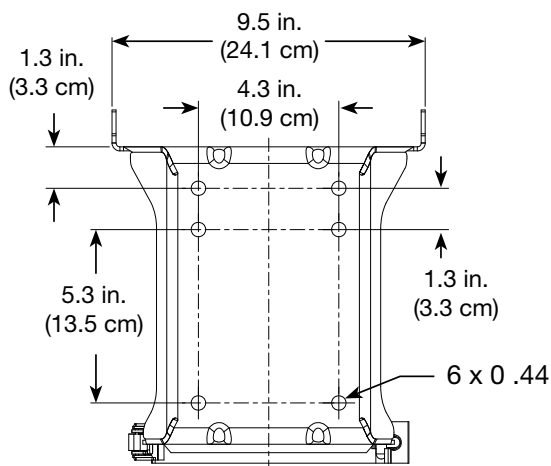
- Die-Cast Aluminum Head
- Steel Bowl Assembly
- Powder Coated Components
- Locking Ring Collar
- 1.5" NPT Inlet and Outlet Ports
- Maximum Pressure: 150 PSI (10 bar) and Maximum Temperature 160°F (71°C)
- Lockable Manual Drain Valve: 1/2" NPT (part# 73225-.5)
- Grounding Lug
- Manual Vent Valve

Specifications	Maximum Flow Rates	Clean	Change
FBO-10	Diesel	Delta P	Delta P
Particulate Filter	25 GPM (94.6 LPM)	2.5 PSID	15 PSID
Water Separator	20 GPM (75.7 LPM)	2.5 PSID	15 PSID
Water Absorber	20 GPM (75.7 LPM)	2.5 PSID	30 PSID
FBO-14	Diesel	Delta P	Delta P
Particulate Filter	30 GPM (113.6 LPM)	2.5 PSID	15 PSID
Water Separator	25 GPM (94.6 LPM)	2.5 PSID	15 PSID
Water Absorber	25 GPM (94.6 LPM)	2.5 PSID	30 PSID

Mounting Information



Mounting Bracket Hole Pattern



How to Order

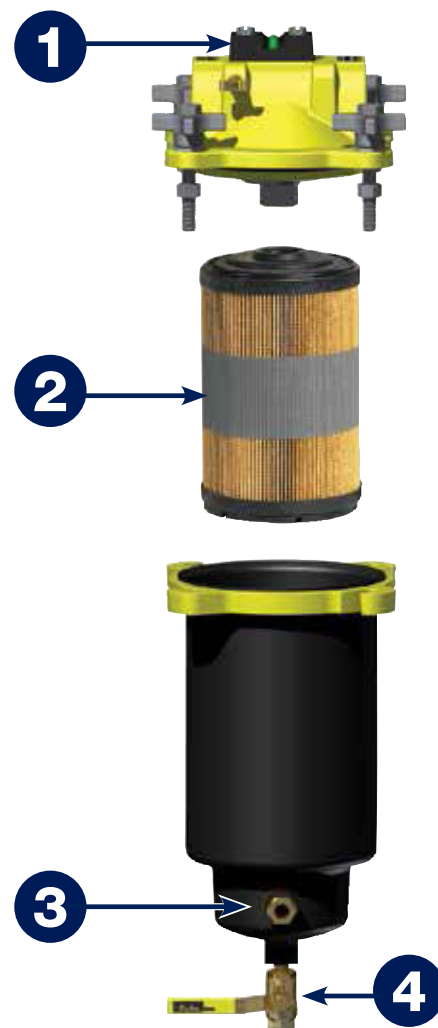
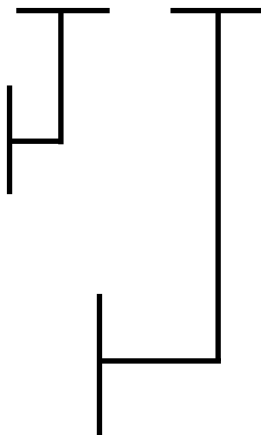
F B O - 1 0 - D P

Flow Rates

10 = 5-25 GPM (19-95 LPM)

14 = 10-30 GPM (38-114 LPM)

DP = Differential Gauge
 DPL = Delta-P Gauge with
 Liquid Sight Glass
 MA = Marine Assembly



Guide to help you specify the right FBO system with the accessories you need.

	1	2	3	4
**Popular Option	Delta-P Gauge	Filter	Sight Glass	Drain Valve
FBO-10		Order Separately (see next page)		•
FBO-10-DP	•	Order Separately (see next page)		•
FBO-10-DPL**	•	Order Separately (see next page)	•	•
FBO-14		Order Separately (see next page)		•
FBO-14-DP	•	Order Separately (see next page)		•
FBO-14-DPL**	•	Order Separately (see next page)	•	•
FBO-10-25M²	•	FBO 60332	•	•
FBO-14-25M²	•	FBO 60341	•	•

² FBO Assemblies available for quick delivery.

