



TECHNICAL MANUAL

for
Series
TFW
Water Filter Systems



Complete information for
Engineering, Installation, Operation & Maintenance
of Tower-Flo® Series TFW Water Filter Systems

UNITED
INDUSTRIES
INCORPORATED

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Filter Model Number _____ Filter Serial Number _____

Total Filter Surface Area _____ Filtration Rate: Maximum **20** GPM/ft² of Filter Surface Area

Required clearance for service and maintenance: Vertical height _____ Horizontal width _____

Filter Flow Rate GPM: Filtration _____ Backwash _____ Maximum Working Pressure _____

Warrant only to _____,

the original retail purchaser, that the products which are manufactured by United Industries, Inc. are free from defects in material and/or workmanship for a period of twelve months from the date of documented installation or, in absence of documented installation date, 12 months from the date of factory shipment. The warranty registration card in this manual **MUST** be completed and returned to United Industries, Inc. in order to establish the date of installation and extend the warranty period. If, within the period provided by this warranty, any such product shall prove defective, it shall be either repaired or replaced.

For repair/replacement, the original retail purchaser shall first contact the installing dealer, as soon as possible after discovery of the defect, but in all events prior to the expiration date of the warranty. Upon notification by the dealer, United Industries, Inc., 202 East Cleveland, Sterling, Kansas 67579 will advise the purchaser of the address to which the defective item may be shipped. The serial number and the date of purchase of the item must be included. Regular UPS cost for shipping replacement part(s) to the customer will be borne by United Industries, Inc.; shipping other than regular service will be at the customer's expense. Customer is responsible for cost of shipping defective part(s) back to United Industries.

If an installing dealer was not involved, then the customer should contact United Industries, Inc.

EXCLUSIONS

1. This warranty shall not apply to any failures resulting from: negligence, abuse, misuse, misapplication, improper installation, alteration or modification, chemical corrosion, or improper maintenance.
2. Any items manufactured by other companies and used by United Industries in its products may carry warranties by the original manufacturers.
3. United Industries is not liable for incidental or consequential damages, loss of time, inconvenience, incidental expenses, labor or material charges in connection with removal or replacement of the equipment.

United Industries is not responsible for any implied warranties or representations by others, and the foregoing warranty is exclusive and in lieu of all warranties provided herein. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

IMPORTANT

Read and fully understand the WARNING labels on the equipment. **DO NOT OPERATE** this unit if any unsafe conditions exist.

WARNING

THIS FILTER SYSTEM OPERATES UNDER PRESSURE. DO NOT OPEN WHILE PUMP IS RUNNING AND/OR UNTIL ALL PRESSURE IS RELEASED THROUGH AIR RELIEF VALVE. SECURELY TIGHTEN VESSEL AND STRAINER CLAMP ASSEMBLIES ACCORDING TO MANUFACTURER'S INSTRUCTIONS. RAISE PRESSURE SLOWLY. DO NOT EXCEED THE MAXIMUM WORKING PRESSURE OF THE VESSEL.

DANGER! EXTREME CARE MUST BE TAKEN DURING PRESSURE TESTS. FAILURE TO FOLLOW THESE INSTRUCTIONS EXPLICITLY CAN RESULT IN PERSONAL INJURY.

Continuous sidestream filtration for removal of suspended solids is one, very important portion of a total water quality management program, which should also include the services of competent water treatment professionals for proper control of water hardness, pH, and biological contaminants.



Warranty Registration

EXTEND YOUR WARRANTY!

COMPLETE AND RETURN THIS WARRANTY REGISTRATION CARD WITHIN 10 DAYS OF INSTALLING YOUR FILTER TO EXTEND YOUR WARRANTY PERIOD!

Congratulations on your selection of a TOWER-FLO® Water Filter System by United Industries, Inc.!

Your TOWER-FLO Filter is designed and manufactured for years of virtually maintenance-free service. As with any mechanical equipment, however, components can and do fail. If you ever have a problem, Tower-Flo is committed to supporting you and helping you get your filter back in operation as soon as possible, whether it remains under warranty or not.

Your TOWER-FLO Filter is covered by a limited warranty as stated on the previous page. This warranty is for 12 months from the date of documented installation or, in the absence of documented installation date, 12 months from the date of factory shipment. **In order to receive the maximum warranty benefit, you must complete and return the Warranty Registration Card below within 10 days of installation to register your warranty and ensure your warranty rights.** Failure to complete and return this Warranty Registration Card will result in your warranty being limited to 12 months from the date of factory shipment.

For Your Records

Date of Installation _____ Date Warranty Registration Card Mailed _____

Complete the card below. Cut along dotted line. Return to:

Warranty Registration
Tower-Flo Filter Division
United Industries, Inc.
P. O. Box 58
Sterling, KS 67579

TOWER-FLO® Manufacturer's Warranty Registration Card

Filter Serial Number: _____

Purchased by: Company: _____

Address: _____

City: _____ State: _____ Zip: _____

Contact Person: _____ Phone: _____

Date of Installation: _____

The information below provides a general description of the main components of Series TFX filter systems. Details of standard, optional, and additional components are found in the **Project Specifications** document, on the following pages.

MAIN COMPONENT DESCRIPTIONS

A. HIGH RATE SAND FILTER VESSEL

This permanent media, high-rate sand filter is a vertical pressure vessel manufactured of filament wound fiberglass with PVC internals and polypropylene laterals. It has a special influent baffle in the top of the tank, a bed of filter sand, and a mechanical underdrain system which collects the filtered water and directs it to the return piping system. The filter operates under pressure. When closed properly and operated without air in the water system, this filter will operate safely. The system is equipped with a manual air release valve, an automatic pressure relief valve set at 50 psi, and 0-60 psi influent and effluent pressure gauges mounted in a common panel. Vessel is rated for 50 psi maximum allowable working pressure and 104 F° maximum allowable working temperature.

B. VALVE ASSEMBLY

The valves are 24 volt, electric actuated, CPVC, 3-way diverter valves.

C. CONTROL PANEL

The control panel provides all controls for automatic backwash operation. The standard control panel is UL® and cUL® Labeled in a NEMA 4X corrosion resistant fiberglass enclosure. Backwash is initiated by: 1) differential pressure switch (external to the enclosure); 2) manual backwash pushbutton on face of control panel; or, 3) 100 hour “re-setting” timer (ΔP switch closure or manual initiation resets timer) for backup initiation. The sequence of the operation is described under the Operation section of this manual. The controls automatically stop the system’s pump whenever valves are to be shifted which prevents water hammer, pipe flexing, and the risk of damage to collection laterals in the vessel. Standard control panels include five sets of dry contacts for BMS interface: 1) alarm on repeat backwash; 2) remote pump on/off with HOA switch.; 3) remote indication of common alarm (motor trip indication); 4) remote indication of backwash operation; 5) remote initiation of backwash; and 6) conductivity interface.

D. PUMP

The pump has a cast brass impeller, motor bracket, and volute with stainless steel fasteners to resist corrosion. The drip-proof, cool running, mechanical seal virtually eliminates burnout and provides easy access for replacement. The pump is self-priming.

E. MOTOR

The totally enclosed motor with its external fan-cooled construction allows for operation in noncombustible, dusty, dirty atmospheres. It is double shielded with pre-lubricated ball bearings on both ends, has a NEMA 56C frame, a high tensile steel shaft, enclosed in a heavy gauge rolled steel case and is rated at a service factor of 1.15 at 40° C over ambient. Motors are UL approved and CSA stamped.

F. STRAINER

The pump suction strainer assembly has a cast brass body, brass lid, and a cyclolac strainer basket. The lid is held in place by two brass lockhandles and includes an o-ring for positive seal.

G. MEDIA

Filter media is shipped with the unit for field installation. The filter media is quartzite or silica with a relative size of .45 to .55 mm. Clean filter media will remove particles 20 microns in size and larger. Accumulated material on the top of the media bed, called a filter cake, contributes to finer particle removal as the filter becomes “dirtier”. Removal of over 99% of 10 micron particles and 90% of 5 micron particles can be expected over the course of a filter cycle.

100 GPM MAX FLOW RATE 50 PSI WORKING PRESSURE

Model Number	Base Dimensions	HP	Max GPM	TDH Ft.	Full Load Amp Draw								Media		Operating Weight in Lbs
					Single Phase				Three Phase				Area SqFt	Vol CuFt*	
					S.F.	115V	208V	230V	S.F.	208V	230V	460V			
TFW-20	36" X 48"	1	44	55	1.15	12.0	6.2	6.0	1.15	3.4	3.2	1.6	2.2	2.0	556
TFW-24	36" X 48"	1.5	65	50	1.0	17.0	8.5	8.5	1.15	4.4	4.2	2.1	3.14	3.0	727
TFW-30	36" X 48"	3	100	45	1.0	-	14.0	13.0	1.15	8.4	7.6	3.8	5.0	4.5	1077

*1 Cubic foot of media = 100 lbs.

TOWER-FLO® Series TFW self-contained filter plants shall consist of the following major components: base, pump, motor, strainer, facepiping, valve, controls, and filter vessel. The system shall be shipped as a complete factory assembled and tested unit. Filter media shall be shipped with the unit for field installation.

Project: _____ Date: _____

The TOWER-FLO® Series TFW Model being specified for this project is a TFW-____ with a maximum filter rate of ____ GPM. ____ unit(s) are specified and each unit shall be equipped with the following components:

COMPONENT SPECIFICATION

- BASE**
 - ___ **Standard:** High density polyethylene.
 - ___ **Option:** Structural steel, primed and painted.
 - ___ **Option:** Type 304 stainless steel.
- PUMP**
 - ___ **Standard:** Self-priming; close grain cast and machined brass volute, impeller, and pump-to-motor coupling; close coupled to a TEFC motor; and capable of ____ GPM at ____ feet TDH.
- MOTOR**
 - ___ **Standard:** TEFC, heavy gauge rolled steel case, NEMA 56C frame, Class F insulation, double shielded prelubricated ball bearings; UL® and CSA® listed; ____ HP; and at the following primary VAC, phase and Hz: _____.
 - ___ **Option:** 575 VAC primary power supply, including control panel conversion.
- STRAINER**
 - ___ **Standard:** Basket type, brass body, ABS basket, brass cover with o-ring, held in place by two brass lock-handles.
- FACEPIPING**
 - ___ **Standard:** Schedule 80 PVC; backwash sight glass; influent / effluent pressure gauges, 0-60 psi, liquid-filled.
 - ___ **Option:** Fresh water backwash from municipal water supply; includes controls modification to stop pump during backwash; flow control valve for field installation; end-user responsible for addition of pressure regulator (maximum 30 psi) and/or backflow preventer, if required.
 - ___ **Option:** Fresh water backwash from static water supply using pump to assist.
- VALVE**
 - ___ **Standard:** CPVC, 3-way, diverter valves with separate 24 VAC electric actuators.
 - ___ **Option:** Brass, 3-way ball valves with single electric actuator and mechanical linkage.
- VESSEL**
 - ___ **Standard:** ____" diameter, filament wound fiberglass with PVC internals and polypropylene laterals; fitted with tank drain, manual air relief valve, 50 psi automatic pressure relief valve; 50 psi maximum allowable working pressure; and 104 F° maximum allowable working temperature. Maximum flow rate _____ GPM at 20 GPM per square foot filter surface area.

