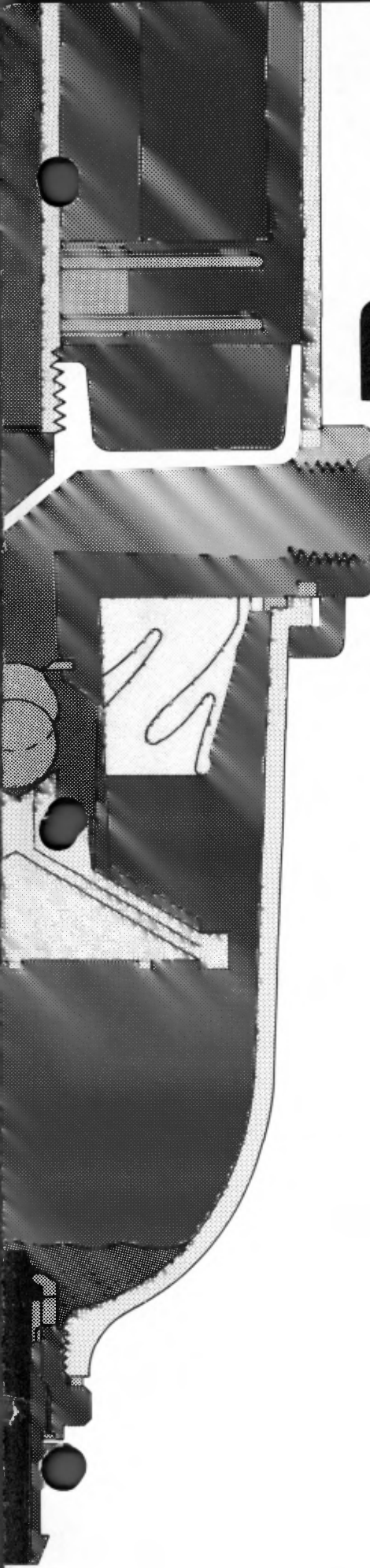




RACOR[®]

Fuel Filter/Water Separators

Installation, operation parts and service data

Racor Industries, Inc., P.O. Box 3208, Modesto, California 95353 USA (209) 521-7860 Telex: 35 9408

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Diesel-Fuel filter/water separators

Installation and Service Instructions

Installation

1. Remove vacuum side filters in fuel line between fuel tank and fuel pump. Cast-in-head or non-removeable housing should be adapted with primary spin-on adaptor (Racor Part No. 11548) where applicable. Otherwise, service and leave in-place.

All secondary or pressure side filters located between pump and engine should be serviced and left 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 and monitoring contaminants on units with the clear see-through bowl.

Maintain vertical clearance above filter housing for removal of element or elements. (See Specifications Chart, page 15.) Position unit between the horizontal planes of the bottom of the fuel tank and pump inlet for minimum restriction to the pump. Use maximum fuel line sizes

available in order to reduce restriction.

When installing a unit in conjunction with an overhead storage fuel tank, which places head pressure on the unit, a valve must be installed on the *inlet side* of the filter system. This valve is necessary when changing elements.

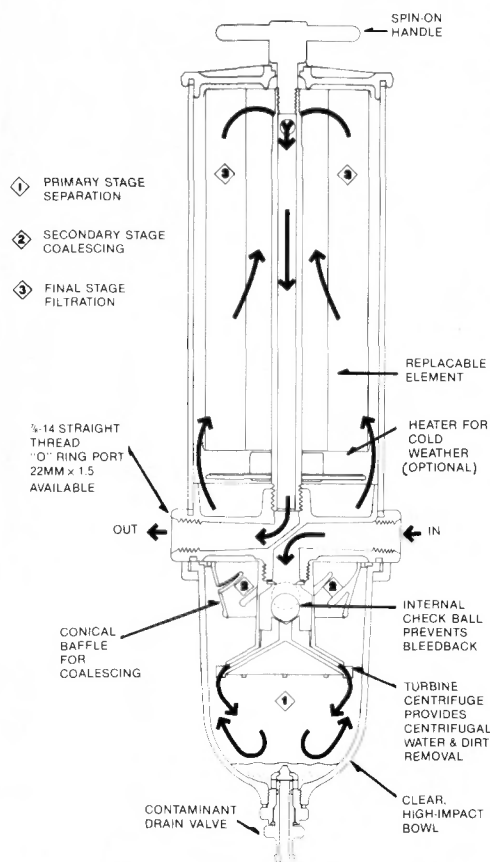
If Racor filter separator in its non-heated version is used in cold weather applications, the unit should be installed behind the engine, in engine compartment or near a manifold, or wherever heat flow is available to strike unit. A Racor heater is available for cold starts, (see page 11). A Racor in-line fuel heater is available for sub-zero conditions, (see page 13).

3. Install fuel line from tank to inlet side of the Racor filter/separator using appropriate fittings. Any fuel by-pass or return lines returning to suction side of filter which are removed must be routed into inlet side of the Racor unit using appropriate fittings. (See FIG. 1, page 3 for suggested mounting location.) These fittings are available from your dealer or Racor Industries, Inc. (See Fittings & Accessories Chart, page 14.)

4. Install fuel line from the outlet of Racor filter/separator to the inlet of the transfer or fuel pump, again using appropriate fittings as shown with each unit.

5. Remove lid and prime the system by pouring clean fuel into filter cylinder until full. Replace lid and hand tighten T-handle.

6. Start engine and test system. (See Troubleshooting Section, page 3.)



Note:

1. For Racor's complete line of Recycle/Filtering & Recycle/Blending Systems, see "800 Series — Installation & Operating Instructions". Racor Part No. 7095.
2. For Racor's complete line of U.L. Listed Marine Units, see "Marine Diesel-Fuel Filter/Water Separators". Racor Part No. 7096.

8 features to save you time and money

1. Single Unit Tri-functional Design
2. Internal Check Valve System
3. Turbine Centrifuge
4. See-Through Bowl
5. Coalescing
6. Long Life Replaceable Element
7. High Quality Construction
8. Spin-on Handle and Easily Removable Cartridge

Operation

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.

Service

Element should be changed at 8 to 15 inches of Mercury restriction. (See Accessories Section for gauges.) Measurement should be made at the pump inlet.

1. Remove lid.
2. Inspect gaskets. Replace only if necessary.
3. Remove element by means of bale.
4. Insert genuine Racor replacement element only, over center return tube with turning motion. See Specifications Chart for correct element number.

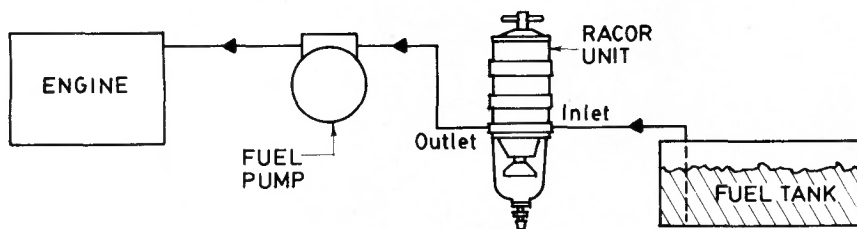


FIG. 1

5. Top off by pouring clean diesel fuel into filter cylinder until full.
6. Replace lid and hand tighten T-handle.

Sump or bowl must be drained at or before contaminant reaches the bottom of the centrifuge assembly. The Water Sensor Light/Alarm Kit is standard equipment on some models and is an available option for other Racor filter/separators. (See Page 13 for details.)

WARNING: Use of additional methanol or alcohol-based additives may damage the clear bowl or centrifuge.

Maintenance and Trouble-Shooting Procedures

New Elements — 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 "O" 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 petcock, and blow out with compressed air. In case of severe stoppages, remove bowl and centrifuge unit and clean with compressed air.

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 gasket.

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**. Over-tightening causes gasket to warp. Replace bowl ring gasket and reinstall bowl and ring. Fill unit with fuel.

Fuel additives, such as isopropyl, can cause the bowl to turn white or develop hair line cracks inside. It will also damage the centrifuge unit and coalescer cone. Use of fuel additives is NOT recommended. Water dispersing additives are not needed with the Racor system.

In cold weather operation, installation of a Racor Fuel Heater in the Racor filter/separator will eliminate the need for additives to prevent waxing. Racor's in-line fuel 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.

