

# BRIZIO

NIPRO MEMBRANE OXYGENATOR AND VENOUS RESERVOIR WITH INTEGRATED CARDIOTOMY FILTER – ADULT



+ SECURITY

+ SMALLER PRIMING

+ EFFICIENCY IN THE WITHDRAWING OF MICROBUBBLES

+ PERFORMANCE



## FEATURES

### VENOUS RESERVOIR FILTRATION SYSTEM

The venous reservoir of BRIZIO – Membrane Oxygenator and Venous Reservoir with Integrated Cardiomy Filter – Adult has a system of progressive filtration that results in better efficiency. This system of filters allows the withdrawing of all the undesired particle material and the microbubbles bigger than 40  $\mu\text{m}$ , which is the size of its filtration mesh.

### ARTICULATED HANDLES

BRIZIO holder has handles with jointed and bi-articulated movements. It allows more flexibility to the user in positioning the oxygenator in relation to the patient and to the heart-lung machine.

### BRIZIO'S OXYGENATION CHAMBER

BRIZIO's oxygenation chamber is coated with a synthetic element, E8 (see page 4), which also covers the polypropylene fibers of the oxygenator. This chamber is fixed in the base of the venous reservoir and locked with a clamp of quick positioning, which allows it to spin 360° on its axis. This gives the perfusionist total freedom for positioning the venous inlet, arterial outlet, recirculation and gas inlet tubing.

During the oxygenation process, blood flow comes from top to down, which retains all bubbles and microbubbles on the upper part of the chamber, avoiding any chance of them to be drawn by the flow in the arterial inlet.

### HEAT EXCHANGER

BRIZIO's heat exchanger is preconnected to the oxygenation chamber coated with E8 to avoid the action of coagulation chain. Blood flow runs inside the 391 stainless steel tubes of very thin wall, absolutely polished, allowing to the blood a nearly "Newtonian" flow, without turbulence, very similar to the physiologic system.

### VENOUS DRAINAGE INLET, VENT LINE AND ASPIRATORS

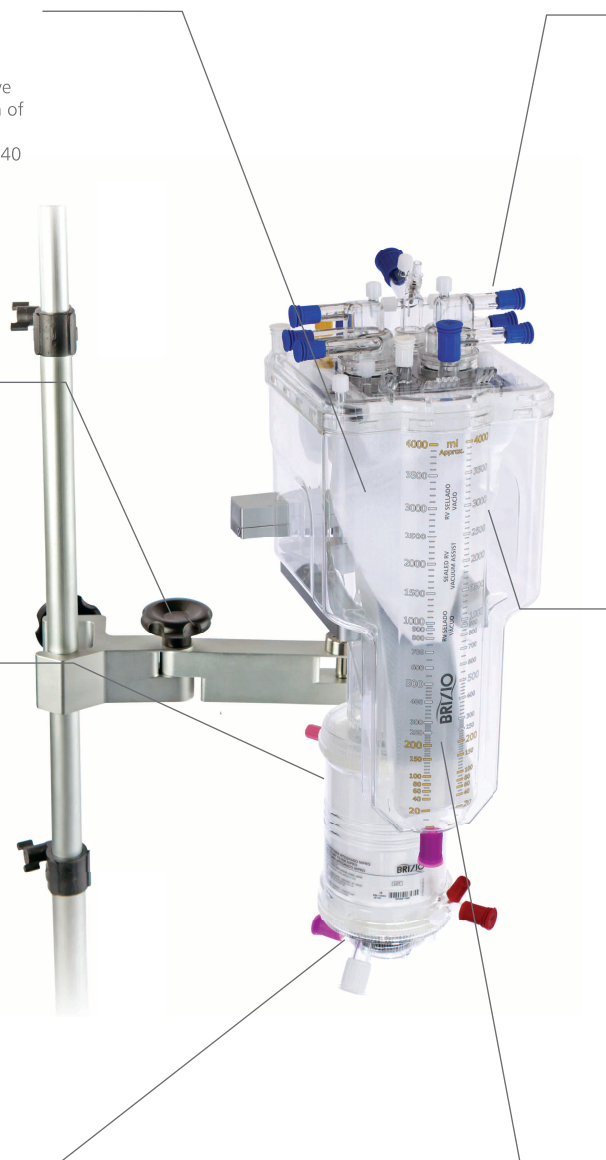
On the top lid there is the 1/2" rotary inlet of venous drainage, as well as the vent line that, through two tubes, takes the blood directly to the venous reservoir outlet, without any contact with the plastic parts of the reservoir. It is as if the bypass of the venous reservoir occurred, once it gets isolated as in a mini-circuit of extracorporeal circulation. As a benefit, despite the venous reservoir is coated with the E8 substance, a significant reduction on inflammatory response occurs by the smaller contact of the blood with the plastic parts of the device.

