TFCL Sand Filter

The TOWER-FLO® Closed Loop filter system by United Industries is designed for use in closed loop applications commonly found in heating and cooling systems. The continuous loop filter will remove suspended solids by directing a small portion of the system water through the permanent media filter removing contaminants to five microns in size.

Eventually, the filtered contaminants will build to a point when backwashing needs to occur. At this time the system will automatically isolate itself from the closed loop, allow water from municipal supply to enter the filter vessel for a preset time period and discharge through the backwash line carrying filtered contaminants to waste, and cleansing the media without loss of any treated system water.

The filter plant shall consist of one vertical pressure vessel, graded filter media, valves and facepiping, and control console with programmable timer for automatic operation.

TOWER-FLO® Series TFCL

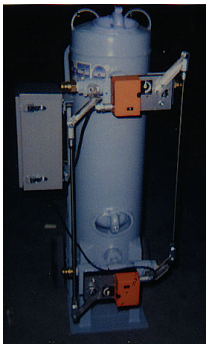
Custom Systems

Tower-Flo's ***Series TFCL*** filters are frequently customized to meet specific needs:

TFCL-12-Manual-Portable on 4-wheel dolly

Challenge: Engineer and fabricate small, portable closed loop filter systems to meet:

- the need of certain customers – most notably school districts, hospitals, and large industrial complexes – for a single filter system that can be conveniently moved on a regular rotation to maintain multiple closed loops; or
- the need of service companies / contractors for a filter system that can be conveniently moved for temporary installation on various customers' closed loop cooling system(s).



TFCL-12-Automatic-Portable-HITEMP filter system for 250˚F water with "positive isolation" valve arrangement and custom control sequence with "cool down" cycle timer.

Solution: TFCL-12 or TFCL-20 filters mounted on two-wheel hand trucks or four wheel dollies, equipped for automatic or manual operation (automatic systems have a pigtail plug-in for 120V power supply to the control panel), and supplied with:

- male-end quick couplings on each of the filter's valve connections;
- male-end quick couplings to be field installed for influent and effluent connections on the closed loop and backwash supply from city water (isolation valves, not included);
- lengths of high pressure hose with female-end quick couplings on each end, quantity matched to the specific design;

Challenge: Engineer and fabricate closed loop filter systems to meet:

- operating pressure and/or temperature extremes;
- operating pressure and/or temperature extremes with portability;
- installation circumstances that require a pump.

Solutions:

- vessels fabricated to 300 psi maximum operating pressure;
- vessel internal coating options to 250˚ F constant immersion;
- valves arranged for "positive isolation" between the closed loop and the municipal water supply (used for backwash) due to pressure differences;
- controls sequence combining "positive isolation" and a "cool down" delay between the closed loop and the municipal water supply (used for backwash) due to temperature differences;
- addition of system match pump and motor controls;
- combine any or all of the above with portability (limited to TFCL-12 & -20).

TFCL-12-Hi Pressure / Hi Temp system with pump

TECHNICAL MANUAL

for

Series

TFCL

Water Filter Systems

Complete information for

Engineering, Installation, Operation & Maintenance

of Tower-Flo® Series

TFCL

TFCL-PIV

TFCL-PIV-PMC

Water Filter Systems

TOWER-FLO® Series TFCL

Index

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UNITED INDUSTRIES, INC.
TOWER-FLO® LIMITED WARRANTY

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.

TOWER-FLO® Series TFCL

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: _____

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Form TFCL-REG:1/10

TOWER-FLO® Series TFCL

System Description
TFCL-Standard / PIV / PMC

The TOWER-FLO® Closed Loop filter system is designed for use in closed loop applications commonly found in heating and cooling systems. Under it's standard arrangement, it is intended for installation around an existing recirculation pump in a loop-the-pump style. Due to the nature of solid contaminants common to closed loops – which do not tend to build a pressure drop when captured – backwash is initated by time.

FILTER VESSEL These permanent media, high-rate sand filters feature a vertical pressure vessel constructed of epoxy lined carbon steel designed for a maximum working pressure of 150 psi. Internal influent distributor piping and effluent collection header and lateral piping are stainless steel. 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 an automatic air relief valve.

FILTER MEDIA shall be quartzite or silica in nature, hard, not smooth, and have a uniformity coefficient of 1.7 with a relative size of .45 to .55 mm. Media shall contain no more than 50% flat particles, or more than 1% clay, loam dust, or other foreign material. Media weighs 100 lbs per cubic foot.

Standard **TFCL** systems use diaphragm type, cast iron bodied, pilot pressure actuated valves (4) controlled by electronic solenoids. Standard pilot pressure is from the municipal water supply used for backwash. An alternate pilot pressure kit is provided for situations where system pressure is greater than municipal water supply. The control panel has a seven day, 24 hour programmable timer, housed in NEMA 3R enclosure, for control of automatic backwash operation

The **PIV** and **PMC** variations of the TOWER-FLO® Closed Loop (TFCL) filter system can include:

- positive-isolation valving (PIV) which completely isolates the actuation of the valves on the system side connections from the actuation of the valves on the city water and drain connections, with the added feature of a time delay between the actuations - which can be particularly useful in hot water applications for cool down time between hot system water and cold city water;
- pump, motor and controls (PMC) useful in situations where the TFCL's standard loop-the-pump installation is not suitable or practical; available with either single or three phase motor and controls;
- both positive isolation valving and pump, motor and controls (PIV-PMC);
- any of the above three arrangements made portable with a caster-wheeled base (two fixed, two swivel), removable push-pull handle, a pigtail plug for singelphase units, and optional quick connect wolf couplings and four 25' steam hoses useful when the filter is to be moved among multiple systems, buildings or locations - ideal for leasing by service contractors for temporary closed-loop clean ups.
  *Note: quick connects and isolation valves are required on the customer's piping and are not included as standard equipment.

Due to the nature of solid contaminants common to closed loops – which do not tend to build a pressure drop when captured by the filter backwash is initated by time.

Details of standard, optional, and additional components are found in the **Project Specifications** document on the next two pages.

Portable units, in manual or automatic, on two-wheel hand-truck or 4-wheel dolly.

High-pressure and/or high-temperature units, with full isolation valving between system and backwash supply. Units with pumps when loop-the-pump installation is not practical.

TOWER-FLO® Series TFCL

Project Specifications
TFCL-Standard / PIV / PMC

192 GPM MAX FLOW RATE 150 PSI WORKING PRESSURE @ 150˚F

Model #	Max GPM	**Standard** Plumbing Connections	**PIV** Plumbing Connections	Vol Sand Ft^3	Operating Weight in Lbs.	**PMC** HP
TFCL-12	20	3/4"	1-1/4"	1.5	330	1/2
TFCL-20	43	1-1/4"	1-1/4"	4.0	800	1
TFCL-24	65	1-1/2"	1-1/2"	5.0	1200	1.5
TFCL-30	100	2"	2"	7.0	1800	3
TFCL-36	141	2-1/2"	2"	10.0	2300	na
TFCL-42	192	3"	na	18.0	3500	na

*1 Ft^3 of media = 100 lbs. Operating Weight based on **Standard** TFCL

TOWER-FLO® Series TFCL filter systems shall consist of the following major components: a vertical pressure vessel, valves, facepiping, controls with programmable timer or programmable relay for automatic operation. Filter media shall be shipped with the unit for field installation. Backwash is timer initiated and is from city water supply.

TFCL units can be configured as follows:

STANDARD: pilot pressure actuated diaphragm valves;
PIV: Positive Isolation Valving which completely isolates the actuation of the valves on the system side connections from the actuation of the valves on the city water and drain connections;
PMC: either of the above valving with the addition of a Pump, Motor, and motor Controls;
PORTABLE: TFCL-12 OR TFCL-20 ONLY, in any of the three above arrangements, on a caster-wheeled base, with or without steam hoses having wolf style quick connections.

Project: _____ Date: _____

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

COMPONENT **SPECIFICATION**

VESSEL
✔ **Standard:** Carbon steel; 15-18 mil epoxy interior coating; exterior coating of two-part epoxy primer finished with two-part industrial and marine grade polyurethane; 150 psi working pressure at 150° F; access through top head opening; threaded influent and effluent; air release coupling in top head with automatic air release valve; type 304 stainless steel internals.
___ **Option:** Type 304 stainless steel vessel.
___ **Option:** Working pressures to 300 psi.
___ **Option:** Working temperatures to 200˚F.

VALVES
✔ **Standard:** Automatic, diaphragm type, cast iron bodied, pilot control valves actuated by electronic solenoids.
___ **Option:** **PIV**: positive isolation valve arrangement; 2 sets of bronze 2-way ball valves, _____", with stainless steel linkage and ____ VAC electric actuators to positively isolate system and backwash water sources. NOTE: Not available on TFCL-42.

FACEPIPING
✔ **Standard:** Class 150 malleable iron fittings; influent pressure gauge, backwash sight glass.

CONTROLS
✔ **Standard:** Automatic backwash operation; control panel with: NEMA 3R enclosure; seven day programmable timer with an LCD time display; minimum 14 daily on/off operations poles; 15A at 125 VAC, 60 Hz.
___ **Option:** Manual backwash operation (bronze ball valves with handles, no actuators).
___ **Option:** **PIV**: Panel with user adjustable timer settings for customized valve operation requirements while isolating system and backwash water sources.