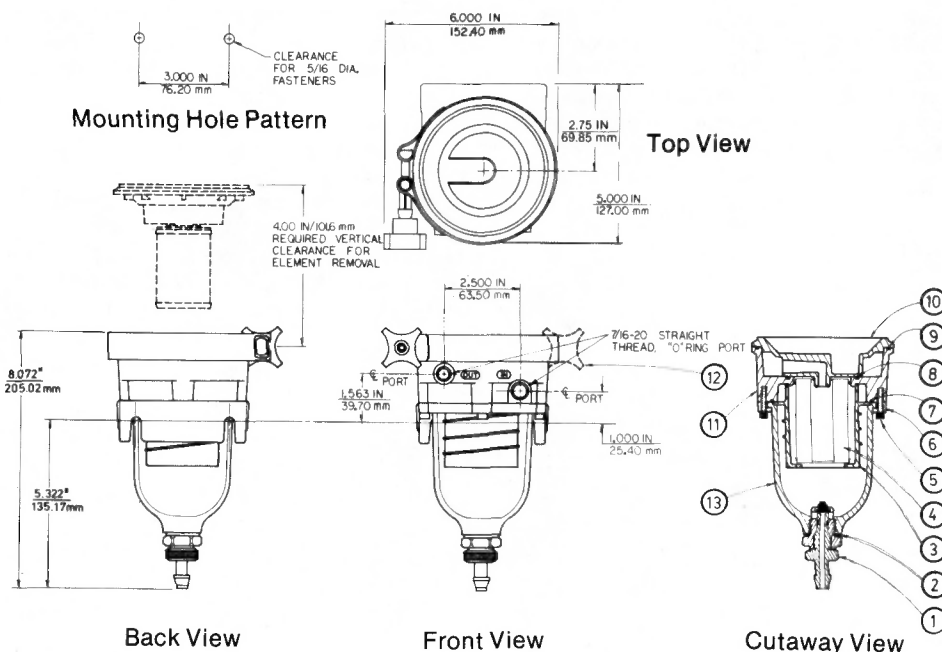
Model 200FG

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

Parts Diagram

Parts List

Item	Part No.	Qty	Description
1	11780	1	Drain Valve
2	11041	1	Bowl Drain Gasket
3	12008A	1	Flow Director
4	2000SM	1	Element
5	15081	4	Bowl Retainer Screw (10-24)
6	12006	1	Bowl Ring Bracket
7	12014	1	Bowl Gasket
8	12013	1	Lower Lid Gasket
9	12003	1	Upper Lid Gasket
10	12075	1	Lid
11	12004A	1	Base
12	12002	1	Retainer Clamp
13	12007	1	Clear Bowl



NOTE: See 200FGM for applications where methanol or alcohol based additives are used in diesel fuel or when gasoline is used.

NOTE: See mounting bracket on Page 10.

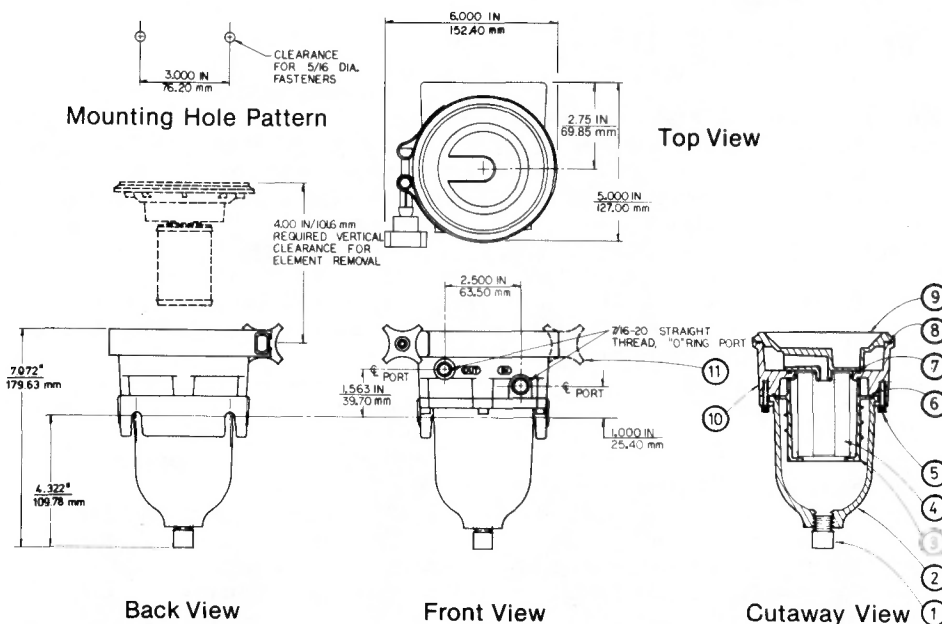
Model 200FGM

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

Parts Diagram

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)
6	12014	1	Bowl Gasket
7	12013	1	Lower Lid Gasket
8	12003	1	Upper Lid Gasket
9	12001	1	Lid
10	12004A	1	Base
11	12002	1	Retainer Clamp



Model 500FG*

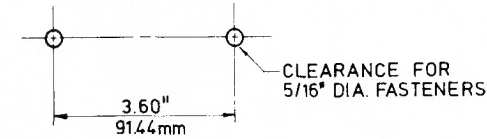
Maximum Rated Flow 4 l/Min. (1.05 GPM)
Port Size: 9/16" x 18 UNF Str Thd
w/O-ring

Parts List

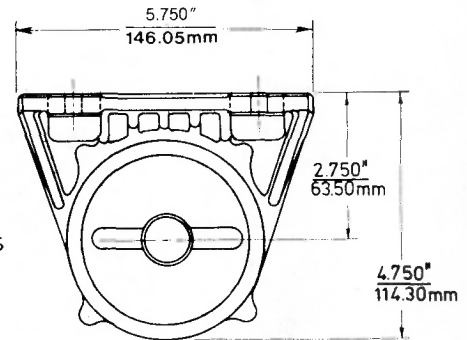
Item	Part No.	Qty	Description
1	11780	1	Drain Valve
2	11041	1	Bowl Drain Gasket
3	15013C	1	Turbine Centrifuge
4	15011	1	Check Ball
5	15010A	1	Check Ball Gasket
6	15012C	1	Conical Baffle
7	15009	1	Bowl O-Ring
8	2010SM	1	Element
9	15079	1	Return Tube
10	15005	1	Lid Gasket
11	15078	1	Lid
12	11350	1	O-Ring
13	11888	1	T-Handle
14	15082	1	Body
15	15090	1	Ring/Bracket
16	15081	4	Bowl Retainer Screw (10 - 24)
17	15014A	1	Clear Bowl

*For  listed applications,
order model 500MA

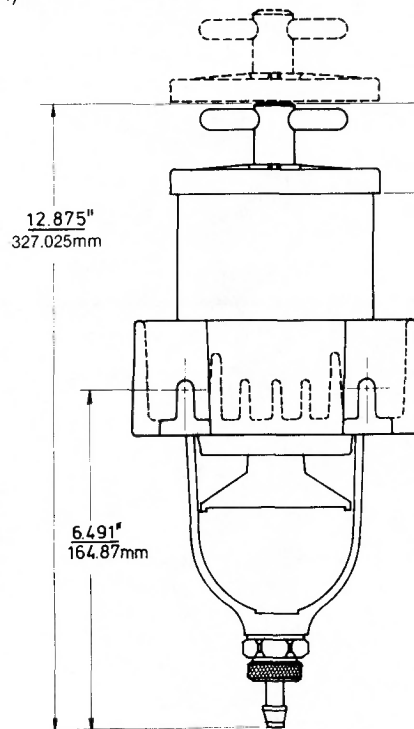
Parts Diagram



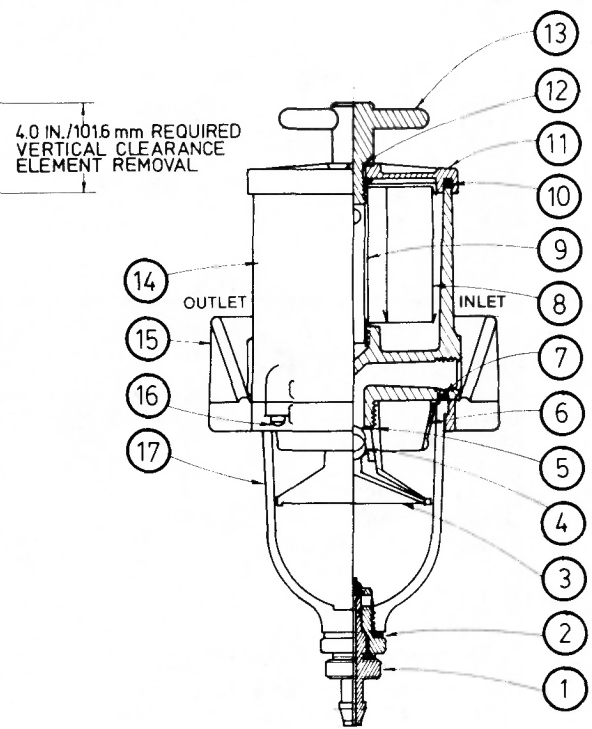
Mounting Hole Pattern



Top View



Back View



Cutaway View

Model 900FG*

Maximum Rated Flow 6 l/Min. (1.59 GPM)

Port Size: 7/8" x 14 UNF Str Thd

w/O-ring

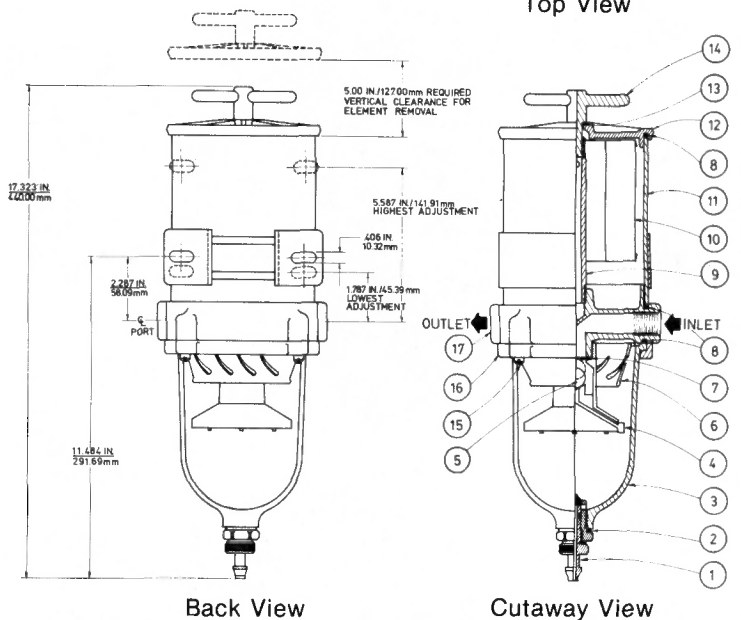
Parts List

Item	Part No.	Qty	Description
1	11780	1	Drain Valve
2	11041	1	Bowl Drain Gasket
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

*For  listed applications, order model 900MA.

