

WATER SOFTENER OPERATING TIPS

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- Spot Free Rinse
- Water Pressure Booster Systems
- Reclaim Systems

6032 SCHOONER ST.
BELLEVILLE, MI 48111

PH 734-944-5200
FX 734-944-5800



💧💧💧 WHAT IS A WATER SOFTENER?

💧 ION EXCHANGE

The 1 to 1 exchange of ions by passing water (H₂O) through an ion exchange material (resin/media). Select minerals (Ca, Mg) may be exchanged for sodium ions by means of a water softener.

💧 ION

An atom or group of atoms having a positive or negative charge. These dissolved solids are measured in parts per million (ppm) or milligrams per liter (mg/l).

💧 CATIONS (+)

Carry a positive charge – Na⁺, Ca⁺, Mg⁺, Fe⁺

💧 ANIONS (-)

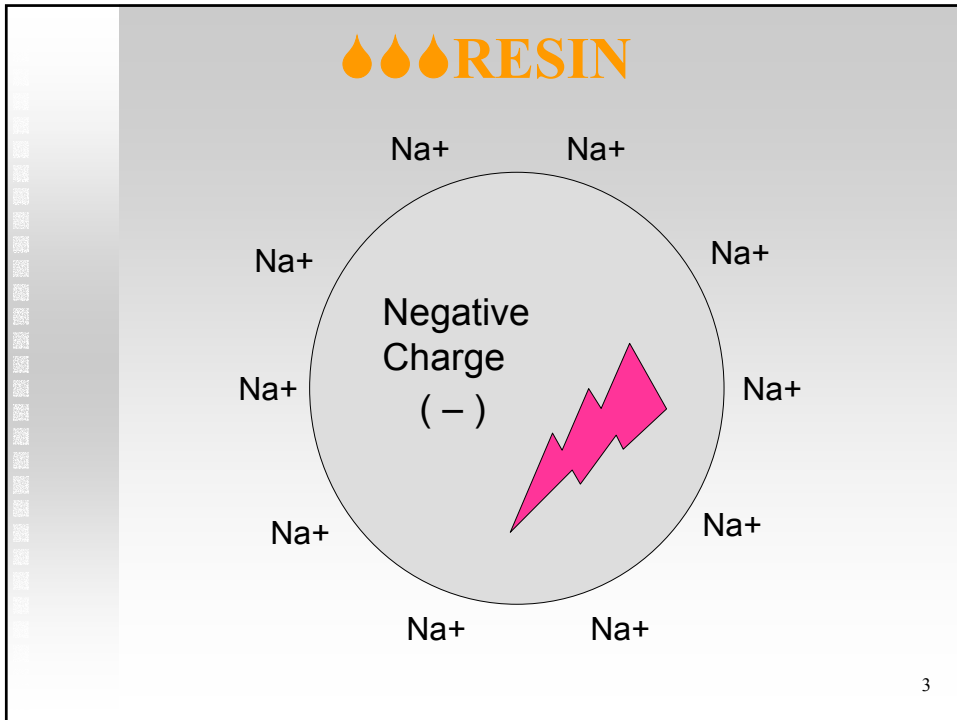
Carry a negative charge – No⁻, So⁻, SiO⁻, F⁻

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💧💧💧 TDS FOUND IN WATER

Material	Symbol	Material	Symbol
Sodium	Na ⁺	Lead	Pb ⁺²
Calcium	Ca ⁺²	Chloride	Cl ⁻²
Magnesium	Mg ⁺²	Bicarbonate	HCO ₃
Potassium	K ⁺	Nitrate	NO ₃
Iron	Fe ⁺²	Fluoride	F ⁻
Manganese	Mn ⁺²	Silicate	SiO ₂₃ ⁻²
Aluminum	Al ⁺³	Phosphate	PO ₄
Ammonium	NH ₄ ⁺	Chromate	CrO ₄ ⁻²
Copper	Cu ⁺²	Cyanide	CN ⁻
Nickel	Ni ⁺²	Sulphite	SO ₃ ⁻²
Zinc	Zn ⁺²	Chromium	Cr ⁺³
Strontium	Sr ⁺²	Bromide	Br ⁺
Cadmium	Cd ⁺²	Borate	B ₄ O ₂₂ ⁻²
Silver	Ag ⁺	Sulphate	SO ₄
Mercury	Hg ⁺²	Arsenic	As
Barium	Ba ⁺²	Selenium	Se ⁻²

