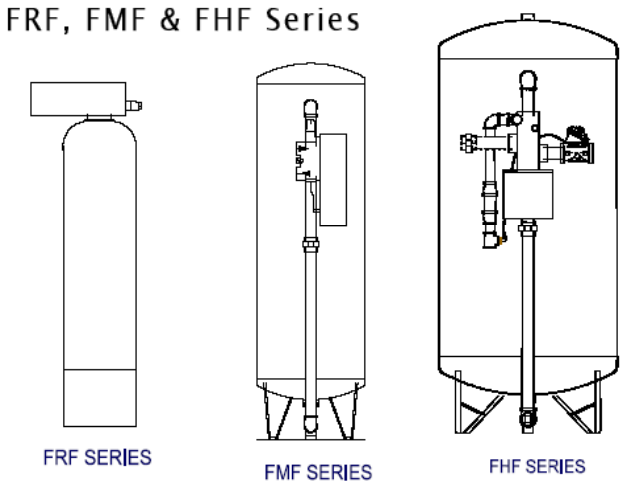
FRF, FMF, FHF FILTERS



FRF series filters. Polyglass 100 psi vessels with top mount Task Master II™ 1 ½ " valve and single point PVC internals.

FMF series filters. Carbon steel epoxy lined and coated vessels with side Task Master II™ 1 ½ " valve side and multipoint PVC internals.

FHF series filters. Carbon steel epoxy lined and coated vessels with side Task Master™ 2 " valve side and multipoint PVC internals.

OPTIONS

BACKWASH INITIATION may be manual, by time clock, by water meter, or by differential pressure transducer.

AUXILIARY BACKWASH may be supplied to feed systems with higher backwash flow demand than available when using filtered water from the systems.

SKID MOUNTED units on welded structural steel frames are pre-piped, wired, and factory tested. Installation requires simple plumbing connections to the manifold inlet and outlet, a drain and brine connection, electrical connection, and loading of the tanks. Skids may be custom-built to meet almost any specifications.

LOCKOUTS prevent twin or multiple units from backwashing at the same time. Inter-connecting wiring between the two units prevents simultaneous backwash.

SHUT-OFF KITS (SOK) prevent unfiltered water by pass during backwash cycles. The kit consists of a solenoid and diaphragm valve located on the outlet line and connected to the Task Master II™ control wiring. The diaphragm valve is automatically closed during regeneration. This option is required on twin alternating applications. (Part No. 720088 for a 1½ inch SOK.)

PRESSURE GAGES AND TEST TAPS can be installed by requesting special taps be made in the valve body. Upon request the valve body can be tapped to accept inlet and outlet pressure gages and inlet and outlet sample taps. This allows the user to sample the inlet and outlet water quality and to monitor pressure losses through the system.

ELECTRICAL REQUIREMENTS. Standard electrical specifications are 120 VAC, 60 Hz, 3 amps. A 220 VAC, 50 HZ, 1.5 amp configuration is available.

Filtration Cycles

- **SERVICE.** Filters the water flows downward through the media and is clarified. The solids accumulate in the media bed.
- **BACKWASH.** When the filter begins to clog or when the head loss though the bed increases, flow rates are dramatically reduced and often solids "break through" the filter and water quality deteriorates. To clean the filter bed, the flow is reversed, fluidizing the media bed, and is directed to drain. The flow required is specific to the media. If too much flow is applied, the bed can be flushed from the tank and if too little flow is applied, the bed will not fluidize properly and will not be cleaned. Improper cleaning leads to mud ball formation and channeling in the filter. The FRF, FMF, and FHF Series all use nozzle type backwash rate-of-flow controllers. Backwash is made possible by shifting the Task Master™ or Task Master II™ multiport valve so that it allows the water to enter the bottom of the filter tank and flow upward through the media bed, thus backwashing filtered solids to drain.
- **FILTER TO WASTE.** When a filter is returned to service after backwash, the initial effluent solids concentration from the filter is high. The bed must be repacked and begin to remove some particulates before it can become effective. Thus, the first few gallons of a filter run are usually wasted. This part of the cycle is called filter to waste.

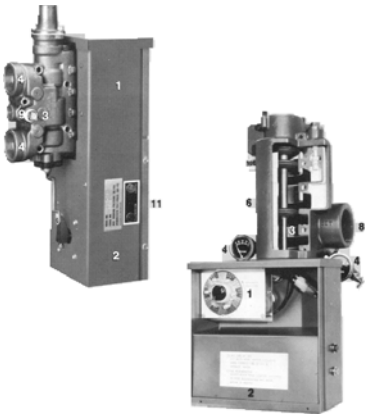
Water King filters based on the Taskmaster™ Valve

- Water King builds a complete line of filters using the Taskmaster™ valve to control and execute the backwash cycle. These filters designated FRF, FMF, and FHF to denote the configuration.
- This brochure covers the vessel and valves and provides an application chart.

