RACOR®

Installation, Operation, Parts and Service Data

Parker Filtration

DIESEL FUEL FILTER/WATER SEPARATORS

Racor Industries is an international company marketing products in 60 countries through a network of over 2,000 distributors and dealers. Founded in 1969 to manufacture and market innovative diesel fuel filter/water separator systems, Racor has extended its product line to include:

- 20 Series Spin-on Diesel Fuel Filter/Water Separators
- Recycling and Recycle/Blender Systems
- Air Dryers for vehicular compressed air systems
- Diesel Fuel Heaters
- Fuel Additives
- Hydraulic Filtration Systems

The precision fuel metering components of diesel engines are especially vulnerable to damage by liquid and solid contaminants in fuel. Airborne dust and dirt, rust and algae induced by the presence of water in storage tanks through condensation and mishandling, all contribute to:

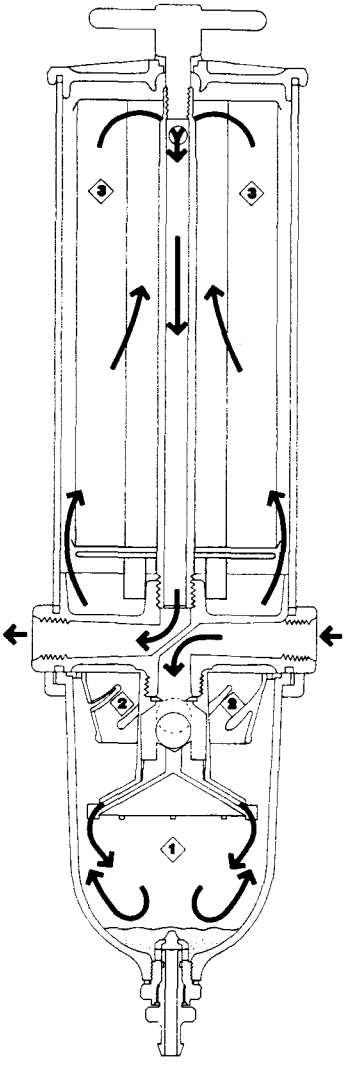
- blown injector tips
- fouled injector nozzles
- excessive pump, injector and ring wear
- loss of power and poor performance

Racor's patented filter/separator design and process removes virtually 100% of the damaging water and solid contaminants from diesel fuel. There is a Racor unit for engine systems with flow rates from 10 gph to 9000 gph. There are no moving parts and maintenance is minimal.

The installation of a Racor fuel filter/water separator in a diesel fuel system will bring the following benefits:

- less pump and injector wear
- more complete combustion
- less exhaust emission
- lower fuel consumption
- less down time and maintenance
- increased operating profits

The industries we serve include on-highway automobile, busses and trucks; off-highway construction, logging and mining; marine workboat, off-shore drilling and exploration and pleasure boat; agriculture; stationary power equipment and fuel storage tanks; railroad; recreational vehicles as well as industrial applications.



Racor diesel fuel filter/water separators and related products have become the standard for all of these industries.

HOW THE RACOR FILTER/ SEPARATOR WORKS

The three stages of the Racor filter/ separator work in series to progressively clean the diesel fuel. Because virtually all water and particles of solid contamination are removed in the primary and secondary stages, the effective life of the fine micron replaceable element (the third stage) is 2-3 times longer than standard filters.

Primary Stage (Separation)

In the primary stage, liquid and solid contamination down to 30 micron are separated out by centrifugal action created by the turbine centrifuge. There are no moving parts in this highly efficient design. Because the contamination is heavier than the fuel, it falls to the bottom of the clear bowl.

Secondary Stage (Coalescing)

This stage functions when minute particles of liquid contamination (lighter than the fuel) remain in suspension and flow up with the fuel into the lower part of the filter/separator shell. Here the minute particles tend to bead on the inner wall of the shell and the bottom of the specially treated replacement element. As the beads accumulate, they become larger and heavier and eventually fall to the bottom of the filter/separator bowl.

Final Stage (Filtration)

In this stage, the fuel flows through the replacement element where the minute solids are removed.

Use only GENUINE RACOR Replacement Elements, Parts and Fuel Additives for maximum operating efficiency. The use of other than GENUINE RACOR products may void your Racor unit warranty.

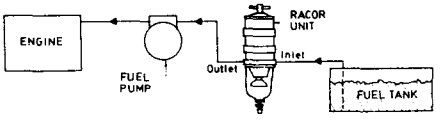
INSTALLATION

PLEASE NOTE FOR AUTOMOBILE APPLICATIONS: Racor manufactures a complete line of mounting bracket kits for installing Racor Filter/Separators on automobiles. The kits contain the Racor mounting bracket specifically designed for the year, make and model automobile and all the necessary hardware with complete mounting instructions for correct installation.

1. Remove vacuum side filters in fuel line between fuel tank and fuel pump. Cast-in-head or non-removable housing should be adapted with primary spin-on adaptor, (Racor part no. 11548) where applicable. Otherwise, service and leave in place.
2. Mount Racor Filter/Separator vertically on the vacuum side of the fuel pump or transfer pump -- whichever comes first -- in a convenient location for servicing.
3. Install fuel line from fuel tank to inlet side of the Racor Filter/Separator. USE MAXIMUM FUEL LINE SIZE AVAILABLE IN ORDER TO REDUCE RESTRICTION. Appropriate fittings are available from your Racor distributor. (See Fittings Chart, page 3.)
4. Install fuel line from the outlet side of the Racor Filter/Separator to the inlet of the fuel pump or transfer pump with appropriate fittings and maximum size fuel line.
5. Remove lid and prime the system by pouring clean fuel into filter/separator housing until full. Replace lid and hand tighten t-handle.
6. Start engine and test system.

WHEN POSITIONING THE UNIT:

- Locate the unit between the horizontal planes of the bottom of the fuel tank and pump inlet for minimum restriction to the pump.
- Do not remove the lid and t-handle.
- Do not overtorque the clamp bolts. Overtorquing will distort housing and seal leaks will occur.
- Maintain vertical clearance above the filter/separator housing for servicing of elements. (See Specfications Chart on Page 10.)



OVERHEAD STORAGE TANK APPLICATION:

Head pressure will be placed on the Racor Filter/Separator when it is installed in conjunction with an overhead storage tank. A valve must be installed on the INLET SIDE of the Racor Filter/Separator for use when servicing replaceable elements.

COLD WEATHER APPLICATION:

If the Racor Filter/Separator is used in cold weather, the unit should be located behind the engine, in engine compartment, near manifold or wherever heat flow is available to strike unit. A Racor In-Filter Heater is recommended to ease cold starts and the Racor Thermoline Diesel Fuel Line Heater is available for efficient cold weather operation.

NOTE: Methanol, ethanol and alcohol-based additives will cause damage to non-metal parts in the Racor unit and the entire diesel engine system. When use of an additive is determined to be necessary, use only genuine RACOR FUEL ADDITIVES. RACOR FUEL ADDITIVES provide preventive maintenance protection all year long, helps cold weather starts, protect against damaging foulants and extend element life.

Racor additives are specially formulated to be completely compatible with engines, fuel filters and water separators. They contain no damaging alcohol and keep fuel in the best possible condition for all diesel engine applications.

RACOR FUEL ADDITIVES ARE SUPER CONCENTRATED. COMPARE TREATMENT COST PER GALLON OF FUEL.

SERVICE

a) REPLACEMENT ELEMENTS

Racor manufactures a complete line of high quality replacement elements for all Racor products. All genuine Racor replacement elements contain a specially-formulated resin-impregnated media designed to repel water and perform the ultra-fine filtration necessary to protect the engine system. An exclusive "lip" seal, designed to prevent element by-pass, contains a molded handle for ease of element removal.

1. Element should be changed at 8 to 15 inches of Mercury restriction. (See Vacuum Gauges on Page 11.) Measurement is made at the pump inlet.
2. On 75/ and 79/ Series models with valving, all valves are in the open position for normal operation. For continuous operation, one unit may be shut down while under power to change element. During element change, reduce fuel flow rate to idle condition.
3. Remove t-handle and lid. Inspect seals and replace if necessary. SEAL SERVICING KITS ARE AVAILABLE FROM YOUR RACOR DISTRIBUTOR.
4. Remove element by holding molded handle and slowly pulling upward with a turning motion.
5. Insert Genuine Racor Replacement Element over center tube with downward turning motion. (See Specifications Chart for replacement element part number on Page 10.)
6. Top off by pouring clean diesel fuel into filter/separator housing until full. Replace lid and hand tighten t-handle.

b) DRAINING THE FILTER/ SEPARATOR BOWL

Bowl must be drained at or before contaminants reach the bottom of the turbine centrifuge assembly. Water Sensor Kits are available as options for Racor Filter/Separators. (See Page 13 for description of kits.)

1. If fuel tank is BELOW filter/separator:
   a. To break vacuum lock, remove t-handle and lid. Inspect seals and replace if necessary. SEAL SERVICING KITS ARE AVAILABLE FROM YOUR RACOR DISTRIBUTOR.
   b. Open drain valve. Drain accumulated water and contaminants. Close drain valve.

c. Prime the system by pouring clean fuel into filter/separator housing until full. Replace lid and hand tighten t-handle.

2. If fuel tank is ABOVE filter/separator:
   a. Open drain valve.
   b. Drain accumulated water and contaminants.
   c. Close drain valve.

