A Division of United Industries, Inc.

Operation & Maintenance Manual

High Rate Sand Filter Systems

United Industries, Inc.
www.swimtime.com

202 East Cleveland Ave
Sterling, KS 67579

800-835-3272
620-278-3160

INDEX

GENERAL

Serial Plate
Warranty
System Description
Specifications
Filter Options
Spare Parts List
Dimensions
Filter Selection Chart
NSF Pressure Loss Curve

FACE PIPING ASSEMBLY DRAWINGS

INSTALLATION

Tank Bottom Fill
Laterals
Media Loading
Pressure Gauge Panel
Backwash Sight Glass

OPERATION

Startup
Manual Operation
Backwash Operation
Automatic Backwash (ABW) Operation
ABW Wiring Schematic

POOL RECORDS SHEET

(Copy this form for repeated use)

SERIAL PLATE

(Replace this page with project specific serial plate)

WARRANTY

SwimTime® Standard Vertical Steel Filter

United Industries, Inc. (manufacturer) Sterling, Kansas warrants to the original purchaser, that the standard lined filter vessel will be free from leaks due to defects in workmanship or materials when used in accordance with manufacturer's installation, operation and maintenance instructions for a period of 3 years. Alternately, if the filter vessel includes the "Uniflex" PVC lining, then the warranty will be for a period of 15 years, subject to the same operating requirements as noted above.

Manufacturer will repair or replace described defects in the vessel, either onsite or at the point of manufacture within a reasonable time following receipt of written notification of warranty claim and warranty approval.

Location and method of repair to be at the discretion of the manufacturer. If vessel is repaired at point of manufacture, freight cost will be the responsibility of the original purchaser, as will the cost of media and/or vessel removal and reinstallation of same.

This implied warranty specifically excludes any damage or failures caused by misuse, abuse, or by *extended periods* of improper water chemistry caused by halogens in excess of 3.0 parts per million (ppm), or pH of less than 7.2 or greater than 7.8, total alkalinity of less than 80 ppm, or greater than 150 ppm, or calcium hardness of less than 200 ppm or greater than 300 ppm.

To implement any warranty claim, owner must provide evidence that acceptable water chemistry conditions have been met on a daily basis of operation.

Warranty becomes effective from the date of installation.

Warranted this _____ day of _____, 20___.

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SYSTEM DESCRIPTION

Filters are the most important accessory used in the treatment of swimming pool water. Their purpose is to eliminate suspended particles from the circulating water, thus improving the clarity of the water. The principle of operation consists of passing the swimming pool water through a media bed consisting of sand.

It should be kept in mind that the filtration system consists of a number of other elements, such as metering equipment, pumps, pool shell fittings and pipe work. These components ensure the correct suction and return flows and will affect the resultant condition of the treated water. Other factors involved in the selection of a filter are the materials used for its construction, the working temperature, and the required working pressure.

The quality of filtration depends on various factors: the size and shape of the sand, the media bed depth, and the distribution of the water flow. The most important parameter is the water filtration rate.

Filter Sizing

Based on the filtration velocity, filters are classified into two groups:

- RAPID RATE FILTERS: Filtration velocities 3 to 12 GPM per sq. ft.
- HIGH RATE FILTERS: Filtration velocities 12 to 20 GPM per sq. ft.

Our recommendations for (maximum) filter velocity:

Water parks **10-12 GPM per sq. ft.** Commercial pools **12-15 GPM per sq. ft.**

Bather load, or the number of people in the pool, may dictate a reduced velocity through the filter system.

Plumbing Sizing

When sizing the plumbing for a filtration package, check local and/or state health codes for the maximum velocity of the water allowed in the plumbing. Our general recommendations:

- The return line (back to the pool) should not exceed **10 ft/s velocity**
- The suction line (from pool to pump suction) should not exceed **6 ft/s velocity**

Pump Sizing

To ensure the correct pump size, the required flow must be obtained by taking the system head into consideration. The system head is the added difficulty to move water through the system

presented by using elbows, piping, tees, changes in elevation, etc. Historical usage has provided us with a range from as little as 55 feet total dynamic head (TDH) to as much as 80+ feet TDH.

- Each individual system varies and we have found that estimating a TDH of 70 feet will suffice in more than 95% of all applications.

It is common to have different municipal and state standards for public and private pools, depending on location. It is the responsibility of the designer and/or installer to be aware of the applicable codes before designing, specifying, or installing any piece of equipment for a swimming pool.

Filter System Capacity

It is recommended that the filtration system should filter a portion of the water volume from the surface of the pool and the remaining volume from the lower levels as suction. The ratio of top to bottom filtration is sometimes dictated by local and/or state health codes.

The maximum turnover time for a public pool should not exceed 6 hours, and for semi-public pools 8 hours, although some codes allow for an 8 hour turnover even in public facilities. In the case of public pools for children the turnover should not exceed 2 hours.

These times may vary by state, and all local and state codes must be followed.

Example

Public pool with a capacity of 150,000 gallons and a turnover rate of 4 hours:

150,000 gal / 4 hours = 37,500 gal/hour or 625 GPM

Water Park = 625 GPM @ 10 GPM per sq. ft. = 62.5 sq. ft. of filtration required

Commercial Pool = 625 GPM @ 15 GPM per sq. ft. = 41.7 sq. ft. of filtration required

Now choose the filter or filters that meet this requirement. Remember it is possible to add filters together to obtain the correct amount of filtration area required. If your requirements do not match exactly any of the filter models available, always use the next *larger* size.

The flow rate of 625 GPM will also determine your piping size and pump duty point.

SPECIFICATIONS

Filter System Requirements

1. The filter system shall be supplied complete by the manufacturer and shall include: internals, face piping and valves, gauge panel with gauges, tube fittings and tubing, backwash sight glass, automatic or manual air relief, bottom drain connection with internal strainer.

2. System shall be fabricated and fully assembled at the manufacturer's plant for pressure testing and dimensional verification. System shall be knocked down for shipping purposes in subassemblies for minimum field assembly. Internal influent manifold and effluent header shall be factory installed and shipped in place. Laterals shall be shipped for assembly in the field following completion of filter system installation.

Filter System Filtration Rate

The filter system shall filter at a rate of XX gallons per minute (GPM) per square foot of filter surface area.

Vertical Steel Filter Tank

1. The filter plant shall consist of (X) high-rate pressure sand filter(s), XX" in diameter with an effective filter surface area of XX sq ft. When operating at a filtration rate of XX GPM per square foot of filter surface area, the filter plant shall have the total capacity of filtering XXX gallons in a one minute period.

2. The tank shall be constructed of ASTM A-36 carbon steel – side shell XX" height, XX" nominal thickness; flanged and dished heads XX" diameter, XX" nominal thickness. Tank shall be designed for a working pressure of (min.) 50 psi and shall be hydrostatically tested to 75 psi.

3. The tank shall be assembled by a rated welder using the automatic submerged arc welding method for continuous, full penetration welds. All welds are to be continuous butt weld. Lap welds of the heads to the side sheet will not be permitted, nor will the lap welding of the side sheet seam be permitted.

