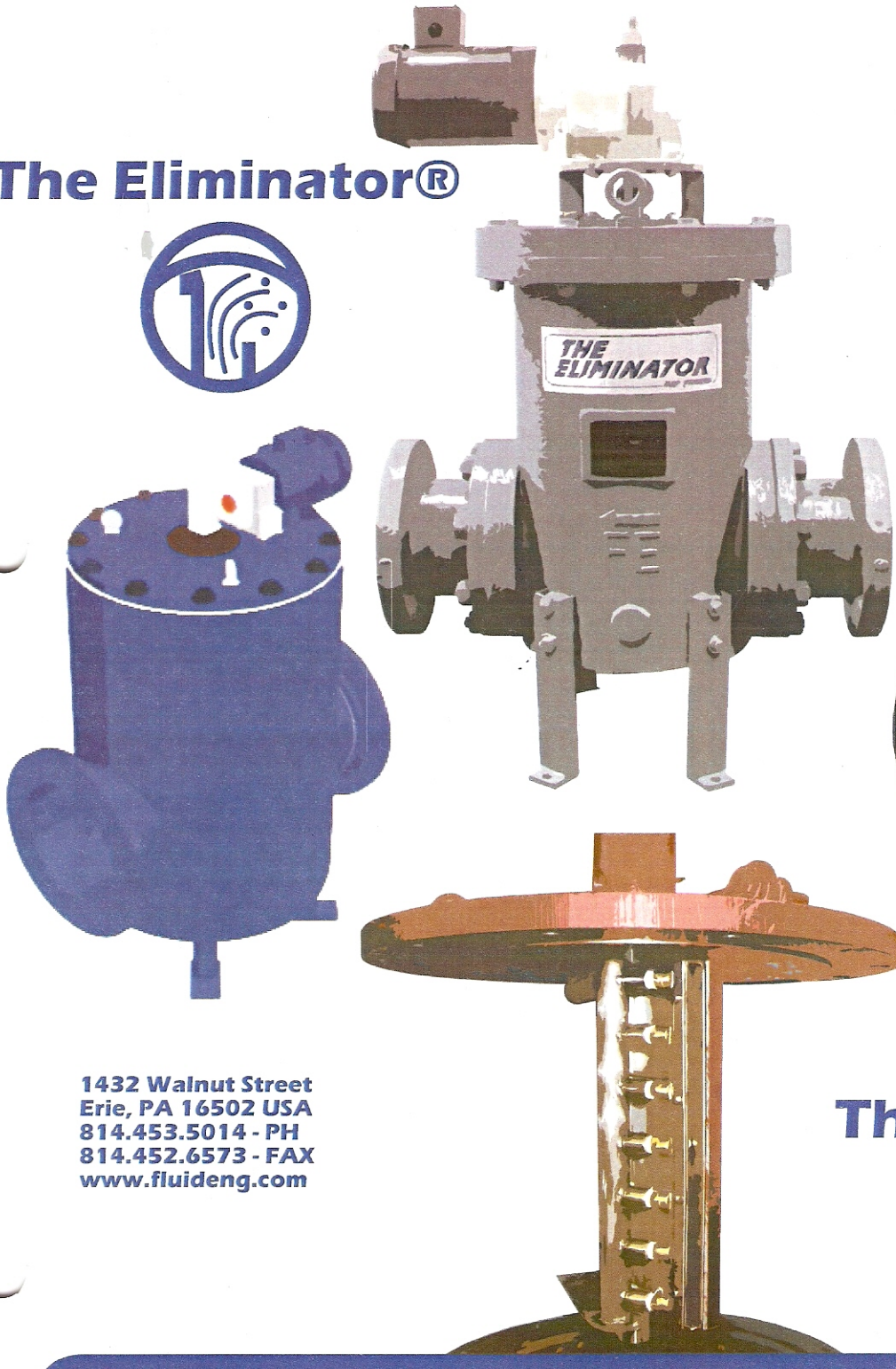
FLUID ENGINEERING

Automatic Self-Cleaning Strainer/Filter Systems

The Eliminator®



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The Hyper-Jet®

"Engineered Products for Demanding Applications, Performance, and Service"

The Hyper-Jet®
Model 721/751

The Hyper-Jet® is Fluid Engineering's additional line of motorized, automatic self-cleaning strainers. On fluid piping systems, which demand added cleaning abilities due to application requirements, the Hyper-Jet® provides continuous uninterrupted debris removal.

The Hyper-Jet® is very effective in system applications where operating pressure is low (under 5 psig) or where the system debris has particularly difficult removal characteristics. Fluid Engineering's 721/751 Series strainer provides unattended service with the addition of external backwash fluid that enhances the self-cleaning attribute over other automatic strainers.

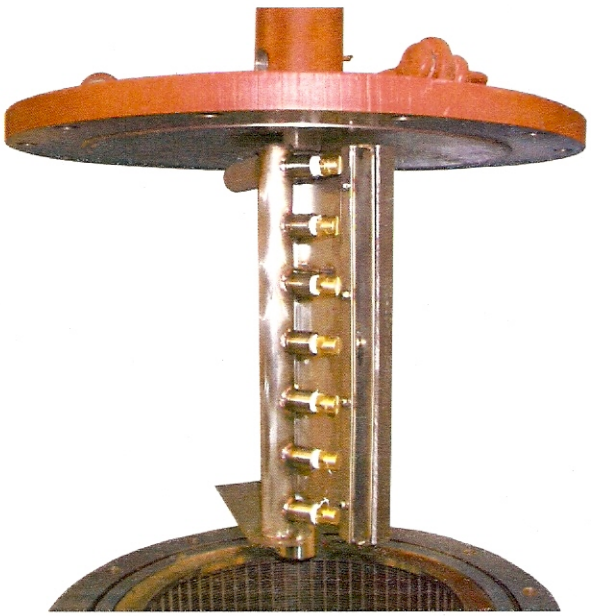


Figure 2 - The Innovative Internals of the Hyper-Jet®

APPLICATION

The Hyper-Jet's® unique patented backwash system coupled with Fluid Engineering's strainer element design permits installation in a broader range of system applications. This scope of operations includes from relatively low pressure to very high pressure and from withdrawing coarse, easily removed debris to fine, sticky debris.