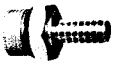
c) CLEANING THE FILTER/ SEPARATOR

IMPORTANT: INSPECT ALL SEALS AND REPLACE IF NECESSARY. SEAL SERVICING KITS ARE AVAILABLE FROM YOUR RACOR DISTRIBUTOR. CLEAN UNIT AND LUBRICATE ALL SEALS BEFORE INSTALLATION WITH CLEAN DIESEL FUEL **ONLY.**

1. Remove t-handle and lid. Inspect for damage and contamination. Clean.
2. Remove and discard replaceable element.
3. Drain unit completely through drain valve. Remove drain valve.
4. Flush unit with clean diesel fuel.
5. If an excessive amount of contamination is present in the bowl:
   Remove bowl retainer screws and lift retainer ring off over bowl. Remove bowl and clean with diesel fuel **ONLY.**
   Replace bowl gasket, place bowl on base, put bowl retaining ring over bowl and tighten retainer screws. (40 inch lbs. max. torque)
6. Install drain valve to bowl (30 inch lbs. max torque) and close.
7. Replace element with new Genuine Racor Replacement Element.
8. Prime the system by pouring clean diesel fuel into the unit until full. Replace lid w/gasket and t-handle w/gasket and hand tighten t-handle.

FITTINGS CHART

When installing fittings to the Racor filter/separator, apply clean diesel fuel to the o-ring of the fitting.

FITTING	RACOR PART NO.	UNIT USAGE	UNIT PORT (STRAIGHT THREAD W/O-RING)	FUEL LINE
Male JIC37 ° 90 ° Elbow 	9010-4-4 9010-6-4 9010-6-6 9010-10-8 9010-10-10	200 220/225/500 220/225/500 900/1000 900/1000	7/16-20 9/16-18 9/16-18 7/8-14 7/8-14	7/16-20 7/16-20 9/16-18 3/4-16 7/8-14
Male JIC37 ° Straight 	9020-4-4 9020-6-4 9020-6-6 9020-10-6 9020-10-8 9020-10-10	200 220/225/500 220/225/500 900/1000 900/1000 900/1000	7/16-20 9/16-18 9/16-18 7/8-14 7/8-14 7/8-14	7/16-20 7/16-20 9/16-18 9/16-18 3/4-16 7/8-14
Female Pipe Straight 	9040-4-4 9040-6-4 9040-6-6 9040-10-4 9040-10-6 9040-10-8 9040-10-8DT 9040-10-12	200 220/225/500 220/225/500 900/1000 900/1000 900/1000 900/1000 900/1000	7/16-20 9/16-18 9/16-18 7/8-14 7/8-14 7/8-14 7/8-14 7/8-14	1/4-18 Pipe Thd. 1/4-18 Pipe Thd. 3/8-18 Pipe Thd. 1/4-18 Pipe Thd. 3/8-18 Pipe Thd. 1/2-14 Pipe Thd. 1/2-14 Pipe Thd. 3/4-14 Pipe Thd.
Progressive Barb Hose Fitting 90 ° Elbow 	9010-HF-4-5/6 9010-HF-6-5/6	200 220/225/500	7/16-20 9/16-18	5/16 (8mm) Hose and 3/8 (10mm) Hose
Progressive Barb Hose Fitting Straight 	9020-HF-4-5/6 9020-HF-6-5/6	200 220/225/500	7/16-20 9/16-18	5/16 (8mm) Hose and 3/8 (10mm) Hose
Barbed Hose Fitting 90 ° Elbow 	9010-HF-10-6 9010-HF-10-8 9010-HF-10-10 9010-HF-10-12	900/1000 900/1000 900/1000 900/1000	7/7-14 7/8-14 7/8-14 7/8-14	3/8 1/2 5/8 3/4
Barbed Hose Fitting Straight 	9020-HF-10-6 9020-HF-10-8 9020-HF-10-10 9020-HF-10-12	900/1000 900/1000 900/1000 900/1000	7/8-14 7/8-14 7/8-14 7/8-14	3/8 1/2 5/8 3/4

TROUBLE SHOOTING PROCEDURES

RESTRICTION

Normal vacuum reading can be 1" to 5" Hg at full governed RPM, depending on the hose I.D., length, elbows, pump efficiency, and height of lift from tank.

Idle RPM should be "0" reading with clean element where pump capacity is dictated by engine RPM.

If vacuum reading does not return to 1" to 5" Hg after element change, check for the following:

- collapsed fuel lines
- tank shut-off valves closed
- plugged fuel lines

If the inlet to the Racor filter/separator is plugged, disconnect inlet line, open drain valve, and blow out with compressed air. In case of severe stoppages, remove bowl and centrifuge and clean with compressed air.

AIR LEAKS

Racor filter/separator systems eliminate the need for "sight glasses" to check air suction leaks. If air bubbles are rising from centrifuge action in the clear bowl, the air leak is between inlet side of the Racor system and tank.

Check for:

- loose fittings
- pin holes in lines
- cracked tank stand pipe
- out of fuel condition
- O-ring not seating
- improper flare angles on hose fittings.*

If no bubbles are noted in bowl and air suction is still evident, check outlet side of Racor system to fuel pump.

Check for:

- loose fittings
- pin holes in line
- O-ring not seating
- improper flare angles on hose fittings.*
- fuel pump seals
- bleed-off fitting on top of Cummins fuel pump
- top gaskets on Racor filter/separator.

*(For example, a 37° flared female hose fitting pulled up tightly to a 45° male fitting sometimes causes a hair line crack, resulting in air suction.)

If Racor filter/separator is sucking air at bowl drain fitting gasket or T-handle and top and cannot be stopped by wetting gasket with fuel and *hand tightening only*, **replace the gasket(s).**

BLEED BACK

If fuel in the filter/separator bleeds back to the tank an air leak or check valve seating problem is indicated. To inspect check valve seat, remove bowl ring, bowl and turbine centrifuge, turning counterclockwise. (See Parts Diagram for identification of parts.)

Inspect check valve and seat. Clean or replace seat and check valve and reinstall centrifuge *hand tight*. Overtightening causes gasket to warp. Replace bowl ring gasket and reinstall bowl and ring. Fill unit with fuel.

In cold weather operation, installation of a Racor Fuel Heater in the Racor filter/separator is recommended to ease starting. Racor's Thermoline Diesel Fuel Line Heater is available for extreme cold weather operations. (See Options and Accessories Section.)

Read and follow the Installation Instructions on Page 2 carefully to insure proper performance of your Racor filter/separator.

Model 200FG

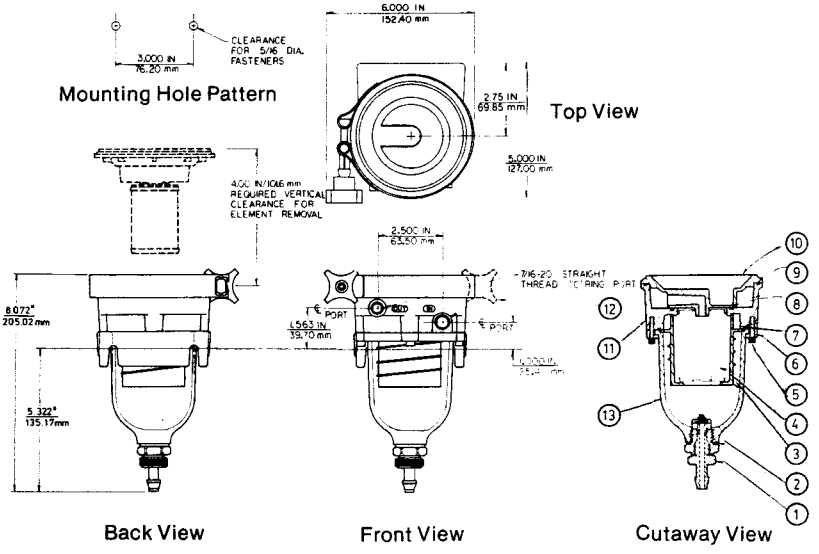
Maximum Rated Flow .53 gpm (2 lpm)
Port Size: 7/16" x 20; UNF Str Thd w/O-ring

Parts List

Item	Part No.	Qty.	Description
1	11780	1	Drain Valve
2	11340	1	Bowl Drain O-Ring
3	12008A	1	Flow Director
4	2000SM	1	Element
5	15081	4	Bowl Retainer Screw (#10-24 x 7/8" long)
6	12006	1	Bowl Ring Bracket
7	12014	1	Bowl O-Ring
8	12013	1	Lower Lid O-Ring
9	12003	1	Upper Lid O-Ring
10	12075	1	Lid
11	12004A	1	Base
12	12002	1	Retainer Clamp
13	12007	1	Clear Bowl

Note: Use 200FGM for non-automotive gasoline applications.

Parts Diagram



Automotive Mounting Bracket Kits

A complete line of mounting bracket kits are manufactured for installing Racor filter/separators on automobiles. They contain the Racor mounting bracket specifically designed for the year, make and model automobile and all the necessary hardware with complete mounting instructions for correct installation.