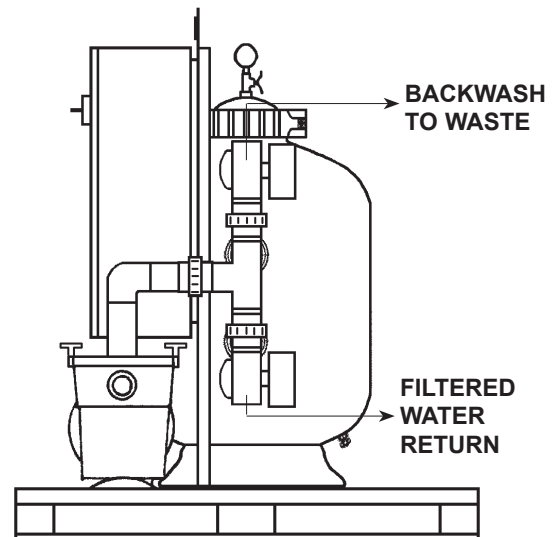
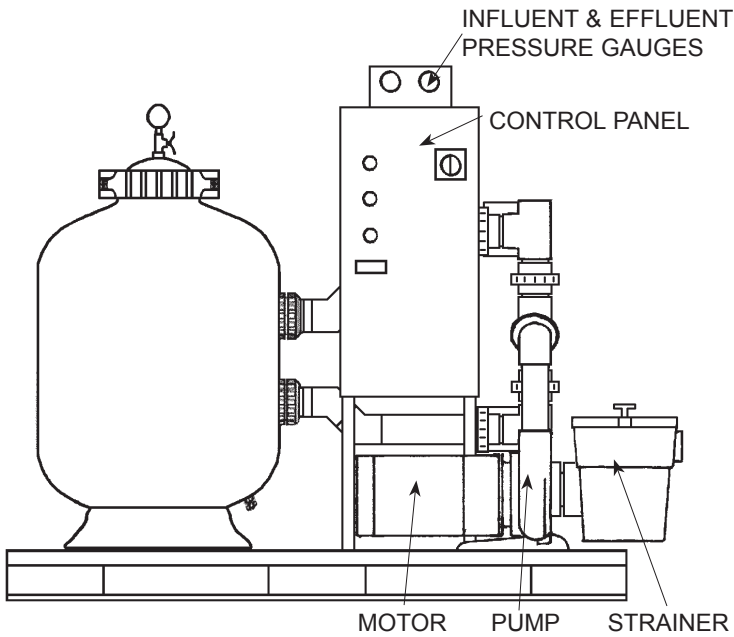
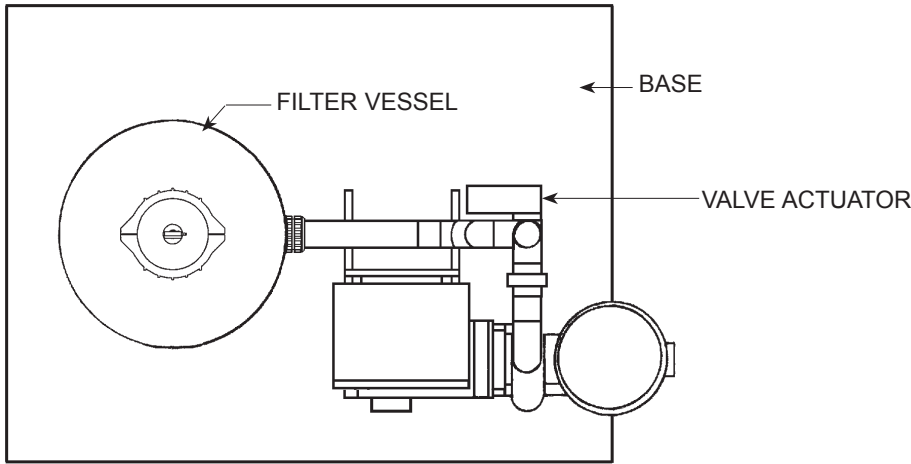
COMPONENT SPECIFICATION

- CONTROLS** ___ **Standard** **Three phase or single phase, Automatic backwash control panel**, UL® and cUL® Labeled, in a NEMA 4X fiberglass enclosure including: motor starter with thermal overload and short circuit protection; fuseless branch and control circuit protection; transformer to convert primary supply to 24 and 120 VAC control power; through-the-door disconnect; programmable relay with program of operation, 7-year battery backup and external memory card backup; HOA switch for pump motor; differential pressure switch (external to the enclosure) for primary backwash initiation; manual backwash initiation pushbutton; backwash counter; and contacts for ΔP repeat closure shut-off and alarm, common alarm (motor trip indication), remote indication of backwash operation, remote backwash initiation, and conductivity interface. Program features 30-second time delay in ΔP switch circuit and 100 hour "re-setting" timer (ΔP switch closure or manual initiation resets timer) for backup backwash initiation.
- ___ **Option:** Backwash lockout between/among ___ units; to prevent simultaneous backwash of multiple filter units; 0-60 minute adjustable lockout time delay program; field connection between/ among control panels by others.
- ___ **Option:** Contacts for connection to BMS, additional specifications required from owner.
 ___ local (lights) and remote (contacts) indication of filter or backwash operating mode.
 ___ other (be specific) _____.
- ___ **Option:** Manual backwash; ___ single-phase; ___ three-phase.
- MEDIA** ___ **Standard:** Quartzite or silica in nature, hard, not smooth, uniformity coefficient of 1.7, relative size of .45 to .55 mm, containing no more than 5% flat particles or more than 1% clay, loam dust, or other foreign material. Media weighs 100 lbs per cubic foot.

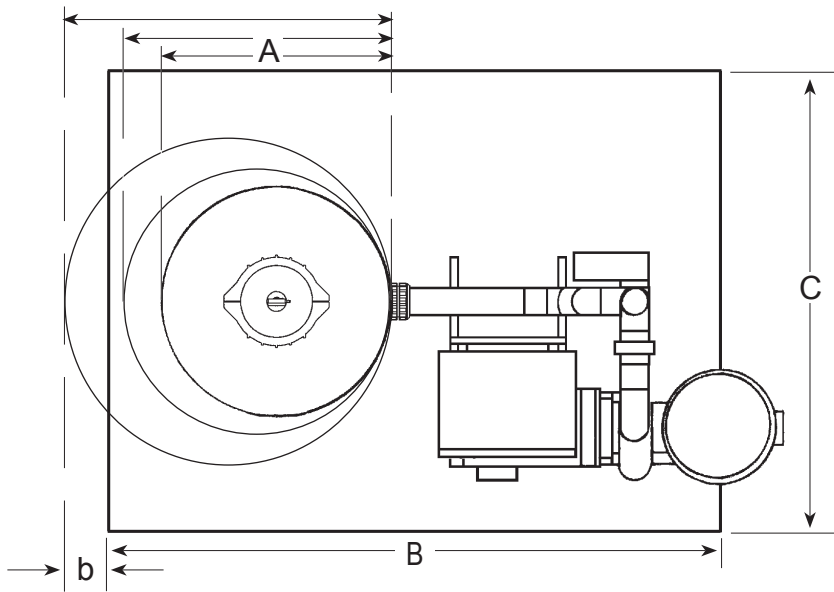
COMMON ADDITIONAL EQUIPMENT:

- NOZZLES** ___ **Sweeper-Eductor Nozzle**, 1/4" MPT, ABS plastic, quantity of _____.
- HOLDERS** ___ **Clip-On Nozzle Holder**, quantity of _____; for ___ 1-1/4"; ___ 1-1/2"; or ___ 2" PVC pipe.
- SURGE TANK** ___ **Polyethylene tank** for backwash surge capture and gravity release to closest drain: _____ gallon capacity, _____" diameter x _____" high, with a _____" diameter lid in top head and a 2" FPT drain bulkhead fitting.
 ___ **Bulkhead fitting, additional**, for inlet from filter ___ 2", ___ 3", or ___ 4", for field installed by others;
 ___ **Manual ball valve**, 2", 2-way, ___ Sch 40 PVC, ___ Sch 80 PVC, ___ brass, for field installation by others on drain piping from tank for isolation and/or throttling.
- LIQUID LEVEL** ___ **Liquid level control assembly** for backwash surge tank to interrupt filter pump if/when surge tank nears capacity. Includes: Gems Series 16M liquid level controller mounted in separate NEMA 3R enclosure requiring separate 120 V power supply factory mounted on filter's control panel bracket (unless otherwise specified); sensor; 3 trimmable probes (L, H, and Ground); field wiring from sensor to LLC enclosure by others. Also includes additional contacts for remote pump on/off in filter control panel.
 ___ **Liquid level control column assembly**; 2" Sch 80 piping assembly mounted on side of poly tank to isolate liquid level probes from turbulence in poly tank.
- SOLENOID VALVE** ___ **Solenoid valve** for backwash siphon break, _____", bronze, with 24 VAC solenoid.

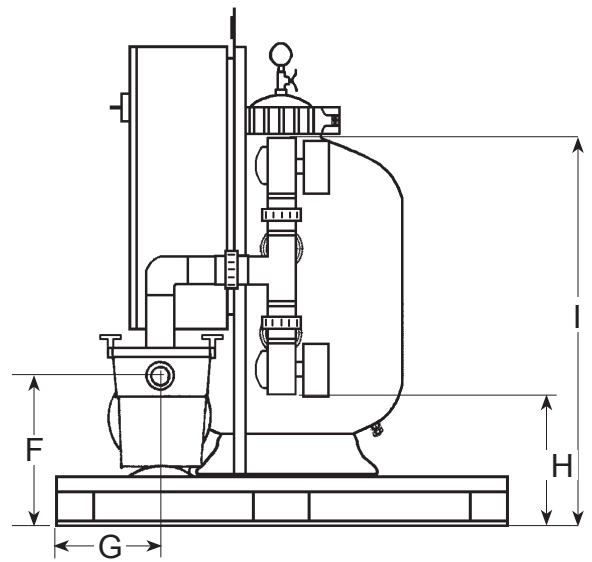
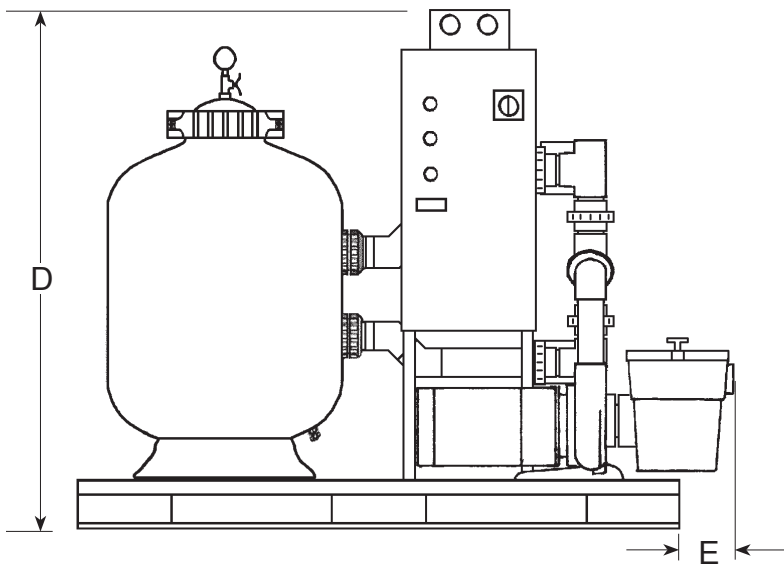
NOTE: Backwash flow rate, irrespective of water source, must be no less than 75% and no greater than 100% of the vessel's designed maximum gpm. Backwash duration is factory preset at 3 minutes and is field adjustable.



DESCRIPTION	MODEL NO.		
	TFW-20	TFW-24	TFW-30
Complete assembly:			
Single Phase	P297520	P297524	P297530
Three Phase	P297521	P297525	P297531
Sub-assemblies:			
Vessel assembly	P297620	P297624	P297630
Valve assembly	M870460X	M870460X	M870460X
Pump assembly:	P171922A	P171938A	P171983A
Base	P295262	P295262	P295262



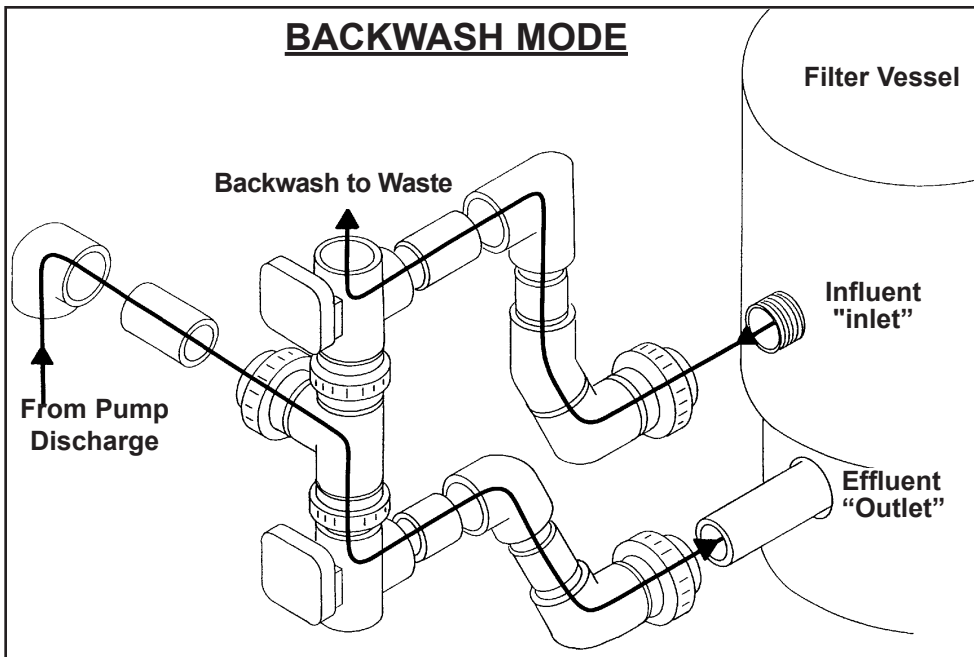
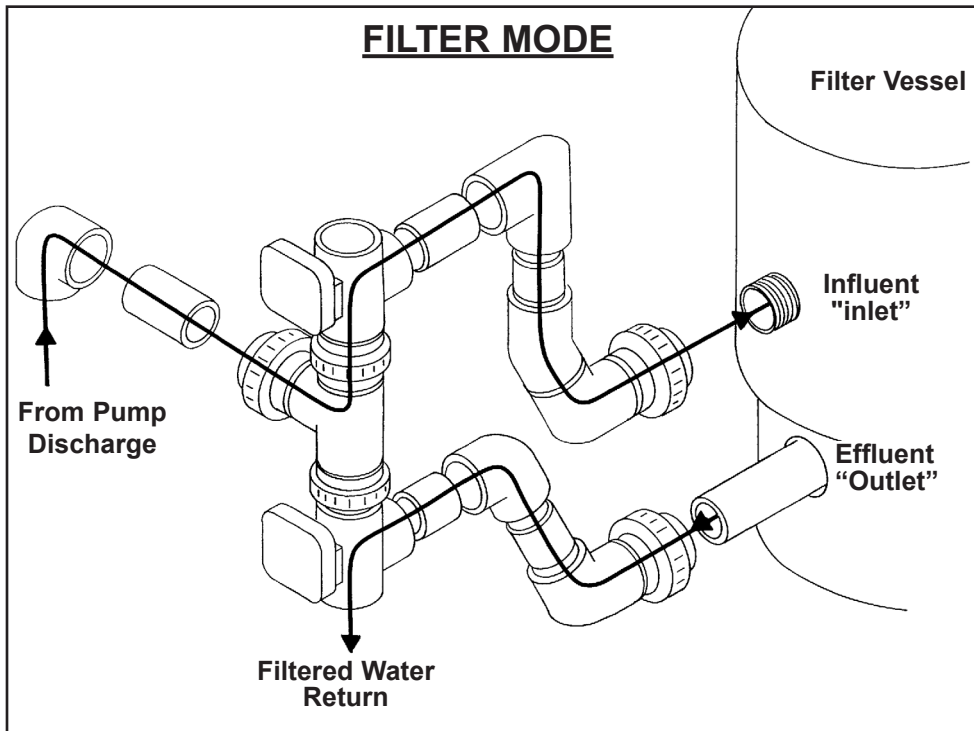
Suction Connection 2" FPT
 Backwash Discharge 2" MPT
 Filter Discharge 2" MPT



