Operation and Maintenance of Mechanical Self-Cleaning Filters

Maynard King
CB Tubecraft div of K&D Pratt

Filtration Terms

- **Filter Area** — **The total area of a filter element, usually expressed in square inches or centimeters.**
- **Effective Filter Area** — **The "OPEN" area. That is, the total measured space of the holes of the element expressed in square inches or centimeters.**
- **Filter Ratio** — **The ratio between the inlet pipe area and the effective filter area.**

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Filtration Terms

- **Filter Cake** — **The debris collected on the filter element usually expressed in MICRON or millimeters.**
- **Micron** — **One-thousandth of a millimeter. The standard used to measure the openings of filter elements.**
- **Mesh** — **The number of wires in a linear inch of a screen element.**

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Filtration Terms

- **Maynard** — **The guy you call and jump up and down on when your water treatment system is not working properly!**

Filter Types and Applications

Type	Description	Application
• Sand Media	Epoxy-Coated, stainless steel or fiberglass tanks of layered silica sand or gravel	For Organic Debris
• Sand Separator	Conical steel chambers with a debris collection area at the bottom	For Large Particle-Sized Sand
• Disc	Wafer-thin grooved discs stacked and compressed and housed in a plastic or steel body	For Organic Debris

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Filter Types and Applications

Type	Description	Application
• Screen	Perforated, wedgewire or woven wire cylindrical steel or polyester elements housed in a plastic or steel body	For Organic or Inorganic Debris
• Intake Screen	Cylindrical, boxed or flat coarse screen usually installed prior to the pump	Large Organic Debris

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MICRON	MESH	MILLIMETER
3500	4	3.50
2500	6	2.50
1500	10	1.50
800	20	0.80
500	30	0.50
300	50	0.30
200	75	0.20
130	120	0.13
100	155	0.10
80	200	0.08
50	300	0.05
25	450	0.02
10	680	0.01

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What are we filtering out of your water?

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Caddisfly Larvae

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Pond Snail

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And Suspended Solids of course!

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Filter Selection Parameters

- **Flow** — **Generally expressed in gallons per minute. Minimum and maximum rates need to be checked for proper filter selection.**
- **Pressure** — **Generally expressed in P.S.I. (pounds per square inch). Minimum, maximum and pressure during flush need to be checked.**
- **Water Source** — **Well water, pond or reservoir, effluent, processed, sea, canal.**

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Filter Selection Parameters

- **Debris** — **Organic, inorganic, or combination. Quantity of debris is usually expressed in PPM (particles per million). Size of particulate is usually expressed in micron.**
- **Emitter Orifice** — **Size of the device to be protected can be expressed in inches or millimeters.**
- **Maintenance** — **Filter flushing can be done either manually or automatically.**