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- ◆ Resins are measured by cubic foot (cu. ft.)
- ◆ 1 cu. ft. = 30,000 grain capacity @ 15 lbs. Na
- ◆ 1 cu. ft. = 20,000 grain capacity @ 8 lbs. Na
- ◆ 1 gallon of fresh water will absorb ~3 lbs. Na
- ◆ Resin will remove iron*
- ◆ Resin will remove chlorine*
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DESIGN CONSIDERATIONS:

💧Chlorine

- ◆ 2 PPM Residual – Drinking Water
 - ◆ Remove Chlorine At POU – GAC Filters
 - ◆ Provide Bottled Water - Filtered
- ◆ Water Softening Resin 8% Cross Linkage
 - ◆ 1 PPM Chlorine = 8 – 12 Year Life
 - ◆ 2 PPM Chlorine = 4 – 6 Year Life
 - ◆ Metals Like Iron & Copper Shorten Life More

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DESIGN CONSIDERATIONS:

💧Water Hardness

- ◆ Water hardness refers to the amount of calcium and magnesium in the water
- ◆ Hardness is measured in Grains Per Gallon (GPG)
- ◆ Parts Per Million (PPM) and Milligrams Per Liter (MG/L) are the same thing.
- ◆ To get GPG from PPM/MG/L, divide (÷) by 17.1
Example: 428 ppm/mg/l divide (÷) by 17.1 = 25 GPG

Water hardness is classified as follows:

Soft Water	0 - 1	grains per gallon
Slightly Hard Water	1 - 3½	grains per gallon
Moderately Hard Water	3½ - 7	grains per gallon
Hard Water	7 - 10½	grains per gallon
Very Hard Water	Over 10½	grains per gallon

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DESIGN CONSIDERATIONS:

💧 Iron Removal

💧 Iron is measured in PPM / MG/L

To allow for removal using a water softener

Use $\text{PPM} \times 3 = \text{GPG allowance}$

Example:

$$1.5 \times 3.0 = 4.5 \text{ GPG}$$

5 GPG Hardness per 1 PPM allowance (maximum 3PPM)

Example:

$$27 \text{ GPG Hardness} + 1.5 \text{ PPM Iron} = 31.5 \text{ GPG Combined Hardness}$$

💧 Other types of iron removal:

- ◆ Greensand
- ◆ Aeration
- ◆ Media

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DESIGN CONSIDERATIONS:

💧 Water Softener Capacity

1. Determine the model of the softener

Example: 2FC 150-M

150,000 GPT Max (75 lbs)

110,000 Salt Eff. (40 lbs)

2. Measure incoming water hardness and check for iron

Allow 3 grains of hardness per 1 part iron

Example: 15 GPG incoming hardness and 2.0 ppm iron

Total Hardness Factor = 21 GPG

3. Using salt efficient capacity

Example: 2FC 150-M = 110,000 Capacity

$$110,000 \div 21 = 5,238 \text{ gallons}$$

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💧💧💧 WHY USE A WATER SOFTENER?

- **Soft Water uses much less chemicals / soap**
MORE CLEANING POWER!

Water Hardness	Estimated Chemical Savings
2 – 5	15%
6 – 10	25%
11 – 15	35%
16 – 20	45%
Over 20	50%

- ◆ **Less chemical/soap = More Profit**
- ◆ **Soft Water Cleans Better**
- ◆ **Clean Cars = Happy Customers**
- ◆ **Soft Water means Less Scale**
- ◆ **Less Scale = Less Maintenance & Reduced Equipment Wear**
- ◆ **Removes Sediment to 50 microns**

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💧💧💧 Water Softener Components

1. **Control Valve**

Directs the flow of water through various cycles.

