

# Element Start-Up Guide

## Heat-Sanitizable Elements

The following guidelines are intended to provide information on initializing operation with TRISEP® heat-sanitizable reverse osmosis (RO), nanofiltration (NF), ultrafiltration (UF) and microfiltration (MF) elements. For questions regarding deviations from these guidelines, please contact MANN+HUMMEL Water & Fluid Solutions Technical Service.

### SAFETY EQUIPMENT

Having proper equipment is essential for safely executing the following start-up procedure. Appropriate gloves, shoes and safety glasses should be worn at all times. Additional equipment may be necessary depending on specific system design.

### HEAT-SETTING PROCEDURE

After the elements have been removed from their packaging and have been installed into their pressure vessels (please refer to **Element Loading Guide – Loading of Pressure Vessels** (TSG-O-006) for loading instructions), the following heat-setting procedure must be performed prior to initial use of elements. The procedure below will remove residual storage solution and will prepare membranes for start-up. This same procedure may also be used for subsequent heat-sanitizations.

Heat-sanitizable RO and NF elements will have high water permeability before being exposed to the initial heat-setting procedure. After the initial heat-setting, the elements will experience a one-time flux loss and attain the specified flow and salt rejection performance characteristics listed on the product data sheet. The performance will remain stable despite subsequent additional heat-sanitization cycles.

**TABLE 1. HEAT-SETTING PROCEDURE FOR TRISEP HEAT-SANITIZABLE RO, NF, UF, AND MF ELEMENTS FOR HIGH PURITY APPLICATIONS.**

Step	Procedure
1	Flush system with high quality water to drain for 30 min at low pressure and low permeate flow rate (see Tables 2 & 3).
2	Recirculate near-neutral (pH 6 – 8) water through the system at a pressure not exceeding 1.7 bar (25 psi). Maximum pressure drop through a single element is 0.5 bar (7.3 psi).
3	Ramp temperature up at a rate no faster than 5°C/min until a temperature between 80 – 90°C (176 – 194°F) for one hour.
4	Maintain temperature between 80 – 90°C (176 – 194°F) for one hour.
5	Ramp temperature down at a rate no faster than 5°C/min until a temperature below 45°C (113°F) is achieved.
6	Flush system with high quality water to drain at very low pressure (Table 2).

*Note:* DO NOT recycle permeate during the heat-setting procedure.

*Note:* DO NOT start-up a second pass RO before the first pass RO has been heat-set.

**RECOMMENDED WATER QUALITY AND FLOW RATES**

The system flush during heat-set should be performed with high-quality water (see Table 2).

**TABLE 2. FLUSH WATER QUALITY RECOMMENDATIONS.**

Solute	Recommended Limit
Iron (Fe)	< 0.05 mg/L
Manganese (Mn)	< 0.02 mg/L
Aluminum (Al)	< 0.05 mg/L
Silica (SiO <sub>2</sub> )	< 5.0 mg/L
Total Hardness as CaCO <sub>3</sub>	< 50 mg/L as CaCO <sub>3</sub>
Total Alkalinity as CaCO <sub>3</sub>	< 50 mg/L as CaCO <sub>3</sub>
Chlorine	0 mg/L *
Turbidity	< 0.5 NTU
Silt	< 1 SDI

\* Chlorine must be undetectable for RO & NF membranes and may be ≥ 2 mg/L for UF & MF membranes.

The recommended flow rates for flushing vary based on the diameter of the elements (see Table 3).

**TABLE 3. RECOMMENDED FLOW RATES FOR FLUSHING.**

Membrane Diameter	Flow Rate per Vessel	Recommended Pressure
4.0"	2.7 - 3.2 m <sup>3</sup> /hr (12 - 14 GPM)	1.5 - 4.0 bar (20 - 60 psi)
8.0"	7.0 - 9.1 m <sup>3</sup> /hr (30 - 40 GPM)	1.5 - 4.0 bar (20 - 60 psi)

## Contact

**Europe**

Germany: +49 611 962 6001  
 Italy: +39 0721 1796201  
 info@microdyn-nadir.com

**Americas**

USA: +1 805 964 8003  
 sales.mnus@microdyn-nadir.com

**Asia**

Singapore: +65 6457 7533  
 China: +86 10 8413 9860  
 waterchina@mann-hummel.com