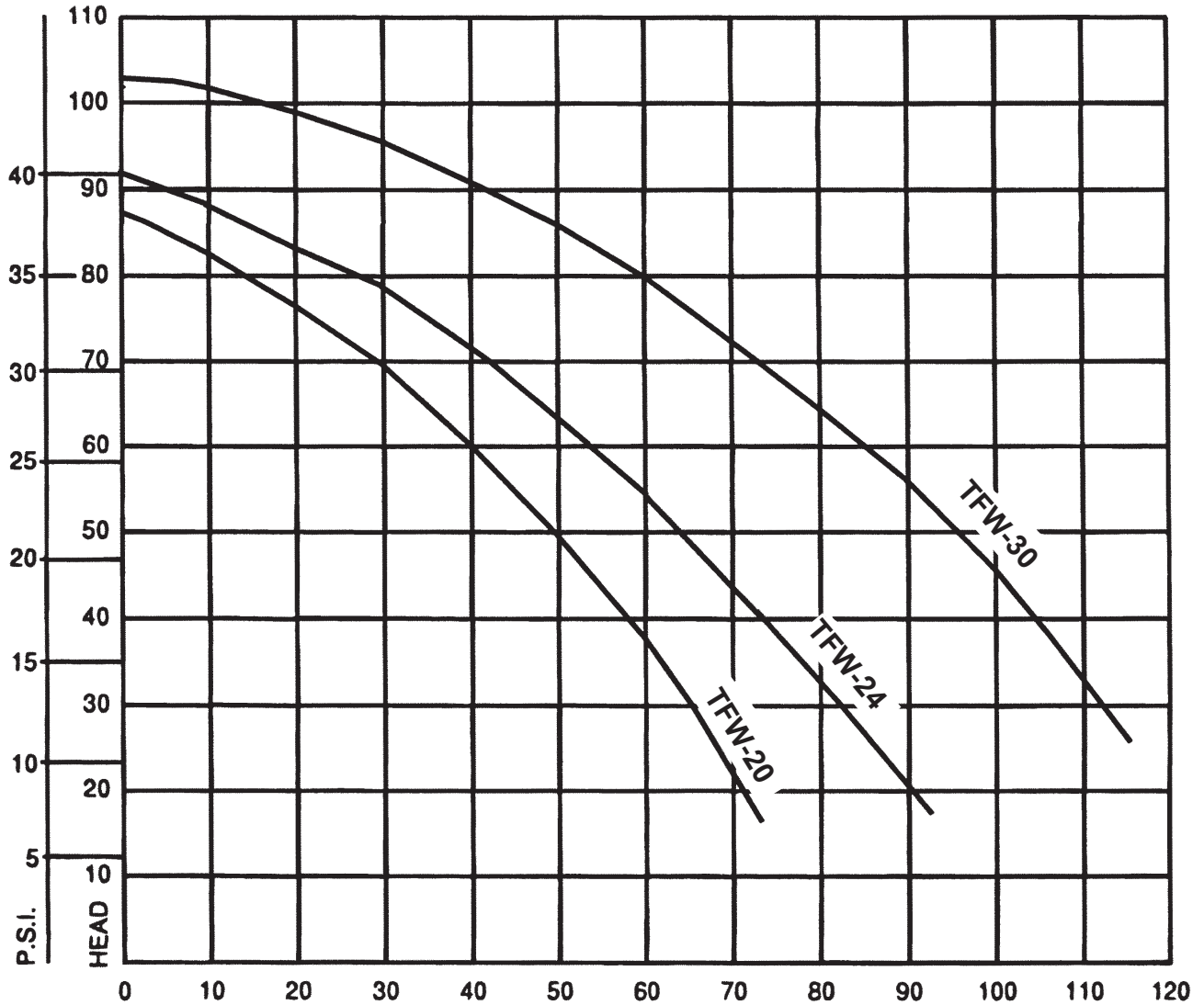
DIMENSION	A	B	b	C	D	E	F	G	H	I
TFW-20	20	48	n/a	36	49.5	1.75	14	7.5	12.75	39.75
TFW-24	24	48	n/a	36	49.5	4.25	14	7.5	14.5	41.75
TFW-30	30	48	3	36	49.5	4.25	14	7.5	15.25	43

All dimensions are in inches.

NOTE: All dimensions are approximate and must be field verified.

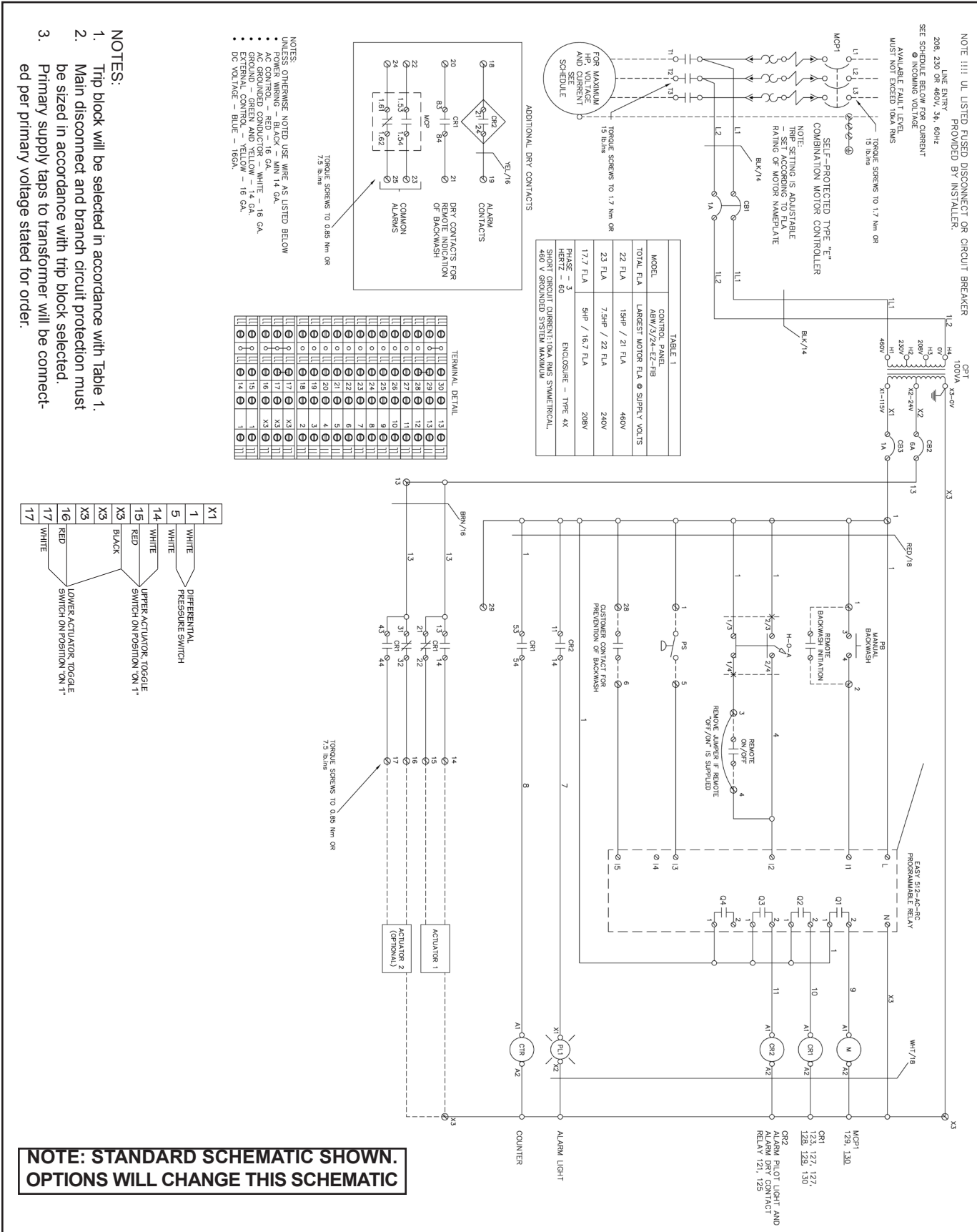


PERFORMANCE CURVE



CAPACITY IN GALLONS PER MINUTE

Curve based on 3450 RPM impeller speed. 50 cycle units available.



Conservation of the world's freshwater resources is a growing global concern. Tower-Flo, recognizing the contribution its solids removal devices for condenser water systems make to waste water streams, announces a new **"conductivity interface"** feature included in its control panels. This feature establishes an interface capability with an automatic water treatment controller designed to permit that controller to:

- prevent the backwash of a filter or the purge of a separator;
- initiate the backwash of a filter or the purge of a separator; and
- receive a signal from the filter or separator controls indicating each time a backwash or purge occurs.

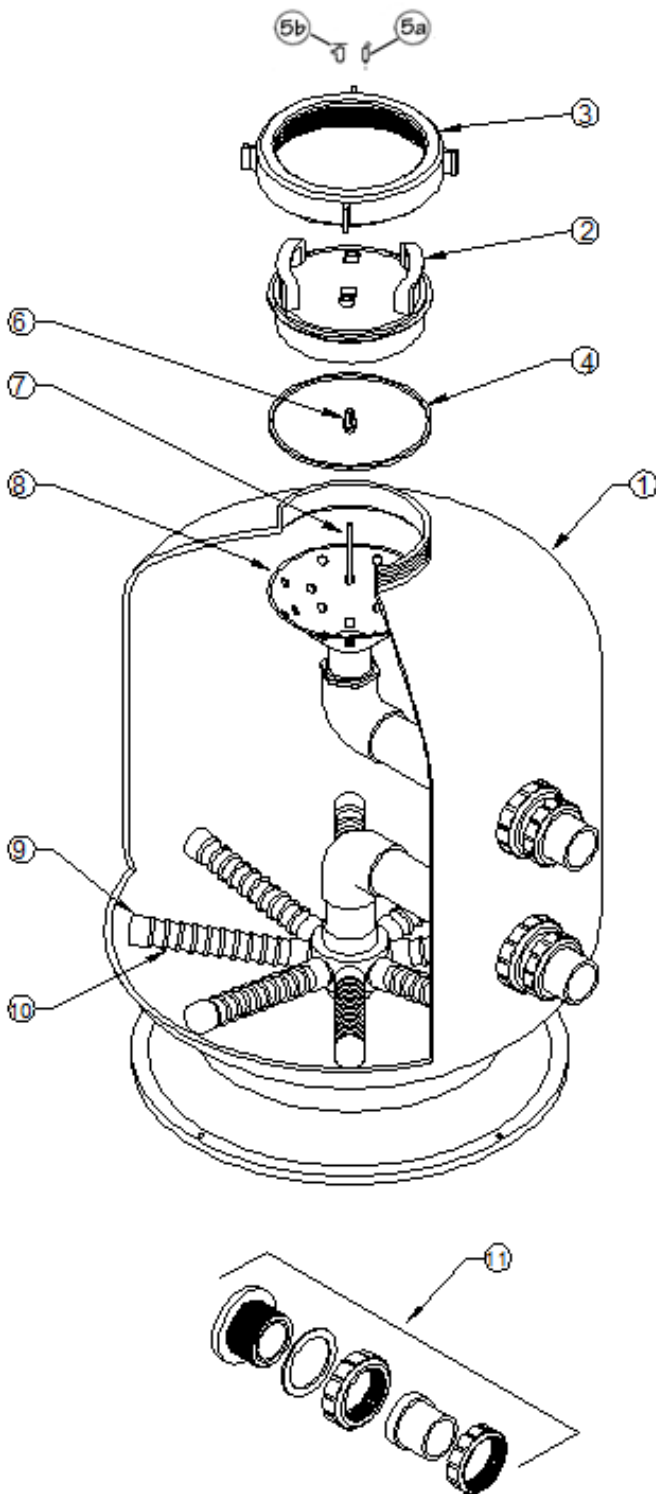
Tower-Flo's new conductivity interface feature overcomes one of the most commonly raised objections about filters and separators for condenser water systems - "backwash and purge wastes too much expensively treated water".