FILTER CONTROLS

- **TIME CLOCK.** Most filters are set to backwash daily or every other day with standard 6 – day timers. To backwash on a given day of the week use a 7 – day timer.
- **DIFFERENTIAL PRESSURE.** As a filter run progresses, the filter becomes clogged developing pressure loss across the bed. A differential pressure gauge placed between the filter inlet and outlet measures this head loss. Each filter can be equipped with an ARC cycle timer with backwash initiation by the differential pressure switch.

MULTIPLE FILTERS. Filters operating in parallel all clog simultaneously and thus must be backwashed at the same time or sequentially. Water King often supplies multiple filters with a lead unit having a time clock and the remaining units having ARC timers. These can be set up to cause sequential backwash at a predetermined interval.



TASKMASTER™ VALVE IN FILTRATION SERVICE

1. **THE PRECISION "MEMORY SYSTEM"** by Water King controls time clock or semi-automatic operation. Water meter regeneration by totalized flow is also available. The valve design keeps timer and valve synchronized. Patent No. 3732738.
2. **MOTOR DRIVEN OPERATION** is not dependent on water pressure, and shifts smoothly without water hammer. The drive assembly accurately and consistently positions the plunger for each cycle.
3. **RAW WATER BY-PASS** up to 70 gpm on the FRF & FMF series, and 150 gpm on the FHF series is available during all regeneration cycles.
4. **THREADED TAPS** at the inlet and outlet ports provide easy installation of test taps and pressure gauges.
5. **EVERY VALVE IS TESTED TWICE.** Valves are hydrostatically pressure tested after initial assembly and then tested again as part of the completed filter.
6. **ALL BRASS CONSTRUCTION** in the valve body provides corrosion resistance. The valve has only one moving part – the plunger.
7. **NEMA 3 ENCLOSURES** provide rainproof protection of electrical components.
8. **ALL PLUMBING** is made up to the tank adapter (FHF only).
9. **INJECTOR SYSTEM** (requried only on greensand filters) controls the injection of potassium permanganate in FRF greensand filters models 50 through 150. On other filters that do not feed chemicals, the injector port is plugged. Larger greensand filters use chemical injection pumps.
10. **ELECTRICAL SYSTEM** is designed to provide on/off signal for external electrical functions.
11. **SERVICE & REGENERATION** lights indicate service or backwash in filter applications.

CAT 500.4
FRF Series Filter Specification

Mineral Tank. The mineral tank shall be "polyglass" consisting of an inner shell of virgin polyethylene and an external shell of continuous fiberglass roving. Tanks shall be rated at 150 psi operating pressure, 120ºF operating temperature with 4"-8 UN threaded top opening.

Internals. The distributor shall be a 2½" Ø single point molded distributor head with 2½" of slotted length and a 1½ inch female socket welded connection. The slots shall be 0.012" - 0.016" wide to retain mineral and the total slot area shall be equal to or larger than the unit pipe size. The distributor pipe shall be 1½ inch schedule 40 white PVC.

Filtration Media. The media shall be supplied as per the application chart. Backwash rate shall match the media.

Underbedding. The bottom of this mineral tank shall be filled above the distributor with #20 graded washed flint gravel sieved between 1/8" and 1/16".

Control Valve. The main control valve(s) shall be the Task Master II™ controlled by a time clock to actuate the cycles of backwash, brine, slow rinse, fast rinse, and service. The control valve(s) shall be Task Master II™ 5-Cycle, 100 psi, multi-port control valve(s) with machined brass body, stainless steel piston assembly, Noryl® inserts, Buna-N seals, service and regeneration lights, drive motor assembly, and NEMA 3 enclosure (120VAC/60Hz/3Amps). The valve shall operate with a single motor driven, cam positioned, piston. The valve shall be of a single piston design and not use multiple plungers or diaphragm valves. Each control valve shall be equipped with "Service" and "Regeneration" indicator lights. The valve shall be equipped with threaded ¼" FNPT ports for the installation of sample taps and pressure gauges. (Taps and gauges are optional.) Unfiltered water by-pass shall be available during all regeneration cycles at 70 gpm or at the peak flow rate of the unit, at a pressure drop less than 25 psi, whichever is less. Simplex units shall bypass during backwash unless optional shut off kits are provided.

MF Series Filter Specification

Mineral Tank (Standard Non Code Vessels). The non-code vessel shall be A36 carbon steel or better rated at 100 psi working pressure designed to a factor of safety of 3.0. The inlet and outlet shall be 3000 psi NPT full couplings. The inlet shall be in the side wall and the outlet shall be in the center of the tank bottom shell. Each tank shall have a top center fitting. Tanks 36" Ø and larger shall have lifting lugs. Tanks 20, 24, and 30" Ø inch tanks shall have a 4" x 6" handhole in the side shell and in the top head. Tanks 36" Ø and larger shall have a 4" x 6" handhole in the top dome and an 11" x 16" or larger manway in the side shell.