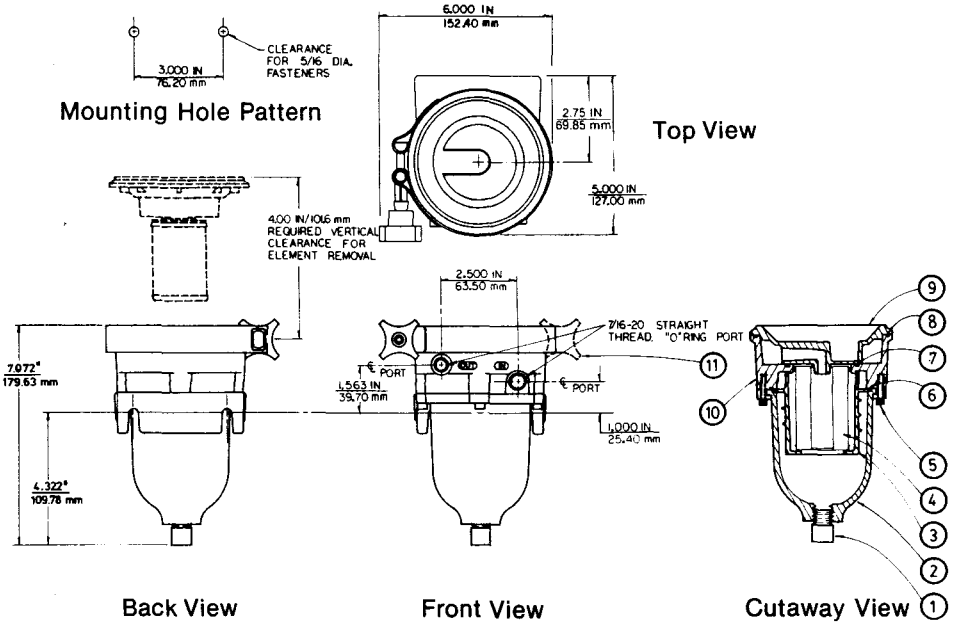
Model 200FGM

Maximum Rated Flow .53 gpm (2 lpm)
Port Size: 7/16" x 20; UNF Str Thd
w/O-ring

Parts List

Item	Part No.	Qty	Description
1	12041	1	Bowl Plug, 1/4" N.P.T.
2	12021	1	Metal Bowl/Bracket
3	12008A	1	Flow Director
4	2000SM	1	Element
5	15081	4	Bowl Retainer Screw (#10-24 x 7/8" long)
6	12014	1	Bowl O-Ring
7	12013	1	Lower Lid O-Ring
8	12003	1	Upper Lid O-Ring
9	12001	1	Lid
10	12004A	1	Base
11	12002	1	Retainer Clamp

Parts Diagram



Model 500FG*

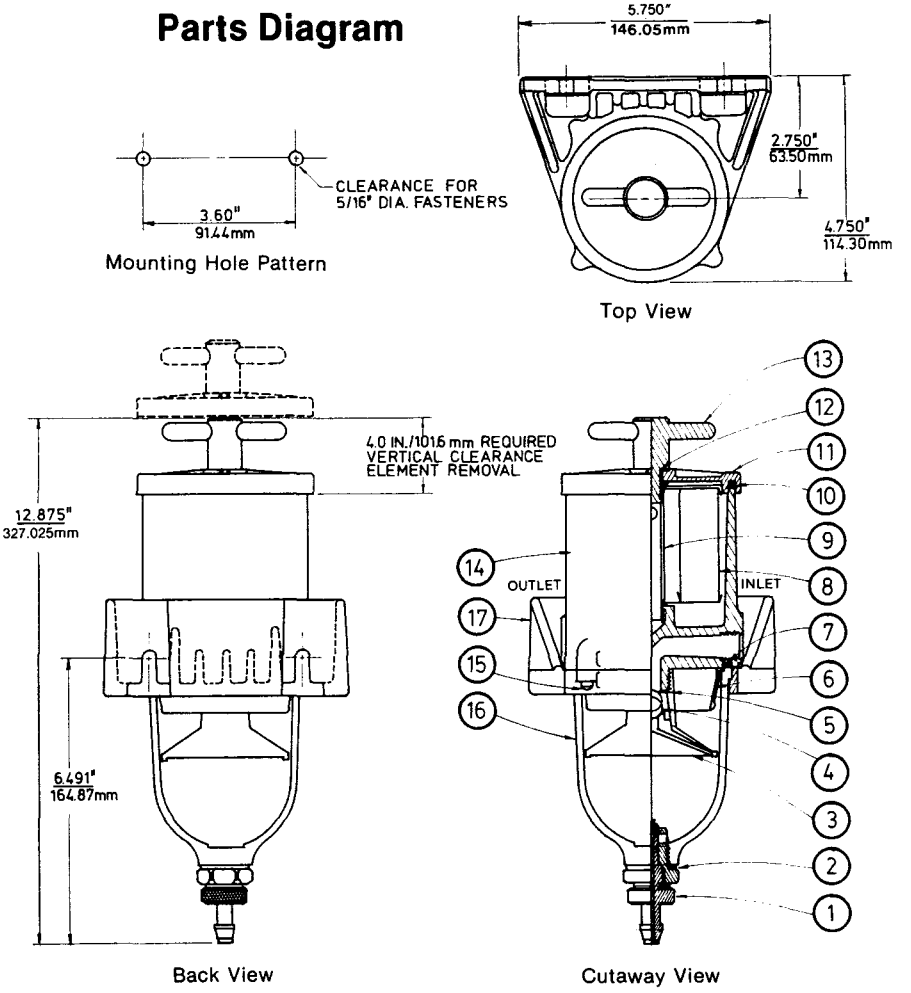
Maximum Rated Flow 1.05 gpm (4 lpm)
Port Size: 9/16" x 18 UNF Str Thd
w/O-ring

Parts List

Item	Part No.	Qty.	Description
1	11780	1	Drain Valve
2	11340	1	Bowl Drain O-Ring
3	15013D	1	Turbine Centrifuge
4	15011	1	Check Ball
5	15010C	1	Check Ball Gasket
6	15012C	1	Conical Baffle
7	15009	1	Bowl O-Ring
8	2010SM	1	Element
9	15079	1	Return Tube
10	15005	1	Lid Gasket
11	15078	1	Lid
12	11350	1	O-Ring
13	11888	1	T-Handle
14	15082	1	Body
15	15081	4	Bowl Retainer Screw (#10-24 x 7/8" long)
16	15014A	1	Clear Bowl
17	15090	1	Ring/Bracket

*For (UL) listed applications, order model 500MA

Parts Diagram



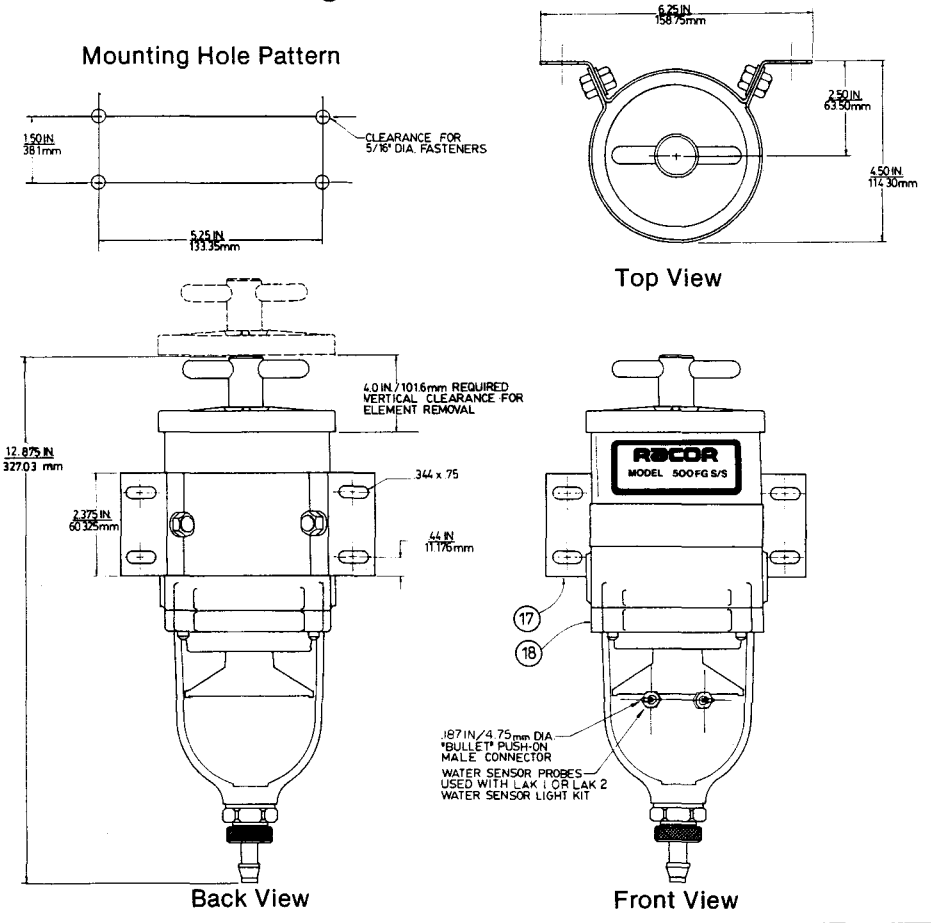
Model 500FG S/S

Maximum Rated Flow 1.05 gpm (4 lpm)
Port Size: 9/16" x 18 UNF Str Thd
w/O-ring

Parts List

Item	Part No.	Qty.	Description
Items 1-16 — Same as 500FG on previous page.			
17	15098	1	Bracket Assembly
18	15035	1	Bowl Ring
19		1	Metal Bowl (optional)

