



Smart Membrane Solutions
Putting Process Managers at Ease

Membrane Removal Toolkit Sanitary Manual



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INSTRUCTION MANUAL

MTK v2

This product manual is delivered to the end user with the Smart Membrane Solutions membrane removal tools. Information in this manual is subject to change without notice. When the manual is changed, the revised copy is published at www.smartmembranesolutions.co.nz.

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1. Introduction

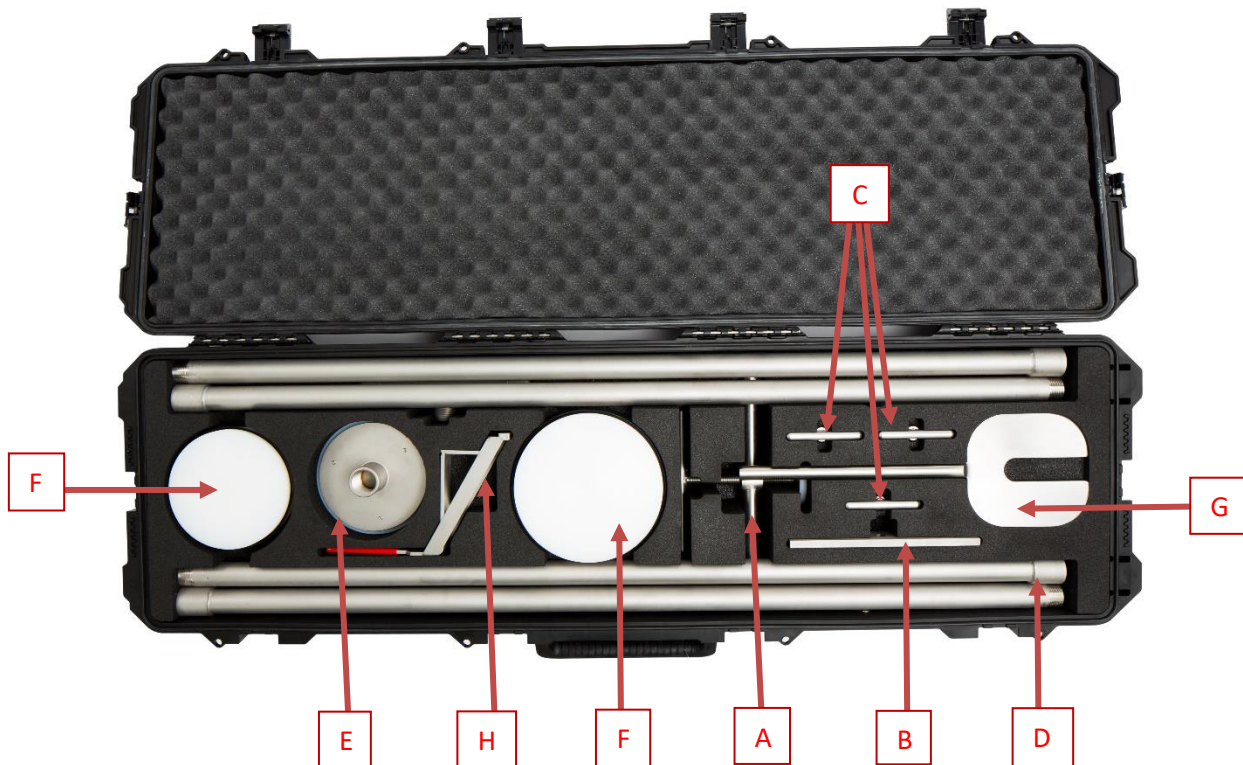
The Smart Membrane Solutions Membrane toolkit includes several tools that ensures the safe removal of membranes and anti-telescopic devices from your plant.

1.1 Toolkit Description

The Sanitary/Spiral Wound Housing Membrane Removal toolkit is designed for use within the dairy, food and beverage industries and meets the Food Contact Materials Regulation (EC) 1935/2004 and the NZFSA Operational Guideline: Design and Construction of Dairy Premises and Equipment.