Mineral Tank (Optional Code Vessels). ASME code stamped tanks shall be available. Tank shall be clearly specified as code or non-code with a specified working pressure. Tanks "built to ASME code but not stamped" shall not be acceptable as ASME code. An ASME U1 form shall be provided with each ASME code tank.

Coating and lining. Tanks shall be prepared for internal and external coating with a SPCC 11 near white sand blast. Internal and external coating shall be two - 3 to 4 mill coats of white Series 20 Tnemic Epoxy. Paint shall be applied according to manufacturer's recommendations. Paint reports and mill thickness reports shall be provided if requested at the time the tank is ordered.

Internals. The bottom distributor shall be a multipoint system using 2½" Ø single point molded distributor heads with 2½" of slotted length and a 1½ inch NPT female threaded connection. The slots shall be .012" - .016" wide to retain mineral and the total slot area shall be equal to or larger than the unit pipe size. A top dome splash distributor with an opening equal to or larger than the unit pipe size shall be installed in the mineral tank. The internal distributor piping shall be SCH 80 PVC.

Media. The media shall be supplied as per the application chart. Backwash rate shall match the media.

Piping. Face piping shall be 1 ½" threaded schedule 40 galvanized carbon steel pipe.

Control Valve. (Same as FRF only side mounted on a brass tank adaptor.)

Operating Conditions. Maximum temperature shall be 100°F. Pressure shall be 25 to 100 psi.

Other items. A standard soft water soap test kit shall be provided. A complete set of instructions, including installation, loading, start-up, adjustments, servicing, and a parts list shall be provided with the equipment.
Qualifications. A company that has continuously manufactured water softeners for at least twenty (20) years shall construct this equipment.
Pressure gauge and test tap kit. A kit containing two liquid filled, stainless steel pressure gauges with 2 ½" Ø face, two brass ball valve sample taps with hose barb connections and associated brass connection fittings shall be provided for mounting in the 1/4" FNPT predrilled and tapped ports in the inlet and outlet of the Task Master II valve.

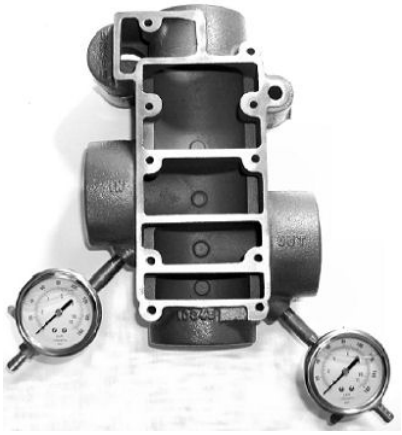
FHF Series Filter Specification

Mineral Tank. 100 psi non code pressure vessels which are the same as the FMF.
Mineral Tank (Optional Code Vessels). ASME code vessels are available which are the same as FMF.
Coating and lining. Epoxy lined and coated vessels are same as FMF.
Internals (HF-150, 20"Ø to HF-900, 42" Ø). Slotted multipoint internals are the same as FMF.
Media. The media shall be supplied as per the application chart. Backwash rate shall match the media.
Face Piping. The piping connecting the tank to the tank adaptor and valve shall be 2" or 2 ½" SCH 40 galvanized steel pipe with NPT fittings.
Control Valve. The main control valve(s) shall be the 2" or 2 ½" Task Master™ controlled by a time clock to actuate the cycles of backwash, brine, slow rinse, fast rinse, and service. The control valve(s) shall be 100 psi, multi-port control valve(s) with machined brass body, stainless steel piston assembly, Noryl® inserts, Buna-N seals, service and regeneration lights, drive motor assembly, and NEMA 3 enclosure (120VAC/60Hz/3Amps). The valve shall operate valve.

with a single motor driven, cam positioned piston. Maximum operating pressure of the valve shall be 80 psi. The valve shall be of a single piston design and not use multiple plungers or diaphragm valves. Each control valve shall be equipped with "Service" and "Regeneration" indicator lights. The valve shall be equipped with threaded ¼" FNPT ports for the installation of sample taps and pressure gauges. (Taps and gauges are optional.) Hard water by-pass shall be available during all regeneration cycles at 70 gpm or at the peak flow rate of the unit, at a pressure drop less than 25 psi, whichever is less. The valve shall be mounted to the piping using a tank adaptor and shall be removable without disturbing the installed piping.