Parts Diagram

Mounting Hole Pattern



Model 75/900FG*

Maximum Rated Flow 6-12 l/Min.

(1.59-3.16 GPM)

Port Size: 3/4" NPT

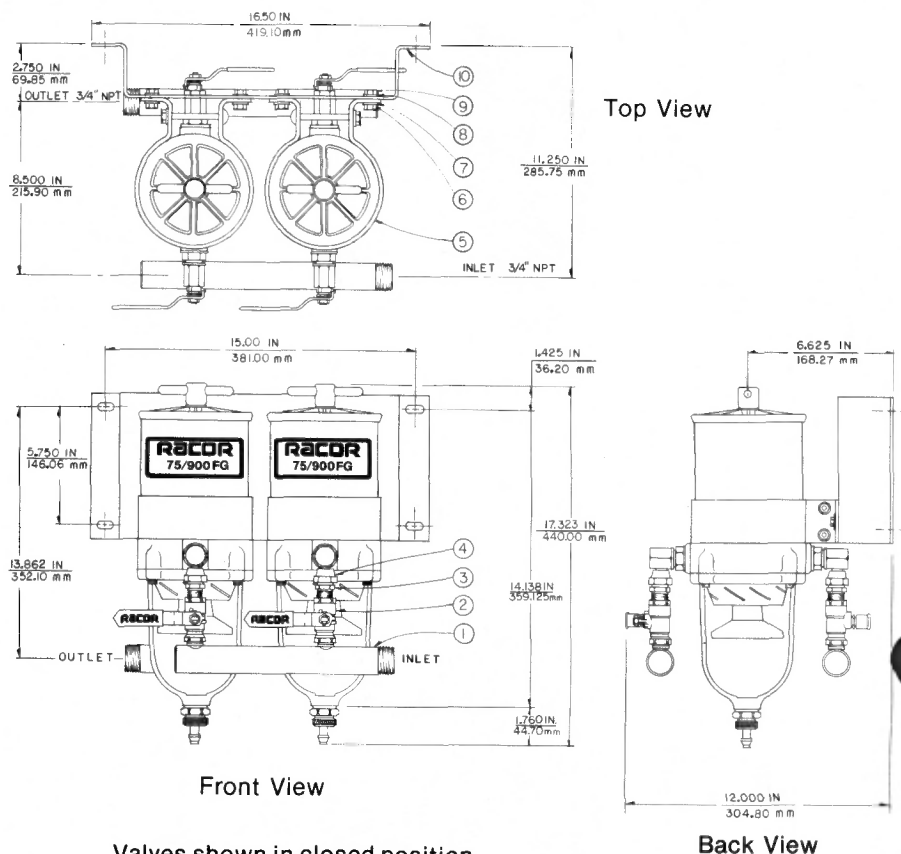
Valves permit servicing under continuous operation. See above for individual Model 900FG Parts List.

Parts List

Item	Part No.	Qty	Description
1	11892	2	3/4" Manifold
2	11073	4	1/2" Ball Valve
3	11074	4	1/2" NPT x 1/2" NPSM FTG
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  listed applications, order model 75/900MA.

Parts Diagram



Valves shown in closed position.

Model 1000FG *

Maximum Rated Flow 12 l/Min. (3.16 GPM)

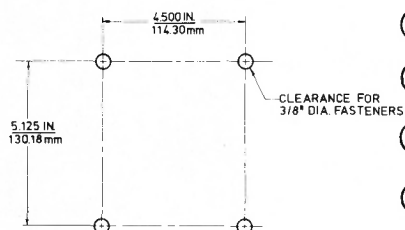
Port Size: 7/8" x 14 UNF Str Thd
w/O-ring

Parts Diagram

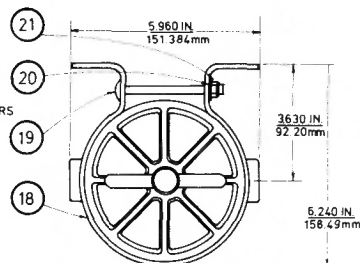
Parts List

Item	Part No.	Qty	Description
1	11780	1	Drain Valve
2	11041	1	Bowl Drain Gasket
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

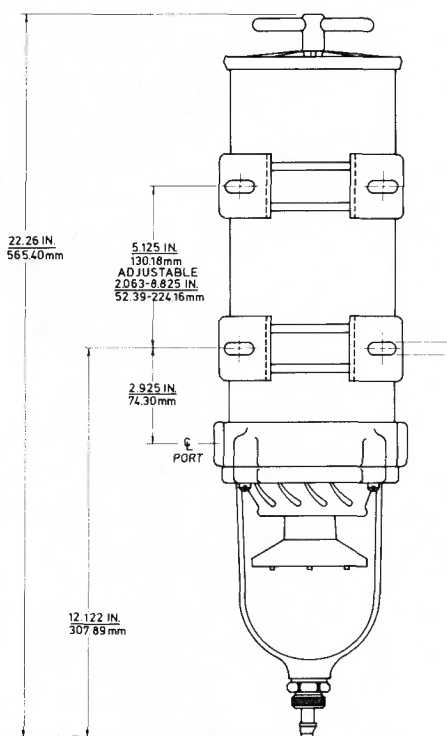
*For  listed applications,
order model 1000MA



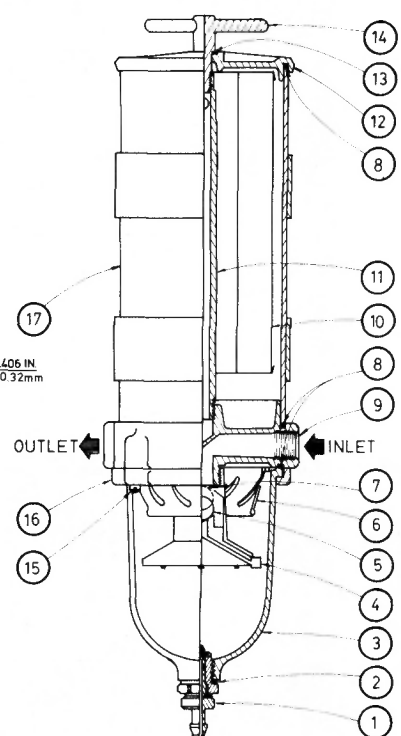
Mounting Hole Pattern



Top View



Back View



Cutaway View

Model 73/1000FG*

Maximum Rated Flow 24 l/Min. (6.32 GPM)

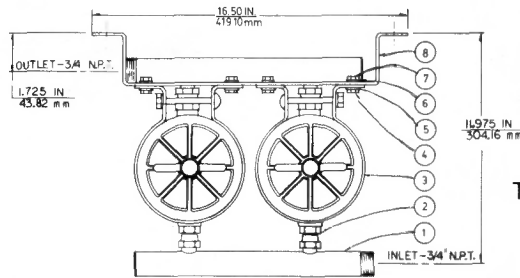
Port Size: 3/4" NPT

See Page 8 for individual Model 1000FG Parts List.

Parts List

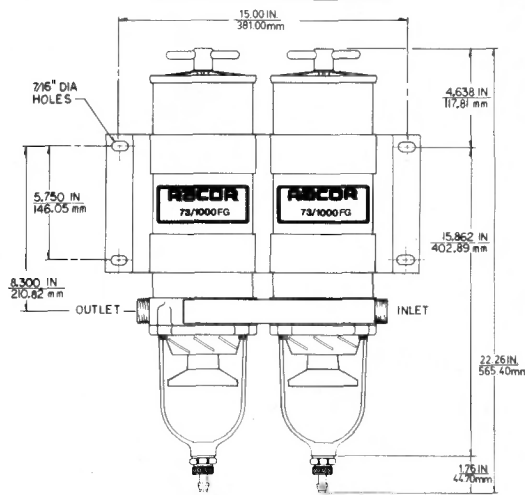
Item	Part No.	Qty	Description
1	11892	2	3/4" Manifold
2	11071	4	Fittings
3	1000FG	2	Filter/Separator
4	11078	8	3/8" Hex-Bolt
5	11080	8	3/8" Washer-Flat
6	11102	8	3/8" Washer-Lock
7	11079	8	3/8" Hex-Nut
8	11065	1	Double Bracket

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

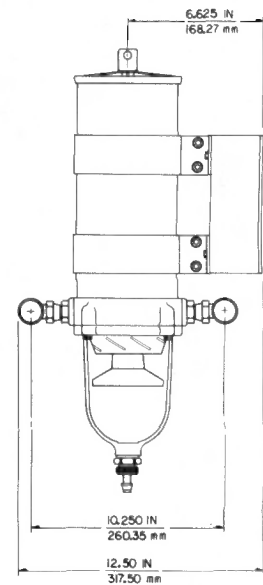


Parts Diagram

Top View



Front View



Side View

Model 75/1000FG*

Maximum Rated Flow 12-24 l/Min.