In a low pressure mode (such as on the suction side of a pumping system), the Hyper-Jet® system is mounted on the leading edge of the strainer backwash arm (Fig. 2). External fluid is directed at an incident angle over the inside surface of the straining element through the high-pressure nozzle assembly. The high velocity of this spray assists the cleaning of the wedge-wire straining element. External source pressure must be a minimum of 30 psi over system operating pressure.

Hyper-Jet® strainers are used to protect equipment such as pumps, motors, heat exchangers, or spray nozzles, as well as process applications such as cooling towers or virtually any similar application.

The Series 721/751 Hyper-Jet® Self-Cleaning Strainers are fabricated in pipe sizes ranging from 1" to 36" to suit most application requirements. The Hyper-Jet® System can also easily and economically be field installed in any Fluid Engineering Self-Cleaning Strainer (6" size and larger) in service as a retrofit installation.

PROVEN FEATURES INCLUDE

- A unique patented spray assisted/ mechanical backwash mechanism for extended service life.
- A clog-resistant straining element (wedge-wire configuration) to reduce maintenance downtime and operator assisted attention.
- All internal replacement parts supplied in corrosion resistant materials (special material available on request).
- An efficient, effective cleaning mechanism which reduces annual maintenance, requiring fewer parts.
- A low rpm backwash cycle provides more efficient cleaning, less wear (no contact between rotating parts) and longer duty cycle on motors and speed reducers.
- Any existing Eliminator® (6" and up) can be converted to the Hyper-Jet®.

How the 700 Series Hyper-Jet® Works

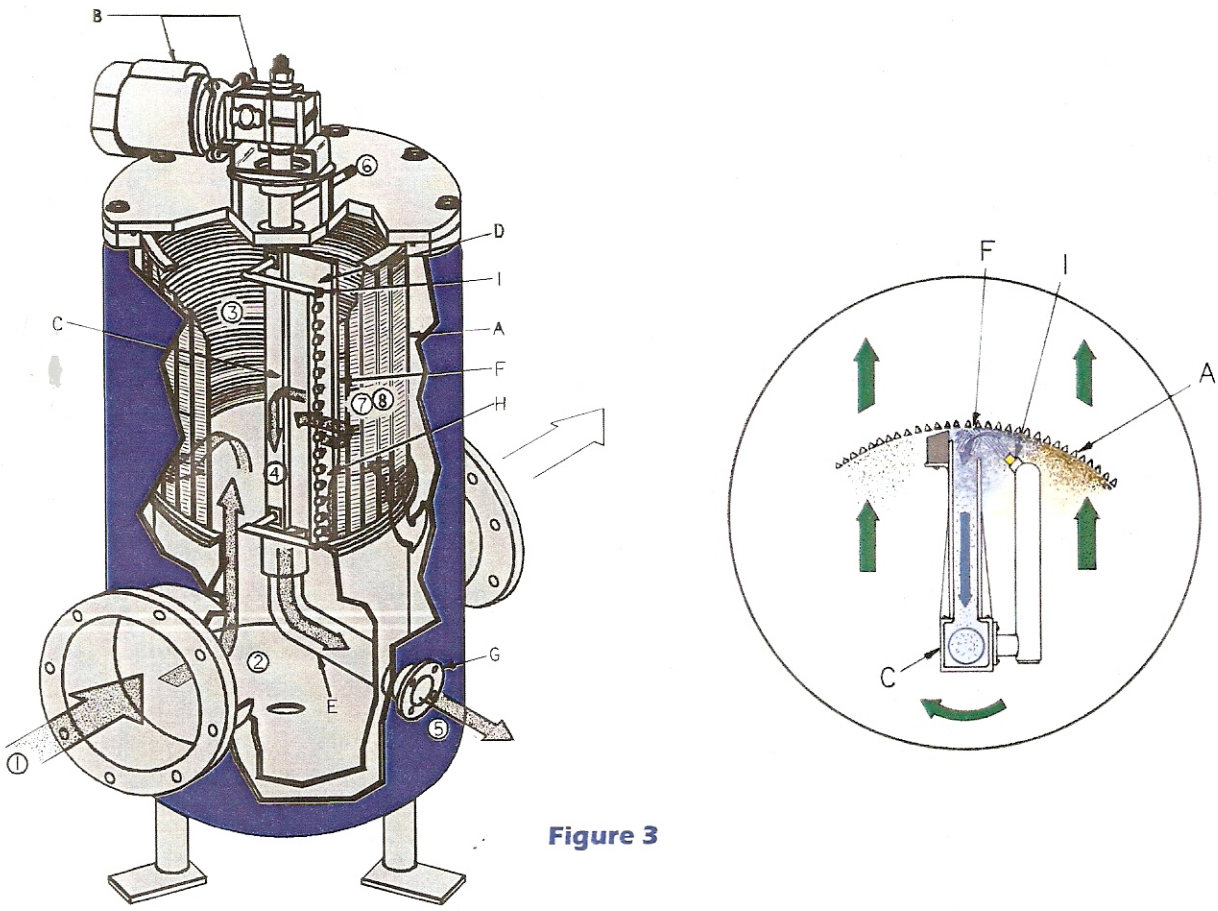


Figure 3

1. Debris laden fluid enters through inlet to inner chamber (Figure 3).
2. Dirty fluid flows upward to the strainer element (A).
3. Debris is retained on the flat face of the strainer element, while strained fluid continues to outer chamber and exits through strainer outlet (See insert).
4. During backwash or cleaning cycle, the motor/gear reducer (B) is engaged and drives the hollow drive shaft (C) and hollow port (D) around the inner circumference of the strainer element.
5. The backwash assembly (C), (D), and (E) are opened to atmospheric pressure by opening the backwash control valve (Not shown).
6. The external source of fluid is introduced by opening the control valve (Not shown) connecting the spray nozzles (J) at the leading edge (F) of the backwash assembly.
7. A "Jet" spray action occurs at the straining element inside surface (See insert) in addition to the flow reversal at the port/straining element interface (H).
8. Debris is effectively removed from the full length of the straining element by a vigorous "Hyper-Jet" fluid flow into the hollow port; down the hollow drive shaft and out the backwash outlet (G).
9. The hollow port continues to sweep the strainer element until the cleaning cycle has ended.
10. The strainer will provide continuous uninterrupted fluid flow during the cleaning operation.
11. The cleaning cycle can be set for continuous or intermittent backwash.

