

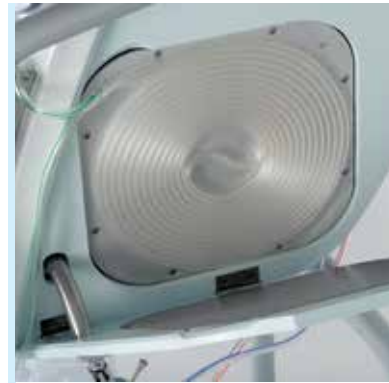
Safe & easy to use

The Aquarius System integrates dual control and protection system processors that work continuously to help safeguard patients. Alarm hierarchies alert clinicians if an out-of-range condition occurs and the Aquarius System responds simultaneously and automatically, to help ensure patient safety. The Aquarius System safety features include:

- **Clinical friendly interface** with on-screen illustrated set-up guides and detailed alarm messaging and error help menus.
- **Minimal intervention** due to self-correcting alarms, automated solution degassing unit to increase priming and integrated recirculation capability.
- Automated **Total Fluid Loss management**
- **Actual Renal Dose** displayed on the main screen
- Tri-colour status lights visible from both the front and back of the display
- Bag change notification
- Automatic degassing unit
- Ultrasonic air detector
- Blood leak detector
- Battery backup (for emergency blood return only)



Rotating head
Allows the screen to be viewed from multiple positions, aiding easy monitoring.



Integrated fluid warmer
To heat replacement solution thus patients receive fluid closer to normal body temperature.



Network
The Aquarius system provides the possibility to download history files from the Aquarius to an external PC/Hospital data system via the optical ports located at the rear of the device.



Less intervention required
The Aquarius system has two rotating scales for connecting two to four 5 liter bags. Less intervention is required for the nurse to change the bags.

Technical data

Flow rates	Adult	Pediatric	
Blood pump	30 to 450 ml/min for all therapies except: 30 to 250 ml/min (TPE)	10 to 200 ml/min	
Pre-dilution pump	0 or 100 to 10,000 ml/h	0 or 100 to 6,000 ml/h	
Post-dilution pump	0 or 100 to 10,000 ml/h	0 or 100 to 4,000 ml/h	
Dialysate pump	0 or 100 to 10,000 ml/h	0 or 10 to 10,000 ml/h (CVVHD) 0 or 10 to 6,000 ml/h (CVVHDF)	
Filtrate pump	0 or 100 to 12,000 ml/h	0 or 100 to 11,000 ml/h	
Plasma	0 or 10 to 3,000 ml/h	0 or 10 to 1,200 ml/h	
Patient fluid loss rate	0 to 2,000 ml/h SCUf -100 to 2,000 ml/h CVVH, CVVHD, CVVHDF	0 or 10 to 1,000 ml/h	
Scales			
Fluid balance alarm	± 50 g	± 20 g	
Substitution/Filtrate scale max. load	20 kg	20 kg	
Fluid warmer			
Adjustable substitution temperature	0 (off) or 35 °C to 39 °C by 0.5 °C		
Capacity	5 l/h		
Anticoagulant settings			
Heparin pump accuracy	± 2 ml/h		
Heparin pump settings	0 or 0.5 to 15 ml/h, by 0.5 ml/h		
Heparin syringe size	50 ml		
Bolus function	0 or 0.5 to 2.5 ml by 0.5 ml		
Degassing unit			
Treatment range	-300 to -30 mmHg		
Gas removal	At least 10 ml/min		
Dimensions and weight			
Aquarius System (H x W x D)	175 cm (without I.V. pole) x 65 cm x 75 cm		
Floor space (W x D)	Approx. 55 cm x 65 cm		
Weight	Approx. 90 kg		
Power requirements			
GE-F096-00 Voltage/Current	230V (alternating voltage) ± 10%, 50/60 Hz/2.2 A with 230V		
GE-F097-00 Voltage/Current	115V (alternating voltage) ± 10%, 60 Hz/4A with 115V		
Power consumption	350W		
Monitor/detection parameters			
Air detector	Ultrasonic measurement; Air bubbles at a volume of 1 µl at a blood flow rate of 200 ml/min		
Blood leak detector	Measurement of clouding; 2 ml blood/1,000 ml filtrate at HCT 32 %		
Display monitor	10.4" TFT color		
Pressure monitoring			
Alarm	Lower Limit	Upper Limit	Units
Access Pressure	-250	200	mmHg
Return Pressure	+20	300	mmHg
Filtrate Pressure	-400	400	mmHg
Pre-filter Pressure	-	400	mmHg
TMP for renal treatments	-30	400	mmHg
TMP for TPE	-30	100	mmHg
TMP for Hemoperfusion	-50	400	mmHg
Pressure drop	-	250	mmHg
Blood Pump Rate	-10	10	% from setpoint

