

1812 Spiral Wound Membrane Housing Assembly and Operation Manual



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1. Introduction

The 1812 Spiral Wound Membrane Housing is a bench-scale crossflow filtration system that is designed to evaluate 1812 spiralwound membrane elements in a variety of applications. It simulates the flow dynamics of commercially available spiral wound membrane elements. Users can vary the operating conditions and fluid dynamics over broad ranges. **Table 1** below outlines the features and technical specifications of the 1812 Spiral Wound Membrane Housing (hereafter referred to as 1812 Housing).

Table 1: 1812 Housing Features and Technical Specification

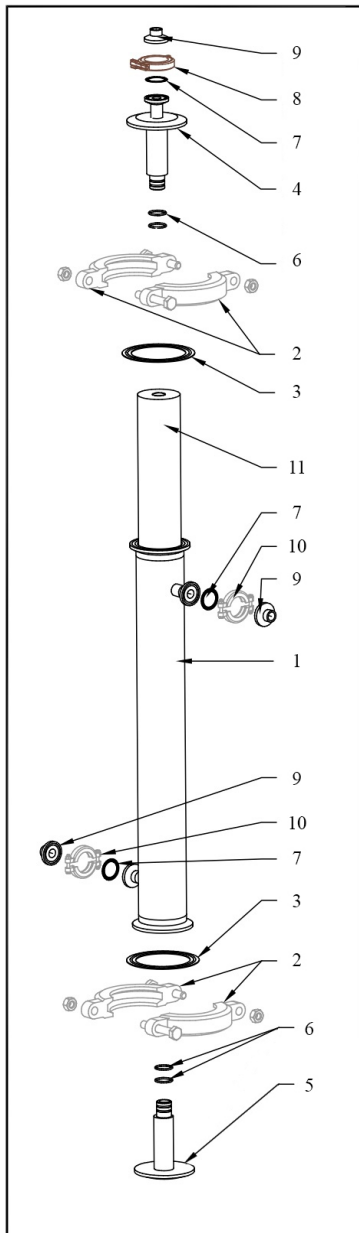
Parameter	Description
Membrane Active Area	Variable (1 to 5 ft ²)
Maximum Pressure	41.3 bar (600 psig)
Maximum Temperature	130°F (55°C)
O-rings	EPDM (Other materials available)
pH Range	Membrane Dependent
Cross Flow Velocity	Variable
1812 Housing	SS316
Dimensions	
Length	12 inch (304.8 mm)
Diameter	1.8 inch (45.7 mm)
Permeate tube ID	0.62 inch (15.7 mm)
Tube connections	3/8 inch FNPT (9.5 mm)

Prior to operating or servicing this device, this manual must be read and understood.

2. 1812 Housing Components

The 1812 housing consists of the following components. **Figure 1** illustrates a typical assembly of the 1812 Housing.

Figure 1. 1812 Housing Assembly



Legend:

1. Stainless Steel 316 housing
2. 2 inch high pressure clamps for top and bottom end caps
3. 2.5 inch gaskets for top and bottom end caps
4. Top end cap
5. Bottom end cap
6. O-rings for permeate collection adapter
7. 1/2 inch gasket for feed and permeate tube connections
8. Permeate collection tube clamp
9. 3/8 inch ferrules for feed and permeate tube connections
10. Feed inlet and outlet connection clamps
11. Female element

2.1. Additional components

Operation of the 1812 housing cell requires additional equipment that are sold separately as listed below. To inquire about a complete system contact sales@sterlitech.com.

- Feed Pump
- Feed Tank
- 1812 Spiralwound Membrane Elements
- Concentrate Control Valve

3. 1812 Housing Assembly

After verifying that all of the necessary components were shipped and present, you can begin the assembly of the system.

To install the 1812 element in the housing:

1. Remove clamp (**Figure 2, #5**) and open up the Bottom End Cap (keep the Top End Cap intact, **Figure 3, #7 and 8**)
2. Insert element into the housing in the correct orientation, i.e. inserted from the left side of the housing where the bottom end cap is, so that O-rings on the permeate collection tube fit snugly in the Top End Cap.
3. Push Bottom End Cap until element is fully inserted into the housing. This may take a bit of force.

