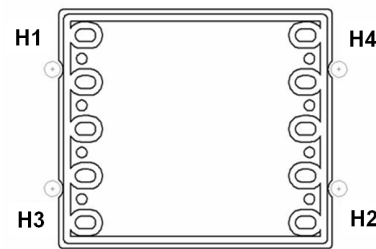


## TANGENX™ PRO CASSETTE INSTALLATION

1. Lift the end plate off the manifold of the TangenX™ PRO cassette holder.
2. Remove the protective blue sheet and rinse the Silicone 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.

**WARNING: Each cassette is stored in an aqueous solution containing 15-20% glycerin and 0.1% sodium azide, pH 7 - 10. Follow standard safety procedures for handling aqueous glycerin/sodium azide, including the use of gloves, safety goggles, and lab coat.**

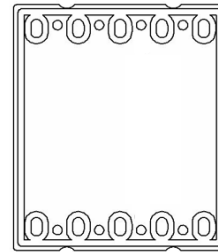
4. Place the cassette into the holder flat against the gasket. Place another gasket on top of the cassette. Ensure that the holes in the manifold, gaskets, and cassette are completely aligned. If you are using multiple cassettes, continue the same gasket/cassette/gasket pattern, ending with a gasket between the last cassette and the end plate.
5. Place the end plate on top of the last gasket of the cassette or cassette stack.
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 using a calibrated manual torque wrench.
7. Proceed to step 8 for a four bolt hardware design or skip to step 9 for a two bolt hardware design.
8. Using the calibrated torque wrench with a deep style socket, tighten each hex nut ¼ turn following the torque sequence illustrated in Figure 2 for a four bolt horizontal hardware. In ¼ turn increments, tighten the first (H1), second (H2), third (H3), and fourth (H4) nut 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.



**FIGURE 2  
TORQUE SEQUENCE FOR TANGENX™ PRO CASSETTES  
(4 Bolt Design)**

9. Using the calibrated torque wrench with a deep style socket, tighten each hex nut ¼ turn following the torque sequence illustrated in Figure 3 for a two-bolt vertical hardware. Tighten the first nut ¼ turn, and then tighten the second nut ¼ 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.

V1



V2

**FIGURE 3  
TORQUE SEQUENCE FOR  
TANGENX™ PRO CASSETTES  
(2 Bolt Design)**

**CAUTION: Nuts must be tightened uniformly to avoid damaging the cassette. Leakage may result from non-parallel plate alignment or over compression of the cassettes at one end.**

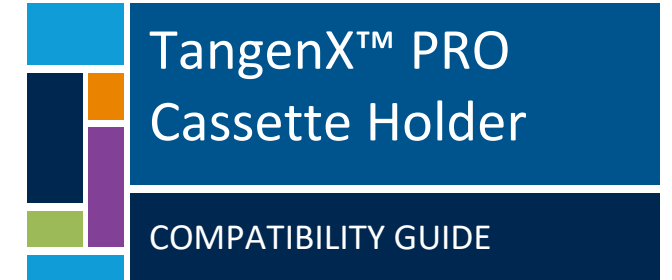
10. Wait 5-10 minutes and allow the gaskets to relax before re-torquing. Check each nut, per the Figure 2 or 3 sequences, using the torque wrench at its set point torque value.
11. Re-torque as needed, to create a liquid-tight seal.