CRRT (Continuous Renal Replacement Therapy), CVVH (Continuous Venovenous Hemofiltration), CVVHD (Continuous Venovenous Hemodialysis), CVVHDF (Continuous Venovenous Hemodiafiltration), SCUf (Slow Continuous Ultrafiltration) and TPE (Therapeutic Plasma Exchange).

References:

1. Ronco C, Fluid balance in CRRT: a call to attention! The International Journal of Artificial Organs. 2005; 28: 763-764
2. Ronco C et al., Polyethersulfone: Membranes for Multiple Clinical Applications. Contrib Nephrol, 2003; 138: 144-152
3. Aquamax filters Instructions for Use
4. Aquarius system Instructions for Use 2012



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DO-M003-00 Version 01, 2014-02



Acute Blood Purification

AQUARIUS SYSTEM ICU — CVVH — CVVHD — CVVHDF — SCUf — TPE — Hemoperfusion

Aquarius system
with Automated Total Fluid Loss management
Unique patented system



Innovation in patient safety

In CRRT, accumulated fluid balance errors due to repeated alarm overrides can result in serious harm to the patient.¹

NIKKISO ABP's latest innovation is aimed at CRRT safety and performance. The new Automated Total Fluid Loss management helps to reduce risks at a significant level.

The Aquarius system provides a strong level of control over fluid balance in CRRT:

- The **Automated Total Fluid Loss management (TFL)** is the only system that has the capability to continuously mitigate fluid loss discrepancies. The TFL is a patented function. This unique function has been developed to prevent and compensate potential fluid gain or loss.
- A balance alarm occurs when a ± 50 g (± 20 g for pediatric) difference is detected between the target ultrafiltration volume and the actual ultrafiltration volume. The volume discrepancies are automatically compensated by the system when the pumps are reactivated by pressing the Balance Start/Stop key.
- The software avoids imbalance accumulation over time due to multiple balance alarms.
- The treatment dose can be easily monitored.

Monitoring the renal dose has become very easy due to recent innovations on the Aquarius system:

- The **renal dose** is related to the patient's body weight, the blood flow rate and the pre- and post-dilution volumes.
- Displayed on the main screen in ml/kg/h, the actual delivered dose enables the user to be fully aware of the dose of treatment achieved. This allows the physician to adjust the programmed dose to achieve the desired treatment dose.



Scales
The Aquarius system automatically compensates for ultrafiltration (UF) variations thanks to the scales.



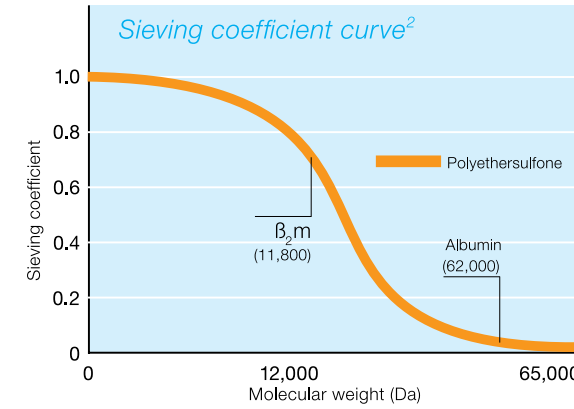
Renal Dose
Displayed on the main screen in ml/kg/h so the user is fully aware of the dose of treatment achieved.

