

Turbine Series

900FH and 1000FH Fuel Filter/Water Separators

Instruction Part Number 12960 Rev C



Turbine Series filters protect precision engine components from dirt, rust, algae, asphaltines, varnishes, and especially water, which is prevalent in engine fuels. They remove contaminants from fuel using the following legendary three stage process:

Stage 1 - Separation

As fuel enters the assembly, it moves through the centrifuge and spins off large solids and water droplets, which are heavier than fuel, and fall to the bottom of the collection bowl.

Stage 2 - Coalescing

Small water droplets bead-up on the surface of the conical baffle and cartridge filter. When heavy enough, they too fall to the bottom of the collection bowl.

Stage 3 - Filtration

Proprietary Aquabloc®II cartridge filters repel water and remove contaminants from fuel down to 2 micron (nominal). Aquabloc®II cartridge filters are waterproof and effective longer than water absorbing filters.



Contact Information: Product Features:

Parker Hannifin Corporation
Racor Division
P.O. Box 3208
3400 Finch Road
Modesto, CA 95353

phone 800 344 3286
209 521 7860
fax 209 529 3278
racor@parker.com

www.parker.com/racor
www.parker.com/racorproducts

- Optional Water Sensor and Electronic Water Detection Modules Available
- Optional 12 or 24 vdc Fuel Heater Available
- Flow Rates: 90 GPH (340 LPH) for 900FH and 180 GPH (681 LPH) for 1000FH
- Available in 2, 10, or 30 Micron
- Easy to Service
- Heavy-duty Construction
- Clear Collection Bowl
- Self-Venting Water Drain
- Installs Quickly



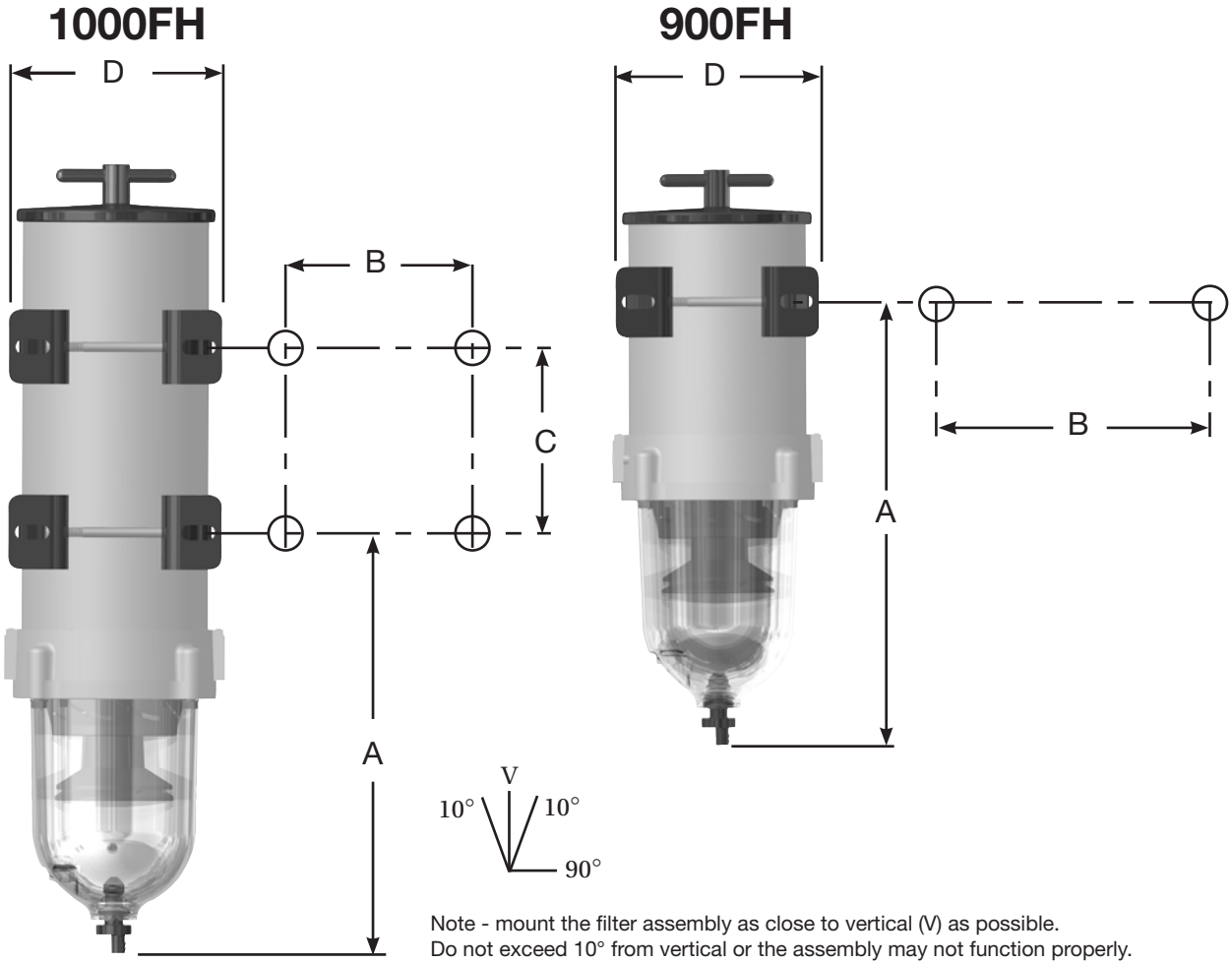
ENGINEERING YOUR SUCCESS.