***Note:** Applying Glycerin to the two O-rings installed on the permeate tube is recommended to ensure that there will be no leaks.*

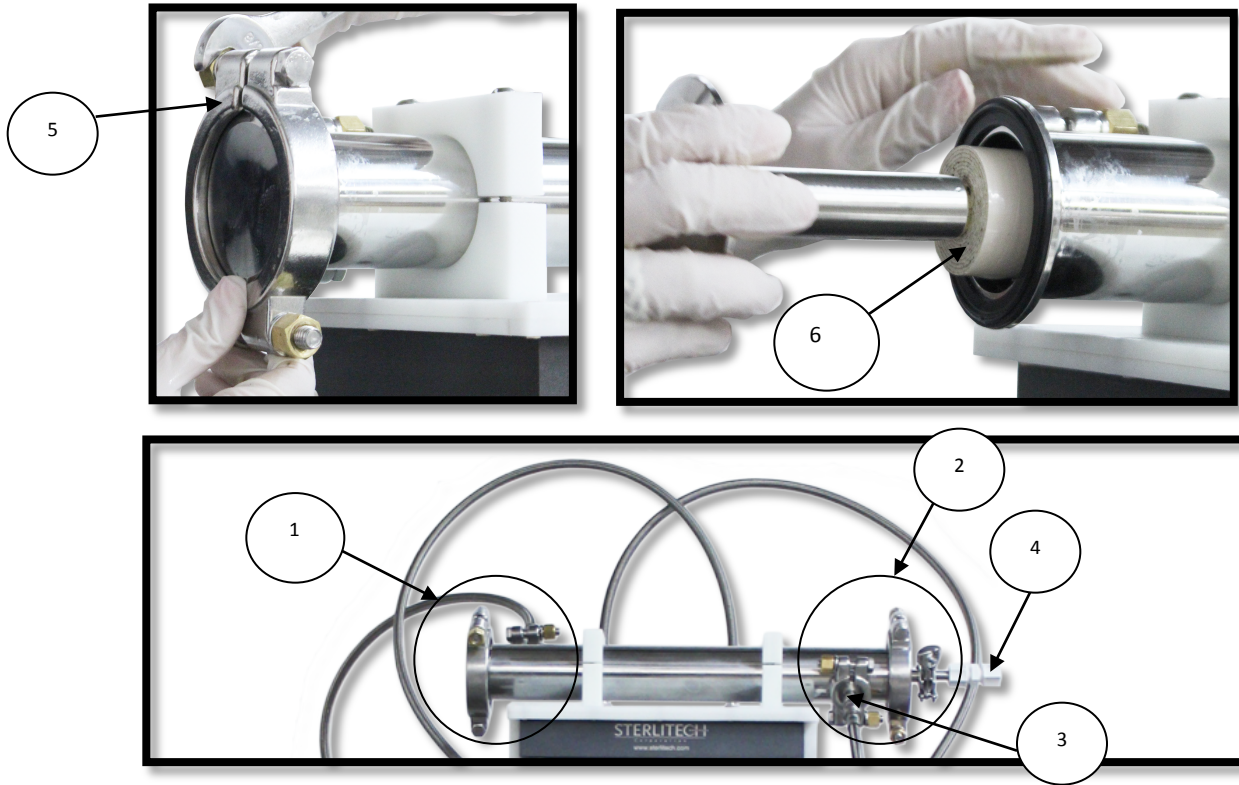
4. Put high-pressure clamp back on the Bottom End Cap and tighten.

WARNING: Do not exceed 600 psi (41 bar) in the 1812 Housing.

To remove the 1812 element from the housing:

1. Remove the clamp (**Figure 3, #7**) and open up the Permeate Collection Tube (**Figure 3, #11**).
2. Remove the clamp (**Figure 3, #8**) and open up Top End Cap.
3. Remove the element by pulling the element through the right side of the housing (through the Top End Cap).