(3.16 - 6.32 GPM)

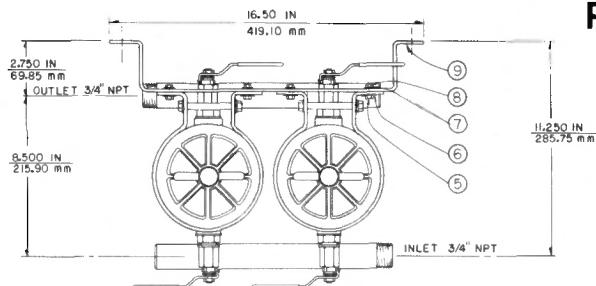
Port Size: 3/4" NPT

*Valves permit servicing under continuous operation. See Page 8 for individual Model 1000FG Parts List.

Parts List

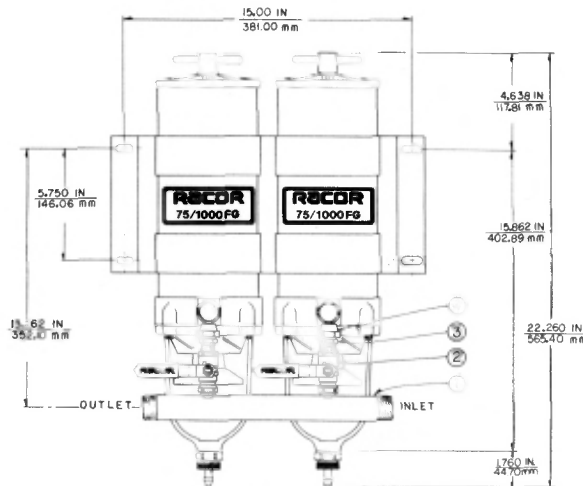
Item	Part No.	Qty	Description
1	11892	2	3/4" Manifold
2	11073	4	Ball Valve Assm.
3	11074	4	FTG Strt 1/2" NPT x 1/2" NPSM
4	11072	4	Elbow Fitting
5	11078	8	3/8" Hex-Bolt
6	11080	8	3/8" Washer-Flat
7	11102	8	3/8" Washer-Lock
8	11079	8	3/8" Hex-Nut
9	11065	1	Double Bracket
10	1000FG	2	Filter/Separator

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

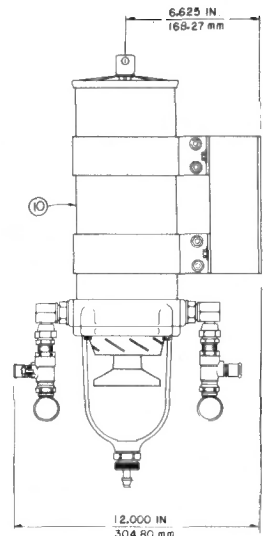


Parts Diagram

Top View



Front Section View



Side View

Valves shown in closed position.

Model 77/1000FG*

Maximum Rated Flow 36 l/Min. (9.48 GPM)

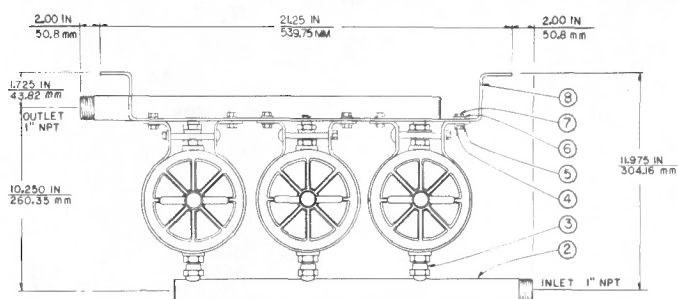
Port Size: 1" NPT

See Page 8 for individual Model 1000FG Parts List.

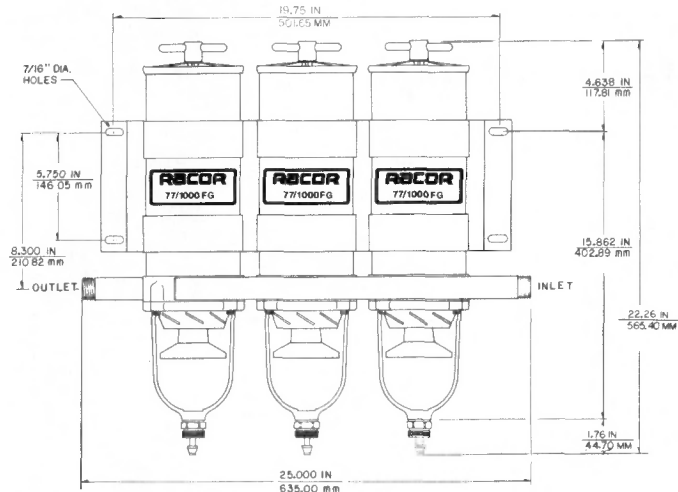
Parts List

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

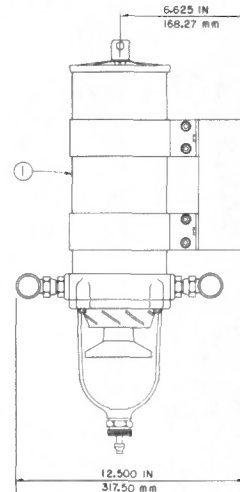
*For  listed applications, order model 77/1000MA.



Top View



Front Section View



Side View

Model 79/1000FG*

Maximum Rated Flow 12-24-36 l/Min. (3.16 - 6.32 - 9.48 GPM)

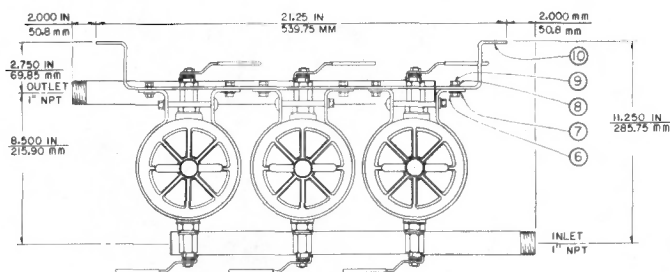
Port Size: 1" NPT

*Valve permit servicing under continuous operation. See Page 8 for individual Model 1000FG Parts List.

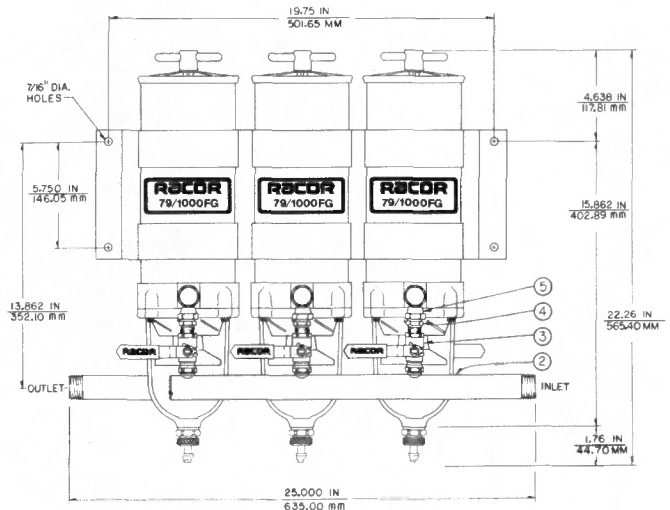
Parts List

Item	Part No.	Qty	Description
1	1000FG	3	Filter/Separator
2	11076	2	1" Manifold
3	11073	6	1/2" Ball Valve
4	11074	6	1/2" NPT x 1/2" 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

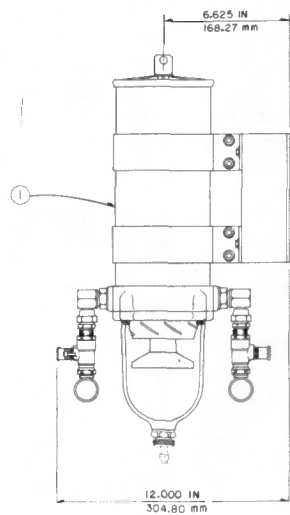
*For  listed applications, order model 79/1000MA.



Top View



Front Section View



Side View

Valves shown in closed position.