Table of Contents

Mounting Information	3
Installation Information	4-5
Installation Diagram and Instructions.....	4
Service Instructions	5
Heater Information	6-7
Heater Installation/Wiring	6-7
Heater Relay Kits.....	7
Water Sensor Information	8-9
Installation Diagram	8
Water Detection Kits.....	8
Water Detection Installation.....	9
Electric Primer Pump Information	9
Replacement Parts	10-11
900FH and 902FH.....	10
1000FH and 1002FH	11
Specifications	12-13
900FH and 902FH.....	12
1000FH and 1002FH	13
Troubleshooting	14-15



Mounting Information



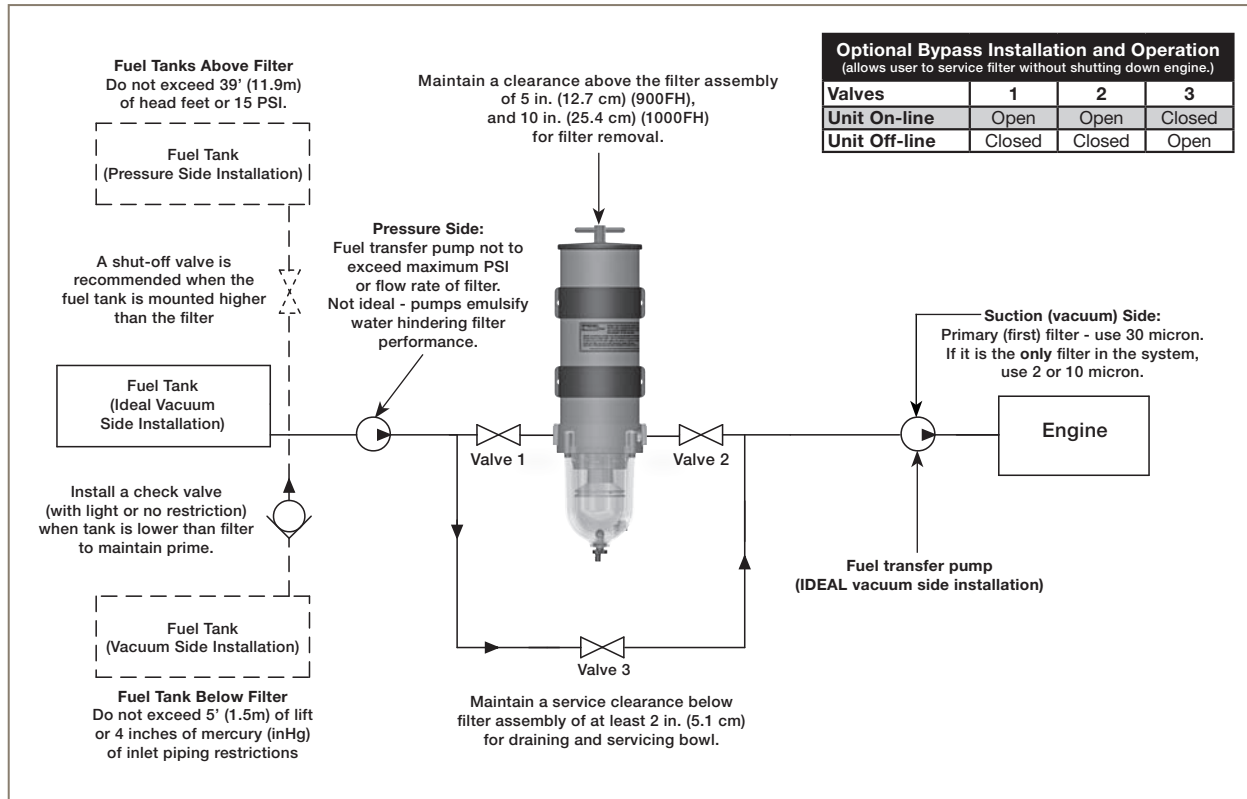
Dimensions	900FH		1000FH	
	in. ¹	cm. ¹	in.	cm.
A	11.0	27.9	10.9 ²	27.7
B	4.5	11.4	4.5	11.4
C	N/A	N/A	5.0 ²	12.7
D	5.8	14.7	5.9	15.0

¹ Mounting Bracket adjustable to 13.5 in. (34.3 cm).

² Brackets are adjustable by ±2.1 in. (5.3 cm).

Note: Fastener size 3/8" (M10) for Mounting brackets.

Installation Diagram



Installation Instructions

Adjustable, one-piece clamp-type mounting brackets (with grade 5 fasteners) are included for ensured durability. The 900FH uses one mounting bracket and 1000FH uses two mounting brackets, both can be adjusted for a secure fit.

The following customer supplied materials should be on hand before beginning installation.

- Shop Towels.
- Diesel Fuel (about 1 gallon).
- Thread Sealant (no thread tapes).
- Parker Super O-Lube (RK 31605) or equivalent.
- Fuel Hose.
- Mounting Hardware (3/8" or M10 fasteners).
- Inlet/Outlet Fittings.

Positioning Filter

- Install Turbine Series filter on vacuum side of fuel transfer pump for optimum water separating efficiency.

Note: See installation diagram above.

- Keep fuel line restrictions to a minimum. Locate filter assembly between horizontal planes of bottom of fuel tank and inlet of fuel pump, if possible. If filter is installed in an application where the fuel tank is higher than the filter, a shut-off valve must be installed between tank and filter assembly INLET. This will be used when servicing replacement filter.

Before Installation

- Obtain good ventilation and lighting.
- Maintain a safe working environment.
- The engine must be off for installation.
- DO NOT smoke or allow open flames near the installation.

Installing Filter

- Completely remove any vacuum side filters in fuel line between fuel tank and fuel pump. This is where filter assembly will be mounted. Leaving these filters in place will add to the fuel line restriction. Filter heads cast

into engine, or that are non-removable, or hard piped should be serviced with a new filter and left in place.

- Keep fuel flow restriction values to a minimum. Always use maximum size fuel hose possible. Do not make sharp bends with flexible fuel hose

as kinks may occur. Avoid use of two 45° elbow fittings where one 90° elbow will work.

- When routing hose, avoid surfaces that move, have sharp edges, or get hot (such as exhaust piping).



Service Instructions

Draining Water

Frequency of water draining is determined by the contamination level of fuel. Inspect or drain collection bowl of water daily or as necessary. Collection bowl must be drained before contaminants reach the top of the turbine or when Water Detection Module (optional) indicates a drain is required.