Renal dose ml/kg/h **35.4**

AQUAMAX filters

Polyethersulfone membranes engineered to meet the needs of modern continuous renal replacement therapy (CRRT):^{2,3,4}

- Optimised for diffusive and convective therapies (CVWH, CVVHD, CVVHDF and SCUF)
- Excellent clearance of small and medium sized molecules
- Excellent biocompatibility
- Glycerin-free membrane only requiring priming to remove all air prior to use
- Choice of four filters with varying membrane surface areas

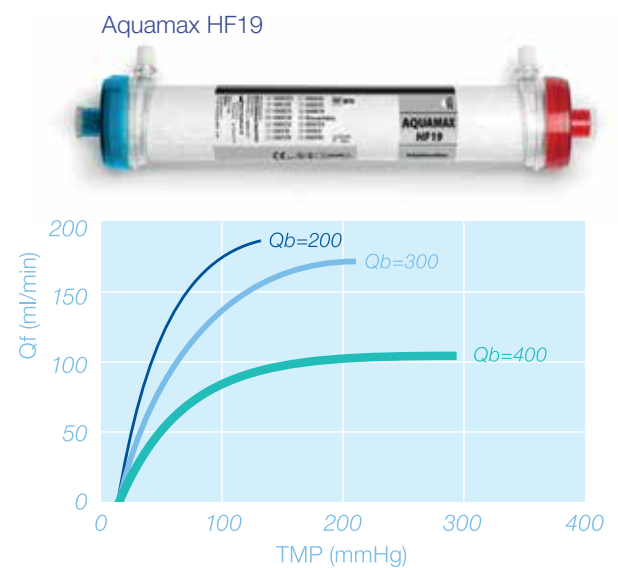
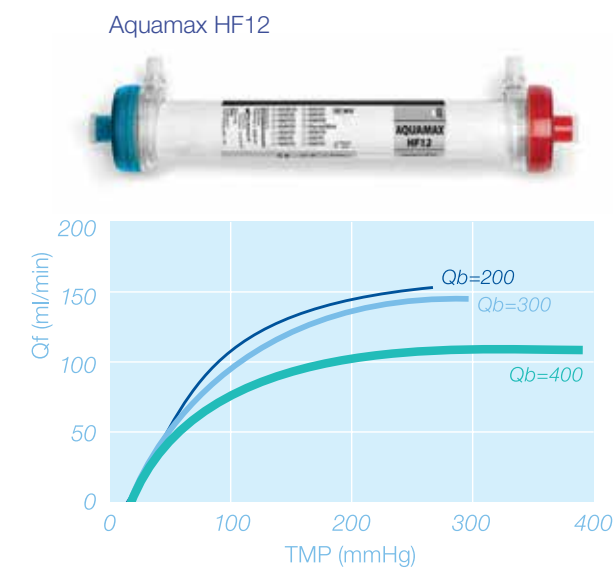
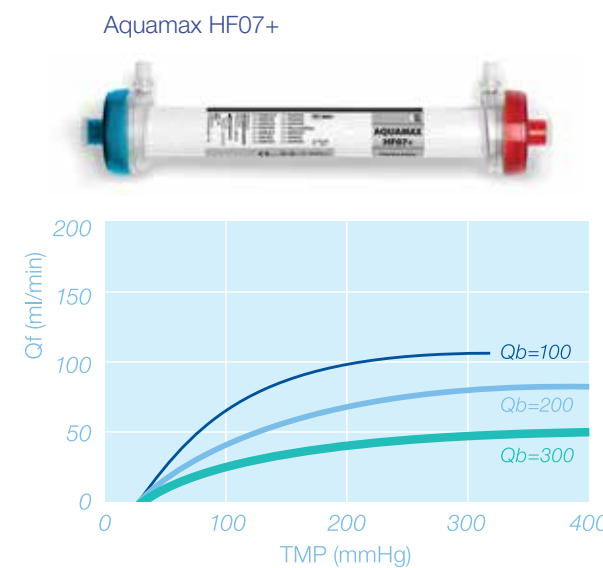
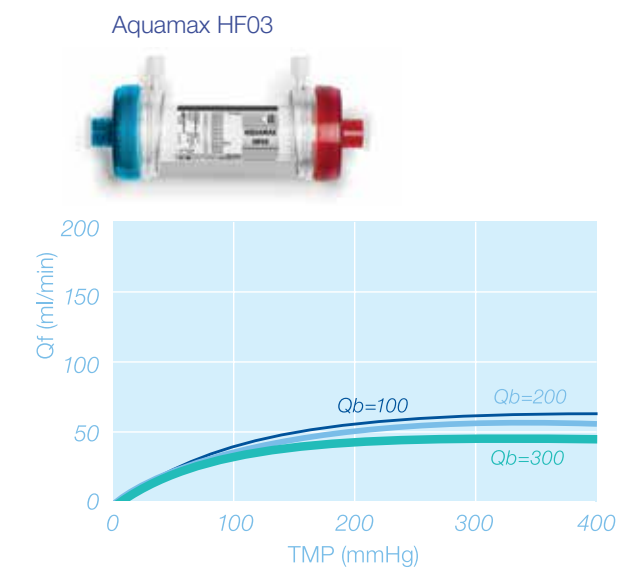