US Patent # 5,152,891

Straining Element

The Eliminator® features a revolutionary reverse rolled wedge-wire straining element (Figure. 4) that is extremely rugged and more clog resistant than conventional strainer elements that use perforated plate or wire mesh screens.

This is proven state-of-the-art straining media is fabricated by wrapping vertical rods with wedge shaped profile wire. Each intersection of rod and wire is welded to produce an extremely rugged one-piece element. This forms a continuous slot that allows only two-point contact with debris particles to reduce clogging.

The wedge shaped profile wire reduces the possibility of retaining debris smaller than the screen opening which historically has been the cause of premature clogging or failure of competitive screen designs.

ADVANTAGES OF WEDGE WIRE STRAINING ELEMENT

- Maximum effective flow area and maximum operating efficiency are maintained throughout service life.
- Maintenance costs are reduced drastically due to reduced clogging and stapling of fibrous material.
- Long-lived straining element provides reduced operating costs over entire service life.
- Rigid element prevents flexing which can cause premature element failure.
- Efficient, effective debris collection at media/screen interface.

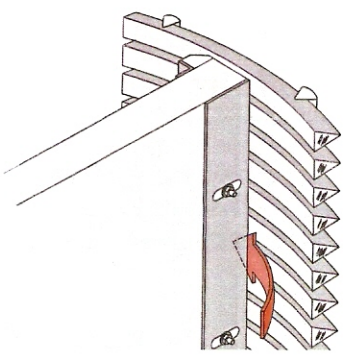


Figure 4 - Wedge Wire Straining Element Cross-Section with Adjustable Accelerator Plate

STANDARD SCREEN MATERIALS

- 304 Stainless Steel
- 316L Stainless Steel
- Monel
- Other materials available upon request

STRAINING ELEMENT SELECTION

The 700 Series Straining Element (Fig. 5) is an extremely rugged, single-piece unit available in a variety of standard and custom openings and materials.

Screen opening should be selected based on the amount of protection necessary and not on the smallest opening available. By specifying a smaller opening than needed, more debris will be retained and will subsequently result in longer

cleaning durations and increased backwash fluid loss. Also, smaller than necessary screen openings will reduce open screen area and increase pressure loss.

The screen opening should be approximately one third (1/3) to one half (1/2) the largest size particle that can safely pass downstream. Example: A strainer protecting spray nozzles with a 1/16" orifice should be supplied with a 1/32" screen opening.

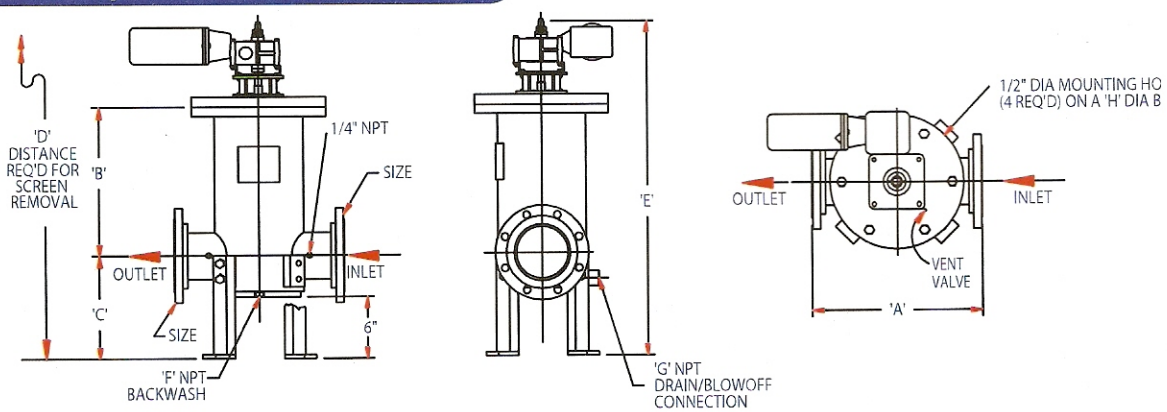
Figure 5 - Wedge Wire Straining Elements

Slot Opening (inches)	Fraction Equivalent (inches) (mm)	Mesh Equivalent	Micron Equivalent	% Open Area
		Standard		
0.003	(0.08)	200	75	9
0.006	(0.15)	100	149	16.5
0.010	(0.25)	50	250	17.5
0.015	1/64 (0.4)	40	385	24
0.020	(0.5)	35	500	30
0.032	1/32 (0.8)	20	795	40
0.062	1/16 (1.6)	10	1590	51
0.125	1/8 (3.2)	6	3205	67
0.187	3/16 (4.8)	4	4795	72
0.250	1/4 (6.4)	3	6410	78

Other slot openings are available upon request.

Specifications
Dimensions/Weight

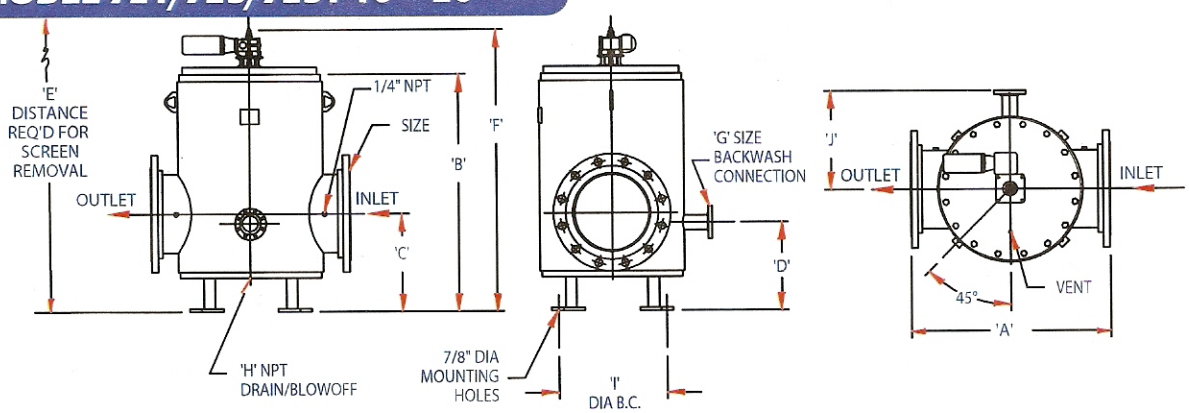
MODEL 721/793 1" - 10"