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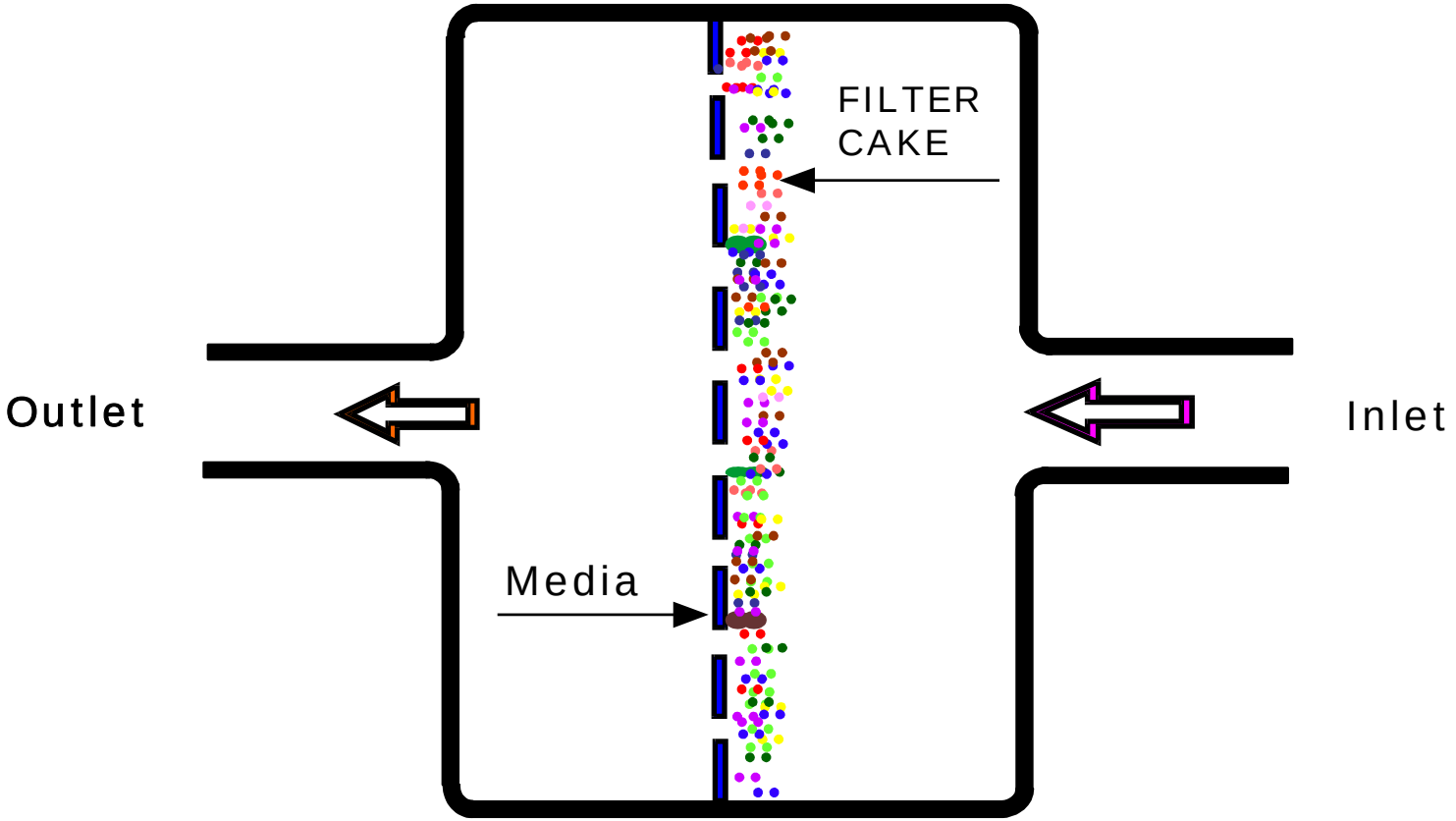
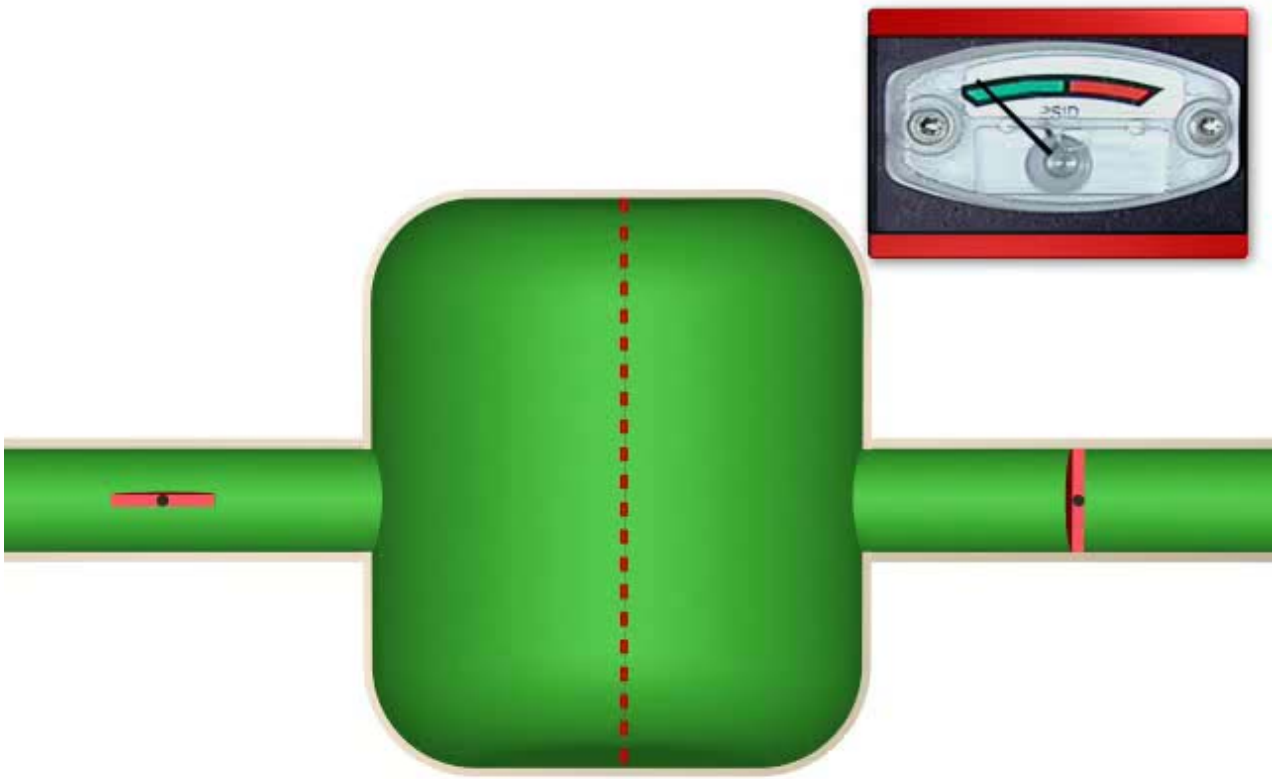
The Filtering Process





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What to do when the filter cake builds up?