For Filter On Vacuum Side

1. Close inlet valve (or valve #1) and open self-venting drain on bottom of bowl.
2. Close drain after all water and contaminants have been evacuated - DO NOT leave drain open too long as it will eventually completely drain entire filter of water AND fuel.
3. Follow **Priming Instructions**.

For Filter On Pressure Side

1. Open self-venting drain on bottom of bowl. Head pressure will push any water and contaminants out of drain while keeping filter primed.
2. Close drain after all water and contaminants have been

evacuated - DO NOT leave drain open too long as it will eventually completely drain entire filter of water AND fuel, and possibly drain entire tank.

Filter Replacement

Frequency of filter replacement is determined by contamination level of fuel. Replace filter every 10,000 miles, every 500 hours, every other oil change, when vacuum gauge (optional) reads between 6 to 10 inches of mercury (inHg), if power loss is noticed, or annually, which ever occurs first.

Note - always carry extra replacement filters as one tankful of excessively dirty fuel can plug a filter.

All Applications

1. Bypass filter assembly with bypass valves, if applicable.
2. Remove T-handle and lid.
3. Remove filter by holding bail handles and slowly pulling upward with a twisting motion. Dispose of properly.
4. Replace old lid gasket and T-handle O-ring with new seals (supplied with new filter). Lubricate both seals with clean motor oil or diesel fuel before installation.

5. Refer to **Priming Instructions** otherwise, fill filter with clean fuel, then replace lid and T-handle and tighten snugly by hand only - **do not use tools**.

Note - above ground tanks or transfer pump applications may use head pressure to prime filter.

Priming Instructions

1. Remove T-handle and lid from top of filter.
2. Fill filter with clean fuel.
3. Lubricate lid gasket and T-handle O-ring with clean fuel or motor oil.
4. Replace lid and T-handle and tighten snugly by hand only - **do not use tools**.
5. If applicable, refer to equipment Operator's Service Manual to complete fuel priming procedure.
6. Start engine and check for fuel system leaks. Correct as necessary with engine off and pressure relieved from filter assembly.

Heater Information

RK 11861 and RK 11862 Heater Relay Installation

Note: Heater options are for use with diesel applications only.

In-filter heaters are a cold weather starting aid with an internal automatic thermostat that turns heater ON when fuel temperature drops below 50°F (10°C) and turns OFF when fuel reaches 80°F (27°C). Heat is supplied in the filter assembly just below replacement filter to melt wax crystals and allow fuel to pass through the filter for quick, easy starting.

If you are adding a heater to a filter assembly that does not already have one, refer to installation instructions that come with the heater. Follow directions below to hook up heater wire and leads to your engine.