4. Adjustable height jack legs shall be supplied for tank support, (6) per tank. Systems which incorporate strap or angle style fixed position legs shall not be accepted. Access to the tank shall be provided by an 18" round manhole (tanks 60" O.D. and smaller) 24" round manhole (tanks 66" O.D. and larger) with bolted cover. Manhole seal shall be a one piece 1/4" thick neoprene gasket. Drain out system shall consist of one 1-1/2" coupling mounted to the tank bottom. Each coupling shall be fitted with an

internal slotted PVC media retainer. Air relief connection shall be one 1/2" (manual) 1" (automatic/manual) coupling mounted on the top of the tank.

5. Each filter tank shall be equipped with the necessary flanges and connections for the internal and external piping. Influent and effluent connections shall be comprised of schedule 40 steel pipe and 150 lb. class carbon steel flanges with ANSI standard 150 lb. bolt pattern. Influent and effluent piping shall be drilled and tapped to accommodate pressure gauge panel tubing connectors.

6. Tank shall be fitted with an easy-to-replace sacrificial anode in the top head.

Filter Piping Internal

1. The upper distribution header shall have a splash plate to facilitate an even and adequate distribution of the influent. The lower collection system shall be a horizontal header with an array of laterals. The header shall be X" Schedule 80 PVC construction, capped on one end and flanged on the other end. Lateral connections shall be spaced no more than 6" on center and shall be 1-1/2" FPT connections.

2. Underdrain laterals shall consist of 1-1/2" Schedule 80 PVC pipe with machined double slotted openings, 10 openings per inch. Machined openings shall be designed to retain all media particles as small as 0.3 mm particle size. Molded or drilled openings or retainer screens will not be acceptable. Each lateral shall be fabricated complete with a socket cap on one end and male adapter on the other. Both fittings to be solvent welded to the slotted pipe.

3. All hardware in wetted areas shall be T304L stainless steel.

Tank Lining (Standard)

1. Prior to application of interior lining, all welds shall be wire brushed clean and smooth. All interior steel surfaces shall be sandblasted to a near white finish.

2. Interior metallic surfaces shall receive two coats with a two-part epoxy interior lining, 6-8 mil thickness per coat, for a total dry film thickness of 12-16 mil.

Tank Lining (Uniflex)

1. Tank(s) shall be coated with a 60-90 mil heat-set PVC lining. Prior to application of interior lining, all welds shall be wire brushed clean and smooth. All interior steel surfaces shall be sandblasted to a near white finish.

2. Vessel substrate shall be heated to 350-400 degrees F for a period of not less than one hour. Vessel shall cool to ambient temperature.

3. Interior surfaces shall receive one coat of "Uniflex" adhesive primer, 2-3 dry mil. Primer shall air dry for 15 minutes and then be heat-set at 350 - 400 degrees F for a

minimum of 15 minutes. Vessel shall cool to ambient temperature prior to application of “Uniflex” finish coat.

4. After cooling, the tank(s) shall receive a minimum two coat application of “Uniflex” finish coating, 30-45 mil per coat, for a total finished thickness of 60-90 mil. Finish coat shall be heat-set at 370 - 425 degrees F for a minimum of one hour.

5. After cooling, all connections shall be chased or trimmed. The interior lining shall be holiday tested using accepted spark test equipment at 7,000 to 10,000 volts and shall be free of imperfections.

6. Tank fabrication, coating application, heat setting of interior lining and spark testing shall all be performed by manufacturer’s personnel at manufacturer’s facility.

Tank Exterior Coating

1. Exterior surfaces shall be cleaned with solvent and wire brush. (for primer)
   All welds shall be wire brushed clean and smooth, and exterior steel surfaces shall be sandblasted to a near white finish. (for exterior finish)

2. (Exterior shall receive one coat of red oxide primer. Finish coat to be applied by others after installation is completed).
   (Exterior shall receive prime and finish coating of Tnemec Series 66 Hi-Build epoxy).
   (Exterior shall receive Uniflex coating following similar application and curing process as above).

Face Piping

1. External face piping shall be X” (Schedule 80 PVC flanged pipe and fittings) (150 pound class ductile iron flanged fittings). Flanges shall be located so as to allow for easy disassembly of the facepiping. All PVC fittings shall be solvent cemented.

2. All valves 2” and smaller shall be threaded gate valves with bronze gate and non-rising stem. Filter valves shall be butterfly type with cast iron epoxy coated body with flange locating holes that meet ANSI 125/150 drillings, Nylon II coated ductile iron disc, 416 stainless steel stem, food grade EPDM seat with tongue and groove design totally encapsulating the valve body with no flange gaskets required. All nuts and bolts shall be (zinc plated) (stainless steel) with washers when using PVC flanges.

3. Face piping shall be fully factory assembled, hydrostatically tested at 75 psi and knocked down for shipment. The warranty of the face piping shall be provided by the filter manufacturer. Field gluing or assembly of the face piping by anyone other than the filter manufacturer will not be accepted.

4. Face piping arrangement shall be as indicated on the drawings.

Air Relief

1. A manual air release assembly shall be included for each tank and shall consist of 1/2” schedule 80 PVC pipe and fittings with a 1/2” bronze gate valve.

2. A 1” automatic air release assembly shall be provided to automatically and continuously release air in the filter. The valve shall be fabricated of plastic or iron with Buna-N seals. A plumbing kit shall be provided with two PVC ball valves to allow manual air relief and isolation of the automatic valve. Valves fabricated of cast iron, bronze or stainless steel shall not be acceptable.

Accessories

Standard accessory items shall include backwash sight glass rated for 50 psi with polycarbonate glass, remote mounted stainless steel gauge panel with two 3-1/2” diameter stainless steel bodied, liquid filled, 0-60 psi pressure gauges, 1/4” petcocks, 1/4” (copper) (poly) tubing with compression type fittings.

Filter System Packaging

All filter piping and valves shall be factory assembled and shipped for minimum field assembly and installation.

Media

1. Prior to loading the media in the tank(s), it is recommended that the contractor fill the void in the bottom of the tank with concrete to within 1” of the level of the bottom of the laterals. Concrete shall be floated level and troweled smooth.

2. Filter media shall be washed, cleaned and properly graded to allow correct operation during backwash and reduce head loss through the filter bed while filtering.

3. The media shall be of quartzite or silica in nature, hard, not smooth, and free of insoluble particles. 90 - 95% insoluble in warm muriatic acid. It must have a uniformity coefficient of 1.7 in 0.45 - 0.55 mm fine sand. Not more than 1% clay, loam dust, or other foreign materials allowable. Media shall be suitable for permanent use.

4. Media shall be shipped in 100 lb bags (1 cu ft) and properly labeled showing grade therein. The tank shall be carefully loaded with the media to prevent damage of the effluent header/lateral assembly. Each grade of media shall be struck smooth and level with a straight edge before placing the next grade of media in the tank.

5. The media shall consist of three grades in required quantities. The filter media shall be 0.45 - 0.55 mm in size with support gravel of 1/8” - 1/4”, and with a bottom layer of 1/4” - 1/2” rock. Quantities shall be per manufacturer standard.