Options & accessories

For Racor Fuel Filter/Water Separators

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 0-15 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

1. Drill and tap 1/8" 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.

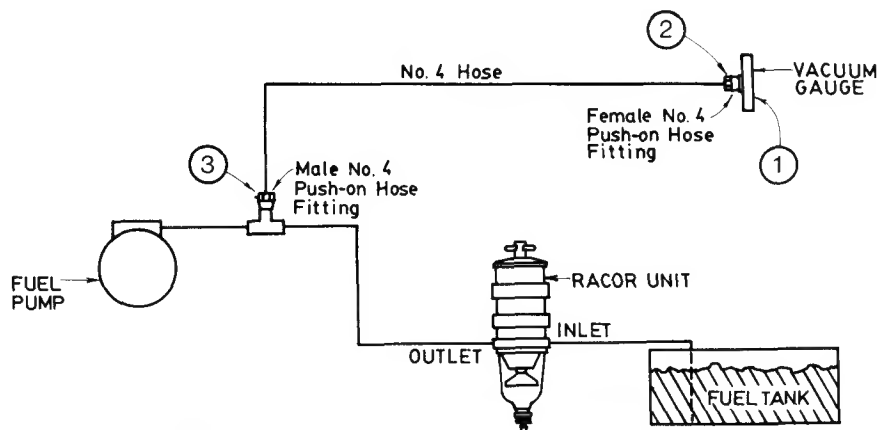
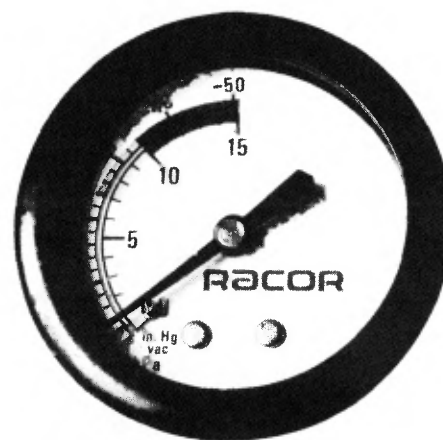
1606B Kit

Parts List

1. (1) No. 11233 Vacuum Gauge
2. (1) No. 7234-4 Female fitting
3. (1) No. 7232-4 Male fitting

Optional:

No. 11268 No. 4 Hose
(Specify length)
No. 9040-10-8DT Filter
port fitting for gauge
No. 11369 1/4" x 1/8"
brass adaptor

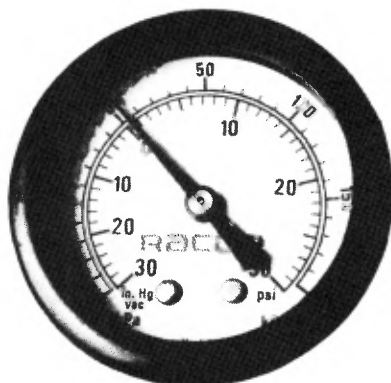


Vacuum/ Pressure Gauge

Part No. 18-1104

The Racor "compound" gauge provides 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).

The compound gauge is also provided with the Racor "TK" series test kits, to simplify vacuum and pressure checking. Pressure and vacuum readings are expressed in both the familiar English measurements and the international standard of Kg/cm².

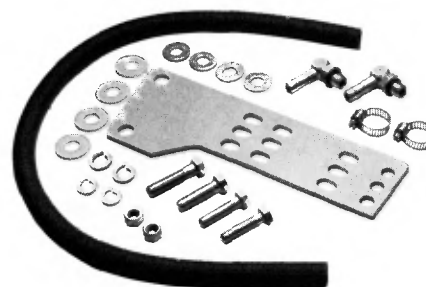


Mounting Bracket Kits for the 200FG

Universal Mounting Kit
Part No. 12046



GM Mounting Bracket Kit
Part No. 12088



These kits have been developed for mounting the 200 FG filter/separator. The GM mounting bracket kit is required for General Motors V-8 diesel engine cars & pickups.

The Universal kit is for mounting units on irregular metal surfaces such as fender aprons and firewalls. It contains the necessary metal screws, nuts and bolts, and lockwashers to firmly attach the bracket.

Racor In-Filter Disc Heater

The new, improved Racor In-Filter Disc Heater:

- a) more direct heat to the element
- b) is fully insulated
- c) more accurate temperature sensitivity
- d) less wires
- e) stronger construction
- f) fits into the 900 and 1000 FE/FF/FG Fuel Filter/Water Separator.

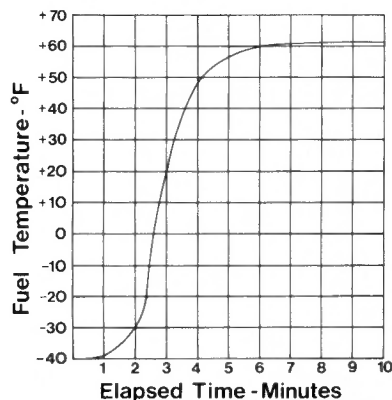
Operation

Internal automatic thermostats turn on the Racor In-Filter Disc Heater as the fuel temperature drops below 30°F (-1.1 C).

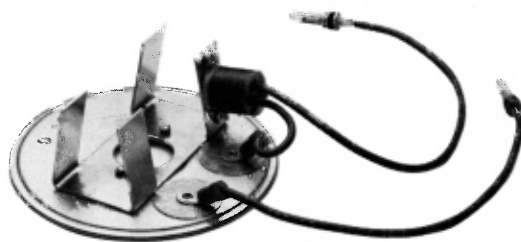
The In-Filter Disc Heater operates on the vehicle's DC current, supplying heat to the fuel filter just below the replaceable element. This critical placement provides increased fuel temperature as the fuel passes through the fine micron filtering element.

When the engine is not running and the temperature is below 30°F, the heater is operated by turning on the master switch for a maximum of 10 minutes prior to starting the engine. With the diesel fuel temperature above 30°F there is no waxing or icing of the filter element. The In-Filter Heater is primarily a cold starting aid; for sub-zero running where the Racor Filter/Separator is exposed to chill factor winds, the use of the Racor In-Line Fuel Heater, RX-20, is suggested. (See Page 13)

WARNING: Racor in-filter heater is not to be used when filtering gasoline or other highly volatile liquids.



Fuel temperature reading taken at a point 1" above the surface of the in-filter fuel heater. Temperatures shown are in Fahrenheit.



Installation

The power rating of the disc heater is 200 watts maximum, 15.5 amperes for the 12v heater, and 7.8 amperes for the 24v heater. Using this power rating, the disc heater can be installed on many vehicles without the use of a relay or by using an existing heavy-duty relay. Refer to GUIDE TO OPTIONAL 12v and 24v RELAY — BELOW.

Guide to Optional 12V And 24V Relay		
Truck Manufacturer	Relay Required	
	Yes	No
Ford	X	
Freightliner		X
GMC—Chevrolet		X
International Harvester "S" Series 1600—2600	X	X
Iveco	X	
Kenworth		X
Mack		X
Marmon	X	
Mercedes	X	
Peterbilt		X
Volvo	X	
White	X	

Note: This chart is to be used only as a guide. Electrical checks must be made to determine if your truck's electrical system is capable of handling an additional amperage load.

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

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 proves capable of additional load, proceed with final electrical connection. (SEE "PREPARING HEATER TERMINALS FOR ELECTRICAL CONNECTION" on PAGE 12 and DIAGRAM A — BELOW.)

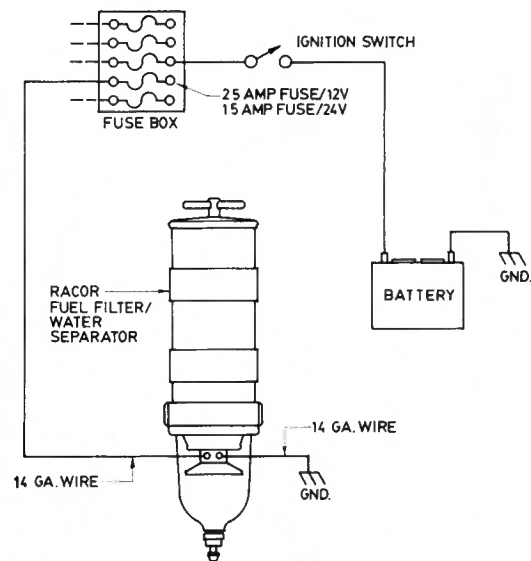
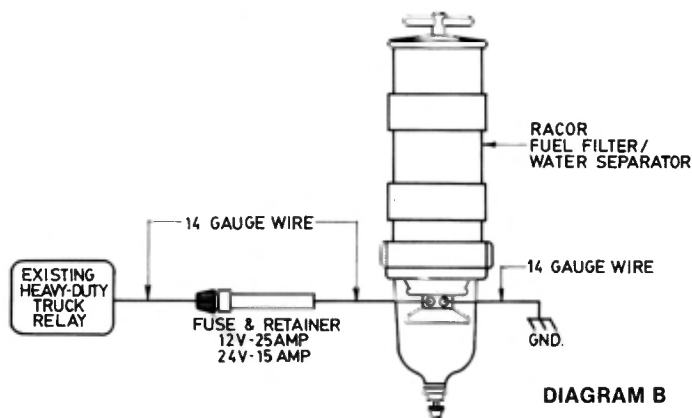


DIAGRAM A

Option B:

Existing Heavy-Duty Relay Electrical Connection

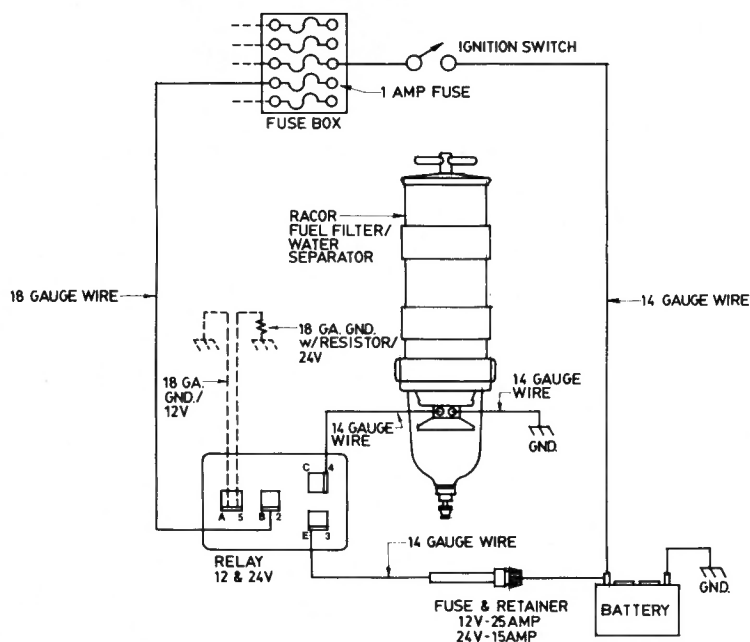
Prior to installation, determine if your truck's existing heavy-duty relay is capable of the additional amperage load as stated in Option A. If the heavy-duty relay proves capable of the additional amperage load, proceed with final electrical connection. (SEE "PREPARING HEATER TERMINALS FOR ELECTRICAL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



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" and DIAGRAM C — BELOW.)