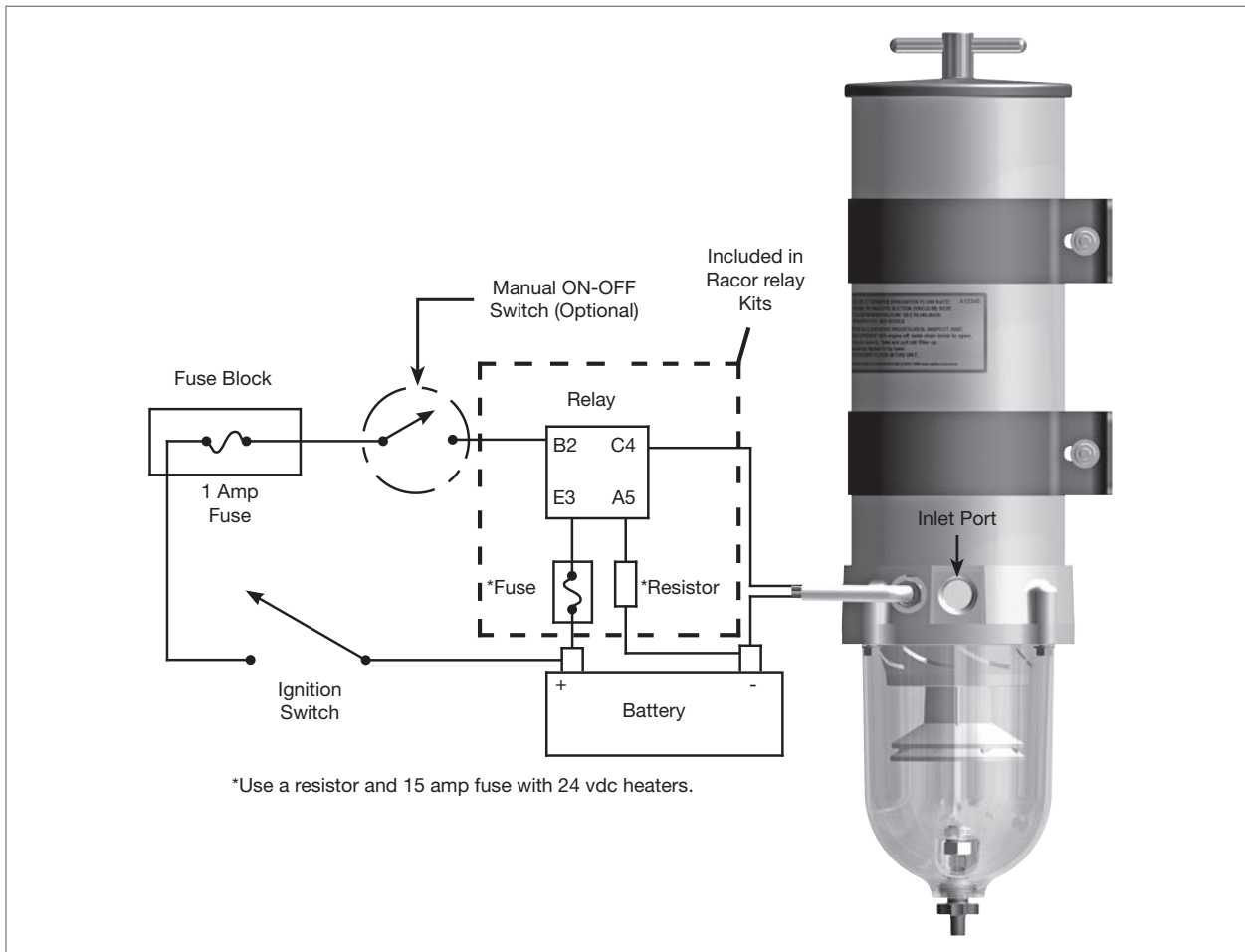
Optional Items

1. Heater power demand is 25 amps for 12 vdc and 13 amps for 24 vdc. Due to power demands, Racor recommends our relay kit for safest method of installation. Racor offers two relay kits available from your Racor distributor. Part numbers are RK 11861 (for 12 vdc) and RK 11862 (for 24 vdc). These kits include an in-line fuse holder (and fuse) and RK 11862 kit also includes a resistor. Use a 25 amp fuse with a 12 vdc system and a 15 amp fuse (and resistor) with a 24 vdc system.

2. A customer supplied ON-OFF toggle switch is recommended to control power to the heater relay. (Cuts power to heater for summer use or servicing procedures.)
3. All wires should be 14 AWG min. (American Wire Gauge).

Installation

1. Either heater wire may be used for Hot (+) or Ground (-).
2. Wire/terminal connections should be soldered and crimped.
3. Run wires in protected locations. Avoid hot surfaces and places that could pinch or rub on wires.



CAUTION

1. Ensure wiring diagram is closely followed and proper safety fuse is used. If fuse should fail, ensure cause is found and corrected prior to using heater again.
2. Prime filter assembly with fuel before applying power to heater.

Note: Never power heater on until fuel is fully primed within filter.

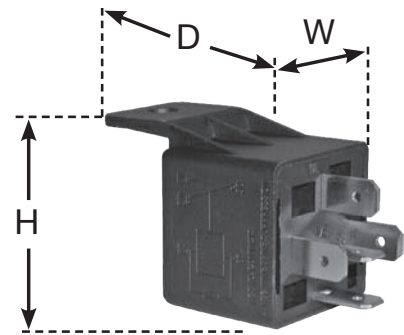
3. During vehicle or equipment servicing always ensure power to heater is shut off to avoid inadvertent heating of fuel in a static condition.
4. Annually, or every 12,000 miles, inspect all wiring for wear or unsafe conditions. Inspect heater for proper operation (at temperatures above 85°F, check

continuity (with power off) across power and ground wires - current should be open - no continuity).

5. For questions or assistance, please call Racor Technical Support at (800) 344-3286 or (209) 521-7860 ext 7555.

Heater Relay Kits

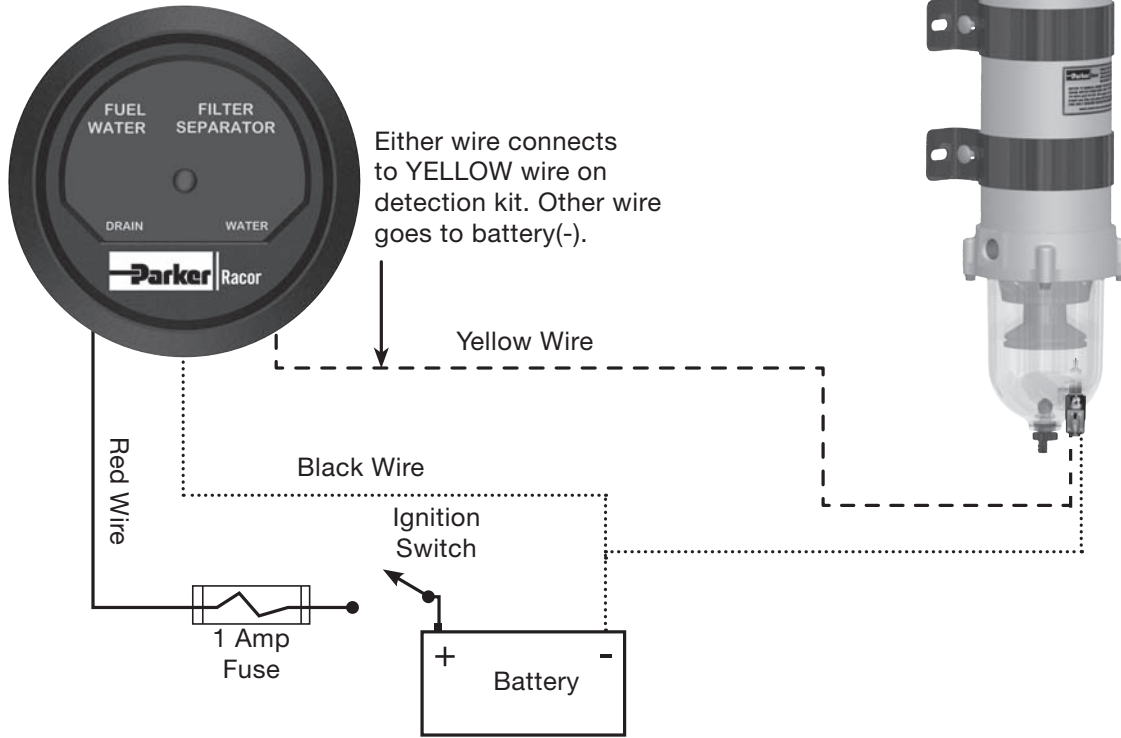
Specifications	RK 11861	RK 11862
Description	Heater Relay Kit, Includes fuse and holder.	Heater Relay Kit, Includes fuse and holder.
Voltage	12 vdc	24 vdc
Detection Module	Remote Mount	Remote Mount
Maximum Watts	300	360
Maximum Amps	25	15
Dimensions	1.3" H x 1.6" D x 1.1" W	1.3" H x 1.6" D x 1.1" W
Weight	0.3 lb (0.1 kg)	0.3 lb (0.1 kg)
Caution: If you are uncertain if your electrical system can provide the additional power draw, consult your equipment dealer or qualified electrician.		