Figure 1.1 below shows a picture of a membrane removal toolkit. The end cap compression tool (A) is used to compress 8"RO/NF end caps that have retainer plates or shim spring design. The jacking plate (B) in combination with the extractor screws (C) removes the end caps. The push-rod tool set (D) enables you to remove and pushout up to 5 elements. These have a single handle and end cap (E) complete with UHMWPE plastic on the outside to prevent the scratching of the pressure vessels. These screw on to one end of a push rod. Pigs (F) are UMPHE blocks with hydraulic lip seals to push out tight membranes using high pressure/low flow water. Also included is an ATD spatula removal tool (G) and blank end plug removal tool (H). The end cap compression tool (A) also allows the user to safely compress end caps back inside the housing at the time of reinstating the vessel end caps.

Figure 1.1



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1.2 General Safety Considerations

The following general safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific WARNINGS given elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment.

Smart Membrane Solutions assumes no liability for the customers' failure to comply with these requirements. If this equipment is used in a manner not specified in this manual, the protection provided by this instrument may be impaired.

Smart Membrane Solutions will not be liable for malfunctions or damage resulting from any modification made to this equipment by the customer.

The following safety symbol marks are used in this user's manual and instrument:

	This indicates a WARNING. It provides safety precaution information needed to avoid injury.
	This indicates a CAUTION. It provides safety precaution information needed to avoid damage to or the destruction of all or part of the equipment.
	This indicates that something is IMPORTANT for the operation of the equipment to avoid damage or failure.
	This indicates a NOTE which contains additional information and hints.

1.3 Warranty

All Smart Membrane Solutions products are guaranteed to be free of material or workmanship defects. Smart Membrane Solutions provides a limited warranty that covers the repair or replacement, without charge, of any defected product or part that occurs within two (2) years from the date of delivery. The repair can only be done by an authorised Smart Membrane Solutions repair facility.

Warranty does not cover normal wear and tear of the product over time, or any products that are handled, installed or used against the manufacturer's guidance.

1.4 Disposal

This is a long-life product that is not intended to be disposed.



2. Operation – Sanitary Toolkit

2.1 General



Important! The tools are only to be used after the plant has been shut down for maintenance.



Warning! Operators must keep body parts clear of the action of the tools and should not pull directly towards themselves with pulling tools.



Warning! Ensure there is a safe platform to stand on when operating the tools.



Warning! Be aware of the weight of the feed cap when using the jacking tool. Prevent this from falling when removing it from the housing.

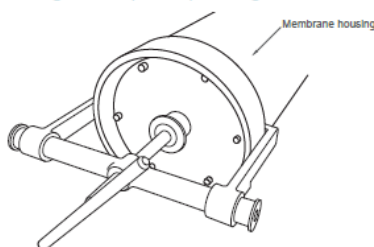


Important! Ensure that the toolkit is stored at ground level to prevent the need to lift. Transport the toolkit by using the handle to wheel it to the plant requiring it.

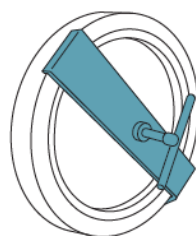
2.2 Extracting an End Cap Out of a Housing

- Use the compression tool to compress the vessel end plate back into the vessel so that any shim springs or retaining plates can be removed.
- Put the plastic cap end of the threaded rod inside the housing end cap and centre it the best that you can. For the permeate end cap, this will be best placed over the permeate outlet tri-clover ferrule fitting.
- Use the adjustable arms to slip over the sides of the housing evenly and begin to slowly wind the handle in, to create inward tension of the end cap into the vessel seal.
- Remove any screws that secure the retaining plates or shim springs before then removing the retaining devices.
- Unwind and remove the compression tool.
- Use the jacking plate and the appropriate fitting extraction screw, thread together to screw into one of the holes on the end cap.
- Do the nut up against the jacking plate.
- Use a ¾ inch spanner (19mm) to turn the nut in a clockwise direction.
- The end cap should begin to ease and pull out.

Housing End Cap Compressing Tool



Housing End Cap Removal Tools

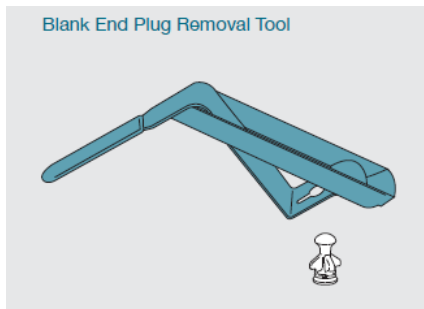


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2.3 Using the Blank End Plug Removal Tool

- Place the keyway over and onto the blank end plug.
- Pop the keyway downwards and gently lever the blank end plug out.



