Racor RVFS Vessel Series
Installation, Operation and Service

- Prefilter Vessel
- Vertical Filter Separator
- Fuel Monitor
- Clay Treater
- Multi-Purpose Applications
Offer Of Sale

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8. Buyer’s Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer, or any other items which become Buyer’s property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller’s possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to reimburse Seller for all such taxes, or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Paragraph. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter “Intellectual Property Rights”). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller’s obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part of Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller’s sole and exclusive liability and Buyer’s sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller’s obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter “Events of Force Majeure”). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, orders or regulations of any government or agency or authority, wars, civil disturbances, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller’s control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the laws of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.
RVFS Multi-Purpose Vessel Series

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RVFS FILTER VESSEL APPLICATION
(Racor Vertical Filter Separator)
The RVFS multi-purpose vessel series is versatile in meeting various fuel and hydrocarbon fluid filtration requirements and applications. The RVFS Vessel Series is designed to be used as:

- Filter Separator to remove emulsified, free and entrained water and solids from liquid hydrocarbon or air/gas streams.
- Pre-filter to remove solid contaminants such as dirt, rust scale, sand and other solid materials from a hydrocarbon flow stream.
- Water absorbing filter to remove water and solids from a hydrocarbon flow stream.
- Clay treater to remove surfactants, additives and color from a hydrocarbon flow stream.

RVFS Vessel Description
A hinged access cover is provided to facilitate cleaning of the interior as well as the replacement of elements installed in the vessel.

Mounting supports for anchoring the vessels are available in the form of adjustable legs or bulkhead brackets.

Standard vessels are equipped with:
- 2” NPT inlet and outlet connections
- 3/4” NPT vent and pressure relief ports
- 1/2” NPT main drain & liquid level gauge ports
- 1/8” NPT differential pressure gauge ports

Custom vessel configurations are available and may affect the design/operating conditions, nozzle size and type as well as location.

Information Needed For Service or Parts
Name plates attached to each vessel contain important information specific to the vessel’s design and application. Information from the nameplate such as model number, serial number, operating conditions, flow rate, element and gasket part numbers and quantities will be required when contacting your Racor Hydrocarbon Filtration representative for parts or service. This information will also be required when contacting your representative or the factory regarding technical questions.

FILTRATION APPLICATIONS
PRE-FILTER APPLICATION
Pre-filters are utilized as first stage filtration for heavily contaminated fuel or hydrocarbon fluids to protect filter separators and any mechanical components installed in the piping system down stream. To achieve good filtration performance, Racor combines media composed of cellulose, synthetic and glass fibers. This media is pleated in several unique ways, then utilized in our pre-filter elements. This offers operators longer life and higher contaminant holding capacity.

Available Pre-filter Element Size
Elements are available in single, double or triple length sizes and in various micron ratings. (See Element Chart on Page 19.)

Pre-filter Fuel Flow-Direction and Operation
Contaminated fuel enters the filter vessel through the inlet port located on the side of the vessel near the top and passes through the pleated pre-filter media, flowing outside-in. Silicone resin impregnated media sheds water and provides maximum solids contaminant removal.

Silicone treated pre-filters remove solids and can remove free water from fuels. Such water droplets are repelled by the pre-filter and directed by gravity to the vessel sump where the water can be drained. The clean filtered fuel then flows down through the element center tube and exits through the outlet port located on the bottom of the filter vessel.

Maximize Element Life & Filtration Performance
To obtain maximum element life and filtration performance, maintenance personnel must use a differential pressure gauge to monitor element condition.

Element Changeout
Elements are recommended to be changed at 20 PSI differential or after one year of service, whichever occurs first.
FILTER SEPARATOR APPLICATION
Filter separators are a two-stage design and use a combination of coalescer and separator elements to remove water and solids contamination from fuels and hydrocarbon liquid flow streams. This element combination provides the driest and cleanest fuels possible where high water content is the main problem.

When Is A Pre-Filter Recommended
The main function of the filter/separator vessel is to remove water. Should the solids particle load in the flow stream be high, a pre-filter is recommended upstream to remove solids and extend the life of the coalescer elements.

Filter/Separator Fuel Flow Direction and Operation
Contaminated fuel enters the filter vessel through the inlet port located on the side of the vessel near the top and passes through the multiple layers of the first stage coalescer element, flowing outside-in.

Solids contaminates are removed by the outside layer of pleated filtration media. Water is coalesced by an interior fiberglass shell. The coalesced water then falls by gravity to the filter vessel sump to be drained.

The fuel then passes through the second stage separator element which acts as a hydrophobic barrier that repels water and directs it to the filter vessel sump to be drained. Separator elements are available in a silicon treated pleated paper, Teflon® coated stainless steel screen and a synthetic screen.

The clean, dry fuel then flows down through the element center tube and exits through the outlet port located on the bottom of the filter vessel.

Element Changeout
Elements are recommended to be changed at 15 PSI differential or after one year of service, whichever occurs first.

WATER ABSORBING ELEMENTS

Application
Water absorbing elements are commonly used in hydrocarbon fuel applications where water is not a constant problem, but at times is present. Also in applications where water would be a problem to an operation if allowed to remain in the hydrocarbon product flow stream. In some filtration applications, a water-absorbing element is required to remove small amounts of free or emulsified water, in addition to removing solids contaminants. Water absorbing elements are most often used to filter aviation gasoline, jet fuel, diesel fuel, hydraulic and cooling fluids.

Type of Filter to Use With High Water Content
Hydrocarbon flow streams with high water content levels should use a filter separator vessel utilizing coalescer and separator elements so the water can be coalesced and drained off.

Typical Water Absorbent Monitor Application

Type of Filter to Use With High Solids Content
Hydrocarbon flow streams with high solids content levels should use a pre-filter vessel with pre-filter elements to remove large quantities of solids. A filter vessel with water absorbing elements can be used down stream of a pre-filter and or filter separator to ensure clean dry product delivery and longer life of the water absorbing element.

Maximize Element Life & Filtration Performance
To obtain maximum element life and filtration performance, maintenance personnel must use a differential pressure gauge to monitor element condition.
When Not to Use Water Absorbing Elements
When used to filter hydraulic or cooling fluids, water absorbing elements should not be used if the fluids are “milky.” Such fluids should be drained and changed before installing water absorbing elements. Under such conditions, the elements would have very short life and would need to be changed very soon.

Monitor Element Fuel Flow Direction and Operation
Contaminated fuel enters the filter vessel through the inlet port located on the side of the vessel near the top and passes through the multiple layers of the water absorbent element media, flowing outside-in. Water absorbing elements use a high performance water absorbing media that can hold 25 times its weight in water. As the media becomes saturated with water, fuel flow is greatly restricted, if the element is not changed. The clean, dry fuel then flows down through the element center tube and exits through the outlet port located on the bottom of the filter vessel.

Maximize Element Life & Filtration Performance
To obtain maximum element life and filtration performance, maintenance personnel must use a differential pressure gauge to monitor element condition.

Element Changeout
Elements are recommended to be changed at 15 PSI differential or after one year of service, whichever occurs first.