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

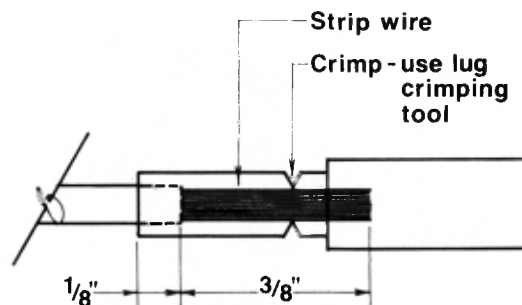
System Voltage	Racor Relay Kit Part No.
12v	11861
24v	11862

An equivalent relay is available through the following manufacturers:

Manufacturer	Part No.
Nartron	13011
Cole-Hersee	24059
Bosch	36-002
Sterling	LB-1550-12
Delco-Remy	1114223

To Prepare Heater Terminals for Electrical Connection:

- 1) Unpack the (2) blue terminals receptacle connectors.
- 2) Crimp each receptacle, as shown, to two lengths of 14 gauge wire. The length of wire depends on which option you are using for electrical connection. (SEE FIGURE BELOW.)



TERMINAL RECEPTACLE CONNECTOR

- 3) Push each connector onto an installed terminal.
Either terminal may be used as ground.

Disc Heater Assembly

Part No.	Description
11585	12v Disc Heater
11586	24v Disc Heater

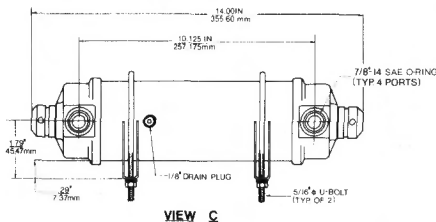
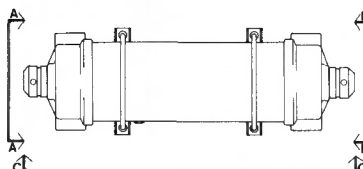
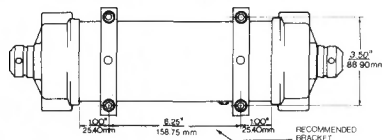
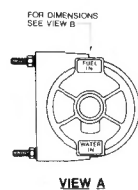
Disc Heater Kits

Part No.	Description
11721	12v Disc Heater (with FF/FG clear bowl & terminals)
11722	24v Disc Heater (with FF/FG clear bowl & terminals)

Racor's RX-20 In-Line Diesel Fuel Heater

How It Works

The RX-20 is Racor's newest in-line heat exchanger. It combines excellent heat rise efficiency and reliability in a rugged design that requires virtually no maintenance. The unit is designed to be mounted externally on diesel-powered machinery and vehicles which operate primarily in cold weather climates. Heat is transferred from a tube bundle containing hot radiator fluid to the cold fuel circulating around the tubes. (See Diagram A.) The heater's design reduces any possibility of internal leaks as the two liquids move through separate compartments of the unit. Internal baffle spacing and overall design of the RX-20 yields maximum efficiency possible with minimum flow restriction. An integral water shut-off valve is a standard feature on the RX-20. For warm weather operation the flow of hot radiator fluid through the unit can be shut off eliminating possible overheating of the diesel fuel. The RX-20 is also equipped with a fuel drain plug that allows the operator to drain any water contamination that accumulates.

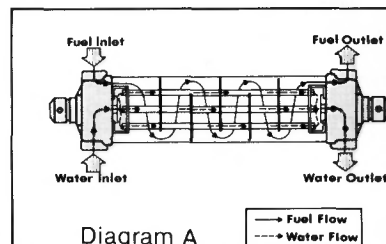
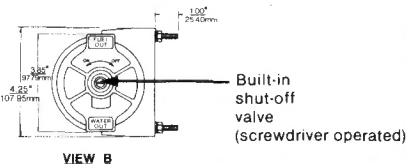


RX-20 Performance					
Inlet Fuel Temp		Outlet Fuel Temp (°F/°C)			
		Fuel Flow Rate (GPM/LPM)			
		2.5 GPM/9.4 LPM		1.5 GPM/5.6 LPM	
°F	°C	°F	°C	°F	°C
-40°F	-40°C	40°F	4.4°C	50°F	10°C
-20°F	-28.89°C	45°F	7.22°C	54°F	12.22°C
-0°F	-17.78°C	50°F	10°C	60°F	15.56°C

NOTE: Lower flow rates result in a higher heat rise

Temperature Rise For Various Engine Models			
Manufacturer	Engine Model	Fuel Temp In	Expected Fuel Temp Out
Cummins	350/335	-40°F	+50°F
		-20°F	+54°F
Cummins	290	-40°F	+62°F
		-20°F	+65°F
Detroit Diesel Allison	8V71 & 8V92	-40°F	+50°F
		-20°F	+54°F
Cat	3406	-40°F	+62°F
		-20°F	+65°F
Mack	E6315 & E7A/673A & E8D/673A	-40°F	+50°F
		-20°F	+54°F
Mack	ETA 1005 & EM8-400	-40°F	+40°F
		-20°F	+45°F

This information is based upon maximum flow rates. Vehicles with a lower fuel flow rate can expect a higher heat rise.



The LAK-1 Water Sensor Light/Alarm Kit

A functional accessory for all Racor filter/separators, the all solid-state Water Sensor Light/Alarm alerts 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 Fuel Filter, 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 the warning light and buzzer are activated. See **Water Level Diagram**. When the warning light and buzzer come on, the bowl must be drained to remove the trapped contaminants and water, insuring maximum engine protection and filtration efficiency (be sure to turn off engine before draining).

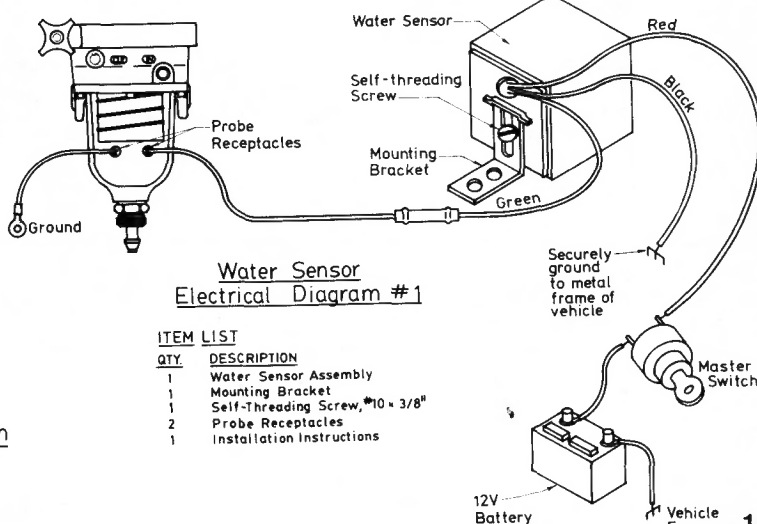
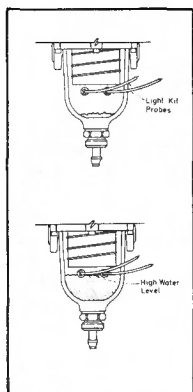
WARNING: Racor Light Kit is not to be used when filtering gasoline or other highly volatile liquids.

Installation

The Racor Water Sensor Light/Alarm Kit is designed for 12 V DC power source.

A collector bowl with probes is required when installing a light kit on Racor Fuel Filter/Water Separators. Contact your Racor dealer for the collector bowl to meet the application.

An optional LAK-1 adaptor kit, Racor Part #11-1048, is available for mounting the LAK-1 in dash.