### CARDIOTOMY SYSTEM

BRIZIO's cardiotomy system has a separated chamber and different from the venous drainage one. The chamber is located on the top part of the venous reservoir, right below the rotary connectors of blood inlet of aspirators. This high position of the cardiotomy system allows inhibiting the permanent contact with the blood of the venous reservoir, when working with a level lower than 1000 mL, which reduces the activation of the coagulation chain.

### VOLUMETRIC LEVEL OF VENOUS RESERVOIR

The front scale that allows the reading of the volume of blood in the blood reservoir is divided of 10 in 10 mL, reaching up to 200 mL of minimum recommended level, in yellow color, to improve the contrast and the checking.

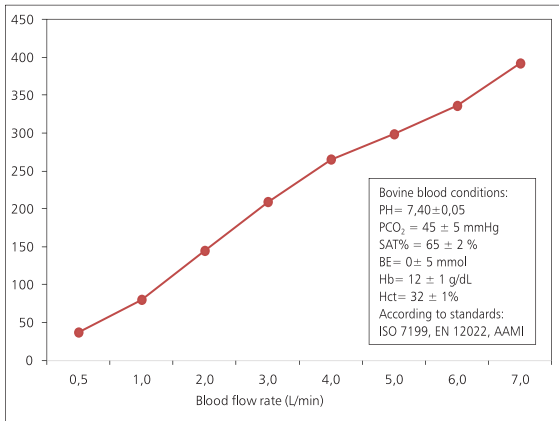


## BLOOD FLOW ON BRIZIO RESERVOIR AND OXYGENATION CHAMBER

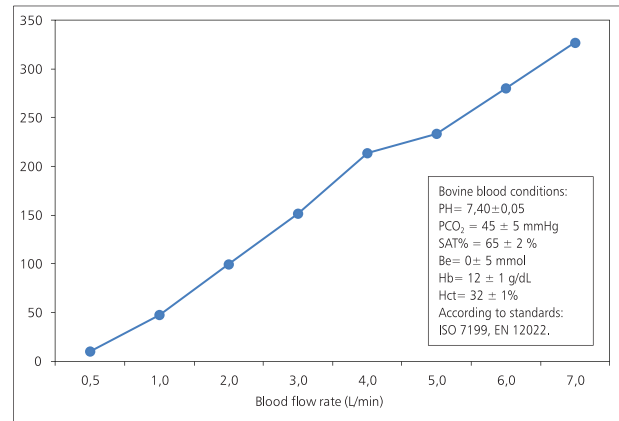


## PERFORMANCE

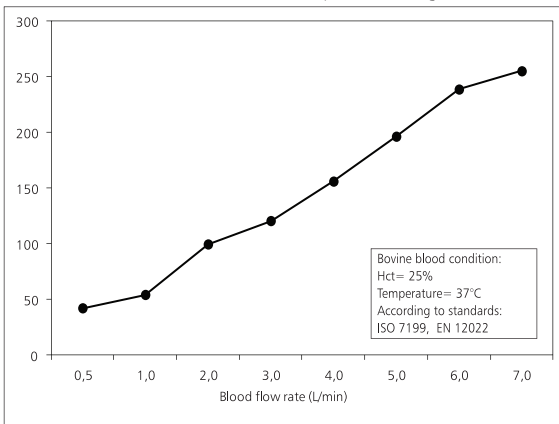
O<sub>2</sub> Transference (mL/min)