CLAY TREATER

Application
Clay elements are used to remove (by adsorption), surface active agents (surfactants), color and additives commonly found in jet fuel or may also be used to remove acids or products of oxidation from various hydrocarbon flow streams such as lube oils and hydraulic fluids.

Unwanted Contaminants Present in Fuel
These unwanted contaminants may be present in the fuel at the processing and refining levels or picked up from various transportation methods such as trucks, ships and pipelines that carry several types of petroleum products in addition to jet fuel.

Installation Location
Clay elements are commonly installed in the upstream piping system to prevent the accumulation of surfactants in the filter separator elements. Accumulation of surfactants in the coalescing element media will reduce the water coalescing efficiency of the filter separator unit and allow water to continue downstream.

Clay Element Fuel Flow Direction and Operation
Contaminated fuel enters the filter vessel through the inlet port located on the side of the vessel near the top and passes through the clay media, flowing outside-in. Surfactants and impurities are adsorbed by the clay media as fuel passes through the element. The treated fuel then flows down through the element center tube and exits through the outlet port located on the bottom of the filter vessel.

Measurement of Clay Element Condition
Important: Clay element condition is not measured by differential pressure as are pre-filter, water absorbent and filter separator type elements. To obtain maximum clay element life and downstream filter separator performance, maintenance personnel must use a Microseparometer (MSEP) test ASTM Method 3948 to monitor clay element condition. MSEP test would need to be run before and after the clay treater to obtain a measure of the improvement in MSEP rating.

Element Changeout
Elements are recommended to be changed if the MSEP reading is not improved downstream of the clay treater, poor results are being measured downstream of the filter separator or after one year of service, whichever occurs first.

Racor Clay Bags and Canisters
CARBON TREATER

Application
Carbon elements are used to remove by adsorption, chlorine, chlorinated organic compounds, odors, unwanted colors, deodorization and decolorization of hydrocarbon based solvents and for deoiling of industrial water. These unwanted contaminants may be present in the hydrocarbon product at the processing and refining levels or picked up from various process operations.

Carbon Element Flow Direction and Operation
Contaminated product enters the filter vessel through the inlet port located on the side of the vessel near the top and passes through the carbon media, flowing outside-in. Contaminants and impurities are adsorbed by the carbon media as the product passes through the element.

Measurement of Carbon Element Condition & Element Changeout
Carbon element condition is not measured by differential pressure as are pre-filter, water absorbent and filter/separator type elements.

To obtain maximum carbon element life, elements are recommended to be changed when poor results are being measured downstream of the carbon filter or after one year of service, whichever occurs first.

GENERAL ELEMENT INFORMATION
Element Micron Rating Guide
The following element micron ratings should be used as a general guide when filtering the fluids listed below: (Preferred micron rating listed first).

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Micron Rating</th>
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<tbody>
<tr>
<td>Aviation Gas</td>
<td>1 or 5 Micron</td>
</tr>
<tr>
<td>Diesel Fuel</td>
<td>10 or 25 Micron</td>
</tr>
<tr>
<td>Gasoline</td>
<td>5 or 10 Micron</td>
</tr>
<tr>
<td>Hydraulic Fluids</td>
<td>5 or 10 Micron</td>
</tr>
<tr>
<td>Jet Fuel</td>
<td>.3 or .5 Micron</td>
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</tbody>
</table>

Consult the factory when filtering fluids not listed; highly contaminated fluids, or fluids with excess water.

GENERAL ACCESSORY INFORMATION
Installation Tips
Normally, accessory items such as differential pressure gauges, air eliminators, relief valves, liquid level gauges and manual drain valves will come factory installed. Inspect all items for damage before operation.
1. Remove vessel from shipping container and inspect for any damage that may have occurred during transit. Replace any damaged parts before operating. Remove any protective packing materials and properly dispose of along with shipping container.

**Note:** Before disposal, be sure to inspect shipping container for any parts that may have been shipped loose.

2. Provide a suitable mounting surface and anchor bolts, nuts and washers of adequate size.

3. Secure unit in place before opening the access cover or proceeding with connecting piping.

**Safety Warning:** Opening the access cover before the vessel is securely mounted may cause the vessel to become unstable and could result in the vessel falling.

4. Once the vessel is securely mounted, the access cover can be safely opened to inspect the vessel internals.

**Note: Factory Installed Elements**
Elements may be installed at the factory before shipment, if so, inspect for any damage that may have occurred during transit.

**Note: If Elements Are Not Factory Installed**
Vessels shipped without elements installed will be tagged calling attention to this fact.

5. If no damage is found and elements are installed, check all elements to be sure that all elements are properly aligned on the filter element stool knife edges and that the top filter element end yoke is properly seated. **Tighten all elements to the recommended torque rating, see chart on page 21.**

6. Inspect the cover o-ring seal for any damage and replace if necessary.

7. Place the cover seal in the o-ring gland, close vessel access cover, being careful not to damage the cover seal, and tighten all bolts evenly and securely.

8. Remove any flange face or thread protectors from all connections.

9. Proceed with connecting piping using a minimum number of turns and fittings to minimize additional turbulence in the inlet piping as well as product/water emulsification and additional system pressure loss.

10. Align all piping to and from the vessel as closely as possible with the connections on the vessel. Proper alignment will avoid overstressing the connections on the vessel.

11. Use thread sealant for threaded connections or the correct gaskets between flanged connections. Be sure that thread sealant and gaskets are compatible with the intended application.

12. Provide shutoff valves in the inlet/outlet piping to isolate the vessel from the piping system for servicing the unit or complete removal of the vessel from the process stream should be necessary.

13. Provide suitable vent and drain lines from the vessel to a suitable collection point for drained water or product to be collected for later processing or disposal.

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**Warning: Correctly Identify Inlet & Outlet Connections**

Correctly identify the inlet and outlet connections before connecting the vessel in the system. The unit will not perform properly should the connections be reversed.
When all piping connections have been made, check that all accessory items have been installed and inspected. A final check should be made before filling the vessel with fluid to test.

1. Verify that all anchor bolts are tight.
2. Verify that any flanged connections have the proper gaskets installed and that flange bolts are tight.
3. Verify that any threaded connections have the proper sealing compound and that all connections are tight.
4. Verify that all accessory items are properly installed and all connections are tight.
5. Verify that all tubing lines are in good condition and all tube fittings are tight.
6. Verify that all vessel access cover bolts are tight.
7. Verify that all packing nuts or glands on valves and liquid level gauges are tight.
8. Verify that any electrical connections are proper and in conformance with local electrical code requirements.
9. Verify that electrical power connected is of the proper voltage.
10. Verify that any electrical equipment used is in conformance with local electrical code requirements for the location and of adequate size and that there are no hazards present. A fused disconnect should be provided in the wiring system to protect electrical equipment from overload and to provide a power disconnect close to the equipment.
11. Should insulation be installed, verify that the insulation does not interfere with the visual inspection or operation of the controls.
12. Verify that all surplus materials that may be a hazard to the operator or any combustible materials have been removed from the immediate area.

