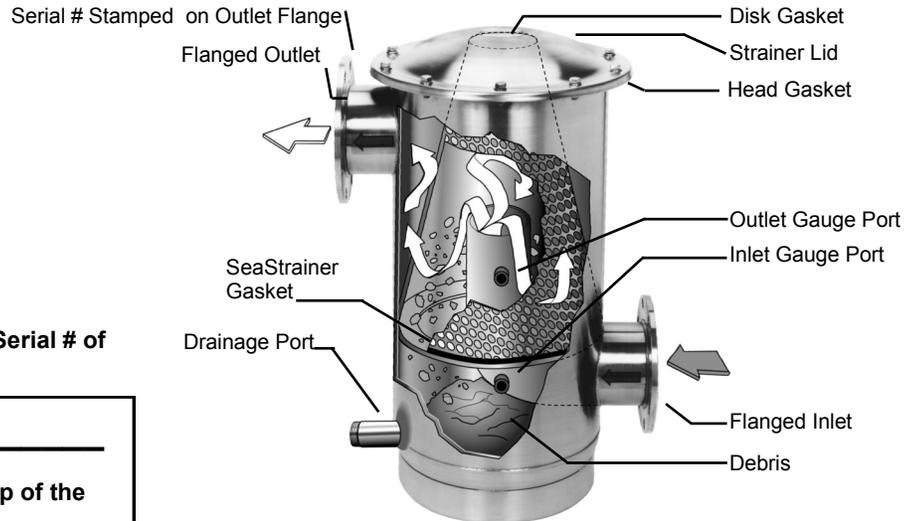




MILLER-LEAMAN, INC.
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OWNER'S MANUAL
OPERATION AND INSTRUCTION GUIDE



Record in the space below the Serial # of your unit

Serial # _____

The Serial # is located on the top of the outlet flange or pipe.

IMPORTANT

Please make certain that persons who are to use this filter thoroughly read and understand these instructions prior to operation. Should you have any questions regarding the operation of this filter, please call (386) 248-0500 and ask to speak with one of our customer service representatives.

I. SAFETY CONSIDERATIONS

Safety precautions are essential when any filtration equipment is involved. These precautions are necessary when using, storing, and servicing your SeaStrainer. If safety precautions are overlooked or ignored, personal injury or product damage can occur.

Your SeaStrainer was designed for specific applications. It **should not** be modified and/or used for any application other than originally specified. If there are any questions regarding its application or installation, contact Miller-Leaman, Inc.

Always adhere to the following precautions, as they are essential when using your Thompson SeaStrainer.

1. Read this manual carefully. Consider the applications, limitations, and the potential hazards specific to your SeaStrainer.
2. The SeaStrainer must be placed on a firm, supporting surface. The SeaStrainer **should not** be suspended by the inlet and outlet flanges.
3. **Absolutely under no conditions should the SeaStrainer lid or pressure gauges be removed while the SeaStrainer is pressurized.** Standard bolted lid models should never exceed 150 PSI; V-Band clamp models should never exceed 125 PSI.
4. Units with damaged or missing parts should **never** be operated. Contact customer service representatives for replacement parts.
5. Back-flow prevention devices should be installed upstream of the inlet and downstream of the outlet of the SeaStrainer as to prevent back flow or vacuum effects that can be damaging to the SeaStrainer element.
6. Pressure relief valves of a sufficient size and volume should be installed upstream of the inlet and downstream of the outlet of the SeaStrainer. They should be set to relieve pressure at 1.2 times the maximum operating pressure (not to exceed the max. rated pressure). This helps prevent damage to the SeaStrainer and element if severe stoppage or water hammer occurs.

AT NO TIME SHOULD THE INTERNAL PRESSURE EXCEED THE MAXIMUM RATED PRESSURE OF THE SEASTRAINER

II. BEFORE SEASTRAINER OPERATION

There are a few tasks that must be completed before your *Thompson SeaStrainer* is ready for operation. Please review the following checklist. When all tasks are complete the SeaStrainer is ready for use.

