



# **3M™ Liqui-Cel™ EXF-4×13 and 4×28 Series Membrane Contactors**

**Assembly and Disassembly Instructions**

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## I. SAFETY INFORMATION

Read, understand, and follow all safety information contained in these instructions prior to the use of this 3M™ Liqui-Cel™ Membrane Contactor. Retain these instructions for future reference.

### Intended Use:

This Liqui-Cel Membrane Contactor is intended to add to or remove dissolved gases from non-dangerous liquid streams. It is expected that all users be fully trained in the safe operation of membrane contactors. Membrane contactors are intended for installation and operation by qualified installers and operators in accordance with all operating guidelines, installation instructions, and any other industry requirements. Use in any other application may not have been evaluated by 3M and may lead to an unsafe condition.

### WARNING

#### To reduce the risks associated with explosion:

- Only use replacement parts supplied by 3M for this product.

#### To reduce the risks associated with crush or impact related injuries:

- Always ensure the membrane contactor is properly secured. Be sure the membrane contactor cannot tip, roll, fall, slide or make any movement that may cause injury or damage to other system components.
- No liquid, vacuum or sweep gas should be running through the contactor when changing cartridges or other parts. Membrane contactors should be completely drained of liquid before attempting to service.
- Care must be taken not to hit or jar (shock) the membrane contactor.

#### To reduce the risks associated with lifting or moving:

- Always consult the product datasheet or operating guide for membrane contactor weights. Use appropriately rated lifting equipment for lifting or moving heavy membrane contactors.
- Drain liquid from the contactor before moving. **Do not** move a membrane contactor while it contains liquid.

### CAUTION



#### To reduce the risks associated with environmental contamination:

- At the end of useable life, dispose of the membrane contactor or cartridges in accordance with local regulations and laws.





### NOTICE

- The membrane contactor(s) should not be stored where they are exposed to direct sunlight. Membrane contactors should always be stored in sealed bags or shrink wrap material and in the original box or other opaque box.
- Store dry membrane contactor(s) at temperatures <49°C (120°F) with low to moderate humidity levels (<60% relative humidity).
- Avoid contact with surfactants/solvents or oxidants (e.g. ozone, chlorine) to prevent wet-out or oxidation of the hydrophobic membrane.
- To avoid contamination, gloves are recommended when handling the membrane cartridges.
- **Do not** use dope or metal connections to connect to plastic connections of the membrane contactor.
- Failure to follow any instructions in this guide will void any warranty, if any exists.

### EXPLANATION OF SIGNAL WORD CONSEQUENCES

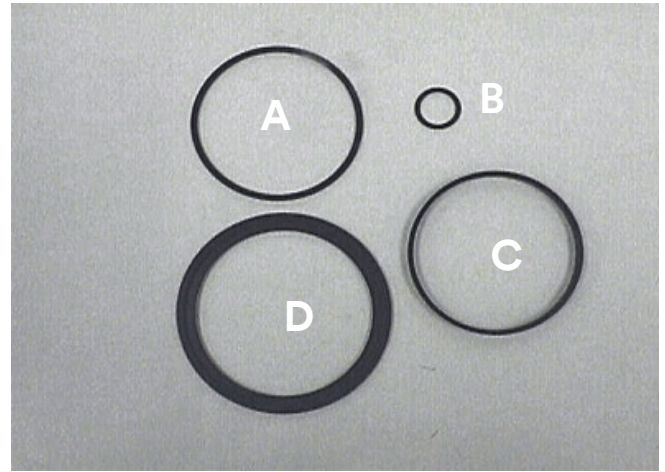
|  |  |
|--|--|
|  <b>WARNING</b>  | Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury and/or property damage.  |
|  <b>CAUTION</b> | Indicates a potentially hazardous situation, which, if not avoided, could result in minor or moderate injury and/or property damage. |
| <b>NOTICE</b>  | Indicates a potentially hazardous situation, which, if not avoided, could result in property damage.                                 |

### EXPLANATION OF SAFETY AND RELATED SYMBOLS

|   |  |
|---|--|
|  | Warning: Explosion                     |
|  | Warning: Crush or Impact               |
|  | Caution: Lifting or Moving Hazard      |
|  | Caution: Possible Environmental Impact |