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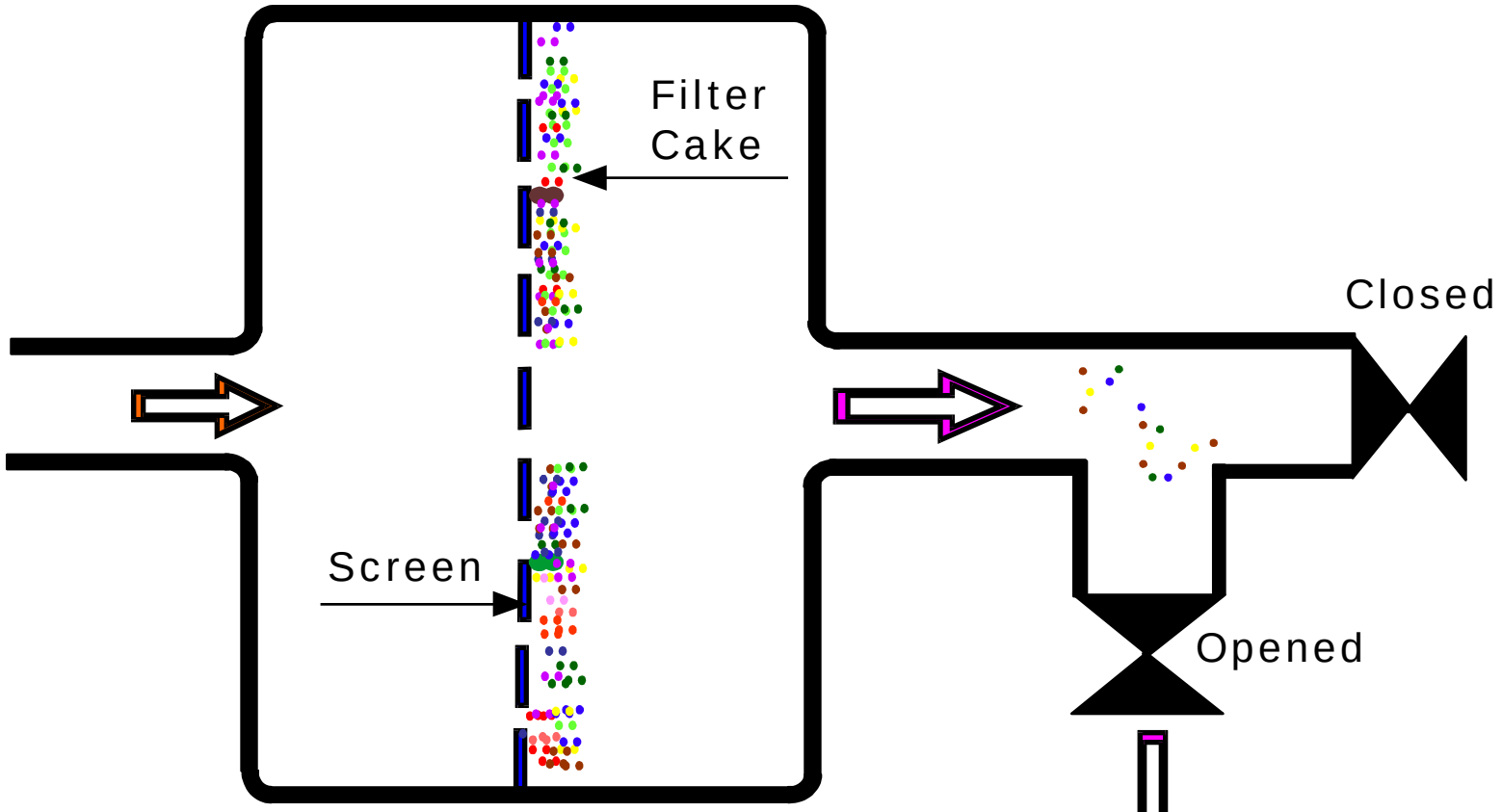
Typical Back Flushing Process



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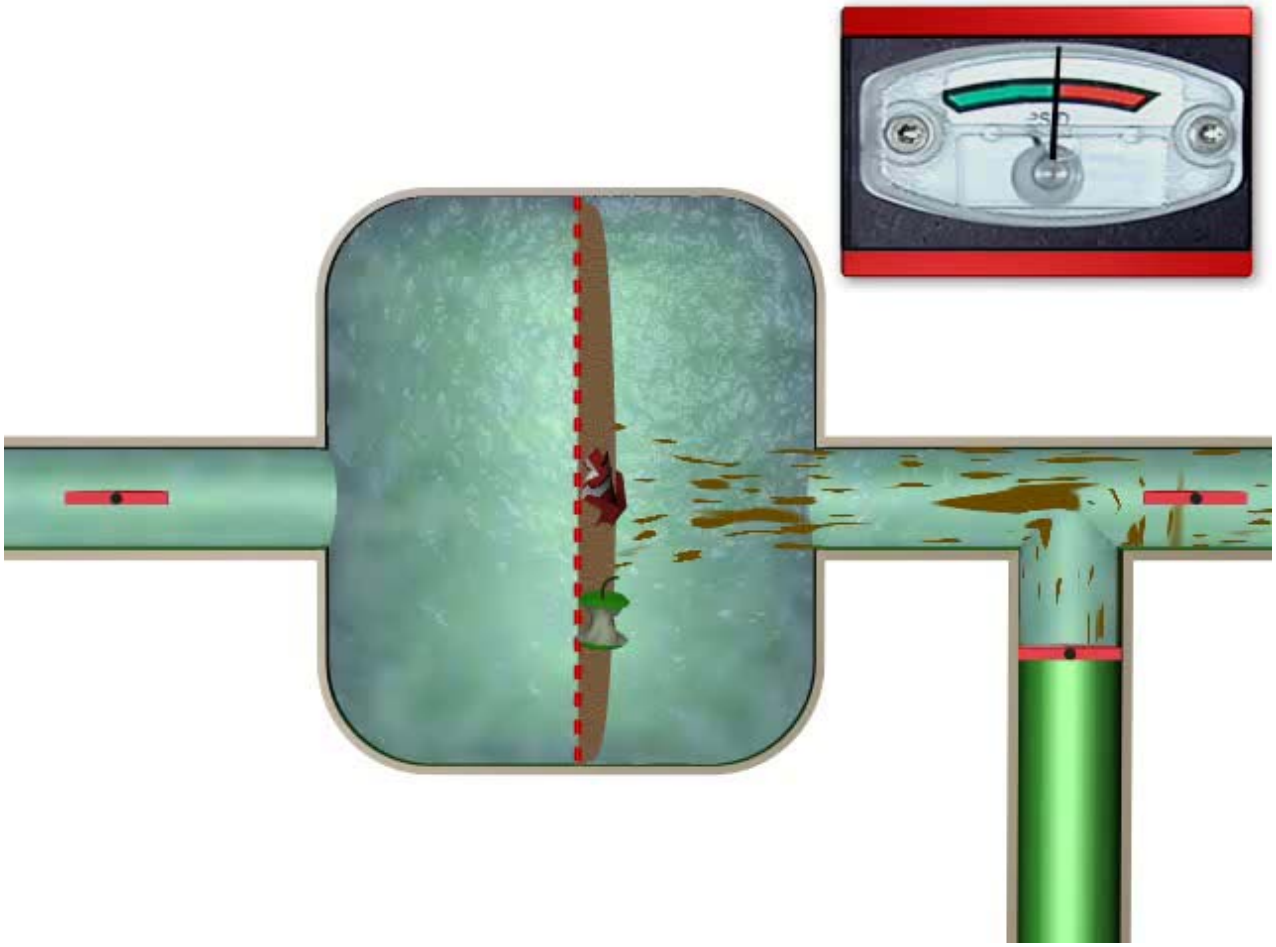

