



# Eaton Filtration, LLC

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## Installation, Operation & Service Manual

### Model 2596 Self-Cleaning Strainer 2" to 8"

Read all instructions before installation or operation of equipment. Failure to comply with these instructions could result in bodily injury or property damage.



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### Introduction

A self-cleaning strainer is a device installed in a pipeline to remove dirt and other unwanted debris from fluids. Straining is accomplished by directing the fluid through "sized" openings in perforated straining elements. Self-cleaning strainers have integral backwash systems designed to isolate and clean a small portion of the element while the remaining area continues to strain normally. During operation, fluid flow through the strainer is continuous. A small quantity of "clean" fluid is used to wash the element and then carry the concentrated debris away from the strainer through the backwash system.

### Introduction, Continued

Self-cleaning strainers are installed where continuous removal of debris from the process fluid is required and where fluid flow cannot be interrupted for cleaning the straining elements. These strainers are used where manual cleaning is not convenient or practicable for reasons such as: the need for frequent cleaning, possibility of strainer not being cleaned when required due to remote location, variable loading rate, etc. Trapped debris is retained inside straining element cavities. These accumulated solids are then backwashed through the hollow backwash arm shaft to a waste line. Self-cleaning strainers are rated to withstand the pressure of the piping system design.

### Receiving, Handling and Inspection

Prior to shipment, strainers have all external machined surfaces coated to protect against rust. All openings are covered and the motor-reducer unit is wrapped with plastic.

Inspect strainer after unpacking for damage incurred during transit. Report any damage to carrier immediately. If strainer is not to be installed immediately, refer to storage instructions.

Remove preservative with solvent wetted cloths. Exercise care when using solvent.

Check to be sure the rated pressure and temperature on the strainer nameplate is not less than the maximum pressure and temperature of the system. The rated pressure shown on the nameplate is the maximum working pressure - including shock - at which the strainer may be operated.

Check to be sure the available electrical power matches the voltage, phase, and cycle requirements of the strainer motor.

Remove flange and thread protectors. Check for and remove any foreign or loose materials such as blocking, desiccant bags, etc. that could be carried downstream when fluid is introduced into the strainer.

### Storage

Store strainers indoors in a clean, dry environment whenever possible.

Replace all protective wrappings, flange protectors, plugs, etc. which may have been removed during receiving inspection.

Outdoor storage, when unavoidable, requires special treatment described below:

Place a bag of silica gel or similar desiccant in each pipe connection to absorb moisture

Attach to inside of flange protectors and put reminder labels on outside.)

Reapply rust preventative to any machined surface that became exposed due to handling or receiving inspection.

Make sure all openings are covered. Seal flange protectors with waterproof tape.

Wrap motor-reducer unit with plastic and secure with tape. Permit air circulation or provide adequate desiccant for moisture control.

Protect the entire strainer with heavy polyethylene wrap and seal with waterproof tape.

**CAUTION: Before strainers are put into operation after storage be sure to remove all desiccants, protective bags, caps, plugs, etc. Inspect gasketing and shaft seals for possible deterioration and replace as required.**

**Inspect oil level in reducer and check lubricant for accumulated condensation.**

## Installation

Position the strainer in the line so that the fluid enters the connection marked inlet.

**CAUTION: Lift strainer with slings under the inlet line nozzles and through the reducer mount. Connect all 3 points above strainer for stability.**

Be sure sufficient headroom is provided for easy removal of the internal parts.

Support the strainer in the line as follows:

These strainers are provided with footpads or slotted openings to accommodate the use of anchor bolts. Put the strainer in place on concrete or foot mounts. DO NOT support the strainer or the piping coming to and from the strainer by the strainer flanges or flange bolting.

**Do not support** the strainer, or the piping coming to and from the strainer by the strainer flanges and flange bolting.

Connect the strainer to the line. Use the same type flange faces. For example: **Do not** bolt raised face flanges to iron flat face flanges. Iron flanges must be flat with full face gaskets.

