



# **3M™ Liqui-Cel™ EXF-8×20 Series Membrane Contactor**

**Assembly and Disassembly Instructions**

## TABLE OF CONTENTS

<b>I. Safety and Warning</b> .....	<b>3</b>
<b>II. Assembly Parts and Tools</b> .....	<b>4</b>
<b>III. End Cap Removal</b> .....	<b>5</b>
<b>IV. Cartridge Removal</b> .....	<b>8</b>
<b>V. Cartridge Insertion</b> .....	<b>9</b>
<b>VI. End Cap Assembly</b> .....	<b>10</b>

## 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.

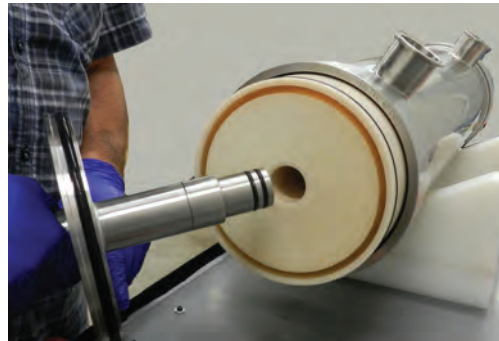
New contactors are shipped fully assembled and do not require cartridge insertion. However, contactors in the field may periodically require cartridge change-outs. This document provides guidelines on how to change-out cartridges for 8 × 20-inch stainless steel membrane contactors.

**IMPORTANT:** Hollow fiber cartridges are shipped in sealed, plastic covers to protect the membrane from contaminants. It is recommended that customers **DO NOT** open the replacement cartridges until they are ready to install.



**IMPORTANT:** For customers that perform hot sanitization, it may be necessary to apply some force to remove the end cap to Cartridge Connector piece from the cartridge. The old cartridge may be damaged in this process, so be sure a new replacement cartridge is available before starting the change-out procedure.

#### Securing the contactor





The end-user/operator is responsible for making sure the contactor is properly secured before starting cartridge replacement. Be sure the contactor cannot roll, fall, slide or make any movement that may cause injury, damage the contactor or damage other system components.



### 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 AND TOOLS

**Note:** We recommend the purchase of the end cap removal and Cartridge Removal tools for cartridge replacement. Instructions in this guide assume these tools are being used.

### A. End Cap to Cartridge Connector (2)

Part #50633

Included in Kit #223 ..... Stainless steel adapter component inserted into the end cap that properly fits into the cartridge's center tube.

**NOTE:** Only one connector will be used if only one end cap is removed during cartridge replacement.

### B. Cartridge O-rings (2)

Part # 50618

Included in Kit #223 ..... 2-263 O-rings are used to seal the cartridge to the vessel. One O-ring is used for each end of the cartridge.

### C. Connector O-rings (8)

Part #50619

Included in Kit #223 ..... 2-124 O-rings are used to seal the end cap connector to the end cap and cartridge.

### D. End Cap O-rings (2)

Part #50617

Included in Kit #223 ..... 2-442 O-rings are used around the outer edge of the end cap.

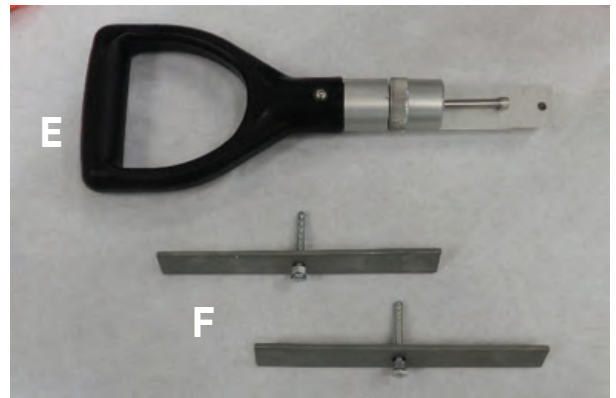
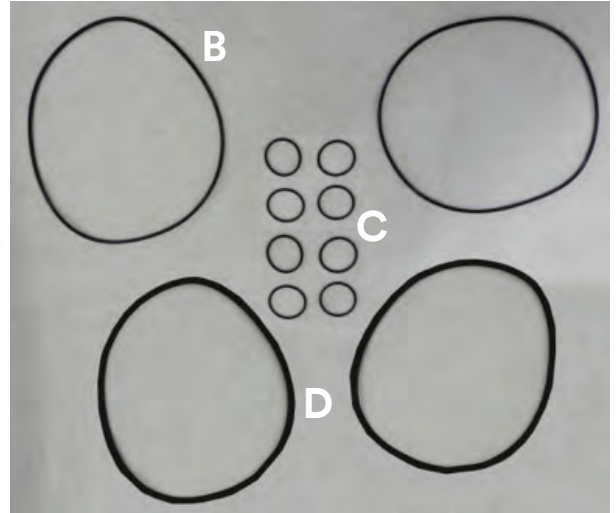
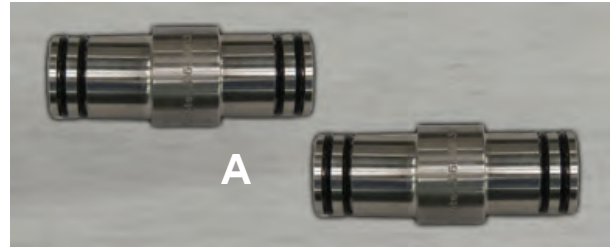
### E. Cartridge Removal Tool