OPTIONS

Tank Options

Materials - All tanks can be fabricated using carbon steel or stainless steel in various grades.

Working Pressure - Carbon steel with 50 psi working pressure is standard and working pressures up to 200 psi are available.

Configuration - All tanks can be fabricated in more than one piece for limited access requirements. Multi-piece tanks are flanged and gasketed around the circumference of the tank.

Access - Tanks can be fabricated using access manholes from a minimum of 11” X 15” elliptical to 24” round. Tank diameters may limit manhole size.

Coating Options

Uniflex - All tanks can receive our “Uniflex” solid PVC heat-set interior and/or exterior lining, 60 – 90 dry mil thickness (15 year warranty).

Custom - All tanks can be coated using customer-specified materials provided the materials are NSF listed under Standard 50.

Face Piping Options

Construction – Face piping can be fabricated using Cast Iron flanged fittings, Ductile Iron flanged fittings or Schedule 80 PVC flanged fittings. Butterfly valves of various manufacturers and materials are available with multi-position locking lever handles, gear operators with hand wheels, or electric or pneumatic valve actuators.

Linkage - Butterfly valve configurations can be supplied with stainless steel adjustable single or dual lever valve linkage for manual operation.

Backwash Operation

All filter systems are available with manual, semi-automatic, or fully automatic backwash operations.

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SPARE PARTS LIST

These are considered normal wear items that may require periodic replacement:

M846219 – Manhole gasket 18” diameter (1 per filter, 60” diam & smaller)
M846419 – Manhole gasket 24” diameter (1 per filter, larger than 60” diam)
M669745 – Sacrificial anode (1 per filter)

For any other parts, please contact United Industries to verify your original configuration and confirm the correct replacement parts.

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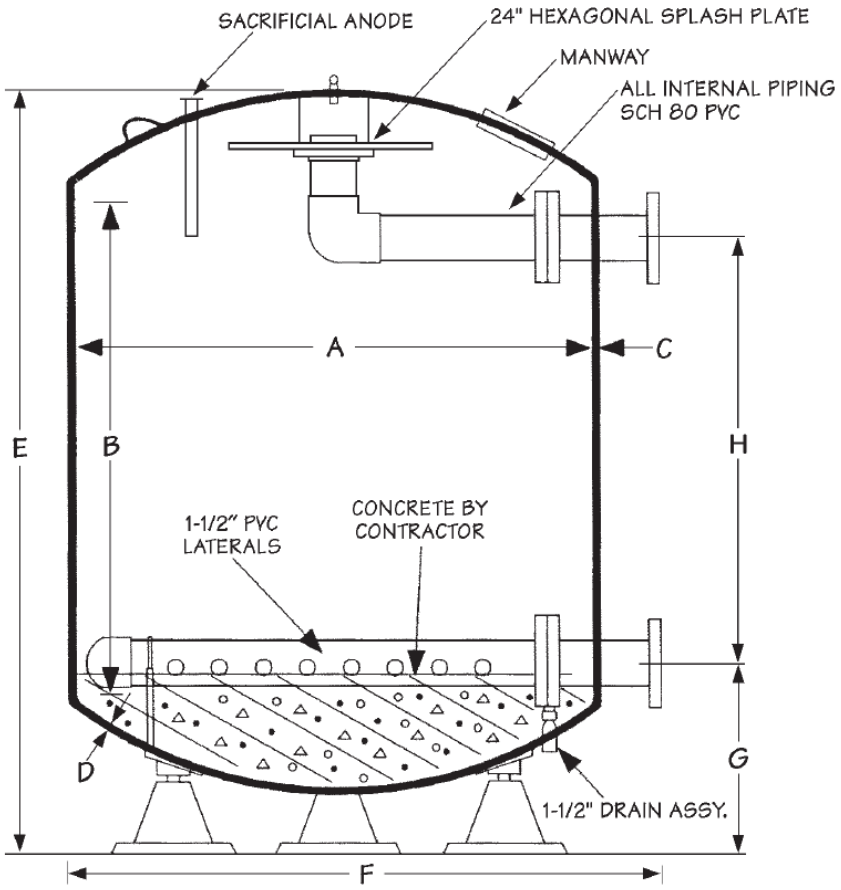
DIMENSIONS



FILTER	A	B	C	D	E	F	G	H
42” x 3”	41-1/2”	48”	1/4”	1/4”	69” +/- 1”	47”	15” +/-1”	30-1/4”
42” x 4”	41-1/2”	48”	1/4”	1/4”	69” +/- 1”	47”	15” +/-1”	30-1/4”
48” x 4”	47-1/2”	48”	1/4”	1/4”	69” +/- 1”	53”	16” +/-1”	30-1/4”
54” x 4”	53-1/2”	48”	1/4”	1/4”	72” +/- 1”	59”	16” +/-1”	30-1/4”
60” x 4”	59-1/2”	48”	1/4”	1/4”	73” +/- 1”	65”	17” +/-1”	30-1/4”
60” x 6”	59-1/2”	48”	1/4”	1/4”	73” +/- 1”	65”	18” +/-1”	39”
66” x 4”	65-1/2”	48”	1/4”	1/4”	75” +/- 1”	71”	18” +/-1”	30-1/4”
66” x 6”	65-1/2”	48”	1/4”	1/4”	75” +/- 1”	71”	19” +/-1”	39”
72” x 6”	71-1/2”	48”	1/4”	1/4”	76” +/- 1”	77”	18” +/-1”	39”
78” x 6”	77-1/2”	48”	1/4”	1/4”	77” +/- 1”	83”	19” +/-1”	39”
84” x 6”	83-3/8”	48”	5/16”	5/16”	78” +/- 1”	89”	19” +/-1”	39”
84” x 8”	83-3/8”	60”	5/16”	5/16”	90” +/- 1”	89”	20” +/-1”	48”
90” x 6”	89-3/8”	48”	5/16”	5/16”	81” +/- 1”	95”	20” +/-1”	39”
90” x 8”	89-3/8”	60”	5/16”	5/16”	93” +/- 1”	95”	21” +/-1”	48”
96” x 6”	95-3/8”	48”	5/16”	5/16”	82” +/- 1”	101”	21” +/-1”	39”
96” x 8”	95-3/8”	60”	5/16”	5/16”	94” +/- 1”	101”	22” +/-1”	48”
102” x 8”	101-1/4”	60”	3/8”	3/8”	96” +/- 1”	107”	23” +/-1”	48”
108” x 8”	107-1/4”	60”	3/8”	3/8”	98” +/- 1”	113”	24” +/-1”	48”
114” x 8”	113-1/4”	60”	3/8”	3/8”	100” +/- 1”	119”	24” +/-1”	48”
120” x 8”	119-1/4”	60”	3/8”	3/8”	102” +/- 1”	125”	25” +/-1”	48”
120” x 10”	119-1/4”	60”	3/8”	3/8”	102” +/- 1”	125”	26” +/-1”	48”