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COMPONENT **SPECIFICATION**

___ **Option:** **PMC: 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 cir cuit protection; fuseless branch and control circuit protection; transformer to convert primary supply to 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; primary backwash initiation by user adjustable timer or 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, and remote backwash initiation.

___ **Option:** **PIV and PMC: Three phase or single phase,** Automatic backwash control panel, same as **PMC** panel above, with **PIV** user adjustable timer settings for customized valve operation requirements: transformer to convert primary supply to 120 and 24 VAC control power.

PUMP:

___ **Option:** **PMC: TFCL-12, thru -30:** Self-priming; close grain cast and machined brass volute, impeller, and pump-to-motor coupling; 316 stainless steel impeller shaft; close coupled to a TEFC motor; and capable of ____ GPM at ___ feet TDH.

___ **Option:** **PMC:** other pump as follows: _____
_____.

MOTOR:

___ **Option:** **PMC: TFCL-12 thru -30:** 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 VAC, phase and Hz: _____.

___ **Option:** **PMC:** other motor as follows: _____
_____.

___ **Option:** 575V.

BASE:

___ **Standard or PIV:** Structural steel plate, primed and coated.

___ **Option:** **PMC:** Structural steel channel, primed and coated.

___ **Option:** **PIV or PMC:** Portable, castered base, structural steel channel, primed and coated. NOTE: TFCL-12 and TFCL-20 units only.

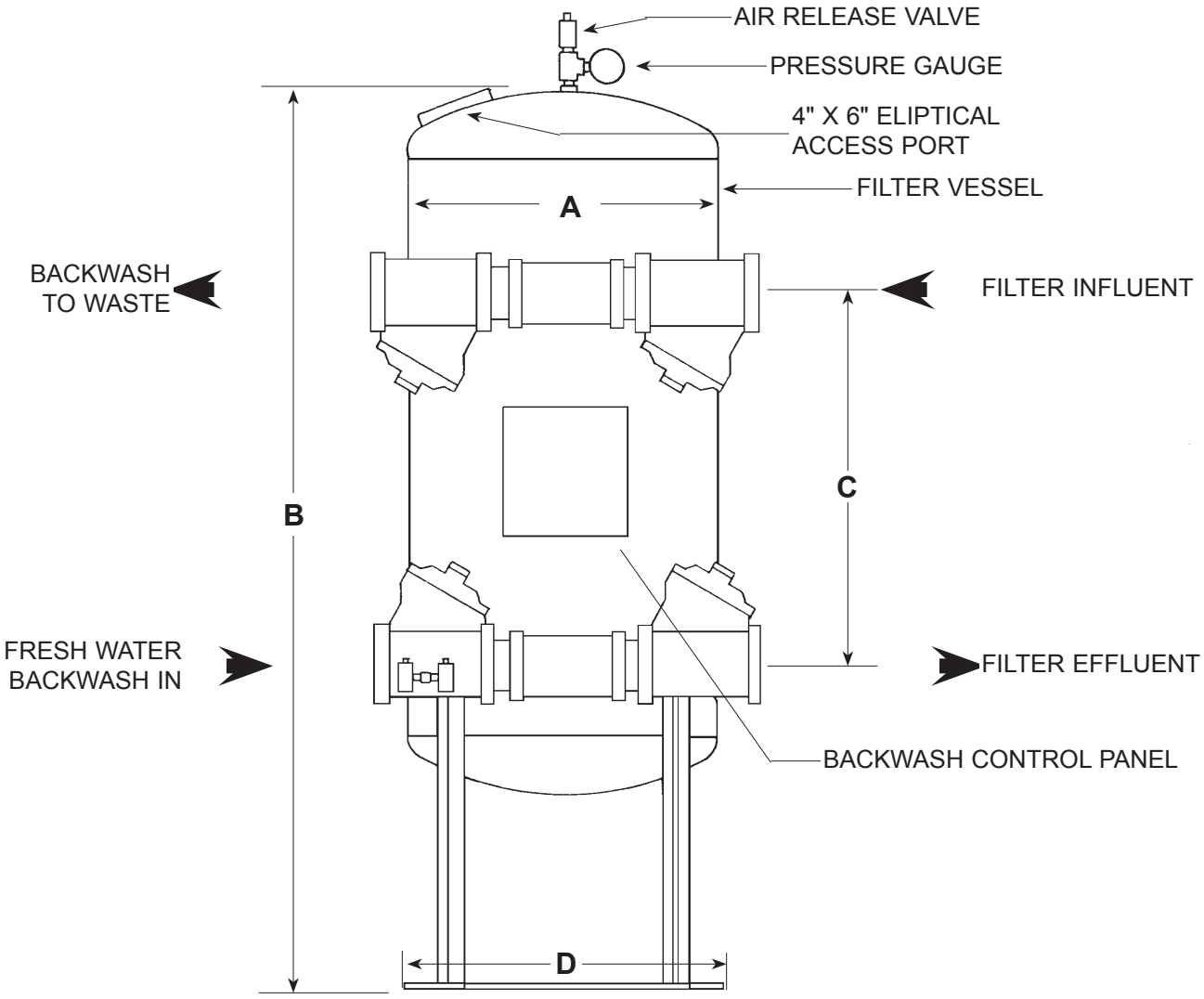
___ **Option:** **PIV or PMC: Portable:** Quick connect wolf couplings, four male ends factory installed on valve connections, and eight female ends, one on each end of four 25' steam hoses: ___ 1"; ___ 1-1/4"

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.

NOTE: Standard connection for pilot pressure to the standard diaphragm valves is to the municipal water supply used for backwashing. If system pressure is greater than municipal supply pressure at the point of installation, the system will not operate properly. In installations where system pressure is greater then municipal pressure, make the pilot connection to system water.

Standard TFCL
Components & Dimensions



Dimensions

Model #	Plumbing Connections	A	B	C	D
TFCL-12	3/4"	12"	52"	31"	15"
TFCL-20	1-1/4"	20"	52"	31"	20"
TFCL-24	1-1/2"	24"	55"	31"	24"
TFCL-30	2"	30"	58"	31"	30"
TFCL-36	2-1/2"	36"	61"	31"	36"
TFCL-42	3"	42"	63"	31"	42"

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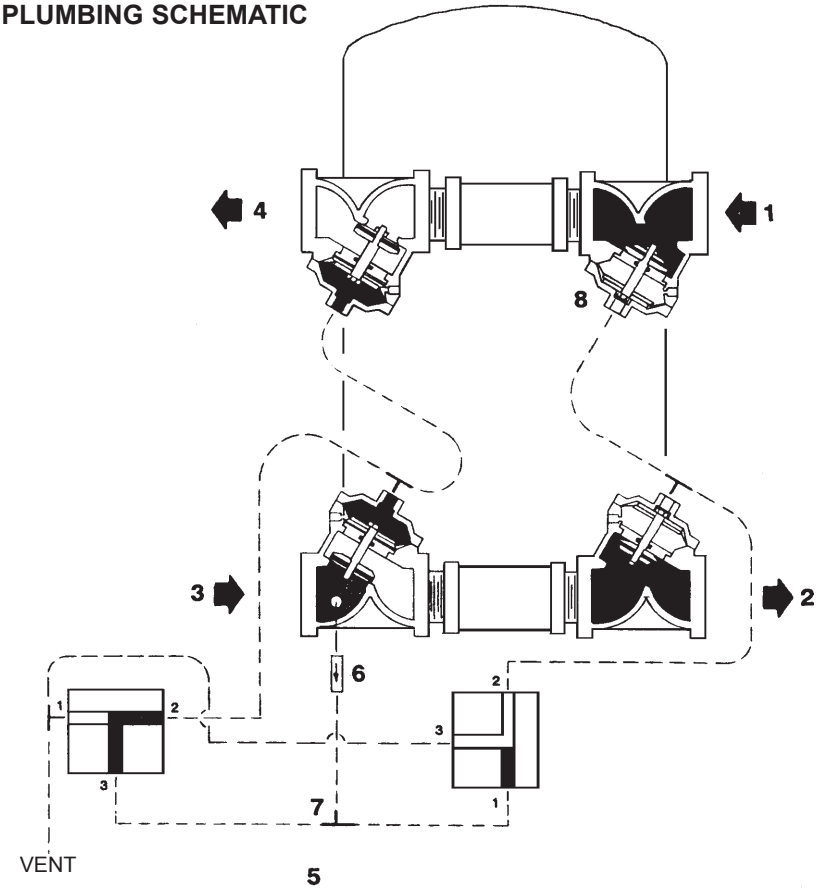
Form TFCL-C&D:1/96

PLUMBING SCHEMATIC

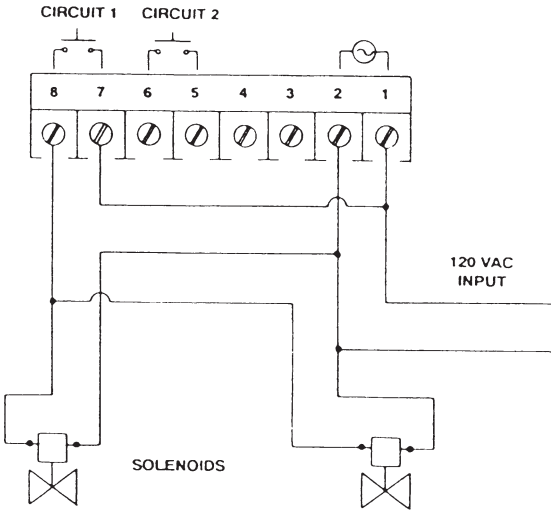


SYSTEM SHOWN IN FILTER POSITION

1 FILTER INLET
2 FILTER OUTLET
3 BACKWASH INLET
4 BACKWASH OUTLET
5 SOLENOIDS
6 CHECK VALVE
7 PILOT PRESSURE
8 DIAGHRAM VALVE

SYSTEM IS SHIPPED UTILIZING MUNICIPAL WATER SUPPLY FOR PILOT PRESSURE. ALTERNATIVE PILOT PRESSURE SOURCES CAN BE SUBSTITUTED IF DESIRED.

