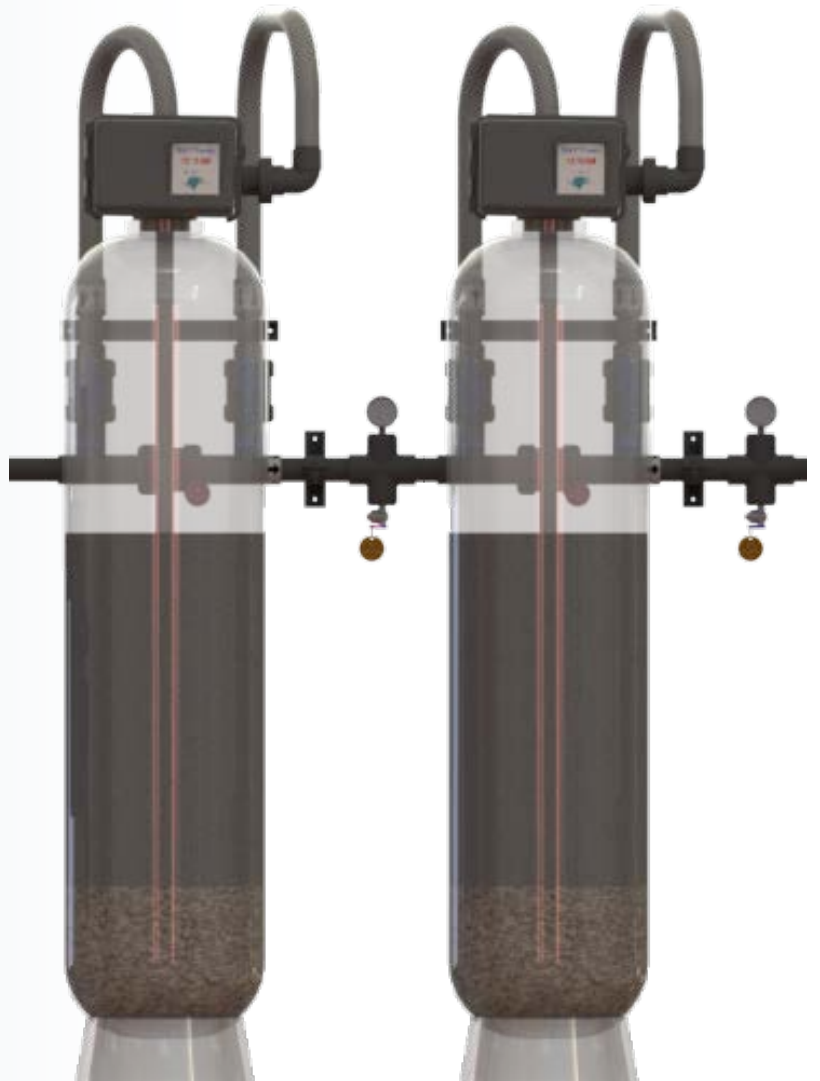


# Operation Manual



## Carbon Filtration

1020 Industrial Drive, Orinda, TN 37141

615-654-4441

sales@specialtyh2o.com

615-654-4449 fax



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**Section 1.1****WARNINGS AND CAUTIONS****WARNINGS**

- Read this manual in its entirety before operating the Carbon Filtration System.
- Misuse, improper operation, and/or improper monitoring of this equipment could result in serious injury, death, or other serious reactions to the end users of the equipment.

**CAUTIONS**

- When used as a medical device, Federal law restricts this device to sale by or on the authority of a physician. Per CFR 801.109 (b)(1).
- It is the responsibility of the governing body of the facility to ensure that all applicable regulations regarding the installation and operation of this system are observed.
- Only authorized personnel can install, perform service, or perform maintenance to the Carbon Filtration System.
- To be used only for pre-treatment of water prior to reverse osmosis (RO).

**Section 1.2****THEORY OF OPERATION**

Carbon filtration is based upon a naturally occurring phenomenon called adsorption, in which molecules of a liquid or gas are trapped by either the external or internal surface of a solid. Activated carbon has a very high internal surface area and thus is an ideal material for adsorption. Raw water quality can be improved with the removal of trace components.

Carbon filters are backwashed periodically (*every other day*) to expose new adsorption sites in the media. After backwash, a down-flow rinse prepares the media for service.

Carbon filtration consist of at least 2 properly sized pressure vessels (*tanks*) which are filled with predetermined volumes of carbon. In most systems, two properly sized, backwashable carbon filters are connected in series with tank #1 adsorbing the entire load (*worker*) and tank #2 performing a polishing task (*polisher*) while providing a back-up capability.