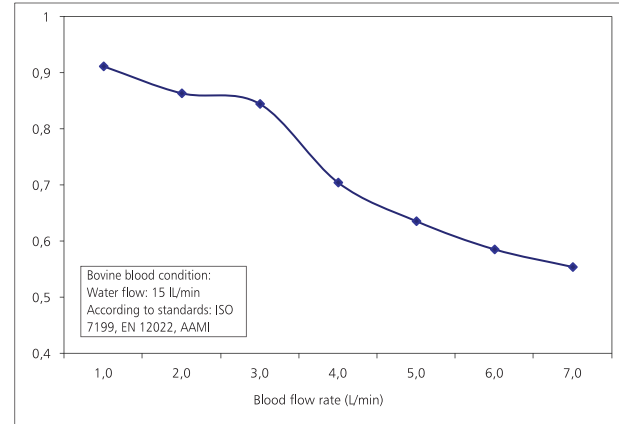
CO<sub>2</sub> Transference (mL/min)



Chamber Pressure Drop ΔP (mmHg)



Heat Exchange Performance Test (In Vitro)



## SPECIFICATIONS

### VENOUS RESERVOIR

	Adult
Maximum volume	4000 mL
Minimum level	200 mL
Venous inlet	12,7 mm (1/2")
Optional cardiomy reservoir inlet	9,5mm (3/8")
Vent line	6,4mm (1/4")
Aspirated blood inlets	6,4mm (1/4")
Recirculation inlet	6,4mm (1/4")
Fast priming inlet	6,4mm (1/4")
Reservoir outlet	9,5mm (3/8")
Venous sample port	Luer Lock type
Temperature probe port	Yellow Spring type thermistor
Drug inlet	Luer Lock type
Filtering element of cardiomy filter	40 μm
Maximum flow in the cardiomy filter	3 L/ min
Negative/positive pressure safety valve (with sealed reservoir)	-200 ± 5 mmHg + 65 ± 5 mmHg

### Brizio Adult Oxygenator Models

Code	Description
BRZ+12000A	Brizio Oxygenator Preconnected Coated
BRZ+12005A	Brizio Oxygenator Preconnected, Coated with Vacuum Line Sealed
BRZ+12305A	Brizio Oxygenator Preconnected, Coated, with Manifold and Vacuum Line Sealed
BRZ+12345A	Brizio Oxygenator Preconnected, Coated, with Manifold, Recirculation Line, Vacuum Line Sealed

### Brizio Adult Oxygenator Holder Models

Code	Description
SUP-001BRZ	Advanced Holder
SUP-002BRZ	Intermediate Holder
SUP-003BRZ	Basic Holder

### OXYGENATION CHAMBER

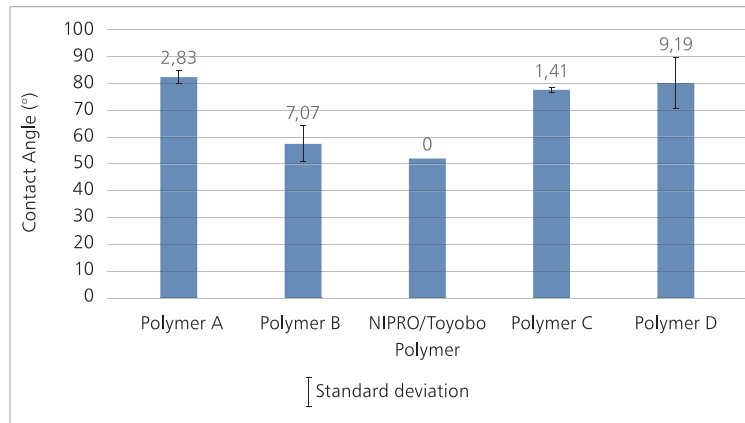
	Adult
Priming	237mL
Maximum blood flow	7 L/min
Pressure variation	180 mmHg
Effective area	2,2m <sup>2</sup>
Oxygenating chamber inlet	9,5mm (3/8")
Arterial outlet	9,5mm (3/8")
Recirculation outlet	6,4mm (1/4")
Gas inlet/outlet	6,4mm (1/4")
Arterial sample port	Luer Lock
Temperature port	Yellow Spring type thermistor
Maximum water pressure in the heat exchanger	138 KPa (1000 mmHg)
Heat exchanger - effective area	0,20m <sup>2</sup>
Water inlet/outlet	Hansen type
Heat exchanger performance factor at 4 L/min blood flow and 15 L/min water flow	0,71