2. **Resin Tank**

Holds the Resin (sometimes referred to as mineral or media tank)

3. **Softening Resin**

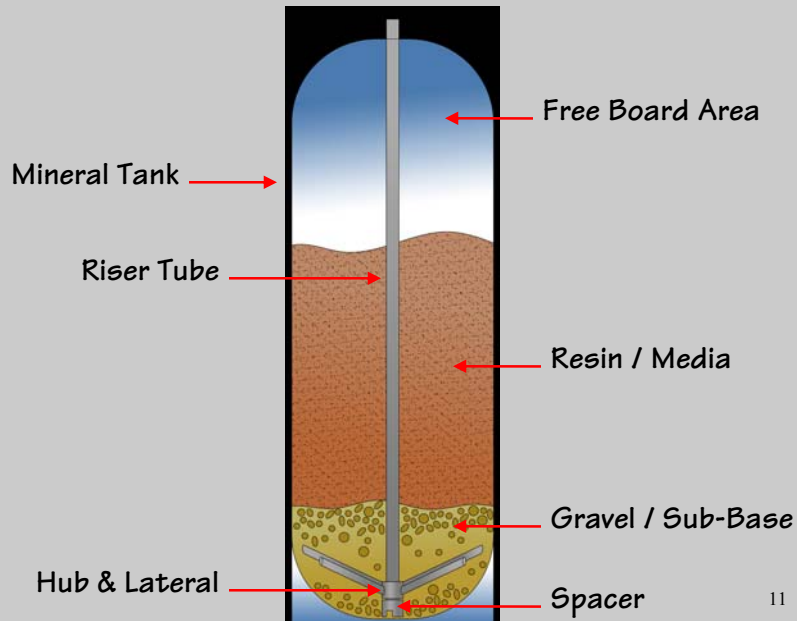
This media allows the Ion-Exchange process to take place.
(Sometimes referred to as mineral or media)

4. **Brine Tank**

Allows salt (sodium chloride or potassium chloride) to be dissolved into a brine solution. The brine solution can easily be drawn into the Resin Tank by the Control Valve to regenerate or recharge the softening resin.

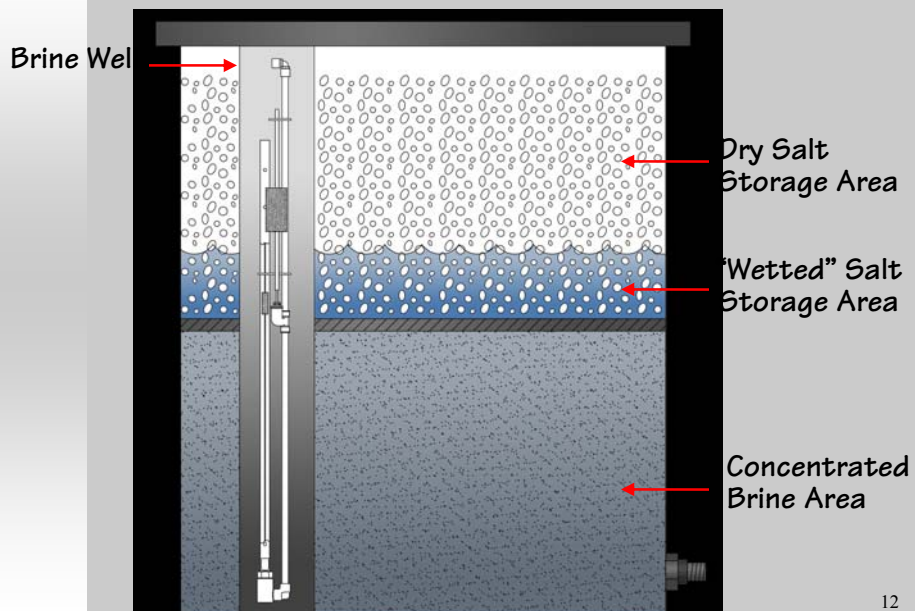
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💧💧💧 MINERAL TANKS



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💧💧💧 BRINE TANKS



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MAINTENANCE

Clean Brine Tank	■ Once (1) a year minimum ■ Install bulkhead fitting to ease future cleaning ■ Clean float/brine valve assembly & verify settings
Test Incoming Water	■ At least twice (2) a year ■ Re-adjust setting if necessary
Use a Good Grade of Salt	■ Dura-Cube, Hardi-Cube ■ Pellets, Block ■ Solar – Last Resort WE DO NOT RECOMMEND THE USE OF ROCK SALT
Check Drain and Brine Lines	■ Insure lines are not kinked or partially blocked ■ Insure lines have not become brittle – replace if so ■ Clean flow control and injector if necessary