**NOTE: Torque may change during processing as the cassettes may compress, or as the cassettes expand or contract with temperature changes. Periodically check the torque of the bolts and adjust torque as needed.**

### REPLIGEN TANGENX™ STANDARD WARRANTY

Repligen Corporation warrants its TangenX™ 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. **REPLIGEN MAKES NO OTHER WARRANTY, EXPRESSED 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 Repligen TangenX™ products appearing in published catalogues and product literature may not be altered except by express written agreement signed by an officer of Repligen. 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, Repligen's sole obligation shall be to repair or replace, at its option, the applicable product or part thereof, provided the customer notifies Repligen promptly of any such breach. If after exercising reasonable efforts, Repligen is unable to repair or replace the product or part, then Repligen shall refund to the customer all monies paid for such applicable product or part. **REPLIGEN SHALL NOT BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL, SPECIAL OR ANY OTHER DAMAGES RESULTING FROM ECONOMIC LOSS OR PROPERTY DAMAGE SUSTAINED.**



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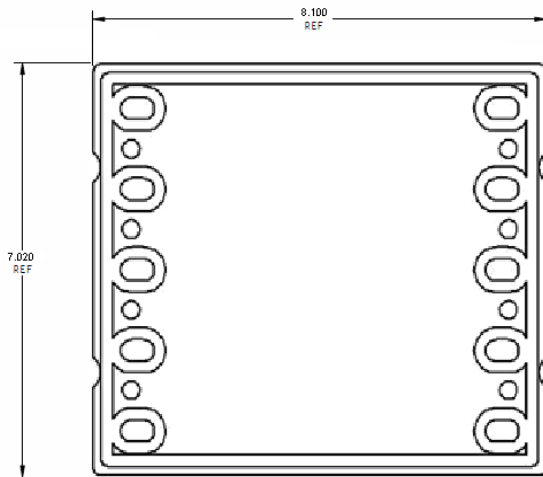
## INTRODUCTION

Tangential flow filtration cassettes are typically installed in a stainless steel cassette holder consisting of two steel plates, one acting as a flow distribution manifold and the other as a mating solid flat surface. Repligen offers a complete series of high performance stainless steel cassette holders and are designed for optimal performance with TangenX™ PRO TFF cassettes. In addition to TangenX™ cassette holders, TangenX™ PRO cassettes have been designed to be compatible with other types from alternative manufacturers. The following guide will outline the compatibility of the TangenX™ PRO cassettes with these other cassette holders and act as a supplement to the standard user guide.

### TANGENX™ PRO TFF CASSETTES

- TangenX™ PRO cassettes are offered with several different membrane surface areas that include 0.5m<sup>2</sup>, 1.5m<sup>2</sup>, and 2.5m<sup>2</sup> sizes. These cassettes have a standard universal format are designed to fit a wide range of cassette holders of various configurations. Figure 1 shows the dimensions for the alignment notches for the TangenX™ PRO cassette.

Figure 1



- The following is a partial list of cassette holders that are compatible with the TangenX™ PRO cassette.

Repligen	TangenX™ PRO Cassette Holder	(TX032)
Pall	Centrasette Cassette Holder	(FS001K05)
Millipore	Pellicon Cassette Holder	(XX42P0080)
Sartorius	Sartocon Cassette Holder	(17546-202)
GE	Kvick Cassette Holder	(KFHR0115TQE)

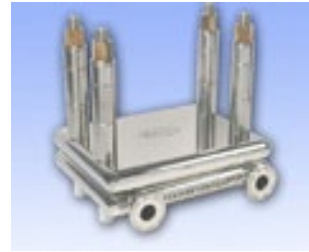
- Once the cassette holder has been identified continue to the next section for the supplemental guide to the standard product use guide.
- Only use the gaskets provided by Repligen supplied with each TangenX™ PRO cassette.

### TANGENX™ PRO CASSETTE | SUPPLEMENTAL INSTALLATION

- Pall Centrasette Cassette Holder**

Reference TangenX™ User Guide IF.PUG.004 for cassette installation instructions, further details are below.

Pall Centrasette cassette holders are offered in several different configurations and are compatible with TangenX™ PRO cassettes with the part number xxxxBxxx. Both a two bolt vertical and a four bolt cassette holder in the horizontal position are available. The vertical two bolt design requires greater torque to seal the cassette in place. The four bolt design reduces the torque that is required to seal the TangenX™ PRO cassette.