Strainers are subject to face-to-face variations due to shrinkage, machining and fabrication tolerances. Pre-fabricated piping systems must allow adjustment at the strainer connections.

Be sure flange gaskets are in place and fasteners are tightened to correct torque values.

Attach a drain line to the bottom NPT drain connection. Install a ball, gate, or plug valve in this line. Keep this valve closed except when necessary to drain the strainer.

Attach the backwash line to the bottom NPT backwash connection. A vigorous backwash flow is necessary for proper operation of the strainer. It is important to prevent pressure loss by having a short, free-flowing backwash line with a minimum of bends, elbows or vertical runs.

Install a backwash valve in the backwash line. The valve may be manually or automatically operated. This backwash valve is to be used only for full-on/full-off control.

For all applications, a manually operated pinch valve (supplied by others) to throttle backwash flow may be installed downstream of the backwash valve. See 'Suggested Backwash Line Installation', Figure 3.

Prior to start up, inspect the inlet waterway for wooden chocks that may have been provided to restrain the backwash arm during shipping. Remove wooden chocks if provided.

Prior to start up, rotate the backwash arm manually to assure freedom of movement. To operate manually, the drive pin must be removed from the top of the shaft.

See "MANUAL OPERATION OF THE EXTERNAL BACKWASH SYSTEM". Use an adjustable wrench on the flats provided on the shaft to allow at least one complete revolution to assure freedom of movement.

**CAUTION: Be sure power source matches motor requirements. Damage may occur if improperly connected. Motor starter should incorporate a thermal overload device to protect the motor. Interlock strainer motor with process fluid service pump where feasible. Install a fusible disconnect or circuit breaker on the incoming power service.**

**Start-Up**

Check the reducer for lubricant. Reducers are shipped filled with oil. Before operating, the breather plug must be installed in the top of the reducer (should be placed in the uppermost side). See "Maintenance Reducer" section.

Open reducer vent that has been plugged to prevent lubricant loss during shipment.

Energize strainer motor and/or controls.

Open vent on strainer cover.

**Slowly** fill the strainer with fluid. Close strainer vent when fluid begins to overflow the vent.

**CAUTION:**

**The strainer must be filled with the working fluid for operation to lubricate all bushings. Do not operate strainer dry.**

NOTE: Good operating practice dictates that the operator observe the strainer carefully for several weeks to determine the best operating mode, that is, continuous or intermittent backwash. Refer to "Self-Cleaning Strainer Control Panel Instructions" provided with such equipment.

**Operation**

Operate the strainer in the continuous mode only, unless controls for intermittent operation have been provided and energized.

Normally the vent and drain valve are left in the closed position. Approximately once each week, open the drain valve for two to three minutes to remove any settled debris on the strainer bottom. Note amount of debris discharged. Frequency of this operation is dependent upon the type and amount of trapped solids in the liquid.

Take daily readings of the pressure drop across the strainer to ensure proper operation.

**CAUTION: Total pressure drop in excess of 10 psig is a warning signal requiring investigation and corrective action. Permanent damage may result if operated in excess of 15 psig.**

**Start-Up...Continued**

If the differential pressure exceeds 10 psid:

Check strainer to verify rotation of the backwash arm. If the shaft (visible at top of strainer) is rotating then arm is rotating (refer to Trouble Shooting Section).

Check backwash line for restrictions. Valves in this line should be opened fully, except for high pressure or mesh screen applications in which case the backwash control and/or throttling valve should be adjusted to a flow rate which produces thorough cleaning.

Position drain valve fully open for 2 to 3 minutes to clear strainer of accumulated debris.

Increase the duration of the backwash cycle by adjusting the timer in the control panel.

Should the pressure drop still remain above normal with the backwash operating, close the outlet valve and open the backwash valve fully for several minutes. If the pressure drop is not normal upon resuming flow through the unit, the strainer should be shut-down and internally examined.

**Normal Shut-Down**

Backwash the strainer for at least six minutes to clean the strainer element.