Tower-Flo's new conductivity interface in a sand filter control panel allows an automatic water chemistry controller to be programmed with:

- a low conductivity setpoint below which none of the three filter backwash initiation sources (ΔP switch, manual pushbutton, 100 hour backup timer) can cause a backwash; a filter backwash cannot inadvertently drive the conductivity too low.
 - that low conductivity set point should close a dry contact wired to the available contacts in the filter's control panel, which will open when conductivity exceeds that low set point.
- a high conductivity setpoint that will initiate a backwash;
 - that setpoint should be higher than the setpoint controlling the water treatment blowdown valve;
 - filters deliver their best particle retention when they are at their dirtiest; consequently, the filter should never be considered as the primary blowdown device;
- use the signal of a backwash to cause the addition of a pre-set volume to a totalized volume of water going to waste.

With Tower-Flo's conductivity interface in a centrifugal separator control panel, an automatic water chemistry controller can control the separator's purge valve the same way it would control a blow-down valve.

This feature is now standard in control panels for Tower-Flo sand filter Series TFW, TFH & TFB. This feature is an option now available on Tower-Flo centrifugal separator Series TFSP and the optional automatic purge for Series TFS, and will become standard in the very near future.



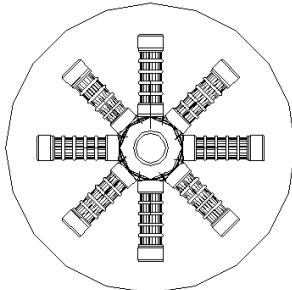
Item	Part #	Description	Qty
1	P297620	Filter vessel w/internals, 20"	1
	P297624	Filter vessel w/internals, 24"	1
	P297630	Filter vessel w/internals, 30"	1
2	P297640	Lid 8" clear	1
3	P297641	Locking ring, lid	1
4	P297642	O-ring, lid, 8"	1
5a	M871813	Valve, pressure relief, 50 PSI	1
5b	P297405	Valve, air release, brass	1
ns	P297405T	Tubing, 3/8" ID, for air release valve	3.5
ns	P297651	Air bleed screen	1
7	P297652	Air bleed assembly	1
8	P297655	Diffuser	1
9	P297730	Lateral cap	*
10	P297735*	Lateral segment, 3-1/2" long	*
	P297745*	Lateral segment, 4-1/2" long	*
ns	P297731*	Fishtail, short	*
ns	P297732*	Fishtail, long	*
ns	P297733*	Hub, 20"	1
ns	P297734*	Hub, 24" & 30"	1
ns	P297653	Drain assembly	1
ns	P181036	Gauge, 0-60psi, 2.5", liquid filled	2
ns	P181120	Backwash sight tube, 2"	1

*NOTE: See next page for quantity & arrangement details

ns = not shown

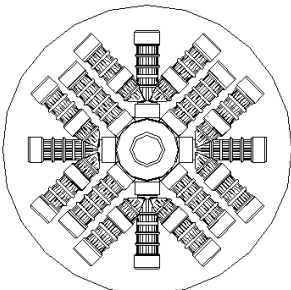
TFW Lateral Components: As built before 1/1/2013 and after 1/1/2013

TFW-20 Before 1/1/2013



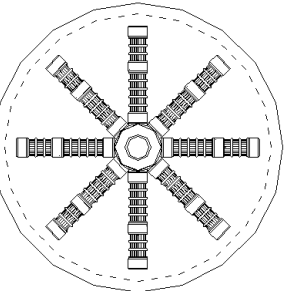
P297733	Manifold (hub) 20" vessel	1
P297745	Lateral segment 4-1/2" long	8
P297730	Lateral cap	8

TFW-20 After 1/1/2013



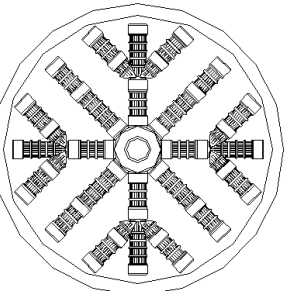
P297733	Manifold (hub) 20" vessel	1
P297745	Lateral segment 4-1/2" long	4
P297735	Lateral segment 3-1/2" long	8
P297732	Lateral segment fishtail, long	4
P297730	Lateral cap	16

TFW-24 Before 1/1/2013



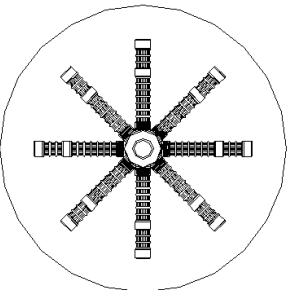
P297734	Manifold (hub) 24" & 30" vessel	1
P297745	Lateral segment 4-1/2" long	8
P297735	Lateral segment 3-1/2" long	8
P297730	Lateral cap	8

TFW-24 After 1/1/2013



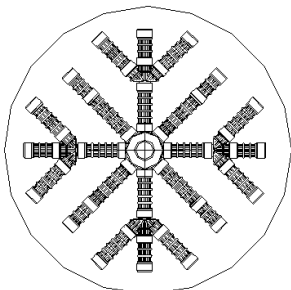
P297734	Manifold (hub) 24" & 30" vessel	1
P297745	Lateral segment 4-1/2" long	4
P297735	Lateral segment 3-1/2" long	16
P297732	Lateral segment fishtail, long	4
P297730	Lateral cap	16

TFW-30 Before 1/1/2013



P297734	Manifold (hub) 24" & 30" vessel	1
P297755	Lateral segment 5-1/2" long	8
P297735	Lateral segment 3-1/2" long	8
P297730	Lateral cap	8

TFW-30 After 1/1/2013



P297734	Manifold (hub) 24" & 30" vessel	1
P297755	Lateral segment 5-1/2" long	4
P297745	Lateral segment 4-1/2" long	12
P297735	Lateral segment 3-1/2" long	8
P297731	Lateral segment fishtail, short	4
P297730	Lateral cap	16

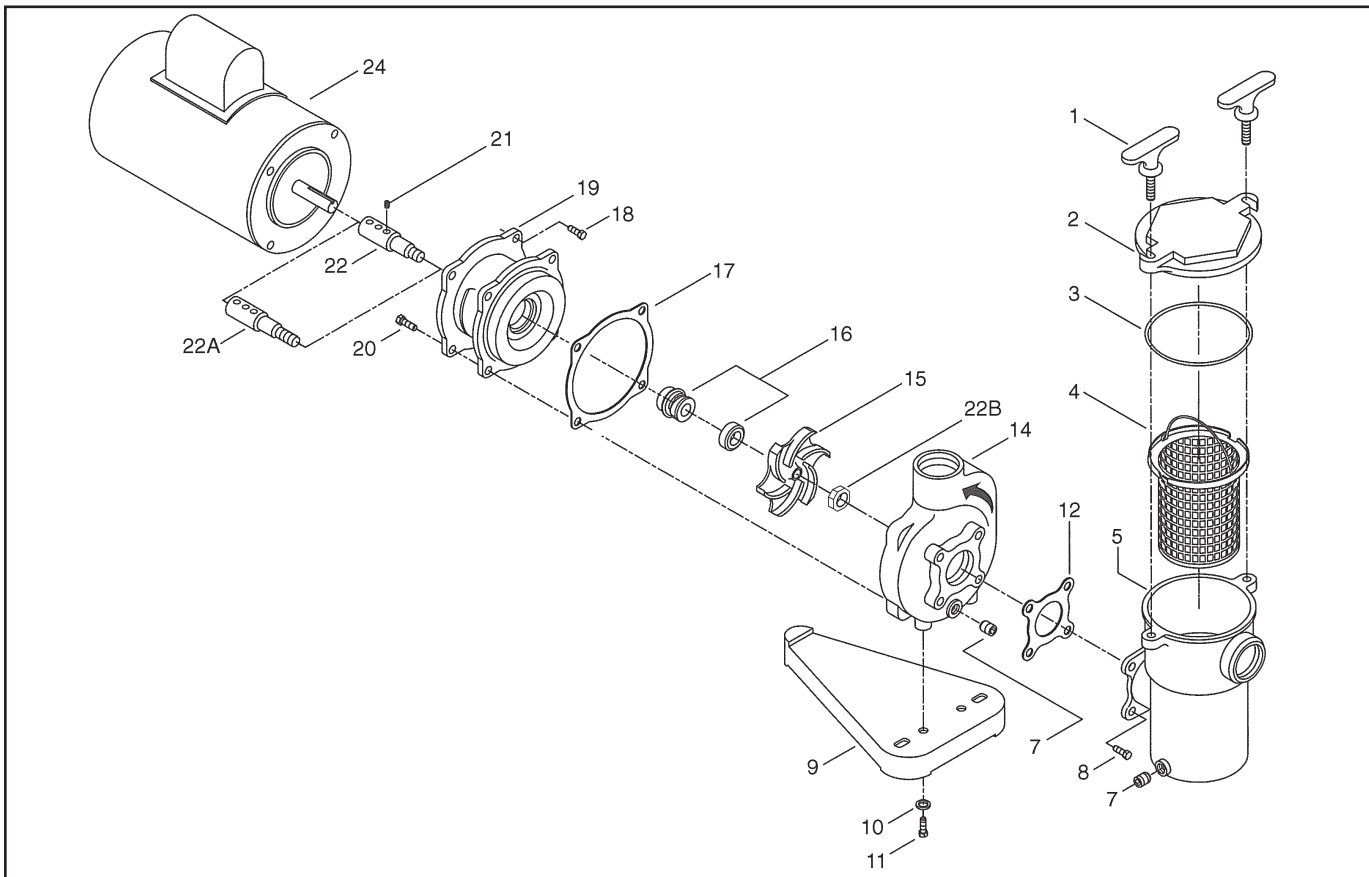
Common Part Numbers for TFW-20,-24, and -30

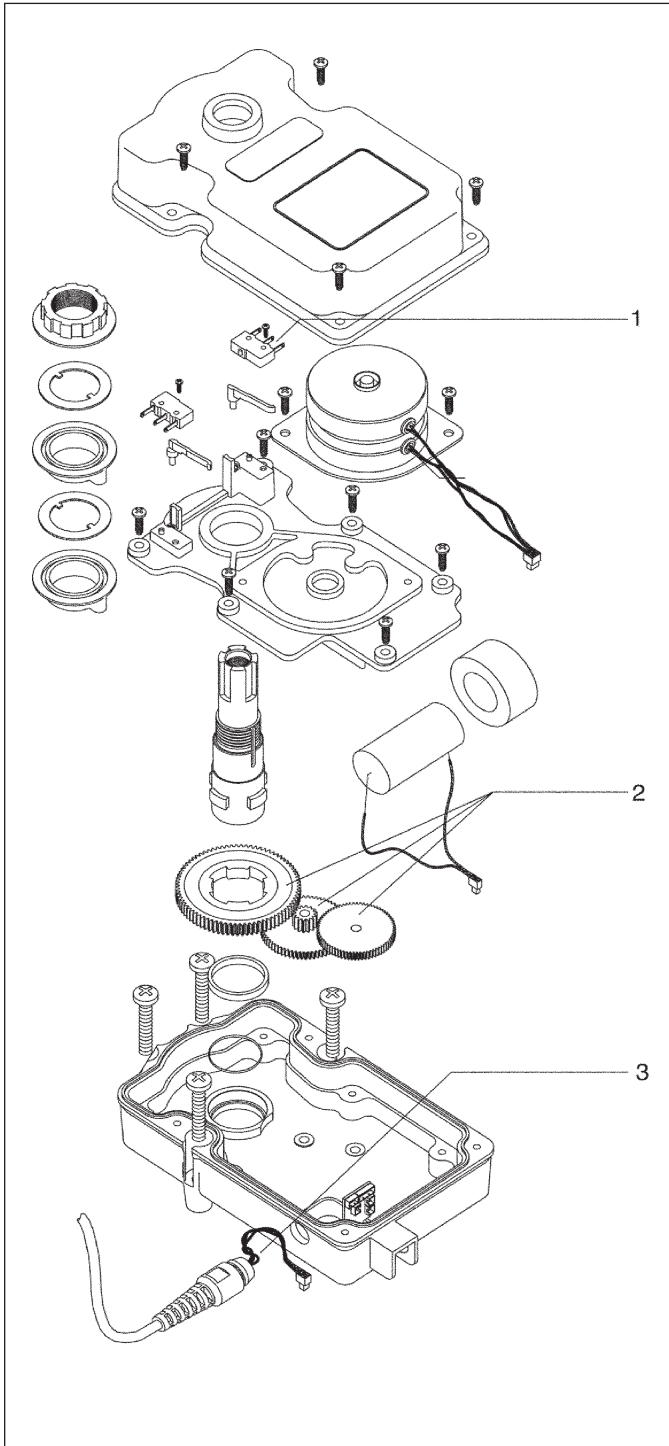
Item	Part #	Description	Qty	Item	Part #	Description	Qty
1	P263165	Lockhandle, brass	2	11	P171920	Hex bolt 5/16-18 x 3/4	2
2	Z010830	Trap cover, bronze, 5"	1	12	P170415	Gasket, trap to volute	1
3	P171977	Trap cover, O-ring 5"	1	14	P170417	Volute	1
4	P171005	Basket, strainer 5"	1	16	P171976	Seal	1
5	P170422	Trap body, bronze, 5" x 2"1	1	17	P171974	Gasket, volute	1
7	P263171	Plug volute and/or trap	2	18	P171903	Hex bolt, 3/8-16 x 5/8	4
8	M808698	Bolt, trap to volute	4	19	P170420	Bracket	1
9	P171915	Pump base	1	20	P171902	Hex bolt, 5/16-18 x 5/8	8
10	P171917	Lockwasher	2	21	P171901	Screws, set	3
				22	P171904	Shaft extension	1
				22A	P171904A	Shaft extension 12/09	1
				22B	P171904B	Jam Nut 12/09	1