Model No.	Size (in.)	A (in.)	B (in.)	C (in.)	D* (in.)	E* (in.)	F (in.)	G (in.)	H (in.)	Dry Lbs	Wet Lbs	Lbs Cov.	Motor H.P.
010-793	1-150	16 1/2	14 1/4	10	59	36 1/2	1 NPT	1 NPT	11 7/8	295	440	130	1/4
015-793	1 1/2-150	16 1/2	14 1/4	10	59	36 1/2	1 NPT	1 NPT	11 7/8	300	445	130	1/4
020-793	2-150	16 1/2	14 1/4	10	59	36 1/2	1 NPT	1 NPT	11 7/8	305	450	130	1/4
025-793	2 1/2-150	16 1/2	14 1/4	10	59	36 1/2	1 NPT	1 NPT	11 7/8	310	455	130	1/4
030-793	3-150	16 1/2	14 1/4	10	59	36 1/2	1 NPT	1 NPT	11 7/8	315	460	130	1/4
040-793	4-150	16 1/2	14 1/4	10	59	36 1/2	1 NPT	1 NPT	11 7/8	325	470	130	1/4
060-721/793	6-150	20	15 5/8	11	65	38	1 1/2 NPT	1 NPT	16	560	750	170	1/4
080-721/793	8-150	28	18	16	74	46 1/2	1 1/2 NPT	1 NPT	21 1/4	825	1065	180	1/4
100-721/793	10-150	28	18	16	74	46 1/2	1 1/2 NPT	1 NPT	21 1/4	840	1080	180	1/4

(*) Add 5 1/4" for Model 721. Threaded (NPT) Inlet/Outlet Connections are available. Weights are approximate.

MODEL 721/723/723T 10" - 20"

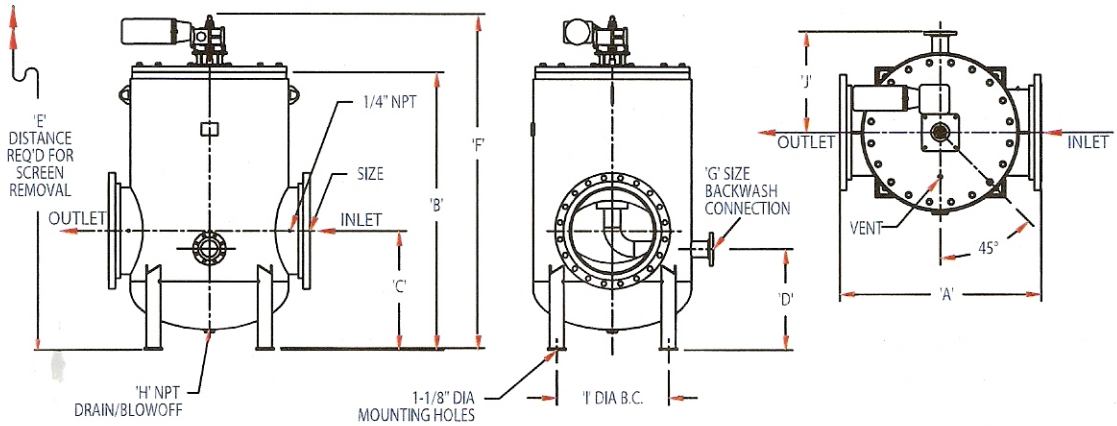


Model No.	Size (in.)	A (in.)	B (in.)	C (in.)	D* (in.)	E* (in.)	F (in.)	G (in.)	H (in.)	I (in.)	J (in.)	Dry Lbs	Wet Lbs	Lbs Cov	Motor H.P.
100-721T/723T	10-150	28	38 1/2	14	11	86	52 1/2	2 NPT	1 1/2 NPT	18	10 11/16	895	1145	195	1/4
100-721/723	10-150	36	43	17 1/2	14 1/2	75	55 1/2	2 NPT	1 1/2 NPT	26	14 3/4	1595	2245	285	1/4
120-721/723	12-150	36	43	17 1/2	14 1/2	75	55 1/2	2 NPT	1 1/2 NPT	26	14 3/4	1650	2305	285	1/4
140-721/723	14-150	44	51 1/2	19 1/2	15 1/2	94	69	3-150	1 1/2 NPT	32	21 3/4	2525	3800	510	1/4
160-721/723	16-150	44	51 1/2	19 1/2	15 1/2	94	69	3-150	1 1/2 NPT	32	21 3/4	2620	3895	510	1/4
180-721/723	18-150	48	66	24	20 7/8	113	87	3-150	2 NPT	38	25 1/4	3225	5470	700	1/4
200-721/723	20-150	48	66	24	20 7/8	113	87	3-150	2 NPT	38	25 1/4	3295	5545	700	1/4

(*) Add 4 1/2" for Model 721. Dimensions subject to change without notice, apply for certified drawings. Weights are approximate.

Specifications
Dimensions/Weight

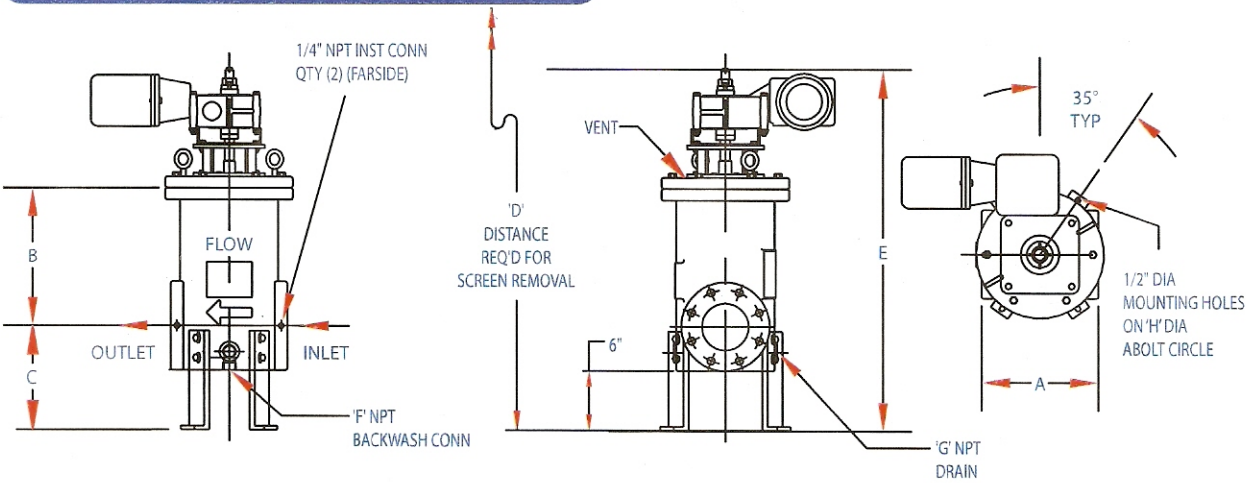
MODEL 721/723 24" - 36"