Water Sensor Diagram

RK 20726
Detection Module (Shown)
Other kits available - see below

900FH or
1000FH



Part Number	Description	Voltage	Picture
RK 12870	Under-dash mount. Light and audio. Illuminates and sounds when water is detected. Plastic enclosure measures 1.4" square by 1.25" deep. Power draw is 1 milliamp. Probe included.	12 vdc	
RK 12871	Same as above.	24 vdc	
RK 20726	In-dash mount. Light and audio. Red 'DRAIN' lamp illuminates continuously and horn sounds momentarily when water is detected. Initial power-up self diagnosis feature and circuit protection included. Plastic 2" gauge. Power draw is 3 milliamps for 12 vdc and 13 milliamps for 24 vdc. Probe included.	12 or 24 vdc	
RK 20725	Under-dash mount. Light only. Green 'ON' lamp illuminates with power and red 'DRAIN' lamp illuminates when water is detected. Initial power-up self diagnosis feature and circuit protection included. Plastic enclosure measures 2.75" by 1.0" by 1.5". Power draw is 10 milliamps. Probe included.	12 vdc	
RK 20725-24	Same as above.	24 vdc	

Note: Detailed installation instructions supplied with each kit.

Water Detection Kits

Installing Optional Water Detection Components

Detection Modules

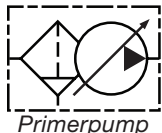
Racor water detection modules are available in a wide selection for various installation requirements. Under dash, in-dash, and remote mount, these solid-state units may be used with any Racor water sensor. They are manufactured using the highest quality materials and are all 100% electronically tested.

An electronic detection module analyzes electrical resistance at the water sensor and determines if water is present. If so, the detection module operates to indicate water, based on its features listed below. All units reset automatically after water is removed (unless specified). Below are some of our more popular modules, others are available. **Note:** Racor electrical options are for use with diesel applications **only**.

Water Sensor

All water sensors must be used with a special Racor Electronic Detection Module to function properly. Due to variety of detection modules available, they are sold separately and installation instructions are supplied with each kit. See chart below for part numbers and descriptions.

1. Completely drain filter assembly.
2. Take out water sensor plug on side of clear bowl and discard properly.
3. Lubricate water sensor O-ring with Parker Super O-lube (RK 31605) or equivalent.
4. Thread water sensor into probe port on side of clear bowl. Tighten snugly.
5. Attach detection module to wire leads of water sensor. Specific instructions for this step are included with each detection module.
6. Prime filter by filling with fuel.
7. Start engine and check for leaks. Correct as necessary with engine off.



Primerpump

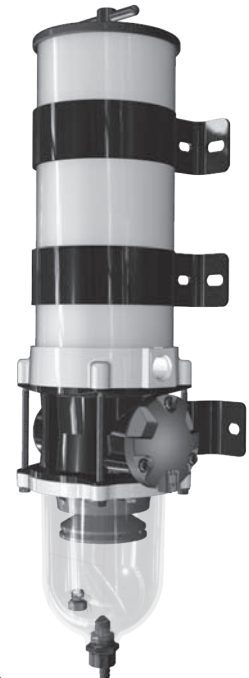
Electric Primer Pump

RKP1912 (12 volt) and **RKP1924** (24 volt)

Primer pump kits are an innovative and proprietary system consisting of a pre-screen filter, a flow by-pass circuit, and a roller cell pump powered by a 12 VDC brushed motor or a 24 VDC brushless motor.

When the switch is activated the fuel is drawn into the pre-screen, then pumped through the housing, refilling the unit with fuel. When not in use the primer pump system is by-passed and the fuel filter/water separator functions normally.

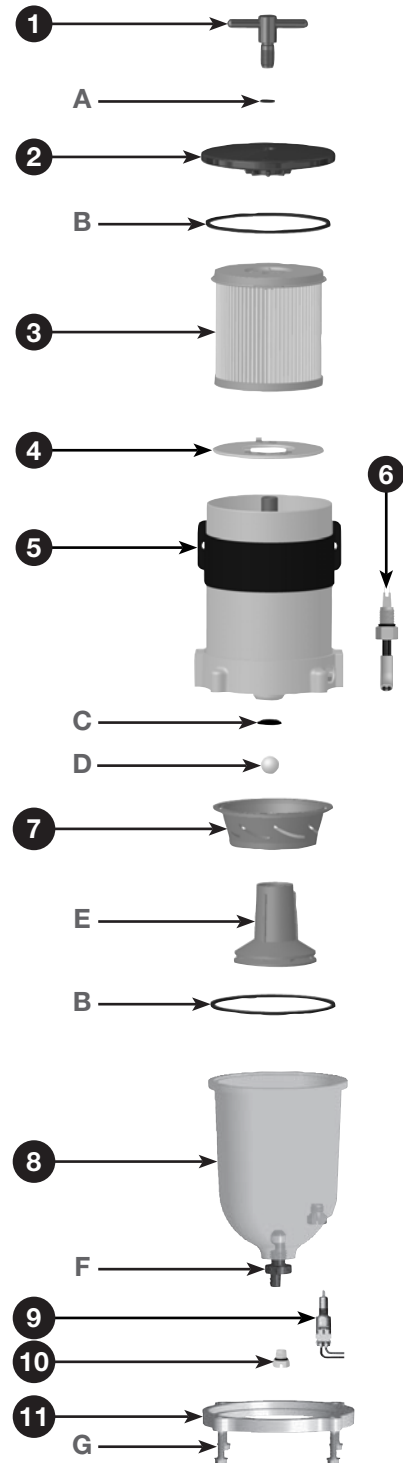
- **Pump adds only 3.3 in. (8.4 cm) to the over all assembly height.**
- **60 GPH (227 LPH) flow rate while in priming mode.**
- **12 VDC brushed electric motor.**
- **24 VDC brushless electric motor.**
- **100 micron pre-screen.**
- **Kit includes wiring harness and controller switch.**
- **Allows for electric re-priming of filter and fuel system.**
- **Not for use in continuous duty applications.**