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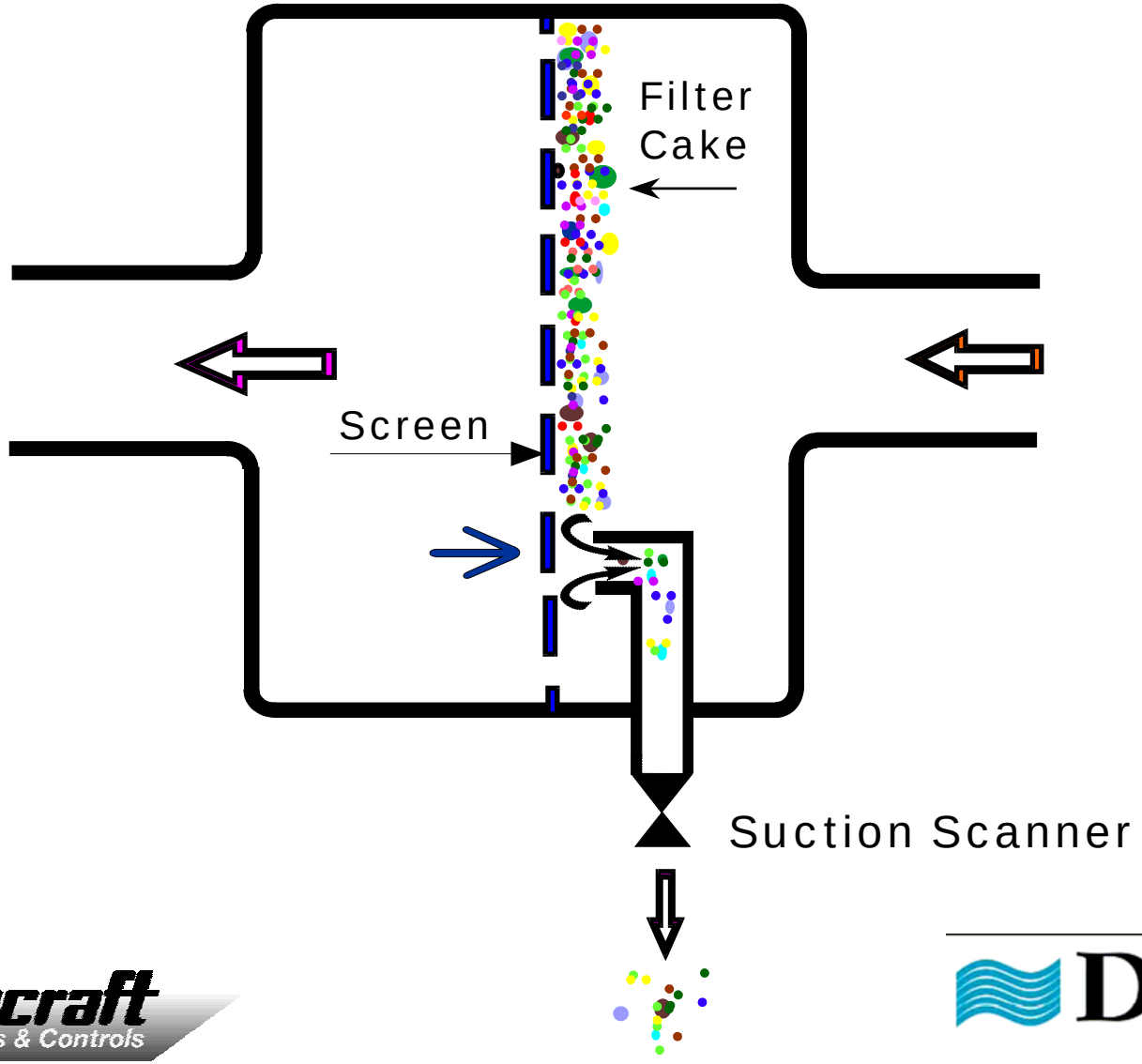
“Focused” Back Flushing



