Capiox® NX19 Oxygenator

with UltraPrime™ Technology

Smaller. And more powerful.[1]

TERUMO

Smaller. And more powerful.

The Capiox® NX19 oxygenator with UltraPrime™ Technology is our smallest, most advanced full-size adult oxygenator to date. Building on Terumo's oxygenator legacy, the Capiox® NX19 oxygenator features high gas transfer utilizing new proprietary hollow fiber, enhanced gaseous microemboli (GME) removal technology, and a highly efficient heat exchanger that delivers the standard of safety[2] and performance that you trust from Terumo.

By uniquely combining materials and technologies engineered to deliver ultra performance, the Capiox® NX19 oxygenator is everything you expect in a full-size oxygenator with the benefit of the lowest prime volume available[3].

Ultra performance.
No compromise.™

UltraPrime™ Technology

Optimized for outstanding outcomes.

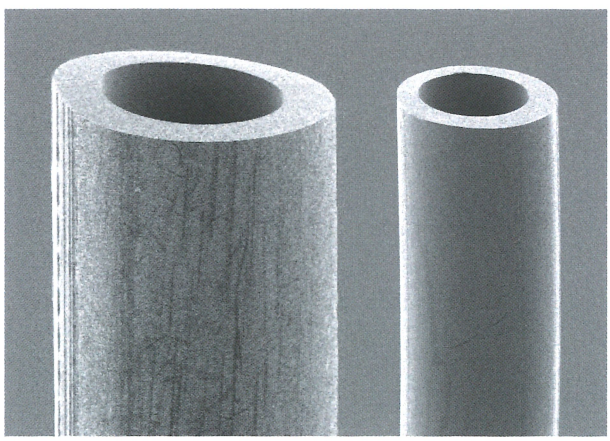
Terumo's UltraPrime™ technology is a combination of materials and technologies to further reduce oxygenator priming volume without giving up functionality and performance or modifying clinical technique.

Smaller hollow fiber with high efficiency

Hollow fiber is the heart of the oxygenator. With decades of experience of in-house hollow fiber development and manufacturing, Terumo now created a smaller hollow fiber with higher efficiency.

This innovative hollow fiber – woven in a unique pattern – provides low priming volume and surface area reduction while delivering high gas exchange performance in combination with a lower transmembrane pressure drop.

- **Lower priming volume**
  - Minimizes hemodilution – resulting in fewer red blood cell (RBC) transfusions, which are associated with infection, ischemic postoperative morbidity, longer hospital stays, and higher hospital costs[4]
  - Maintains higher hematocrit – potentially reducing acute kidney injury (AKI)[5,6]
- **Less foreign surface area**
  - Reduces risk of inflammatory reaction[7]



Standard hollow fiber

Capiox® NX19 hollow fiber

Highly efficient heat exchange

Terumo's choice of polymer material and small capillary design increases performance in warming and cooling.[3] Clinicians can be confident in the heat exchanger's efficiency with the benefit of low prime in a smaller device.

Innovative air removal technology

Plastic heat exchangers retain air bubbles in the spaces between the heat exchange layers. Leveraging our own hollow fiber technology, Terumo has developed a new patent-pending pre-heat-exchanger air removal technology. This technology in combination with our original self-venting technology and Prime Assist™ feature ensures excellent GME removal.

- **Pre-heat-exchanger air removal technology**
  - Removes air and prevents it from becoming trapped in the heat exchanger – reducing the potential for inflammatory reactions[8]
- **Proven self-venting technology and integrated arterial filter**
  - Provides the safety[2] of arterial filtration with less foreign surface area and no added prime volume – simplifying the circuit and assuring that the oxygenator is fully primed
- **Prime Assist™ feature**
  - Enables easier prime – efficiently removing air without tapping and manipulation

Reducing Primary Risks of Cardiopulmonary Bypass Surgery

Hemodilution

"Excessive hemodilution during cardiopulmonary bypass (CBP) is associated with an increased rate of red blood cell (RBC) transfusion and acute kidney injury (AKI). Minimization of the oxygenator priming volume is a measure to contain hemodilution."[5]

Systemic Inflammatory Response

"Cardiac Surgery using cardiopulmonary bypass (CPB) provokes a systemic inflammatory response. This is mainly triggered by contact activation of blood by artificial surfaces of the extracorporeal circuit. … In its extreme form this inflammatory response may be associated with the development of the systemic inflammatory response syndrome (SIRS) that can often lead to major organ dysfunction (MODs) and death."[7]