Specifications common to all filters

Operating Conditions. Maximum temperature shall be 100°F. Pressure shall be 25 to 100 psi.
Other items. A standard soft water soap test kit shall be provided. A complete set of instructions, including installation, loading, start-up, adjustments, servicing, and a parts list shall be provided with the equipment.
Qualifications. A company that has continuously manufactured water softeners for at least 20 years shall construct the equipment.
Pressure gauge and test tap kit. A kit containing two liquid filled, stainless steel pressure gauges with 2 ½" Ø face, two brass ball valve sample taps with hose barb connections and associated brass connection fittings shall be provided for mounting in the 1/4" FNPT predrilled and tapped ports in the inlet and outlet of the Task Master II.



CAT 500.6

FILTER APPLICATION TABLE

GENERAL SPECIFICATIONS. APPLIES TO ALL TYPES OF MEDIA.

Model	Dia. (in.)	Side Sheet	Bed Area ($ft.^2$)	Pipe (in.)	Media (ft^3)	Underbed (ft^3)	Width (in.)	Depth (in.)	Height (in.)
FRF 50	12	52	0.79	1 ½	1.50	0.25	18	12	59
FRF 70	13	54	0.92	1 ½	2.00	0.30	18	13	61
FRF 100	14	65	1.07	1 ½	3.25	0.35	18	14	72
FRF 120	16	65	1.40	1 ½	4.00	0.55	18	15	72
FRF 150	21	62	2.40	1 ½	5.00	2.00	22	21	69
FMF 240	24	54	3.14	1 ½	8.00	2.50	24	35	71
FHF 300	30	60	4.90	2	10.00	3.00	30	44	81
FHF 600	36	60	7.10	2	20.00	4.00	36	50	83
FHF 900	42	72	9.60	2	30.00	5.00	42	57	99

HEAD LOSS IN PSI AT 5 GPM/FT²

MODEL	Continuous Flow rate at 5 (gpm/ft^2)	Fine Sand	Filter AG	Activated Carbon	Green Sand	Multimedia	Continuous flow rate at 15 (gpm/ft^2)
FRF 50	3.9	4.0	0.6	0.5	1.0	5	11.8
FRF 70	4.6	6.3	0.8	0.7	1.9	7	13.8
FRF 100	5.4	6.5	1.0	0.9	2.1	7	16.0
FRF 120	7.0	7.3	1.2	1.2	2.4	8	21.0
FRF 150	12.1	7.0	2.3	2.3	2.8	9	36.0
FMF 240	15.7	8.5	2.7	2.7	3.5	10	47.1
FHF 300	24.5	8.1	0.8	0.8	2.4	10	73.5
FHF 600	35.4	8.4	1.8	1.8	2.8	10	106.5
FHF 900	48.1	10.2	2.5	2.7	4.0	10	144.0

BACKWASH RATE IN GPM

MODEL	Fine Sand	Filter AG	Activated Carbon	Green Sand	Multimedia
FRF 50	8	5	5	8	8
FRF 70	10	8	8	10	15
FRF 100	15	10	10	15	15
FRF 120	15	12	12	15	20
FRF 150	30	20	20	30	35
FMF 240	35	25	25	35	50
FHF 300	60	40	40	60	75
FHF 600	90	60	60	90	100
FHF 900	115	90	90	115	140

SHIPPING WEIGHT IN POUNDS

MODEL	Fine Sand	Filter AG	Activated Carbon	Green Sand	Multimedia
FRF 50	260	145	145	240	295
FRF 70	300	150	155	270	355
FRF 100	405	200	205	360	496
FRF 120	550	250	255	500	570
FRF 150	830	450	460	760	900
FMF 240	1390	790	800	1290	1485
FHF 300	1850	1100	1140	1725	2285
FHF 600	3375	1875	1930	3125	3200
FHF 900	4975	2725	2820	4590	4250

COMPONENTS FOR MULTI MEDIA FILTERS (FT^3)

Model	No. 1 Anthracite	.45-.55 mm Sand	30/40 Garnet	8/12 Garnet
FRF 50	0.85	0.56	0.28	0.17
FRF 70	1.25	0.75	0.40	0.25
FRF 100	1.50	1.00	0.50	0.30
FRF 120	2.00	1.50	0.75	0.40
FRF 150	3.00	2.00	1.00	0.50
FMF 240	4.50	3.00	1.50	1.00
FHF 300	7.00	5.00	2.50	1.50
FHF 600	10.00	7.00	4.00	2.00
FHF 900	14.00	9.50	4.50	2.50

NOTES:

- Continuous flow rates at 5 gpm/ft^2 for all except multimedia, which is rated at 15 gpm/ft^2
- Peak flow rating is 10 gpm/ft^2.
- Flow rates in gpm.
- Make certain sufficient backwash flow is available.
- Specifications listed are not skid mounted systems. Skid dimensions - given upon request.

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