WIRING SCHEMATIC



1) The system pressure must not be greater than the maximum pressure rating of the vessel.

2) The filter must be installed as a bypass or "loop the pump" for proper operation.

3) Isolation valves and unions must be installed for service/maintenance capability.

NOTE: Valves and unions are not included.

4) To ensure proper backwash, a minimum flow of 75% of the maximum GPM rating of the filter must be provided from municipal supply.

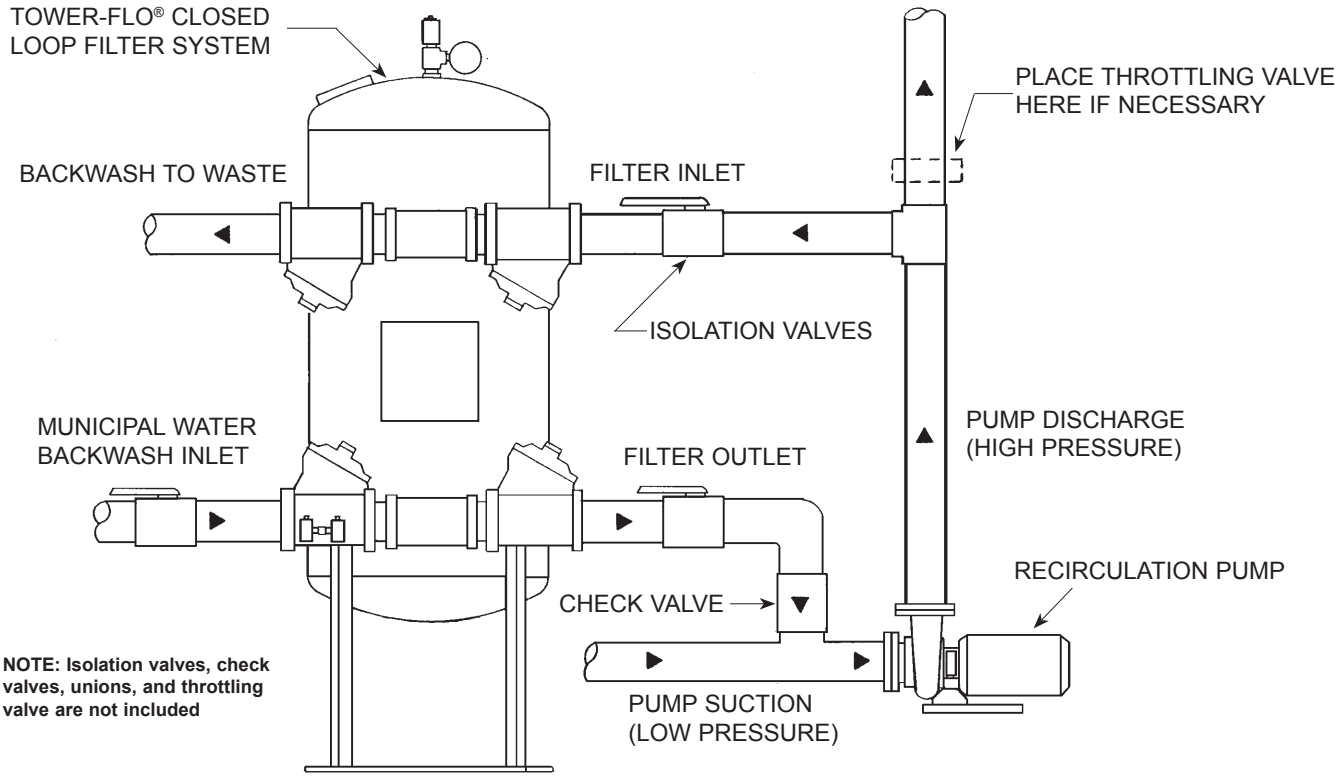
5) Remove cap in top of vessel and fill vessel 1/2 full of water.

6) Add filter media provided, fill vessel to top with water and replace cap.

7) Insure proper installation of all plumbing connections prior to opening isolation valves.

NOTE: Standard connection for pilot pressure to the diaphragm valves is to the municipal water supply used for backwashing. **If system pressure is greater than municipal supply pressure at the point of installation, the system will not operate properly.** In installations where system pressure is greater than municipal pressure, change the pilot connection to system water or, if necessary, compressed air.

8) Open isolation valves and adjust throttling valve (if applicable) to provide proper flow through filter.



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BACKWASH FREQUENCY

Series TFCL filters are equipped for time-initiated backwash only. This requires you, the operator, to determine the backwash frequency required in your installation and to modify the backwash program frequency accordingly.

1) Tower-Flo recommends that a newly installed closed loop filter be programmed to conduct a back wash at least three (3) times daily for the first three days in service. In fact, in order to complete final quality testing of the closed loop filter system, a program of operation was installed in the control timer. Circuit #1 was set to backwash the filter 3 times per day, for a duration of 3 minutes each time, to commence at 12:30 AM, 8:30 AM and 4:30 PM Central time. That program will still be in the filter's control timer. You may wish to change the current time to your time zone.

2) The decision to extend backwash frequency must be made based on observation of actual backwash water clarity. Because the closed loop filter backwashes at a set time, personnel should be present to observe a backwash on the third day; capture a sample of the backwash water going to waste, and evaluate the quantity of filtered material being flushed to waste. Lots of material, continue the three backwash per day program; little or no material, its time to extend backwash frequency

3) Tower-Flo recommends that once backwash water clarity suggests that the filter system is backwashing too frequently and, thereby, wasting backwash water, the filter be reprogrammed to backwash once daily for the following seven days. Again, evaluation of backwash water clarity will guide when backwash frequency can be extended to once every three days and, eventually, to once per week.

START-UP

1) Program / re-program the backwash control timer using the programming instructions found on the following two pages and also packed in the control panel enclosure.

2) Place controller in "RUN" mode.

3) Adjust throttling valve for desired flow rate (if applicable).

WARNING! This filter system operates under pressure. Do not open until system is isolated and all pressure is released through air relief valve. Tighten cap securely.

MANUAL BACKWASH

The TOWER FLO continuous loop filter system is equipped with an electronic programmable backwash timer. This timer has a built in "Output" switch which enables the operator to place system in one of three different modes:

ON: Turns on output regardless of program.
(manual operation)

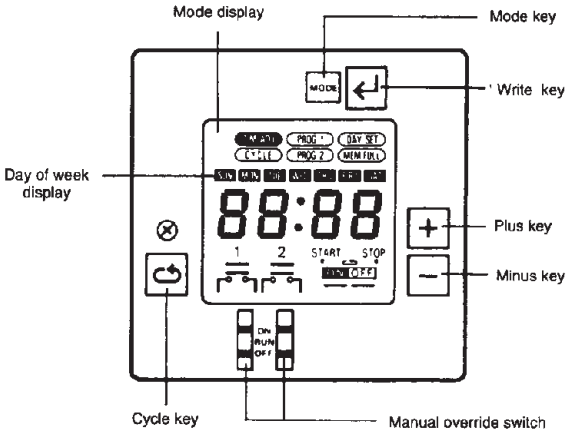
RUN: Executes program keyed into the controller by the operator.
(automatic operation)

OFF: Turns output off regardless of program.

To achieve manual backwash, simply place controller mode switch to ON position for desired length of backwash time (usually 2-3 minutes is required).

Operation

■ NOMENCLATURE



Output status indication

Output ON

Output OFF

Invalid instruction written to a step

■ KEY OPERATIONS

Key	Name	Function
MODE	Mode key	Changes program mode RUN mode → Current time setting mode → First circuit operation setting mode → First weekday setting mode → Second circuit operation setting mode → Second circuit weekday setting mode → RUN mode
↵	Write key	To write the set data using the plus and/or minus key Reads out the set program
+	Plus key	Plus key increments displayed digits Minus key decrements displayed digits When the plus key is held down, the displayed digit increments continuously; when the minus key is held down, the displayed digit decrements continuously When specifying output, the plus key specifies output ON, the minus key specifies output OFF. If the same key is pressed twice, the output specification becomes invalid, so neither ON nor OFF is set.
-	Minus key	
↻	Cycle key	Selects the cycle program.
ON RUN OFF	Manual override switch	ON: Turns ON output regardless of program RUN: Executes program OFF: Turns OFF output regardless of program Each circuit can be operated independently

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■ PROGRAMMING SEQUENCE

The H5L weekly timer has six program modes. Use the mode key to change the modes. Use the write key, plus and minus keys and cycle key for programming in each mode.

Mode sequence **Programming details**

Current time setting

To set the current time in the order of "day of week", "hour" and "minute".