SAFETY WARNING: Adequate fire fighting equipment should be provided for the operating area before conducting a fluid test and at all times when performing any maintenance or service work in the operating area. Provide “No Smoking” signs in the operating area.

PERSONNEL SAFETY PRECAUTIONS

The following precautions are recommended for the safety of the operating personnel:

1. The fluid being filtered is volatile. No smoking is permitted in the area where the system pumps, storage tanks and filtering equipment are located.
2. Any fluid spill must be cleaned up immediately. Dispose of all contaminated cleaning materials in a fire-safe container.
3. Any clothing contaminated with fluid must be removed immediately and disposed of in a fire-safe container.
4. Fluid resistant gloves must be worn when handling parts that have been in contact with the fluid.
5. When servicing the filtering equipment, allow for maximum ventilation to disperse fumes. An air mask may be worn when servicing the vessel main body.
6. Use only non-sparking tools when performing maintenance on the filtering equipment and on the fuel system components.
7. Avoid any unnecessary contact of fluid to the skin or clothing. Always wear safety gloves.
8. Avoid any spillage of liquid in the operating area. Any spills must be cleaned up immediately to reduce injury from slipping.
9. Personnel should wash hands thoroughly after any maintenance to the filtering equipment or any of its components. Apply medication to any cuts or abrasions.
10. Secure medical attention for any serious cuts, stomach discomfort or breathing difficulties that may be caused by excessive inhalation of fumes.
**PRE-OPERATIONAL FLUID TEST**
After all of the aforementioned procedures have been followed, the filter system is ready for a fluid test prior to being placed in full operation.

1. Close the drain valves and open the vent valve, or make sure the air eliminator is unrestricted.

2. Open the gauge cocks on the liquid level gauge if used.

3. Open the main valve from the storage tank to SLOWLY fill the system piping and filter vessel with fluid using head pressure from the storage tank.

4. If head pressure is not available, the system piping and filter vessel will need to be filled using the system pump.

**Instruction**

**If Positive Displacement Pump Is Used**

1. If a positive displacement pump is used in the system, a bypass line must be installed around the filter vessel, or a pressure relief valve be installed in the piping to prevent excessive pressure that may cause damage.

2. Start the system pump and SLOWLY open the main valve on the inlet piping.

3. Allow the filter vessel to fill SLOWLY and completely.

4. Close the vents and SLOWLY open the main valve on the outlet piping of the filter vessel.

5. **If Fluid Mist Occurs**
There will be a slight emission of fluid mist when the filter vessel is on line and when the air eliminator vents, the manual vent is opened or when excess thermal pressure is discharged from the pressure relief valve.

6. Inspect all connections for leaks.

7. Tighten connections or replace gaskets where necessary. If tightening connections fails to stop leaks, inspect for damage and replace parts as necessary.

8. Check all components for proper operation and valve alignment.

9. Verify that all fluid spills have been cleaned and dried and removed from the area.

**CAUTION: Use Only Non-sparking Tools**
Use only non-sparking tools when performing any maintenance or service work.

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**FILTER OPERATION PROCEDURES**

(After Installation & Fluid Tests)
After installation of the filter vessel is complete (including the fluid test for leaks), the filter vessel is ready for operation. **To place the filter vessel on stream, the following procedures must be observed.**

1. Verify all drain valves are closed. Should an automatic drain valve be installed, any valves located downstream should be open to permit discharge of accumulated water.

2. Verify liquid level gauge cocks are open, if equipped.

3. Verify air eliminator and pressure relief valves are not restricted. If the filter vessel is only equipped with a manual air vent valve, this manual vent will need to be open until the vessel is full.

4. Open the main valve in the outlet line leading from the filter vessel.

5. Open the main valve from the storage tank to SLOWLY fill the system piping and filter vessel with fluid using head pressure from the storage tank.
   A. If head pressure is not available, start the system pump and slowly open the main valve in the inlet line to fill the filter vessel.
   B. Allow the unit to fill slowly and completely.
   C. Allow the vent valve to remain open (if so equipped) long enough to allow entrapped air to escape.
   D. Close the vent valve as soon as the filter vessel is full.

6. When the filter vessel is filled and vented, open the main inlet and outlet valves to full open position. Check the flow meter, if installed, to verify flow rate.

7. Verify that the system pressure does not exceed the design pressure of any of the components in the system.

8. Check the differential pressure and record the reading and the date.

**Element Changeout**
For maximum performance and efficiency, the elements must be replaced when the differential pressure reaches 15 PSID, or replaced at least once each year, whichever occurs first.
DIFFERENCES IN ELEMENT CHANGING PROCEDURES

The element changing procedure will be slightly different depending on the application and the type of elements installed. The following paragraphs will detail each of the available element configurations. Proceed to the changing instructions that best fit your element configuration.

ELEMENT TYPES

6" Pre-filter, Water Absorbing Element (See Figure 1) Clay Canister Type Elements (See Figure 2)

NOTE: It is not necessary to remove the center rod from the element-mounting adapter when replacing elements.

If the center rod is removed from the adapter, thread the jam nut onto the center rod until approximately 1 1/2" (one and one-half inches) of center rod is extending through the jam nut.

Screw the center rod into the element adapter until the jam nut is securely seated against the adapter and locked in place.

1. Remove the element(s) by removing the hex nut, lock washer, flat metal washer, gasket washer and end yoke from the center rod.
2. Slide the old element(s) from the center rod. Be careful not to dislodge any solids debris from the element as the element is removed from the vessel. Any solids that fall back into the vessel could fall into the clean product chamber, contaminating the down-stream process.
3. Discard old elements to a fire-safe place, per current local EPA regulations.
4. Clean all interior surfaces of the filter vessel including the mounting adapter and element mounting hardware.
5. Using clean product, flush any solids debris from the bottom of the filter vessel through the vessel drain connection. Solids that are too large or are in too great of quantity must be removed by another method.
6. Once the filter vessel is clean, the new elements are ready to install.
CAUTION: Handle Elements Only By End Caps
Elements should only be handled by the end caps to prevent physical damage to the media. Performance of the elements may also be affected by touching the media even though no physical damage is apparent.

7. Slide the new element(s) on to the center rod.
8. Re-assemble the end yoke, gasket washer, flat metal washer, lock washer and hex nut to the center rod. If elements are stacked, be sure that the center seals are installed between each element.
9. Verify that the elements are seated properly on the adapters and center seals.
10. Using a torque wrench, tighten the hex nuts to recommended torque shown on page 21.
11. Install a new access cover gasket of the proper type and close the filter vessel access cover.
12. Tighten all closure bolts evenly and securely.
13. Follow the instructions outlined in the “FILTER OPERATION PROCEDURES” section on page 7 to return the filter vessel to service.

Coalescer/Separator Type Elements (See Figure 3).

NOTE: It is not necessary to remove the center rod from the element-mounting adapter when replacing elements.