Each carbon filter in the system has a 7 day calendar time clock to control backwashing. The controller can be set to backwash at pre-set times on specific days, giving the user maximum flexibility. The controller has an interlock feature to prevent the RO from running during the backwash cycle. When backwashing a red light is illuminated as an indicator of this cycle and the RO will not run due to the interlock.

The carbon selected is of the highest quality available and meets our demanding specifications for chlorine/chloramine removal. The carbon is granular activated, acid washed, and designed for the purification of aqueous liquids which may be sensitive to acid soluble constituents such as iron.

Section 1.3

SYSTEM ILLUSTRATION



**Section 2.1**

**SPECIFICATIONS**

**ELECTRICAL AND WATER REQUIREMENTS:**

Water Requirements: Tempered water.

Electrical Requirements: 120 VAC from uninterruptable, ground fault protected.

Drain Requirements: Must facilitate up to 65 gpm.

**SPECIFICATIONS:**

\*\*Each Model Series Consists of -W (Worker) and -P (Polisher) 2 Tank Set

<u>MODEL</u>	<u>K-A-MT-4E32-104</u>	<u>K-A-MT-4F13-205</u>	<u>K-A-MT-4G14-306</u>	<u>K-A-MT-4G14-307</u>	<u>K-A-MT-4H15-408</u>	<u>K-A-MT-4H15-410</u>	<u>K-A-MT-4K26-512</u>
Tank Size	16x65	18x65	21x62	21x62	24x72	24x72	30x72
Media Cu. Ft	4	5	6	7	8	10	12
Service Flow @ 10 ECBT	6 gpm	7.5 gpm	9 gpm	10.5 gpm	12 gpm	15 gpm	18 gpm
Drain Flow	12 gpm	15 gpm	20 gpm	20 gpm	25 gpm	25 gpm	45 gpm
Pressure Drop (Δ)	< 6 psi	< 6 psi	< 6 psi	< 9 psi	< 9 psi	< 9 psi	< 9 psi
Control Head	Fleck 2750	Fleck 2850					Fleck 2850-S
Control Timer	Fleck SXT Digital						
Port Inlet	1"	1 ½"					
Port Outlet	1"	1 ½"					
Drain	1"						1 ¼"
Carbon	Acid Washed, Minimum Iodine # of 900						
Carbon (12x40)	4 cu/ft	5 cu/ft	6 cu/ft	7 cu/ft	8 cu/ft	10 cu/ft	12 cu/ft
Gravel (1/4")	50 lbs	75 lbs	100 lbs	100 lbs	150 lbs	150 lbs	200 lbs

Section 2.1

SPECIFICATIONS

SPECIFICATIONS: (continued)

\*\*Each Model Series Consists of -W (Worker) and -P (Polisher) 2 Tank Set

MODEL	K-A-MT-4K26-514	K-A-MT-4K26-515	K-A-MT-4M27-616	K-A-MT-4M27-617	K-A-MT-4M27-618	K-A-MT-4M27-620	K-A-MT-4M27-621
Tank Size	30x72	30x72	36x72	36x72	36x72	36x72	36x72
Media Cu. Ft	14	15	16	17	18	20	21
Service Flow @ 10 ECBT	21 gpm	22.5 gpm	24 gpm	25.5 gpm	27 gpm	30 gpm	31.5 gpm
Drain Flow	45 gpm	45 gpm	65 gpm	65 gpm	65 gpm	65 gpm	65 gpm
Pressure Drop (Δ)	< 9 psi	< 9 psi	< 12 psi	< 12 psi	< 12 psi	< 12 psi	< 12 psi
Control Head	Fleck 2850-S						
Control Timer	Fleck SXT Digital						
Port Inlet	1 ½"						
Port Outlet	1 ½"						
Drain	1 ¼"						
Carbon	Acid Washed, Minimum Iodine # of 900						
Carbon (12x40)	14 cu/ft	15 cu/ft	16 cu/ft	17 cu/ft	18 cu/ft	20 cu/ft	21 cu/ft
Gravel (1/4")	200 lbs	200 lbs	300 lbs	300 lbs	300 lbs	300 lbs	300 lbs

\* Other sized tanks are available as well as custom tanks and applications.