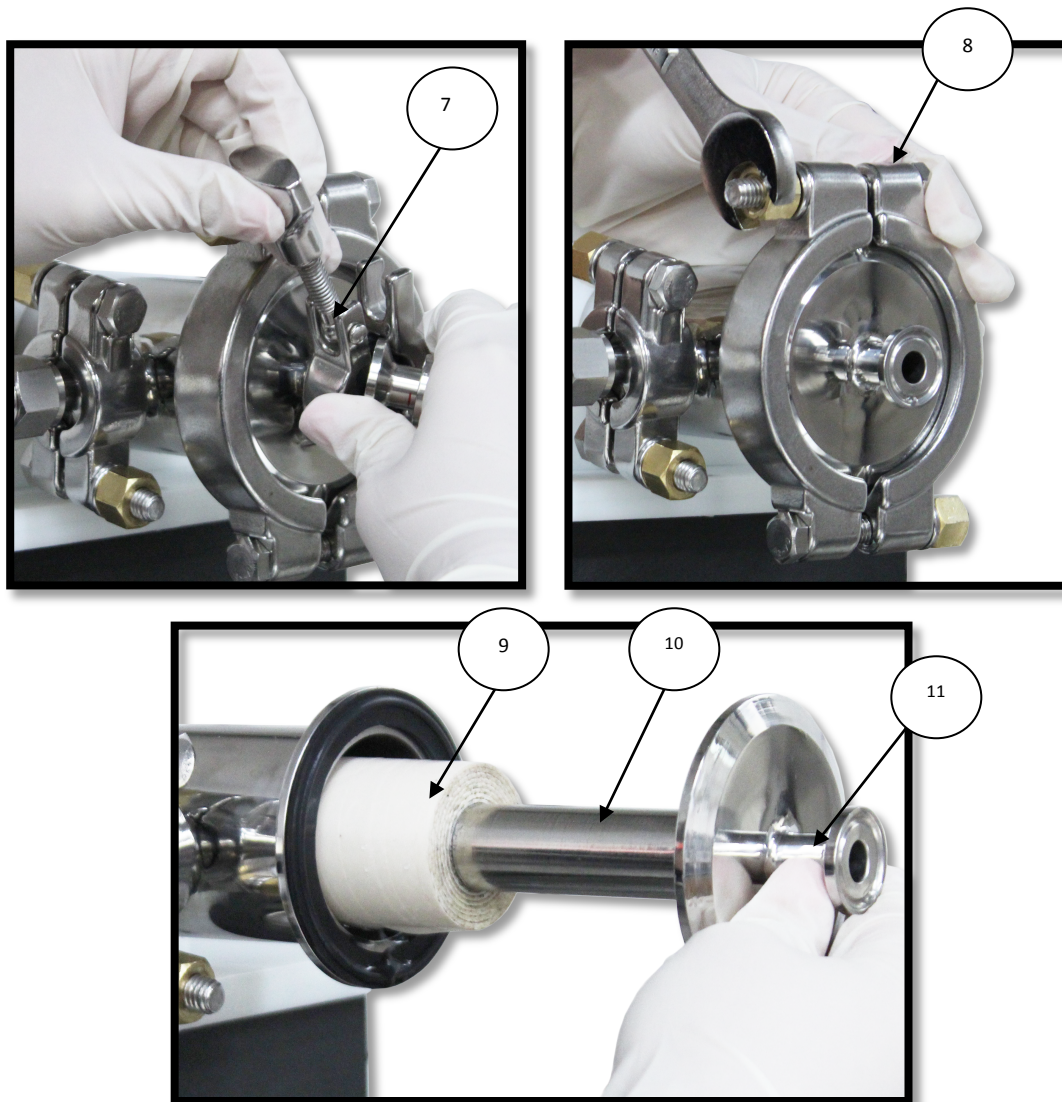
Figure 2. 1812 Housing Sanitary Fittings on Bottom End Cap



Legend

	Component Name
1	Bottom End Cap
2	Top End Cap
3	Feed Outlet Tube
4	Permeate Collection Tube
5	Sanitary Fittings on the Bottom End Cap
6	1812 Element