1. If the center rod is removed from the adapter, thread the jam nut on to the center rod until approximately 1 - 1/2” (one and one-half inches) of center rod is extending through the jam nut.
2. Screw the center rod into the element adapter until the jam nut is securely seated against the adapter and locked in place.
3. Remove the coalescer element(s) by removing the hex nut, lock washer, flat metal washer, gasket washer and end yoke from the center rod.
4. Slide the old coalescer element(s) from the filter vessel. Be careful not to dislodge any solids debris from the element as the element is removed from the vessel. Any solids that fall back into the vessel could fall into the clean product chamber, contaminating the down-stream process.
5. Remove the separator element(s) by removing the hex nut, lock washer, flat metal washer, gasket washer and end yoke from the center rod.
6. Slide the old separator element(s) from the filter vessel. Be careful not to dislodge any solids debris from the element as the element is removed from the vessel. Any solids that fall back into the vessel could fall into the clean product changer contaminating the down-stream process.
7. Discard old elements to a fire-safe place, per current local EPA regulations.
8. Clean all interior surfaces of the filter vessel including the mounting adapter and element mounting hardware.
9. Using clean product, flush any solids debris from the bottom of the filter vessel through the vessel drain connection. Solids that are too large or are in too great of quantity must be removed by another method.
10. Once the filter vessel is clean, the new elements are ready to install.

CAUTION: Elements Should Only Be Handled By End Caps
Elements should only be handled by the end caps to prevent physical damage to the media. Performance of the elements may also be affected by touching the media even though no physical damage is apparent.

11. Slide the new separator element(s) onto the center rod.
12. Re-assemble the end yoke, gasket washer, flat metal washer, lock washer and hex nut to the center rod. If the separator elements are stacked, be sure that the center seals are installed between each element.
13. Verify that the elements are seated properly on the adapters and knife edge center seals.
14. Using a torque wrench, tighten the hex nuts to 60 inch pounds (5 foot pounds).

15. Slide the new coalescer element(s) over the separator element(s), which were just installed. The coalescer element must center on the knife edge seal ring in the bottom of the vessel.

16. Re-assemble the end yoke, gasket washer, flat metal washer, lock washer and hex nut to the center rod. If the coalescer element(s) are stacked, be sure that the center seals are installed between each element.

17. Verify that the elements are seated properly on the seal ring and knife edge center seals.

18. Using a torque wrench, tighten the hex nuts to 120 inch pounds (10 foot pounds).

19. Install a new access cover o-ring gasket of the proper type and close the filter vessel access cover.

20. Tighten all closure bolts evenly and securely.

21. Follow the instructions outlined in the “FILTER OPERATION PROCEDURES” section on page 7 to return the filter vessel to service.

**NOTE:** Standard Closure Seal is: Buna-N O-Ring P/N 72025

---

**Parts List**

1. Hex Nut
2. Star Lock Washer
3. Flat Washer
4. Gasket Washer *
5. End Yoke
6. Center Rod
7. Jam Nut
8. Mounting Stool

*Gasket Washers Are Supplied With New Element.*
**Parts List**

1. Hex Nut
2. Star Lock Washer
3. Flat Washer
4. Gasket Washer *
5. End Yoke
6. Center Rod
7. Jam Nut
8. Mounting Stool Adapter
9. Mounting Stool

*Gasket Washers Are Supplied With New Element.

Center Seal Required If Elements Are Stacked Two Deep.

---

**Parts List**

1. Hex Nut
2. Star Lock Washer
3. Flat Washer
4. Gasket Washer *
5. Coalescer Yoke
6. Separator Yoke
7. Center Rod
8. Jam Nut
9. Mounting Stool

*Gasket Washers Are Supplied With New Element.
CAUTION: Do This Before Removal or Repair of Filter

Filter vessel must be relieved of internal pressure, drained and vented before removal or repair of any accessory option.

DIFFERENTIAL PRESSURE GAUGE

Application
The primary reason for installing a differential pressure gauge on a filter vessel is to determine the difference between the pressure in the inlet chamber and the outlet chamber. The resulting number of pounds difference is a direct indication of the condition of the elements contained in the filter vessel.

Operation
While under pressure, fluid enters the filter vessel through the inlet connection and flows through the element(s) to the outlet connection. During this filtering process, there is a gradual clogging of the element with solid contaminants. This will result in a gradual increase of pressure and decrease in product flow. The condition of the element(s) is indicated by the amount of pressure loss shown on the gauge.

Element Changeout
When the filter vessel has been in operation for some time, a gradual increase in the difference of inlet and outlet pressures will be indicated on the gauge. When the actual differential pressure reaches the recommended change-out differential pressure (shown on the vessel nameplate), the elements must be replaced.

Gauge Type
The gauge shown in Figure 4 is a direct reading type. The large indicating pointer is free to swing toward the high-pressure side while the filter vessel is in operation. When the filter vessel is not in operation, the indicator will return to the zero mark.

Gauge Reading Results
In addition, a dead hand or maximum pointer indicator will also be included on the standard direct reading differential gauge. The dead hand indicator will provide indication of the maximum differential pressure that occurred during a time period or system cycle. This feature is also desirable in systems where line surges or hydraulic hammer may be expected.

Installation of Direct Reading Gauges
Figure 4 illustrates the standard installation assembly of the direct reading differential pressure gauge assembly recommended for Parker Racor Hydrocarbon Filters RVFS type filter vessels.

Tubing lines are to be threaded into the connections provided on the filter vessel inlet and outlet connections and on the differential pressure gauge high and low pressure ports.

Check differential pressure gauge mounting bracket screws to be sure they are tightened securely. This will minimize vibrations and possible breakage of the connecting tubes or pipes. All tubing, pipes and fittings should be checked for obstructions or damage before any connections are made and the filter vessel is put into operation. Make certain that all connections are tight before operation.

CAUTION: Do not over-tighten connections.

Stripped threads on the fittings may result in leaky joints. Replace damaged fittings and/or flattened or kinked tubing with new parts before filter vessel is put into operation.

NOTE: Valves Should Remain Open
Any valves installed in the differential pressure gauge hookup assembly should remain open while the filter vessel is in operation.

AIR ELIMINATOR

Application
In many fluid systems, a filter vessel will tend to trap air or vapor in a partially filled condition. A float operated air eliminator will automatically vent to the atmosphere any trapped air or vapor which might be entrained in the fluid passing through the unit. The air eliminator is mounted at the top of the filter vessel at the position best suited for the collection of air and vapor.

Operation
Since the air eliminator mechanism is fully automatic, it requires no attention during operation. As the air accumulates in the chamber of the air eliminator, the float drops and opens the internal vent valve. When the air is exhausted, the liquid will rise in the chamber of the air eliminator and lift the float shutting the internal vent valve.
Installation of Air Eliminator

*Figure 5* illustrates the standard hook-up assembly of the automatic air eliminator recommended for Parker Racor Hydrocarbon Filtration RVFS type filter vessels.

A pipe nipple and the air eliminator are threaded into the vent connection provided on top of the filter vessel. Make certain that all connections are tight before operation.

*Figure 6* - Illustrates a pipe tee and a manual vent valve installed below the air eliminator for venting purposes when a check valve is installed in the outlet of the air eliminator. The check valve can be installed to prevent air from entering the filter vessel when the system is not operating and there is potential for fluid in the filter vessel to drain back by gravity through the piping system.