**Section 3.1****INSTALLATION**

1. The carbon filter must be placed before the softener (unless an organic scavenger is installed in which the carbon filter will go after the softener). Identify the location where the unit will be placed and verify that it is in a well-lit, with level, smooth floor, easy access location with access to a 120 VAC electrical outlet.
2. The unit will be connected by 1 ½" (or 2") PVC hose into the pretreatment water supply manifold. It needs to have a bypass valve and inlet and outlet valve ready to connect to the multi-media filter.
3. You will need a drain for the backwashing cycles. If possible, the drain should be no farther than 20 feet from the filter. You will need to purchase this flexible 1", 1 ¼" or 2" diameter plastic tubing from SWT. The tubing can be vinyl, polyethylene, polybutylene, etc. The drain line will be under pressure when the backwash cycle is working, therefore make sure the drain line is secured. The drain line will need to dump into a drain that is a diameter of 1 ½" to 2" and ideally be below the top of the head of your filter. All local building codes should be adhered to. Never connect the drain line directly into a drain. Allow an air gap between the drain tubing and waste line to prevent the possibility of reverse siphoning. A (DAG) Drain Air Gap Assembly can be used.
4. Put the distributor tube (riser) into the media tank, the screen intake/strainer will be at the bottom and the open end of the tube will be at the top. The screen/strainer should be resting on the bottom and centered.
5. Use masking tape or scotch tape to tape over the open end of the riser tube. This is to keep any media from falling into the tube while pouring the media into the tank.
6. Place a funnel into the tank and pour the entire contents of each box or bag in the following order to fill the tank from bottom to top:
  - a. Gravel
  - b. Carbon
7. While filling the bottom of the tank with gravel be careful to keep the distributor/riser centered as best you can. Once the filling of the tank is completed, remove the tape from the distributor/riser. Do NOT pull upwards on the tube!



**Section 3.1****INSTALLATION**

8. The control valve (head) must be screwed in to the top of the tank. As you start to screw the control valve into the tank make sure the hole in the center of the control valve fits over the distributor/riser tube. NO pipe dope should be used on the threads. The control valve should be hand tightened, snugly, clockwise. Try not to over tighten the control valve, over tighteneing can make future removal difficult. The control valve contrains an O-ring in a grooved slot, and serves as the primary tank-to-valve seal. After the control valve is threaded into the tank, rotate the tank to align the control head facing forward.
9. Located between the inlet and outlet water connection on the by-pass valve, you will find a male 1", 1 ¼" or 2" inch threaded (NPT) nipple. This is the connection for your drain line. Be sure it is connected as per the instructions in step 3 (above). You can connect flexible tubing to a 90° hose barb fitting. If you decide to use this connection method, wrap the threaded nipple with Teflon tape prior to connecting the 90° fitting. It's advisable to use a metal hose clamp to secure the tubing onto the barb fitting.
10. Make sure the main water supply is off. Depress the Red Pointer Knob and turn the knob counter- clockwise into the backwash position. With the water supply off, place the bypass valve into the service position. (For digital fleck heads please refer to the manual that is supplied) Open the water supply valve very slowly to approximately the 1/4 open position. In this position, you should hear air escaping slowly from the drain line.

**CAUTION:** If opened too rapidly or too far, some filter media may be lost and plugging of the valve is possible.

11. Check for leaks and re-tape or re-tighten any loose or leaking fittings.
12. When water begins to flow steadily from the drain, signifying the air has been purged from the tank, open the main water supply valve all the way. You will notice that the water running in the drain line is slightly cloudy or discolored. This is normal, and you are now backwashing a small amount of "fine" material contained in the filter media from the bed. After the water in the drain line is running clear to the drain (this can sometimes take up to 1 hour), initiate a manual backwash by turning the red pointer knob to the indicated position or per the instruction for a digital head, and allow the unit to run through a complete cycle.

**Section 3.1****INSTALLATION**

13. Now refer to the manual that was supplied with you specific model and set the time and backwash cycle frequency as directed. We recommend that you set the filter to backwash three to four times each week. It is good practice to be present at your first full cycle of back wash to make any adjustments needed to assure a complete back wash of the whole filtering system.
14. If a water softener or reverse osmosis system is to be installed downstream of a backwashing filter, make sure that the by-pass valve on the water softener is in by-pass during filter installation. This will guarantee that this equipment is not contaminated with an excessive amount of filter media. You can take the equipment out of by-pass when water from filter is running clear.
15. Conduct a chlorine/chlorimine test to ensure there is no faulty connections with the riser tube or strainer. If the total chlorine level is >0.1ppm then the filter needs to be taken offline and rechecked/repared until a good reading is obtained.

**Section 4.1****OPERATION**

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1. The operations of the carbon filter system is completely automatic. Once the system has been setup, little operator action is necessary.

**Setting Timer**

See Control Head Manual for details.

**Control Head**

See Control Head Manual for details.