The TangenX™ PRO cassette must be placed in the cassette holder with the cassette's identification label facing "up" or away from the lower flow-path manifold and towards the brass retaining nuts. Tighten the bolts in ¼ turn increments, as described on page 4 and page 5, until the recommended torque is achieved. The suggested torque values are shown in Table 1 below.

Table 1 Recommended Torque Values | Pall Centrasette Holder

Holder Part Number	Torque Range (in-lbs)	Torque Range (Nm)
FS001K05 (4-Bolt)	300 – 450	35 – 50
FS004K05 (2-Bolt)	600 – 900	70 – 100

- Millipore Pellicon Cassette Holder**

Reference TangenX™ User Guide IF.PUG.004 for basic cassette installation instructions. The Millipore Pellicon cassette holders are offered in several different configurations and are compatible with TangenX™ PRO cassettes with the part number xxxxBxxx. Several four bolt holders are available.



Millipore Pellicon pilot and process scale holders utilize a series of permeate channels resembling a "star" shape on the lower manifold. This type of holder requires a manifold support plate to be installed when using TangenX™ PRO cassettes. The support plate is available from Millipore and is identified with the part number XXPEL3MAP. The TangenX™ PRO cassette must be placed in the cassette holder with the cassette's identification label facing "up" or away from the lower flow-path manifold and towards the brass retaining nuts. Do not use the white compression washers included with the Pellicon cassette holders. Only use solid stainless steel spacers. Tighten the bolts in ¼ turn increments, as described on page 4 and page 5, until the recommended torque is achieved. The suggested torque values are shown in Table 2 below.

Table 2 Recommended Torque Values | Millipore Pellicon

Holder Part Number	Torque Range (in-lbs)	Torque Range (Nm)
XX42P0080 (4-Bolt)	300 – 450	35 – 50

- Sartorius Sartocon 2 Cassette Holder**

Reference TangenX™ User Guide IF.PUG.004 for basic cassette installation instructions, further details are as follows.

The Sartorius Sartocon 2 cassette holders are offered in many different configurations and are compatible with TangenX™ PRO cassettes with the part number xxxxBxxx. Several two bolt holders in the vertical positions are available. The TangenX™ PRO cassette must be placed in the cassette holder with the identification label facing away from the feed/retentate ports and towards the brass retaining nuts. Tighten the two bolts in ¼ turn increments, as described on page 4 and page 5, until the recommended torque is achieved. The suggested torque values are shown in Table 3 below.



Table 3 Recommended Torque Values | Sartorius Sartocon 2 (2-Bolt)

Holder Part Number	Torque Range (in-lbs)	Torque Range (Nm)
17546-202 (2-Bolt)	600 – 900	70 – 100

- GE Kvick Flow Cassette Holder**

Reference TangenX™ User Guide IF.PUG.004 for basic cassette installation instructions. The manual torque GE Kvick cassette holders are compatible with TangenX™ PRO cassettes with the part number xxxxBxxx. Four bolt holders in the vertical position are available. The TangenX™ PRO cassette must be placed in the cassette holder with the identification label facing away from the feed/retentate ports and towards the brass retaining nuts. Tighten the four bolts in ¼ turn increments, as described on page 4 and page 5, until the recommended torque is achieved. The suggested torque values are shown in Table 4 below.



Table 4 Recommended Torque Values | GE Kvick Holder

Holder Part Number	Torque Range (in-lbs)	Torque Range (Nm)
KFHR0115TQE (4 Bolt)	300 – 450	35 – 50

- TangenX™ PRO Cassette Holder (TX032)**

Follow the instructions outlined in TangenX™ User Guide IF.PUG.004 for cassette installation procedures. A copy is included in the box of every TangenX™ PRO cassette. TangenX™ cassette holders are offered in several different configurations, both horizontal and vertical positions. The cassette holder is compatible with all TangenX™ PRO cassettes with the part number xxxxBxxx.