Kit #K218 ..... Custom tool used to extract and insert cartridges (sold separately).

### F. End Cap Removal Tool

Kit #226 ..... Tool used to remove the end cap from the vessel (sold separately).

A 10 mm wrench and 5 mm hex key are also needed for this procedure. A small plastic hammer may also be needed. These tools are not provided.



### III. END CAP REMOVAL

#### 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.

#### NOTICE

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

### END CAP REMOVAL STEPS

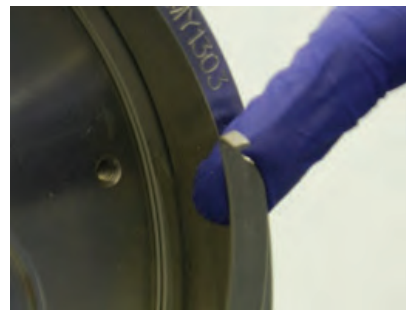
- Begin by removing both retaining clips from the end cap with a 5 mm hex key.
- Using pliers (or other suitable tool), pull the tab of the end cap retaining clip free. Then, remove the retaining ring from the end cap and set aside. Do not discard.

- Ensure that the screw in the end cap removal tool is inserted all the way into the hole so the screw head is flat against the bar.

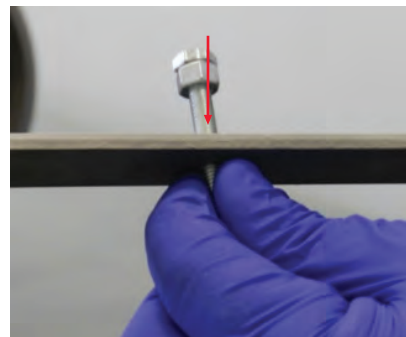
A



B

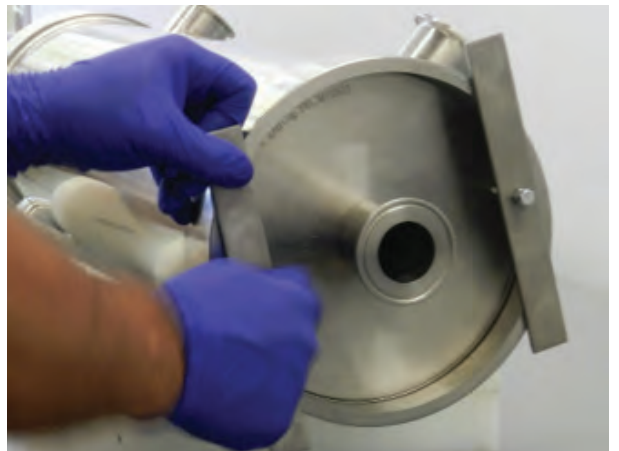
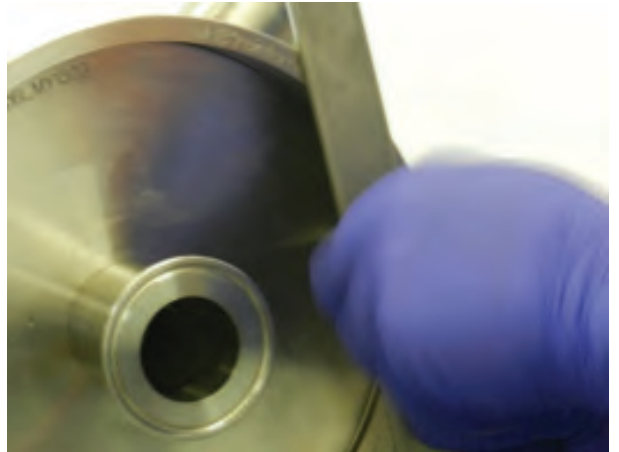
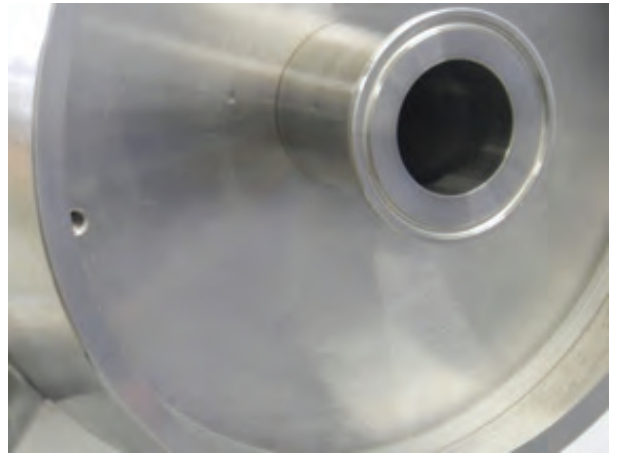