Close the inlet/outlet flow valves. Then slowly open the bottom drain valve and the vent on the strainer cover.

De-energize strainer motor and/or controls.

Follow standard maintenance procedures contained herein. Do not allow the straining elements to dry while full of debris.

**Emergency Shut-Down**

To quickly shut-down the system, close the inlet and outlet flow valves.

Fully open all vents and drains. **Proceed with caution as the strainer may be under full pressure.**

De-energize strainer motor and/or controls.

Follow standard maintenance procedures as soon as possible.

## Maintenance—Internals

At scheduled intervals, the strainer cover should be removed for internal inspection (refer to “Normal Shut-Down” procedures).

Follow “Removal of Cover and Operating Mechanism Assembly” procedures.

Inspect assembly for damage or wear due to normal operation.

Examine straining element and check for mechanical damage or blinding. Refer to Disassembly and Replacement Parts Procedures.

Clean straining element thoroughly. Cleaning may be accomplished by scrubbing the straining element with a bristle brush or spraying with a high pressure hose. If necessary the straining element may be steam cleaned.

## Maintenance—Reducer

The oil in a new reducer should be drained at the end of two weeks or 100 hours of operation, whichever comes first, and the case thoroughly flushed with a light flushing oil. The original oil can be used for refilling if it has been filtered; otherwise new oil must be used.

After the initial maintenance in Item 1 above, it is recommended to change the reducer oil every 2500 hours of operation or every six months (whichever comes first) for units operating under normal conditions. If the unit is operating in extremely dirty or high temperature environments, the oil should be changed more often.

The unit should be filled when not running to the center of the oil sight gauge or the oil level plug with Mobil 600W cylinder oil or equivalent AGMA 7 or 7EP lubricant when the ambient temperature does not exceed 90oF.

For units operating in ambient temperatures normally between 80oF – 125oF, Mobil 600W super cylinder oil or equivalent AGMA 8 or 8EP lubricant is recommended. Please refer to gear reducer manufacturer’s instruction operation manual.

## Manual Operation of the Backwash Arm

The Strainer is furnished with a drive pin that when removed allows manual operation.

De-energize the power supply to the strainer motor.

Remove the drive pin.

The drive shaft is now disconnected from the reducer and may be rotated manually.

Manually open the backwash control valve (manual cleaning only).

Place a wrench on the flats at the top of the backwash arm/shaft. Rotate the shaft at 1-1/2 turns per minute and long enough to get the required low pressure drop. Direction of rotation is clockwise.

**CAUTION: Do not use excessive force on the backwash arm. Disconnecting the shaft from the reducer also disconnects the shaft from the protection of the motor overloads. If excessive resistance is met, the cover must be removed and the source of blockage cleared away.**

To return the strainer to normal operation, first close the backwash control valve.

Replace the drive pin.

Energize the power supply to the strainer drive motor.

The strainer is now ready for operation.

## Disassembly and Parts Replacement Procedures

The strainer cover assembly may be removed and disassembled without removing the body from the process piping. This permits examination or replacement of any internal part.. Refer to this manual and the included assembly drawings for the location of parts.

**CAUTION: Do not perform any maintenance on this strainer until normal shut down procedures have been performed**

## Removal of Cover and Operating Mechanism Assembly

Complete “NORMAL SHUT-DOWN” procedure.

Disconnect power source and remove fuses in the control panel.

### **Removal of Cover and Operating Mechanism Assembly...Continued**

Disconnect electrical connections to the motor.

Match mark the body girth flange with the cover girth flange.

Loosen and remove all studs and nuts from the cover assembly.

Using slings under the gear reducer that attach above the whole strainer cover assembly, gently lift the cover assembly straight up.

Place the cover assembly on an elevated SECURE surface with wooden blocks that has enough room the loosen the bolts securing the bottom Cenpeller plate to the cover.

Loosen and remove the four bolts securing the bottom Cenpeller plate to the cover.