Figure 3. 1812 Housing Sanitary Fittings on Top End Cap



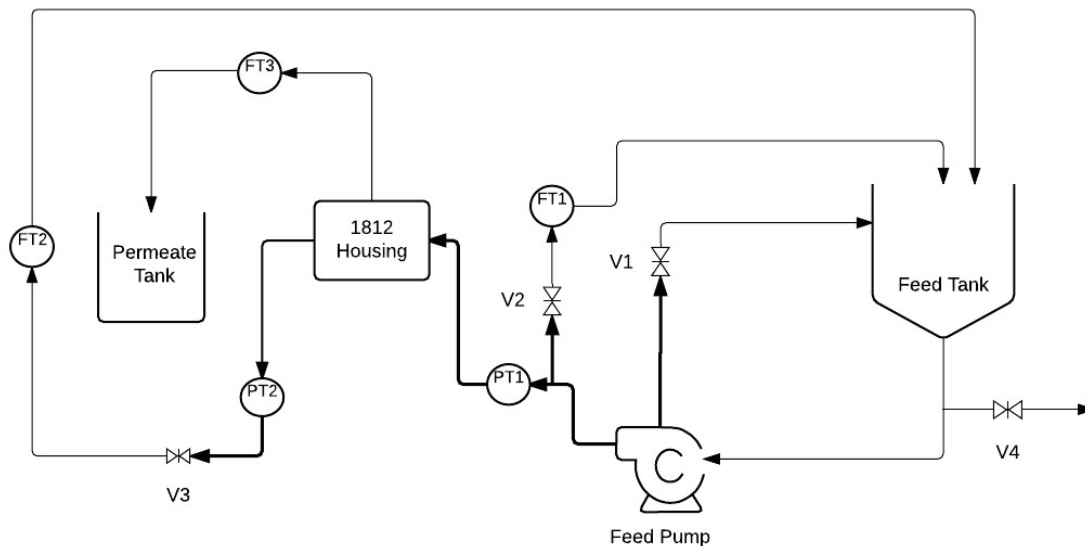
Legend

	Component Name
7	Sanitary Fittings on Permeate Collection Tube
8	Sanitary Fittings on the Top End Cap
9	1812 Element
10	Permeate Collection Adapter
11	Permeate Collection Tube

The 1812 Housing is now assembled and ready to be connected to a feed pump for operation.

4. 1812 Housing Assembly Connections and Parts

Figure 4. 1812 Housing Assembly Flow Diagram



Legend

V1: Feed pressure relief valve
 V2: Feed by-pass valve
 V3: Pressure control valve
 V4: Drain valve
 PT1: Feed pressure gauge
 PT2: Concentrate pressure gauge
 FT1: Feed by-pass flow meter
 FT2: Concentrate flow meter
 FT3: 1812 permeate flow meter

—▶ Low pressure fluid line
 —▶ High pressure fluid line

STERLITECH CORPORATION 22027 - 70th Ave S, Kent, WA Description: 1812 Housing Basic Setup Diagram
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Figure 4 shows typical plumbing connections that need to be made for the operation of the 1812 Housing, the configuration can change slightly depending on the objectives of the user. In general, the connections to be made are:

1. Feed vessel to the inlet pump
2. Pump outlet to the feed inlet of the 1812 housing
3. Concentrate outlet of the 1812 housing to the feed vessel
4. Permeate collection tube to the permeate collection vessel

Figure 4 also lists the additional components that are necessary to operate the 1812 Housing. These components are sold separately and can be found in the Membrane/Process Development section of the Sterlitech website (<http://www.sterlitech.com/membrane-process-development.html>). The final assembly of the system will vary with the feed vessels, pumps, and tubing used.

5. Operation of the 1812 Housing Assembly

Once the 1812 Housing has been assembled and connected to a feed pump, it can be used in reverse osmosis, ultrafiltration, nanofiltration, and microfiltration separation processes for applications in a variety of industries, including food and beverage, pharmaceutical, or industrial.

1. Open all of the valves in the system to relieve any pressure build-up before turning on the feed pump.
2. Turn the feed pump on.
3. Set the feed pressure to be less than or equal to 600 psig by gradually closing the concentrate control valve (**Figure 4, V3**).
4. Verify the feed pressure reading on the concentrate pressure gauge sold separately (**Figure 4, PT2**).
5. Adjust the bypass valve (**Figure 4, V2**) and concentrate control valve (**Figure 4, V3**) to obtain the desired pressure and flow. Experimentation enables you to determine the optimum settings for pressure, and flow rate to use on the chosen membrane and the fluid being processed.
6. Once the experiment is complete, shut down the system by turning the feed pump off and opening all of the valves to relieve any pressure build up.

6. Supplementary Operating Information

6.1. Membrane Performance Results

Spiral wound membranes containing mesh spacers are usually operated with a fluid velocity across the membrane surface of 0.1–0.5 m/sec (0.3–1.6 ft/sec). Higher velocities in membranes may lead to excessive pressure differential across the membrane and possible damage.

6.2. Membrane Performance

Other parameters such as viscosity, pressure, and suspended solids may also affect performance/operation. Experimentation with the 1812 Housing can help predict the best operating parameters. If your pump is delivering too much flow, a portion of the flow can be diverted back to the feed container before entering the feed inlet of the cell body. This requires installation of an optional bypass valve and fitting on the pump outlet (**Figure 4, V2**), which is not supplied with the housing.