Parts Diagram



Model 900FG*

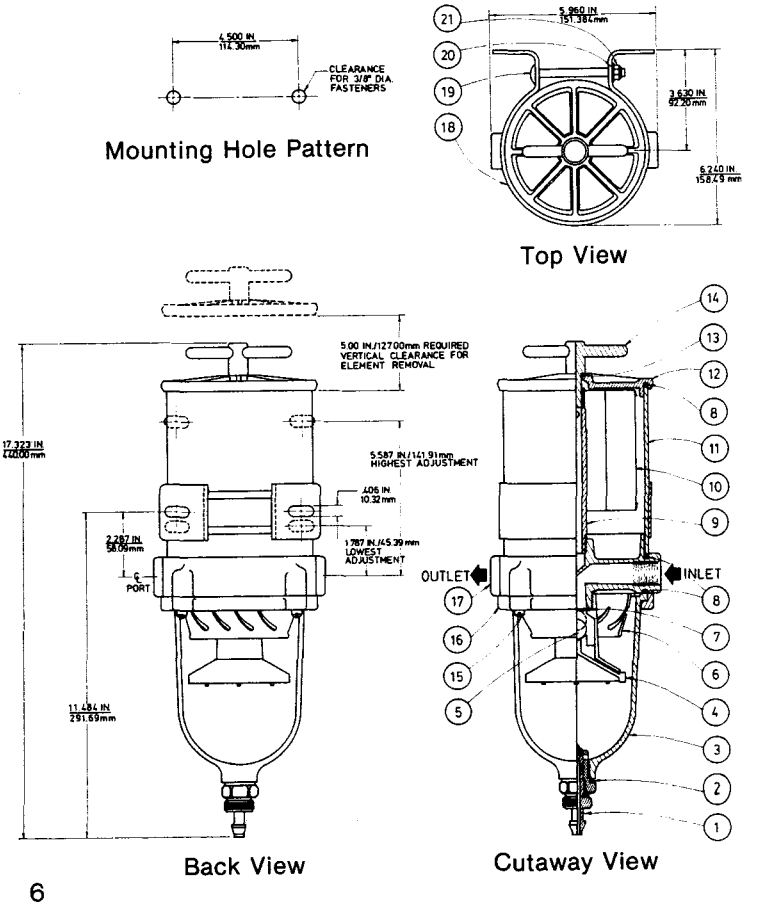
Maximum Rated Flow 1.59 gpm (6 lpm)
Port Size: 7/8" x 14 UNF Str Thd
w/O-ring

Parts List

Item	Part No.	Qty.	Description
1	11780	1	Drain Valve
2	11340	1	Bowl Drain O-Ring
3	11031A	1	Clear Bowl
4	11026C	1	Turbine Centrifuge
5	11027	1	3/4" Check Ball
6	11025C	1	Conical Baffle
7	11028B	1	Check Ball Gasket
8	11007	3	Gasket
9	19001	1	Return Tube
10	2040SM	1	Element
11	19002	1	Outer Cylinder
12	11005B	1	Lid
13	11350	1	O-Ring
14	11888	1	T-Handle
15	11542	4	Bowl Retaining Screw
16	11037A	1	Bowl Ring
17	11023B	1	Base
18	11815	1	Bracket Clamp
19	11838	2	5/16" Carriage Bolt
20	12049	2	5/16" Flat Washer
21	11841	2	5/16" Lock Nut
22		1	Metal Bowl (optional)

*For (UL) listed applications, order model 900MA.

Parts Diagram



Model 75/900FG*

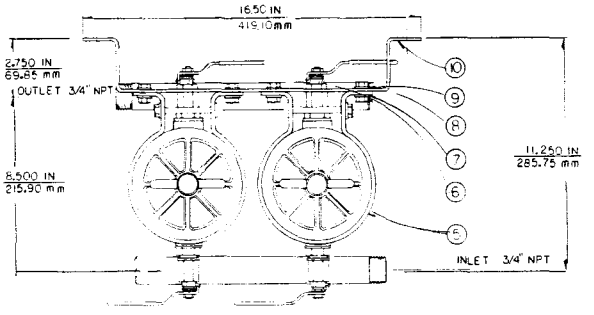
Maximum Rated Flow 1.59-3.16 gpm (6-12 lpm)
Port Size: 3/4" NPT
Valves permit servicing under continuous operation. See above for individual Model 900FG Parts List.

Parts List

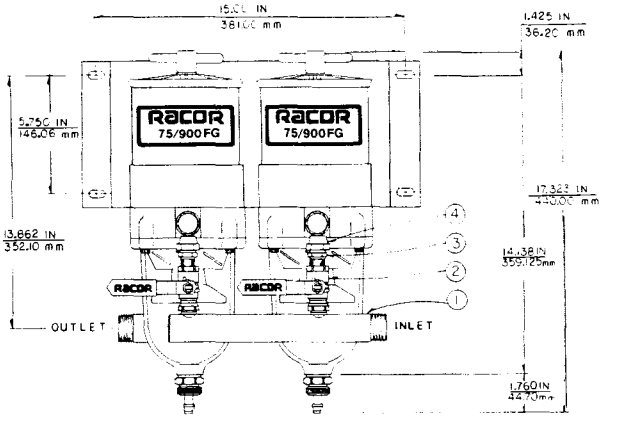
Item	Part No.	Qty	Description
1	11892	2	3/4" Manifold
2	11073	4	Ball Valve Assm. ½" NPT
3	11074	4	Strt. Ftg. - ½" NPT x ½"-14 NPSM
4	11072	4	Elbow Fitting
5	900FG	2	Filter/Separator
6	11078	4	3/8" Hex-Bolt
7	11080	4	3/8" Washer Flat
8	11102	4	3/8" Washer-Lock
9	11079	4	3/8" Hex-Nut
10	11065	1	Double Bracket

*For (UL) listed applications, order model 75/900MA.

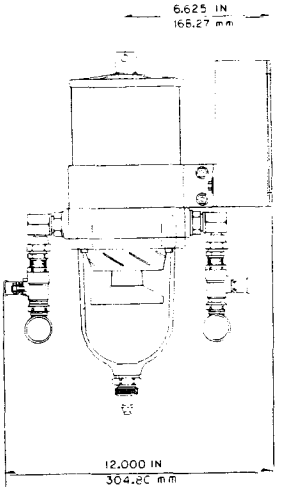
Parts Diagram



Top View



Front View



Back View

Valves shown in closed position.

Model 1000FG*

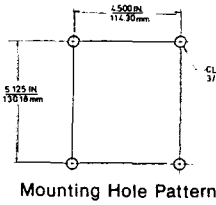
Maximum Rated Flow 3.16 gpm (12 lpm)
Port Size: 7/8" x 14 UNF Str Thd w/O-ring

Parts List

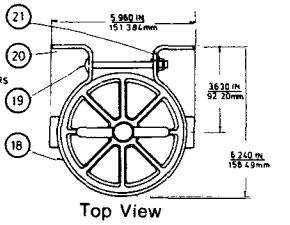
Item	Part No.	Qty.	Description
1	11780	1	Drain Valve
2	11340	1	Bowl Drain O-Ring
3	11031A	1	Clear Bowl
4	11026C	1	Turbine Centrifuge
5	11027	1	3/4" Check Ball
6	11025C	1	Conical Baffle
7	11028B	1	Check Ball Gasket
8	11007	3	Gasket
9	11023B	1	Base
10	2020SM	1	Element
11	11008	1	Return Tube
12	11005B	1	Lid
13	11350	1	O-Ring
14	11888	1	T-handle
15	11542	4	Bowl Retaining Screw
16	11037A	1	Bowl Ring
17	11021	1	Outer Cylinder
18	11815	2	Bracket Clamp
19	11838	4	5/16"Carriage Bolt
20	12049	4	5/16" Flat Washer
21	11841	4	5/16" Lock Nut
22			Metal Bowl (optional)

*For (UL) listed applications, order model 1000MA

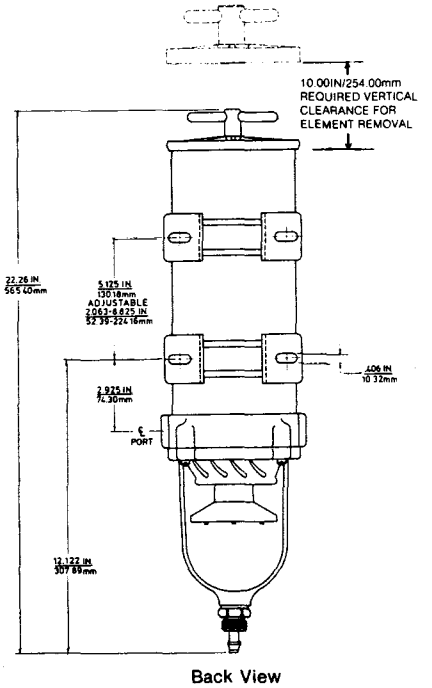
Parts Diagram



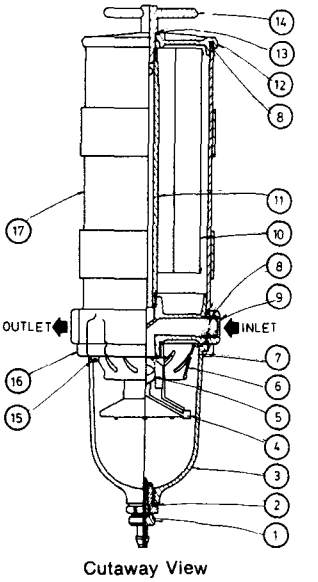
Mounting Hole Pattern



Top View



Back View



Cutaway View

Model 73/1000FG*

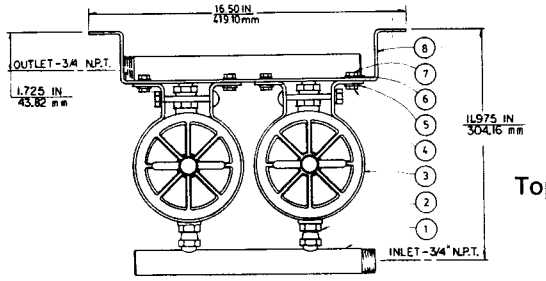
Maximum Rated Flow 6.32 gpm (24 lpm)
Port Size:3/4" NPT
See Page 8 for individual Model 1000FG Parts List.