C



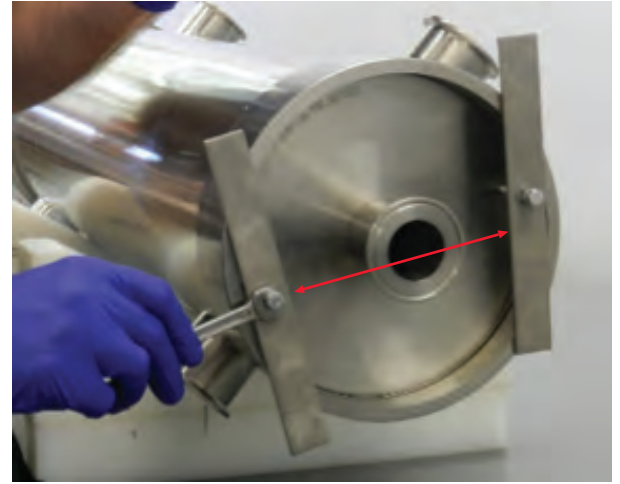
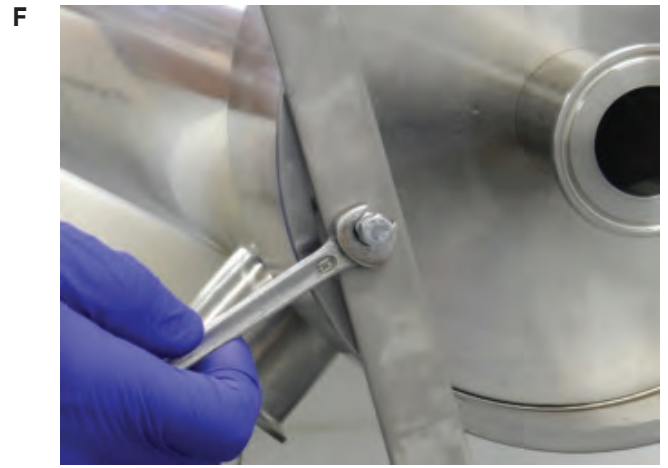
- D. With the screw fully inserted into the end cap removal tool bar, place the screw into the hole in the end cap and hand tighten.
- E. Repeat steps C and D for the opposite side of the end cap.

D

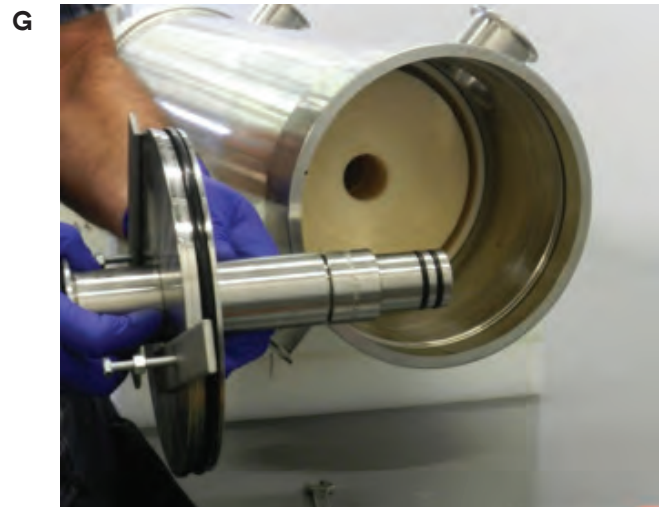




- F. Using a 10 mm wrench tighten the screws by one turn each, alternating between the two screws with each turn.