## E8 SYNTHETIC COATING

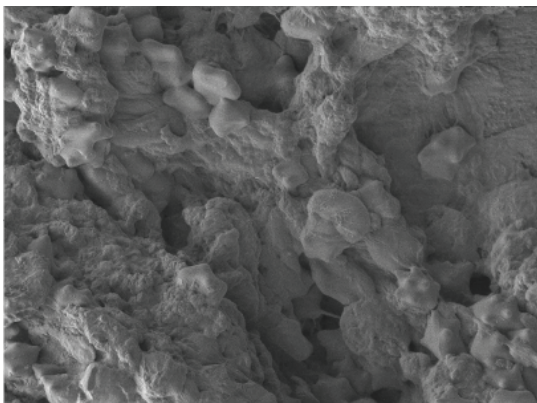
As is already a consensus of medical community, every coating that inhibits the direct contact of blood with plastic surfaces, filters materials and components of oxygenators leads to a reduction on aggregation of the formed elements of the blood and, as a result, to the reduction of the inflammatory response.

Having this in mind, NIPRO adopted the synthetic coating E8, developed by Toyobo company. This is a functional copolymer in a 100% chemical composition (non-biological) obtained by a synthesis that presents excellent lasting biocompatibility. Its basis is a polyethylene glycol, a hydrophilous substance with a high grade of molecular freedom and aliphatic chain length. The composition of the E8 substance, when liquid, creates a non-rigid membrane, different from all the other coating substances. Offering a homogeneous and continuous surface, E8 also makes the contact angle of cell system smaller in comparison to biological coating (Graphic 1).

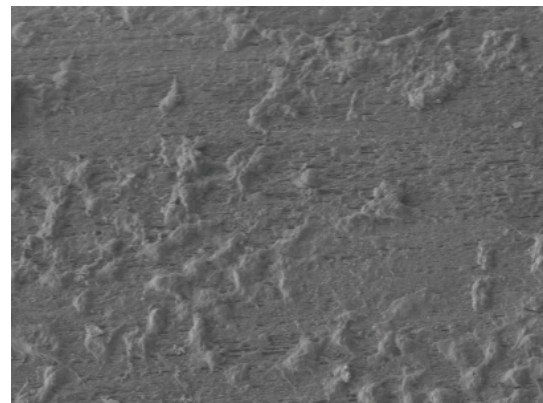
**Graphic 1 – E8 contact surface angle in coated polycarbonate (n=2)**



Below there are the results obtained in oxygenators without coating (Picture 1) and with E8 coating (Picture 2), tested in animals in extracorporeal procedure with a three-hours perfusion at 7 L/min. These results show that E8 coated oxygenators present a significant reduction on the formation of thrombus and the platelets aggregation in extracorporeal circulation.



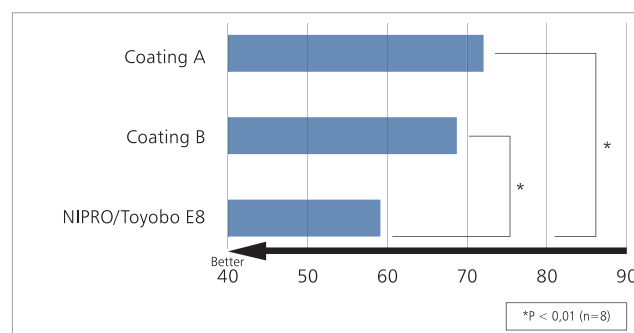
Picture 1: Polypropylene fiber without coating



Picture 2: Polypropylene fiber with coating

Also, studies have been revealed that E8 coated BRIZIO, in comparison to other coating substances in the market, presents smaller activation of one of the biggest responsible for causing inflammatory responses arising from extracorporeal circulation, that are the molecules from complement system (Graphic 2), generating a favorable impact on the patient's post-operative.

**Graphic 2: Activation grade of C3 and CH50 (%) inflammatory markers**



E8 coating reduced inflammatory proteins response and supplied a reasonable spectre of trombogenicity.



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