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FILTER SELECTION CHART

CATALOG NO.	TANK DIA.	NO. TANKS	SQ. FT. FILTER AREA	CAPACITY @ 15 GPM/SQ. FT.			CAPACITY @ 20 GPM/SQ. FT.			PIPE SIZE	FILTER MEDIA REQ'D CU. FT.			CONCRETE REQ'D CU. FT.	REQ'D ACCESS	
				GPM FLOW RATE	OVERTURN GALLONS 6 HOURS	OVERTURN GALLONS 8 HOURS	GPM FLOW RATE	OVERTURN GALLONS 6 HOURS	OVERTURN GALLONS 8 HOURS		#4 ROCK 1/4"-1/2"	#3 ROCK 1/8"-1/4"	FINE SAND .45-.55MM		WIDTH	HEIGHT
P251423	42	1	9.39	141	50,760	67,680				3	8	3	16	3	60	75
P251424	42	1	9.39				188	67,680	90,240	4	8	3	16	3	62	75
P251484	48	1	12.31	185	66,600	88,800	246	88,560	118,080	4	10	4	21	5	68	75
P251544	54	1	15.61	234	84,240	112,320	312	112,320	149,760	4	13	5	27	7	74	78
P251604	60	1	19.31	290	104,400	139,200				4	16	6	33	9	80	79
P251606	60	1	19.31				386	138,960	185,280	6	16	6	33	9	85	79
P251664	66	1	23.40	351	126,360	168,480				4	19	8	40	11	86	81
P251666	66	1	23.40				468	168,480	224,640	6	19	8	40	11	91	81
P251726	72	1	27.88	418	150,480	200,640	558	200,880	267,840	6	23	10	47	14	97	82
P251786	78	1	32.76	491	176,760	235,680	655	235,800	314,400	6	27	11	55	18	103	83
P251846	84	1	37.91	569	204,735	272,980				6	31	13	64	27	109	84
P251848	84	1	37.91				758	272,980	363,973	8	31	13	64	27	113	96
P251906	90	1	43.57	654	235,262	313,683				6	36	15	73	31	115	87
P251908	90	1	43.57				871	313,683	418,244	8	36	15	73	31	119	99
P251966	96	1	49.61	744	267,911	357,214				6	41	17	83	37	121	88
P251968	96	1	49.61				992	357,214	476,286	8	41	17	83	37	125	100
P251028	102	1	55.91	839	301,933	402,578	1118	402,578	536,771	8	46	19	94	44	131	102
P251088	108	1	62.74	941	338,778	451,704	1255	451,704	602,272	8	52	21	105	51	137	104
P251148	114	1	69.95	1049	377,744	503,658	1399	503,658	671,544	8	58	24	117	60	143	106
P251208	120	1	77.56	1163	418,824	558,432				8	64	26	130	69	149	108
P251200	120	1	77.56				1551	558,432	744,576	10	64	26	130	69	179	114

For larger flow rates, please contact the factory.

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FACE PIPING DRAWING

(If provided, replace with project specific drawing in lieu of standard configuration shown in the in operations section of this manual)

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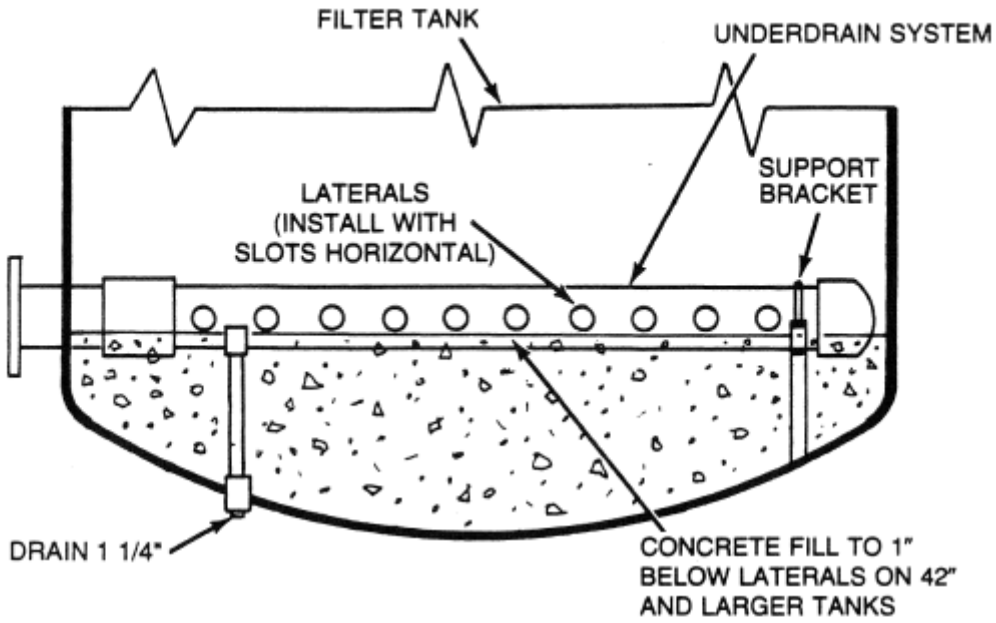
CONCRETE FILL



1. Place masking tape over tapped openings in header before pouring concrete
2. Pour concrete to within 1" of lateral bottom.
3. Allow concrete to cure for 24 hours.
4. Remove tape after concrete is cured.
5. Install laterals with slots HORIZONTAL.
6. Add 12" to 15" of water to vessel covering header/lateral.
7. Begin media loading per chart. SLOWLY add media to vessel allowing water to cushion the media entry until header/lateral assembly is completely covered.