If Air Eliminator Fails

Should the air eliminator fail to function, or should it permit fuel to leak from the air outlet:

1. Remove the assembly and check the float mechanism.
2. In some cases, washing the mechanism with naphtha or gasoline and blowing out with compressed air will remove dirt or debris, which might be causing the linkage to stick.
3. If the linkage remains stiff or will not move, replace the air eliminator.

RELIEF VALVE

Application

Relief valves are installed on filter vessels to provide for the bleed-off of excess pressure caused by line surges or thermal expansion. In general, the valves are not designed to handle relief of full flow on a bypass operation, but only to relieve excess pressure.

Operation

Since the relief valve mechanism is fully automatic, it requires no attention during operation. As excess pressure accumulates inside the filter vessel, the excess pressure overcomes the spring mechanism inside the relief valve and the relief valve opens momentarily or until the pressure returns to normal levels. Once the pressure is relieved to a level below the relief valve set point, the spring mechanism will force the relief valve closed.

Installation of Relief Valve

*Figure 7* illustrates the standard hook-up assembly of the relief valve recommended for Parker Racor RVFS type filter vessels.

The relief valve will thread directly into the relief connection provided on top of the filter vessel. Make certain that all connections are tight before operation.
MANUAL VENT AND DRAIN VALVES

Application
Manual vent valves are manually operated ball valves installed on the filter vessel to provide a way to vent the filter vessel when an automatic air eliminator is not used. *The filter vessel will need to be vented during either the filling or draining operation.*

A manual vent valve also is required when the automatic air eliminator is installed and equipped with a check valve to prevent the return of air into the filter vessel. *See Figure 6 on previous page.*

Manual drain valves are manually operated ball valves that are installed on the filter vessel drain connection. This valve provides a way to drain fluid from the filter vessel. *Manual drain valves should be opened frequently during operation so that accumulated solids and water can be removed.*

CAUTION: Always drain and thoroughly vent the filter vessel before element replacement or maintenance on any of its components.

Operation of Manual Vent and Drain Valves
Manual vent and drain valves can be fully opened or fully closed by turning the handle 90 degrees.

Installation of Manual Vent Valve
*Figure 8* illustrates the standard hook-up assembly of the manual vent valve recommended for Parker Racor RVFS type filter vessels should the filter vessel not be equipped with an automatic air eliminator.

A pipe nipple and the manual vent valve are to be threaded into the vent connection provided on top of the filter vessel. Make certain that all connections are tight before operation.

*Figure 9* illustrates the standard hook-up assembly of the manual drain valve recommended for Parker Racor RVFS type filter vessels.

LIQUID LEVEL GAUGE

Application
A liquid level gauge will provide visual observation of the level of two immiscible fluids in the sump of a filter vessel. A liquid level gauge will be of most use when the filter vessel is operating as a filter separator to coalesce water from a hydrocarbon product stream (sometimes referred to as a water sight glass).

Operation Liquid Level Gauge
When the liquid level gauge is used to determine the level of two immiscible liquids, such as fuel and water, the level is read by the position of the interface of the two liquids. Water is heavier than most hydrocarbon products and will be the most common fluid being coalesced or removed from a hydrocarbon product stream. Once the water is coalesced into droplets, the water droplets will settle and collect in the sump at the bottom of the filter vessel.

Location of Liquid Level Gauge
The liquid level gauge will be positioned in the sump area near the bottom of the filter vessel.
Installation of Liquid Level Gauge

Figure 10 illustrates the standard hook-up assembly of the type liquid level gauge recommended for Parker Racor RVFS type filter vessels.

The upper and lower liquid level gauge valves, if supplied, will thread directly into the two connections provided on lower side of the filter vessel and will need to be aligned properly to accept the clear level indicator tube. Guard rods are provided on some models to protect the level indicator tube from breakage. If the level indicator tube is broken, the gauge valves, if equipped, can be closed to prevent product spillage.

Make certain that all connections, gauge valve stem packing nuts and level indicator tube packing nuts are tight before operation.

CAUTION: Do not over-tighten packing nuts or other connections. Stripped threads on the fittings may result in leaky joints. Replace any damaged fittings or parts before the filter vessel is put into operation.

NOTE: Gauge Valves to Remain Open
Gauge valves, if supplied, in the liquid level gauge assembly should remain open while the filter vessel is in operation.

MECHANICAL DUAL GRAVITY DRAINER

Application
A mechanical dual gravity drainer is a device designed to automatically drain a heavier liquid such as water from a flow stream of a lighter hydrocarbon product. This type of drainer would be used in an application where water is considered a contaminant and is being removed from the flow stream.

A filter separator vessel is designed to remove water from a hydrocarbon flow stream. Water is coalesced from the product flow stream and being heavier than the hydrocarbon product, will fall by gravity into the sump located at the bottom of the vessel. The water can then be drained from the sump by a manually operated drain valve or automatically by a Mechanical Dual Gravity Drainer mounted in the drain line at the bottom of the vessel.

Operation of Mechanical Dual Gravity Drainer
Since the drainer mechanism is fully automatic, it requires no attention during operation. A mechanical dual gravity drainer uses a weighted float that is designed to float in water and sink in the hydrocarbon product. Water will accumulate in the sump of the vessel and equalize into the drainer body. As the water level increases in the chamber of the drainer, the float rises and opens the internal mechanical drain valve. Water is then expelled by the system operating pressure through the drain port. As water is expelled through the drain port, it is replaced by hydrocarbon product entering the body of the drainer lowering the float and closing the internal drain valve.

Installation of Mechanical Dual Gravity Drainer
Instructions will be provided for the standard hook-up assembly of the mechanical dual gravity drainer recommended from Parker Racor RVFS type filter separator vessels.

Location of Mechanical Dual Gravity Drainer
Pipe nipples, fittings and the mechanical dual gravity drainer are to be threaded into the drain connection provided on the bottom of the filter separator vessel and to one of the liquid level gauge connections.

A manual drain valve should also be installed in order to drain the filter separator vessel for maintenance purposes. Make certain that all connections are tight before operation.
If Mechanical Dual Gravity Drainer Fails or Leaks
Should the Mechanical Dual Gravity Drainer fail to function, or should it permit fuel to leak from the outlet:

1. Remove the assembly and check the float mechanism.
2. In some cases, washing the mechanism with naptha or gasoline and blowing out with compressed air will remove dirt or debris, which might be causing the linkage to stick.
3. If the linkage remains stiff or will not move, replace the automatic drainer.

SUMP HEATER

Application
A sump heater is an electrical heating device for providing freeze protection only to the sump area of a filter separator vessel. A filter separator vessel is designed to remove water from a hydrocarbon product stream. The water being removed will settle by gravity into the sump of the filter separator vessel. In the winter, water left in the sump can freeze and cause operational problems as well as damage to equipment.

Operation - Use Only in Cold Weather
A sump heater is a device that will only be of use in cold weather and should be turned off when freezing is not a threat or during service or maintenance periods.

Install a disconnect switch at site close to where the heater is installed.