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MAINTENANCE

Grid Plate	■ Replace if deteriorated
Seals	■ Replace every two years minimum
Pistons	■ Remove control covers and visually inspect for piston leaks

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TROUBLE SHOOTING

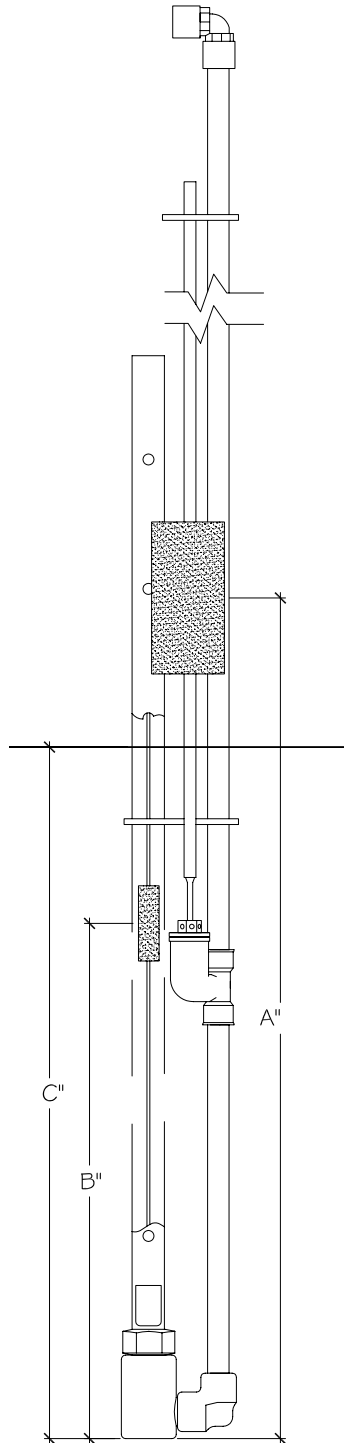
Hard Water	■ Check brine tank salt, bridging, water, float ■ Check bypass valve – should be closed ■ Check settings – test incoming water – Do The Math ■ Note gallons remaining when going hard ■ Low water pressure
Resin In Line	■ = Broken / Warped Distributor / Riser ■ Installed backwards ■ Excessive / high water pressure
Brine Tank Overfilling	■ Check float assembly

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TROUBLE SHOOTING

No Water Pressure/Flow	■ Check piston position – possibly out of sync ■ Check cams – possibly broken or cracked ■ Valves closed
No/Reduced Salt Consumption	■ Check float/brine valve assembly – clean and verify settings ■ Check for salt bridging ■ Check settings – test incoming water – do the math ■ Low water pressure ■ Poor weather / Lost Customers
High Salt Consumption	■ Check float/brine valve assembly – clean and verify settings ■ Check settings – test incoming water – do the math ■ Great weather / New Customers

BRINE VALVE SETTINGS



MODEL	GRID HT	FLOAT SETTINGS	
	INCHES	FILL A	DRAW B
1FC120	16"	20	11.5
1FC150	16"	20	9.5
1FC200	16"	21	7.5
1FC240	16"	19	8.5
1FC300	16"	21	7.5
1FC450	24"	28	9.5
1FC600	16"	23	6.5
1FC750	24"	27	9.5
MODEL	GRID HT	FLOW SETTINGS	
	INCHES	FILL A	DRAW B
2FC120	16"	19	12.5
2FC150	16"	19	11.5
2FC200	24"	28	18.5
2FC240	24"	27	16.5
2FC300	24"	27	18.5
2FC450	24"	27	15.5
2FC600	16"	23	6.5
2FC750	24"	27	9.5
MODEL	GRID HT	FLOW SETTINGS	
	INCHES	FILL A	DRAW B
3FC120	16"	19	12.5
3FC150	16"	19	11.5
3FC200	24"	28	18.5
3FC240	24"	27	16.5
3FC300	24"	27	18.5
3FC450	24"	27	15.5
3FC600	16"	23	6.5
3FC750	24"	27	9.5
MODEL	GRID HT	FLOW SETTINGS	
	INCHES	FILL A	DRAW B
9F844	5"	11.5	6
9F948	8"	11.0	6
9F1044	8"	11.0	6
9F1054	8"	13.0	6
9F1248	8"	16.0	6
9F1354	8"	22.0	6
9F1465	5"	16.5	6
9F1665	5"	18.5	6