Parts List

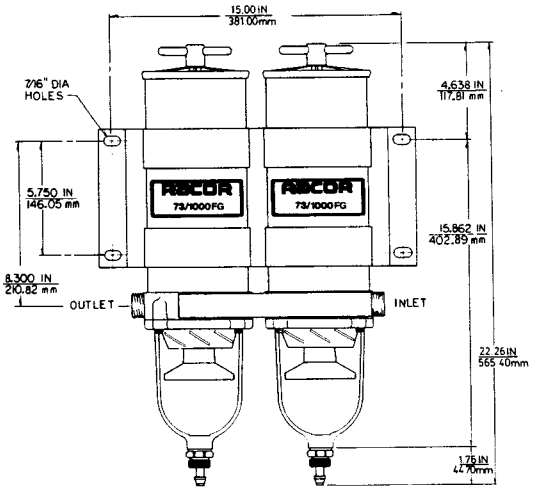
Item	Part No.	Qty	Description
1	11892	2	3/4" Manifold
2	11071	4	Fittings
3	1000FG	2	Filter/Separator
4	11078	8	3/8" Hex-Bolt
5	11080	8	3/8" Washer-Flat
6	11102	8	3/8" Washer-Lock
7	11079	8	3/8" Hex-Nut
8	11065	1	Double Bracket

*For (UL) listed applications, order model 73/1000MA.

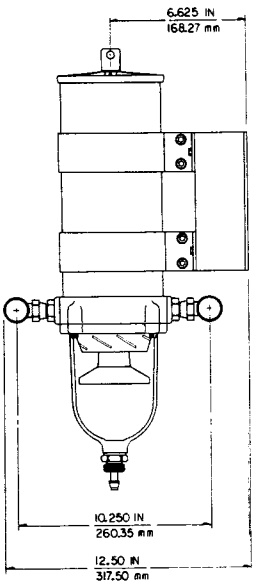
Parts Diagram



Top View



Front View



Side View

Model 75/1000FG*

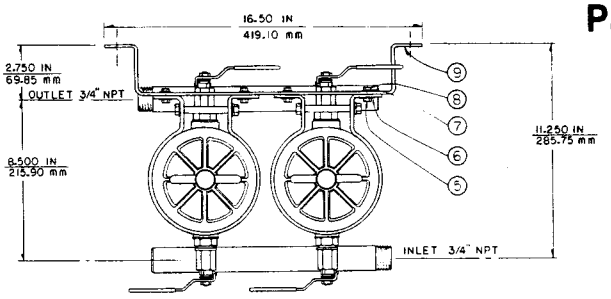
Maximum Rated Flow 3.16-6.32 gpm (12-24 lpm)
Port Size: 3/4" NPT
*Valves permit servicing under continuous operation. See Page 8 for individual Model 1000FG Parts List.

Parts List

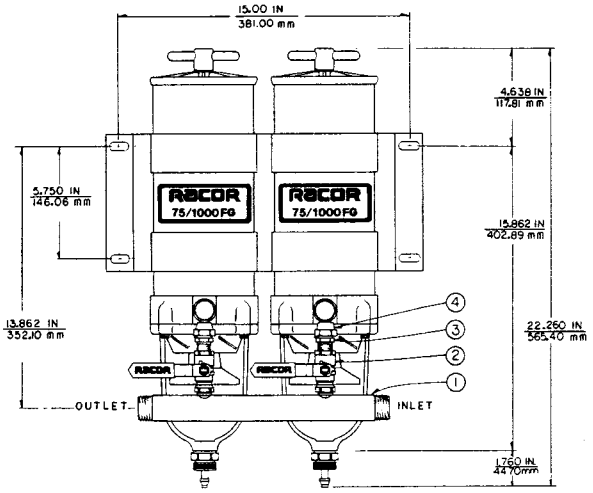
Item	Part No.	Qty	Description
1	11892	2	3/4" Manifold
2	11073	4	Ball Valve Assm. ½" NPT
3	11074	4	Strt. Ftg.- ½" NPT x ½"-14 NPSM
4	11072	4	Elbow Fitting
5	11078	8	3/8" Hex-Bolt
6	11080	8	3/8" Washer-Flat
7	11102	8	3/8" Washer-Lock
8	11079	8	3/8" Hex-Nut
9	11065	1	Double Bracket
10	1000FG	2	Filter/Separator

*For (UL) listed applications, order model 75/1000MA.

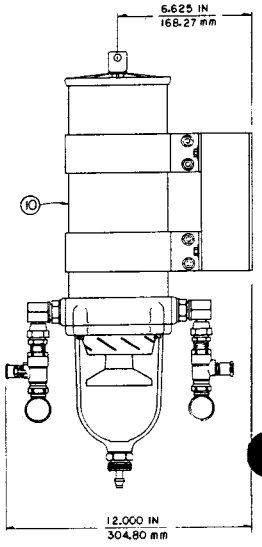
Parts Diagram



Top View



Front Section View



Side View

Valves shown in closed position.

Model 77/1000FG*

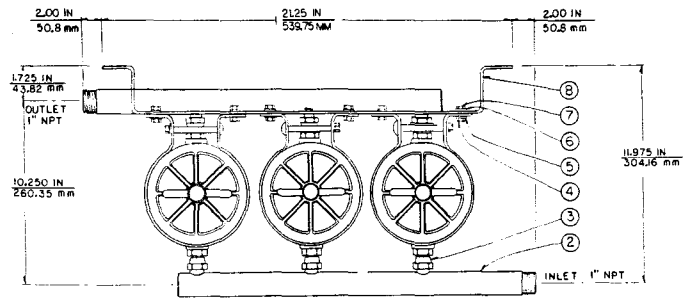
Maximum Rated Flow 9.48 gpm (36 lpm)
Port Size: 1″ NPT
See Page 7 for Individual Model 1000FG Parts List.

Parts List

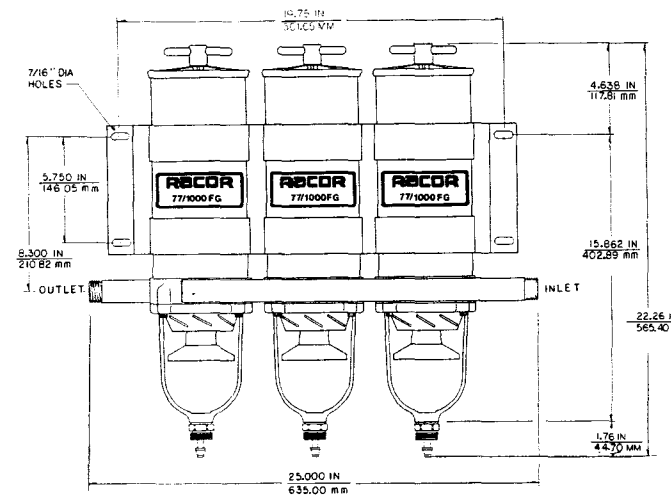
Item	Part No.	Qty	Description
1	1000FG	3	Filter/Separator
2	11076	2	1″ Manifold
3	11071	6	Fittings
4	11078	12	3/8″ Hex-Bolt
5	11080	12	3/8″ Washer-Flat
6	11102	12	3/8″ Washer-Lock
7	11079	12	3/8″ Hex-Nut
8	18998	1	Triple Bracket

*For (UL) listed applications, order model 77/1000MA.

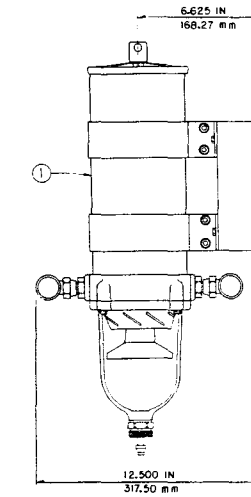
Parts Diagram



Top View



Front Section View



Side View

Model 79/1000FG*

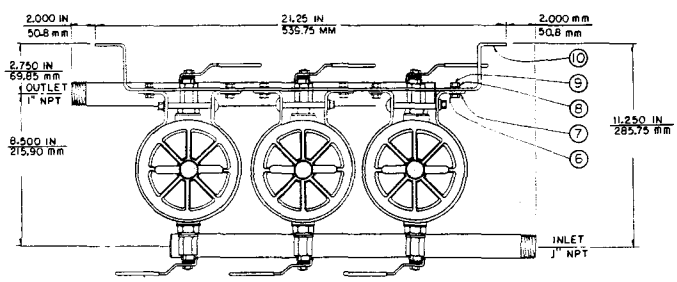
Maximum Rated Flow 3.16-6.32-9.48 gpm (12-24-36 lpm)
Port Size: 1″ NPT
*Valve permit servicing under continuous operation. See Page 7 for individual Model 1000FG Parts List.