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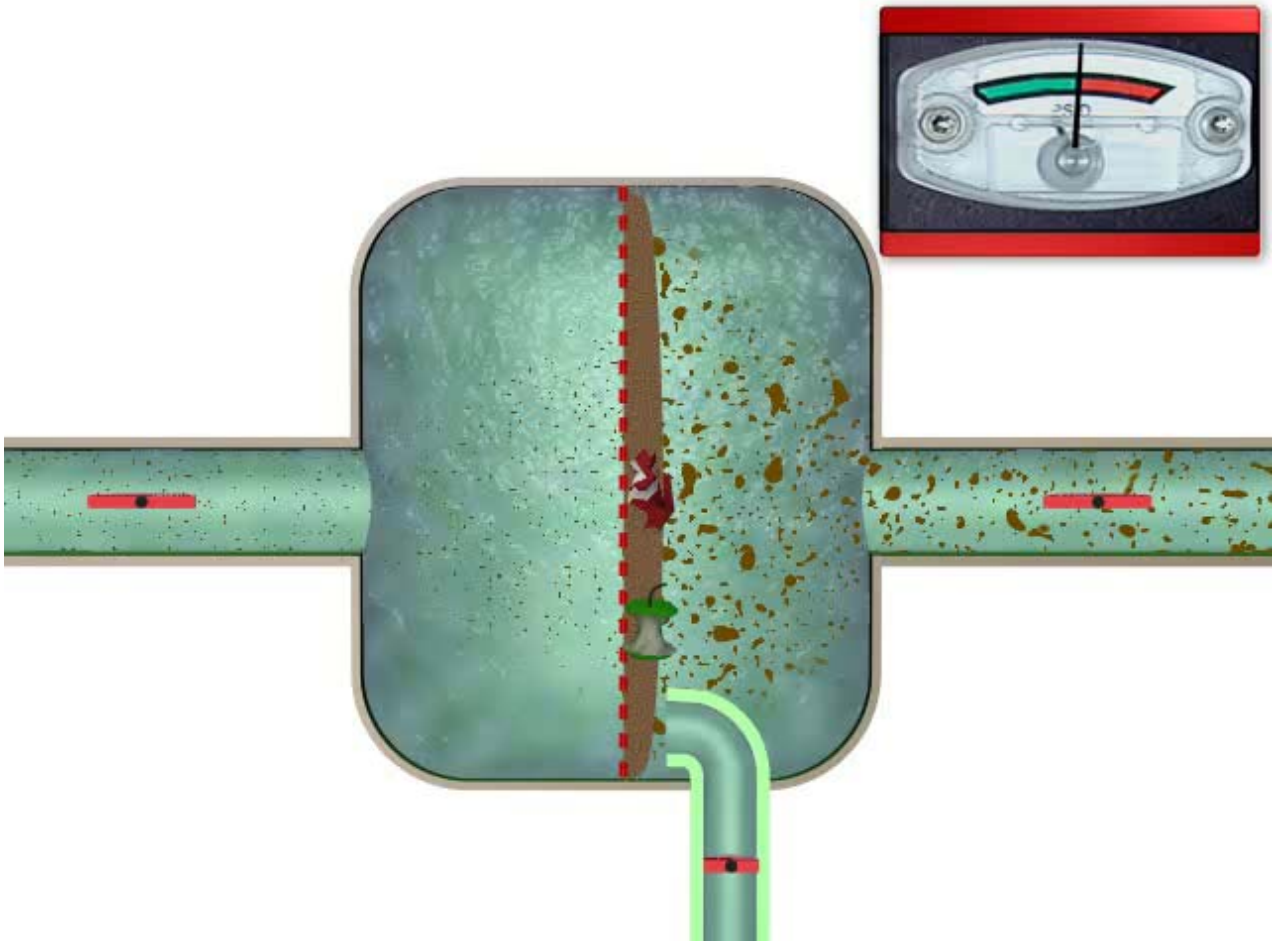

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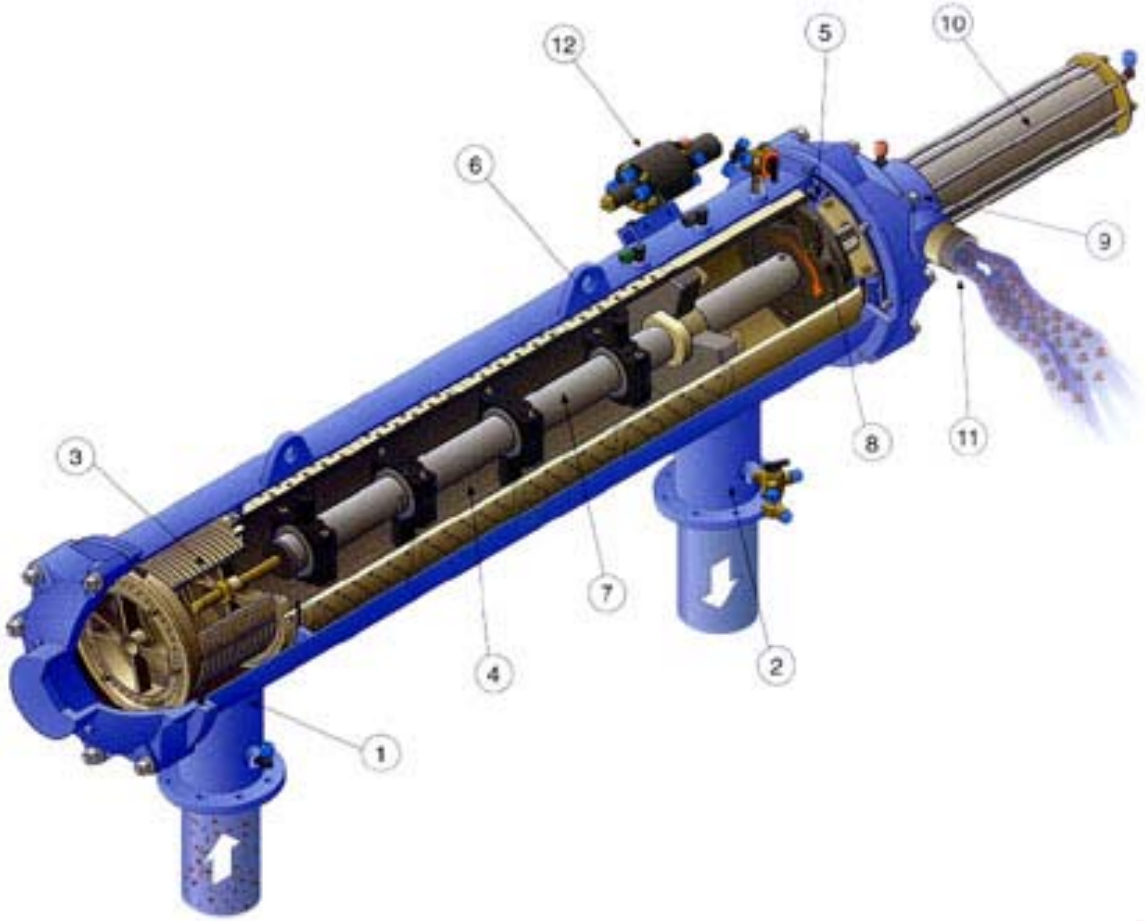
FILTOMAT – M106LP CUTAWAY VIEW