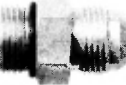


Water Sensor Electrical Diagram #1

ITEM	DESCRIPTION
QTY.	
1	Water Sensor Assembly
1	Mounting Bracket
1	Self-Threading Screw, #10 x 3/8"
2	Probe Receptacles
1	Installation Instructions

Water Level Diagram

Racor Fittings Chart

FITTING	RACOR PART NO.	UNIT USAGE	T1	T2
Straight Thread w/O-ring 90° Elbow/ Male JIC37° 	9010-4-4 9010-6-4 9010-6-6 9010-10-8 9010-10-10	200 500 500 900/1000 & RX-20 900/1000 & RX-20	7/16-20 w/o-ring 9/16-18 w/o-ring 9/16-18 w/o-ring 7/8-14 w/o-ring 7/8-14 w/o-ring	7/16-20 7/16-20 9/16-18 3/4-16 7/8-14
Straight Thread w/O-ring/ Male JIC37° 	9020-4-4 9020-6-4 9020-6-6 9020-10-6 9020-10-8 9020-10-10	200 500 500 900/1000 & RX-20 900/1000 & RX-20 900/1000 & RX-20	7/16-20 w/o-ring 9/16-18 w/o-ring 9/16-18 w/o-ring 7/8-14 w/o-ring 7/8-14 w/o-ring 7/8-14 w/o-ring	7/16-20 7/16-20 9/16-18 9/16-18 3/4-16 7/8-14
Straight Thread w/O-ring/ Female Pipe 	9040-4-4 9040-6-4 9040-6-6 9040-10-4 9040-10-6 9040-10-8 9040-10-8DT 9040-10-12	200 500 500 900/1000 & RX-20 900/1000 & RX-20 900/1000 & RX-20 900/1000 900/1000 & RX-20	7/16-20 w/o-ring 9/16-18 w/o-ring 9/16-18 w/o-ring 7/8-14 w/o-ring 7/8-14 w/o-ring 7/8-14 w/o-ring 7/8-14 w/o-ring 7/8-14 w/o-ring	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.
Hose Fittings 	9010-HF-4-5 9010-HF-4-6 9010-HF-6-5 9010-HF-6-6	200 200 500 500	7/16-20 w/o-ring 7/16-20 w/o-ring 9/16-18 w/o-ring 9/16-18 w/o-ring	5/16 hose 3/8 hose 5/16 hose 3/8 hose
Hose Fittings 	9020-HF-4-5 9020-HF-4-6 9020-HF-6-5 9020-HF-6-6	200 200 500 500	7/16-20 w/o-ring 7/16-20 w/o-ring 9/16-18 w/o-ring 9/16-18 w/o-ring	5/16 hose 3/8 hose 5/16 hose 3/8 hose

† Racor recommends using 9040 fittings for customers' existing pipe that does not match Racor's 37° JIC fitting.

*For use with U. L. listed fuel hose only.

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All products manufactured or distributed by Racor Industries are subject to the following, and only the following, LIMITED EXPRESS WARRANTIES, and no others: For a period of ninety (90) days from and after the date of purchase of a new Racor Industries product, Racor Industries warrants and guarantees only to the original purchaser-user that such a product shall be free from defects of materials and workmanship in the manufacturing process. A product claimed to be defective must be returned to the place of purchase. Racor Industries, at its sole option, shall replace the defective product with a comparable new product or repair the defective product. This express warranty shall be inapplicable to any product not properly installed and properly used by the purchaser-user, or to any product damaged or impaired by external forces. THIS IS THE EXTENT OF WARRANTIES AVAILABLE ON THIS PRODUCT. RACOR INDUSTRIES SHALL HAVE NO LIABILITY WHATSOEVER FOR CONSEQUENTIAL DAMAGES FLOWING FROM THE USE OF ANY DEFECTIVE PRODUCT OR BY REASON OF THE FAILURE OF ANY PRODUCT. RACOR INDUSTRIES SPECIFICALLY DISCLAIMS AND DISAVOWS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED INCLUDING, WITHOUT LIMITATION, ALL WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE, WARRANTIES OF DESCRIPTION, WARRANTIES OF MERCHANTABILITY, TRADE USAGE OR WARRANTIES OF TRADE USAGE.

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For a period of ninety (90) days from and after the date of purchase of a new Racor product, Racor warrants and guarantees to the original purchaser-user only that such product shall be free from defects of materials and workmanship in the manufacturing process. A product claimed to be defective should be returned to the dealer from whom the product was purchased and, in addition, the dealer should be provided with the purchaser-user address. The Racor dealer, at his sole option, shall replace the defective product with a comparable new product or return it to his point of purchase for repair or replacement. Racor shall, after receipt of the product and determination it is defective, return the product so replaced or repaired to the direct account who will ensure that the product is returned to the retail outlet for appropriate action. In the event Racor is unable to replace or repair a defective product, the selling Racor dealer shall reimburse the purchaser-user in an amount equal to the purchase price paid by the buyer, less that amount directly attributable to use by the purchaser-user prior to the discovery of the alleged defect. This express warranty shall be inapplicable to any product not properly installed and properly used by the purchaser-user, or to any product damaged or impaired by external forces. RACOR INDUSTRIES SHALL HAVE NO LIABILITY WHATSOEVER FOR CONSEQUENTIAL AND/OR INCIDENTAL DAMAGES FLOWING FROM THE USE OF ANY DEFECTIVE PRODUCT OR BY REASON OF THE FAILURE OF ANY PRODUCT. ANY AND ALL IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR USE, DESCRIPTION AND/OR TRADE USAGE, ARE LIMITED IN DURATION TO THE DURATION OF THE EXPRESS WARRANTY CONTAINED HEREIN, i.e., NINETY (90) DAYS FROM AND AFTER THE PURCHASE OF THE NEW RACOR PRODUCT.

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitations on the duration of an implied warranty so the above limitations or exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Specifications

MODEL NO.	200FG	200FGM	500FG	900FG	1000FG	75-900FG	73-1000FG ^① 75-1000FG ^②	77-1000FG ^③ 79-1000FG ^④
MAXIMUM FLOW RATE								
l/Min.	2	2	4	6	12	12	24 ^① 12/24 ^②	36 ^③ 24/36 ^④
Gpm	.53	.53	1.05	1.59	3.16	3.16	6.32 ^① 3.16/6.32 ^②	9.48 ^③ 6.32/9.48 ^④
CLEAN VACUUM DROP								
Hg Inch	1.25	1.25	1.25	2.0	3.0	2.0	3.5 ^① 5.0 ^②	3.5 ^③ 5.0 ^④
Hg CM	3.175	3.175	3.175	5.08	7.62	5.08	8.89 ^① 12.70 ^②	8.89 ^③ 12.70 ^④
WORKING PRESSURE (PRESSURE SIDE USE NOT RECOMMENDED)								
Psi	15	15	15	100	100	100	100	100
Bar	1.05	1.05	1.05	6.89	6.89	6.89	6.89	6.89
PROOF PRESSURE								
Psi	100	100	50	200	200	200	200	200
Bar	20.68	20.68	3.45	20.68	20.68	20.68	20.68	20.68
MAXIMUM VACUUM								
Hg"	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5
mmW	8122.5	8122.5	8122.5	8122.5	8122.5	8122.5	8122.5	8122.5
ELEMENT MODEL NO.	2000SM	2000SM	2010SM	2040SM	2020SM	2040SM	2020SM	2020SM
ELEMENT MATERIAL	RESIN IMPREGNATED CELLULOSE							
REMOVAL RATING	96% @ 2 MICRON W/AC FINE DUST				96% @ 2 MICRON W/AC FINE DUST			
DIRT CAPACITY (AC Fine Dust) *	45 Gms	45 Gms	250 Gms	500 Gms	1000 Gms	1000 Gms	2000 Gms	3000 Gms
ELEMENT REMOVAL CLEARANCE								
In.	4.0	4.0	4.0	5.0	10.0	10.0	10.0	10.0
Mm	101.6	101.6	101.6	127.0	254.0	254.0	254.0	254.0
TEMPERATURE RATINGS								
F°	-50/225	-50/225	-50/225	-50/225	-50/225	-50/225	-50/225	-50/225
C°	-46/107	-46/107	-46/107	-46/107	-46/107	-46/107	-46/107	-46/107
PORT SIZE								
In.	7/16"-20 UNF	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			
HEIGHT								
In.	8.072	7.072	12.875	17.323	22.26	17.323	22.26	22.26
Mm	205.02	179.63	327.025	440.00	565.40	440.00	565.40	565.40
WIDTH								
In.	6.00	6.00	5.750	5.960	5.960	16.50	16.50	25.00
Mm	152.40	152.40	146.05	151.384	151.384	419.10	419.10	635.00
DEPTH								
In.	5.00	5.00	4.750	6.240	6.240	12.00	12.50 ^① 12.00 ^②	12.50 ^③ 12.00 ^④
Mm	127.00	127.00	114.30	158.49	158.49	304.80	317.50 ^① 304.80 ^②	317.50 ^③ 304.80 ^④
TOP TO ϕ OF INLET								
In.	1.00	1.00	6.00	8.126	13.00	15.287	13.0 ^① 18.50 ^②	13.0 ^③ 18.50 ^④
Mm	25.40	25.40	152.40	206.40	330.20	388.29	330.20 ^① 469.90 ^②	330.20 ^③ 469.90 ^④
TOP TO ϕ OF OUTLET								
In.	1.00	1.00	5.75	8.126	13.00	15.287	13.0 ^① 18.50 ^②	13.0 ^③ 18.50 ^④
Mm	25.40	25.40	146.0	206.40	330.20	388.29	330.20 ^① 469.90 ^②	330.20 ^③ 469.90 ^④
WEIGHT								
Lbs.	3	3.61	3.90	6.68	8.73	27	35	47
Kg	1.36	1.637	1.77	3.03	3.96	12.24	15.88	21.32
SEALS								
							BUNA	N
VALVES							NONE BALL TYPE ^②	NONE BALL TYPE ^④
BALL TYPE								

*Specifications shown are the result of tests conducted at the optimum flow rate for each unit (equal to 1/2 the maximum flow rate).

CAUTION: ALCOHOLS AND ACIDS WILL HAVE A DETRIMENTAL EFFECT ON CLEAR BOWL & PLASTIC PARTS

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.)