EXTREME CARE MUST BE TAKEN WHILE INSTALLING FILTER MEDIA

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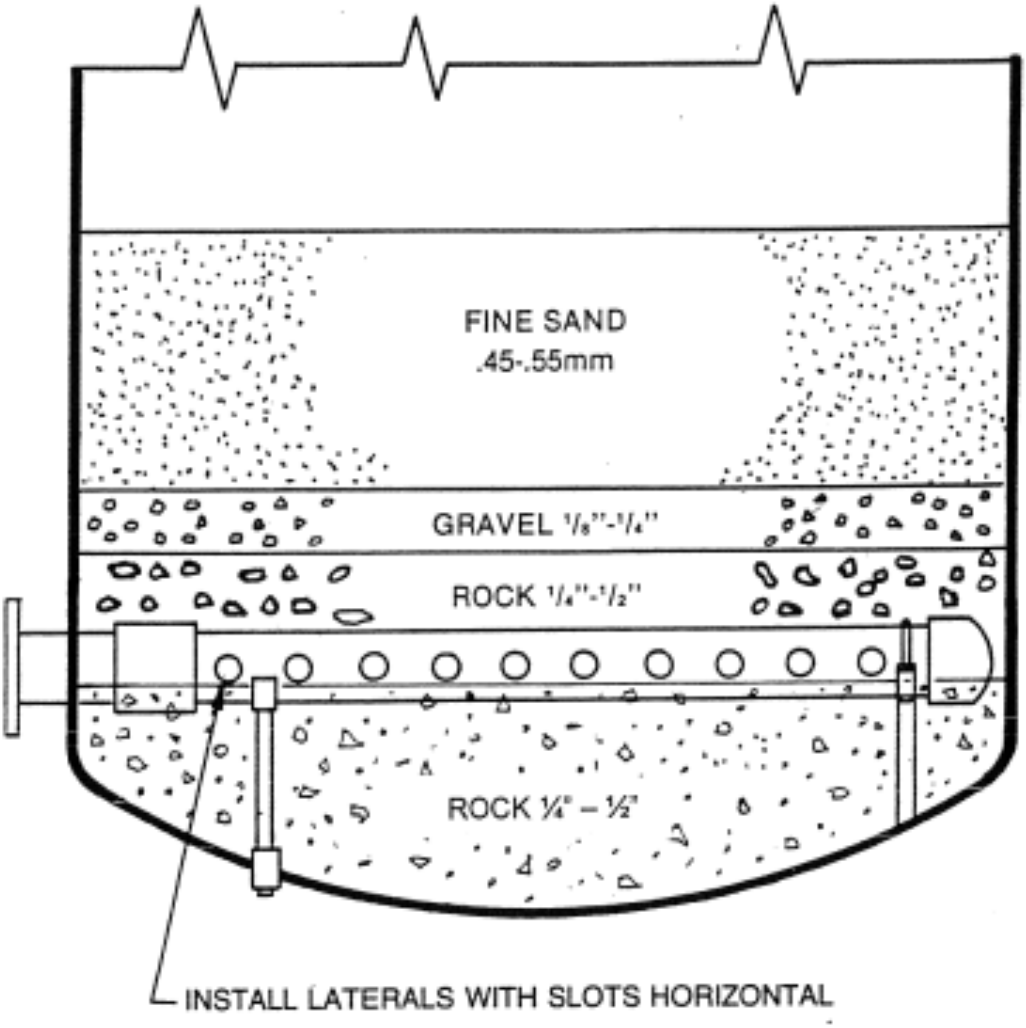
ALTERNATE FILL - ROCK

Instead of concrete for the fill, the contractor may elect to use additional rock as noted below:



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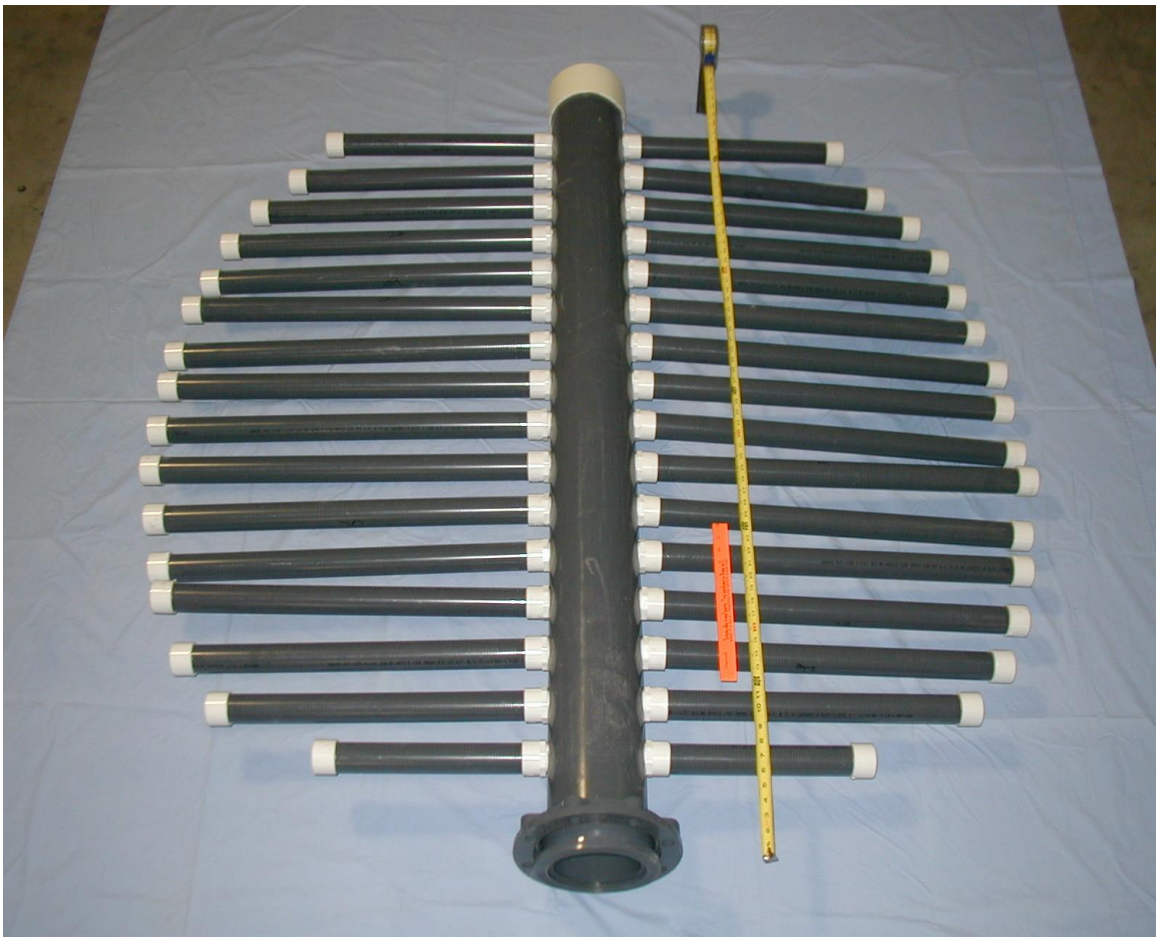
FILTER LATERALS

Working internals shall be Schedule 80 PVC pipe. Influent shall terminate to a perforated distribution header to facilitate an even distribution of the influent. Effluent header to be fitted with 1-1/2” Schedule 80 PVC laterals, machine slotted both sides with 0.016” slots at 10 slots to the inch, maximum lateral spacing of 6” O.C., and fabricated for minimum field installation. Total open area of laterals shall be no less than 6 times the open area of the effluent header and the water velocity through the laterals shall be less than 1 foot per second. Influent and effluent headers are to be supported internally.



Effluent header & lateral assembly from 84” SwimTime Filter

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LATERAL INSTALLATION

Each SwimTime filter system is delivered with influent and effluent headers attached internally. However, to avoid damage during shipping and during media loading, the effluent laterals are not installed. Complete the following for proper lateral installation:

1. Apply masking tape over each threaded outlet in the installed effluent header. Fill bottom of vessel below laterals with required quantity of standard grade concrete to increase vessel stability and fill the void beneath the lateral assembly.
2. Install laterals by turning male threaded end of lateral into female threaded hole in header until tight. It is preferable to tighten laterals until slots in lateral are horizontal.

The quantity and length of laterals supplied with each filter system is shown below. Install laterals in order as listed by filter size, beginning at the outside/capped end of the header, one lateral on each side of header, and progress to the header outlet.

