# Neutron™ and TKO®-6 Comparative Matrix

## Neutron by ICU Medical Inc.
- **Base Technology:** Internal cannula and split-septum compression seal. Internal cannula windows are exposed by the insertion of a male luer, and cannula enters the male luer's internal space to achieve flow.
- **Anti-Reflux Technology:** 100% of the time. Bi-directional silicone valve and bellows combination remains closed unless infusion or aspiration pressure is exerted. The unique design actively absorbs and physically compensates for pressure variations that can result in blood reflux into a catheter.
- **Displacement:** Neutral: 0 mL
- **High Pressure Compatibility:** 350 psi, 10 mL/sec
- **Residual Volume:** 0.1 mL
- **Fluid Path:** Straight through polycarbonate cannula. Laminar flow optimized through anti-reflux valve and bellows. Enhances flushing efficiency.
- **Disinfection Directions:** Swab with 70% isopropyl alcohol using an aggressive circular motion for three seconds.
- **Flow Rate:** 100 mL/min
- **Patient Comfort:** 22% smaller profile. 32% less weight.
- **Catheter Patency Performance:** The ICU Medical Neutron was the only connector to maintain catheter patency in all three tested connectors throughout the 11-day pilot study period, including through three simulated reflux events on days 3, 6, and 9.
- **Flushing Performance:** Highly efficient. Connector cleared of blood elements with minimal flush volumes (approx. 4.5 mL). Not recommended to change connector after blood draw.

## TKO-6 by Nexus Medical, LLC.
- **Mechanically actuated septum**
- **Multi-conduit fluid path**
- **Check valve**
- **Clear housing**
- **Base Technology:** Mechanically actuated silicone septum. Insertion of a male luer compresses the silicone seal forcing it against a rigid column, spreading open the top of the seal. Fluid enters the silicone seal chamber then enters the column through a single window, achieving flow.
- **Anti-Reflux Technology:** All times except during male luer connect and disconnect. Bi-directional silicone valve remains closed unless infusion or aspiration pressure is exerted or upon removal of a male luer.
- **Displacement:** Neutral: Allows less than 0.01 cc of reflux (fluid retrograde) upon disconnection of standard syringe. Allows between 1/16 inch and 1/8 inch of reflux in standard small bore tubing with 0.047" ID (inner diameter).
- **High Pressure Compatibility:** 350 psi, 10 mL/sec
- **Residual Volume:** 0.15 mL
- **Fluid Path:** Fluid exits male luer into a silicone chamber, into polycarbonate column, then through anti-reflux valve.
- **Disinfection Directions:** Swab the Nexus TKO-6 in a circular motion for a minimum of 5 seconds with an alcohol prep pad, flip the pad over and swab for an additional 5 seconds and allow to dry.
- **Flow Rate:** 75 mL/min claimed. 64 mL/min tested.
- **Patient Comfort:** Larger and heavier than Neutron.
- **Catheter Patency Performance:** Not tested.
- **Flushing Performance:** Moderately efficient. Connector cleared of blood elements with approx. 8 mL.

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**Performance data on file at ICU Medical Inc. San Clemente, CA 92673. Neutron Engineering Evaluation Test, in vivo pilot test, July 11, 2011**

**Performance data on file at ICU Medical Inc. San Clemente, CA 92673. Nexus TKO-6 Engineering Test, October 10, 2012**

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How does Neutron anti-reflux technology differ from the others?

Neutron shares an identical housing component, split-septum seal, and blunt cannula geometry with our market-proven MicroClave Clear connector. Building on these and other industry-leading features, Neutron also incorporates several new technology features to create the first simple to use connector that actively helps to reduce intraluminal catheter occlusions.

Neutron’s innovative bi-directional silicone valve and internal bellows-design work together to prevent blood reflux at all times. The valve remains closed unless the Neutron is being accessed for aspiration or infusion, and the bellows give the Neutron its unique ability to absorb and physically compensate for pressure variations that typically result in blood reflux into a catheter.

TKO-6

Other “valved” or “anti-reflux” technologies on the market are simple two-way check valves attached to needlefree connectors or integrated into catheter hubs.