Carefully lift the cover assembly straight up until it clears the top of the straining element. This will leave the backwash arm/shaft attached to the cover assembly.

Place the cover assembly on a SECURE surface. Take precautions to prevent tipping over and or falling of the cover assembly.

The straining element with Cenpeller support will be left on the secure surface. This will allow removal of the straining element. The straining element may now be inspected and replaced as necessary. Note: the top element o-ring is now available for inspection.

To remove the backwash arm/shaft, position the cover assembly in an upright position. Make sure that there is ample support under the backwash arm/shaft.

Make note of the relative position of the shaft and the reducer top. Remove the drive pin from the top of the backwash arm/shaft.

Using slings under the gear reducer that attach above the whole strainer cover assembly, gently lift the cover assembly straight up. This allows the backwash arm/shaft to slide out of the gear reducer and the top seal. Note: You must be positioned to support the backwash arm/shaft as it will be unsupported as it clears the reducer and seal.

Other components to be inspected at this time include the lower bushing, inner and outer internal seals in the body and body O-ring. To reassemble, reverse the above steps as applicable.

### **Body O-Ring, Inner and Outer Internal Seals Replacement**

First, complete "Normal Shut Down" procedure.

Disconnect power to the strainer motor, and disconnect the motor leads.

See "Removal of Cover Assembly and Straining Element" Instruction Steps 1 through 7.

Inspect body O-Ring, inner and outer internal seals and replace as necessary.

Replace Cover Assembly by reversing steps referred to in "Removal of Cover Assembly and Straining Element" above.

### **Lower Bushing Replacement**

First, complete "Normal Shut Down" procedure.

Disconnect power to the strainer motor, and disconnect the motor leads.

See "Removal of Cover Assembly and Straining Element" instructions Steps 1 through 11.

Inspect the lower bushing on the backwash arm/shaft for signs of wear. If wear is excessive, remove and replace the bearing.

NOTE: This is a composite material and is force fit on the backwash arm. The nature of this material is to relax and therefore become loose. The bushing should be changed if there is a very loose fit. Excessive or eccentric wear will then occur on the backwash arm. To remove a tight fitting damaged bushing, carefully cut apart and slide off the arm.

To replace the lower bushing, press fit the bushing "inside" diameter over the "bushing" surface of the backwash arm. Approximately 200 pounds of force will be required.

Replace Cover Assembly by reversing the Instruction in "Removal of Cover Assembly, Straining Element & Backwash Arm/Shaft".

## Upper Shaft Seal Removal

First, complete "Normal Shut Down" procedure.

Disconnect power to the strainer motor and disconnect the motor leads.

Disconnect power and remove fuses in the control panel.

Disconnect electrical connections to the motor.

## Upper Shaft Seal Removal.. Continued

Make note of the relative position of the backwash arm/shaft and the reducer top. Remove the drive pin from the top of the backwash arm/shaft.

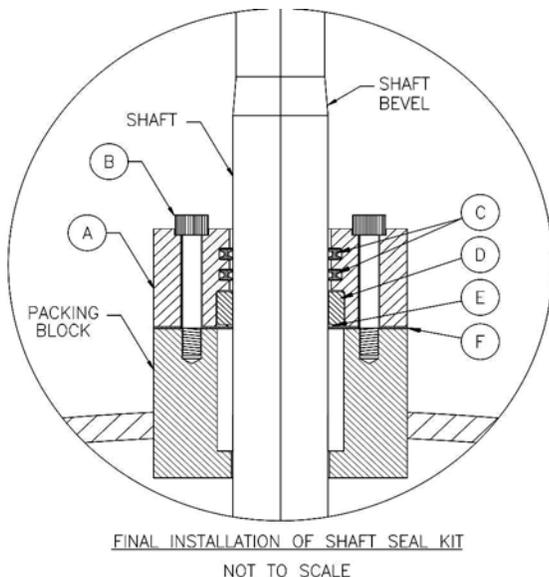
Remove the four (4) bolts holding the speed reducer and motor to the cover assembly.