Parts List

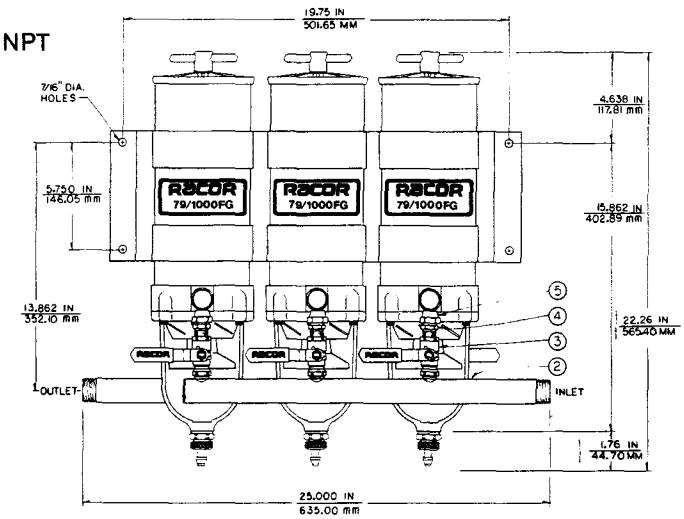
Item	Part No.	Qty	Description
1	1000FG	3	Filter/Separator
2	11076	2	1″ Manifold
3	11073	6	Ball Valve Assm. - ½″ NPT
4	11074	6	Strt. Ftg. - ½″ NPT × ½″-14 NPSM
5	11072	6	Elbow Fitting
6	11078	12	3/8″ Hex-Bolt
7	11080	12	3/8″ Washer-Flat
8	11102	12	3/8″ Washer-Lock
9	11079	12	3/8″ Hex-Nut
10	18998	1	Triple Bracket

*For (UL) listed applications, order model 79/1000MA.

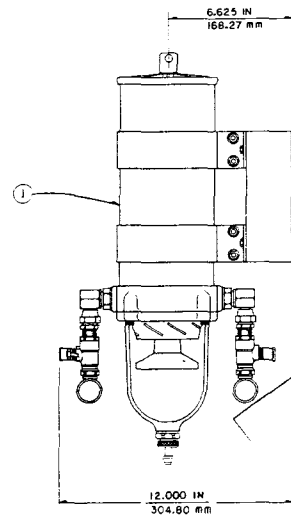
Parts Diagram



Top View



Front Section View



Side View

Valves shown in closed position.

SPECIFICATIONS *

MODEL NO.	200	500	900	1000	75/900	73/1000[1] 75/1000[2]	77/1000[3] 79/1000[4]
		FG AND MA SERIES					
MAXIMUM FLOW RATE						6.0[1]	9.0[3]
GPM	.5	1.0	1.5	3.0	3.0	3.0/6.0[2]	6.0/9.0[4]
						24[1]	36[3]
LPM	2	4	6	12	12	12/24[2]	24/36[4]
CLEAN VACUUM DROP						3.5[1]	3.5[3]
in Hg	1.25	1.25	1.5	3.0	2.0	5.0[2]	5.0[4]
						.121[1]	.121[3]
kgs./sq. cm.	.043	.043	.052	.104	.069	.173[2]	.173[4]
PROOF PRESSURE							
psi	100	100	100	100	100	100	100
bars	6.90	6.90	6.90	6.90	6.9	6.90	6.90
MAXIMUM VACUUM							
in Hg	28.5	28.5	28.5	28.5	28.5	28.5	28.5
kgs./sq. cm.	.984	.984	.984	.984	.984	.984	.984
ELEMENT MODEL NO.	2000SM	2010SM	2040SM	2020SM	2040SM	2020SM	2020SM
ELEMENT MATERIAL	RESIN IMPREGNATED CELLULOSE						
DIRT REMOVAL RATING	2 micron nominal						
DIRT CAPACITY (AC Fine Dust)*	10gms	20gms	150gms	500gms	300gms	1000gms	1500gms
ELEMENT REMOVAL CLEARANCE							
in.	4	4	5	10	10	10	10
mm	102	102	127	254	254	254	254
WATER REMOVAL EFFICIENCY	less than 25 ppm free water						
TEMPERATURE RATINGS							
Fahrenheit	−50/255						
Centigrade	−46/107						
HEIGHT							
in.	8	13	17	22	17	22	22
mm	203	330	432	559	432	559	559
WIDTH							
in.	6	6	6	6	16	16	23
mm	152	152	152	152	406	406	584
DEPTH (FG Series)						13[1]	13[3]
in.	5	5	6	6	12	12[2]	12[4]
						330[1]	330[3]
mm	127	127	152	152	305	305[2]	305[4]
DEPTH (MA Series)						9[1]	9[3]
in.	—	6	7	7	10	10[2]	10[4]
						229[1]	229[3]
mm	—	152	178	178	254	254[2]	254[4]
WEIGHT (FG Series)							
lbs.	3	4	7	9	27	35	47
kgs.	1.5	2	3	4	12	16	21
WEIGHT (MA Series)							
lbs.	—	4	6	10	23	25	32
kgs.	—	2	3	5	10	11	15
PORT SIZE							
in.	7/16"-20 UNF	9/16"-18 UNF	7/8"-14 UNF	7/8"-14 UNF	3/4" NPT.	3/4" NPT.	1" NPT.
mm		14mm x 1.5	22mm x 1.5	22mm x 1.5			
PORT SIZE (MA Series)							
in.		9/16"-18 UNF	7/8"-14 UNF	7/8"-14 UNF	3/4" NPT.	3/4" NPT.	3/4" NPT.
mm		14mm x 1.5	22mm x 1.5	22mm x 1.5			

*Specifications shown are the result of tests conducted at the optimum flow rate for each unit (equal to ½ the maximum flow rate).

FOOTNOTES: ① Model 73-1000FG w/o Shut-Off Valves
② Model 75-1000FG w/Shut-Off Valves
③ Model 77-1000FG w/o Shut-Off Valves
④ Model 79-1000FG w/Shut-Off Valves

Fuels and additives containing alcohol will cause damage to the non-metal parts of the Racor unit and the entire engine system.

Racor Filter/Separators are available with metal bowl for applications where required. Add M to part number. Metal bowl units are one inch (25.40 mm) shorter than clear bowl units. All other specifications are the same.

Racor Filter/Separators available with metric tapped ports are so noted. Specify metric ports when ordering.

Simplified Flow Rate Formula for Medium Range Diesel Engines

Hp x .006 =Approximate gpm pump flow rate.
(This formula is an approximate flow rate for engines below 600 H.P. Consult your engine manufacturer for accurate flow rate specifications.)

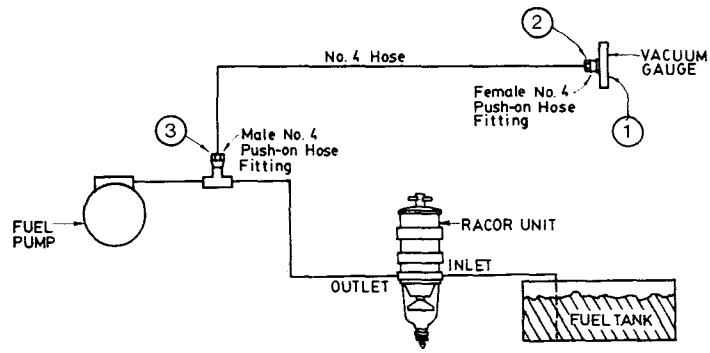
OPTIONS AND ACCESSORIES

Vacuum Gauge

The Racor Vacuum Gauge permits accurate monitoring of the vacuum level in the outlet line of a Racor filter/separator.

Installing a Racor Vacuum Gauge increases troubleshooting efficiency, eliminates guess work and lengthens element change periods.

The 9-15 scale 2" color-keyed face gauge is remotely mounted, using a No. 4 hose and T-fitting, into the line between the filter/separator and pump.



INSTALLATION INSTRUCTIONS

NOTE: For severe service, use liquid-filled vacuum/pressure gauge, Racor Part No. 18-1551.

1. Drill and tap ⅛" pipe hole or install "T" in fuel line between outlet port of Racor filter/separator and inlet port of pump. (See Fittings & Accessories Chart, page 14, for adaptor fitting.)
2. Install male hose fitting into tapped hole or "T"
3. Attach low pressure No. 4 hose to push-on hose fitting (available as an option).
4. Install 2" gauge in panel or bracket.
5. Connect female push-on hose fitting to gauge.
6. Connect hose to gauge hose fitting.

NOTE: Seal all connections with Teflon tape or an equivalent sealant.

1606B KIT

Parts List

1. (1) 11233 Vacuum Gauge
2. (1) 7234-4 Female fitting
3. (1) 7232-4 Male fitting
4. (1) 18-1202 Vacuum Gauge Label

Optional:

No. 11268 No. 4 Hose (Specify length)
No. 9040 -10-8DT Filter/Separator port fitting for gauge
No. 11369 ¼" or ⅛" brass adaptor

VACUUM/PRESSURE GAUGES

The Racor "compound" gauges provide measurement of both vacuum and pressure over a wider range in applications that may be exposed to both vacuum and pressure (i.e., installations with a positive head pressure on the filter/separator).

Pressure and vacuum readings are expressed in both the familiar English measurements and the international standard of Kg/cm².

PART NO. 18-1104 VACUUM/PRESSURE GAUGE for Light Service Applications

For light service where the features of waterproof, weatherproof, hermetically sealed and vibration/pulsation resistant are not required.

- 2" Gauge
- Drawn steel case -- phosphatized for rust resistance. Black enamel finish
- Clear window
- Brass socket
- Kit includes gauge and mounting hardware

PART NO. 18-1551 VACUUM/PRESSURE GAUGE for Severe Service Applications

For severe service requiring a waterproof, steamproof or weatherproof gauge, with the added problem of pulsation and vibration. Rustproof hermetically sealed case with polycarbonate crystal provides external shock protection. Gauge has shock absorbing movement plus liquid filling to absorb effect of vibration and pulsation.