42” filter	**48” filter**	**54” filter**	**60” filter**	**66” filter**	**72” filter**	**78” filter**
2 @ 9”	2 @ 10”	2 @ 11”	2 @ 12”	2 @ 13”	2 @ 14”	2 @ 15”
2 @ 12”	2 @ 13”	2 @ 16”	2 @ 18”	2 @ 19”	2 @ 21”	2 @ 22”
2 @ 13”	8 @ 16”	2 @ 18”	2 @ 20”	2 @ 21”	2 @ 23”	2 @ 25”
4 @ 14”	2 @ 15”	6 @ 19”	2 @ 21”	2 @ 23”	2 @ 25”	2 @ 27”
2 @ 13”	2 @ 13”	2 @ 18”	6 @ 22”	8 @ 24”	2 @ 26”	2 @ 28”
2 @ 12”		2 @ 17”	2 @ 21”	2 @ 23”	8 @ 27”	2 @ 29”
		2 @ 15”	2 @ 20”	2 @ 21”	2 @ 26”	8 @ 30”
		2 @ 14”	2 @ 18”	2 @ 17”	2 @ 25”	2 @ 29”
			2 @ 16”		2 @ 23”	2 @ 28”
					2 @ 18”	2 @ 27”
						2 @ 25”
						2 @ 19”

84” filter	**90” filter**	**96” filter**	**102” filter**	**108” filter**	**114” filter**	**120” filter**
2 @ 16”	2 @ 17”	2 @ 18”	2 @ 19”	2 @ 20”	2 @ 21”	2 @ 21”
2 @ 24”	2 @ 25”	2 @ 27”	2 @ 28”	2 @ 29”	2 @ 30”	2 @ 32”
2 @ 27”	2 @ 28”	2 @ 30”	2 @ 31”	2 @ 33”	2 @ 34”	2 @ 35”
2 @ 29”	2 @ 31”	2 @ 32”	2 @ 34”	2 @ 36”	2 @ 37”	2 @ 39”
2 @ 30”	2 @ 32”	2 @ 34”	2 @ 36”	2 @ 38”	2 @ 40”	2 @ 41”
2 @ 32”	2 @ 34”	2 @ 36”	2 @ 38”	2 @ 40”	2 @ 42”	2 @ 44”
10 @ 33”	2 @ 35”	2 @ 37”	2 @ 39”	2 @ 41”	2 @ 44”	2 @ 45”
2 @ 32”	10 @ 36”	2 @ 38”	2 @ 40”	2 @ 42”	2 @ 45”	2 @ 47”
2 @ 30”	2 @ 35”	8 @ 39”	2 @ 41”	2 @ 44”	4 @ 47”	2 @ 48”
2 @ 29”	2 @ 34”	2 @ 38”	8 @ 42”	10 @ 45”	10 @ 48”	2 @ 49”
2 @ 27”	2 @ 32”	2 @ 37”	2 @ 41”	2 @ 44”	4 @ 47”	2 @ 50”
2 @ 20”	2 @ 31”	2 @ 36”	2 @ 40”	2 @ 42”	2 @ 45”	10 @ 51”
	2 @ 28”	2 @ 34”	2 @ 39”	2 @ 41”	2 @ 44”	2 @ 50”
	2 @ 22”	2 @ 32”	2 @ 38”	2 @ 40”	2 @ 42”	2 @ 49”
		2 @ 30”	2 @ 36”	2 @ 38”	2 @ 40”	2 @ 48”
		2 @ 23”	2 @ 34”	2 @ 36”	2 @ 37”	2 @ 47”
			2 @ 31”	2 @ 33”	2 @ 34”	2 @ 45”
			2 @ 24”	2 @ 29”	2 @ 26”	2 @ 44”
				2 @ 25”		2 @ 41”
						2 @ 39”
						2 @ 35”

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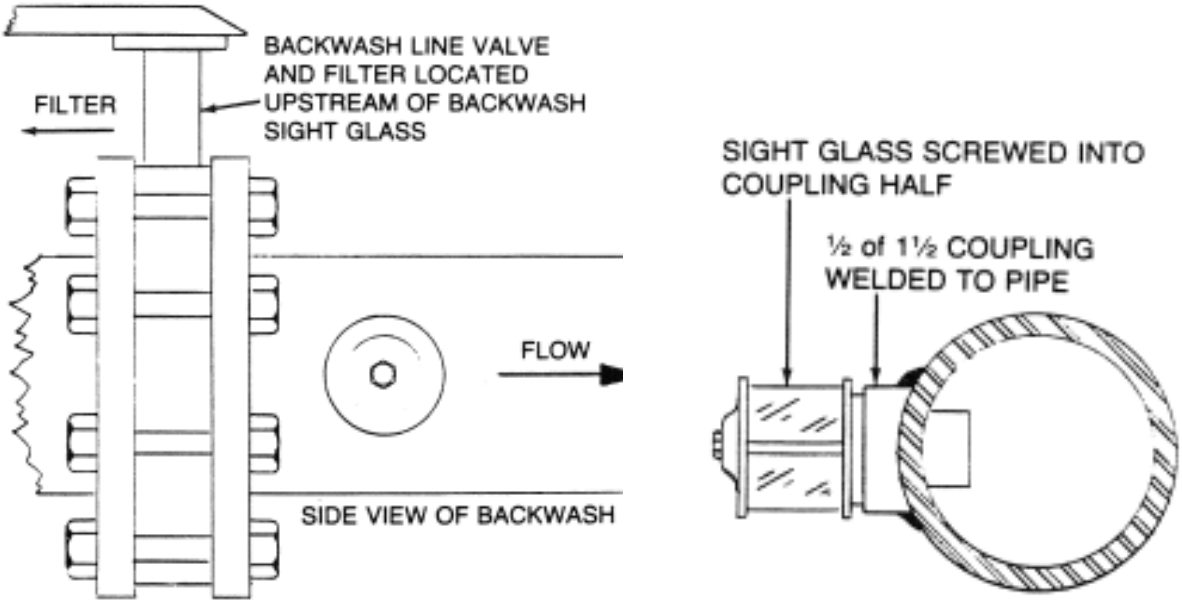
GAUGE PANEL

BACKWASH SIGHT GLASS



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STARTUP

Prior to placing your new filter system into service, United Industries recommends that the newly installed filter system be filled with water slowly, using any available water source. If the pool water is the only available source, fill the filter tank slowly using the system recirculation pump. The discharge of the pump should be “throttled” back so that the initial flow into the filter tank is reduced.

The following is a step-by-step procedure for new system startup:
(It is assumed the installing contractor has verified all plumbing, the electrical connections have been tested, the filter laterals and media have been installed, and the manway covers are properly secured)

1. Open the manual air release valve on each filter tank.

2. Adjust the throttling valve so that flow from the water source will be greatly reduced. The influent valve should be open and the remaining filter valves should be closed.

3. Start the recirculation pump and allow each filter tank to fill slowly.

4. The open air release valve will allow air in the tank to escape. Once water flows from the air release valve the filter tank is full.

5. Stop the recirculation pump and adjust the filter valves to the filter position (see drawing below). It is recommended that the throttling valve remain in place so the initial flow from the pump is reduced.