Carefully lift the reducer and motor straight up until it clears the top of the backwash arm/ shaft.

Remove Screws (B) from the Housing (A) & slide Housing (A) over the backwash arm/shaft. See Figure 1

The Upper Bushing (D) and the two (2) Quad-Rings (C) can be inspected and replaced as needed. See Figure 1.

**Figure 1**



## Upper Shaft Seal Replacement

Refer to Figure 1.

Slide Gland Gasket (F) down the backwash arm/shaft to the Packing Block (machined area around the top central hole of the cover).

Slide O-Ring (E) down the backwash arm/shaft to the Gland Gasket (F).

Slide Upper Bushing (D) over the backwash arm/shaft to the Upper O-Ring (E).

Lubricate the two (2) Quad-Rings (C) with a light film of Process Compatible Lubricant and insert each into the Housing (A).

## Upper Shaft Seal Replacement..Continued

Slide Housing (A) over the backwash arm/shaft, until the Housing (A) rests on the Packing Block and over the Upper Bushing (D).

Align holes in Housing (A) and Gland Gasket (F) to the Packing Block.

Insert the Screws (B) into Housing (A) going through the Gland Gasket (F) and into Packing Block and screw until tight.

Replace the gear reducer and motor using Instruction Steps 8 through 13 in " SPEED REDUCER REPLACEMENT".

**Motor Replacement**

First, complete “Normal Shut Down” procedure.

Disconnect power source and remove fuses in the control panel and motor leads.

Remove bolts holding the motor to the reducer and the key from the motor output shaft.

**CAUTION: Do not Allow the Motor to Drop Or For It To Rest On The Shaft.**

Install the key on the new motor output shaft. Install the new motor on the reducer and secure with motor mounting cap screws.

Reconnect the power leads to the motor.

Replace fuses and reconnect power source.

**Speed Reducer Replacement**

First, complete “Normal Shut Down” procedure.

Disconnect power and remove fuses in the control panel.

Disconnect electrical connections to the motor.

Remove bolts holding the motor to the reducer and place the motor on a secure surface.

Remove the key from the motor output shaft.

**CAUTION: Do not Allow the Motor to Drop Or For It To Rest On The Shaft.**

**Speed Reducer Replacement..Continued**

Make note of the relative position of the shaft and the reducer top. Remove the drive pin from the top of the backwash arm/shaft.

Remove the four (4) bolts holding the speed reducer to the cover assembly.

Carefully lift the reducer straight up until it clears the top of the drive shaft.

Position the new reducer in relative position as in Step 5 above. Secure with bolts.

Install the drive pin.

Install the motor key on the motor output shaft. Install the motor on the reducer and secure with motor mounting cap screws.

Check lubricant levels in the reducer and check the vent.

Reconnect the power leads to the motor.

Replace fuses and reconnect power source.

**Trouble Shooting****High Differential Pressure due to high solids loading in process fluid:**

Increase length of backwash cycle or backwash continuously.

**Backwash Arm not rotating, Motor overloads tripped:**

Obstruction between straining element and backwash arm.

Misalignment of backwash arm.

Bearing failure.

**High Differential Pressure due to piping:**

Shorten backwash piping by eliminating elbows, vertical pipe runs and restrictions due to valves, fittings, etc. By removing pipe friction losses, system pressure losses are reduced.

**Trouble Shooting, Continued****Backwash Arm not rotating, Motor and/or reducer failure:**

Incorrect voltage applied to strainer motor.

Overload heaters in motor starter improperly sized.

Lubricant level in reducer too low, reducer vent plugged, or no lubricant.

**Control Problems:**

Blown fuses.