6.3. Temperature Limits

The membranes, feed spacer, permeate, O-rings, and cell body materials construction dictates maximum operating temperatures.

Table 2: Upper Temperature Limits

Component	Maximum Temperature
1812 Housing	177 °C (350°F)
Membrane Element	Membrane dependant
O-rings	
Buna-N	121 °C (250 °F)

6.4. Membrane Cleaning

The 1812 housing can be cleaned easily after the membrane is removed. However, you may wish to simulate the actual cleaning conditions of Cleaning-In-Place (CIP) in larger systems with spiral-wound or tubular membranes. CIP chemically cleans without removing the membrane to mechanically scrub the unit.

During CIP, cleaning solutions are re-circulated and, in some cases, allowed to sit for a period of time within the cell body. In some cases, the feed pump can be used to re-circulate the cleaning solutions.

7. Accessory and Spare Part Ordering Information

Accessories and spare parts for the 1812 housing can be ordered by calling Sterlitech Corporation at 1-877-544-4420 or by visiting www.sterlitech.com.

Table 3: Accessory and Spare Part Ordering Information

Product	Shipping Weight	Ordering Number
1812 Housing, for operation to 41.3 bar (600 psig)	10.30 lbs (4.67 kg)	1230075
Feed Flow Pump	Contact Sterlitech	Contact Sterlitech
Spare Parts		
FFKM O-rings for permeate adapter	0.05 lb (0.028 kg)	1220171
Male End Cap Kit	2.45 lbs (1.11 kg)	1230127
Female End Cap Kit	2.45 lbs (1.11 kg)	1230128
Concentrate Control Valve	2 lbs (0.9 kg)	1149419
1812 Membrane Elements		
Visit www.sterlitech.com for membrane ordering information.		

8. Return Material Authorization

If materials are to be returned to Sterlitech for repair, evaluation, or warranty consideration, a Return Material Authorization (RMA) number and form must be obtained from Sterlitech prior to the return. Contact Sterlitech's Customer Service Department for these forms.

The form must be completed and returned with the material. Be sure to include a complete, detailed written reason for the return. Also, include serial numbers, installation and removal dates, and any other pertinent information that is available. 1812 Housings have a serial number imprinted on the cell bottom.

Indicate the proposed disposition of the material, and reference the RMA number on all packages or cartons. All material must be shipped to Sterlitech with freight prepared by the customer.

9. Warranty

The following is made in lieu of all other warranties expressed or implied. Sterlitech Corporation guarantees equipment to be free from defects in material and workmanship when operated in accordance with written instructions for a period of one year from receipt. Parts not manufactured by Sterlitech are covered by their manufacturer's warranties, which are normally for one year.

Manufacturers and Seller's only obligation shall be to issue credit against the purchase or replacement of equipment proved to be defective in material or workmanship. Neither manufacturer nor seller shall be liable for any injury, loss or damage, direct or indirect, special or consequential, arising out of the use of, misuse, or the inability to use such product.

The information contained herein is based on technical data and tests, which we believe to be reliable, and is intended for use by persons having technical skill at their discretion and risk. Since conditions of use are outside Sterlitech's control, we can assume no liability whatsoever for results obtained or damages incurred through the application of the data presented.

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The foregoing may not be altered except by a written agreement signed by officers of the manufacturer.

10. Technical Assistance

Please contact us if you have any questions or technical inquires about our products by calling Sterlitech Corporation at 1-877-544-4420 or by visiting www.sterlitech.com.

Notes:

Notes:

Founded in 2001 in Kent, WA, Sterlitech Corporation manufactures and markets filtration-focused laboratory products to a broad spectrum of scientific and industrial sectors. Its line of flat sheet membranes and tangential flow cells deliver industry-leading performance and reliable results. Configured for reverse osmosis, nanofiltration, ultrafiltration, and microfiltration applications, Sterlitech's bench scale test equipment provides the versatility required to innovate.

Sterlitech's comprehensive line of products is supported by the expertise of its technical specialists who can assist with application-specific product selection, and provide customized solutions where necessary. Unique problem-solving approaches, flexibility, and consistent quality have made Sterlitech Corporation a renowned global provider of filtration products and equipment.

General Corporate Information

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