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HURON VALLEY SALES
6032 SCHOONER ST.
BELLEVILLE, MI. 48111
PHONE: (734) 944-5200
FAX: (734) 944-5800

DRAWING TITLE:
BRINE VALVE SETTINGS

PROPAK
ENERGY EFFICIENT HEATING



SCALE:
Scaled

AUTHOR:
Y.M.

DATE:
8-22-2001

FILE NUMBER:

HVS REFERENCE NUMBER:
0183

Model	Riser 1.5	Riser Length	Size of Tanks		Floor Space H x D x W	Grain Capacity / lbs Salt		Underbed #20 lbs	Resin Load Cu. Ft.	Flow Rate - GPM			Salt Storage lbs	Ship WT lbs	Grid Ht Inches	Float Settings Fill A / Draw B	Timer Speed	BW Pins	BR/SR Holes	RR Pins	Refill Holes	Rst Pins	Gal Regen	Inj #	BW Flow	Refill Flow
			Resin D x H	Brine D x H		Grains / lbs	Grains / lbs			Backwash	Cont	Peak														
1FC120	h&l		16x65	24x48	74x26x46	88,000/33#	120,000/60#	60	4	7	47	64	500	400	16"	20/11.5	1/30rpm	6	25	5	4	2	237	3c	7	0
1FC150	h&l		18x65	24x48	72x26x52	110,000/44#	150,000/75#	70	5	9	51	68	500	500	16"	20/9.5	1/30rpm	6	31	5	5	2	365	3c	8	0
1FC200	h&l		21x62	24x48	72x26x52	146,000/56#	200,000/100#	100	6.6	12	61	78	500	600	16"	21/7.5	1/30rpm	6	25	5	7	2	370	4c	12	0
1FC240	h&l		24x71	30x48	82x32x62	176,000/67#	240,000/120#	150	8	15	74	97	800	860	16"	19/8.5	1/30rpm	6	30	5	8	2	455	4c	15	0
1FC300	h&l		24x71	30x48	82x32x62	220,000/84#	300,000/150#	150	10	15	91	800	800	910	16"	21/7.5	1/30rpm	6	27	5	10	2	485	5c	15	0
1FC450	h&l		30x72	30x48	88x32x68	330,000/126#	450,000/225#	250	15	25	83	110	600	1325	24"	28/9.5	1/30rpm	7	40	5	15	2	830	5c	25	0
1FC600	h&l		36x72	39x48	90x41x82	440,000/169#	600,000/300#	350	20	30	89	120	1375	1900	16"	23/6.5	1/30rpm	8	49	5	16	2	1245	6c	30	0
1FC750	h&l		36x72	39x48	90x41x82	550,000/210#	750,000/375#	350	25	30	88	118	1000	2050	24"	27/9.5	1/30rpm	8	49	5	16	2	1325	6c	30	0
Model	Riser 1.5	Riser Length	Size of Tanks		Floor Space H x D x W	Grain Capacity / lbs Salt		Underbed #20 lbs	Resin Load Cu. Ft.	Flow Rate - GPM			Salt Storage lbs	Ship WT lbs	Grid Ht Inches	Float Settings Fill A / Draw B	Timer Speed	BW Pins	BR/SR Holes	RR Pins	Refill Holes	Rst Pins	Gal Regen	Inj #	BW Flow	Refill Flow
			Resin D x H	Brine D x H		Grains / lbs	Grains / lbs			Backwash	Cont	Peak														
2FC120	h&l		(2)16x65	(1) 30x48	74x32x72	88,000/33#	120,000/60#	60	4	7	47	64	800	800	16"	19/12.5	1/30rpm	6	25	5	4	2	237	3c	7	0