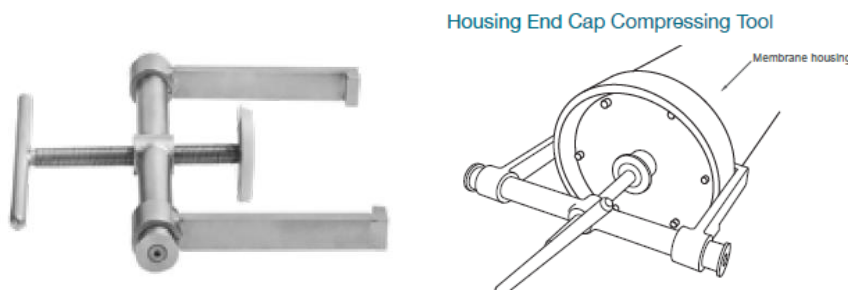
2.4 Using the ATD Spatula Removal Tool

- Position the edge of the removal tool between the stainless steel or Polysulfone ATD and the end of the spiral membrane.
- With some downward force, gently manoeuvre the spatula down between the ATD and membrane until the spatula slot is sitting between the centre core of the ATD.
- Gently prise the ATD from the permeate tube by pulling or pushing the spatula handle away from the up and down position. The ATD should pop out of the permeate tube.
- Take care to ensure the spatula handle doesn't suddenly move towards the user and make contact with the body as the ATD suddenly let's go.



2.5 Using the Compression Tool to Refit the Vessel End Caps

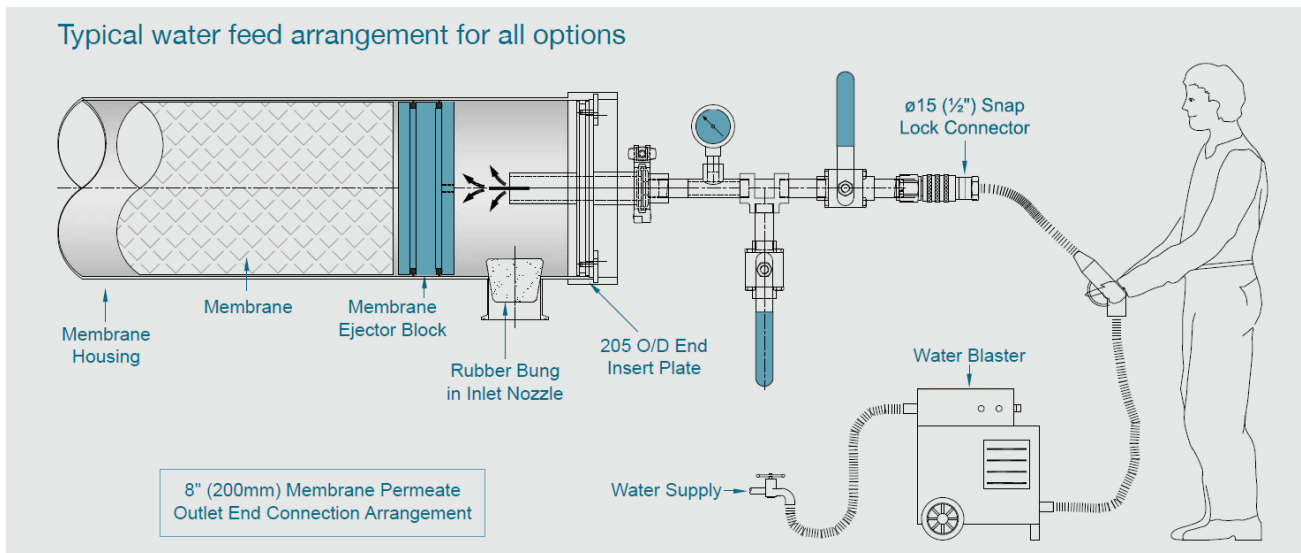
- Once any seals or O-rings have been replaced, place the end cap onto the vessel end and position as best as you can.
- Use the adjustable arms to slip over the sides of the housing evenly and begin to slowly wind the handle in, to create inward tension of the end cap into the vessel seal.
- Refit the retaining plates or shim spring, before removing the compression tool.