Note: early TFX filters had FRP strainers, call

Uncommon Part Numbers

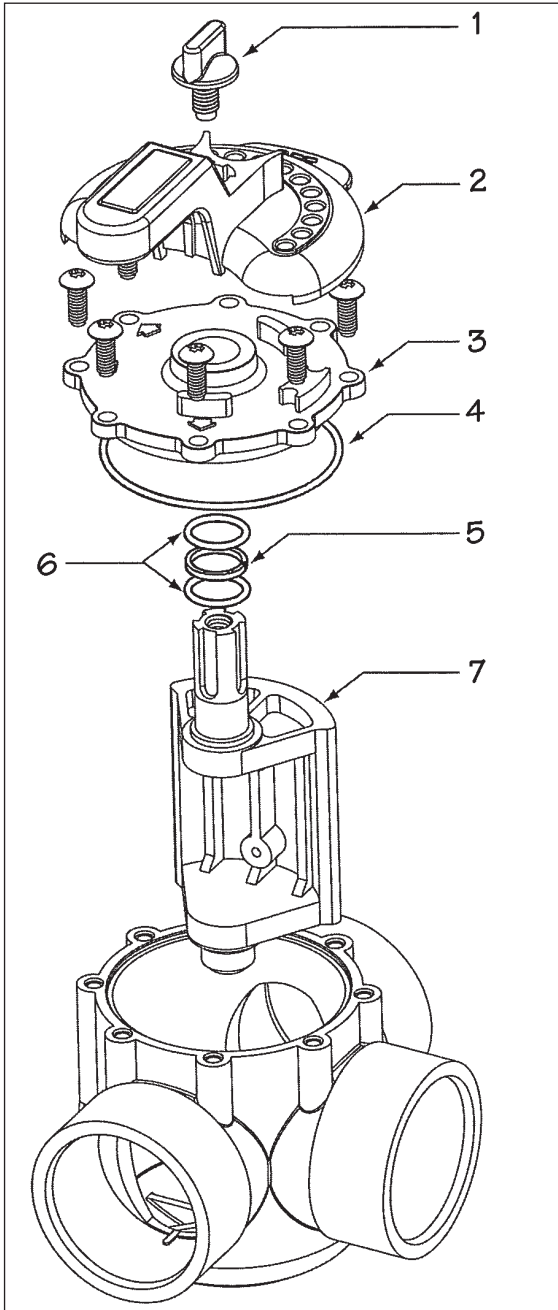
Item	TFW-20	TFW-24	TFW-30	Description	Qty
15	P171971	P171972	P171973	Impeller	1
23	P171922A	P171938A	P171983A	Pump assembly, (items 9-22)	1
24	P171548	P171549	P171542	Motor, single phase, TEFC	1
24	P171942	P295056	P171541	Motor, three phase, TEFC	1



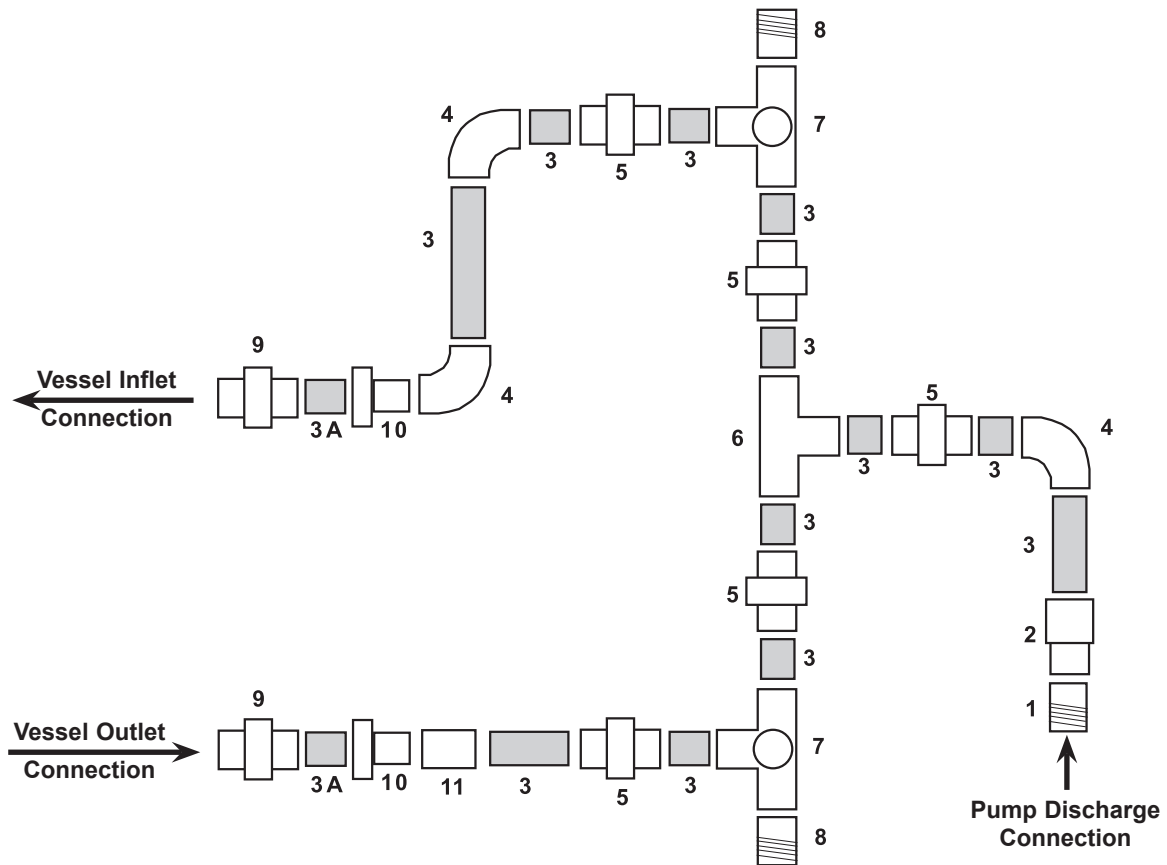


Item	Part #	Description	Qty
	M870461	Actuator Only, 24 VAC	1
1	M870477	Switch, actuator	2

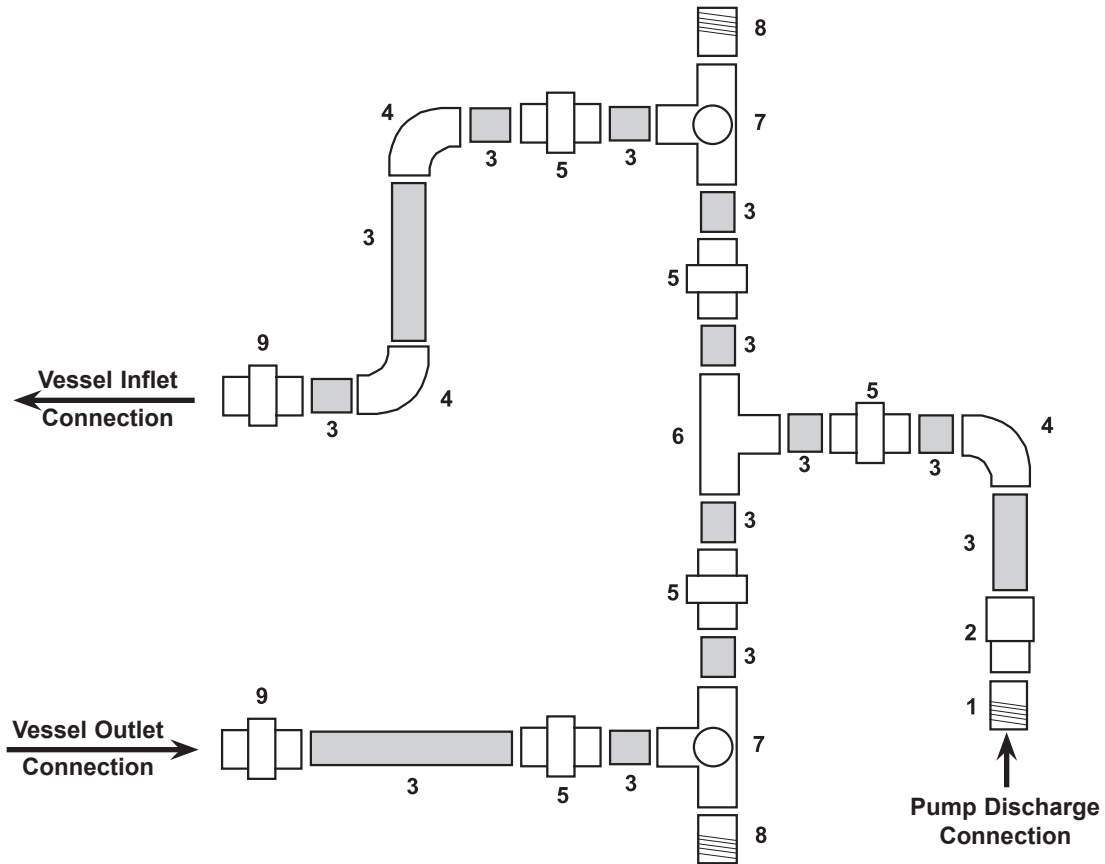
No other actuator parts sold separately



Item	Part #	Description	Qty
	M870462	Valve Only, 3-way, CPVC, 2" socket dimensions machined to pre-2/06	1
	M870462X	Valve Only, 3-way, CPVC, 2" socket dimensions since 2/06	1
1	M870486	Handle knob	1
2	M870487	Handle	1
3	M870484	Cover	1
4	M870465	O-Ring, cover, 3" X 0.1	1
5	M870467	Spacer, split ring	1
6	M870466	O-Ring, shaft, 3/4" X 0.103	2
7	M870473	Diverter Assembly	1



Item	Part Number	Qty	Description
1	M855828	.5	Nipple, PVC Sch 80, 1.5" x 6"
2	M826795	1	Coupling, reducer, PVC Sch 80, 2" x 1.5"
3	M860400	5'	Pipe, PVC Sch 80, 2"
3A	M860380	.5'	Pipe, PVC Sch 80, 1-1/2"
4	M833106	3	Elbow, PVC Sch 80, 2", SxS, 90°
5	M870280R	5	Union, PVC Sch 80, 2" SxS
6	M868500	1	Tee, PVC, Sch 80, 2" SxSxS
7	M870460	2	Valve, 3-way, CPVC, 2", socket, with 24VAC actuator
	M870461	-	Actuator Only
	M870462	-	Valve Only (port depth dimension on units from 11/97 to 2/06)
	M870462X	-	Valve Only (new port depth dimension on units since 2/06)
8	M855795	1	Nipple, PVC Sch 80, 2"
9	P297610	2	Port Assembly, 1-1/2"
10	M821216	2	Bushing, reducer, PVC, Sch 80, 2" x 1-1/2", slip
11	M827115	1	Coupling, PVC, Sch 80, 2", slip



Item	Part Number	Qty	Description
1	M855828	.5	Nipple, PVC Sch 80, 1.5" x 6"
2	M826795	1	Coupling, reducer, PVC Sch 80, 2" x 1.5"
3	M860400	5'	Pipe, PVC Sch 80, 2"
4	M833106	3	Elbow, PVC Sch 80, 2", SxS, 90°
5	M870280R	5	Union, PVC Sch 80, 2" SxS
6	M868500	1	Tee, PVC, Sch 80, 2" SxSxS
7	M870460	2	Valve, 3-way, CPVC, 2", socket, with 24VAC actuator
	M870461	-	Actuator Only
	M870462	-	Valve Only (port depth dimension on units from 11/97 to 2/06)
	M870462X	-	Valve Only (new port depth dimension on units since 2/06)
8	M855795	1	Nipple, PVC Sch 80, 2"
9	P297615	2	Port Assembly, 2"

Component & Part Number

	Item No.	Common
Strainer, Pump and Motor (Item No. refers to Form TFW-PTS-SPM:1/10 "Parts - Strainer, Pump, & Motor")		
Trap cover, O-ring 5"	3	P171977
Gasket, trap to volute	12	P170415
Seal	16	P171976
Gasket, volute	17	P171974

Valve Body (Item No. refers to Form TFW-PTS--VLV:1/10 "Parts-Valve")		
O-ring, cover	1	M870465
O-ring, shaft (2 each valve)	2	M870466
Spacer. split ring	4	M870467

Vessel (Item No. refers to Form TFW-PTS-VSL:1/10 "Parts-Filter Vessels")

	Item No.	Common
O-ring, lid, 8"	4	P297642

TOWER-FLO® Filters are equipped to automatically back wash using water from the same source they are filtering. In the vast majority of sidestream applications this is perfectly satisfactory. However, in some cases it is not desirable to dispose of system water for filter backwashing. In those cases, TOWER-FLO offers two alternative approaches as described below.