FILTOMAT
Self Cleaning Filters

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Flush Control Systems (Automatic Operation)

Hydraulic Flush Controller	Uses high and low pressure signals and hydraulic movement of diaphragms to initiate and control the backflush cycle.
Electronic Flush Controller	A DP switch monitors pressure drop. It signals a PLC controller, which electrically operates a solenoid valve to initiate and control backflush.

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Manual Operation with Hydraulic Flush Controller

- A small 3-way valve controls the water flow to the controller.
- In “A” position (Auto) the filter flushes automatically.
- Moving to “C” position (Clean) for a couple seconds and then back to “A” flushes the filter manually. Leaving the valve in the “Clean” position will result in continuous flushing.
- Third position “O” (Open) is not used.

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Manual Operation with Electronic Flush Controller

- A pushbutton is provided on the controller panel labeled “Manual Flush”
- You will hear the click of the solenoid valve, after which backflush cycle begins
- An amber light indicates backflush cycle is in progress
- A red light on the panel signals that backflush is occurring too frequently

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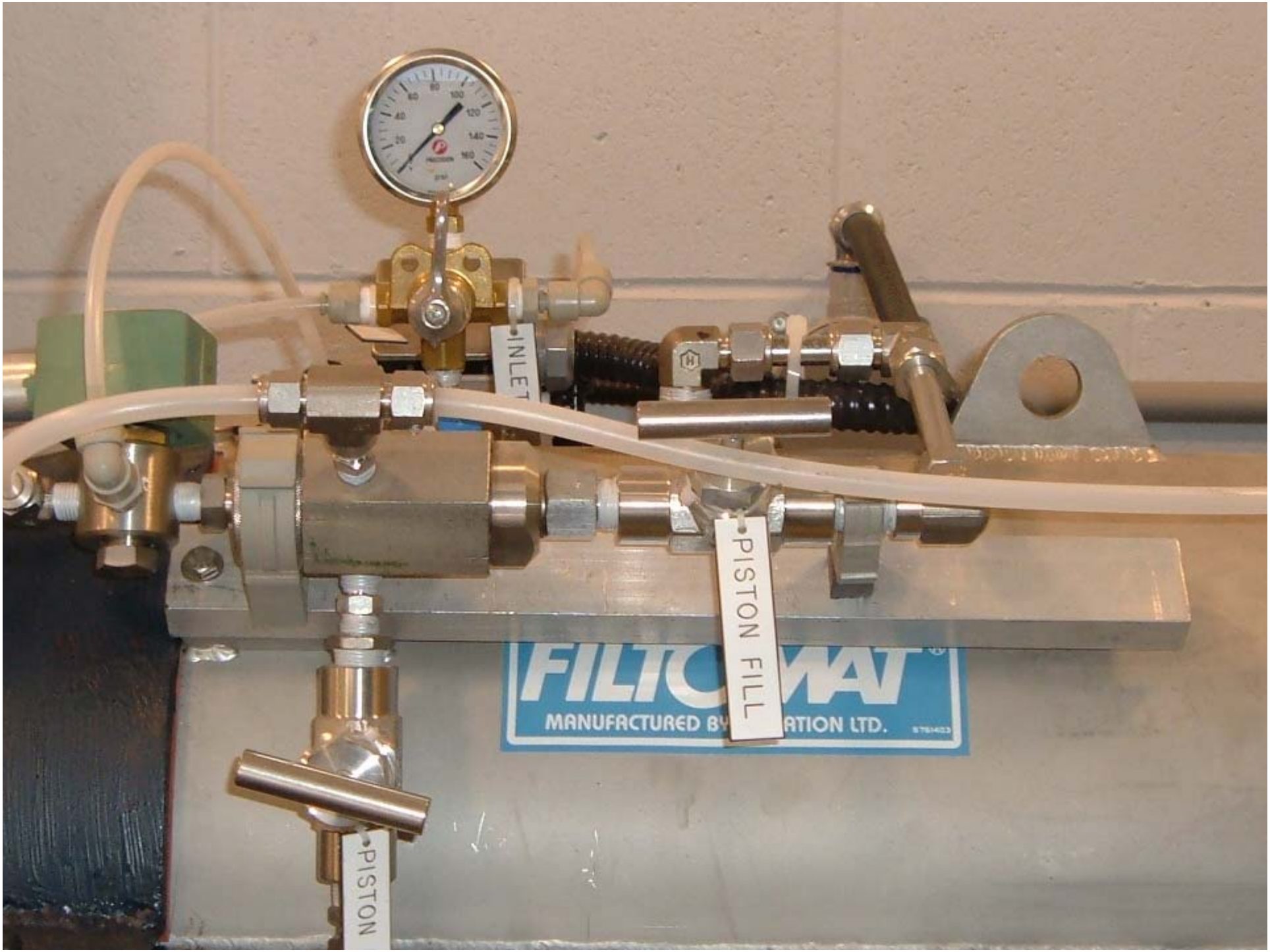
INLET
PISTON FILL
PISTON
MANUFACTURED