1. Is your *Thompson SeaStrainer* placed on a firm, supporting surface? Failure to do this can cause stress on the weld joints. Miller-Leaman recommends a concrete pad be poured under the base of the SeaStrainer.
2. Are the inlet / outlet connections securely fastened to the in-line pipe? The arrows clearly depict flow direction (see above).
3. Have you installed a check valve/back flow prevention device upstream of the inlet and downstream of the outlet of the SeaStrainer so as to prevent back flow or vacuum effects which can be damaging to the SeaStrainer element?
4. Have you installed a quick-pressure relief valve upstream of the inlet and downstream of the outlet of the SeaStrainer set to relieve pressure at 1.2 times the maximum operating pressure (not exceeding the maximum rated pressure of your SeaStrainer)? This is to prevent damage to the SeaStrainer element when and if severe clogging or water hammer occurs. Pressure-relief valves are available in various sizes, consult your local dealer or valve manufacturer to obtain the proper valve for your application.
5. Have you installed a valve on the drainage port located at the bottom of the SeaStrainer body (see front cover diagram)? This valve, when opened, will allow debris to escape the SeaStrainer body. The valve must be plumbed to atmosphere. The flush line should not have any elevation and should not be piped to a pressurized line.
6. Make sure back-mount pressure gauges are installed in the gauge ports located on the front of the SeaStrainer body (see front cover diagram). These gauges will allow you to monitor the pressure differential on each side of the screen so as to know when and if the SeaStrainer element is clogging.
7. Is the *Thompson SeaStrainer* lid securely fastened? Each bolt should be tightened to ensure safety and an adequate seal.

III. TORQUE SPECIFICATIONS

BAND CLAMP MODELS: (MLS-2, MLS-3, and MLS-4C)

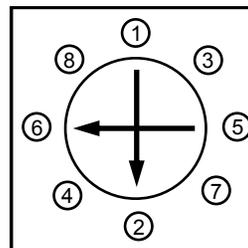
The over-center latch clamp is used on the MLS-2, MLS-3, and MLS-4C units and is installed by placing the clamp around the SeaStrainer, latching the T-bolt with the receiver, and pushing the latch handle towards the SeaStrainer body until the safety catch engages. The over-center clamp does not require adjustment to be installed and removed. The lock washer is set at the factory for proper clamp compression and normally requires no field adjustment. Minor tightening may be necessary over time. (SEE TABLE BELOW)

NOTE: The MLS-4 SeaStrainer is available with both a bolted lid and clamped lid. These are differentiated by a "B" for the bolted lid and a "C" for the clamped lid version. (MLS-4B / MLS-4C)

BOLTED LID MODELS: (MLS-4B, MLS-6, MLS-8, MLS-10)

The bolted lid *Thompson SeaStrainers* require that the attachment bolts be tightened sufficiently to make a complete seal without damaging the bolts or the SeaStrainer head. Grade 5 Zinc plated bolts, nuts and washers are used to attach the heads to these SeaStrainers. The size and recommended torque of the bolt is dependent on the SeaStrainer size. The following table shows the bolt

SEASTRAINER	BOLT SIZE	RECOMMENDED TORQUE
MLS-2 (Clamp)	5/16" - 18	40 – 50 in. lbs.
MLS-3 (Clamp)	5/16" - 18	60 – 80 in. lbs.
MLS-4C (Clamp)	5/16" - 18	75 – 85 in. lbs.
MLS-4B	3/8" - 16	15 – 25 ft.lbs
MLS-6	1/2" - 13	45 – 55 ft.lbs
MLS-8	1/2" - 13	45 – 55 ft. lbs.
MLS-10	5/8" - 11	80 – 100 ft. lbs.



**Recommended
Torquing
Sequence**

It is important to follow the torque specifications as over-torquing may result in premature failure of the bolt. Another important procedure when tightening the bolted lid is to follow a star wheel torque pattern (see above right). This is similar to the tightening of an automobile wheel in that the next bolt to be tightened is located opposite to the bolt just tightened. Most likely the SeaStrainer lid will not seat down completely after one series of torquing, this is especially evident on the larger SeaStrainers (MLS-8 and larger). A second tightening of the bolts should seat the lid securely to the body. On MLS-8 and MLS-10 models a 1/8 inch lid ring can be seen and should rest flush against the body flange when the head is properly tightened. The MLS-4B and MLS-6 lids also have this ring but it is hidden by the edge of the head. The MLS-4B and MLS-6 head will seat completely after two torquing sequences.