1. Press the MODE key for longer than 1 s to set the H5L to T.M ADJ mode.
2. Set "day of week" using + and − keys. Then press the ↵ key to write the set weekday.
3. Set "hour" using + and − keys. Then press the ↵ key to write the set hour.
4. Set "minute" using + and − keys. Then press the ↵ key to write the set minute.

First circuit operation setting

To specify the first circuit operation in the order of "hour", "minute", and "output ON or OFF"

1. Press the MODE key to set the H5L to PROG 1 mode.
2. Set "hour" using + and − keys. Then press the ↵ key to write the set hour.
   Set "minute" using + and − keys. Then press the ↵ key to write the set minute.
3. Specify "ON" or "OFF" of output using + or − key and press the ↵ key to write the set output specification.

In this manner, set ON time and OFF time as many times as necessary.

First circuit weekday setting

To set for each weekday whether the program for the first circuit set in the previous step is to be executed or not

1. Press the MODE key to set the H5L to PROG 1 DAY SET mode.
2. Press + key to run the first circuit and press − key for it not to run.
3. Press ↵ key to change day of week.

Rspeat steps 2 and 3 for Sunday to Saturday.

Second circuit operation setting

To specify the second circuit operation in the order of "hour", "minute", and "ON" or "OFF" of output

1. Press MODE key to set the H5L to PROG 2 mode.
2. Proceed with the settings in the same manner as in the first circuit operation setting above.

Second circuit weekday setting

To set for each weekday whether the program for the second circuit set in the previous steps is to be executed or not

1. Press the MODE key to set the H5L to PROG 2 DAY SET mode.
2. Proceed with the settings in the same manner as in the first circuit operation setting above.

RUN

Run the H5L by the set program. In RUN mode, the current time and output status are displayed but the operation mode is not displayed. On starting operation of the H5L, the colon between the "hour" and "minute" blinks to indicate that time count is proceeding.

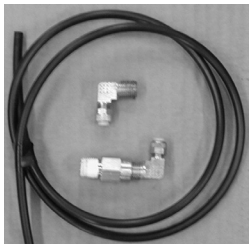
NOTE: The H5L operates according to the program already set, even while another program is being set. The output status display shows the program being set. The actual output status may not agree with the displayed status during programming.

TOWER-FLO® Series TFCL

Standard TFCL
Alternate Pilot Pressure Kit

Standard TFCL Filters are equipped with diaphragm-type pilot control valves. Standard factory connection for pilot pressure to the diaphragm valves is from the municipal water supply used for backwashing (from the lower left valve).

If system water pressure is greater than municipal water pressure in your installation, the system will not operate properly. In such a situation, use this ALTERNATE PILOT PRESSURE KIT to change to system water for pilot pressure (from the upper right valve).



The ALTERNATE PILOT PRESSURE KIT contains the items shown at left:

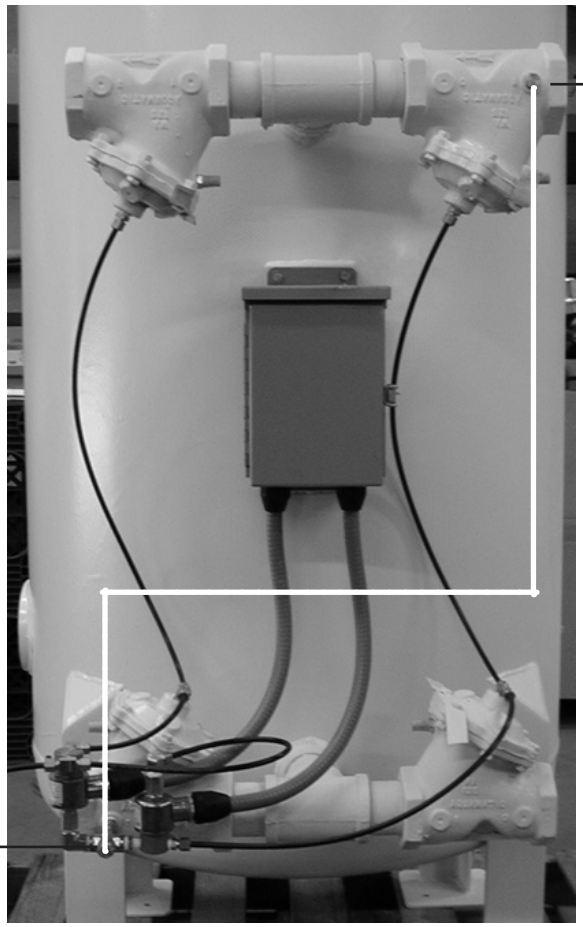
1) a length of 1/4" poly tubing;
2) one elbow, brass, 90˚, 1/4" MPT x 1/4 poly compression
3) one elbow, brass, 90˚, 1/4" MPT x 1/4 poly compression pre-assembled to one valve, check, brass, 1/4" MPT inlet x 1/4" MPT outlet

Using these parts and the instructions below, you will connect pressure tubing from the pilot port on the upper right valve to the control solenoids mounted on the lower left valve, as shown by the dotted white line in the center photo below.

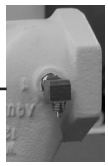
Properly backup brass cross and remove plug.

Wrap threads with teflon tape and install brass check valve.

Remove the ferrel and nut from the elbow, slip on end of the tubing, then attach poly tubing with nut.



Remove brass plug.



Wrap threads with teflon tape and install brass elbow.

Remove the ferrel and nut from the elbow, slip on one end of the tubing, then attach poly tubing with nut.

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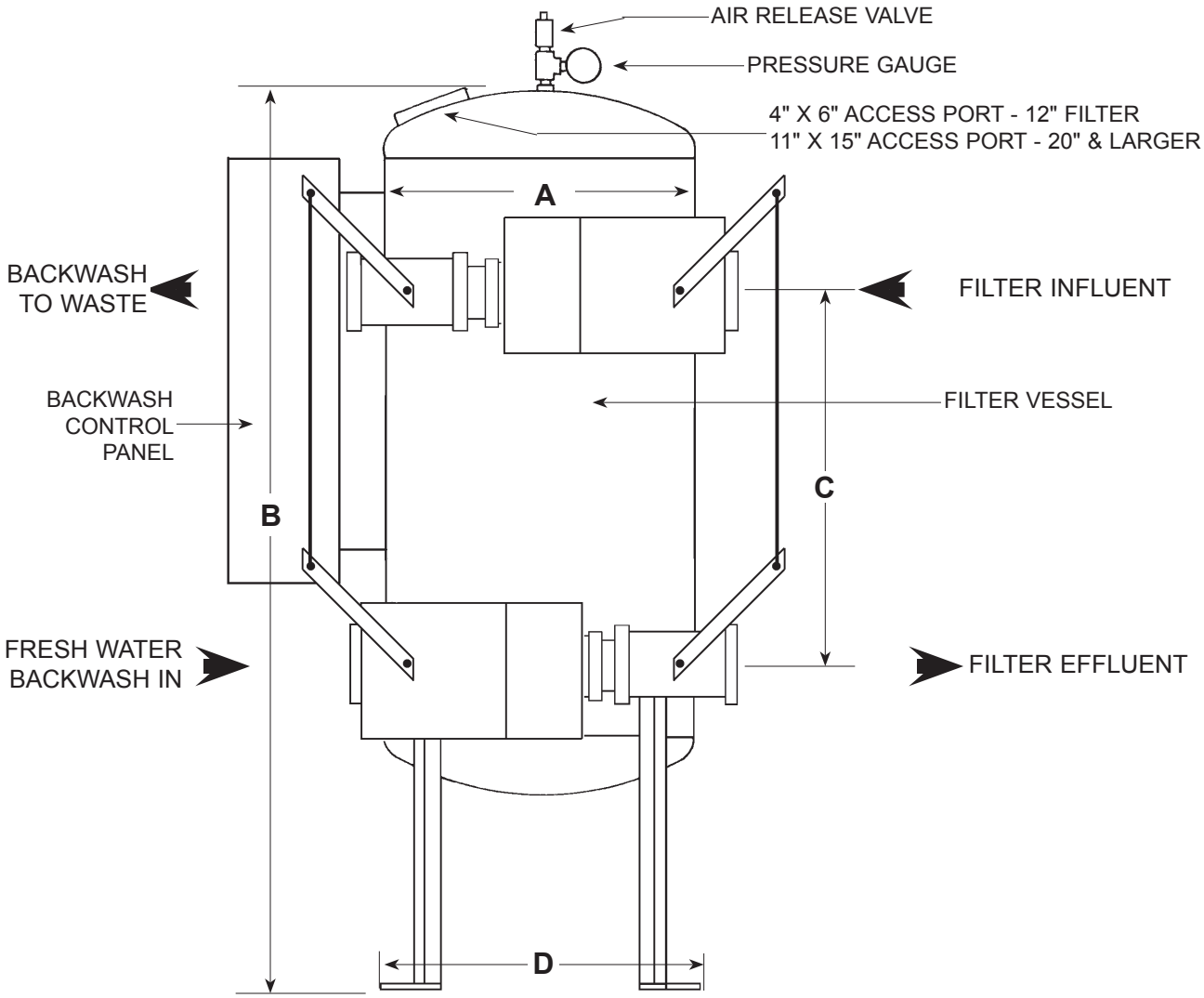

Dimensions

Model #	Plumbing Connections	A	B	C	D
TFCL-12	1-1/4"	12"	52"	31"	15"
TFCL-20	1-1/4"	20"	52"	31"	20"
TFCL-24	1-1/2"	24"	55"	31"	24"
TFCL-30	2"	30"	58"	31"	30"
TFCL-36	2”	36"	61"	31"	36"

NOTE: ALL DIMENSIONS ARE APPROXIMATE AND MUST BE FIELD VERIFIED.