2FC150	h&l		(2)18x65	(1) 30x48	72x32x82	110,000/44#	150,000/75#	70	5	9	51	68	800	800	16"	19/11.5	1/30rpm	6	31	5	5	2	365	3c	8	0
2FC200	h&l		(2)21x62	(1) 30x48	72x32x82	146,000/56#	200,000/100#	100	6.6	12	61	78	600	1200	24"	28/18.5	1/30rpm	6	25	5	7	2	370	4c	12	0
2FC240	h&l		(2)24x71	(1) 30x48	82x32x90	176,000/67#	240,000/120#	150	8	15	74	97	600	1630	24"	27/16.5	1/30rpm	6	30	5	8	2	455	4c	15	0
2FC300	h&l		(2)24x71	(1) 39x48	82x41x100	220,000/84#	300,000/150#	150	10	15	91	115	1000	1760	24"	27/18.5	1/30rpm	6	27	5	10	2	485	5c	15	0
2FC450	h&l		(2)30x72	(1) 39x48	88x41x108	330,000/126#	450,000/225#	250	15	25	83	110	1000	2650	24"	27/15.5	1/30rpm	7	40	5	15	2	830	5c	25	0
2FC600	h&l		(2)36x72	(2) 39x48	90x41x122	440,000/169#	600,000/300#	350	20	30	89	120	1375	3500	16"	23/6.5	1/30rpm	8	49	5	16	2	1245	6c	30	0
2FC750	h&l		(2)36x72	(2) 39x48	90x41x122	550,000/210#	750,000/375#	350	25	30	88	118	1000	4000	24"	27/9.5	1/30rpm	8	49	5	16	2	1325	6c	30	0
Model	Riser 1.5	Riser Length	Size of Tanks		Floor Space H x D x W	Grain Capacity / lbs Salt		Underbed #20 lbs	Resin Load Cu. Ft.	Flow Rate - GPM			Salt Storage lbs	Ship WT lbs	Grid Ht Inches	Float Settings Fill A / Draw B	Timer Speed	BW Pins	BR/SR Holes	RR Pins	Refill Holes	Rst Pins	Gal Regen	Inj #	BW Flow	Refill Flow
			Resin D x H	Brine D x H		Grains / lbs	Grains / lbs			Backwash	Cont	Peak														
3FC120	h&l		(3)16x65	(1) 30x48	74x32x94	88,000/33#	120,000/60#	60	4	7	94	128	800	1200	16"	19/12.5	1/30rpm	6	25	5	4	2	237	3c	7	0
3FC150	h&l		(3)18x65	(1) 30x48	72x32x109	110,000/44#	150,000/75#	70	5	9	102	136	800	1100	16"	19/11.5	1/30rpm	6	31	5	5	2	365	3c	8	0
3FC200	h&l		(3)21x62	(1) 30x48	72x32x109	146,000/56#	200,000/100#	100	6.6	12	122	156	600	1800	24"	28/18.5	1/30rpm	6	25	5	7	2	370	4c	12	0
3FC240	h&l		(3)24x71	(1) 30x48	82x32x120	176,000/67#	240,000/120#	150	8	15	148	194	600	2490	24"	27/16.5	1/30rpm	6	30	5	8	2	455	4c	15	0
3FC300	h&l		(3)24x71	(1) 39x48	82x41x130	220,000/84#	300,000/150#	150	10	15	182	230	1000	2670	24"	27/18.5	1/30rpm	6	27	5	10	2	485	5c	15	0
3FC450	h&l		(3)30x72	(1) 39x48	88x41x144	330,000/126#	450,000/225#	250	15	25	166	220	1000	3975	24"	27/15.5	1/30rpm	7	40	5	15	2	830	5c	25	0
3FC600	h&l		(3)36x72	(3) 39x48	90x41x164	440,000/169#	600,000/300#	350	20	30	178	240	1375	5400	16"	23/6.5	1/30rpm	8	49	5	16	2	1245	6c	30	0
3FC750	h&l		(3)36x72	(3) 39x48	90x41x164	550,000/210#	750,000/375#	350	25	30	176	236	1000	6000	24"	27/9.5	1/30rpm	8	49	5	16	2	1325	6c	30	0
