CLAIMS

1. A fluid treatment assembly comprising:

one or more fluid treatment units, each fluid treatment unit including a permeable fluid treatment medium having a feed side and a permeate side;

a feed inlet communicating with a fluid flow path extending from the feed inlet to the feed side of the permeable fluid treatment medium;

a permeate outlet communicating with a permeate fluid flow path extending from the permeate side of the permeable fluid treatment medium to the permeate outlet;

a retentate outlet communicating with a fluid flow path extending from the feed side of the permeable fluid treatment medium through the fluid treatment unit to the retentate outlet;

first and second end plates, wherein each fluid treatment unit is positioned between the first and second end plates and wherein the first end plate includes an upper face; and

a plurality of adjustable tensioning rod assemblies extending between the first and second end plates and arranged to press the one or more fluid treatment units and the first and second end plates together, each adjustable tensioning rod assembly comprising a threaded tensioning rod extending between the first and second end plates, the tensioning rod having a first threaded end extending beyond the first end plate, and a tensioning nut and a locking nut threadably attached to the first threaded end of the tensioning rod, the tensioning nut having a tensioning nut upper face, a tensioning nut lower face, and a first external diameter and the locking nut having a locking nut lower face, and a second external diameter, wherein the first external diameter is greater than the second external diameter, and wherein the locking nut lower face is directed toward the tensioning nut upper face, and the tensioning nut lower face is directed toward the upper face of the first end plate; the tensioning nut being rotatable on the threaded tensioning rod without rotating the locking nut.

2. A method for adjusting tension on a fluid treatment assembly, the fluid treatment assembly comprising:

one or more fluid treatment units, each fluid treatment unit including a permeable fluid treatment medium having a feed side and a permeate side;

a feed inlet communicating with a fluid flow path extending from the feed inlet to the feed side of the permeable fluid treatment medium;

a permeate outlet communicating with a permeate fluid flow path extending from the permeate side of the permeable fluid treatment medium to the permeate outlet;

a retentate outlet communicating with a fluid flow path extending from the feed side of the permeable fluid treatment medium through the fluid treatment unit to the retentate outlet;

first and second end plates, wherein each fluid treatment unit is positioned between the first and second end plates and wherein the first end plate includes an upper face; and

a plurality of adjustable tensioning rod assemblies extending between the first and second end plates and arranged to press the one or more fluid treatment units and the first and second end plates together, each adjustable tensioning rod assembly comprising a threaded tensioning rod extending between the first and second end plates, the tensioning rod having a first threaded end extending beyond the first end plate, and a tensioning nut and a locking nut threadably attached to the first threaded end of the tensioning rod, the tensioning nut having a tensioning nut upper face, a tensioning nut lower face, and a first external diameter and the locking nut having a locking nut lower face, and a second external diameter, wherein the first external diameter is greater than the second external diameter, and wherein the locking nut lower face is directed toward the tensioning nut upper face, and the tensioning nut lower face is directed toward the upper face of the first end plate; the tensioning nut being rotatable on the threaded tensioning rod without rotating the locking nut, the fluid treatment assembly having a desired preload applied thereto, and the locking nuts are in contact with the tensioning nuts, locking the tensioning nuts in place;

the method comprising tightening the tensioning nuts to provide a desired operating tension to the fluid treatment assembly, without rotating the locking nuts.

3. A method for adjusting tension and maintaining a preloaded condition on a fluid treatment assembly, the fluid treatment assembly comprising:

one or more fluid treatment units, each fluid treatment unit including a permeable fluid treatment medium having a feed side and a permeate side;

a feed inlet communicating with a fluid flow path extending from the feed inlet to the feed side of the permeable fluid treatment medium;

a permeate outlet communicating with a permeate fluid flow path extending from the permeate side of the permeable fluid treatment medium to the permeate outlet;

a retentate outlet communicating with a fluid flow path extending from the feed side of the permeable fluid treatment medium through the fluid treatment unit to the retentate outlet;

first and second end plates, wherein each fluid treatment unit is positioned between the first and second end plates and wherein the first end plate includes an upper face; and

a plurality of adjustable tensioning rod assemblies extending between the first and second end plates and arranged to press the one or more fluid treatment units and the first and second end plates together, each adjustable tensioning rod assembly comprising a threaded tensioning rod extending between the first and second end plates, the tensioning rod having a first threaded end extending beyond the first end plate, and a tensioning nut and a locking nut threadably attached to the first threaded end of the tensioning rod, the tensioning nut having a tensioning nut upper face, a tensioning nut lower face, and a first external diameter and the locking nut having a locking nut lower face, and a second external diameter, wherein the first external diameter is greater than the second external diameter, and wherein the locking nut lower face is directed toward the tensioning nut upper face, and the tensioning nut lower face is directed toward the upper face of the first end plate; the tensioning nut being rotatable on the threaded tensioning rod without rotating the locking nut;

the method comprising:

a) tightening the tensioning nuts to provide a desired preload to the fluid treatment assembly;

b) tightening the locking nuts to contact the tightened tensioning nuts; and,

c) further tightening the tensioning nuts to provide a desired operating tension to the fluid treatment assembly, without further tightening the locking nuts.

4. The method of claim 2 or 3, further comprising relieving the desired operating tension and approaching, or returning to, the desired preload, including loosening the tightened tensioning nuts.

5. The method of claim 2, further comprising relieving the desired operating tension and returning to the desired preload, including loosening the tightened tensioning nuts until they contact the locking nuts.

6. The assembly of claim 1, wherein the locking nut includes a thread sealer.

7. The assembly of claim 1 or 6, wherein each tensioning rod assembly further comprises a washer interposed between the tensioning nut and an upper face of the first end plate.

8. The assembly of any one of claims 1, 6, or 7, wherein the tensioning nuts are made of a different material than the tensioning rods.

9. The assembly of any one of claims 1, or 6-8, further comprising first and second manifold plates, wherein the first manifold plate is positioned between the first end plate and the one or more fluid treatment units, and the second manifold plate is positioned between the second end plate and the one or more fluid treatment elements, and the plurality of adjustable tensioning rod assemblies are arranged to press the one or more fluid treatment units, the first and second manifold plates, and the first and second end plates, together.