2.6 Pigging Out Stuck Membranes

- We recommend membranes are hydraulically pushed from the permeate outlet end of the vessel, with membranes being removed from the feed end of the vessel.
- Ensure that the end membrane has gone past the outlet port to the width of the hydraulic pig.
- Place the pig inside the housing, make sure it pushes past the outlet port. Ensure the hydraulic seal edges are facing towards you.
- Place the bung in the outlet port hole at the bottom (or top) of the housing to stop extraction liquid by-passing.
- Reinstate the permeate spigot end cap. Secure the cap with tri-clamp if on 6.3" UF vessels or with compression tool and retaining plates/shim springs if using on 8" RO/NF vessels.
- Attach the, independently supplied, water blaster connection to the permeate outlet tri-clover ferrule fitting, with appropriate safety devices (isolation, drain valves, pressure indication etc).
- We recommend you use a small domestic, 7 - 10 litres per minute, water blaster that will provide a gentle hydraulic push of the membranes in series.
- Please refer to our website, listed below, for the MTK brochure and for further details.



3. Toolkit Specification

Component	Part Code	Quantity	Material of Construction	Length or other Dimensions
RO/NF End Cap Compression Tool	MTK-COMPRESS	1	304L Stainless Steel	Designed to remove 8.0" RO or NF vessel end caps that are retained by retaining plates and shim springs
RO/NF Housing End Cap Jacking Plate Tool	MTK-CAP-BAR	1	304L Stainless Steel	250 mm long
Jacking Plate Tool Extractor Screws	MTK-CAP-SC5/16 MTK-CAP-SCM10 MTK-CAP-SCM6	3	304L Stainless Steel	One each, M10 thread, ¼" UNC thread, M6 thread to suit different vessel end cap threads
Membrane Removal Pushrods	MTK-PUSHRODMOD	4	304L Stainless Steel	1.2 meters each (for removal of up to 5 elements per vessel)
Membrane Removal Pushrod Handle	MTK-PUSHRODTBAR	1	304L Stainless Steel	
Membrane removal Pushrod End Cap	MTK-PUSHRODEND	1	304L Stainless Steel and UHMW Polyethylene	Suitable for both 6.3" and 8.0" vessels
ATD Spatula Tool	MTK-SPATULA	1	304L Stainless Steel	Total length 460mm, width 150mm
Blank End Plug Removal Tool	MTK-BEPREMOVAL	1	304L Stainless Steel	Suitable for SMS designed blank end plug removal from all elements.
6.3" Hydraulic Ejector Block (Pig)	MTK-MBOR-6.0 MTK-UR-8.0	1	UHMW Polyethylene and EPDM Seal Combination	To fit 6.3", 6.4" membrane vessels
8.0" Hydraulic Ejector Block (Pig)	MTK-MBOR-8.0 MTK-UR-8.0	1	UHMW Polyethylene and EPDM Seal Combination	To fit 8.0" membrane vessels
Hydraulic Ejector Port Bung	MTK-RB-50	1	Natural Rubber	Conical shape to fit various size feed or retentate outlet ports

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4. Maintenance and Trouble Shooting

4.1 Installation

- Ensure a good membrane mapping system is used during installation. We recommend the SMS barcode system.
- Carefully handle the membranes during install, trimming any mesh tails only just enough to enable snug fitting into vessels, don't drop elements or damage may result.
- Correct and careful component installation ie., seals, ATD's and end plugs (see our videos on how best to do this).
- Use little amounts of lubricant for seals, water is preferred to glycerin.
- Take care with height work, ensure membranes and personnel are well supported.
- Check vessels for and remove any foreign matter, if necessary, clean out the vessels with lint free cloth.

4.2 Membrane Killers

- Aggressive plant starts after installation, ensure plant is started slowly, gently filled with water and ensure all air is removed before full ramp up/operation.
- Aggressive caustic cleaning.
- Exposure to too much oxidizer, improper peroxide use, poor chlorine control in UF CIP.
- High Pressure drop.
- Permeate backpressure.
- High fluid velocity (linked to excessive different pressure).
- Ineffective cleaning, including low flows.
- Cheese or casein fines.
- Fat.
- Incorrect feed pH.
- High temperatures.
- Poor automation sequencing (loop timing).

For further servicing information please refer to: www.smartmembranesolutions.co.nz

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