Section 5.1

ROUTINE MAINTENANCE

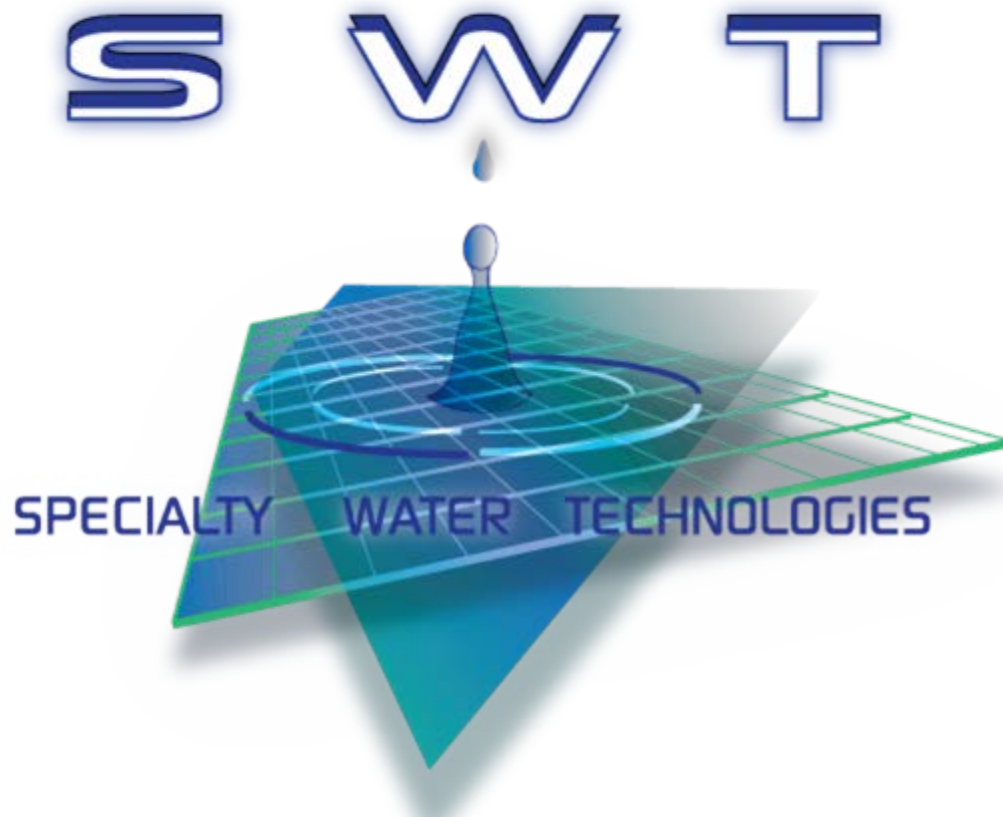
TROUBLESHOOTING GUIDE

Problem	Possible Causes	Possible Solutions
The filter backwashes at unscheduled times.	<ul style="list-style-type: none"> <li>• Problem with automatic control valve or time clock</li> </ul>	<ul style="list-style-type: none"> <li>• Check the time of day on the controller and adjust if necessary.</li> </ul>
Filter has a pressure drop greater than 15 psi.	<ul style="list-style-type: none"> <li>• Pretreatment component needs to be backwashed or regenerated more often</li> <li>• Media exhausted</li> </ul>	<ul style="list-style-type: none"> <li>• Using the manufacturer’s instructions set the controller to backwash more often.</li> <li>• If this fails to correct the problem, the tank must be emptied, cleaned, and re-bedded.</li> </ul> <p>NOTE: When re-bedding, always install a new distributor.</p>
Chlorine break-through has occurred.	<ul style="list-style-type: none"> <li>• Carbon media failure</li> <li>• Possible problem with organic scavenger or sediment filters.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Facility staff should be made aware of the situation immediately.</b></li> <li>• If the level of Total Chlorine exiting the first tank exceeds 0.1 mg/l, a sample should immediately be drawn from the water exiting the second tank. If that water meets the AAMI standard, dialysis can proceed; however, arrangements should be made to replace the first tank. If the chloramine level in the effluent of the second tank also exceeds 0.1 mg/l, that water must not be used for dialysis.</li> <li>• The tank must be removed from service and re-bedded. Ensure the manufacturer’s instructions are followed and only specified carbon and gravel are used.</li> </ul>

**Section 5.1****ROUTINE MAINTENANCE**

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1. Daily monitoring checking the pressures along with the Delta Pressure (pressure drop) across the filter while the RO is running.
2. Daily monitoring should be done to ensure that chlorine/chloramine free water is available prior to each hemodialysis treatment shift. This requires testing for chlorine/chloramine before the first treatment of the day and prior to each treatment shift throughout the day.
3. The media in the tank should be changed (re-bedded) when the pressure drop across the filter is greater than 15 psi when the RO is running and is consistent even after a backwash cycle.
4. The media in the tank should be changed (re-bedded) if the chlorine/chloramines breakthrough is greater than 0.1 ppm after two verified backwashing cycles.



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Manual P/N: OM-CARBON-FILTER

1020 Industrial Drive, Orinda, TN 37141

615-654-4441

[sales@specialtyh2o.com](mailto:sales@specialtyh2o.com)

615-654-4449 fax