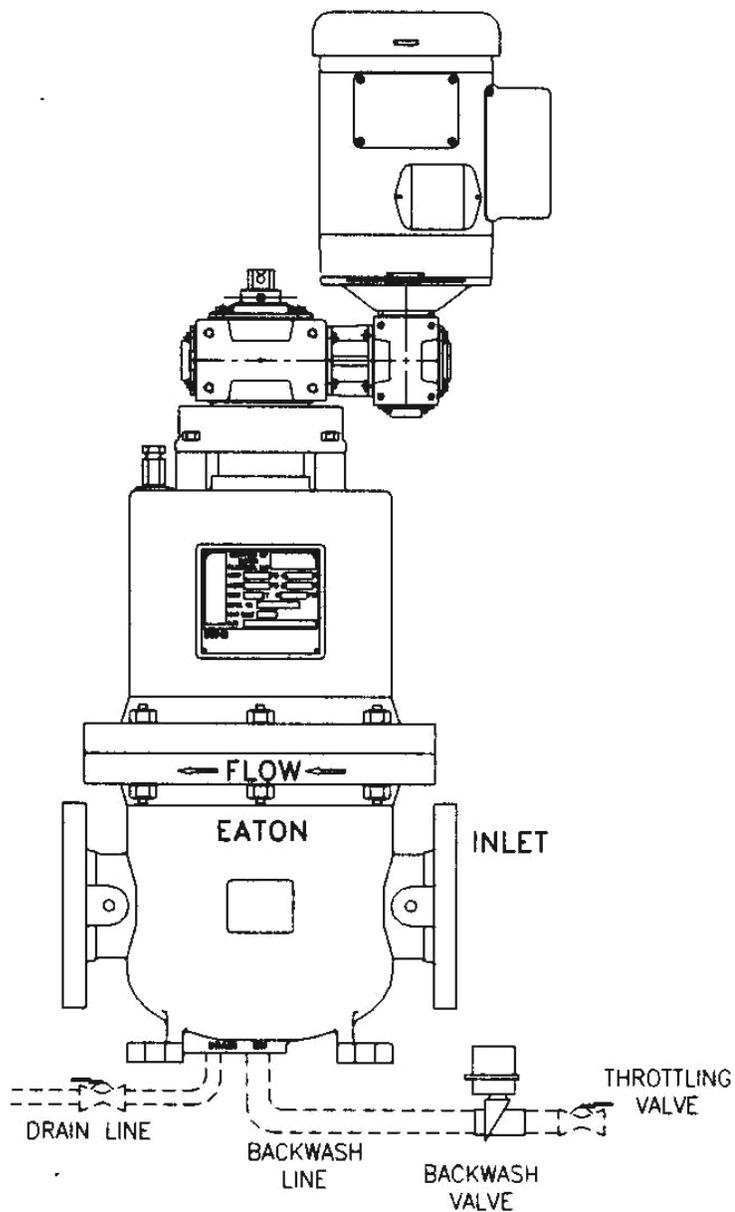
Incorrect voltage applied to control panel and/or valves, switches, etc.

Incorrect wiring between control panel and valves, switches, alarms, etc.

Differential pressure switch improperly adjusted.