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1) The system pressure must not be greater than the maximum pressure rating of the vessel.

2) The filter must be installed as a bypass or "loop the pump" for proper operation.

3) Isolation valves and unions, by others, must be installed for service/maintenance capability.

NOTE: Isolation alves and unions are not included.

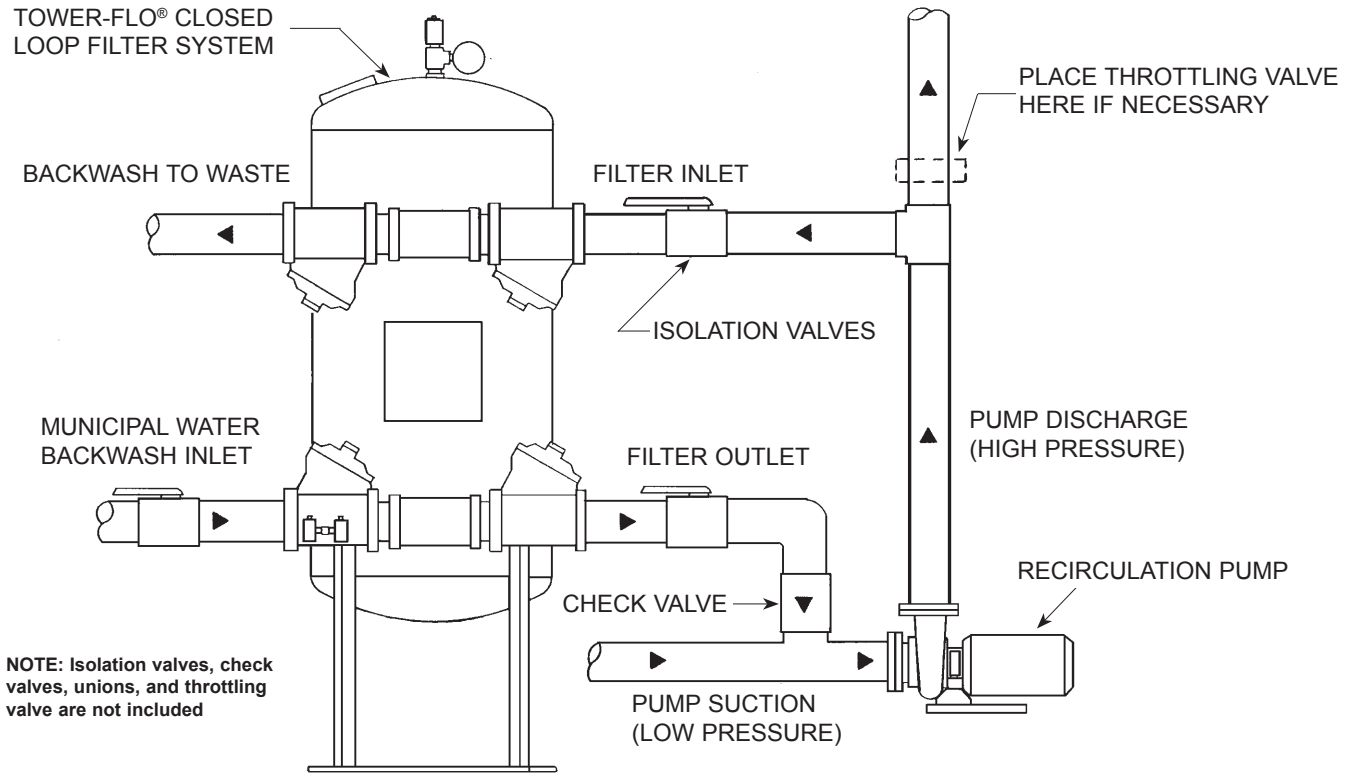
4) To ensure proper backwash, a minimum flow of 75% of the maximum GPM rating of the filter must be provided from municipal supply.

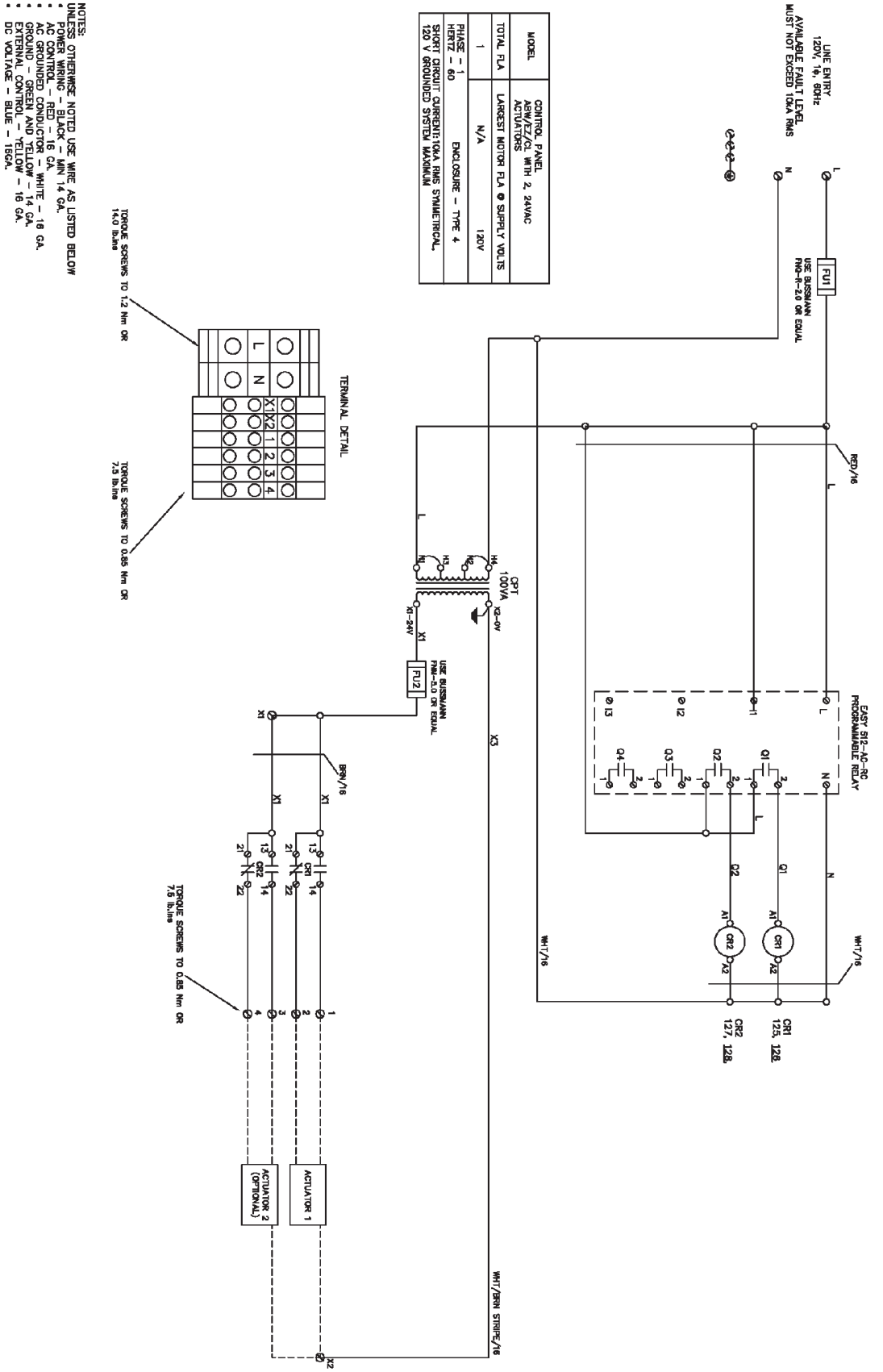
5) Remove cap in top of vessel and fill vessel 1/2 full of water.

6) Add filter media provided, fill vessel to top with water and replace cap.

7) Insure proper installation of all plumbing connections prior to opening isolation valves.

8) Open isolation valves and adjust throttling valve (if applicable) to provide proper flow through filter.