- 2½" Gauge
- Stainless Steel Case w/ stainless steel ring gasketed and crimped to case for positive leakproof seal.
- Polycarbonate window
- Brass threaded socket with internal o-ring for positive leakproof seal to case
- Kit includes gauge and mounting hardware

RACOR IN-FILTER DISC HEATERS

Racor's in-filter disc fuel heater is a cold weather starting aid connected to the power source by sealed, weather-proof terminals in the bowl. The internal automatic thermostat turns the heater on if the fuel temperature drops below 35 °F (1.7 °C). Heat is supplied in the unit just below the replacement element to melt the wax crystals and allow fuel to pass through the element for quick, easy starts.

When the engine is not running, the heater is operated by turning on the ignition switch for a minimum of five minutes prior to starting the engine. The Racor in-filter heater may be installed on positive or negative ground and is available in 12V or 24V. RACOR FILTER/SEPARATOR ELECTRICAL OPTIONS ARE FOR DIESEL APPLICATIONS ONLY. DO NOT USE WITH GASOLINE OR OTHER VOLATILE LIQUIDS.

INSTALLATION

The In-Filter Disc Heater supplys heat to the fuel filter just below the replaceable element. This critical placement provides increased fuel temperature as the fuel passes through the fine micron filtering element. The power rating of the 500 Disc Heater is 100 watts maximum, 10 amperes for the 12V heater, 5 amperes for the 24V heater. The power rating of the 900/1000 Disc Heater is 200 watts maximum, 15.5 amperes for the 12V heater, 7.8 amperes for the 24V heater.

To Prepare Heater Terminals for Electrical Connections

1. Unpack the (2) 90° insulated connectors.
2. Connect to two lengths of 14 gauge wire. The length of wire depends on which option you are using for electrical connection.
3. Push each connector onto an installed terminal. Either terminal may be used as ground.
4. All electrical connections must be made to accommodate the power of the heater using appropriate lug and terminal connections.

CAUTION: Loose or improper connections will cause electrical arcing, shorts and corrosion.

Do not allow the water to reach the level of the disc heater. Water level reaching the disc heater will cause damage to the heater. Drain accumulated water as necessary.

The chart below is to be used only as a guide for 900/100 Disc Heater installation. Electrical checks must be made to determine if your truck's electrical system is capable of handling an additional amperage load.

Guide to Optional 12V and 24V Relay

Truck Manufacturer	Relay Required	
	Yes	No
Ford	X	
Freightliner		X
GMC—Chevrolet		X
International Harvester		
"S" Series		X
1600—2600	X	
Iveco	X	
Kenworth		X
Mack		X
Marmon	X	
Mercedes	X	
Peterbilt		X
Volvo	X	
White	X	

An optional Racor relay replacement kit can be ordered which includes specific instructions for relay installation. Refer to chart below for ordering information:

SYSTEM VOLTAGE	RACOR PART NUMBER	
	500	900/1000
12V	15156	11861
24V	15157	11862

An equivalent relay is available through the following manufacturers:

Manufacturer	Part No.
Nartron	1300-1
Cole-Hersee	24059
Bosch	36-002
Delco-Remy	1114223

For flexibility, three different electrical system connections are possible. An electrical check must be performed for each option before final installation is made.

OPTION A:

Ignition Switch Electrical Connection 500 Disc Heater

Prior to installation, determine if your vehicle's ignition switch is capable of an additional 10 amperage load for a 12V system, 5 amps for a 24V system. If the ignition switch proves capable of the additional load, proceed with final electrical connection.

900/1000 Disc Heater

Prior to installation, determine if your truck's ignition switch is capable of an additional 15.5 amperage load for a 12V system, 7.8 amps for a 24V system. If the ignition switch prove capable of the additional load, proceed with final electrical connection. SEE "PREPARING HEATER TERMINALS FOR ELECTRICAL CONNECTION" ON PAGE 12 AND DIAGRAM A BELOW.

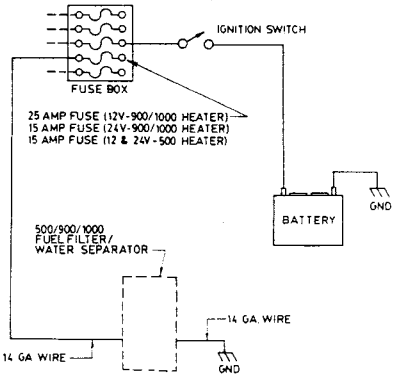


DIAGRAM A

OPTION B:

Existing Heavy-Duty Electrical Connection

Prior to installation, determine if your vehicle's existing heavy-duty relay is capable of the additional amperage load as stated in Option A. If the heavy-duty relay proves capable of the additional amperage load, proceed with final electrical connection. SEE "PREPARING HEATER TERMINALS FOR ELECTRICAL CONNECTION" ON PAGE 12 AND DIAGRAM B BELOW.

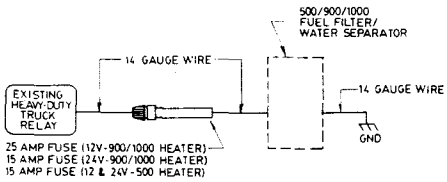


DIAGRAM B

OPTION C:

Optional Relay Electrical Connection

If after running the electrical checks in Option A & B, the ignition switch and/or existing heavy-duty relay proves incapable of an additional amperage load, an optional relay must be installed. SEE "PREPARING HEATER TERMINALS FOR ELECTRICAL CONNECTION" ON PAGE 12, AND DIAGRAM C BELOW.

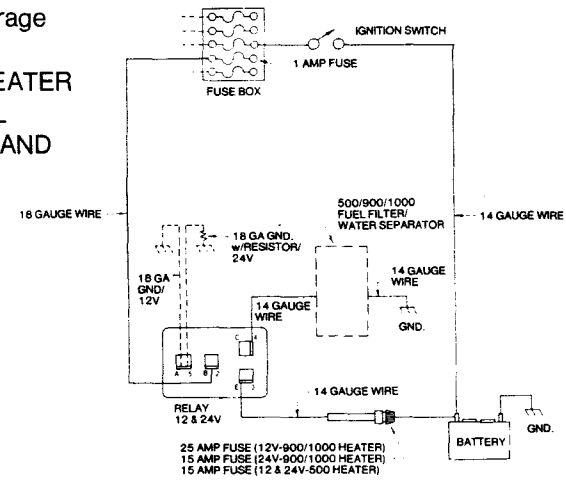


DIAGRAM C

WATER SENSORS

You must specify Racor unit with optional probes in the bowl for use with water sensors.

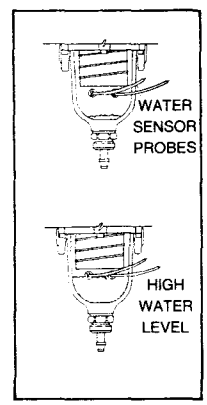
A functional accessory for all Racor filter/separators, all solid-state Water Sensors alert the operator when liquid contaminants filtered out of the system should be drained from the collector bowl, thereby maintaining maximum filter/separator efficiency.

In the primary stage of the Racor filter/separator, water and solid contaminants are separated out of the fuel by centrifugal action. The water and solids fall to the bottom of the bowl. When the water in the bowl reaches the level of the sensor probes, a low voltage circuit is completed and a warning light and/or alarm are activated. (See **Water Level Diagram.**) When the warning light and/or buzzer comes on, the bowl must be drained to remove the trapped contaminants and water, insuring maximum engine protection and filtration efficiency. Engine must be off before draining.

RACOR FILTER/SEPARATOR ELECTRICAL OPTIONS ARE FOR DIESEL APPLICATIONS ONLY. DO NOT USE WITH GASOLINE OR OTHER VOLATILE LIQUIDS.

INSTALLATION

Sealed, weather-proof sensor probes in the bowl detect water and, by LED readout, a solid-state Water Sensor alerts the operator to drain the bowl. A Water Sensor with light and audio alarm is also available. Both models come in 12VDC or 24VDC.

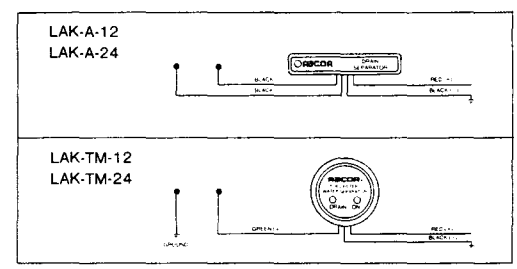


Water Level Diagram

LAK-T/M-12V or 24V Water Sensor Light/Alarm for dash or panel mount

Green LED illuminates to indicate circuit is on. Red LED lights and alarm sounds to indicate water must be drained from Racor Filter/Separator bowl. Kit includes:

(1) 2¼" Diameter Water Sensor
(4) Splice Connectors
(10) Cable Ties
Installation Instructions



LAK-A-12V or 24V Water Sensor Light for dash mount

Green LED illuminates to indicate circuit is on. Black out panel illuminates red to indicate water must be drained from Racor Filter/Separator bowl. Kit includes:

(1) 3" x 1¼" x ½" Water Sensor with pressure sensitive tape mounting
(4) Splice Connectors
(10) Cable Ties
Installation Instructions

ALSO AVAILABLE FROM RACOR:

RACOR THERMOLINE® DIESEL FUEL LINE HEATER

The Racor Thermoline Diesel Fuel Line Heater is a self-regulating heating device that prevents wax buildup during cold weather permitting easy starts and smooth engine operation. The Thermoline heater permits the use of less expensive, higher BTU No. 2 diesel fuel all year round. Overnight engine idling to keep fuel warm is no longer needed.

Easy Installation

The Thermoline heater replaces the existing line between the fuel tank and primary fuel filter. Installation time is approximately one hour. No modification to the cooling system is required.

