CAUTION

In the event that the cassette is subjected to any of the conditions listed below, it is recommended that you perform both cassette integrity and water flux tests to ensure your cassette is not damaged. Damage may occur as a result of the following:

- Dropping on hard surfaces, or other mechanical shock.
- Poking with sharp objects on screened surfaces.
- Excessive feed pressure.
- Excessive permeate backpressure, or pressurizing the filtrate port.
- Exposure to harsh chemicals.
- Freezing.
- Excessive heat.
- Drying out - ultrafiltration membrane that is allowed to dry out can permanently damage the pore structure.

MEMBRANE CASSETTES MUST REMAIN WET AT ALL TIMES TO MAINTAIN PRODUCT INTEGRITY AND PERFORMANCE.

For technical support or order assistance please call your local sales representative.

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TABLE 3: RECOMMENDED CROSSFLOW RATES

<table>
<thead>
<tr>
<th>Crossflow</th>
<th>ΔP</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;LP&quot; Screen</td>
<td>4-8 L/min/m²</td>
</tr>
<tr>
<td>&quot;J&quot; Channel</td>
<td>10-15 L/min/m²</td>
</tr>
<tr>
<td>&quot;K&quot; Channel</td>
<td>20-30 L/min/m²</td>
</tr>
</tbody>
</table>

* Typical ΔP measured with water and permeate closed

TABLE 4: MAXIMUM RECOMMENDED OPERATING PRESSURES

<table>
<thead>
<tr>
<th>Maximum Operating Pressures at 30°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward</td>
</tr>
<tr>
<td>100 psi (7 bar)</td>
</tr>
<tr>
<td>Reverse</td>
</tr>
<tr>
<td>7 psi (0.48 bar)</td>
</tr>
</tbody>
</table>

TABLE 5: AIR INTEGRITY TEST SPECIFICATION

<table>
<thead>
<tr>
<th>Air Diffusion Rates</th>
<th>1kD thru 5kD</th>
<th>10kD thru 300kD</th>
<th>Microfiltration</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 323 sccm/m² @ 15 psi (1 bar)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 323 sccm/m² @ 7.3 psi (0.5 bar)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 323 sccm/m² @ 3 psi (0.2 bar)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MAXIMUM OPERATING TEMPERATURE

50°C

CHEMICAL COMPATIBILITY

TangenX membrane cassettes are compatible with the following:
- DMF, DMSO (<40%)
- DMAC (<15%)
- Phosphoric acid (<1M)
- Sodium Hypochlorite (<400ppm)
- Sodium Hydroxide (<0.5M)

TangenX membrane cassettes are NOT compatible with the following:
- Pure aromatic and chlorinated hydrocarbons
- Ketones
- Polar aromatics
- Aliphatic esters

A more comprehensive list is available in the cassette validation guide.

TANGENX STANDARD WARRANTY

Tangen Technology Corporation ("TangenX") warrants its products will meet their applicable published specifications when used in accordance with their applicable instructions for a period of one year from shipment of the products. **TANGENX MAKES NO OTHER WARRANTY, EXRESSED OR IMPLIED. THERE IS NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** The warranty provided herein and the data, specifications and descriptions of TangenX products appearing in TangenX's published catalogues and product literature may not be altered except by express written agreement signed by an officer of TangenX. Representations, oral or written, which are inconsistent with this warranty or such publications are not authorized and if given, should not be relied upon.

In the event of a breach of the foregoing warranty, TangenX’s sole obligation shall be to repair or replace, at its option, the applicable product or part thereof, provided the customer notifies TangenX promptly of any such breach. If after exercising reasonable efforts, TangenX is unable to repair or replace the product or part, then TangenX shall refund the customer all monies paid for such applicable product or part. TangenX shall not be liable for consequential, incidental, special or any other damages resulting from economic loss or property damage sustained.

IF.PUG.005 Rev R6
Product includes the following:

(1) Sius™-LS 0.01 m² (0.11 ft²), 0.02 m² (0.22 ft²), 0.1 m² (1.1 ft²) single-use filtration cassette

(2) EPDM Gaskets

### IMPORTANT INFORMATION BEFORE YOU BEGIN

**Cassettes**
- Product is packaged wet and must remain hydrated for optimal performance.
- Keep bag sealed until cassette installation (step 3 below).
- Sius™-LS cassettes are compatible with the NovaSet™-LS cassette holder. A list of other cassette holders is shown in the cassette holder compatibility guide.
- Cassettes may be stacked to increase filtration surface area; however, use only one type of membrane molecular weight cutoff at one time. Do not install a mixture of cassettes with different pore sizes in the hardware.
- Cassettes must be equilibrated with an appropriate buffer (i.e., phosphate buffered saline) to ensure the neutralization of the 0.2M sodium hydroxide storage agent in the membrane filter. It is important to use pre-filtered buffer to avoid fouling the membrane or introducing contaminants into the system that could affect membrane performance and product recovery.