Pressure Diagnostics

- A pressure gauge with a 3-way valve is mounted to the filter body (Using only one gauge eliminates gauge error)
- It allows the operator to observe inlet, outlet, and drain chamber pressures
- The DP between the inlet and drain chamber should be a minimum of 25psid and maximum of 45psid during cleaning

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Maintenance

- Most self-cleaning filters only need a semi-annual check. Open the cover to determine if the internal dirt collector spins freely and confirm the fine screen is intact.

- The dirt collector nozzles should have no more than 3mm clearance from the screen in order to clean sufficiently

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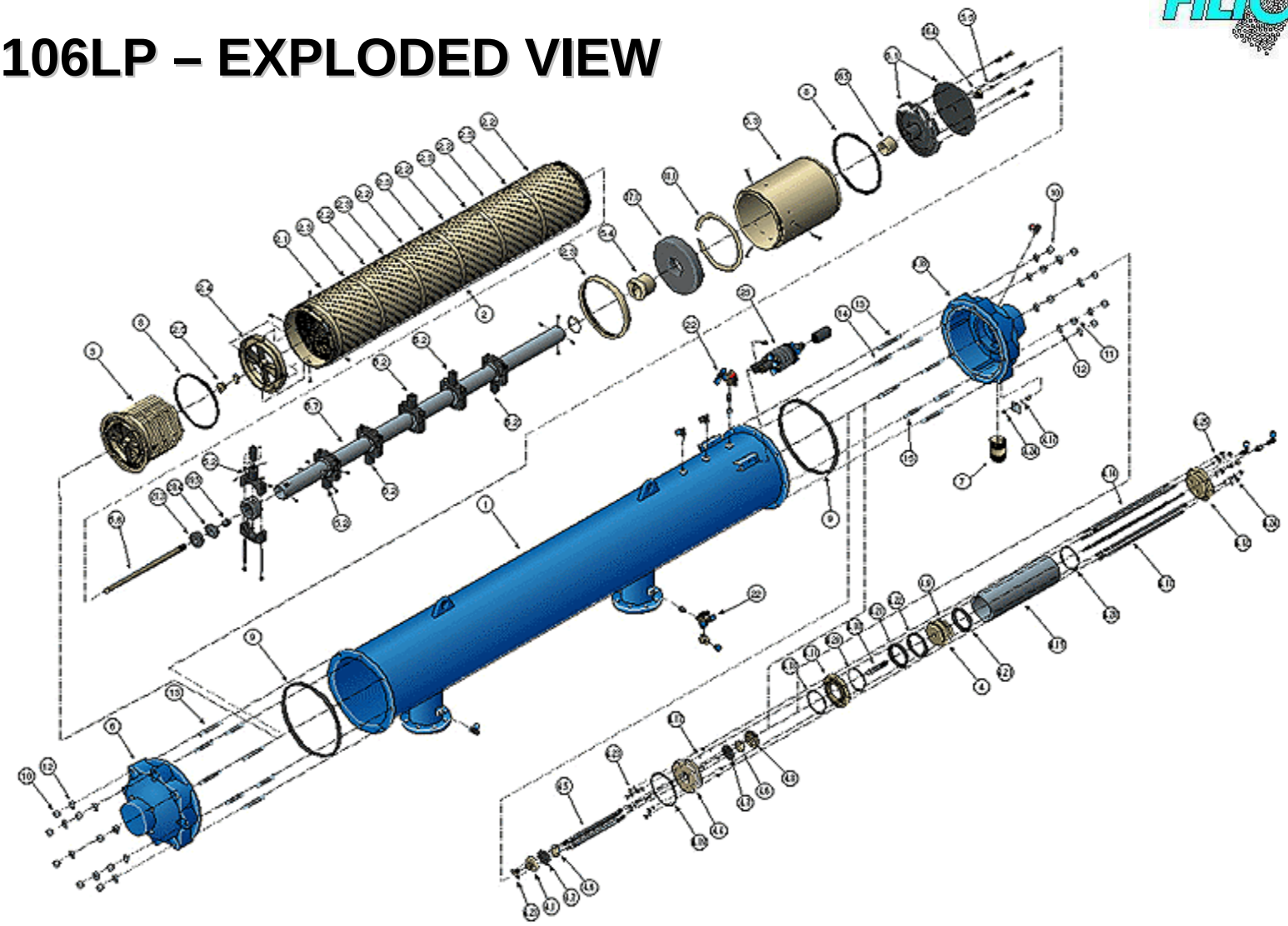
M106LP – EXPLODED VIEW



Maintenance

- O-rings on the filter screen ends should be lubricated with a plumbers grease such as Dow Corning DC33 or other silicone

- A manual backflush should be performed periodically to verify correct flushing cycle, cycle time, and pressures

Troubleshooting

- Filter backflushes too frequently (Red “Frequent Flush” alarm indicated on PLC panel)
  - Usually caused by excessive flowrate, insufficient screen area, or excessive dirtload. Add additional filter in parallel.
  - Inadequate cleaning of screen could also be the cause. This is almost always due to insufficient inlet pressure. Check it is at least 30psi. Add booster pump if below.