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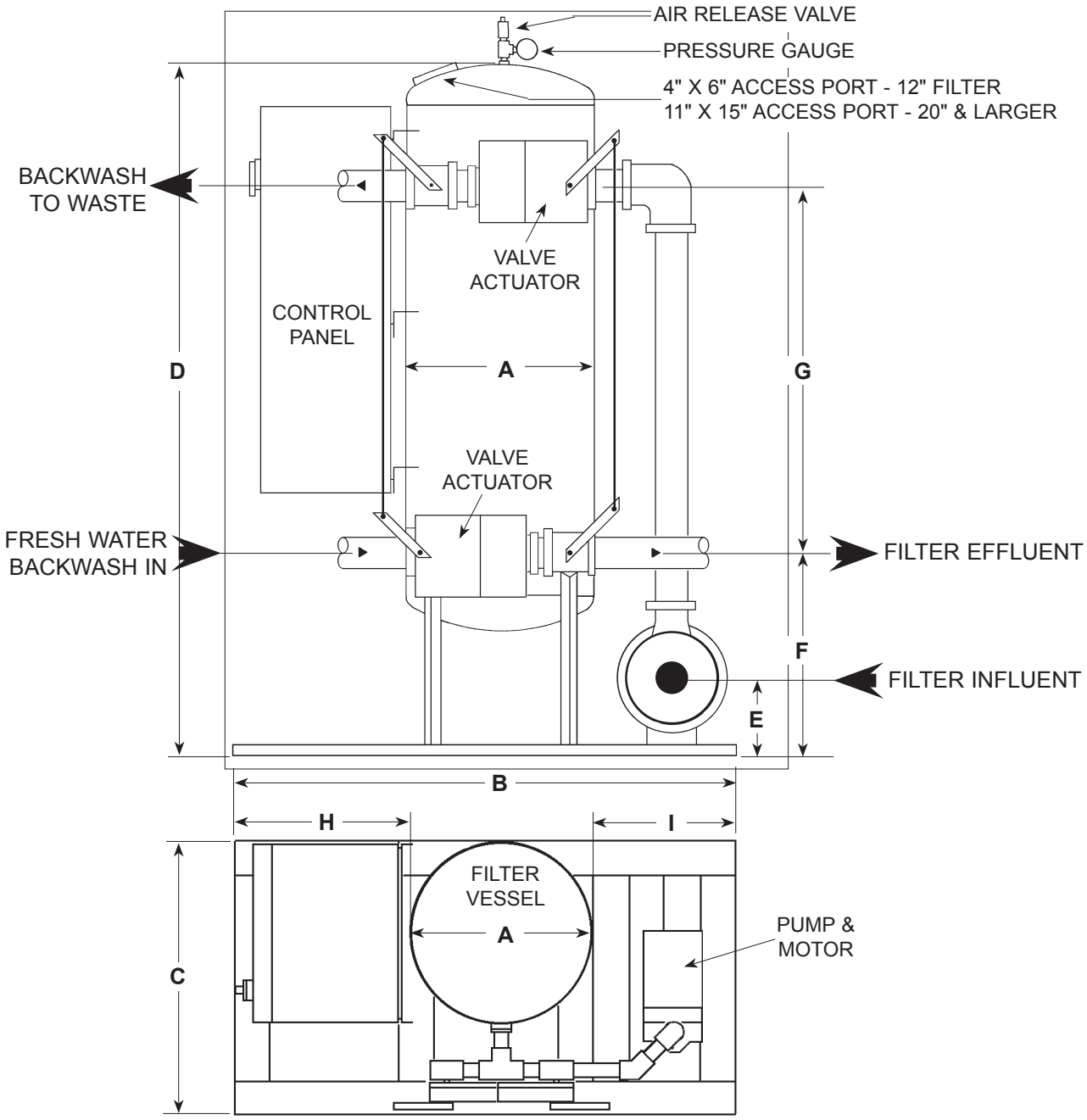

Dimensions

Model #	Plumbing Connections	A	B	C	D	E	F	G	H	I
TFCL-12	1-1/4"	12-3/4"	40"	24"	56"	8-7/8"	15-1/2"	31"	14"	13"
TFCL-20	1-1/4"	20"	46"	32"	58-3/4"	9"	16-1/2"	31"	14"	23-1/4"
TFCL-24	1-1/2"	24"	50"	36"	62"	9-1/2"	16-1/4"	31"	14"	23"
TFCL-30	2"	30"	58"	42"	64"	9-1/2"	18-1/4"	31"	14"	28"
TFCL-36	2"	36"	66"	48"	66"	9-1/2"	18-1/4"	31"	14"	33"

NOTE: DRAWING IS REPRESENTATIONAL ONLY. ALL DIMENSIONS ARE APPROXIMATE AND MUST BE FIELD VERIFIED.

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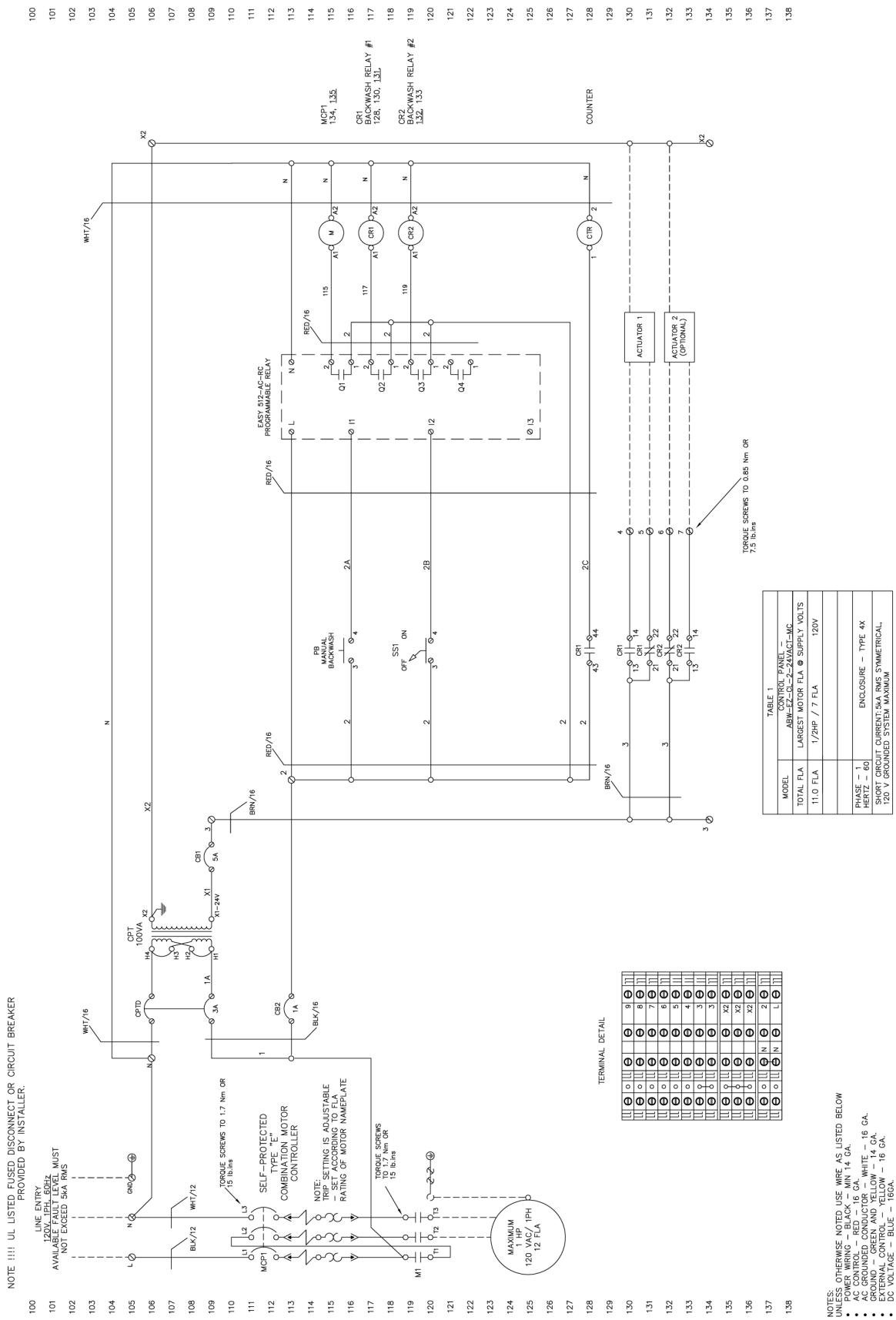

NOTE !!!! UL LISTED FUSED DISCONNECT OR CIRCUIT BREAKER PROVIDED BY INSTALLER.
LINE ENTRY 120V, 1PH, 60Hz AVAILABLE FAULT LEVEL MUST NOT EXCEED 5kA RMS
SELF-PROTECTED TYPE "E" COMBINATION MOTOR CONTROLLER
NOTE: TRIP SETTING IS ADJUSTABLE AND SET ACCORDING TO FLA RATING OF MOTOR NAMEPLATE
TORQUE SCREWS TO 1.7 Nm OR 15 lb.ins
MAXIMUM 1 HP 120 VAC/ 1PH 12 FLA
MCP1 1,34, 135
CR1 BACKWASH RELAY #1 128, 130, 131
CR2 BACKWASH RELAY #2 132, 133
COUNTER
ACTUATOR 1
ACTUATOR 2 (OPTIONAL)
EASY 512-AC-RC PROGRAMMABLE RELAY
PB MANUAL BACKWASH
SS1 ON OFF
CPT 100VA
TORQUE SCREWS TO 0.85 Nm OR 7.5 lb.ins
TERMINAL DETAIL
TABLE 1
MODEL — CONTROL PANEL – ABW-EZ-CL-2-24VAC1-MC
TOTAL FLA — LARGEST MOTOR FLA @ SUPPLY VOLTS
11.0 FLA — 1/2HP / 7 FLA — 120V
PHASE – 1
HERTZ – 60
ENCLOSURE – TYPE 4X
SHORT CIRCUIT CURRENT: 5kA RMS SYMMETRICAL, 120 V GROUNDED SYSTEM MAXIMUM
NOTES:
UNLESS OTHERWISE NOTED, USE WIRE AS LISTED BELOW
POWER WIRING – BLACK – MIN 14 GA.
AC CONTROL – RED – 16 GA.
AC GROUNDED CONDUCTOR – WHITE – 16 GA.
GROUND – GREEN AND YELLOW – 14 GA.
EXTERNAL CONTROL – YELLOW – 16 GA.
DC VOLTAGE – BLUE – 16GA.