Replacement Parts

900FH and 902FH

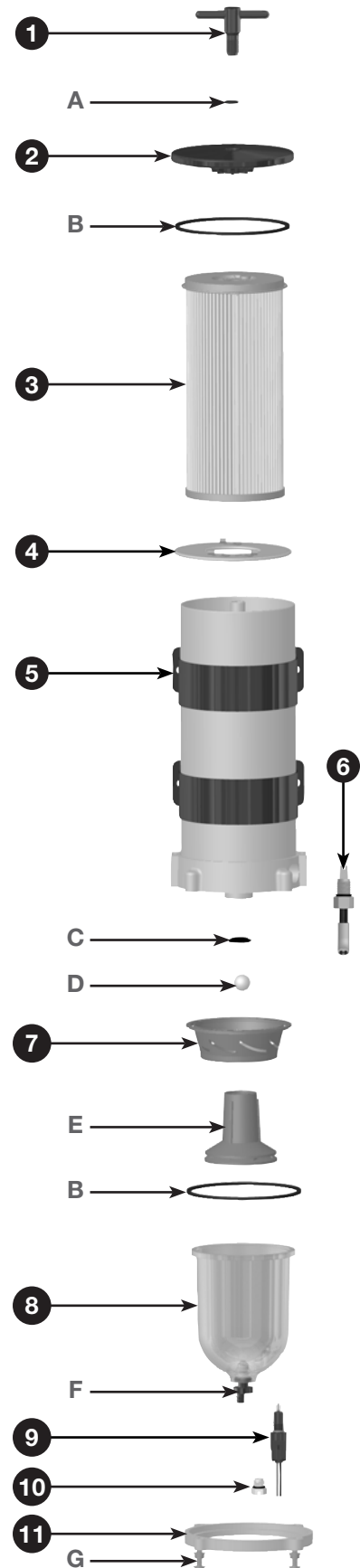
	Part No.	Description
1.	RK 11-1945	T-handle and O-ring Kit (includes A)
2.	RK 11-1927-01	Lid Kit (includes B)
3.	2040SM-OR	Replacement Filter (2 Micron) (includes A & B)
	2040TM-OR	Replacement Filter (10 Micron) (includes A & B)
	2040PM-OR	Replacement Filter (30 Micron) (includes A & B)
4.	RK 11-2002	12 vdc, Heater Body Feed-thru Kit (includes A, B, & 6)
	RK 11-2001	24 vdc, Heater Body Feed-thru Kit (includes A, B, & 6)
5.	RK 11815-103	Mounting Bracket Kit
6.	RK 21067	Body Feed-thru Heater Assembly Kit
	RK 11-1679	Body Feed-thru Plug Kit
7.	RK 11-1939	Conical Baffle and Turbine Centrifuge Kit (includes B, C, D, & E)
8.	RK 11-1938	See-thru Bowl with Drain and Plug Kit (includes B, F, & 10)
9.	RK 32204	Water Sensor Kit
10.	RK 20126	Bowl Plug Kit
11.	RK 11037A	Bowl Ring (includes B & G)
G.	RK 11542	Cap Screw Kit
Additional Parts (not shown)		
	RK 11-1952	Complete Seal Service Kit



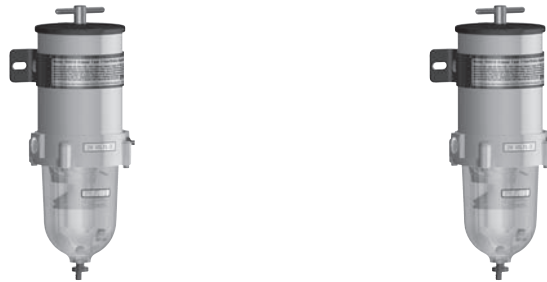
Replacement Parts

1000FH and 1002FH

	Part No.	Description
1.	RK 11-1945	T-handle and O-ring Kit (includes A)
2.	RK 11-1927-01	Lid Kit (includes B)
3.	2020SM-OR	Replacement Filter (2 Micron) (includes A & B)
	2020TM-OR	Replacement Filter (10 Micron) (includes A & B)
	2020PM-OR	Replacement Filter (30 Micron) (includes A & B)
4.	RK 11-2002	12 vdc, Heater Body Feed-thru Kit (includes A, B, & 6)
	RK 11-2001	24 vdc, Heater Body Feed-thru Kit (includes A, B, & 6)
5.	RK 11815-103	Mounting Bracket Kit
6.	RK 21067	Body Feed-thru Heater Assembly Kit
	RK 11-1679	Body Feed-thru Plug Kit
7.	RK 11-1939	Conical Baffle and Turbine Centrifuge Kit (includes B, C, D, & E)
8.	RK 11-1938	See-thru Bowl with Drain and Plug Kit (includes B, F, & 10)
9.	RK 32204	Water Sensor Kit
10.	RK 20126	Bowl Plug Kit
11.	RK 11037A	Bowl Ring (includes B & G)
G.	RK 11542	Cap Screw Kit
Additional Parts (not shown)		
	RK 11-1952	Complete Seal Service Kit