IV. SEASTRAINER OPERATION

At this point the *Thompson SeaStrainer* is ready for operation. Periodically (depending on liquid quality) the debris that settles out at the bottom of the SeaStrainer will need to be flushed out. The drainage port located at the bottom of the SeaStrainer is what makes this possible. Upon receiving your SeaStrainer, you must install a valve on the drainage port. It is the user's discretion how often the valve should be opened. It strictly depends on how much debris is being captured by the screen and falling into the SeaStrainer reservoir. Over time, one should be able to accurately determine how often the valve should be opened. **It is important that you never allow debris to accumulate beyond the capacity of the reservoir.**

Larger series SeaStrainers (MLS-4, MLS-6, MLS-8, MLS-10) are equipped with a flush port extension inside the SeaStrainer to allow for a nearly complete cleaning of the SeaStrainer reservoir every time the SeaStrainer is flushed. The drainage port valve should be opened while the SeaStrainer is in operation. Flow rate and pressure determine how long the valve should be open to flush the debris from the SeaStrainer tank. A good rule of thumb is to leave the valve open until the liquid being expelled flows free of debris. This should take from 30 to 60 seconds depending on the flow, pressure, and amount of debris.

Larger SeaStrainers require higher flushing pressures to achieve complete cleaning: the MLS-4 can be flushed as low as 15 - 20 PSI; the MLS-6 can be flushed as low as 30 - 35 PSI; and the MLS-8 and MLS-10 should be flushed at 40 PSI or greater if possible.

(Note: After operation, open the drainage port to allow the water contained in the SeaStrainer body to drain. If there is corrosive chemical content in the water, it may corrode the SeaStrainer element. Also, in winter months, the water may freeze and expand putting unnecessary stress on the SeaStrainer body).

V. SEASTRAINER ELEMENT CLEANING

The optional pressure gauges can be used to monitor the pressure differential between the inlet and outlet sides of the SeaStrainer. When there is a pressure loss of 5-10 PSI between the inlet and outlet side of the Thompson SeaStrainer, the SeaStrainer element may require cleaning.

CAUTION: Make sure that the system is completely shut down when the SeaStrainer element is to be taken out and cleaned. NO pressure should remain in the system.

Follow these steps when cleaning the Thompson SeaStrainer element:

Step 1: (Bolted Lid Models) Remove the top of the Thompson SeaStrainer by removing the Grade 5 Zinc plated bolts from the lid.

Step 1: (Band-Clamp Lid Models) Remove the top of the Thompson SeaStrainer by taking off the band-clamp assembly.*

Step 2: Lift the SeaStrainer element (conical screen) out of the SeaStrainer body.

Step 3: Carefully scrub down the SeaStrainer element with a rigid nylon brush until all matter is loosened.

Do not use a steel brush.

Step 4: Wash the SeaStrainer element off with clean water. It is preferable to use a hose with a significant amount of water pressure. ***Do not use a pressure washer.***

Step 5: Wash all matter from the SeaStrainer gaskets and clean the inner-ring where the bottom of the SeaStrainer element rests.

Step 6: Make sure the U-shaped gasket is fitted securely to the bottom of the SeaStrainer element. Reposition the SeaStrainer element into the body of the SeaStrainer.

Step 7: Make sure the SeaStrainer head gasket is secure on the top of the SeaStrainer body. On V-Band models, O-rings should be seated completely in the body flange. Reposition the SeaStrainer lid back on the SeaStrainer body. ***Tighten the lid securely either with the bolts or with the band-clamp.***

For band-clamp models, opening and closing is achieved without adjusting the lock nut. It is tightened at the factory to the correct compression. (Minor tightening may be necessary if the gasket loses memory over time.) To open the clamp, depress the safety latch and pull the over-center lever outward. To close the clamp, make sure the T-Bolt is seated in its receiver and push the over-center lever back toward the SeaStrainer housing. ***Be sure that the safety latch is engaged before putting the unit to use.***

VI. INFORMATION CONCERNING WATER HAMMER

WHAT IS WATER HAMMER?

Water hammer is a phenomenon that can occur in fluid systems with long pipes between the fluid source and the outlet. The term itself refers to the sound made when water hammer occurs which resembles banging a hammer on a long pipe. Water hammer is a rapid change of pressure caused by a rapid change in velocity. When the velocity is changed a pressure wave that travels at the speed of sound is initiated and travels in the upstream direction until it reaches some stationary energy level, like a reservoir. A rarefaction wave (at the pressure of the water source) then travels downstream at the same speed. If the flow has been shut off downstream the pressure wave impacts the blockage and the pressure in the entire system is raised very quickly.