SUMP HEATER SAFETY PROCEDURES
A sump heater is an electrical device and has the potential to cause electrocution, fire or an explosion should it be installed or operated improperly.

1. Check local electrical codes as well as the area classification where the electrical device will be installed and operated to determine the proper type of heating device and hook-up required.
2. Disconnect electrical power from the sump heater before draining the vessel of all liquid.
3. Never operate the heating device when the filter separator vessel is empty. The heater element as well as the filter vessel may be damaged.

Installation of Sump Heater - Normally Preinstalled
1. Normally, if ordered as an option, the filter separator vessel will come with the sump heater device preinstalled from the factory.
2. Should the sump heater device be ordered separate for installation at the job site, detailed instructions will be supplied.

3. A qualified electrician should perform the installation and hook-up.

WATER PROBE

Application
A water probe is an electrical device for measuring conductance. Water is a conductor and normally a hydrocarbon product is a non-conductor. A filter separator vessel is designed to remove water from a hydrocarbon product stream. The water being removed will settle by gravity into the sump of the filter separator vessel.

Location of Water Probe
A water probe is positioned in a filter separator vessel near the sump area and will provide an electrical signal indicating rising water in the sump of the filter separator upon water making contact with the probe. The electrical signal (usually a contact closure) can be used to shut down or divert flow or alert operators by audible or visual methods.

Operation
A water probe is an electrical device that will only be of use in a filter separator vessel where water is considered a contaminant and is being removed from a hydrocarbon product flow stream. Water is detected by conductance and normally a contact closure is provided for customer use. Water probes are available in various voltages and styles.

Location of Disconnect Switch
Install a disconnect switch at the site close to where the water probe is installed.

WATER PROBE SAFETY PROCEDURES
A water probe is an electrical device and has the potential to cause electrocution, fire or an explosion should it be installed or operated improperly.

1. Check local electrical codes as well as the area classification where the electrical device will be installed and operated to determine the proper type of water probe and hook-up required.
2. Disconnect electrical power from the water probe before draining and servicing the vessel.

Installation of Water Probe
1. Normally, if ordered as an option, the filter separator vessel will come with the water probe pre-installed from the factory.
2. Should the water probe be ordered separate for installation at the job site, detailed instructions will be supplied.
3. A qualified electrician should perform the installation and hook-up.
SAMPLE PROBES

Application
Sample probes are installed on filter vessels to provide a way to draw a sample of the product flow stream for testing. Contamination is normal in a hydrocarbon product flow stream, the type and level of contamination may be used to determine the quality of the product being delivered.

Location of Sample Probes
Sample probes are normally installed in the inlet and the outlet connections of the filter vessel.

Operation
A sample of the hydrocarbon product flow stream is taken at the sample connection and filtered through a special filter disk. Samples may be taken to determine the quantity of solids and or water in the product being delivered. Delivery of product with too high solids or water content may be considered “off spec” and rejected due to poor quality. Sample probes can also be used to determine how well the elements in a filter vessel may be working by comparing upstream and downstream samples of the product.

Installation of Sample Probes
Figure 11 illustrates the standard hook-up assembly of the sample probes recommended for Parker Racor RVFS type filter vessels.

The sample probes will thread into a connection added to the filter vessel inlet and outlet connections. The sample probe is provided with with a tube that extends to the center of the piping and has a bevel cut which faces upstream to collect the sample. The sample probe is also provided with a quick connector and a ball valve to isolate the connection. Make certain that all connections are tight before operation.
Specification Drawings, Dimensions, Flow Charts, & Parts Lists

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## RVFS ELEMENT OPTIONS CHART

### Recommended For Diesel Fuel Applications

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**NOTE:** Standard Closure Seal is: Buna-N O-Ring P/N 72025
RVFS-1, -2, & -3
ELEMENT MOUNTING HARDWARE
PARTS LIST

PREFILTER, MONITOR, & CLAY ELEMENTS

OPEN ENDED

SINGLE SEAL (BLIND ONE END)

8" COALESCER ELEMENTS W/ 4" SEPARATOR ELEMENTS

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<tr>
<td>7&quot; CLAY CANISTER *</td>
<td>ALUM</td>
<td>72463</td>
</tr>
<tr>
<td>8&quot; COALESCER</td>
<td>ALUM</td>
<td>72177</td>
</tr>
<tr>
<td>4&quot; SEPARATOR</td>
<td>ALUM</td>
<td>71122</td>
</tr>
<tr>
<td>6 CLN LR ROD</td>
<td>.50-13 SS</td>
<td>EXISTING</td>
</tr>
<tr>
<td>7 JAM NUT</td>
<td>.50-15 SS</td>
<td>72141</td>
</tr>
<tr>
<td>8 MOUNTING STOOL</td>
<td>EXISTING</td>
<td>EXISTING</td>
</tr>
</tbody>
</table>

* CENTER SEAL, P/N 72484, REQ'D FOR STACKED CLAY ELEMENTS.
** GASKET WASHERS ARE SUPPLIED WITH NEW ELEMENT.
RVFS-1, -2, & -3
RECOMMENDED SEALING TORQUE

PREFILTER, MONITOR,
& CLAY ELEMENTS

OPEN ENDED

SINGLE SEAL
(BLIND ONE END)

5 FT. LBS.

10 FT. LBS. FOR PREFILTER/MONITOR
5 FT. LBS. FOR CLAY CANISTER

8" COALESER ELEMENTS
W/4" SEPARATOR ELEMENTS

KNIFE EDGE
SEAL

5 FT. LBS.

10 FT. LBS.

TORQUE CONVERSION TABLE

<table>
<thead>
<tr>
<th>FOOT-POUNDS</th>
<th>INCH-POUNDS</th>
<th>KILOGRAM-METERS</th>
<th>NEWTON-METERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>60</td>
<td>.69</td>
<td>6.78</td>
</tr>
<tr>
<td>7</td>
<td>84</td>
<td>.97</td>
<td>9.49</td>
</tr>
<tr>
<td>10</td>
<td>120</td>
<td>1.38</td>
<td>13.55</td>
</tr>
<tr>
<td>15</td>
<td>180</td>
<td>2.07</td>
<td>20.34</td>
</tr>
<tr>
<td>20</td>
<td>240</td>
<td>2.77</td>
<td>27.12</td>
</tr>
<tr>
<td>30</td>
<td>360</td>
<td>4.15</td>
<td>40.67</td>
</tr>
</tbody>
</table>

RECOMMENDED CHANGE OUT
COALESCER: 15 PSID
FILTERS: 20 PSID
Racor Hydrocarbon Filters
In-Stock Filter Vessels