Model No.	Size (in.)	A (in.)	B (in.)	C (in.)	D (in.)	E* (in.)	F* (in.)	G (in.)	H (in.)	I (in.)	J (in.)	Dry Lbs	Wet Lbs	Lbs Cover	Motor H.P.
240-721/723	24-150	56	77	33	28	122	98	4-150	2 NPT	44	28	4500	8475	150	1/3
300-721/723	30-150	66	94	39	34 1/4	150	115	4-150	2 NPT	54	33	6525	13625	1275	1/3
360-721/723	36-150	86	120	48	40 1/2	210	132	6-150	2 NPT	72	43	12050	26975	1650	1/2

(*) Add 7" for Model 721. Larger sizes available upon request. Dimensions subject to change without notice, apply for certified drawings. Weights are approximate.

MODEL 751/753 CAST IRON

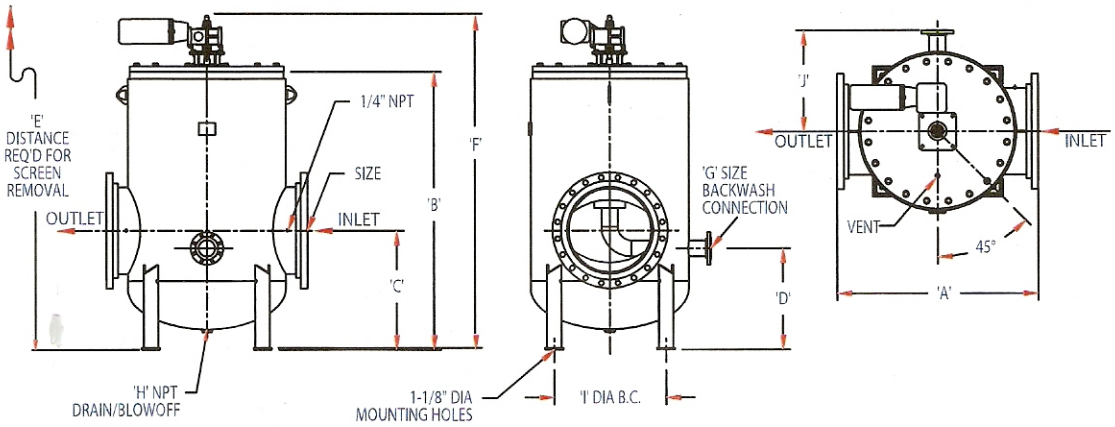


Model No.	Size (in.)	A (in.)	B (in.)	C (in.)	D* (in.)	E* (in.)	F	G	H (in.)	Dry Lbs	Wet Lbs	Lbs Cov	Motor H.P.
02004-751/753	125/150FF	23 7/8	14	10 1/2	60	37	1" NPT	1" NPT	13 1/4	370	520	130	1/4
02504-751/753	125/150FF	23 7/8	14	10 1/2	60	37	1" NPT	1" NPT	13 1/4	375	530	130	1/4
03004-751/753	125/150FF	23 7/8	14	10 1/2	60	37	1" NPT	1" NPT	13 1/4	380	540	130	1/4
04004-751/753	125/150FF	11 7/8	14	10 1/2	60	37	1" NPT	1" NPT	13 1/4	300	425	130	1/4
06006-751/753	125/150FF	15 7/8	15 7/8	11 1/2	62	39	1 1/2" NPT	1" NPT	16 1/4	590	690	170	1/4
08008-751/753	125/150FF	32 5/8	20 3/4	14	75	47 1/2	1 1/2" NPT	1" NPT	21 1/4	1160	1435	180	1/4
10010-751/753	125/150FF	20 5/8	20 3/4	14	75	47 1/2	1 1/2" NPT	1" NPT	21 1/4	875	1120	180	1/4
10012-751/753	125/150FF	30	27 1/2	16 1/2	76	56 1/2	2" NPT	1" NPT	24 1/2	1658	2313	285	1/4
12012-751/753	125/150FF	30	27 1/2	16 1/2	76	56 1/2	2" NPT	1" NPT	24 1/2	1625	2280	285	1/4
14012-751/753	125/150FF	30	27 1/2	16 1/2	76	56 1/2	2" NPT	1" NPT	24 1/2	1600	2255	285	1/4

(*) Add 5 1/4" for Model 751. Dimensions subject to change without notice, apply for certified drawings. Weights are approximate.

Specifications
Dimensions/Weight

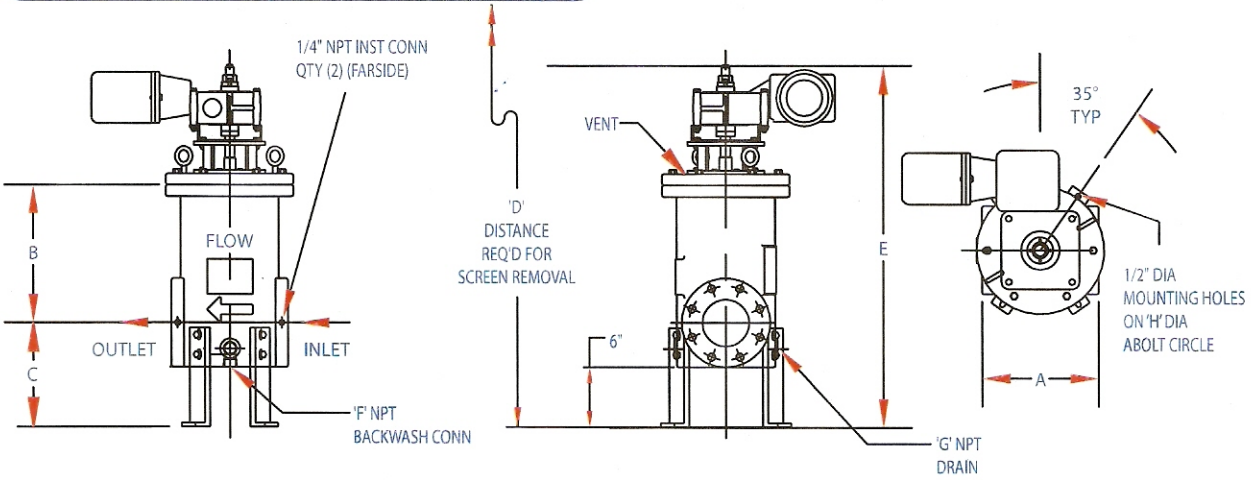
MODEL 721/723 24" - 36"



