

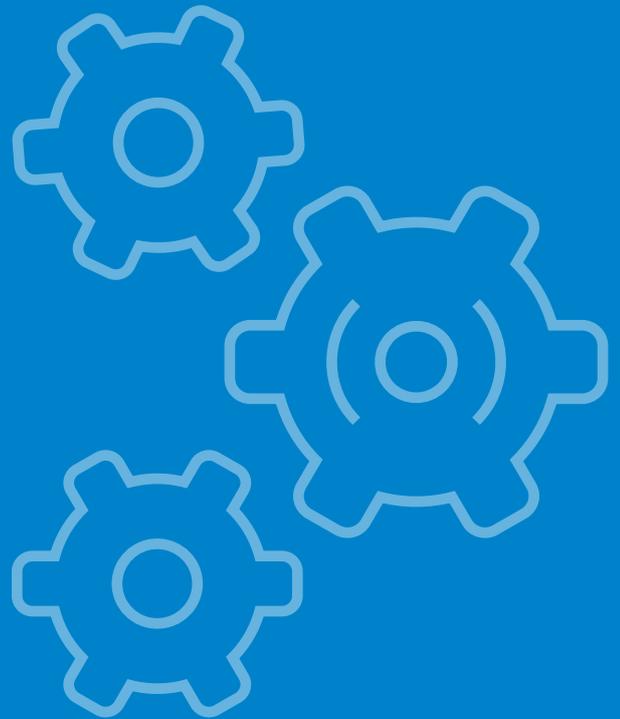
INSTRUCTION

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# C10 MODULE MEMBRANE

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Maintenance Instructions





# C10 MODULE MAINTENANCE

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## C10 MODULE MAINTENANCE

### 1. Tools required

The following tools are required for remembraning. Do not use other tools that may damage the plastic modules.

PCI MS stock No.	Description
9PLI001	Slim nosed pliers
22030092	U-Bend tool (slide hammer or pliers)
22030091	Tube seal prodder
9MAL001	Rubber mallet

### 2. General remembraning procedure

The general procedure for remembraning is:

1. Isolate the plant, or a section of the plant from supply.
2. Remove the inlet/outlet manifolding to gain access to the modules.
3. Remove module end caps, U-bends and tube seals.
4. Remove the old membranes and dispose of in accordance with local regulations.
5. Insert new membranes into one module at a time. Note that each C10 module will require 4 sets of membranes.
6. Once all modules have been changed, refit the manifolds.
7. Clean and rinse the membranes to remove preservative.
8. Check for correct function.

### 3. Detailed instruction for dismantling and removal of membranes

**Before remembraning, the plant should have been cleaned and rinsed.**

Isolate the fluid and electrical supplies to the plant.

#### Caution:

The permeate side pressure must never be greater than the membrane tube side pressure, otherwise the membrane tubes will collapse (implode). This situation can occur if the module end caps and inserts are removed without:

- First draining the permeate side (shroud side)
- Opening the tube side air release valves (if fitted)

To prevent the membranes from drying out, work on one module at a time.

When the shrouds have drained, loosen the module to manifold socket unions at the front end of the module. Allow any water to drain out.

When drained, removed the inlet/outlet sub-manifolds from the module and from other modules as necessary to gain access to the module being worked on.

Remove the end caps from both ends of the module. The inlet/outlet cap is removed complete with the inlet/outlet connectors. Some resistance will be felt until the connectors come free.

Use the C10 U-bend removal tool to remove the U-bends from one end of the module. Start at the opposite end to which the membranes will be withdrawn.

Use long nosed pliers to remove the tube seals. Use a twisting action until the seal starts to pucker, then pull out the seal.

**Note: Take care not to damage the recessed sealing areas of the module. Tube seals and U-bends must be discarded after removal.**

Remove the U-bends and tube seals from the second end. It is likely some tube seals and membranes will be withdrawn with the U-bend. Any remaining membranes should be removed using long nosed pliers. Folding the membrane with a small screwdriver will help to gain a grip with the pliers.

Throw away the membranes after removal.

In most cases the membranes can be removed fairly easily, however if a membrane breaks in the tube try to remove the remainder from the other end.

The module assembly must be replaced if damage occurs, for example:

- Scoring or scratching of the tube plate counterbores.
- Splitting of the support tubes.

When all the membranes have been removed, wash the membrane support tubes with a hose to clean and wet them.

Proceed to re-membrane the modules.

#### 4. Remembraning and re-assembly

Insertion of the new membranes can be carried out from either end of the module - work from the end which offers the best access.

The module tube assembly must be completely clean before remembraning. The support tubes must be wet.

##### Caution:

Great care is needed during the following operation as the performance of the module depends on the correct installation of the membrane tubes. It is advisable that two people work together when inserting the new membranes.

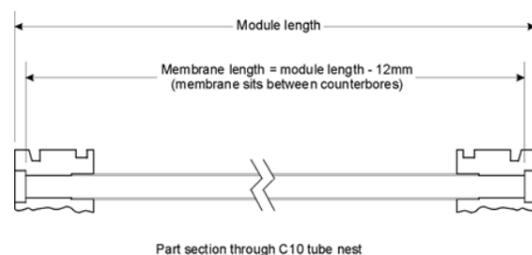
The membranes contain a preservative. see safety data sheet supplied with the membranes.

Each set of membranes carries an identification number. This is marked on one of the packing tube end caps. Record this reference number together with the module number and the module position in the plant. This information will be required in the event of a warranty claim.

Remove both end caps from the plastic packing tube and carefully open the polythene bag.

Use a support such as a pair of step ladders to ensure the plastic tube is in line and level with the module, carefully withdraw a new membrane and gently feed it into one of the support tubes in the module.