BACKWASH FREQUENCY

Series TFCL filters are equipped for time-initiated backwash only. This requires you, the operator, to determine the backwash frequency required in your installation and to modify the backwash program frequency accordingly.

1) Tower-Flo recommends that a newly installed closed loop filter be programmed to conduct a back wash once every 8 hours for the first three days in service.

2) The decision to extend backwash frequency must be made based on observation of actual backwash water clarity. Because the closed loop filter backwashes at a set time, personnel should be present to observe a backwash on the third day, capture a sample of the backwash water going to waste, and evaluate the quantity of filtered material being flushed to waste. Lots of material, continue the three backwash per day program; little or no material, its time to extend backwash frequency.

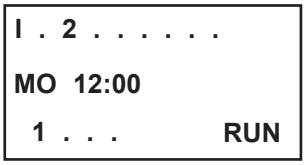
3) Tower-Flo recommends that once backwash water clarity suggests that the filter system is backwashing too frequently and, thereby, wasting backwash water, the filter be reprogrammed to backwash once every 24 hours for the following seven days. Again, evaluation of backwash water clarity will guide when backwash frequency can be progressively extended to once every 48 hours, 72 hours, and eventually to the maximum 99 hours & 59 minutes.

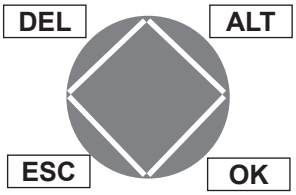
BACKWASH FREQUENCY TIMER CHANGE

Changing the backwash frequency timer is a simple procedure, as follows:

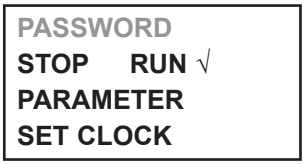
1. Open control panel door.

2. Locate the EASY 512-AC-RC programmable relay. The face of the relay will have an LED status display, 4-way cursor toggle button, and control buttons as shown at right. This LED display is referred to as the main display..

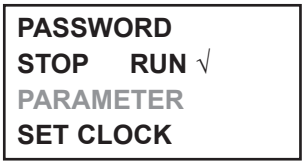




3. Press OK once. The display will appear as shown at right. Cursor position is indicated by blinking; PASSWORD will be blinking (represented by “light” text).



4. Using the 4-way cursor toggle button, press the **down** arrow to move the cursor down two lines to PARAMETER.



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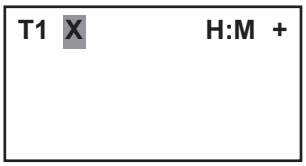
5. Press the OK button once. A new display will appear as shown at right.(the cursor position is indicated as a blinking black square, represented at right as ▮).



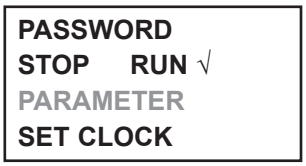
6. Press the OK button once again. A new display will appear as shown at right This is the Timer T1 setting screen. It is set to an Hour and Minutes (H:M) mode and will initiate backwash every 8 hours (the 08:00 timer setting is read HH:MM).

7. Using the 4-way cursor toggle button, press the **right** arrow three times to move the cursor to the first “0” in 08:00 on the I1 line.

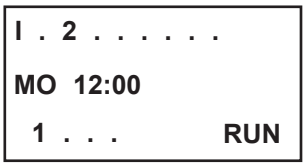
8. Press the OK button once to make the setting change function operational; the cursor will disappear and the number 0 will begin to flash. Use the **up** or **down** arrows on the 4-way cursor toggle button to change the value of the first H digit. Once the desired value is set for the first H digit, press the **right** arrow once to move the cursor to the second H digit and then the **up** or **down** arrows to change its value as desired. Continue in the same manner to change the first and second M values, if desired. The example at right shows T5 changed to 12 hours.

9. Once timer values have been changed, as desired, press the OK button once. The cursor will reappear on the first H.

10. Press ESC once. This display will reappear.



11. Press ESC again. The main display will reappear. Close the enclosure door. Backwash timer change is complete.



TOWER-FLO® Filter Media and Particle Retention

The filter media supplied with Tower-Flo® filter systems is consistent with American Water Works Association (AWWA) standards for fine filter sand for potable water; that is, quartzite or silica in nature, hard, not smooth, with a uniformity coefficient of 1.7, a relative size of .45 to .55 mm, and containing no more than 5% flat particles, or more than 1% clay, loam dust, or other foreign material.

Filter media conforming to the AWWA standard is generally accepted as retaining 20 micron size particles and larger when clean. Particulate entering the tortuous pathways created by the deep bed of sand will become trapped in the interstitial spaces between the individual grains of sand (that space is defined by the uniformity coefficient criteria of the standard). As these spaces become increasingly clogged by the retained particulate, progressively finer particles will be trapped over the course of a filter run (from backwash to backwash). At a 10 psi pressure drop across the media bed – the point at which backwash will be initiated by differential pressure – it is generally accepted that the media bed, “loaded” with particulate, will retain approximately 99% of 10 micron particles and 90% of 5 micron particles.

Series TFB systems utilize two additional grades of support media -- 1/8" to 1/4" gravel and 1/4" to 1/2" rock. These additional support grades are necessary for proper hydrodynamics inside the vessel at the significant flow rates found in Series TFB systems.

All three grades of media weigh 100 lbs. per cubic foot.

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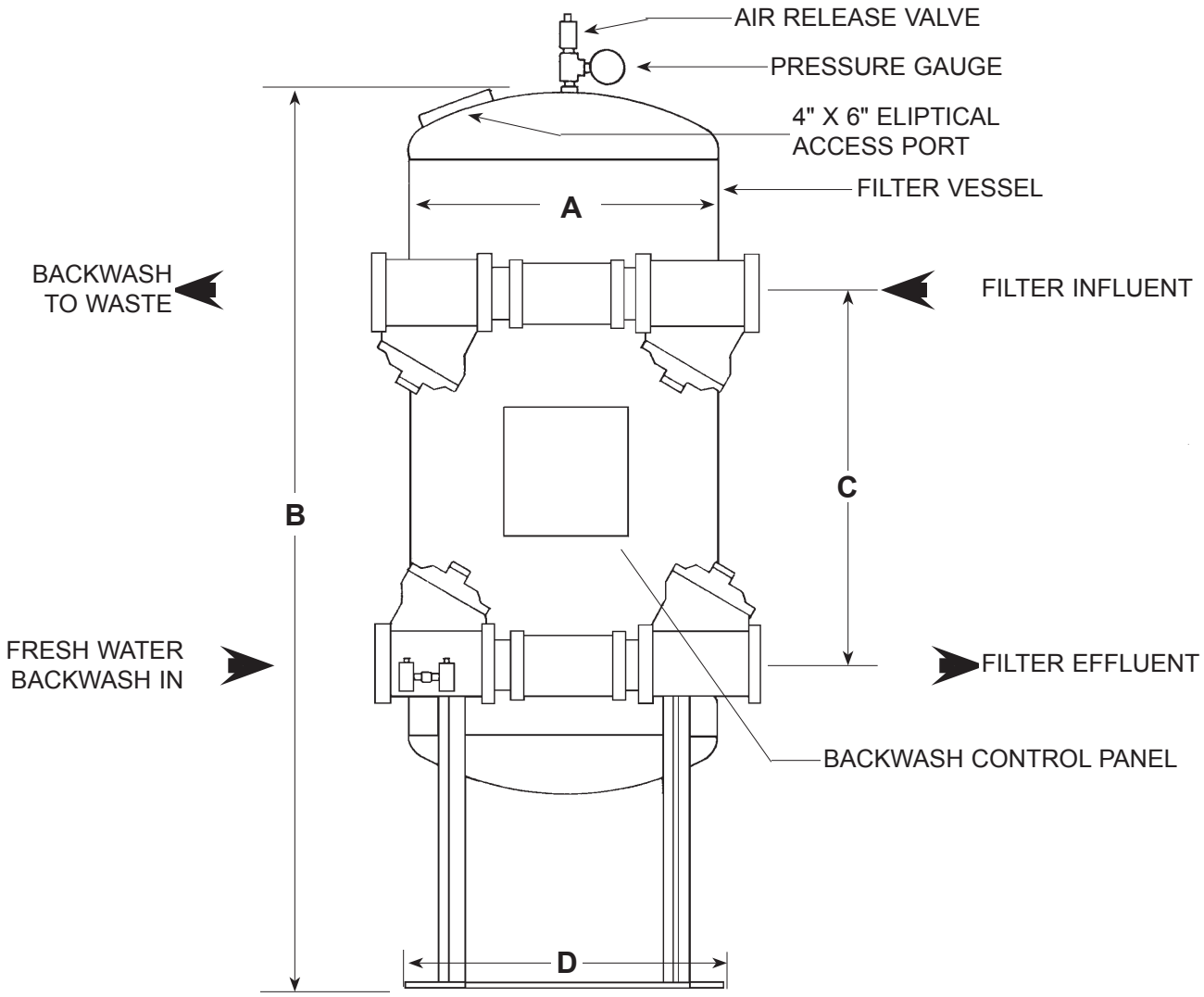
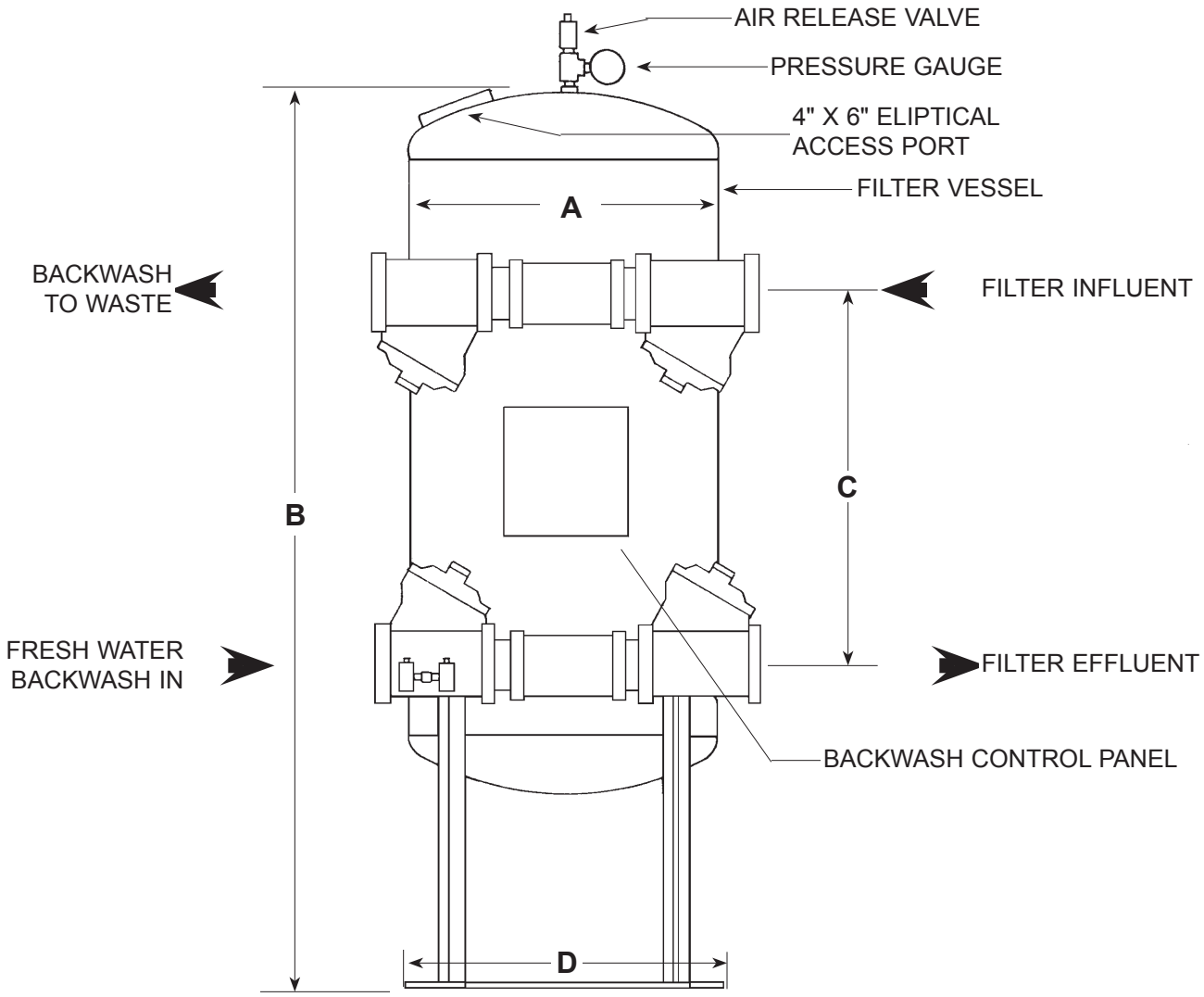