Characteristics and performance features of the Aquamax filters³

	Aquamax HF03	Aquamax HF07+	Aquamax HF12	Aquamax HF19
Membrane surface area (m ²)	0.30	0.70	1.20	1.90
Cut-off	55 Kda	55Kda	55Kda	55Kda
Priming volume (ml)	32	49	73	109
Pressure drop (mmHg)	<40	<80	<50	<25
Maximum transmembrane pressure (mmHg)	600	600	600	600
Overall unit length (mm)	145	305	305	305
Fiber internal diameter (µm)	200	200	200	200
Fiber length (mm)	100	241	241	241
Blood port connectors	ISO	ISO	ISO	ISO
Ultrafiltrate ports	Luer	Luer	Luer	Luer
Sterilization	Ethylene oxide	Ethylene oxide	Ethylene oxide	Ethylene oxide

Performance features	Qd 300	Qd 500	Qd 300	Qd 500	Qd 500	Qd 500
Clearance (ml/min) at Qb 200 ml/min						
Urea	79	82	152	162	186	192
Creatinine	74	77	142	151	174	183
Phosphates	69	71	134	143	168	179
Vitamin B12	45	46	112	118	139	150

Ultrafiltration profiles:³



Qb: Blood flow rate
Qf: Ultrafiltration rate
TMP: Transmembrane Pressure

AQUALINE tubing

Exclusively designed for the Aquarius system:⁴

- For use in CVWH, CVVHD, CVVHDF, SCUF, TPE and Hemoperfusion
- Adult (Aqualine tubing) and Pediatric (AqualineS tubing)
- Colour-coded lines for safe and easy set-up
- Integrated tubing coil for the heating of replacement fluid
- Degassing chamber for the removal of gas from warm replacement fluid
- Package includes an empty 2 liter priming bag and a 5 liter effluent bag

One tubing set for all therapies

Aqualine tubing set for adults and AqualineS tubing for pediatrics can be used for all therapies performed by the Aquarius system. Therefore during the treatment, patients prescription and therapy needs can be altered without changing the tubing set.

Disposables for the Aquarius system (GE-F096-00)^{3,4}

Designed for use on the Aquarius system, Aquaset disposables conveniently combine an Aquamax filter with an Aqualine tubing. The Aquarius system provides prescription flexibility with a choice of five sets.