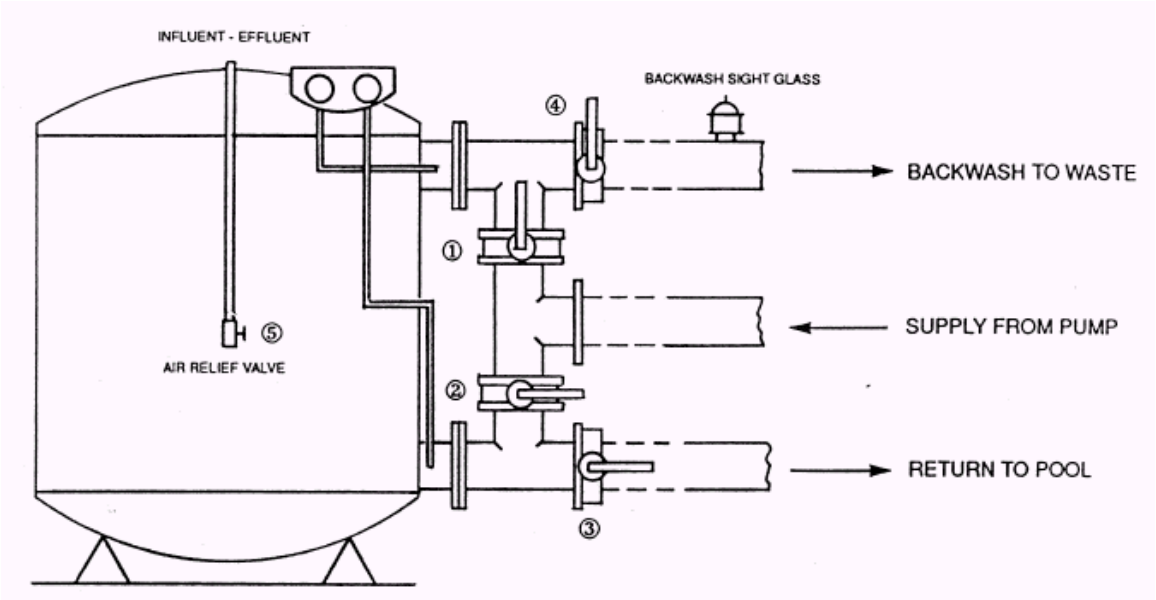
6. Start the recirculation pump and slowly open the throttling valve until you have achieved the desired filtration flow rate. Allow the system to run in the filter mode for a 1 – 3 minute period. This will ensure that any debris left in the lines between the water source and the filter system will be trapped in the filter. Starting the system in the backwash mode is **not** recommended, as any debris left in those lines would be forced backwards through the internals of the filter lateral collection assembly potentially clogging or damaging the laterals.

7. Stop the recirculation pump and adjust the filter valves to the backwash position.

8. Start the recirculation pump. Backwash the system for approximately 3 minutes or until the water flowing through the contractor-installed backwash sight glass is clear.

9. Stop the recirculation pump and adjust the filter valves back to the filter position. Start the recirculation pump. The filter is now in normal filter mode.

MANUAL OPERATION



Valves shown in filter mode

Filter Mode

1. Turn pump off
2. Open valves 1 & 3
3. Close valves 2 & 4
4. Turn pump on
5. If there is any air in the system, open valve #5 until all air is released, then close valve

Backwash Mode

1. Turn pump off
2. Close valves 1 & 3
3. Open valves 2 & 4
4. Turn pump on
5. Backwash until water is clear in sight glass
6. Stop pump, return valves to filter mode, start pump

* Standard face piping shown, arrangement may vary depending on the project requirements.

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MANUAL BACKWASH

After completion of initial startup, the influent and effluent pressures should be recorded. While there is no “standard” for initial start-up pressure readings, there will be a slight difference between the influent (high) pressure and the effluent (low) pressure, usually in the 2 – 6 psi range. This is referred to as the ***pressure differential.***

Throughout the filter cycle, the trapping of dirt and debris in the filter will cause the influent pressure to rise and may result in the effluent pressure dropping effectively increasing the overall pressure differential. Industry standards recommend backwashing when this pressure differential between the influent and effluent reaches 10 – 12 psi.

<u>DO NOT</u> backwash your high rate sand filter on the basis of time!

A common mistake made by operating personnel is to assume a clean filter is a better filter. In fact, the more dirt and debris trapped by the filter, the more effective the filtration becomes. Using the ***pressure differential*** between influent and effluent is the best method to determine the need for backwash.

AUTOMATIC BACKWASH

OPERATION

If equipped with the automatic backwash option, the control panel on the filter provides all controls necessary. The panel is UL® listed with a NEMA 3R corrosion resistant enclosure and includes timers T1 through T6, contacts for field connections of the differential pressure switch (provided with panel), and to one leg from the 120VAC coil on your existing pump motor starter (allows controls to stop/start existing pump). The program will automatically stop the system's pump whenever valves are to be shifted which prevents water hammer, pipe flexing, and risk of damage to collection laterals in the vessel.

The filter system is provided with butterfly valves linked together by an adjustable stainless steel linkage providing concurrent movement from filter mode to backwash mode and back.

Backwash may be initiated as described below, by one of three means:

1. Primary initiation of backwash is by the ΔP switch, factory set to close on a 10 psi difference between the influent and effluent pressures. When this switch closes, a delay timer (T4) is initiated, and the switch must remain closed for the duration of the 30 second delay before backwash is initiated. This prevents momentary pressure surges from triggering an unnecessary backwash.
2. Secondary method of backwash initiation is by depressing the manual backwash push button on the face of the control panel.
3. Finally, the panel is equipped with a 100-hour (field adjustable) "re-setting" backup timer (T5) which will force a backwash every 100 hours in the event that neither ΔP nor manual push button backwash has occurred (ΔP or manual initiation resets T5).

ALARM

An alarm condition will result if the ΔP switch triggers a second backwash before the Timer T6 has reset (15 minutes). When an alarm condition occurs, the filter will automatically shut itself off, energize its alarm light, close the dry contacts provided for remote indication of alarm condition, and require manual attention at the filter's control panel to restart the filter system.

An alarm condition could also result from the ΔP switch being stuck in the closed position.

When an alarm occurs, the operator must investigate the cause of the alarm. The ΔP switch is normally open, and continuity can be verified across control terminals #2 and #3. If there is no continuity, there is most likely a problem with the media bed and media inspection must be conducted. If there is continuity, the ΔP switch must be replaced.

Alarm conditions can be cleared by cycling the ON/OFF switch on the face of the control panel.