Specifications



	900FH	902FH
Maximum Flow Rate:	90 GPH (341 LPH)	90 GPH (341 LPH)
Port Size	7/8"-14 UNF (SAE J1926) (female threads)	22M X 1.5 (female threads)
Min. Service Clearance: <i>Above Assembly</i> <i>Below Assembly</i>	7.5 in. (19.1 cm) 2.0 in (5.1 cm)	7.5 in. (19.1 cm) 2.0 in (5.1 cm)
Replacement Filter: (2 micron) (10 micron) (30 micron)	(1 Per Assembly) 2040SM-OR 2040TM-OR 2040PM-OR	(1 Per Assembly) 2040SM-OR 2040TM-OR 2040PM-OR
Height	17.0 in. (43.2 cm)	17.0 in. (43.2 cm)
Depth	7.0 in. (17.8 cm)	7.0 in. (17.8 cm)
Width	6.0 in. (15.2 cm)	6.0 in. (15.2 cm)
Weight (dry)	6.0 lb (2.7 kg)	6.0 lb (2.7 kg)
Clean Pressure Drop	0.30 PSI (0.021 bar)	0.30 PSI (0.021 bar)
Maximum Pressure¹	15 PSI (1.03 bar)	15 PSI (1.03 bar)
Water In Bowl Capacity:	10.3 oz (305 ml)	10.3 oz (305 ml)
Available Options: (water detection kit) ² (12 or 24 vdc heater) ² (vacuum gauge) (12 or 24 vdc primer pump)	Yes Yes Yes Yes	Yes Yes Yes Yes
Water Removal Efficiency	99%	
Ambient Temperature Range	-40° to +255°F (-40° to +124°C)	
Maximum Fuel Temperature	190°F (88°C)	
¹ Pressure installations are applicable up to the maximum PSI shown. Vacuum installations are recommended. ² Not for use on gasoline applications. Note: Units with 1/2" NPT ports are available, contact the factory.		