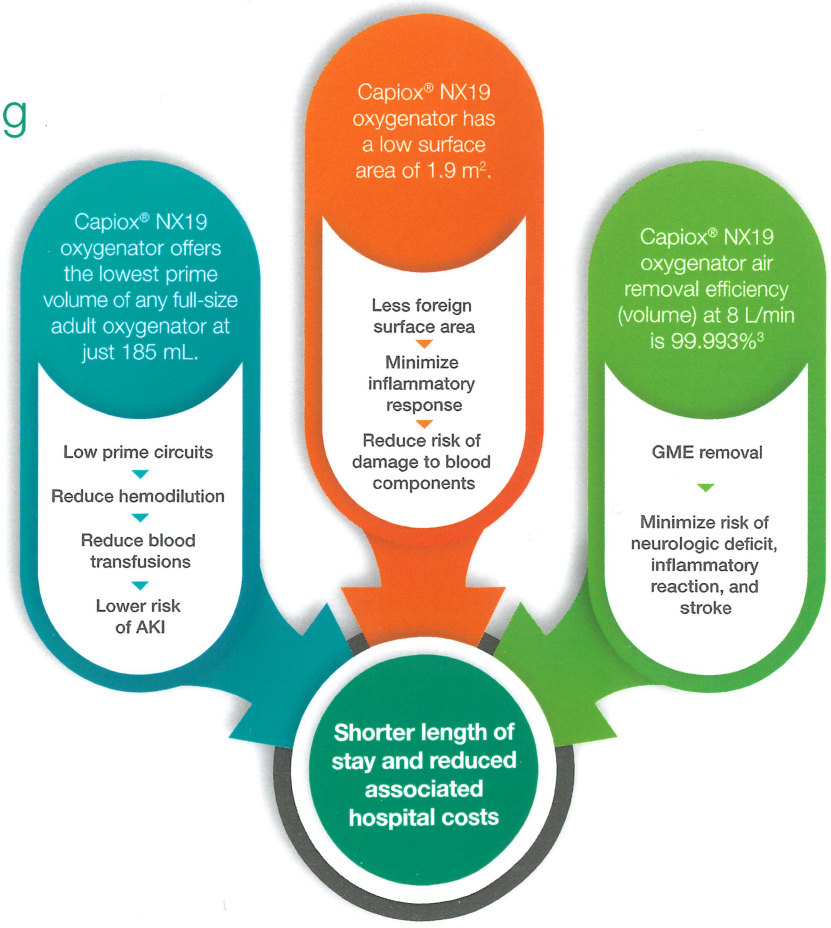
Gaseous Microemboli (GME)

"The consequences of microemboli, microbubbles, is underrecognized and usually overlooked in daily practice. ... Micro bubbles originate mainly in extracorporeal lines and devices, such as cardiopulmonary bypass... The micro bubble obstructs blood flow in the capillary, thus causing tissue ischemia, followed by inflammatory response and complement activation."[8]

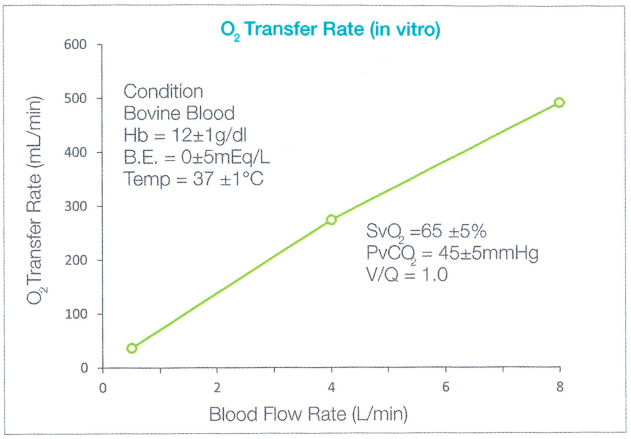
"The incidence of cognitive dysfunction at 1 week following cardiac surgery is approximately twice that of noncardiac surgery. In addition to patient morbidity, adverse cerebral outcome is associated with increased mortality, prolonged hospitalization, and excessive use of intermediate or long-term care facilities."[8]

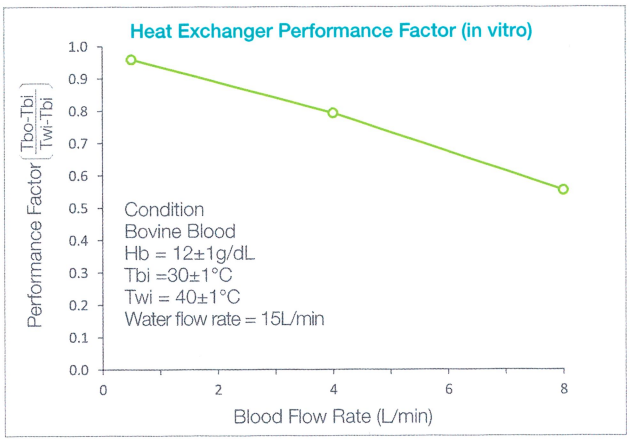
Clinical evidence supports lower prime circuits, less foreign surface area and gaseous microemboli (GME) removal are leading contributors to optimal patient care and reduced hospital expenditure.[7,8,9,10]