Replacement Filters

Filters are used to protect the OEM supplied fuel system.

Coalescer/Separator

Coalescer/separator filters are a two stage element that removes water and contaminants from diesel fuel streams and are the most popular filters.

Particulate Filter

Particulate filters remove contaminants down to one micron. Particulate filters can also be used upstream, before a water separator filter, to extend filter life.

Water Absorber

Water absorber filters absorb water and filter out contaminants from diesel fuel.



Part# FBO 60338



Part# FBO 60341



Part# FBO 60344

FBO	Micron Rating	Coalescer/Separator	Particulate	Water Absorber
<p>FBO-10 (6 X 10 Filter)</p>	1	FBO 60327	FBO 60330	FBO 60333
	5	FBO 60328	FBO 60331	FBO 60334
	10	FBO 60353	FBO 60354	FBO 60355
	25	FBO 60329	FBO 60332	FBO 60335
<p>FBO-14 (6 X 14 Filter)</p>	1	FBO 60336	FBO 60339	FBO 60342
	5	FBO 60337	FBO 60340	FBO 60343
	10	FBO 60356	FBO 60357	FBO 60358
	25	FBO 60338	FBO 60341	FBO 60344

Duplex Diesel Filtration

DFBO Duplex Filter:

The DFBO duplex filter brings Racor FBO filters to the engine room or any other high flow environment. Made with cast-iron head and steel bowls meet Marine specific applications, that require ABS certification (Marine model: DFBO-14-MA not shown)

The DFBO comes with the two 25 micron coalescer/separator elements. A particulate filter or a water absorptive filter may be used.

Features and Benefits

- Head material is cast-iron, and bowl material is steel.
- Install in vacuum or pressure applications.
- Fluoroelastomer seals for biodiesel compatibility.
- Selector valve allows you to isolate filters to have standby filtration.
- Water-in-fuel sight glass available.



Part# shown:
DFBO-14-IN

FBO-14-DPL-Duplex Filter:

The FBO Duplex Stand was designed with continuous duty applications in mind. The Duplex Stand assembly allows the isolation of one filter at a time for servicing while still in operation. The duplex design ensures that fuel is filtered without interruption.

A particulate filter, a coalescer/separator filter, or a water absorptive filter can be used.

Features and Benefits

- Die-Cast Aluminum Head
- Locking Ring Collar (no v-clamps)
- Maximum Pressure: 150 PSI (10 bar)
- Maximum Temperature: 160°F (71°C)
- Manual Vent Valve and Grounding Lug
- 1" NPT Inlet and Outlet Ports
- Steel Bowl Assembly
- Powder Coated Components
- Lockable Manual Drain Valve: 1/2" NPT (part# 73225-.5)



Part# shown:
FBO-14-DPL-Duplex

Portable Diesel Filtration

These portable units are a cost effective way to filter diesel and biodiesel, in storage or transport. Filter Carts are fully portable and self-contained. They are easily moved at the job-site by one person using the built-in wheels and handle. Filter carts can polish, clean up, and recycle old or contaminated fuel. They can also be used in preventative maintenance practices to keep fuel tanks clean.

Features and Benefits

- Versatile and portable
- Viton® seals and gaskets
- Sight glass and drain valve to detect and remove water
- Particulate removal, coalescer/separation, and water absorption filtration
- Drip pans to capture dripping fluids and prevent environmental issues
- Filter shows differential pressure for filter element changeout

Viton® is a registered trademark of DuPont™



Part# shown:
FC-16-25



Part# shown:
FC-20-1-120V



Part# shown:
FC-10-1

	FC-16-25	FC-20-1-120V	FC-10-1
Enclosed Cart			•
2 Wheel Cart	•		•
4 Wheel Cart		•	
Available Bypass Valve for fluid transfer only		•	
Holding Tank			•
Additional Mesh Strainer		•	•
FBO-10			•
FBO-14	•	•	
5 micron element			•
10 micron element		•	
25 micron element	•		
120V Power Requirement		•	•
110V Power Requirement	•		
Hose Kit/Wands	•	Order FC-20-1-120V-kit for fuel cart plus kit	•
Flow Rate (GPM)	16	17	10

Additional Pre-filtration Products

icountACM20

State-of-the-Art Fuel Contamination Monitoring

Fully functional particle counter approved for use on fuels.