**Gaskets**
- Gaskets are intended to be single use; TangenX recommends that you replace cassettes with each cassette changeover. TangenX supplies two gaskets per cassette. Installation of the first cassette requires two gaskets; stacking additional cassettes requires only one gasket. Extra gaskets should be saved to replace worn or damaged gaskets.

**Pump**
- When using TangenX cassettes, select a pump with adequate capacity. Crossflow rate ranges (see Table 3) are feed channel type and process fluid dependent.

### Sius™-LS CASSETTE INSTALLATION

1. Lift the end plate off the manifold of the NovaSet™-LS cassette holder.
2. Rinse the EPDM gaskets with deionized water or WFI. Place a rinsed gasket flat against the bottom manifold; ensure that the holes in the gasket line up with the holes in the manifold.
3. Using scissors, carefully open the cassette bag to remove cassette.
4. Place the cassette into the holder flat against the bottom manifold; ensure that the holes in the gasket line up with the holes in the manifold.
5. Using a thin plastic spatula or similar tool, remove the thin plastic cassette end plate.
6. Install the tie-rod spacers (if used) and washers on each bolt leaving a minimum of 18 mm (0.75 inch) of thread exposed on the rod. By hand, screw the nut on each bolt and hand tighten evenly by alternating from one nut to the other. Bolts must be further tightened to within the recommended torque values shown in Table 1 using a calibrated manual torque wrench.

<table>
<thead>
<tr>
<th>TABLE 1: RECOMMENDED TORQUE VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holder Type</td>
</tr>
<tr>
<td>NovaSet™-LS</td>
</tr>
</tbody>
</table>

7. When using the calibrated torque wrench with an 11/16” deep style socket, tighten each hex nut ½ turn following the torque sequence illustrated in Figure 1. Tighten the first nut ¼ turn, and then tighten the second nut ½ turn alternating back and forth until the torque wrench "clicks". Repeat this sequence until the wrench "clicks" without turning the nut. The "click" of the torque wrench indicates that the nut has reached the set point torque value.

**EQUILIBRATION OF Sius™-LS CASSETTES**

Cassettes must be equilibrated with an appropriate buffer (i.e., phosphate buffered saline) to ensure the neutralization of the 0.2M sodium hydroxide storage agent in the membrane filter. Verifying the pH of the effluent from the cassette is neutralized to minimize any possible interaction with your particular application. For most applications, further sanitization is not required.

**CLEANING OF THE CASSETTE SYSTEM**

Sius™-LS Cassettes are intended for single use only, post-cleaning and re-use is not recommended. To clean the TFF system following use, recirculate 0.5M sodium hydroxide through the system with all valves open. Cassettes are left in place during the system cleaning procedure to provide a flow path for the cleaning solution. Alternatively, the cassettes may be removed and a spacer gasket (1) is put in place of the used cassettes. Upon completion of the cleaning cycle, flush the system with WFI, or DI water prior draining and discarding the cassettes. Table 2 lists possible recommended cleaning solutions.

**DISPOSAL OF USED Sius™-LS CASSETTES**

Sius™-LS cassettes are removed from the by reversing the cassette installation procedure. If the cassettes are difficult to separate from the stainless steel holder, a thin plastic spatula (2) can be slid under the edge of the cassette and break the seal. Used cassettes can then be disposed of in a similar fashion to other disposable process equipment.

**STORAGE OF UNUSED Sius™-LS CASSETTES**

Membrane cassettes must remain sealed in their original packaging prior to use to maintain their characteristics, integrity, and prevent microbial growth. Below are critical points to remember when storing unused Sius™-LS cassettes:

- Recommended storage temperature:
  - 4°C - 25°C long term (>7 Days)
  - 50°C short term (<7 Days)
  - Do not freeze cassettes

**MEMBRANE OPERATING CHARACTERISTICS**

Take care to use the membrane at the lowest pressure possible while still producing consistent permeate flow. Although higher operating pressures initially improve flow rate, they also promote increased concentration polarization and membrane compaction, which ultimately limit flow. With very low MW cutoff membranes, lower operating pressure may also reduce the retention of salts and very low molecular weight species.

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**TABLE 2: RECOMMENDED CLEANING SOLUTIONS**

<table>
<thead>
<tr>
<th>Cleaning Agent</th>
<th>Cleaning Conditions</th>
<th>Contact Time</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5N Sodium Hydroxide</td>
<td></td>
<td>30 - 60 minutes</td>
<td>35°C (95°F)</td>
</tr>
<tr>
<td>1.5% Alconox® B Detergent</td>
<td></td>
<td>30 - 60 minutes</td>
<td>40°C (104°F)</td>
</tr>
</tbody>
</table>