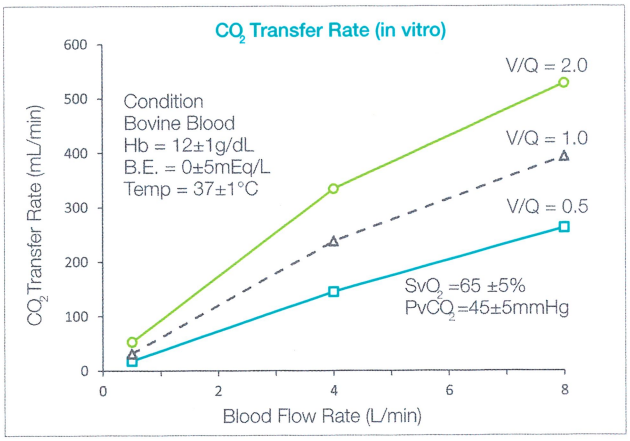
Terumo links oxygenator performance to improving clinical outcomes

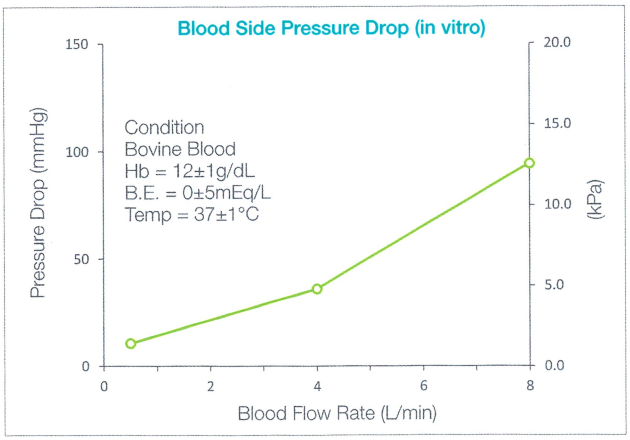


Performance Data









Specifications

CAPIOX® NX19 Oxygenator Module

Component	Specifications	
Housing	Material	Polycarbonate
Fibers	Material	Microporous Polypropylene
	Surface area	Approx. 1.9 m^2
Arterial filter	Material	Polyester screen type
	Pore size	32 µm
	Surface area	360 cm^2
Heat exchanger	Material	Polyethylene Terephthalate (PET)
	Surface area	Approx. 0.43 m^2
Blood flow range	Min.	2.0 L/min (or 0.5 L/min for up to 2 hours)
	Max.	8.0 L/min
Priming volume (static)		185 mL ± 10%
Blood inlet port (from pump)		3/8" (9.5 mm)
Blood outlet port		3/8" (9.5 mm)
Cardioplegia port		1/4" (6.4 mm)
Gas inlet port		1/4" (6.4 mm)
Gas outlet port		5/16" (7.9 mm)
Water ports		1/2" (12.7 mm) Hansen quick connect fitting
Maximum pressure	Blood inlet	1,000 mmHg (133 kPa) (1.36 kgf/cm^2)
	Water inlet	1,470 mmHg (196 kPa) (28 PSI) (2 kgf/cm^2)

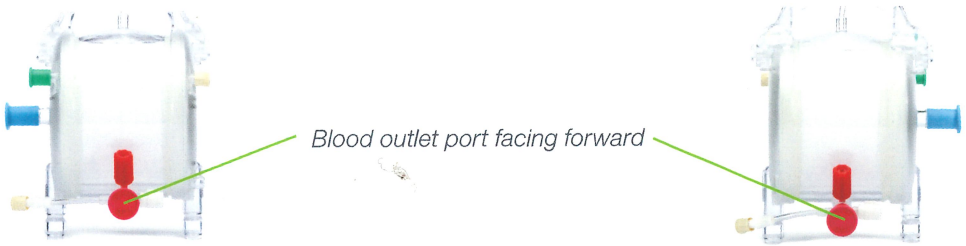
CAPIOX® Hardshell Reservoir

Component	Specifications	
Housing	Material	Polycarbonate
Blood flow range		
Venous flow	Min.	2.0 L/min (or 0.5 L/min for up to 2 hours)
	Max.	8.0 L/min
Cardiotomy inlet	Max.	5.0 L/min
Combined flow	Max.	8.0 L/min
Blood storage capacity		4,000 mL
Operating volume	Min.	150 mL
Venous filter	Material	Polyester screen type
	Pore size	47 µm
Cardiotomy filter	Material	Polyester depth type
Defoaming part	Material	Polyurethane foam
Venous blood inlet port		1/2" (12.7 mm) rotatable
Blood outlet port (to pump)		3/8" (9.5 mm)
Suction ports		six 1/4" (6.4 mm)
Vertical port to CR filter		3/8" (9.5 mm)
Quick prime port		1/4" (6.4 mm)
Vent port		1/4" (6.4 mm)
Auxiliary port		1/4"—3/8" (6.4 mm—9.5 mm)
Luer ports		- three filtered luer locks to cardiotomy filter - a non-filtered luer lock - two luer locks on venous inlet
Positive pressure relief valve		0 to 8 mmHg (1.1 kPa)
Maximum sustainable negative pressure in reservoir		-150 mmHg (-20 kPa)