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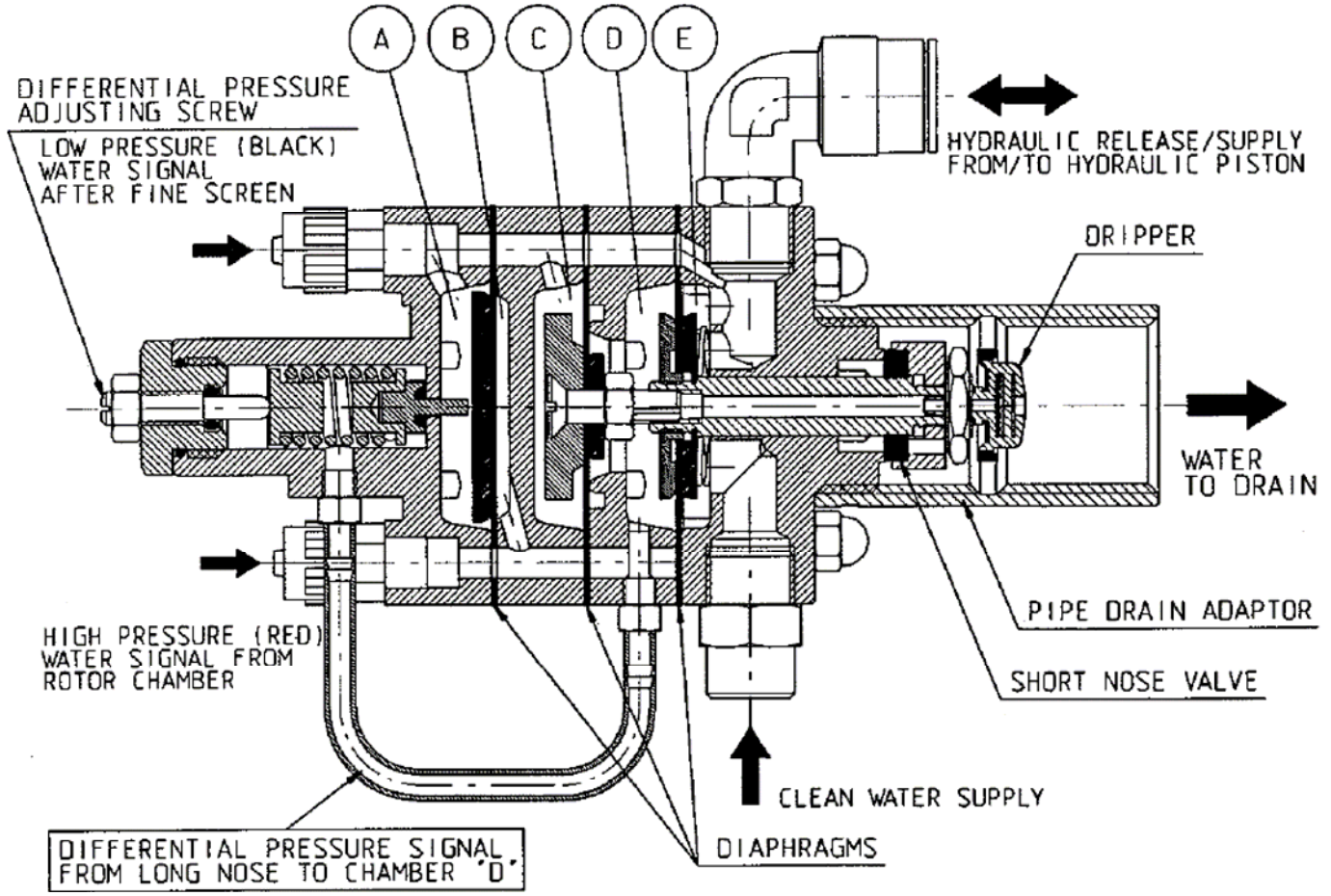
Troubleshooting

- Filter will not backflush, though DP high.
  - In filter with Hydraulic Flush Controller, suspect dripper is clogged. Dripper cannot be cleaned and must be replaced.
  - In filter with Electronic Flush Controller, check operation of solenoid valve, and DP switch. Also check hydraulic lines to DP switch.

Hydraulic Flush Controller



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Troubleshooting

- A filter screen which has been severely clogged due to excessive dirtload or operation without backflushing can be cleaned manually
- Remove the filter screen, soak 24 hours in a solution of 35 parts water to 1 part Mr. Clean. Spray-clean with a pressure washer at 900psi

Filter Life

Typical filter life is expected to be in excess of twenty years. It really depends on water chemistry and frequency of flushing.

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Service Contacts

- Maynard King, CB Tubecraft div of K&D Pratt
- Jim Crosby, Service Manager, Durpro

Come see us at our booth during the exhibit breaks!

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