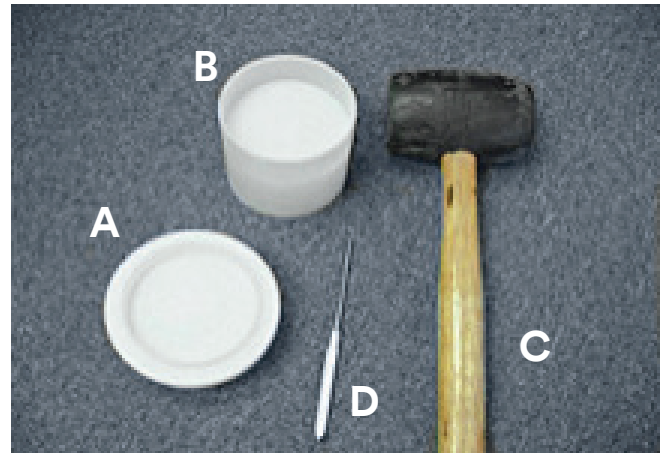
## II. ASSEMBLY PARTS

- A. **Outer Viton O-ring (2)** .....O-ring used to seal water side (cartridge/housing seal).
- B. **Center Viton O-ring (4)** .....O-ring used to seal water side (cartridge/center nozzle seal).
- C. **Retention Ring (2)** .....9 mm diameter retention ring for outer O-ring.
- D. **Viton Gasket (2)** .....4 inch gasket (end cap seal).



## III. ASSEMBLY TOOLS

- A. **Small Insertion Tool** ..... Used to support the cartridge during assembly/disassembly.
- B. **Large Insertion Tool** ..... Used to insert the cartridge and outer O-ring.
- C. **Rubber Mallet** ..... Used to tap insertion tool during O-ring assembly.
- D. **O-ring Pick** ..... Used to remove the outer (shellside) O-ring during disassembly.



## IV. DISASSEMBLY PROCEDURE

### WARNING

#### To reduce the risks associated with crush or impact related injuries:

- Always ensure the membrane contactor is properly secured. Be sure the membrane contactor cannot tip, roll, fall, slide or make any movement that may cause injury or damage to other system components.
- No liquid, vacuum or sweep gas should be running through the contactor when changing cartridges or other parts. Membrane contactors should be completely drained of liquid before attempting to service.
- Care must be taken not to hit or jar (shock) the membrane contactor.

#### To reduce the risks associated with lifting or moving:

- Always consult the product datasheet or operating guide for membrane contactor weights. Use appropriately rated lifting equipment for lifting or moving heavy membrane contactors.
- Drain liquid from the contactor before moving. **Do not** move a membrane contactor while it contains liquid.

### CAUTION

#### To reduce the risks associated with environmental contamination:

- At the end of useable life, dispose of the membrane contactor or cartridges in accordance with local regulations and laws.

### NOTICE

- To avoid contamination, gloves are recommended when handling the membrane cartridges.

## DISASSEMBLY PROCEDURE STEPS

- (A) Using a 3/8" socket, remove the end cap clamps.
- (B) Remove the end caps using a twisting, pulling motion. It may be necessary to lightly tap the gas elbow outward with a rubber mallet to loosen the end cap.
- (C) Remove the gasket.
- (D) Using the O-ring pick, remove the retention ring.

A



B



C

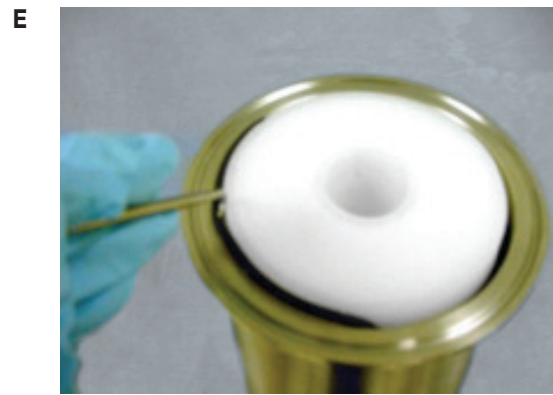


D

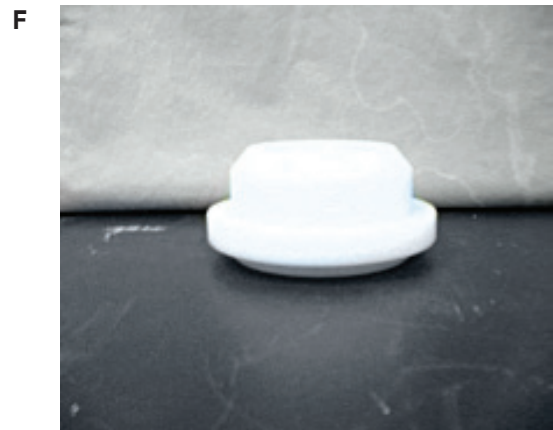


- (E) Using the O-ring pick, remove the outer O-ring. Insert the pointed end of the pick into the O-ring and pull outward.