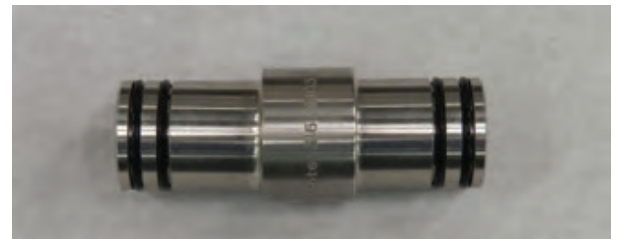
- G. The end cap will come loose after several rotations of the screws. Once loosened, pull the end cap free from the vessel. Set the end cap removal tool and end cap aside.



**Note:** There is a stainless steel end cap to cartridge connector piece that joins the end cap with the cartridge. This piece may come out with the end cap when it is pulled free or it may remain inside the cartridge. If the connector piece remains inside the cartridge, pull it free.

Additional note for contactors that have been used in a hot sanitization process.

In some instances the connector piece may be stuck in the cartridge. If this occurs, it may be necessary to remove both end caps in order to remove the cartridge. To remove the other end cap repeat steps A-G. More detail on removing the cartridge is covered in the Cartridge Removal section of this guide.



## IV. CARTRIDGE REMOVAL

### 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.

## CARTRIDGE REMOVAL STEPS

- Begin by inserting the cartridge removal tool into the center tube of the cartridge. Near the tip of the cartridge removal tool there is a small knob that must be inserted into one of the slots, or holes, on the inside of the center tube.
- With the cartridge removal tool inserted into the cartridge, slide moveable sliding lock forward and into the center tube to lock the tool in place.
- With the tool locked into place, pull the cartridge free of the vessel.
- To release the cartridge removal tool from the center tube, slide the moveable sliding lock back toward the handle to release it from the center tube.
- Remove the cartridge removal tool from the center tube and set aside. The cartridge can be discarded.

### Additional instructions for contactors that have been used in a hot sanitization process

If the end cap to cartridge connector piece is stuck in the cartridge it will not be possible to use the cartridge removal tool to remove the cartridge. With the end caps removed from both ends of the contactor, the cartridge will need to be pushed out of the contactor with the connectors still in the cartridge. Once the cartridge is free of the vessel, the end cap to cartridge connector can be forced from the cartridge. Alternatively, the end cap to Cartridge connectors can be discarded with the old cartridge as new connectors are supplied with each replacement cartridge.

Put one of end caps with the end cap to cartridge connector piece installed back on the vessel. Instructions to install the connector and end cap are in section V.

A



B



C





## V. CARTRIDGE INSERTION

### 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:

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### NOTICE

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

## CARTRIDGE INSERTION STEPS

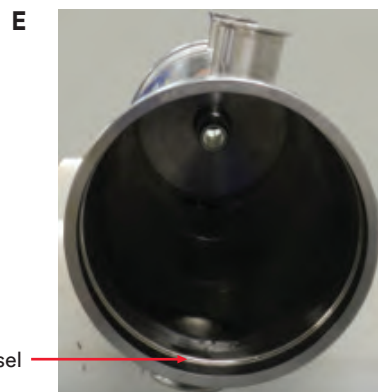
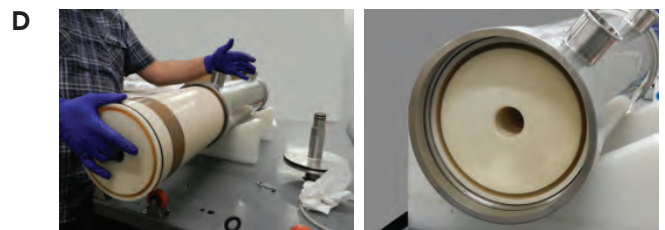
- Unwrap the new replacement cartridge.
- Begin by placing the large O-rings (2-263) into the grooves near the end of the new cartridge. Be sure the O-rings are completely inside of the groove. Do this for both ends of the cartridge.

- It is recommended to apply a thin coat of a 50/50 mixture of water and glycerin to the outside of the cartridge.

Care should be taken with the exposed fibers on the face of the cartridge. Do not allow any contact that risks contaminants coming into contact with the fibers, including the 50/50 water and glycerin solution.

- Insert the cartridge into the vessel.

- The cartridge should be inserted far enough into the vessel so it is past the groove near the end on the inside of the vessel.