WHAT CAUSES WATER HAMMER?

Any action that can cause a rapid change in the velocity of the flow can set off a water hammer - closing a downstream valve, pipe fracture, pump stoppage, etc. The critical time for which a valve may be closed depends on the length of piping between the valve and the source reservoir. The longer the distance the slower the valve may be shut to cause a water hammer. Typically for short lengths of pipe (below 500 ft) the critical time is less than 1/10 second.

WHAT CAN WATER HAMMER DO?

Pressure spikes from water hammer can raise fluid pressures to very high values (in excess of 1000 PSI depending on the situation). Such pressure spikes can result in mechanical failures such as broken valves, pipes, SeaStrainers, joints, etc. Water hammer does not have to occur fully to raise the pressure. A partial hammer can occur that raises the pressure to a certain percentage of the theoretical maximum. The Thompson SeaStrainer is rated to an absolute maximum pressure of 150 PSI for bolted lid models, 125 PSI for band clamp lid models. A water hammer pressure spike that raises the pressure higher than the maximum rated pressure may result in SeaStrainer damage.

WHAT CAN I DO TO PREVENT WATER HAMMER?

There are precautions that can be taken to prevent or decrease the effect of water hammer. A pressure relief valve that leads to a surge tank or accumulator may protect other key components from water hammer. A close adherence to operational policies will also help prevent valves or pumps from being accidentally shut off thereby causing a water hammer. A close examination of a system will inform you of potential hazards.

VII. LIMITED WARRANTY

This Warranty gives you specific legal rights and you may also have other rights which vary from state to state.

- 1. Duration:** SeaStrainer Housing: One year from the date of purchase by the original purchaser. Conical Screen: Ninety days from the date of purchase by the original purchaser (other than for purposes of resale).
- 2. Who gives this warranty (Warrantor):** Miller-Leaman Incorporated / 800 Orange Avenue; Daytona Beach, FL 32114 / 386-248-0500
- 3. Who receives this warranty (Purchaser):** The original purchaser (other than for purposes of resale) of the Miller-Leaman product.
- 4. What products are covered by this warranty:** Any MLS *Thompson SeaStrainer* housing and conical screen SeaStrainer elements manufactured by the warrantor.
- 5. What is covered under this warranty:** Defects on materials and workmanship, which occurs within the duration of the warranty period.
- 6. What is not covered under this warranty:**
 - A. Implied warranties, including those of merchantability and fitness for a particular purpose, are limited to one year from the date of original purchase. Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you.
 - B. Any incidental, indirect, or consequential loss, damage, or expense that may result from any defect, failure, or malfunction of the Miller-Leaman product. 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.
 - C. Any failure that results from an accident, purchaser's abuse, neglect, or failure to operate the products in accordance with the instructions provided in the owner's manual supplied with the product.
 - D. Items or service that are normally required to maintain the product, i.e. gaskets, bolts, nuts, and washers.
- 7. Responsibilities of warrantor under this warranty:** Repair or replace, at warrantor's option, products or components which have failed within the duration of the warranty period.
- 8. Responsibilities of purchaser under this warranty:**
 - A. Deliver or ship the Miller-Leaman product to the Miller-Leaman manufacturing facility. Freight costs, if any, must be borne by the purchaser.
 - B. Use reasonable care in the operation and maintenance of the product as described in the owner's manual.
- 9. When the warrantor will perform repair or replacement under warranty.**
 - A. Repair or replacement will be scheduled and serviced according to the normal workflow at the manufacturing facility, and depending on the availability of replacement parts.
 - B. If the purchaser does not receive satisfactory results from the product repair or replacement, the purchaser shall contact Miller-Leaman immediately.

NOTE: THIS WARRANTY IS VOID IN THE EVENT THE PURCHASER FAILS TO COMPLY WITH ANY ONE OF THE REQUIREMENTS FOR INSTALLATION AND USE OUTLINED OR SET FORTH IN THIS MANUAL AND MILLER-LEAMAN INCORPORATED ASSUMES NO LIABILITY WHAT-SO-EVER.



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The Thompson SeaStrainer is a product of Miller-Leaman, Inc. and is protected under patent #5,132,013