When any of the three backwash initiations occur, the programmable relay in the control panel will execute its pre-programmed sequence with Timers as shown:

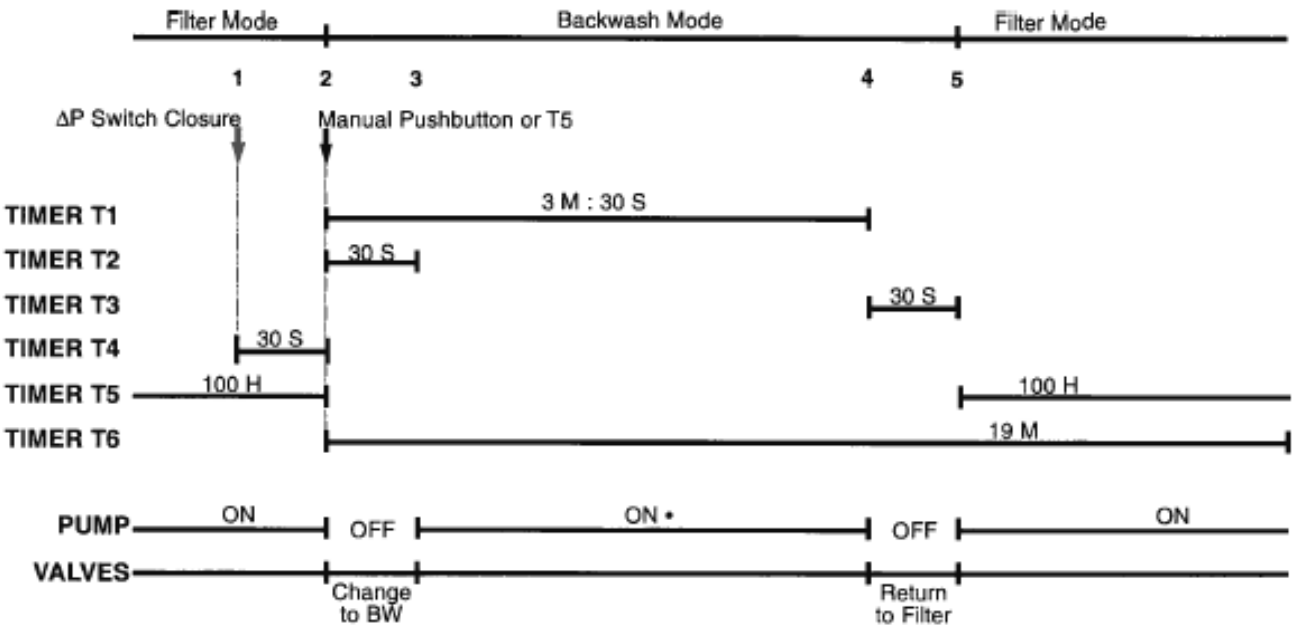
1. Differential pressure switch closes, initiates T4, and remains closed for 30 seconds.

2. T4 elapses, the manual backwash push button is pressed, or T5 elapses; which initiates T1 and T2. When T1 energizes the control relay to the valve actuators, the valves change to backwash position. T2 interrupts the pump motor contactor stopping the pump while the valves rotate.

3. T2 elapses and the pump motor contactor is re-energized restarting the pump. Filter is now in backwash mode for 3 minutes.

4. T1 elapses and T3 is initiated. T3 interrupts the pump motor contactor stopping the pump. T1 de-energizes the control relay to the valve actuators changing the valves back to filter position.

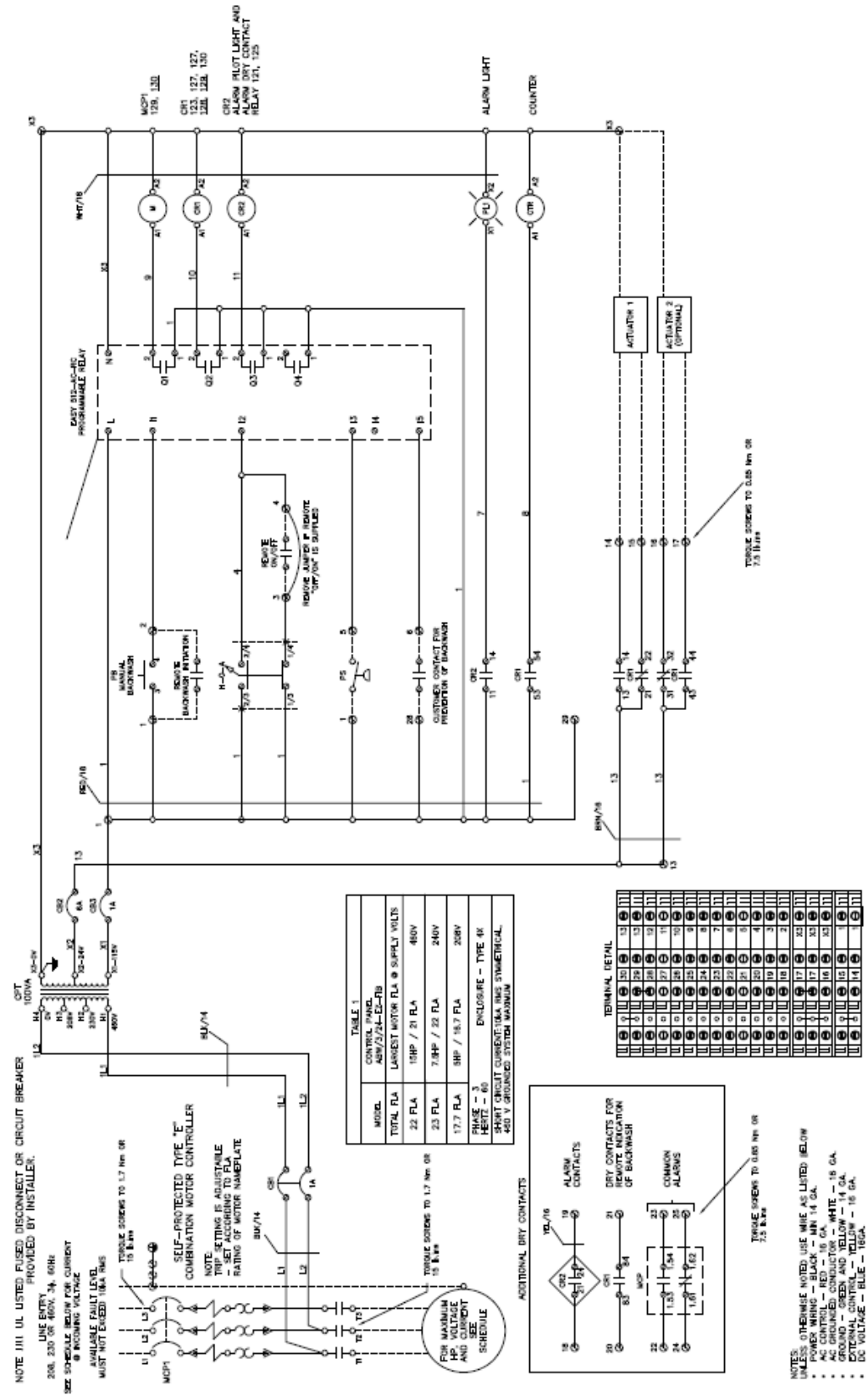
5. T3 elapses and the pump motor contactor is re-energized restarting the pump. Filter is now back to filter mode.



NOTE: T5 and T6 are field adjustable through the PARAMETERS screen on the programmable relay. All other Timers are password protected.

NOTE: On filter systems equipped with optional freshwater backwash from separate source, the pump is not energized for backwash. The factory setting of T2 will be changed to 3:30.

AUTOMATIC BACKWASH GENERIC SCHEMATIC



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POOL RECORDS

DATE	TIME	CHLORINE LEVELS Total	Free	Combined	pH	ALK	CALCIUM HARDNESS	PRESSURE psi Influent	Effluent	TEMP	FLOW	CHEM CONTROLLER Settings ORP	pH

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