The membrane tubes may need trimming to length to fit the module. The correct membrane length is equal to the module length minus 12mm (i.e. the distance between the bases of the counterbores) – see illustration below. Once the amount to be cut from the membranes has been established, the remaining membranes can be marked and cut before insertion.

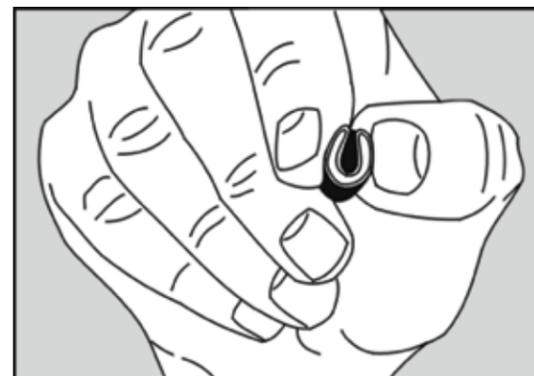


**Note: Use good quality sharp scissors and make a square cut. If a membrane tube is kinked during insertion, it must be discarded.**

If a membrane tube is particularly difficult to insert, withdraw it and ensure that the support tube is wet. Re-wet if necessary. If the membrane is still difficult to insert, try it in other tubes. If the membrane still cannot be inserted, replace it in a packing tube and advise PCI Membranes.

Using new tube seals only, insert a tube seal into the feed end of the membrane by folding it between thumb and index finger (see illustration below). Insert it into the tube so that only the O-ring flange part of the seal is showing. Release the seal, and then use the seal insertion prod to seat it properly in the membrane. Push the membrane and seal fully home until the flange of the seal is within the tube plate counterbore.

**Note: Fit the tube seals to the feed end of the module – this will make fitting of the inlet/outlet end cap easier.**



Folding the tube seal for insertion into the membrane.

It is easier to insert the tube seals if they are warm (30°C) and if there is a witness of silicone grease on them.

Insert the remaining membrane tubes into the module and fit the tube seals into the feed end only. There are 72 membrane tubes in each C10 module, each set of replacement tubes contains 18, and therefore 4 sets are required for each module.

**Note: Use a suitable lamp to examine each tube seal individually.**

Once all the U-bends are fitted at the feed end, the U-bends are pushed into position. A small witness of silicone grease on the U-bend pins will make insertion easier (too much grease will cause the U-bends to slide out again).

The position of each U-bend is marked by the printing on the face of the tube plate. Once the U-bend is inside the tube seals it can be gently tapped home with a rubber mallet.

**Note: It is extremely important that the U-bends are inserted in the correct positions. Do not use excessive force to tap in the U-bends – this may cause them to leak. It can also knock the tube nest through the shroud.**

When all the U-bends have been inserted, the inlet/outlet end cap can be fitted to the module.

The connectors must be screwed into the cap before the cap is fitted. Rotating the inlet/out connectors when fitted to a module can damage the membranes. Use silicone grease on the inlet/outlet pins to aid assembly. Fit and tighten the band clamp to complete the first end.

At the other end of the module, fit the tube seals into the membranes and seat as before.

The O-ring flange part of the tube seals should then be inside the tube plate counterbores. Use a lamp to inspect each seal for correct seating.

Fit all remaining U-bends.

Fit and tighten the band clamp.

Repeat the above procedure for the remaining modules being serviced and re-fit any O-rings, seals and couplings to all modules. This completes the membraning procedure.

##### Caution:

Membranes must not be allowed to dry out. Plan the work to complete each module without interruption.

If it cannot be completed, reseal the plastic bag containing the remaining membranes and keep the module moist.

New membranes must be cleaned and rinsed before returning to process. Consult the plant operating manual for cleaning and rinse details.

### 5. Shroud O-ring replacement

#### O-ring removal

The module tube assembly must be completely clean before remembraning. The support tubes must be wet.

**Note: A shroud puller is required for this operation – contact PCI Membranes for details of this tool.**

Drain the shrouds and disconnect all manifold connections.

Make a note of (or mark) the shroud / tube nest alignment so the tube nest can be fitted in the same orientation on re-assembly.

Remove one end cap retaining clamp and attach the shroud puller to this end of the module.

The shroud puller works similarly to a bearing puller. When using the shroud puller, an end cap fitted (without a clamp) will protect the U-bends.

Turning the handle of the puller will push the tube bundle through the shroud. Do this until the O-ring seal at the opposite end of the module is exposed. Detach the shroud puller.

**Note: Take care the blank end cap does not fall during operations when the retaining clamp is removed.**

Remove the exposed O-ring seal.

Remove the second retaining clamp and fit the shroud puller to this end of the module.

Turn the handle of the puller until the second O-ring seal is exposed – remove the shroud puller.

Remove the shroud exposed O-ring.

With the O-rings removed the shroud sealing surfaces can be inspected.

#### O-ring fitting

**Note: It is recommended that new O-ring seals fitted to the module. It is advised that two people work as a team for this operation.**

Lubricate the O-ring seals and shroud sealing surfaces with food grade silicone grease.

**Note: Align the tube plate and shroud before refitting the shroud as rotating the shroud with the O-rings fitted is difficult.**

Fit the O-ring seal to one of the tube plates and, with the shroud puller, push the tube nest into the shroud until the O-ring groove at the other end is exposed. Ensure the O-ring does not roll or get pinched as it slides into the shroud.

Fit the second O-ring and use the puller to push the tube nest into shroud. Again, check that no rolling and pinching occurs. Position the shroud centrally on the tube nest and check for correct orientation.

Reconnect the sub-manifolds to the module, refill the plant and check for leaks.