Dimensions

Model #	Plumbing Connections	A	B	C	D
TFCL-12	3/4"	12"	52"	31"	15"
TFCL-20	1-1/4"	20"	52"	31"	20"
TFCL-24	1-1/2"	24"	55"	31"	24"
TFCL-30	2"	30"	58"	31"	30"
TFCL-36	2-1/2"	36"	61"	31"	36"
TFCL-42	3"	42"	63"	31"	42"



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TFCL-20	1-1/4"	20"	52"	31"	20"
TFCL-24	1-1/2"	24"	55"	31"	24"
TFCL-30	2"	30"	58"	31"	30"
TFCL-36	2-1/2"	36"	61"	31"	36"
TFCL-42	3"	42"	63"	31"	42"

TOWER-FLO® Series TFCL

Project Specifications
TFCL-Standard / PIV / PMC

192 GPM MAX FLOW RATE 150 PSI WORKING PRESSURE @ 150˚F

Model #	Max GPM	**Standard** Plumbing Connections	**PIV** Plumbing Connections	Vol Sand Ft^3	Operating Weight in Lbs.	**PMC** HP
TFCL-12	20	3/4"	1-1/4"	1.5	330	1/2
TFCL-20	43	1-1/4"	1-1/4"	4.0	800	1
TFCL-24	65	1-1/2"	1-1/2"	5.0	1200	1.5
TFCL-30	100	2"	2"	7.0	1800	3
TFCL-36	141	2-1/2"	2"	10.0	2300	na
TFCL-42	192	3"	na	18.0	3500	na

*1 Ft^3 of media = 100 lbs. Operating Weight based on **Standard** TFCL

TOWER-FLO® Series TFCL filter systems shall consist of the following major components: a vertical pressure vessel, valves, facepiping, controls with programmable timer or programmable relay for automatic operation. Filter media shall be shipped with the unit for field installation. Backwash is timer initiated and is from city water supply.

TFCL units can be configured as follows:

STANDARD: pilot pressure actuated diaphragm valves;
PIV: Positive Isolation Valving which completely isolates the actuation of the valves on the system side connections from the actuation of the valves on the city water and drain connections;
PMC: either of the above valving with the addition of a Pump, Motor, and motor Controls;
PORTABLE: TFCL-12 OR TFCL-20 ONLY, in any of the three above arrangements, on a caster-wheeled base, with or without steam hoses having wolf style quick connections.

Project: _____ Date: _____

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

COMPONENT **SPECIFICATION**

VESSEL
✔ **Standard:** Carbon steel; 15-18 mil epoxy interior coating; exterior coating of two-part epoxy primer finished with two-part industrial and marine grade polyurethane; 150 psi working pressure at 150° F; access through top head opening; threaded influent and effluent; air release coupling in top head with automatic air release valve; type 304 stainless steel internals.
___ **Option:** Type 304 stainless steel vessel.
___ **Option:** Working pressures to 300 psi.
___ **Option:** Working temperatures to 200˚F.

VALVES
✔ **Standard:** Automatic, diaphragm type, cast iron bodied, pilot control valves actuated by electronic solenoids.
___ **Option:** **PIV**: positive isolation valve arrangement; 2 sets of bronze 2-way ball valves, _____", with stainless steel linkage and ____ VAC electric actuators to positively isolate system and backwash water sources. NOTE: Not available on TFCL-42.

FACEPIPING
✔ **Standard:** Class 150 malleable iron fittings; influent pressure gauge, backwash sight glass.

CONTROLS
✔ **Standard:** Automatic backwash operation; control panel with: NEMA 3R enclosure; seven day programmable timer with an LCD time display; minimum 14 daily on/off operations poles; 15A at 125 VAC, 60 Hz.
___ **Option:** Manual backwash operation (bronze ball valves with handles, no actuators).
___ **Option:** **PIV**: Panel with user adjustable timer settings for customized valve operation requirements while isolating system and backwash water sources.

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COMPONENT **SPECIFICATION**

___ **Option:** **PMC: 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 cir cuit protection; fuseless branch and control circuit protection; transformer to convert primary supply to 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; primary backwash initiation by user adjustable timer or 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, and remote backwash initiation.

___ **Option:** **PIV and PMC: Three phase or single phase,** Automatic backwash control panel, same as **PMC** panel above, with **PIV** user adjustable timer settings for customized valve operation requirements: transformer to convert primary supply to 120 and 24 VAC control power.

PUMP:

___ **Option:** **PMC: TFCL-12, thru -30:** Self-priming; close grain cast and machined brass volute, impeller, and pump-to-motor coupling; 316 stainless steel impeller shaft; close coupled to a TEFC motor; and capable of ____ GPM at ___ feet TDH.

___ **Option:** **PMC:** other pump as follows: _____
_____.

MOTOR:

___ **Option:** **PMC: TFCL-12 thru -30:** 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 VAC, phase and Hz: _____.

___ **Option:** **PMC:** other motor as follows: _____
_____.

___ **Option:** 575V.

BASE:

___ **Standard or PIV:** Structural steel plate, primed and coated.

___ **Option:** **PMC:** Structural steel channel, primed and coated.

___ **Option:** **PIV or PMC:** Portable, castered base, structural steel channel, primed and coated. NOTE: TFCL-12 and TFCL-20 units only.

___ **Option:** **PIV or PMC: Portable:** Quick connect wolf couplings, four male ends factory installed on valve connections, and eight female ends, one on each end of four 25' steam hoses: ___ 1"; ___ 1-1/4"

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.

NOTE: Standard connection for pilot pressure to the standard diaphragm valves is to the municipal water supply used for backwashing. If system pressure is greater than municipal supply pressure at the point of installation, the system will not operate properly. In installations where system pressure is greater then municipal pressure, make the pilot connection to system water.