Xcoating™ Surface Coating, Terumo Corporation's biocompatible amphiphilic polymer surface coating, is a standard feature on the Capiox® NX19 Oxygenator with UltraPrime™ Technology.

Ordering Information

Capiox® NX19 Oxygenator comes in two configurations. Place the blood outlet port facing forward as indicated in the photo. The blood inlet port orientation is (W)est – LEFT or (E)ast – RIGHT side.



Blood inlet port (W)est – LEFT

Blood inlet port (E)ast – RIGHT

Catalog #	Description	Units/Case
CAPIOX® NX19 Oxygenator with Integrated Arterial Filter and UltraPrime™ Technology		
3CX*NX19RW	Hollow fiber oxygenator with 4000 mL hardshell reservoir, "West" orientation	4
3CX*NX19RE	Hollow fiber oxygenator with 4000 mL hardshell reservoir, "East" orientation	4
3CX*NX19W	Hollow fiber oxygenator "West" orientation	4
3CX*NX19E	Hollow fiber oxygenator "East" orientation	4
Holders and Accessories for CAPIOX® NX Oxygenators		
XX*CXH15	Holder for CAPIOX® NX19 oxygenators	1
XX*CXH18	Holder for CAPIOX® NX19 oxygenators when separated from reservoir	1
XX*CXH18R	Holder for CAPIOX® NX19 oxygenators with hardshell reservoir, long arm	1
XX*XH032	Holder for CAPIOX® NX19 oxygenators with hardshell reservoir, short arm	1
CX*BP021	Thermistor wire, blue	10
CX*BP022	Thermistor wire, red	10

REFERENCES:

1. The Capiox® NX19 oxygenator is Terumo's smallest, most advanced, full size (with a maximum flow range of 6-8 L/min) adult oxygenator to date.
2. Gomez D et al. Evaluation of air handling in a new generation neonatal oxygenator with integral arterial filter Perfusion 2009; 24:107-112.
3. Internal testing, data on file.
4. Murphy GJ et al. Increased mortality, postoperative morbidity, and cost after red blood cell transfusion in patients having cardiac surgery. Circulation 2007; 116:2544-2552.
5. Ranucci M et al. Effects of priming volume reduction on allogeneic red blood cell transfusions and renal outcome after heart surgery. Perfusion 2015; 30:120-126.
6. Ranucci M et al. Acute kidney injury and hemodilution during cardiopulmonary bypass: a changing scenario. Ann Thorac Surg. 2015; 100:95-100.
7. Day JR, Taylor KM. The systemic inflammatory response syndrome and cardiopulmonary bypass. Int J Surg. 2005; 3:129-140.
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9. LaPar DJ et al. Blood product conservation is associated with improved outcomes and reduced costs after cardiac surgery. J Thorac Cardiovasc Surg. 2013; 145:796-803.
10. Murphy GS et al. Optimal perfusion during cardiopulmonary bypass: an evidence-based approach. Anesth Analg. 2009; 108:1394-1417.

TERUMO

Terumo Corporation
+81 3 3374 8111

Terumo Cardiovascular Group
+1 734 663 4145

Terumo Europe NV
+32 16 38 12 11

EMEA SALES OFFICES

Terumo Europe NV
Africa Business Division
+32 16 38 13 08

Terumo Europe NV
Benelux Sales Division
Belgium:
0800 14468
The Netherlands:
0800 0231938

Terumo Europe NV
Emerging Market Division
+32 16 38 12 11

Terumo Deutschland GmbH
+49 6196 80 230

Terumo Deutschland GmbH
Switzerland
+41 56 419 10 10

Terumo Europe España SL
+34 902 10 12 98

Terumo France S.A.S.
+33 130 96 13 00

Terumo Italia S.r.l.
+39 06 94 80 28 00

Terumo Russia LLC
+7 495 988 4740

Terumo Sweden AB
+46 3174 85 880

Terumo Sweden AB Denmark
+45 7020 93 80

Terumo Middle East FZE
+971 4 292 0200

Terumo UK Ltd
+44 1276 480 440

Terumo BCT Tıbbi Cihazlar Dağıtım ve Hizmetleri A.Ş.
+90 216 645 92 00

Addresses subject to change, please consult our website.
www.terumo-europe.com