Products	AQUASET03LV	AQUASET07PLV	AQUASET07P	AQUASET12	AQUASET19
Aquamax filter	HF03	HF07+	HF07+	HF12	HF19
Bloodline	AqualineS	AqualineS	Aqualine	Aqualine	Aqualine
Bloodline blood volume	61 ml	61 ml	100 ml	100 ml	100 ml
Ancillaries	1 effluent bag 5 liter + 1 empty priming bag 2 liter + 1 two-way connector				

Ancillaries

Product code	Description
1500040206	A pair of four-way manifolds (Aquaspikes 2) for connecting several fluid or effluent bags
AQUASAFE	An empty bag with 25 ml capacity used to release excessive pressure from the Aqualine tubing set
B3052	Effluent bag

- CVVH post-dilution
- Therapeutic Plasma Exchange

Aquarius system with RCA

with Automated Total Fluid Loss management
Unique patented system

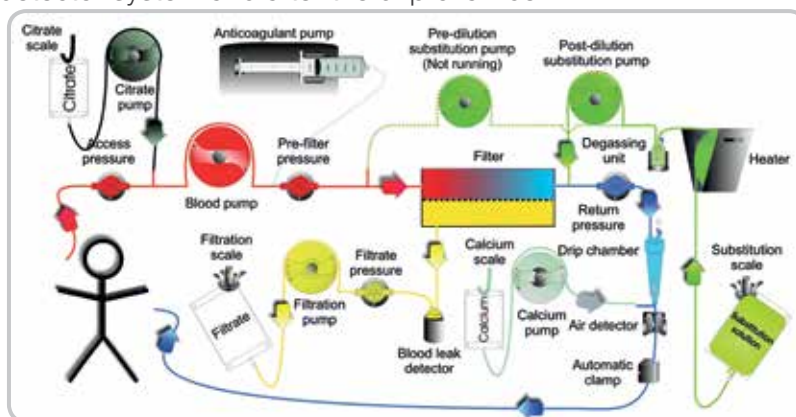


Highlights RCA

- Pure convective exchange without predilution
- Choice of citrate (TPE or CVVH post-dilution) and/or heparin anticoagulation
- Possibility to change anticoagulation mode from citrate to heparin during the treatment, without changing the bloodline set
- Integrated citrate and calcium pump
- Two different sets with pre-connected calcium and citrate lines for more safety

Treatment CVVH-postdilution

Citrate solution is infused into the blood circuit before the blood pump. To compensate for the amount of Calcium lost in the filtrate, Calcium solution is infused into the blood circuit just before the air detector system and after the drip chamber.



Consumables for the Aquarius system with RCA (GE-F095-00)


The Aquarius system with RCA system provides prescription flexibility with a choice of seven sets. Regular sets can be used with the Aquarius system with RCA for treatment without citrate anticoagulation, and the two new CITRASET/RCA sets were designed for the treatments with citrate anticoagulation.

Sets for RCA therapy	Products	Citraset RCA 12	Citraset RCA 19
	Aquamax filter	HF12	HF19
	Bloodline	Aqualine RCA	Aqualine RCA
	Bloodline blood volume	100 ml	100 ml
	Ancillaries	1 citrakit + 1 effluent bag 5 liter + 1 empty priming bag 2 liter + 1 two-way connector	


Technical data

Flow rates		Adult
Blood pump	TPE CVVH	30 to 250 ml/min 30 to 300 ml/min
Post-dilution pump		0 or 500 to 6,000 ml/h
Post-dilution	TPE	0 or 500 to 3,000 ml/h
Filtrate pump	RCA	0 or 100 to 8,800 ml/h
Plasma	RCA	0 or 500 to 3,000 ml/h
Citrate		0 or 20 to 500 ml/h
Calcium		0 or 2 to 300 ml/h
Fluid loss	CVVH	0 to 2,000 ml/h
Scales		
Citrate/Calcium maximum load		2.2 kg
Citrate and Calcium intended use		
Concentration of citrate		between 136 and 148 mmol/l
Concentration of calcium supplementation		approx. 10 mmol/l to 20 mmol/l

CRRT (Continuous Renal Replacement Therapy), CVVH (Continuous Veno-Venous Hemofiltration) and TPE (Therapeutic Plasma Exchange).

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DO-M002-00, Version 01, 2014-02