- Two minute test procedure
- Fully manufactured by Parker with 20 years experience in the Particle Counter Measuring market
- Laser optical scanning analysis
- Multi-standard ISO cleanliness reporting
- On-board, rear-mounted pump enables monitoring possibilities. For example: Fuel storage/vehicle tanks and fuel storage drums
- Latest averaging software as standard
- Downloader software



Part# shown:
ACM202022US

icountOS

Portable Condition Monitoring for Fuel Systems

- Fluid viscosity as high as 300cSt (usable range) will be able to pass through the detector at the proper flow rate
- Quick connections for testing online and offline
- Reporting Standards ISO4406:1999, NAS1638 and RH% moisture sensor display in high intensity OLED format
- Data Storage up to 250,000 test points of information
- Compact, lightweight and robust, truly portable iOS makes field analysis simple, quick and easy
- Able to sample directly from a hydraulic reservoir, barrel and vehicle fuel tank or from a high pressure, online hydraulic system with the addition of a pressure reducing adaptor
- Completely self contained, with laser detection particle counter (icountPD), rechargeable battery and flow management pump
- No special software needed
- Embedded web page generator for data download onto any PC or laptop via a universal RJ45 connection interface
- Fast detection of the presence of contamination with a sampling period from 5 seconds to 999 seconds
- Wi-fi access



icountBSplus

The benchtop solution to fluid contamination bottle sampling

- Quick sample bottle analysis with variable test time options from 15 seconds and volume capacities from 25ml
- Repeatable and re-producible result performance to ISO4406:1999, NAS1638 AS4509E and GOST 17216:2001 (Differential and Cumulative) particle count distributions
- On-board compressor and 'shop' air capability
- icountBSplus has the capability for on-line fluid measurement configuration as well as off-line fluid sampling
- Design concept allowing for portability. DC and rechargeable battery pack power option built in
- CE compliant
- On-board thermal printer
- 500 test memory (fully downloadable)



Fuel Filter Funnel

Racor Filter Funnel (RFF) is a heavy-duty, fast-flow, filter-in-a-funnel that separates damaging free water and contaminants from gasoline, diesel, heating oil, and kerosene.

The RFF family of products is capable of removing free water and solids down to 0.005 inches and allows you to visually inspect the integrity of your fuel supply as you refuel.

The RFF family is manufactured using industrial-grade black electro-conductive polypropylene. Carbon powder is injected into the plastic so that the RFF will conduct static electricity. The grounding capability of the RFF is an important safety feature. Always use proper fuel handling procedures and follow local, state, and federal regulations.



Specifications	RFF1C	RFF3C	RFF8C	RFF15C
Max. Flow Rate	2.5 GPM (9.4 LPM)	3.5 GPM (13.2 LPM)	5 GPM (18.9 LPM)	12 GPM (45.4 LPM)
Micron Rating	50 micron	50 micron	50 micron	50 micron
Height	6.0 in. (15.2 cm)	9.0 in. (22.9 cm)	10.0 in. (25.4 cm)	10.0 in. (25.4 cm)
Diameter	3.5 in. (8.9 cm)	5.5 in. (14.0 cm)	8.5 in. (21.6 cm)	8.5 in. (21.6 cm)
Weight	0.2 lb (0.09 kg)	0.3 lb (0.14 kg)	0.6 lb (0.27 kg)	1.0 lb (0.45 kg)

How They Work

The Racor Filter Funnel comes complete with a built-in DuPont Teflon® PTFE (polytetrafluoroethylene) coated stainless steel screen filter. As fuel is being filtered, free water and contaminants collect on the bottom. Because water is heavier than fuel, free water will settle to the bottom. When you have a substantial amount of water (approximately 1 cup), dispose of it properly and resume refueling.

When properly used, the filter will separate free water from hydrocarbon fuels. Free water is a collection of water molecules in the bottom of fuel cans, tanks, or drums, formed when fuel is stored for even short periods of time. The free water formation is due to condensation in the air and/or separation of water molecules from fuel.

Water may be present in hydrocarbon fuels as free water or as an emulsion, small droplets of water suspended in fuel. Water may be emulsified in fuel by vibration or by emulsifying additives such as alcohol, or detergents. The RFF filter will not remove emulsified water. Instead, install a Racor fuel filter/water separator to remove emulsified water from your fuel delivery or engine fuel system.

Excessive filling will cause pressure and can force water through the funnels filter. If funnel filter is more than 1/3 covered with water and flow rate begins to slow, stop fueling immediately, properly dispose of water and contaminants from the funnel, then continue fueling.

2-cycle oil contains detergents, which may allow some water to pass through the filter screen. The only safe way to filter out

water is to add the 2- cycle oil to the tank after filtering the fuel through the funnel. Additives containing alcohol can emulsify and bind water to fuel. The filter cannot remove this bound water. Add additives after fueling.

Do not attempt to remove the filter from the funnel, filter is permanently attached to the funnel.

The RFF is designed to work with fuels only. CAUTION! Do not use the RFF for anything but filtering fuels, other liquids may compromise the effectiveness of the filter.

Another purpose for using a RFF is to facilitate the inspection of fuel for contamination in the form of solids (down to 50 micron) and free water. Don't forget to check the fuel filter sump for water. If water or contamination are found, dispose of properly.

To test the RFF, simply fill with water, roughly 1/3 the way up the screen. This amount of water should not pass through the Teflon® coated filter screen. Keep this amount in mind when using the RFF knowing that the head pressure caused by the weight of more than this may cause water to pass through the screen.

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