Model No.	Size (in.)	A (in.)	B (in.)	C (in.)	D (in.)	E* (in.)	F* (in.)	G (in.)	H (in.)	I (in.)	J (in.)	Dry Lbs	Wet Lbs	Lbs Cover	Motor H.P.
240-721/723	24-150	56	77	33	28	122	98	4-150	2 NPT	44	28	4500	8475	150	1/3
300-721/723	30-150	66	94	39	34 1/4	150	115	4-150	2 NPT	54	33	6525	13625	1275	1/3
360-721/723	36-150	86	120	48	40 1/2	210	132	6-150	2 NPT	72	43	12050	26975	1650	1/2

(*) Add 7" for Model 721. Larger sizes available upon request. Dimensions subject to change without notice, apply for certified drawings. Weights are approximate.

MODEL 751/753 CAST IRON

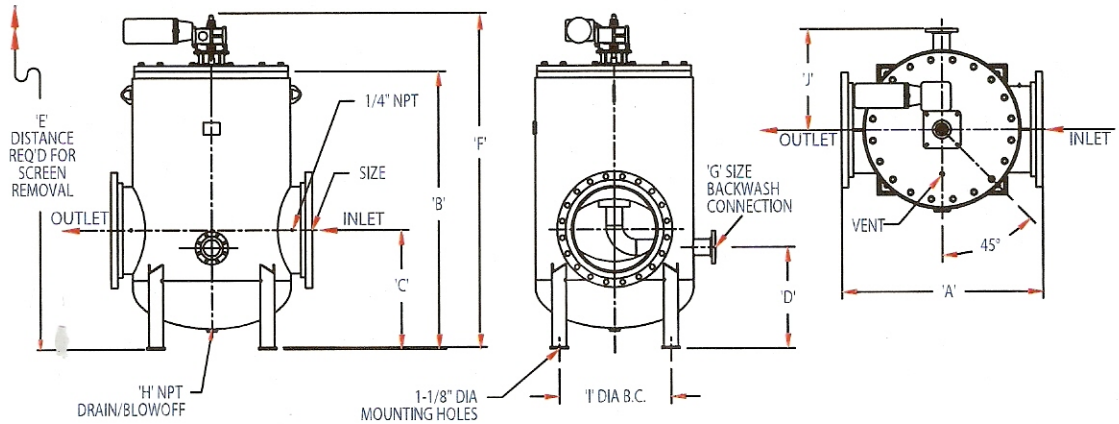


Model No.	Size (in.)	A (in.)	B (in.)	C (in.)	D* (in.)	E* (in.)	F	G	H (in.)	Dry Lbs	Wet Lbs	Lbs Cov	Motor H.P.
02004-751/753	125/150FF	23 7/8	14	10 1/2	60	37	1" NPT	1" NPT	13 1/4	370	520	130	1/4
02504-751/753	125/150FF	23 7/8	14	10 1/2	60	37	1" NPT	1" NPT	13 1/4	375	530	130	1/4
03004-751/753	125/150FF	23 7/8	14	10 1/2	60	37	1" NPT	1" NPT	13 1/4	380	540	130	1/4
04004-751/753	125/150FF	11 7/8	14	10 1/2	60	37	1" NPT	1" NPT	13 1/4	300	425	130	1/4
06006-751/753	125/150FF	15 7/8	15 7/8	11 1/2	62	39	1 1/2" NPT	1" NPT	16 1/4	590	690	170	1/4
08008-751/753	125/150FF	32 5/8	20 3/4	14	75	47 1/2	1 1/2" NPT	1" NPT	21 1/4	1160	1435	180	1/4
10010-751/753	125/150FF	20 5/8	20 3/4	14	75	47 1/2	1 1/2" NPT	1" NPT	21 1/4	875	1120	180	1/4
10012-751/753	125/150FF	30	27 1/2	16 1/2	76	56 1/2	2" NPT	1" NPT	24 1/2	1658	2313	285	1/4
12012-751/753	125/150FF	30	27 1/2	16 1/2	76	56 1/2	2" NPT	1" NPT	24 1/2	1625	2280	285	1/4
14012-751/753	125/150FF	30	27 1/2	16 1/2	76	56 1/2	2" NPT	1" NPT	24 1/2	1600	2255	285	1/4

(*) Add 5 1/4" for Model 751. Dimensions subject to change without notice, apply for certified drawings. Weights are approximate.