Groove in vessel

## VI. END CAP ASSEMBLY

### 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.
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### NOTICE

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

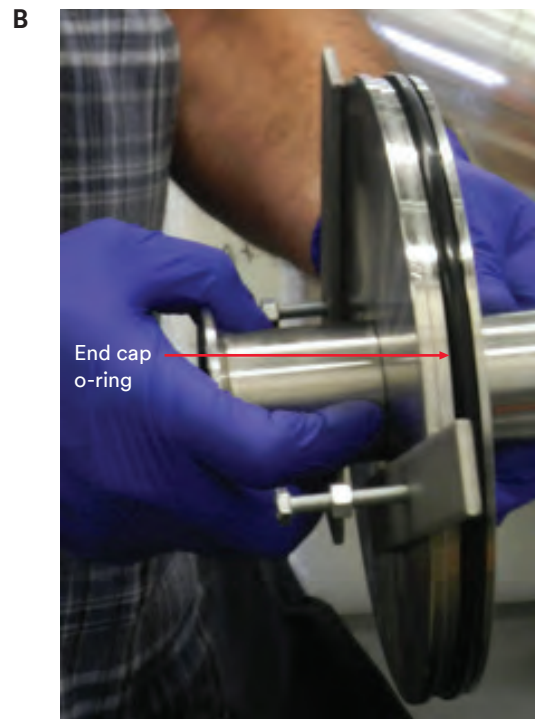
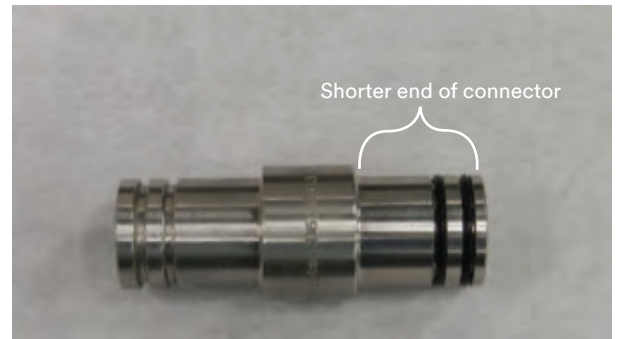
## END CAP ASSEMBLY STEPS

End cap connector pieces and O-rings are provided with each cartridge shipment. Four O-rings (2-124) need to be applied to each end cap to cartridge connector. One O-ring (2-442) is used on each end cap.

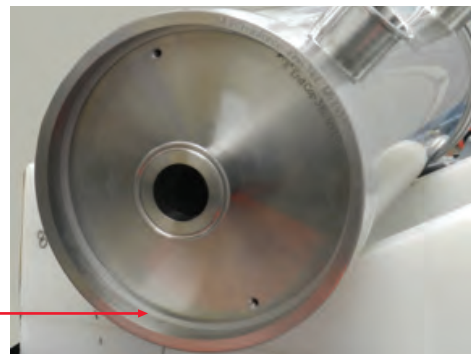
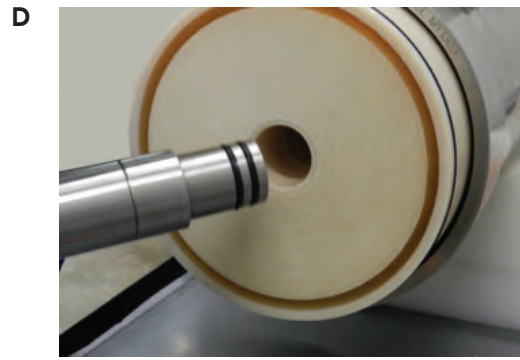
If only one end cap is removed during change-out, then only one O-ring (2-442) will be used.

Note that the end cap to cartridge connector piece has a short and long side. The shorter end is inserted into the end cap.

- A. Begin by installing the small o-rings to the end of the end cap to cartridge connector. There are 4 o-rings for each contactor. Ensure the o-rings (2-442) are seated completely into the grooves on the end cap to cartridge connector.
- B. Replace the large o-ring (2-442) around the outside rim of the end cap. Be sure to use the correct o-ring.
- C. Insert the end cap to cartridge connector into the end cap. If needed a small amount of a 50/50 mixture of water and glycerin can be applied to the o-rings on the connector.



- D. Insert the assembled end cap into the cartridge far enough so the end cap is just past the groove on the inside of the vessel. It may be necessary to gently tap the end cap into the vessel with a plastic mallet.
- E. Install the retaining ring into the groove.



Groove on  
inside of vessel



- F. Install the retaining ring Clips by setting them into the holes in the end cap.
- G. Hand tighten the screws so the clips are snug against the retaining ring.



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