Simple Operation

The Racor Thermoline heater contains no moving parts. It is controlled by a switch installed in the dash or control panel. By pre-heating the in-line fuel, the Thermoline heater assists with cold starts down to —40 °F (—40 °C). A typical prestart heating time of five minutes consumes less than 2% of available battery capacity. The Thermoline allows fast-idling of an engine to warm it and eliminates the chance of power loss or stalling due to wax buildup during operation.

Self-regulating Performance

The Thermoline heater is constructed of a conductive polymeric core extruded between two parallel copper bus wires. At low temperatures, electrical current flows through the core between the conductors, generating heat. As the temperature rises, the electrical resistance of the core material increases, reducing current flow and decreasing heat output. This infinitely reversible process occurs independently at each point along the heater strips and prevents overheating.

RD-3 AIR DRYERS

The RD-3's superior efficiency is based on an exclusive design that features a unique "chimney" or center tube which allows cool outside air to flow upward through the center of the unit to provide additional cooling and drying action. Racor's exclusive Electromatic Drain (EMD) is electronically controlled by a solid-state Timer/Driver. The Timer/Driver initially fires the EMD once upon ignition and 3.25 minutes later. The EMD is then activated every 7.5 minutes later for ½ second to eliminate accumulated water and contaminants. The red LED light on the side of the Timer/Driver flashes continually to indicate power is being supplied to the circuit.

The RD-3 is easy to install and virtually maintenance free.

The RD-3 operates on compressor systems up to 15 cfm and is available in 12- or 24- volt negative ground. A 100 watt heater is standard in the RD-3 for efficient cold weather operation.

Where electrical installation is not available or advisable, Racor offers the RD-3AIR with automatic "Air Drain Valve." The ADV is activated by the compressor governor to eliminate water and contaminants from the air system.

RD-3

Height 15" (381 mm)
Width: 7" (180 mm)
Depth: 7¾" (200 mm)
Proof Pressure: 625 psi (43.1 bars)
Maximum Flow Rate: 15 cfm (425 lpm)
Clean Pressure Drop: .5 psi (.03 bars)
Seal Material: Buna-N
Working Pressure: 150 psi (10.3 bars)
Weight: 16 lbs. (7.26 kgs.)

RECYCLE/BLENDER SYSTEMS

Racor's 800-OF6 stationary system and the mobile 800-5 "Filter Buggy" not only remove water and solid contamination from diesel fuel, but these recycle/blenders also provide fleet operators with a steady supply of FREE diesel fuel by blending waste engine lube oil at a 20:1 ratio (5%) with the diesel fuel. Every gallon of waste engine lube oil now becomes a gallon of no-cost diesel fuel and at the same time solves a major environmental problem—the disposal of the waste oil.

The 800-OF6 stationary units for both overhead and underground storage tanks and has a built-in 33 gallon storage tank for the waste lube oil. This oil is automatically blended into the diesel fuel during the recycling operation. The mobile "Filter Buggy" draws oil from the crankcase or other container to blend this oil into the diesel fuel being recycled from the vehicle's fuel tank.

802 HYDRAULIC FILTER BUGGY

The 802 Hydraulic Filter Buggy represents the application of Racor's filtration expertise to the cleaning of hydraulic fluids. A dual filtration system removes damaging solids and water in a multipass operation. The portable buggy comes ready-to-operate with heavy-duty pump and motor, pressure and vacuum gauges, hoses and motor control.

The 802 is standard with one cleanable element in the primary pre-filter to remove larger solids and free water. Two fine filtration replaceable elements in the secondary system remove minute solid contamination.

Emulsified water can be removed by using two filtration/absorption elements (optional) in the secondary system. The replaceable filtration/absorption elements cannot be used with water-based fluids.

SPIN-ON FILTER/SEPARATORS

THE RACOR 20 SERIES SPIN-ON FUEL FILTER/WATER SEPARATORS CAN SOLVE DIESEL FUEL PROBLEMS UNDER ANY OPERATING CONDITIONS IN THE WORLD.

Advanced Filtration/ Separation Technology

The unique design of the 20 Series directs the fuel flow to the expanded center core of the unit. The reduced velocity causes heavy liquid and solid contaminants to accumulate in the inner chamber of the filter/separator bowl. Then they are drained off through a positive seal drain valve. This primary separation or pre-cleaning stage gives extended element life.

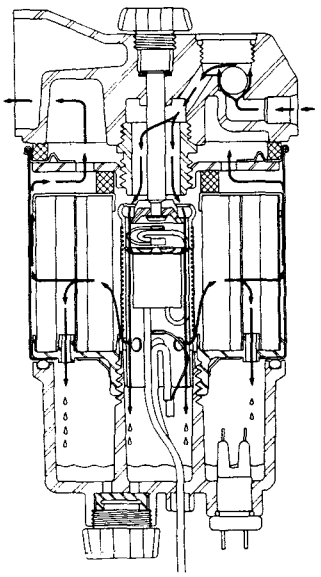
The 20 Series Filter/Separator units are compact and easy to service.

Vacuum (Suction) Applications

The *Dual Media Replacement Filter Element* uses a new Racor two-stage process of Dual Phase Repelling Action and Dual Phase Filtration to remove virtually 100% of the remaining free water and damaging solid particulate contaminants from diesel fuel. Primer pump, vent cap and check valve are standard.

Pressure Applications

The *Multi-Media Coalescer Replacement Filter Element* is for pressure side installations where the fuel has passed through a transfer pump and a coalescing filtration action is necessary for a high degree of water removal effectiveness. With the coalescer replacement filter element, 99+% of free and emulsified water an damaging solid particulate contaminants are removed. Vent cap is standard.



Options

Electrical in-filter heater
Metal Bowl
Service Indicator Package
(water sensor and element change monitor)

220

Height 8" (203 mm)
Width 4" (102 mm)
Depth 4" (102 mm)
Max. Flow Rate 30 gph (114 lph)
Weight 1.75 lbs. (.79 kgs.)

Element Model No.	R24 Dual Media	C25 Coalescer
Dirt Capacity (Soft C-2A)	80 gms.	75 gms.
Dirt Removal Rating	96% at 2 micron w/A.C.F.T.D.	
Water Removal Efficiency Effluent:	less than 10ppm free water	less than 30ppm free water

225

Height 9.5" (241 mm)
Width 4" (102 mm)
Depth 4" (102 mm)
Max. Flow Rate .45 gph (170 lph)
Weight 2 lbs (.90 kgs.)

Element Model No.	R26 Dual Media	C27 Coalescer
Dirt Capacity (Soft C-2A)	117 gms.	107 gms.
Dirt Removal Rating	96% at 2 micron w/A.C.F.T.D.	
Water Removal Efficiency Effluent:	less than 10ppm free water	less than 30ppm free water

FUEL ADDITIVES

Racor additives are specially formulated to be completely compatible with engines, fuel filters and water separators. They contain no damaging alcohol and keep fuel in the best possible condition for all diesel engine applications.

SUPER CONCENTRATED. COMPARE TREATMENT COST PER GALLON OF FUEL.

Racor RX-100 Cold Weather Diesel Additive

- Contains a pour point depressant fuel conditioner
- Keeps fuel flowing down to —40 °F (—40 °C).
- Improves engine performance reduces engine wear
- Eases starting, aids combustion, prevents corrosion
- Eliminates waxing and clogged filters
- Cleans fuel lines, pumps and injectors

Part No.	Type	Size	Treatement
11-1179	RX-100	10 oz.	15-30 Gallons
11-1180	RX-100	32 oz.	150-200 Gallons
11-1181	RX-100	1 gal.	1,000 Gallons
11-1264	RX-100	2.5 gal.	5,000 Gallons
11-1265	RX-100	20 gal.	55,000 Gallons

(Continued on Page 16)

Racor RX-200 Diesel Treatment

- Improves engine performance
- Cleans fuel lines, pumps and injectors
- Eases starting and prevents corrosion

Part No.	Type	Size	Treatment
11-1270	RX-200	10 oz.	One 10 oz. Can Per Tankful
11-1274	RX-200	32 oz.	150-200 Gallons

Racor RX-300 Marine Diesel Treatment

Formulated for diesel fuel in a marine environment, RX-300—

- Contains a biocide and fuel conditioner
- Prevents fungi, bacteria and algae growth
- Cleans fuel lines, pumps and injectors
- Improves engine performance
- Provides rust protection and lubrication throughout the entire system

Part No.	Type	Size	Treatment
11-1266	RX-300	10 oz.	50 Gallons
11-1267	RX-300	32 oz.	500 Gallons
11-1268	RX-300	1 gal.	5,000 Gallons
11-1269	RX-300	20 gal.	100,000 Gallons

RX-400 Diesel Biocide and Conditioner

- Prevents the growth of fungi and other micro-organisms
- Conditions fuel and cleans fuel lines
- Improves performance and provides rust protection and lubrication

Part No.	Type	Size	Treatment
11-1414	RX-400	10 oz.	15-30 Gallons
11-1415	RX-400	32 oz.	150-200 Gallons

RXG-600 Gasoline Conditioner for Fuel Injection Systems

- Improves overall engine performance, with easier starting and smoother idling
- Cleans and lubricates pumps and injectors; removes gums and varnish
- Prevents rust and corrosion; prolongs fuel system life

Part No.	Type	Size	Treatment
11-1387	RXG-600	10 oz.	One 10 oz. Can Per Tankful

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In Alaska, California and Hawaii, call 1-209-521-7860

INSTALLATION INSTRUCTIONS
Racor Part No. 7091FG
11-88/24M