Specifications
Dimensions/Weight

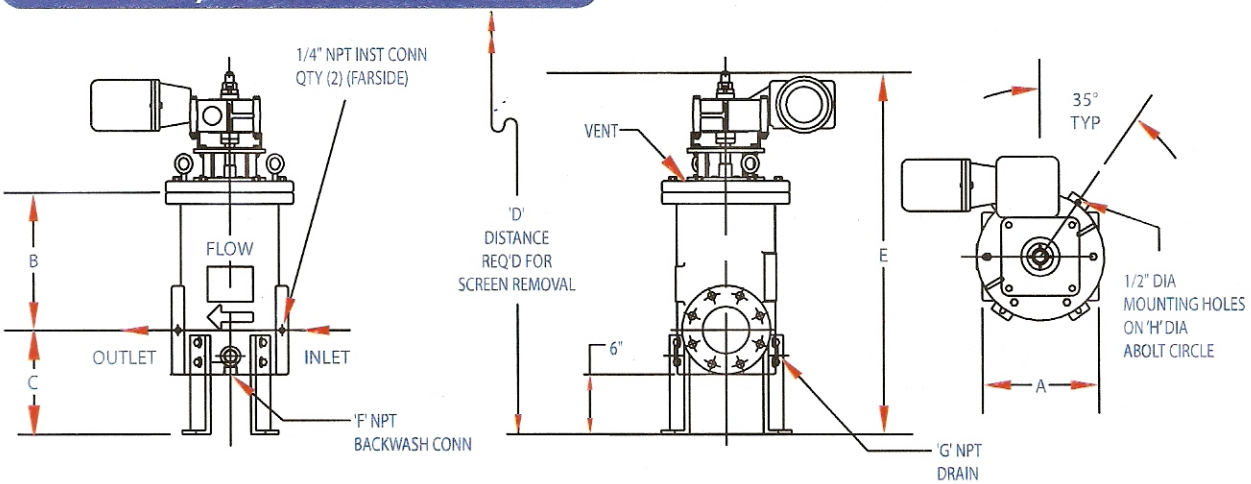
MODEL 721/723 24" - 36"



Model No.	Size (in.)	A (in.)	B (in.)	C (in.)	D (in.)	E* (in.)	F* (in.)	G (in.)	H (in.)	I (in.)	J (in.)	Dry Lbs	Wet Lbs	Lbs Cover	Motor H.P.
240-721/723	24-150	56	77	33	28	122	98	4-150	2 NPT	44	28	4500	8475	150	1/3
300-721/723	30-150	66	94	39	34 1/4	150	115	4-150	2 NPT	54	33	6525	13625	1275	1/3
360-721/723	36-150	86	120	48	40 1/2	210	132	6-150	2 NPT	72	43	12050	26975	1650	1/2

(*) Add 7" for Model 721. Larger sizes available upon request. Dimensions subject to change without notice, apply for certified drawings. Weights are approximate.

MODEL 751/753 CAST IRON

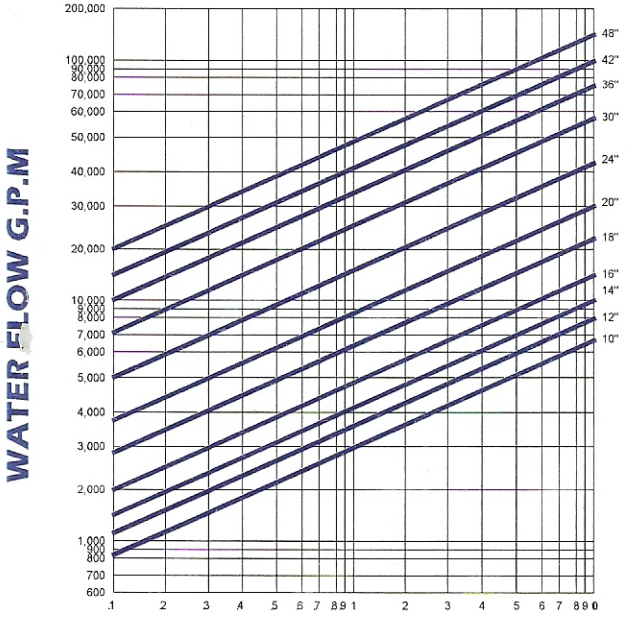


Model No.	Size (in.)	A (in.)	B (in.)	C (in.)	D* (in.)	E* (in.)	F	G	H (in.)	Dry Lbs	Wet Lbs	Lbs Cov	Motor H.P.
02004-751/753	125/150FF	23 7/8	14	10 1/2	60	37	1" NPT	1" NPT	13 1/4	370	520	130	1/4
02504-751/753	125/150FF	23 7/8	14	10 1/2	60	37	1" NPT	1" NPT	13 1/4	375	530	130	1/4
03004-751/753	125/150FF	23 7/8	14	10 1/2	60	37	1" NPT	1" NPT	13 1/4	380	540	130	1/4
04004-751/753	125/150FF	11 7/8	14	10 1/2	60	37	1" NPT	1" NPT	13 1/4	300	425	130	1/4
06006-751/753	125/150FF	15 7/8	15 7/8	11 1/2	62	39	1 1/2" NPT	1" NPT	16 1/4	590	690	170	1/4
08008-751/753	125/150FF	32 5/8	20 3/4	14	75	47 1/2	1 1/2" NPT	1" NPT	21 1/4	1160	1435	180	1/4
10010-751/753	125/150FF	20 5/8	20 3/4	14	75	47 1/2	1 1/2" NPT	1" NPT	21 1/4	875	1120	180	1/4
10012-751/753	125/150FF	30	27 1/2	16 1/2	76	56 1/2	2" NPT	1" NPT	24 1/2	1658	2313	285	1/4
12012-751/753	125/150FF	30	27 1/2	16 1/2	76	56 1/2	2" NPT	1" NPT	24 1/2	1625	2280	285	1/4
14012-751/753	125/150FF	30	27 1/2	16 1/2	76	56 1/2	2" NPT	1" NPT	24 1/2	1600	2255	285	1/4

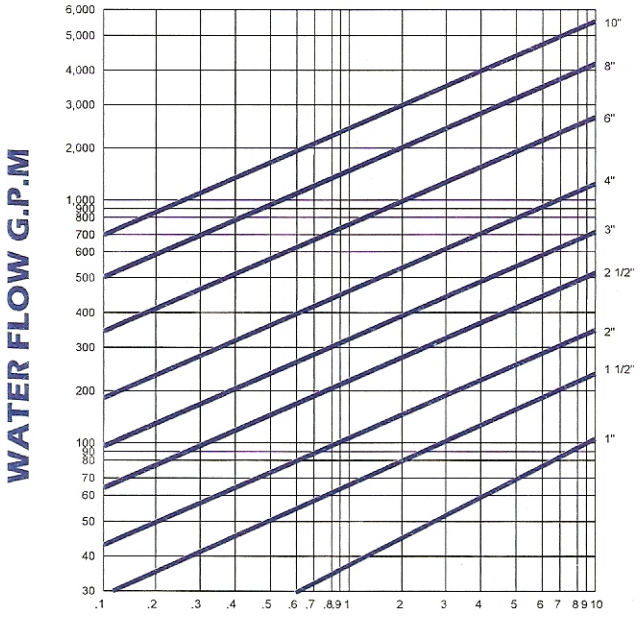
(*) Add 5 1/4" for Model 751. Dimensions subject to change without notice, apply for certified drawings. Weights are approximate.