FRESH WATER BACKWASH FROM MUNICIPAL SUPPLY

This option uses municipal water supply for backwashing. When the filter’s differential pressure switch activates backwash, the system pump is stopped for the duration of the backwash operation and a valve is opened to allow city water to backwash the vessel. The flow rate and pressure of the city water supply must be controlled so as not to exceed the limits of the vessel; conversely, the flow rate must meet the vessel’s minimum backwash flow requirement of 75% of flow rate.

Ordering this option changes the facepiping from the standard configuration (as shown on pages 9, 10 & 23) to the configuration shown on the following page. Municipal water supply is connected to the bottom valve as shown. Additionally, this option provides a flow control valve, factory preset to the maximum flow rate of the vessel, to be installed on site in the municipal water supply line to the filter. **The end-user is responsible for the addition of a pressure-controlling device in the fresh water supply line set to a maximum 30 psi. Local code may also require the addition of a back flow preventer in the fresh water supply line.**

FRESH WATER BACKWASH FROM STATIC SUPPLY, PUMP ASSISTED

This option uses some totally independent, static pressure water supply (such as an accumulation vessel) for backwashing and relies on the system pump to create the backwash flow. This option is useful when it is not desirable to backwash with system water and municipal supply is either not available or cannot meet the minimum flow requirement.

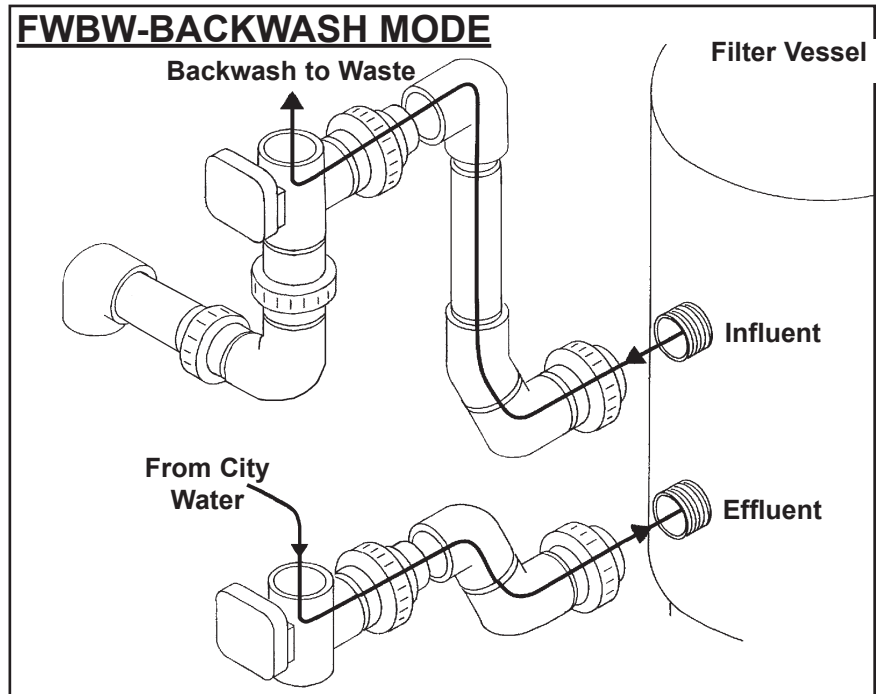
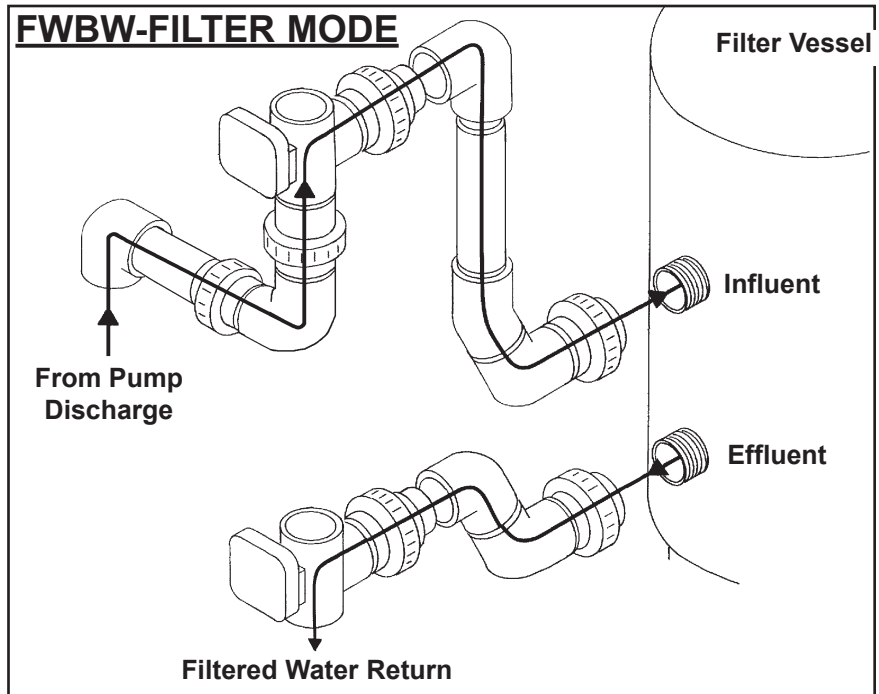
Ordering this option provides an additional three-way valve mounted to the suction port on the pump pre-strainer. The three-way valve is normally open on the suction line from source and closed to the backwash water source. It switches position simultaneously with the two backwash control valves.

**INSTALLATION
FRESH WATER BACKWASH FROM
MUNICIPAL SUPPLY**

This option changes the facepiping from the standard configuration (as shown in drawings elsewhere) to the configuration shown here. Included with this option is a flow control valve for field installation. **The end-user is responsible for the addition of a pressure-controlling device in the municipal water supply line set to a maximum 30 psi. Local code may also require the addition of a back flow preventer in the municipal water supply line.**

Municipal water supply is connected to the bottom port of the top valve. The additional equipment required to control the pressure and flow of municipal water supply to the filter system should be installed in the following sequence from source toward the valve connection on the filter: 1) back flow preventer (by others); 2) pressure controlling device set to maximum 30 psi (by others); 3) flow control valve 2" (provided by TF) set at either:

- 36% for TFW-20 at 35 gpm,
- 28% for TFW-24 at 65 gpm,
- 20% for TFW-30 at 100 gpm.



INSTALLATION STYLE

Tower-Flo® generally recommends sidestream installation of its filter systems and its standard systems are designed and built for sidestream application. Sidestream filtration means a filter system which draws water from and returns it to a static pressure reservoir of water in the cooling loop, completely independent of the cooling water recirculation system. Usually, that reservoir of water is the basin of the cooling tower or sometimes it may be a chilled water storage reservoir in the cooling loop.

However, there are occasions where a design has called for slipstream installation. Slipstream filtration means a filter which is installed on the pressurized recirculation piping system, "slipping" a portion of the chilled water recirculation flow through the filter system. Depending on the points of connection to the recirculation piping, the slipstream may be either under the influence of the discharge side or the suction side of the recirculation pump.

If the filter system you are about to install is to be installed in any other fashion than sidestream, please be sure that necessary consideration has been given to operating pressure of the filter system and flow promotion issues. If you, as the installer, have any questions, contact your local Tower-Flo Representative or contact the Tower-Flo Water Filter Systems Division of United Industries, Inc.

BASIN SWEEPER PIPING SYSTEM

A basin sweeper piping system will use the return flow of filtered water from the filter system to help sweep solids towards the filter's suction point. However, it is very important to have a reasonable expectation of such a basin sweeper piping system. It must be understood that the primary purpose of the filter system is the continuous removal of suspended solids from the water being recirculated through the cooling loop. The basin sweeper piping system provides a secondary benefit by promoting the movement solids across the basin floor toward the filter suction point for removal.

While such a system can reduce the time and effort required for regular basin clean-out, even the best designed sweeper piping system cannot keep a cooling tower basin perfectly clean nor sweep effectively around all appertinances. If you plan to use a basin sweeper piping system, please review the information on the next page to determine the proper number of nozzles or perforations to be used with your basin sweeper piping system.

IF YOU, AS THE INSTALLER OR OWNER OR OPERATOR, HAVE ANY QUESTIONS ABOUT ANY ASPECT OF YOUR INSTALLATION AND/OR OPERATION OF THIS TOWER-FLO FILTER SYSTEM, CONTACT YOUR LOCAL TOWER-FLO REPRESENTATIVE OR CONTACT THE TOWER-FLO WATER FILTER SYSTEMS DIVISION OF UNITED INDUSTRIES, INC., BEFORE START-UP OF THIS FILTER SYSTEM.

DISCHARGE OPENINGS: The sizing of holes in a basin sweeper piping system evolves from the decision of the type of DISCHARGE openings to be used; either simple holes, sweeper-educator nozzles, or a combination of those two types. Different criteria must be used to determine the number of discharge holes and/or nozzles to be used for a given application, as follows:

HOLES ONLY: The total open area of discharge line openings should be equal to or slightly greater than the total open area of the discharge pipe size. Use the table or the formula below to determine the size and number of holes to be used.

NOZZLES ONLY: The total number of nozzles will be the flow rate of the filter system divided by 5 gpm per nozzle.

COMBINATION OF NOZZLES & HOLES:

- 1) start with the filter flow rate.
- 2) determine the preliminary number of nozzles you want to use.
- 3) multiply that number of nozzles by 5gpm per nozzle.
- 4) subtract the outcome of 3) from the total flow rate of the filter system (this is the portion of the filter flow rate consumed by nozzles; this number cannot exceed the filter's flow rate; if it does, return to the nozzle only instructions).
- 5) divide the remaining flow rate by 3 gpm to determine the number of 1/4" holes to be used in conjunction with the nozzles.

SUCTION OPENINGS: Irrespective of the type of discharge openings selected, the number and size of suction openings will **always** be determined by the following: the total open area of suction line openings should be equal to or slightly greater than 125% of the total open area of the discharge pipe size.

TO CALCULATE NUMBER AND SIZE OF DISCHARGE AND SUCTION OPENINGS

- Steps:
- 1 Calculate open area of selected discharge pipe size based on its inside diameter (πr^2);
 - 2 Calculate open area of selected discharge hole size (πr^2);
 - 3 Divide result of Step 1 by result of Step 2 to find number of holes in discharge piping (round up);
 - 4 Multiply result of Step 3 by 1.25 to find number of suction holes (round up).

The calculated number of discharge openings should be spaced evenly around the discharge pipe run or across pipe runs designed to influence specific areas. Suction holes should be spaced evenly around the suction header in the water basin or reservoir. Common sense should always govern the selection of hole sizes, the resulting number of holes, and the placement of those openings; keep the number of holes to be drilled to a practical, manageable number for the run of pipe.

The tables below will help you select the size and number of holes for most Series TF, TFD, TFD2, and TFH installations. The Inside Diameter Table provides the information necessary for you to calculate hole sizes and number for other installations.

Inside Diameter of Common Pipe Sizes							
	1.5"	2.0"	2.5"	3.0"	4.0"	6.0"	8.0"
Sch 40	1.610	2.067	2.469	3.068	4.026	6.065	7.981
Sch 80	1.500	1.939	2.323	2.900	3.826	5.761	7.625

Suggested Number of Pipe Holes												
PIPE SIZE	SCH 40						SCH 80					
	# 1/4" holes		#3/8" holes		# 1/2" holes		# 1/4" holes		#3/8" holes		# 1/2" holes	
	DIS	SUC	DIS	SUC	DIS	SUC	DIS	SUC	DIS	SUC	DIS	SUC
1.5"	50	63	19	24	11	14	36	45	16	20	9	12
2"	68	85	31	39	18	23	61	77	27	34	16	20
2.5"	98	123	44	55	25	32	87	109	39	49	22	28
3"	•	•	67	84	38	48	•	•	60	75	34	43
4"	•	•	116	145	65	85	•	•	104	130	59	74
6"	•	•	•	•	148	185	•	•	•	•	133	167
8"	•	•	•	•	255	319	•	•	•	•	233	292

STEP 1. UNPACK AND INSPECT THE FILTER

New Tower-Flo® Series TFW Filters should have been unwrapped and thoroughly inspected for freight damage upon receipt at your receiving dock, per the receiving stickers affixed to the filter's protective shrink-wrap. Freight damage issues must be addressed with the freight carrier when accepting delivery.

As you prepare to install your filter, confirm that you have:

- 1) the skid mounted filter system;
- 2) a cardboard box containing the pump pre-strainer and the filter vessel's air release and pressure relief valves;
- 3) a skid containing the correct number of bags of filter media (sand) for the size of your filter.