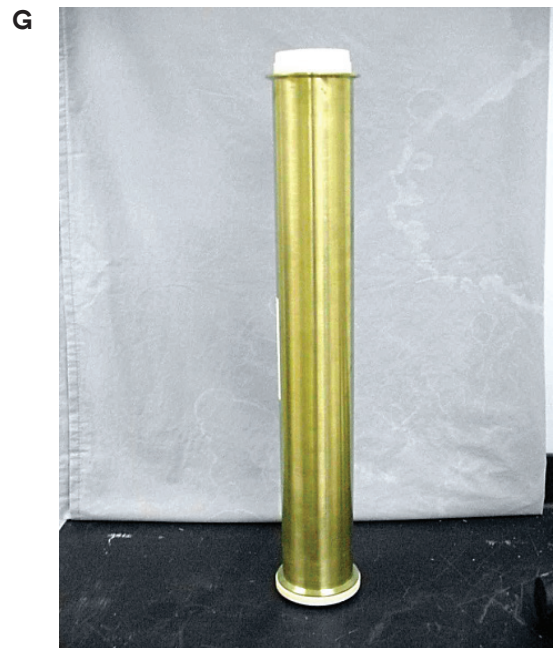
**NOTE:** The outer O-rings may be damaged during removal and should be discarded – DO NOT RE-USE.



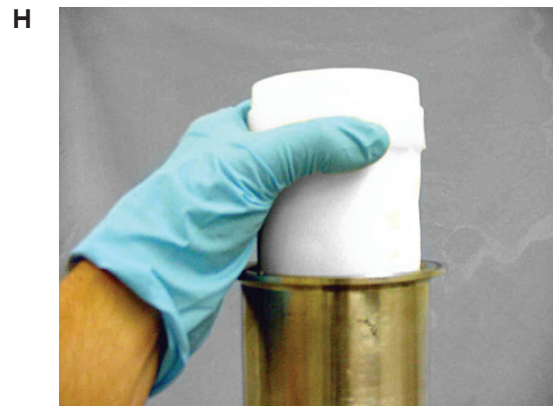
- (F) Place the small insertion tool on a solid flat surface, with the beveled side pointing up.



- (G) Flip the contactor over and rest on top of the small insertion tool.
- Repeat the previous 3 steps on the other end of the contactor.
- Once the outer O-ring is removed, the vessel should slide down over the cartridge. The cartridge will be supported by the small insertion tool.



- (H) Carefully slide the cartridge out of the housing.
- NOTE:** Be careful not to chip the potted edge of the cartridge.





## V. ASSEMBLY PROCEDURE

### WARNING

#### To reduce the risks associated with explosion:

- Only use replacement parts supplied by 3M for this product.

#### To reduce the risks associated with crush or impact related injuries:

- Always ensure the membrane contactor is properly secured. Be sure the membrane contactor cannot tip, roll, fall, slide or make any movement that may cause injury or damage to other system components.
- Care must be taken not to hit or jar (shock) the membrane contactor.

#### To reduce the risks associated with lifting or moving:

- Always consult the product datasheet or operating guide for membrane contactor weights. Use appropriately rated lifting equipment for lifting or moving heavy membrane contactors.

### NOTICE

- To avoid contamination, gloves are recommended when handling the membrane cartridges.

## ASSEMBLY PROCEDURE STEPS

- (A) Place the small insertion tool on a solid flat surface, with the beveled end pointing down.

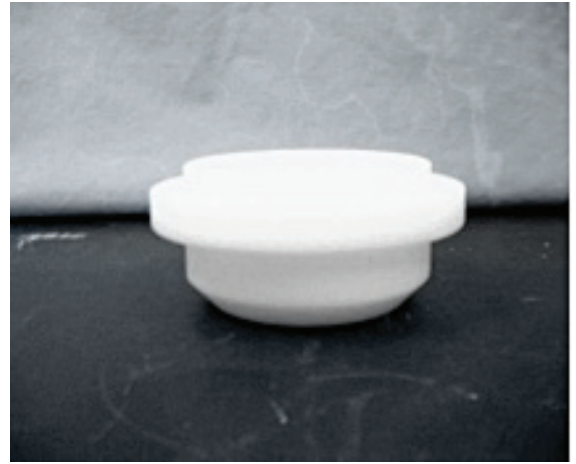
**NOTE:** The end with the 1/4" ridge should be pointing up.