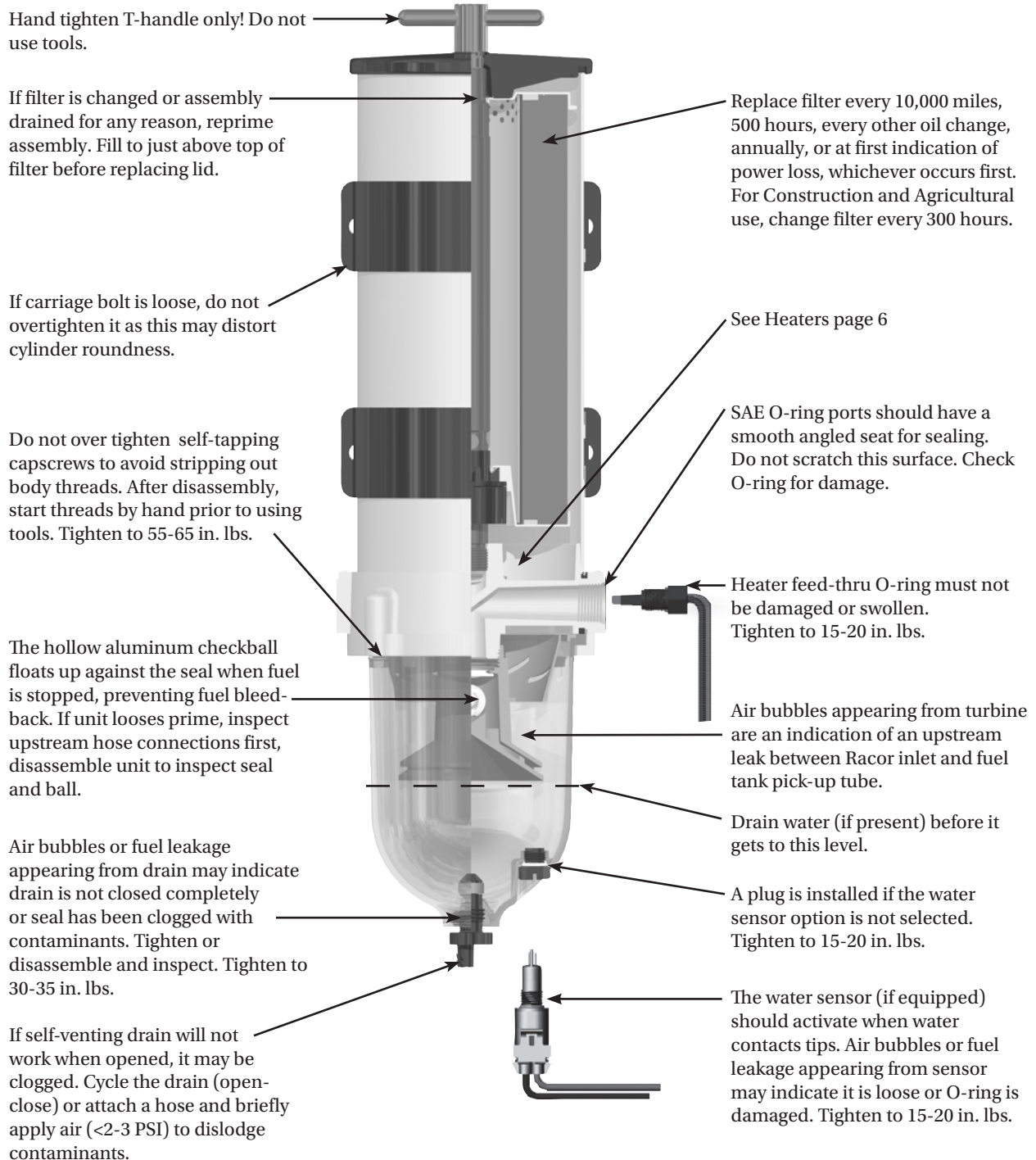
Specifications



	1000FH	1002FH
Maximum Flow Rate:	180 GPH (681 LPH)	180 GPH (681 LPH)
Port Size	7/8"-14 UNF (SAE J1926) (female threads)	22M X 1.5 (female threads)
Minimum Service Clearance: (Above Assembly) (Below Assembly)	10.0 in. (25.4 cm) 2.0 in. (5.1 cm)	10.0 in. (25.4 cm) 2.0 in. (5.1 cm)
Replacement Filter: (2 micron) (10 micron) (30 micron)	(1 Per Assembly) 2020SM-OR 2020TM-OR 2020PM-OR	(1 Per Assembly) 2020SM-OR 2020TM-OR 2020PM-OR
Height	22.0 in. (55.9 cm)	22.0 in. (55.9 cm)
Depth	7.0 in. (17.8 cm)	7.0 in. (17.8 cm)
Width	6.0 in. (15.2 cm)	6.0 in. (15.2 cm)
Weight (dry)	10.0 lb (4.5 kg)	10.0 lb (4.5 kg)
Clean Pressure Drop	0.43 PSI (0.03 bar)	0.43 PSI (0.03 bar)
Maximum Pressure¹	15 PSI (1.03 bar)	15 PSI (1.03 bar)
Water In Bowl Capacity:	10.3 oz (305 ml)	10.3 oz (305 ml)
Available Options: (water detection kit) ² (12 or 24 volt dc heater) ² (vacuum gauge) (12 or 24 vdc primer pump)	Yes Yes Yes Yes	Yes Yes Yes Yes
Water Removal Efficiency	99%	
Ambient Temperature Range	-40° to +255°F (-40° to +124°C)	
Maximum Fuel Temperature	190°F (88°C)	
¹ Pressure installations are applicable up to the maximum PSI shown. Vacuum installations are recommended. ² Not for use on gasoline applications.		

Troubleshooting

Damaged, worn, or dirty seals will allow air ingestion. Inspect and replace all seals as needed. Clean the sealing surfaces of dirt or debris every time the filter is replaced.



Troubleshooting

Note - Correct external fuel leaks immediately! These conditions will result in reduced engine performance such as: hard starting, stalling, reduced power, and other associated problems.

New filter installations must be filled with fuel and fuel system must be adequately primed following the **engine manufacturer's recommendations**, if applicable. Existing installation difficulties are usually associated with improper priming procedures or damage to the unit or fuel system. The result is either internal air suction or external fuel leakage. Diagnosis should be in these following steps:

1. Check fuel tank level and make sure any fuel delivery valves are in open position, as applicable.
2. Ensure T-handle, bowl fasteners, and fuel fittings are tight. Also verify that bowl drain is closed.
3. If filter is new, check potential restriction at fuel tank draw tube. An in-tank strainer may be plugged.

Correct Application - It is very important that filter is not 'under specified' for the application. The maximum fuel flow rating of filter must not be exceeded. Doing so will reduce efficiency and de-gas (pull air from) fuel.

Filter - Replacement filters are available in 2, 10, and 30 micron ratings. Filtration needs are based on application, fuel quality, maintenance schedules, and operating climates. A simple rule to remember is - the finer the filtration, the more frequent the filter change. *Always carry extra replacement filters with your equipment as one tankful of excessively contaminated fuel can plug a filter.* When clogged to the maximum capacity, filters will

have a brown to black color or tar like contaminants may be present - this is normal. An appearance of a multi-colored slime (which may have a foul odor) is an indication of microbiological contamination. This condition must be treated immediately.

Severe conditions must be corrected by a repair facility.

Note - Never operate without the filter in place - the filter safety valve will not expose outlet hole on fuel return tube if filter is removed. Instead, punch emergency tab on the top of filter and leave in place. Puncturing emergency tab will bypass all filtration and send unfiltered fuel to your engine. Service filter as soon as possible to avoid harmful contaminants flowing downstream to engine.

Water Sensors - This feature alerts operator of a high-water condition. The bowl is then drained of water at earliest convenience. Note - a Racor water detection module is needed to work with the in-bowl sensor. The unit should activate when water reaches sensor tips (and when they measure between 47,000 and 100,000 ohms of resistance, depending on detection module used.) If not, tips may be fouled with a coating. Remove water sensor and clean tips with a cloth. Run a jumper wire between tips with ignition ON to test system. Difficulties usually lie in the wire connections, power source, or an independent ground.

Heaters - In-filter heaters are starting aids only, but may be left on during cold operations. The 300 watt heater is an extremely reliable option, but MUST be powered via a relay switch due to initial amperage surge at start-up: 25 amps at 12 vdc and

12.5 amps at 24 vdc. They do not activate unless the fuel is below 50°F (10°C) and automatically deactivate at 80°F (28°C).

Heater Testing - Heaters can only be tested when the thermostat is closed (fuel temperature is below 50°F or 10°C). With a voltmeter attached to external wiring, and engine off, power should drop when heater is switched on. (Option - remove heater and place it in a freezer until the temperature is under 50°F (10°C). Remove heater and repeat the above test).

All Racor FH filter assemblies are 100% tested to ensure a leak-proof, quality product.

Note - Correct external fuel leaks immediately! In the event difficulties are experienced with your filter assembly or a problem appears to prevent the engine from running smoothly, refer to the procedures on the previous page. **Note** - Apply Parker Super O-lube (part number RK 31605) or equivalent to all seals at major attachment points to maintain integrity, seal elasticity, to fill small voids, and to provide protection from degradation.

Perform all checks with engine OFF (and applicable valves closed). For replacement parts, refer to the Replacement Parts section of this manual.



Limited Warranties Statement

All products manufactured or distributed by Racor are subject to the following, and only the following, LIMITED EXPRESS WARRANTIES, and no others: For a period of one (1) year from and after the date of purchase of a new Racor product, Racor 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. The warranty period for pumps and motors is specifically limited to ninety (90) days from date of purchase. A product claimed to be defective must be returned to the place of purchase. Racor, 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 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 SPECIFICALLY DISAVOWS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED INCLUDING, WITHOUT LIMITATION, ALL WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE (EXCEPT FOR THOSE WHICH APPLY TO PRODUCT OR PART THEREOF THAT IS USED OR BOUGHT FOR USE PRIMARILY FOR PERSONAL, FAMILY, OR HOUSEHOLD PURPOSES), WARRANTIES OF DESCRIPTION, WARRANTIES OF MERCHANTABILITY, TRADE USAGE OR WARRANTIES OR TRADE USAGE.

Warning

Failure or improper selection or improper use of the products and/or systems described herein or related items can cause death, personal injury and property damage. This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product

and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the applications are met. The products described herein, including with limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

The following statement is required pursuant to proposition 65, applicable in the State of California: 'This product may contain a chemical known to the State of California to cause cancer or reproductive toxicity'