TFW-20 = four 50 lb. bag TFW-24 = six 50 lb. bags TFW-30 = nine 50 lb. bags

Re-inspect the filter system to check that all plumbing connections, especially union nuts, are hand tight and that there are no cracks or fractures in any of the external piping (NOTE: over tightenin can crack fittings). Confirm that the three position toggle switch on each of the two electric valve actuators is in the "ON 1" position.

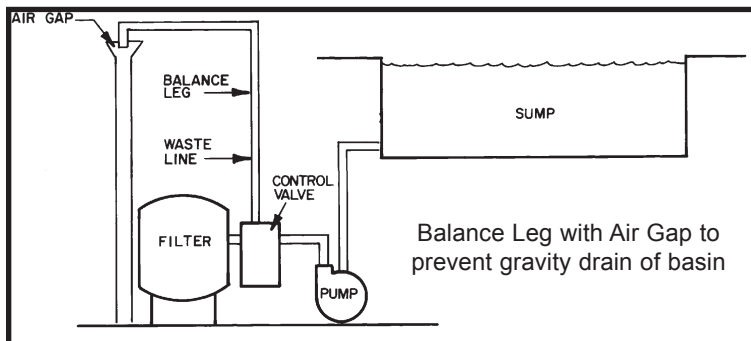
STEP 2. LOCATE FILTER

Place the TOWER-FLO Filter System on a firm level surface. The TOWER-FLO Filter does not need to be anchored, unless required by local code. Select a location that allows for convenience, accessibility and serviceability. If the filter is to operate year-round, exposure to winter conditions should be a considered in your location decision.

WARNING

If your TOWER-FLO is to be installed BELOW the static water level of the tower sump, in either an independent sidestream or a slipstream:

- 1) Install valves on the inlet, waste and outlet piping to permit removal or maintenance of filter system without draining the tower.
- 2) Install a balance leg with an air gap in the waste line (as shown below) to prevent gravity from accidentally draining condenser water should power loss occur to the control valves while in a backwash cycle.
 - a) In lieu of a balance leg with air gap, you may install a normally closed solenoid valve in the waste line to prevent accidental draining of the tower; consult TOWER-FLO for a valve and its proper electrical connections.



WARNING

TOWER-FLO Filters should never be installed on a dirty basin or reservoir. Installing the filter on a dirty basin will cause a nearly constant backwash condition. Always clean accumulated mud, silt, and debris from the bottom of the basin or reservoir BEFORE installation of the sidestream filter.

WARNING

Your TOWER-FLO Filter is equipped with a self priming pump. This pump will prime on a straight vertical lift of up to 7 feet. However, when the need for self priming exists, horizontal pipe runs above water source water level significantly reduce the ability of the pump to prime itself. When installing your filter in a self priming position, limit horizontal pipe runs above water level to a *maximum of 18 inches*. If this limit is not practical for your installation, we recommend the use of a foot valve in the suction line in order to maintain self priming capability.

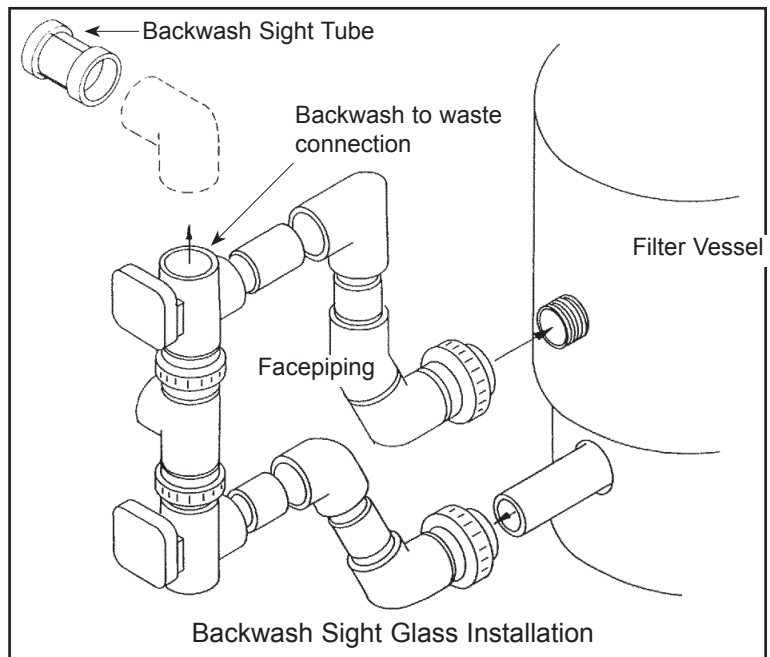
STEP 3. PLUMBING

- A) Fabricate and install sweeper piping system in water source with holes sized according to the Sweeper Pipe Sizing tables and formula or, if using TOWER-FLO® Sweeper-Eductor Nozzles, follow directions supplied with the nozzles. The sweeper piping system should be designed so that water returning from the filter sweeps particulate matter toward the suction line to the filter which is usually installed at or near the lowest point in the source water basin.
- B) Install the pressure relief valve and the air release valve and its tubing (all shipped inside the strainer pot). Use teflon tape on the fitting and thread them into the ports on the clear 8" filter vessel lid.
- C) Install the strainer basket assembly shipped with unit onto filter unit's pump inlet*.
- D) Connect piping from water source to strainer inlet*.
- E) Install return piping from filter's effluent (filtered water) valve outlet to water source*.
- F) Install waste piping from backwash outlet valve to drain. The backwash sight tube shipped with the unit should be installed in the waste line (as shown below) in a position which allows convenient observation of backwash flow. Make certain the disposal point will handle the unit's stated backwash flow.
- G) To permit drainage of filter system for winterization, add drain valve at lowest point in side stream piping.

*TOWER-FLO recommends the installation of unions and/or valves in these three plumbing connections for ease of isolation or removal, should it become necessary for any reason.

NOTE: All plumbing connections should follow accepted plumbing procedures. Pipe joints should be sealed using teflon tapes without adhesive backings or with compounds suitable for use with PVC and ABS plastics.

NOTE: Keep field piping tight and free of leaks. Pump suction line leaks may cause trapped air in filter tank or loss of prime at pump.



WARNING

Field piping must be supported independently from the filter system to prevent stress and strains that might damage or break the filter's valves, face piping, and vessel.

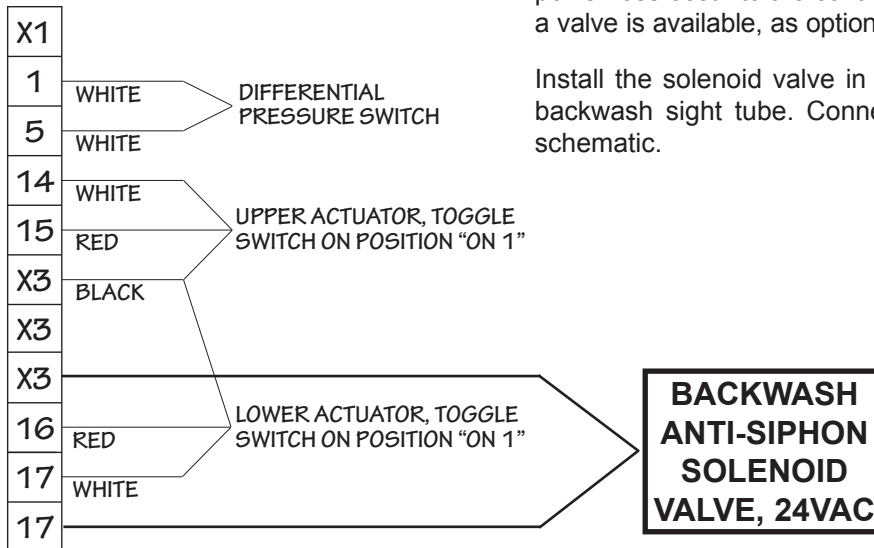
STEP 4. ELECTRICAL

All TOWER-FLO® systems are pre-wired at the factory and require only field connections to power source. Proceed as follows:

- A) Locate the panel specific, 11" x 17", wiring schematic packed in the filter's control panel. This schematic matches this exact control panel. Make copies if necessary. This schematic should remain in the control panel for future reference.
- B) Check power supply wiring and related components for compatibility with system making sure local code requirements are met.
- C) Make all contacts according to the appropriate phase/voltage wiring schematic.
- D) In the standard control panel, there are two sets of contacts for remote communication with a building control system (BCS):
 - 1) control terminals 8 & 9 are for remote indication of repeat backwash alarm.
 - 2) control terminals 10 & 11 are for remote pump on/off in combination with the HOA switch. They are factory jumpered so that the system will operate in either Hand or Auto. To connect to the BCS, remove the jumper across terminals 10 & 11 and connect BCS wiring.

STEP 4A. ANTI-SIPHON SOLENOID VALVE

**TFW SERIES FILTERS
 CONTROL TERMINAL WIRING**



Per the warning statement under STEP 2, you may choose to install a normally closed 24 VAC solenoid valve in the backwash line to waste designed to prevent accidental draining of condenser water should power loss occur to the control valves while in a backwash cycle. Such a valve is available, as optional equipment, from Tower-Flo.

Install the solenoid valve in the backwash line before it reaches the backwash sight tube. Connect the solenoid valve according to this schematic.

CAUTION

Extreme care must be taken while installing filter media to prevent damage to the lateral assembly.

NOTE

1 Cubic Foot of .45-.55 mm sand media = 100 lbs

STEP 5 FILTER MEDIA LOADING

- A) Open the air relief valve. This is a pressurized system which should never be opened without first bleeding off the pressure; make it a habit to always open the air relief valve even when the system is not pressurized!
- B) Un-thread the tank lid locking ring (never attempt to open the vessel while there is pressure in the filter) and remove the lid and lid o-ring.
- C) Inspect the filter's internals for any broken or loose components, especially the underdrain laterals, caused by shipping damage. Replace if necessary.
- D) Fill the tank half-full with water to cushion the underdrain laterals during media loading.
- E) Remove the top diffuser from the internal diffuser pipe (30" filters have two diffusers) and place the flexible air tube to the side, out of the way.
- F) Cover the internal diffuser pipe to prevent sand from entering this pipe.
- G) Gently "float" media under and around the laterals until they are completely covered, then slowly add the rest of the media provided with the unit. See the specification table found on Page 8 of this manual for required amount.
- H) Replace tank lid as follows:
 - 1) Clean all filter media and debris away from the neck of the filter vessel, inside and outside
 - 2) Inspect the lid o-ring for cuts, nicks, etc. If damaged, replace with new one.
 - 3) O-ring has been coated with silicone lubricant at the factory. If lubricant has become dried, hardened or dirty with sand or debris, clean and re-lubricate (Dow 111 or equivalent).
 - 4) Place lid with o-ring into vessel neck. Align lid locking ring on vessel neck. Tighten locking ring slowly. As it tightens, the o-ring will compress and the lid will slide down fully into the neck; then complete tightening.

WARNINGS

THIS SYSTEM OPERATES UNDER PRESSURE AND SHOULD NEVER BE OPENED UNTIL THE PUMP IS SHUT OFF AND THE PRESSURE IS BLEDED OFF THROUGH THE AIR RELIEF VALVE.

Never operate filter at pressures over 50 psi. Such pressures indicate need for complete cleaning or a malfunction.

Maximum allowable working pressure 50 psi. Maximum allowable working temperature 104 F°.

START UP PROCEDURE

- A) Secure drain plugs in filter vessel, pump and pump strainer. Check tightening of set screws on pump shaft extension.
- B) Ensure all suction, discharge (return), and waste line isolation valves are open.
- C) If the filter is installed in a self-priming location (above source water level), remove strainer lid and fill strainer pot with water to facilitate priming of pump. Replace strainer lid according to instructions. If filter is in a flooded-suction location, Step B will cause the strainer to fill.
- D) Open the air release valve to its full open position. Air release valve must be open before starting pump.
- E) Start the pump by turning the HOA motor contactor switch to either HAND or AUTO (requires control terminal jumper or connection to BMS to run in AUTO) and the disconnect switch to the on position. **There will be a 30 second time delay before the pump starts** (this delay will occur any time the system is restarted after a power interruption or disconnect)(NOTE: TFW systems with optional brass valves will have a 2minute 30 second time delay before the pump starts). Allow up to 3 to 4 minutes for pump to prime. Pump is primed when strainer remains filled with water. If pump does not prime, repeat steps D, E, and F.
- F) Check proper pump rotation with arrow on pump housing by turning system on/off rapidly. If pump rotation is backwards, correct electrical connection.
- G) Close air relief valve when a steady stream of water flows from the valve into the clear plastic tubing -- this indicates that all air has been bled from the tank.
- H) Check system plumbing for leaks; repair any leaks.
- I) Your TOWER-FLO® is now in operation.
- J) RECORD THE FOLLOWING START-UP INFORMATION FOR FUTURE REFERENCE:

Start Up Date	_____
Influent Pressure	_____
Effluent Pressure	_____
Backwash Counter	_____

L1 Volt	_____	Amp	_____
L2 Volt	_____	Amp	_____
L3 Volt	_____	Amp	_____

- K) Allow system to filter for a brief period of time (approximately 5 minutes) then manually activate and observe a backwash cycle. This will rinse construction dirt and debris from the system.