- (B) Rest the housing on the small insertion tool.

- (C) Carefully insert the cartridge into the housing.

- (D) Position an outer O-ring over the potted end. Note that the cartridge will be about 1/4" below the flanged surface of the housing.

A



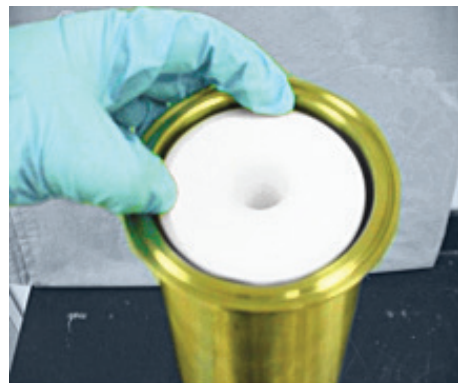
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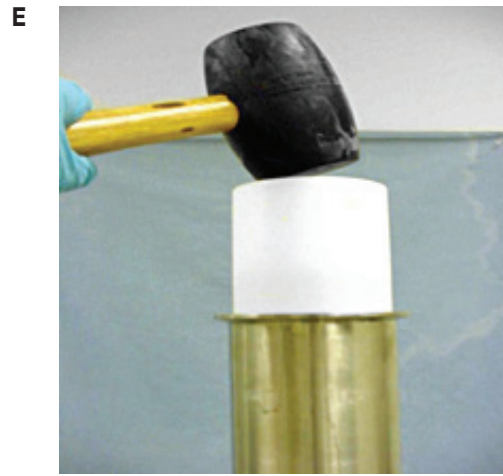
C



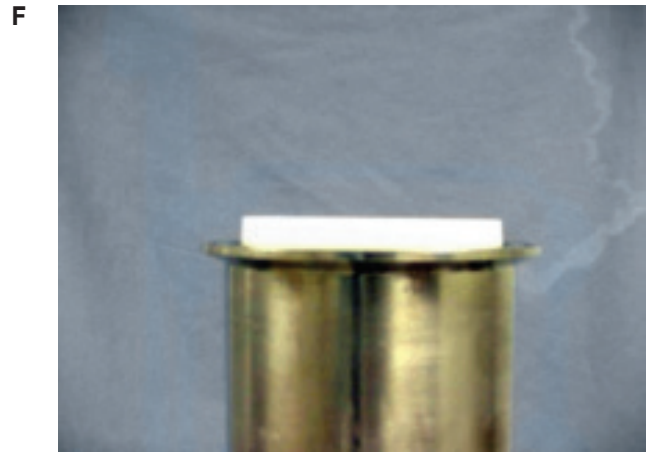
D



- (E) Place the large insertion tool over the end of the cartridge and outer O-ring. Be sure the large insertion tool is placed evenly over the O-ring.
- Tap lightly around the circumference of the insertion tool until the cartridge and outer O-ring move into the housing. (The small insertion tool will act as a stop.)



- (F) Flip the housing over and rest back on the small insertion tool. Note that the cartridge protrudes approximately 1/4" from the flanged surface of the housing.



- (G) Place an outer O-ring over the potted end of the cartridge.



- (H) Place the large insertion tool over the end of the cartridge and outer O-ring. Tap lightly on the insertion tool until the cartridge is centered in the housing.

**NOTE:** Slightly more tapping force may be required during this procedure.





- (I) Install a retention ring on one side of the contactor.  
Tap lightly with the rubber mallet if necessary.



- (J) Install a gasket in the grooved end of the housing.

**NOTE:** Prior to inserting the end cap, check the integrity of the 2 small center O-rings. Replace if damaged or worn.



- (K) Install the end cap using a twisting, pressing motion. Press evenly to prevent damage to the center O-ring or to the center tube. If the center O-rings are pinched, or otherwise damaged, they will not seal properly.
- Continue until the end cap is completely flush with the vessel.



- (L) Install the clamps using a 3/8" socket.

Repeat the previous 4 steps for both ends of the contactor. Ensure that the gas ports are properly aligned before completely tightening the clamp bolts.



For more information, contact us or visit us online at [3M.com/Liqui-Cel](http://3M.com/Liqui-Cel).

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