RVFS-1

RVFS-2

RVFS-3
**RVFS SPECIFICATIONS**

<table>
<thead>
<tr>
<th>DESIGN DETAILS</th>
<th>RVFS-1</th>
<th>RVFS-2</th>
<th>RVFS-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet &amp; Outlet Ports</td>
<td>2 in. NPT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vent &amp; Relief Ports</td>
<td>3/4 in. NPT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drain &amp; Liquid Level Gauge Ports</td>
<td>1/2 in. NPT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differential Gauge Ports</td>
<td>1/8 in. NPT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design Pressure &amp; Temperature</td>
<td>250 PSI @ 250 Deg. F (17 bar @ 121 Deg. C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASME Code Stamped</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Drop - Clean</td>
<td>2 PSID (.14 bar)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Drop - Dirty</td>
<td>15 PSID (1.04 bar)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>39 in. (991 mm)</td>
<td>51 in. (1295 mm)</td>
<td>65 in. (1651 mm)</td>
</tr>
<tr>
<td>Width</td>
<td>13.75 in. (350 mm)</td>
<td>13.75 in. (350 mm)</td>
<td>13.75 in. (350 mm)</td>
</tr>
<tr>
<td>Depth</td>
<td>13.5 in. (343 mm)</td>
<td>13.5 in. (343 mm)</td>
<td>13.5 in. (343 mm)</td>
</tr>
<tr>
<td>Dry Weight</td>
<td>100 lbs. (45 kgs)</td>
<td>115 lbs. (52 kgs)</td>
<td>130 lbs. (59 kgs)</td>
</tr>
<tr>
<td>Overhead Space for Element Change</td>
<td>16 in. (406 mm)</td>
<td>32 in. (813 mm)</td>
<td>47 in. (1194 mm)</td>
</tr>
</tbody>
</table>

*NOTE: Overall dimensions will vary depending on mounting leg or bulkhead method of installation.*

**RVFS MAXIMUM FLOW RATES**

**Diesel @ 37 SSU**

<table>
<thead>
<tr>
<th>Filter Sep.</th>
<th>Prefilter</th>
<th>Monitor</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>RVFS-1</td>
<td>25</td>
<td>66</td>
<td>29</td>
</tr>
<tr>
<td>RVFS-2</td>
<td>50</td>
<td>133</td>
<td>58</td>
</tr>
<tr>
<td>RVFS-3</td>
<td>75</td>
<td>200</td>
<td>87</td>
</tr>
</tbody>
</table>

**Aviation @ 32 SSU**

<table>
<thead>
<tr>
<th>Filter Sep.</th>
<th>Prefilter</th>
<th>Monitor</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>RVFS-1</td>
<td>50</td>
<td>66</td>
<td>58</td>
</tr>
<tr>
<td>RVFS-2</td>
<td>100</td>
<td>133</td>
<td>116</td>
</tr>
<tr>
<td>RVFS-3</td>
<td>150</td>
<td>200</td>
<td>174</td>
</tr>
</tbody>
</table>

**Lube Oils and Other Hydrocarbon Applications**

<table>
<thead>
<tr>
<th>Filter Sep.</th>
<th>Prefilter</th>
<th>Monitor</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>RVFS-1</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>RVFS-2</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>RVFS-3</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

*Consult factory for flow rates. Factory will require details of the application for proper sizing.*

**RVFS OPTIONAL EQUIPMENT**

**Diesel / Industrial Applications**

<table>
<thead>
<tr>
<th>Item</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Differential Pressure Gauge</td>
<td>72059</td>
</tr>
<tr>
<td>*Stainless Auto Air Eliminator</td>
<td>71679</td>
</tr>
<tr>
<td>Or Brass Manual Air Vent</td>
<td>71943-.75</td>
</tr>
<tr>
<td>*Pressure Relief Valve, 125 PSI</td>
<td>71330-.125</td>
</tr>
<tr>
<td>*Brass H₂O Sight Glass, 125 PSI</td>
<td>70906</td>
</tr>
<tr>
<td>Or Electronic Water Probe (12 VDC)</td>
<td>RK 30880</td>
</tr>
<tr>
<td>Or Electronic Water Probe (110 VAC)</td>
<td></td>
</tr>
<tr>
<td>Or Auto Drain Valve</td>
<td>71166</td>
</tr>
<tr>
<td>*Brass Manual Drain Valve</td>
<td>71943-.5</td>
</tr>
<tr>
<td>*Bulkhead Mounting Brackets (pair)</td>
<td>71982</td>
</tr>
<tr>
<td>Or Adjustable Mounting Legs</td>
<td>71981</td>
</tr>
</tbody>
</table>

**Aviation Applications**

<table>
<thead>
<tr>
<th>Item</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Differential Pressure Gauge</td>
<td>72059</td>
</tr>
<tr>
<td>*Stainless Auto Air Eliminator</td>
<td>71679</td>
</tr>
<tr>
<td>Or Stainless Manual Air Vent</td>
<td>72060-.75</td>
</tr>
<tr>
<td>*Stainless Check Valve for Air Eliminator</td>
<td>72482</td>
</tr>
<tr>
<td>*Pressure Relief Valve, 125 PSI</td>
<td>71330-.125</td>
</tr>
<tr>
<td>*Stainless H₂O Sight Glass, 300 PSI</td>
<td>72061</td>
</tr>
<tr>
<td>Or Electronic Water Probe (12 VDC)</td>
<td>RK 30880</td>
</tr>
<tr>
<td>Or Electronic Water Probe (110 VAC)</td>
<td></td>
</tr>
<tr>
<td>Or Auto Drain Valve</td>
<td>71166</td>
</tr>
<tr>
<td>Stainless Manual Drain Valve</td>
<td>72060-.5</td>
</tr>
<tr>
<td>*Bulkhead Mounting Brackets (pair)</td>
<td>71982</td>
</tr>
<tr>
<td>Or Adjustable Mounting Legs</td>
<td>71981</td>
</tr>
</tbody>
</table>
### OPTIONAL EQUIPMENT: DIESEL SERVICE

- Differential Pressure Gauge
- Stainless Auto Air Eliminator
  OR Brass Manual Air Vent
- Pressure Relief Valve, 125 PSI
- Brass H₂O Sight Glass, 125 PSI
  OR Electronic Water Probe
  OR Auto Drain Valve
- Brass Manual Drain Valve
- Bulkhead Mounting Brackets (Pair)
  OR Mounting Legs

### OPTIONAL EQUIPMENT: AVIATION SERVICE

- Differential Pressure Gauge
- Stainless Auto Air Eliminator
  OR Stainless Manual Air Vent
- Pressure Relief Valve, 125 PSI
- Stainless H₂O Sight Glass, 300 PSI
  OR Electronic Water Probe
  OR Auto Drain Valve
- Stainless Manual Drain Valve
- Bulkhead Mounting Brackets (Pair)
  OR Mounting Legs
RVFS-2

OPTIONAL EQUIPMENT: DIESEL SERVICE
- Differential Pressure Gauge
- Stainless Auto Air Eliminator
  OR Brass Manual Air Vent
- Pressure Relief Valve, 125 PSI
- Brass H₂O Sight Glass, 125 PSI
  OR Electronic Water Probe
  OR Auto Drain Valve
- Brass Manual Drain Valve
- Bulkhead Mounting Brackets (Pair)
  OR Mounting Legs

OPTIONAL EQUIPMENT: AVIATION SERVICE
- Differential Pressure Gauge
- Stainless Auto Air Eliminator
  OR Stainless Manual Air Vent
- Pressure Relief Valve, 125 PSI
- Stainless H₂O Sight Glass, 300 PSI
  OR Electronic Water Probe
  OR Auto Drain Valve
- Stainless Manual Drain Valve
- Bulkhead Mounting Brackets (Pair)
  OR Mounting Legs
OPTIONAL EQUIPMENT:

**DIESEL SERVICE**
- Differential Pressure Gauge
- Stainless Auto Air Eliminator
  OR Brass Manual Air Vent
- Pressure Relief Valve, 125 PSI
- Brass H₂O Sight Glass, 125 PSI
  OR Electronic Water Probe
  OR Auto Drain Valve
- Brass Manual Drain Valve
- Bulkhead Mounting Brackets (Pair)
  OR Mounting Legs

**AVIATION SERVICE**
- Differential Pressure Gauge
- Stainless Auto Air Eliminator
  OR Stainless Manual Air Vent
- Pressure Relief Valve, 125 PSI
- Stainless H₂O Sight Glass, 300 PSI
  OR Electronic Water Probe
  OR Auto Drain Valve
- Stainless Manual Drain Valve
- Bulkhead Mounting Brackets (Pair)
  OR Mounting Legs
SAFETY PRECAUTIONS

The following precautions are recommended for the safety of the operating personnel:

1. The fluid being filtered is volatile. No smoking is permitted in the area where the system pumps, storage tanks and filtering equipment are located.

2. Any fluid spill must be cleaned up immediately. Dispose of all contaminated cleaning materials in a fire-safe container.

3. Any clothing contaminated with fluid must be removed immediately and disposed of in a fire-safe container.

4. Fluid resistant gloves must be worn when handling parts that have been in contact with the fluid.

5. When servicing the filtering equipment, allow for maximum ventilation to disperse fumes. An air mask may be worn when servicing the vessel main body.

6. Use only non-sparking tools when performing maintenance on the filtering equipment and on the fuel system components.

7. Avoid any unnecessary contact of fluid to the skin or clothing. Always wear safety gloves and glasses.

8. Avoid any spillage of liquid in the operating area. Any spills must be cleaned up immediately to reduce injury from slipping.

9. Personnel should wash hands thoroughly after any maintenance to the filtering equipment or any of its components. Apply medication to any cuts or abrasions.

10. Secure medical attention for any serious cuts, stomach discomfort or breathing difficulties that may be caused by excessive inhalation of fumes.

SAFETY WARNINGS

Adequate fire fighting equipment should be provided for the operating area before conducting a fluid test and at all times when performing any maintenance or service work in the operating area. Provide “No Smoking” signs in the operating area.

1. Opening the access cover before the vessel is securely mounted may cause the vessel to become unstable and could result in vessel falling over.

2. Correctly identify the inlet and outlet connections before connecting the vessel in the system. The unit will not perform properly should the connections be reversed.

3. Turn off any heating devices before performing any maintenance or service work.

4. Due to the toxic effects of some of the additives used in liquid hydrocarbon products, care should be taken in handling any parts that have been in contact with liquid product.

5. Filter vessel must be relieved of internal pressure, drained or vented before removal or repair of any accessory option.

6. Do not over-tighten packing nuts or other connections. Stripped threads on the fittings may result in leaky joints. Replace any damaged fittings or parts before the filter vessel is put into operation.
### Worldwide Filtration Manufacturing Locations

#### North America
- **Compressed Air Treatment & Separation/Balston**
  - Haverhill, MA
  - 978 858 0605
  - www.parker.com/balston

- **Finite Airtek Filtration**
  - Airtek/domnick hunter/Zander
  - Lancaster, NY
  - 716 886 6400
  - www.parker.com/faf

- **Finite Airtek Filtration/Finite**
  - Oxford, MI
  - 248 626 6400
  - www.parker.com/finitefilter

#### Engine Filtration & Water Purification
- **Racor**
  - Modesto, CA
  - 209 521 7860
  - www.parker.com/racor

- **Holly Springs, MS**
  - 662 252 2656
  - www.parker.com/racor

- **Racor – Village Marine Tec.**
  - Gardena, CA
  - 419 644 4311
  - www.parker.com/hydraulicfilter

- **Arnhem, Holland**
  - 31 26 3760376
  - www.parker.com/hfde

- **Laval, QC Canada**
  - 450 629 9594
  - www.parker.com/hfde

- **Norfolk, England**
  - 44 (0) 1842 763 299
  - www.parker.com/hfde

- **Peterborough, England**
  - 44 (0) 1733 232 495
  - www.kittiwake.com

- **Zaandam, Netherlands**
  - +31(0) 75 655 50 00
  - www.twinfilt.com

- **Parker Kittiwake**
  - West Sussex, England
  - 44 (0) 1903 731 470
  - www.kittiwake.com

#### Process Filtration & Separation
- **domnick hunter Process Filtration**
  - Oxnard, CA
  - 805 604 3400
  - www.parker.com/processfiltration

- **Madison, WI**
  - 608 824 0500
  - www.sciilog.com

- **Phoenixville, PA**
  - 610 933 1600
  - www.parker.com/processfiltration

#### Aerospace Filtration
- **Velcon Filtration**
  - Colorado Springs, CO
  - 719 531 5655
  - www.velcon.com

- **Vallejo, CA**
  - 707 643 6500
  - www.velcon.com

- **Saipan, CNMI**
  - 670 767 6600
  - www.velcon.com

- **Tokyo, Japan**
  - 81 3 5651 5101
  - www.velcon.com/japan

### Europe
- **Compressed Air Treatment**
  - domnick hunter Filtration & Separation
  - Gateshead, England
  - +44 (0) 191 402 9000
  - www.parker.com/dhns

- **Parker Gas Separations**
  - Etten-Leur, Netherlands
  - +31 76 508 5300
  - www.parker.com/dhns

- **Hiross Zander**
  - Padova Business Unit
  - Padova, Italy
  - +39 049 9712 111
  - www.parker.com/hzd

### Asia Pacific
- **Australia**
  - Castle Hill, Australia
  - +61 2 9634 7777
  - www.parker.com/australia

- **China**
  - Shanghai, China
  - +86 21 5031 2525
  - www.parker.com/china

- **India**
  - Navi Mumbai, India
  - +91 22 651 370 8185
  - www.parker.com/india

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  - www.parker.com/japan

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  - Hwaseong-City
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  - www.parker.com/korea

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  - Jurong Town, Singapore
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  - www.parker.com/singapore

- **Thailand**
  - Bangkok, Thailand
  - +66 2186 7000
  - www.parker.com/thailand

#### Latin America
- **Parker Comercio Ltda.**
  - Sao Paulo, Brazil
  - +55 12 4009 3500
  - www.parker.com/br

- **Pan American Division**
  - Miami, FL
  - 305 470 8800
  - www.parker.com/panam

#### Africa
- **Aeropart Kenya**
  - Nairobi, Kenya
  - +254 21 3000 010
  - www.parker.com/kenya

- **Parker Hannifin Corporation**
  - Filtration Group Global Headquarters
  - 6035 Parkland Boulevard
  - Cleveland, OH 44124-4141
  - phone 216 896 3000
  - fax 216 896 4021
  - www.parker.com/racor