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

Racor Nationwide Availability Through Over 1500 Dealers

***Call the RACOR distributor nearest you for a list of the dealers in your area.**

ALABAMA
Birmingham
Industrial Hydraulics Inc.
205/251-1094

Mobile
M & L Industries
205/432-0527

ALASKA
Anchorage
Alaska Marine & Equip.
907/276-1540

ARIZONA
Tucson
Southwestern Diesel
Technology
602/748-1888

ARKANSAS
Little Rock
Gemini Industries, Inc.
501/374-6737

CALIFORNIA
Fresno/Northern Area
CLF Warehouse
209/264-3015

Santa Fe Springs
CFL Warehouse
213/946-3341

San Leandro
CLF Warehouse
415/357-6448

Sacramento
CLF Warehouse
916/446-3211

Oakland
Sea-Power Marine
415/533-9290

Los Angeles/Southern Area
Cummins Service &
Sales, Inc.
213/746-3850

Bakersfield
Cummins Service &
Sales, Inc.
805/325-9404

Rialto
Cummins Service &
Sales, Inc.
714/877-0433

Newport Beach
Balboa Marine Hardware
714/548-3407

Montebello
Cummins Service &
Sales, Inc.
213/728-8111

Costa Mesa
Balboa Marine Hardware
714/549-9671

San Diego
Kettenburg Marine
714/224-8211

COLORADO
Denver
Western Jacobs Co.
303/623-7662

CONNECTICUT
Wallingford
Waltco, Inc.
203/265-1675

DELAWARE
Annapolis, MD
Marine Engine Sales
& Service
301/268-3072

Also see Pennsylvania

FLORIDA
Tampa
Stuart Diesel Service
813/626-7105
813/623-1551

GEORGIA
Atlanta
Diesel Injection & Elect.
404/768-8745

Cummins Georgia, Inc.
404/524-7716

Savannah
Southern Industrial Supply
912/232-6116

Cummins Georgia, Inc.
912/232-5565

Dalton
Cummins Georgia, Inc.
404/277-1144

Augusta
Cummins Georgia, Inc.
404/722-8825

Albany
Cummins Georgia, Inc.
912/888-6210

HAWAII
Honolulu
AMFAC Dist. Co. De Rocher
808/839-9021

IDAHO
See Utah
Diesel Service & Sales Co.
801/266-3331

ILLINOIS
Chicago
Cummins Illinois Engine
Sales Corp.
312/581-3100

St. Louis, Mo.
Cummins, Missouri
314/389-5400

INDIANA
Indianapolis
Coram Filtration
317/788-9571

Gary
Cummins Power
219/885-5591

Newburgh
Dunham Rubber
812/422-1114

IOWA
Des Moines
Midwestern Power Products
515/278-5521

KANSAS
Dodge City
Diesel Power, Inc.
316/225-1796

Also see Missouri
Kansas City, MO
Gooch Brake & Equipment
816/421-3085

KENTUCKY
Louisville
Auto Wheel & Rim
502/582-1383

Bowling Green
Auto Wheel & Rim
502/781-4490

Lexington
Truck Parts & Equip.
606/252-6773

LOUISIANA
Belle Chasse
Gemini Industries, Inc.
504/394-6350
504/394-6353

MAINE
Portland
Gowen, Inc.
207/773-1761

MARYLAND
Annapolis
Marine Engine Sales
& Service
301/268-3072

MASSACHUSETTS
Allston
Arcand Sales & Service
617/782-1075

Boston
Boston Thermo King
617/423-6720

New Bedford
Shuster Corporation
617/999-3261

Salem
Marine Gear, Inc.
617/744-9350

MICHIGAN
Detroit
Universal Engine Controls
313/644-1850

Adrian
A & L Parts
517/265-5101

Ann Arbor
A & L Parts
313/665-4411

Iron Mt.
Cummins Wis. Inc.
906/774-2424

Mt. Clemens
Blue Water Marine
313/468-6960

MINNESOTA
Minneapolis/St. Paul
Adeco Manufacturing
612/645-9814

Parts Midwest, Inc.
612/331-4860

American Trailer Serv.
612/633-2872

MISSISSIPPI
Gemini Industries, Inc.
504/394-6350
504/394-6353

MISSOURI
St. Louis
Cummins Missouri
314/389-5400

Sikeston
Cummins Missouri, Inc.
314/472-0303

Kansas City
Gooch Brake & Equipment
816/421-3085

MONTANA
Billings
Holeman G.M. Diesel Inc.
406/252-4191

Missoula
Holeman GM
406/728-7600

Kalispell
Holeman G.M. Diesel Inc.
406/755-4191

NEBRASKA
Omaha
Diesel Power, Inc.
402/731-8300

NEVADA
Reno/Northern Area
CLF Warehouse
916/446-3211

Las Vegas/Southern Area
Cummins Service &
Sales, Inc.
702/735-4058

NEW HAMPSHIRE
Concord
Patsy's GMC-Kenworth
603/224-5366

NEW JERSEY
Merchantville
Mid Atlantic Engine
609/662-8140

See New York
College Point, N.Y.
Knese Marine
212/353-9300

Valley Stream, N.Y.
LaBan Equipment Corp.
516/561-2203

Montclair
Caro-Chem Associates, LTD.
201/783-9510

NEW MEXICO
Albuquerque
Diesel Power Center
505/345-8777

NEW YORK
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LaBan Equipment Corp.
516/561-2203

College Point
Knese Marine
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Williamson
Johnson Equipment Sales
515/589-2347

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Pineville
Industrial Eng. & Equip.
704/889-7511

Raleigh
Stone Heavy Vehicle
919/779-2320

Greensboro
Stone Heavy Vehicle
919/292-9512

Wilmington
Stone Heavy Vehicle
919/762-8761

Charlotte
Stone Heavy Vehicle
704/332-9011

NORTH DAKOTA
Williston
Holeman G.M. Diesel
701/572-2000

Fargo
American Wheel & Brake
701/282-2866

OHIO
Mentor
Great Lakes Power Products
216/951-5111

Cincinnati
Transport Specialists, Inc.
513/651-4200

Columbus
Columbus Diesel Supply
614/228-6663

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Oklahoma City
Motive Power Industries
405/943-2195

Tulsa
Motive Power Industries
918/496-1350

OREGON
Cottage Grove
Alan Richards Enterprises
503/942-0124

Portland
Western Turbo
503/285-7781

PENNSYLVANIA
York
Reinhart Equipment Sales
717/741-1617

Murrysville
Penn Power Products
412/327-3003

Allentown
Fuel Injection
Sales & Service
215/395-3718

RHODE ISLAND
Cranston
Pole & Pons Inc.
401/785-0693

East Greenwich
Layton Industries Inc
401/272-0176

SOUTH CAROLINA
Charleston
Superior Diesel Inc.
803/553-8331

Columbia
Industrial Systems
803/798-3141

SOUTH DAKOTA
Sioux Falls
American Rim & Brake
605/336-9661

Cummins South Dakota
605/336-1715

Rapid City
Holeman G.M. Diesel
605/348-0374

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Knoxville
Racor Sales & Service
615/577-6735

Memphis
Dickson Diesel
901/526-2284

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Gemini Industries, Inc.
214/357-7565

Houston
Gemini Industries, Inc.
713/621-7424

San Antonio
Gemini Industries, Inc.
512/231-2182

El Paso
Diesel America Inc.
915/772-1451

UTAH
Salt Lake City
Diesel Service & Sales Co.
801/266-3331

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Williamson
Johnson Equipment Sales
315/589-2347

VIRGINIA
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Virginia Diesel Service
804/232-8988

Norfolk
Paxton Co.
804/853-6781

WASHINGTON
Seattle
Alaska Marine Engine
206/789-3600

Douglas Filter Service
206/746-1927

Westport (summer only)
Alaska Marine Engine
206/789-3600

WEST VIRGINIA
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Walker Lift
304/768-0075

Huntington
Walker Lift
304/697-7200

Parkersburg
Walker Lift
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WISCONSIN
New Berlin
D.M.T. Corp.
414/784-6420

Green Bay
D.M.T. Corp.
414/336-2589

Milwaukee &
Various Locations
Cummins Wisconsin
414/543-3160

WYOMING
Casper
Cummins Diesel, Inc.
307/235-6685

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Wyoming Machinery
307/634-1561

Gillette
Holeman G.M. Diesel Inc.
307/682-8596

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Loveseth, Ltd.
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Loveseth, Ltd.
403/532-4496

Peace River
Loveseth, Ltd.
403/624-3150

Fort McMurray
Loveseth, Ltd.
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Calgary
Loveseth, Ltd.
403/243-5281

BRITISH COLUMBIA
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Fred Holmes Fuel Injection
604/253-7585

Dawson Creek
Loveseth, Ltd.
604/782-4861

Cranbrook
Fred Holmes Fuel Inject.
604/426-5511

Prince George
Fred Holmes Fuel Inject.
604/563-9277

Abbotsford
Valley Fuel Inject.
604/853-6096

MANITOBA
Winnipeg
Powell Equipment
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Thompson
Powell Equipment
204/778-7004

Brandon
Powell Equipment
204/728-8592

NOVA SCOTIA
Dartmouth
Hydraulic Systems, Ltd.
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ONTARIO
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Industry Diesel Service
416/845-3444

Thunder Bay
Vesco Fluid Power
807/623-4422

Powell Equipment
807/577-5701

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Powell Equipment
807/223-3256

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SASKATCHEWAN
Saskatoon
Cummins Mid-Canada LTD.
306/652-4047

SALES OFFICES

HOME OFFICE
Racor Industries, Inc.
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Modesto, CA 95353
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**PACIFIC REGIONAL
MANAGER**
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Santa Ana, CA
714/833-9795

**WESTERN REGIONAL
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604/796-9749 or 604/792-0727
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