NOTE: Small grains of sand may leave the filter during backwashing or may even appear at the return line when the filter is first started. This is characteristic of permanent media filters and should clear up after the first few backwash cycles. Should sand continue to appear at the return line over time, this is evidence that a collection lateral was cracked or broken during media loading and that lateral must be identified and replaced.



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AUTOMATIC BACKWASH

All permanent media filter systems have a difference in pressure between fluid entering the filter (influent) and the fluid exiting the filter (effluent). This pressure drop, commonly referred to as differential pressure or ΔP , will be approximately 3 psi when the filter media is clean. As system water passes through the media bed, particles in the water become trapped in the media. As the amount of trapped particles increases, so does the resistance to flow and the ΔP . As the filter becomes increasingly loaded with trapped particles, the influent pressure will increase and the effluent pressure will decrease.

Your Tower-Flo® filter is equipped with an automatic backwash control system. Primary initiation of an automatic 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 30 second delay timer (T4) is initiated, and the switch must remain closed for the duration of that 30 second time delay before backwash is initiated. This prevents random pressure surges from initiating an unnecessary backwash.

Your Tower-Flo filter's automatic backwash operation can also be initiated by two other means: 1) by depressing the manual backwash push button on the face of the control panel; or 2) by the 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 initiated backwash has occurred (ΔP or manual initiation resets T5).

When any of these three backwash initiations occur, the programmable relay in the control panel will execute its pre-programmed timing sequence as described and time lined on the next page.

ALARM

The control panel on your Tower-Flo filter is equipped with a ΔP switch repeat alarm (Timer T6). 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 will occur:

- 1) If a ΔP switch closure tries to initiate a second backwash within 15 minutes after a previous ΔP switch initiated backwash.
- 2) If the ΔP switch gets stuck in the closed position.

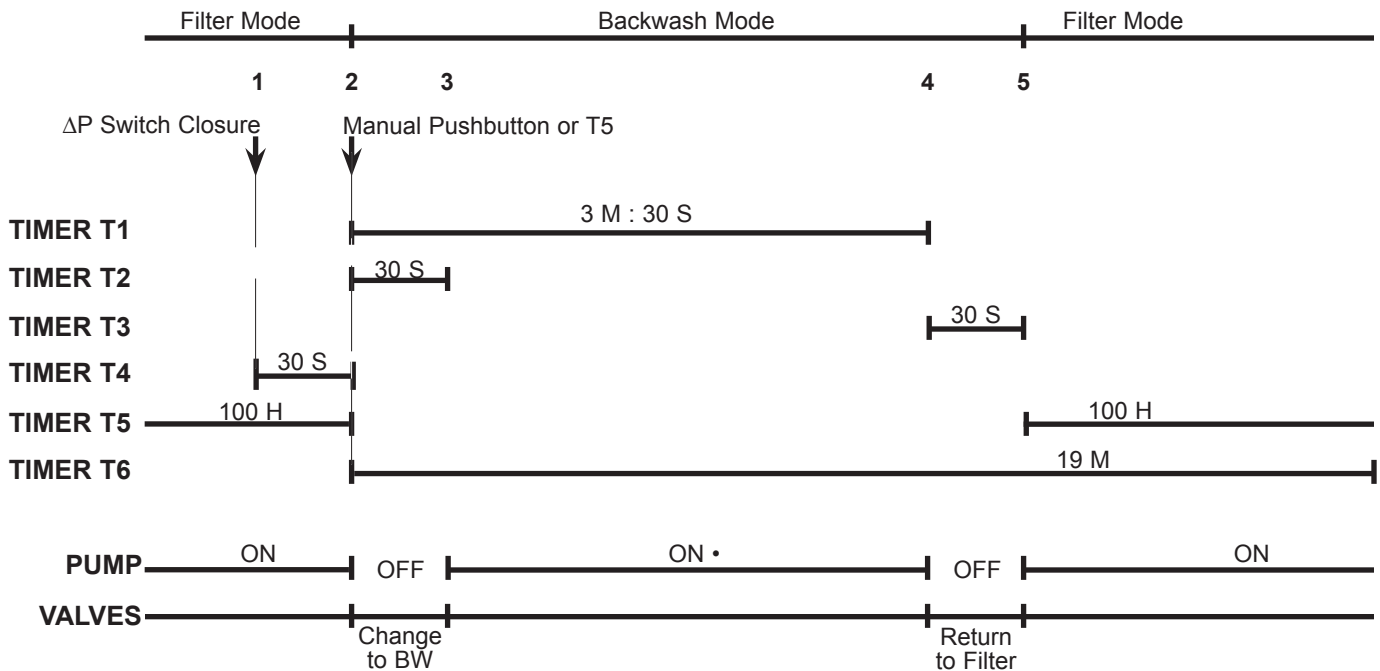
The Alarm condition is cleared by rotating the H/O/A switch on the face of the control panel from H to O and back or from A to O and back. When an alarm occurs, the operator must investigate the cause of the alarm. The ΔP switch is normally open. Check continuity through the ΔP switch across control terminals #2 and #3. If there is no continuity, condition #1 exists indicating there is most likely a problem with the media bed and media inspection must be conducted. If there is continuity, condition #2 exists and the ΔP switch must be replaced.

AUTOMATIC BACKWASH OPERATION

The series of events controlling automatic backwash are described below. The programmable relay follows these steps and timer identifications in its program of operation.

1. Differential pressure switch closes, initiates Timer T4, and remains closed for 30 seconds.
2. Timer T4 elapses, or the manual backwash push button is pressed, or Timer T5 elapses, which initiates Timer T1 and Timer T2. Timer T1 energizes the control relay to the valve actuators changing the valves to backwash position. Timer T2 interrupts the pump motor contactor stopping the pump while the valves rotate.
3. Timer T2 elapses, pump motor contactor is re-energized restarting the pump. Filter is now in backwash mode for 3 minute flow time.
4. Timer T1 elapses, Timer T3 initiated. T3 interrupts pump motor contactor stopping the pump. Timer T1 de-energizes the control relay to the valve actuators changing the valves back to filter position.
5. Timer T3 elapses, pump motor contactor is re-energized restarting the pump. Filter is now back in filter mode.

BACKWASH TIME LINE



NOTE: Timers T5 and T6 are field adjustable through the PARAMETERS screen on the programmable relay. All other Timers are password protected and can only be changed with consultation from Tower-Flo®.

NOTE: On TFW systems equipped with optional fresh water backwash from municipal water supply, the pump is not energized for backwash. Factory setting of Timer T2 will be changed to 3:30.

NOTE: On TFW systems equipped with optional brass valves, the factory setting of Timer T1 will be 5:30 and Timers T2 & T3 will be 2:30.

The TOWER FLO® filtration system is virtually maintenance free. The following are guidelines to ensure proper performance and increase longevity of the system.

DAILY

- 1) Release trapped air in filter vessel through air release valve.

WEEKLY

- 1) Check all plumbing connections for leakage.
- 2) Check all electrical connections and components for signs of malfunction or poor connection.
- 3) Visually inspect strainer basket. If cleaning is necessary, turn system off, release pressure from filter vessel, remove strainer lid, clean basket, replace basket and lid following recommended safety procedures, and restart system following the Start Up Procedure.
- 4) Check pressure gauges for proper operation.

MONTHLY

- 1) Place unit in "off" position.
- 2) Check pressure release valve for proper operation.
- 3) Remove lid from filter vessel and inspect the media bed. **See Media Inspection instructions on the next page.**

YEARLY

- 1) Inspect media bed for visible contamination or extraneous material. Media should be tested to a depth of 8" to 12".
- 2) Maintain proper level of media bed.

The filter sand provided with your Tower-Flo® filter is permanent media and should never require replacement. However, the media bed will function as a “concentrator” of both problem filtrates that resist removal by backwash action, as well as water treatment deficiencies. Regular monthly media bed inspections will keep your filter operating properly and can alert you to emerging water chemistry issues.

Media bed inspection requires accessing the media. Turn off the pump, close isolation valves in influent and effluent piping to the filter, open the tank drain, open the air relief valve, remove the lid locking ring and the the clear tank lid, close the tank drain when the water level is low enough to expose the surface of the media bed.

Inspection is a three step process; smell, look, feel:

- Smell to see if the media smells clean. A “septic” smell would indicate the presence of live biological contaminants in the media bed and an issue with the biocide treatment. Sanitize the media bed with bleach.
- Look to see if the surface of the media bed is clean, smooth and flat. Remove any accumulation of fibrous materials (i.e., cottonwood tree seeds) or heavy materials that are not being removed by backwash action. The appearance of “ridges and valleys” on the surface of the media bed would indicate the beginning of hard spots down in the media bed (under the ridges) and an issue with water hardness control. Either remove the hardened media and replace with an equal volume of new sand or recondition media bed with a muriatic acid wash to dissolve calcium.
- Feel the sand at the surface to see if it is clean and loose. Probe the bed in several random places to a depth of 8 to 12 inches to see if it is clean, loose and free of evidence of foreign matter, mudballs, oilballs, or hard spots down in the media bed. If contamination is found, either remove the contaminated media and replace with an equal volume of new sand or recondition media bed with a muriatic acid wash to dissolve calcium or a low sudsing / low phosphate detergent to dissolve oilballs.

Resolution of problems revealed by your inspection requires the suggested remedies for the media bed (to treat the symptoms) as well as attention from those responsible for your water treatment / water chemistry program (to treat the problem).

After inspection, replace the vessel lid and the lid locking ring, open isolation valves and restart your filter system according to the Start-Up Instructions.

For SEASONAL SHUTDOWN of the TOWER-FLO® Filter System:

1. **ELECTRICAL:** Disconnect electrical power.
2. **PUMP:** Drain liquid from the pump through the plug at bottom front section of volute. Addition of a good rust inhibitor into liquid end of the pump is recommended to prevent corrosion. Be sure the motor is kept dry and covered.
3. **VESSEL & VALVES:** Remove the vessel drain plug and disconnect the unions connecting the filter to the facepiping and valve assembly. Allow the tank and valves to drain completely. After draining the tank, reconnect the unions on all units and replace the drain plug.
4. **GAUGES & DIFFERENTIAL PRESSURE SWITCH:** Disconnect influent and effluent pressure lines at facepiping and allow to drain, then reconnect.

For YEAR-ROUND OPERATION of the TOWER-FLO Filter System:

In installations where freezing may occur, heat tracing of all lines, especially tubing to pressure gauges and differential pressure switch, is highly recommended. Use standard insulation and freeze protection methods for your region.

TROUBLE SHOOTING

The trouble shooting pages are provided in order to give you the ability to locate and possibly remedy problems that may occur during normal operation of your TOWER-FLO® Water Filter System. If you are unable to solve the problem, please do not hesitate to contact us.

PROBLEM	POSSIBLE CAUSE	SOLUTION
PUMP STOPS	A Pump motor or circuit	A Check circuit breakers, wire connections (loose, broken or incorrect), thermal protector in motor starter tripped. Allow motor to cool, then try to restart ¹
WATER LEVEL DROPS IN BASIN	A Gravity draining of basin; filter installed below static water level of basin and power interrupted to pump during backwash	A Prevent gravity draining by following the warning instructions under Installation, Step 1.
BACKWASHES TOO OFTEN OR CONSTANT BACKWASH	A Differential pressure switch adjusted too low; virtually constant closure B Valves indexed to wrong position C Backwash control circuit failure D High pressure drop through filter due to clogging	A Using bench air, check ΔP set at 10 psi. If at 10 psi, increase setting by two to three psi B Check actuator toggle switches in "ON 1" position C Check circuit breakers and wire connections (loose, broken or incorrect) D Inspect filter bed for foreign material and contaminated or caked sand and remove from tank. Replace with same volume of clean, new silica sand
BACKWASHES TOO INFREQUENTLY OR NEVER	A Differential pressure switch adjusted too high for backwash initiation or B Differential pressure switch malfunction C No water flow D Low pressure drop through filter due to channeling	A Using bench air, check ΔP set at 10 psi. If at 10 psi, decrease setting by two to three psi B Check switch for continuity with no pressure on system C Check for 1. Loss of pump prime 2. Clogged strainer basket D Inspect filter bed for foreign material and contaminated or caked sand and remove from tank. Replace with same volume of clean, new silica sand
PUMP LOSES PRIME	A Strainer cover leaking B Water level too low C Suction line clogged or leaking D Horizontal run over 18" in suction line	A Check lid and O-ring for defects; tighten lid clamp B Add water C Inspect and repair as needed D See warning under Installation, Step 1., on page 7.
UNUSUAL NOISES	A Plumbing vibration B Bad motor bearings C Pump 1. Cavitation 2. Foreign objects in pump 3. Impeller out of adjustment	A Ensure all plumbing anchored properly B Repair or replace motor C 1. See A, B, and C directly above 2. Check volute and impeller 3. Adjust impeller by loosening the three set screws in the shaft extension and repositioning the impeller to .015" from inside suction port.
SAND BEING DRIVEN TO TOWER	A Cracked or broken lateral(s)	A Replace cracked or broken laterals

¹If motor re-starts after cooling, check amperage draw at the motor and compare to Full Load Amp Draw (FLA) as noted in Your Filter's Specifications on page 4. If amp draw is above noted FLA draw, reduce flow on discharge side of pump.