Pressure Drops Charts

MODEL 721/723



MODEL 721/751/753/793



PRESSURE DROP P.S.I. WITH 1/32" OR LARGER SCREEN OPENING

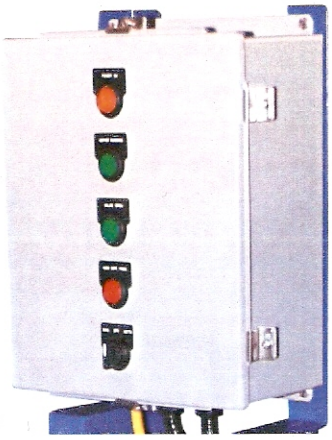
SERIES 721/751 SELF-CLEANING STRAINER TYPICAL EXTERNAL SOURCE REQUIREMENT

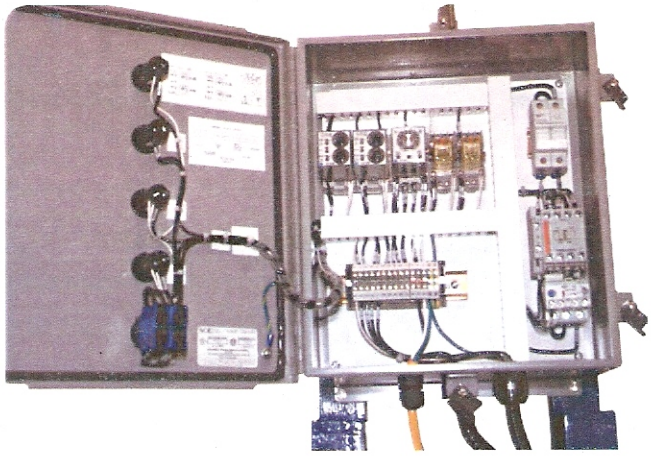
Strainer Size	1", 1 1/2", 2", or 3"	4"	6"	8"	10/12"	14/16"	18/20"	24"	30"	36"
External Source GPM	10-15	10-15	10-15	10-15	25-35	40-50	50-60	60-70	85-95	115-125
External Line Size	3/4"	3/4"	3/4"	1"	1"	1"	1 1/4"	1 1/2"	1 1/2"	2"
Backwash Linesize	1"	1"	1 1/2"	1 1/2"	2"	3"	3"	4"	4"	6"
Backwash Flow in GPM (Gal. Per Minute)	8-12	15-20	30-40	60-75	110-150	170-210	250-310	400-490	550-700	750-900

TYPICAL BACKWASH FLOW REQUIREMENT

	SERIES 753/793 SELF-CLEANING STRAINER (1" – 8")				SERIES 723/723TSELF-CLEANING STRAINER (10" – 36")					
Strainer Size	1"/1 1/2" 2" or 3"	4"	6"	8"	10/12"	14/16"	18/20"	24"	30"	36"
Backwash Linesize	1"	1"	1 1/2"	1 1/2"	2"	3"	3"	4"	4"	6"
Backwash Flow in GPM (Gal. Per Minute)	8-12	15-20	30-40	60-75	110-150	170-210	250-310	400-490	550-700	750-900

The Sequence Controller





DESIGN AND CONSTRUCTION

The Fluid Engineering's Sequence Controller is designed with the Customers' specific requirements in mind. The Sequence Controller provides an automatic, effective backwashing cycle with a minimum loss of water.

The Fluid Engineering Sequence Controllers are constructed with state-of-the-art industrial type components, which permits replacing individual components without having to replace an entire circuit board. The industrial type components are more durable and reliable and adjustments can be made with ease (Fig. 10).

MODES OF OPERATION

There are basically two modes of operation – intermittent and continuous. By turning the selector switch, the mode of operation can be selected.

AUTOMATIC INTERMITTENT POSITION

With the selector switch in the "Auto" position, the drive motor will start and the backwash valve opens as determined by the adjustable cycle timer or by the differential pressure switch.

The differential pressure switch is normally factory set at 1 – 1½ psig over the anticipated clean pressure drop. Should a high differential pressure occur during the timed off period, the differential pressure switch will override the cycle timer and start or continue to backwash until the differential pressure is satisfied.

After the differential pressure has been satisfied, the strainer will continue to backwash for an additional 60 seconds (time delay relay).

The Fluid Engineering Automatic Self-Cleaning Strainer would start a backwash cycle based on the timed sequence selected on the adjustable cycle timer. The timed sequence should be determined by each installation and the conditions experienced. The adjustable cycle timer can be programmed from 15 minutes to a 10-hour cycle (off) and for 1 to 10 minutes duration (on). Adjustments can be made as conditions warrant them. The default factory settings for timers are 2 hours OFF and 2 minutes ON.

CONTINUOUS OPERATION

The selector switch is adjusted to "Manual" thus permitting the continuous mode. In the continuous mode, the Fluid Engineering Automatic Self-Cleaning Strainer will be backwashing continuously with the backwash valve open and the drive motor running. This mode of operation may be necessary if the installation experiences high solid loadings.

In either mode of operation, the backwash assembly is specifically designed to rotate at 2 RPM to allow for effective backwashing in less time, thus decreasing the amount of backwash water lost.

CONTROL PACKAGE

The Fluid Engineering Sequence Controller Control Package consists of:

- Control Panel with Nema 4 Enclosure
- Backwash Valve with Electric Operator
- Single Element Differential Pressure Switch

STANDARD FEATURES

- Enclosure – Nema 4
- Adjustable Cycle Timer
- Off-Delay Timer
- Motor Starters with Auxiliary contact and overload relay
- Selector Switch
- Indicating Lights
- Fuses
- Terminal Block

OPTIONS

- 230 V, 380 V, 460 V, 575 V
- 50 or 60 hertz
- Dual element differential pressure switch
- Nema 4X (fiberglass or stainless steel), Nema 7 or 9 (explosion proof), Nema 12, Nema 3 enclosures
- Circuit breakers, disconnect switch, transformer
- Reset buttons
- Alarms
- PLC interface and/or pump interlock
- Extra contact and relays