Model	Riser 1.05	Riser Length	Size of Tanks		Floor Space H x D x W	Grain Capacity / lbs Salt		Underbed #20 lbs	Resin Load Cu. Ft.	Flow Rate - GPM			Salt Storage lbs	Ship WT lbs	Grid Ht Inches	Float Settings Fill A / Draw B	Timer Speed	BW Pins	BR/SR Holes	RR Pins	Refill Holes	Rst Pins	Gal Regen	Inj #	BW Flow	Refill Flow
			Resin D x H	Brine D x H		Grains / lbs	Grains / lbs			Backwash	Cont	Peak														
9FC844	hw	41.75	(2)8x44	(1) 18x40	54x22x22	13,000/5	24,000/11.3	8	0.7	1.3	13	17	375	170	5	11.5/6	1/15rpm	8	54	6	10	2	41	1	1.7	0.5
9FC948	hw	45.5	(2)9x48	(1) 18x40	56x22x24	22,000/8	32,000/15.0	10	1	2	14	19	375	205	8	11.0/6	1/15rpm	8	54	6	10	2	49	1	2	0.5
9FC1044	hw	41.75	(2)10x44	(1) 18x40	54x28x28	22,000/8	37,500/18.75	12	1.2	2.4	15	20	375	210	8	11.0/6	1/15rpm	8	54	6	10	2	54	1	2.4	0.5
9FC1054	hw	51.5	(2)10x54	(1) 18x40	60x22x22	27,000/10	48,000/22.5	12	1.4	2.4	14	19	375	260	8	13.0/6	1/15rpm	8	54	6	10	2	55	1	2.4	0.5
9FC1248	hw	45.5	(2)12x48	(1) 18x40	54x28x24	35,000/13	52,000/25.5	17	1.7	3.5	16	21	375	325	8	16.0/6	1/15rpm	8	54	6	10	2	88	2	3.5	1.0
9FC1354	hw	51.5	(2)13x54	(1) 18x40	60x35x42	52,000/20	64,000/30	20	2.3	4	16	21	525	410	8	22.0/6	1/30rpm	4	30	3	10	2	107	2	4	1.0
9FC1465	hw	62.5	(2)14x65	(1) 24x41	71x39x46	70,000/26	96,000/45	26	3.3	5	16	21	525	560	5	16.5/6	1/30rpm	4	30	3	10	2	132	3	5	1.0
9FC1665	hw	62.5	(2)16x65	(1) 24x41	71x45x54	88,000/31	120,000/60	35	4.3	7	17	22	525	640	5	18.5/6	1/30rpm	4	35	3	10	2	170	3	7	1.0
CARBON UNITS																										
Model	Riser 1.05	Riser Length	Size of Tanks		Floor Space H x D x W	Media Load				Flow Rate - GPM			Salt Storage lbs	Ship WT lbs	Grid Ht Inches	Float Settings Fill A / Draw B	Timer Speed	BW Pins	BR/SR Holes	RR Pins	Refill Holes	Rst Pins	Gal Regen	Inj #	BW Flow	Refill Flow
			Resin D x H	Brine D x H		1/8x1/4/#20 Flint	.44 Filter Sand	GreenSand	Carbon	Backwash	Cont	Peak														
00-212	hw	51.5	10x54	n/a	54x12x12	0/11lbs	12lbs	.25cu/ft	1cu/ft	5	3	6.5	n/a	95lbs	n/a	n/a	1/30rpm	10	2	3	2	2	130	n/a	5	n/a
00-222	hw	62.5	14x65	n/a	71x16x16	35lbs/25lbs	25lbs	.5cu/ft	2cu/ft	10	6	12	n/a	230lbs	n/a	n/a	1/30rpm	10	2	5	2	2	300	n/a	10	n/a
00-232	hw	62.5	16x65	n/a	71x18x18	45lbs/30lbs	35lbs	.5cu/ft	3cu/ft	15	7.5	15	n/a	250lbs	n/a	n/a	1/30rpm	10	2	5	2	2	450	n/a	15	n/a