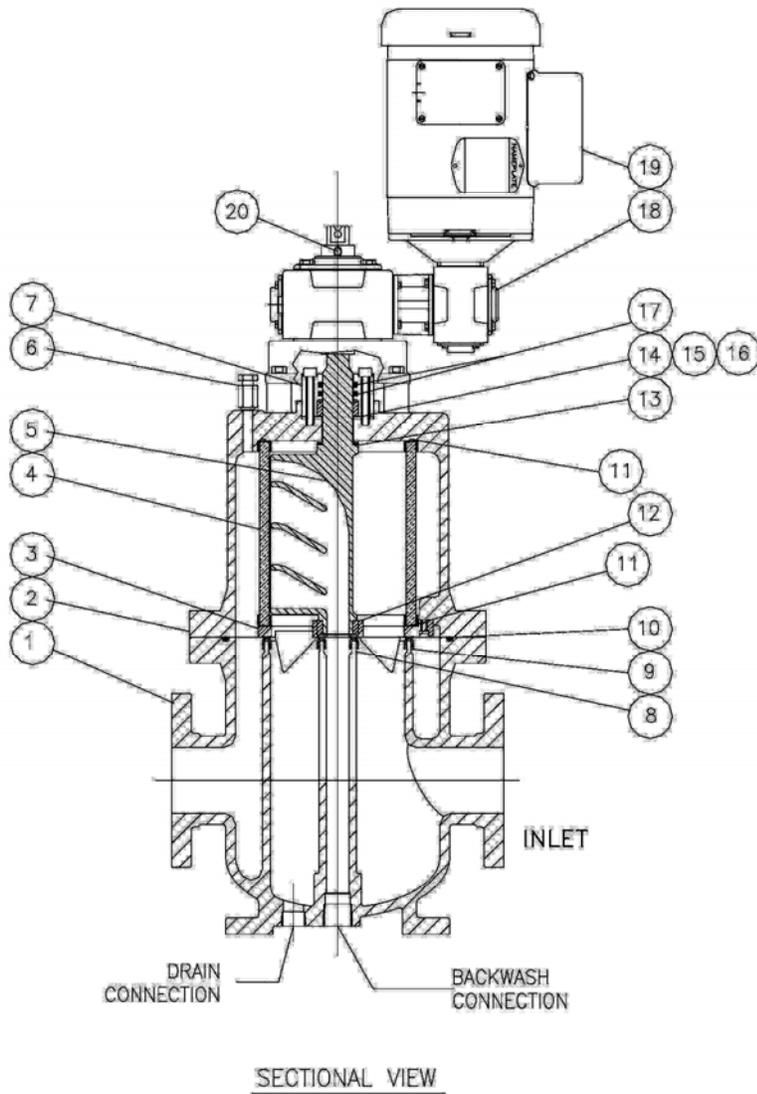
Insufficient air pressure applied to pneumatically operated backwash valves

**Suggested Backwash Line Installation**  
**Figure 2**



ITEMS SHOWN IN PHANTOM  
ARE SUPPLIED BY OTHERS

Typical Assembly Drawing—Figure 3



NO.	PART NAME
1	STRAINER BODY
2	STRAINER COVER
3	CENPELLER SUPPORT
4	STRAINING ELEMENT
5	BACKWASH ARM/SHAFT
6	VENT
7	idL™ HOUSING
8	INNER INTERNAL SEAL
9	OUTER INTERNAL SEAL
10	BODY O-RING
11	ELEMENT O-RING
12	LOWER BUSHING
13	SHAFT WASHER
14	GLAND GASKET
15	UPPER O-RING
16	UPPER BUSHING
17	SHAFT SEAL RINGS
18	GEAR REDUCER
19	MOTOR
20	DRIVE PIN

## Recommended Spare Parts

Part Description	Quantity
Strainer Element	1
Element O-Ring	2
Backwash Arm/Shaft Drive Pin	1
idL Seal Kit	1 (Contains 2 quad rings, upper bushing with o-ring & gland gasket)
Internal Seal Kit	1 (Contains inner and outer internal seals)

When ordering parts specify the strainer size and model number, the strainer serial number and Eaton part number, the description of the part and the part number if known and the quantity required.

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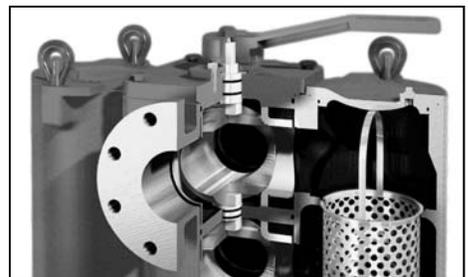
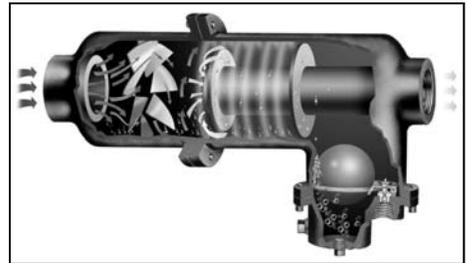
## Filtration Systems

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