NIKKISO

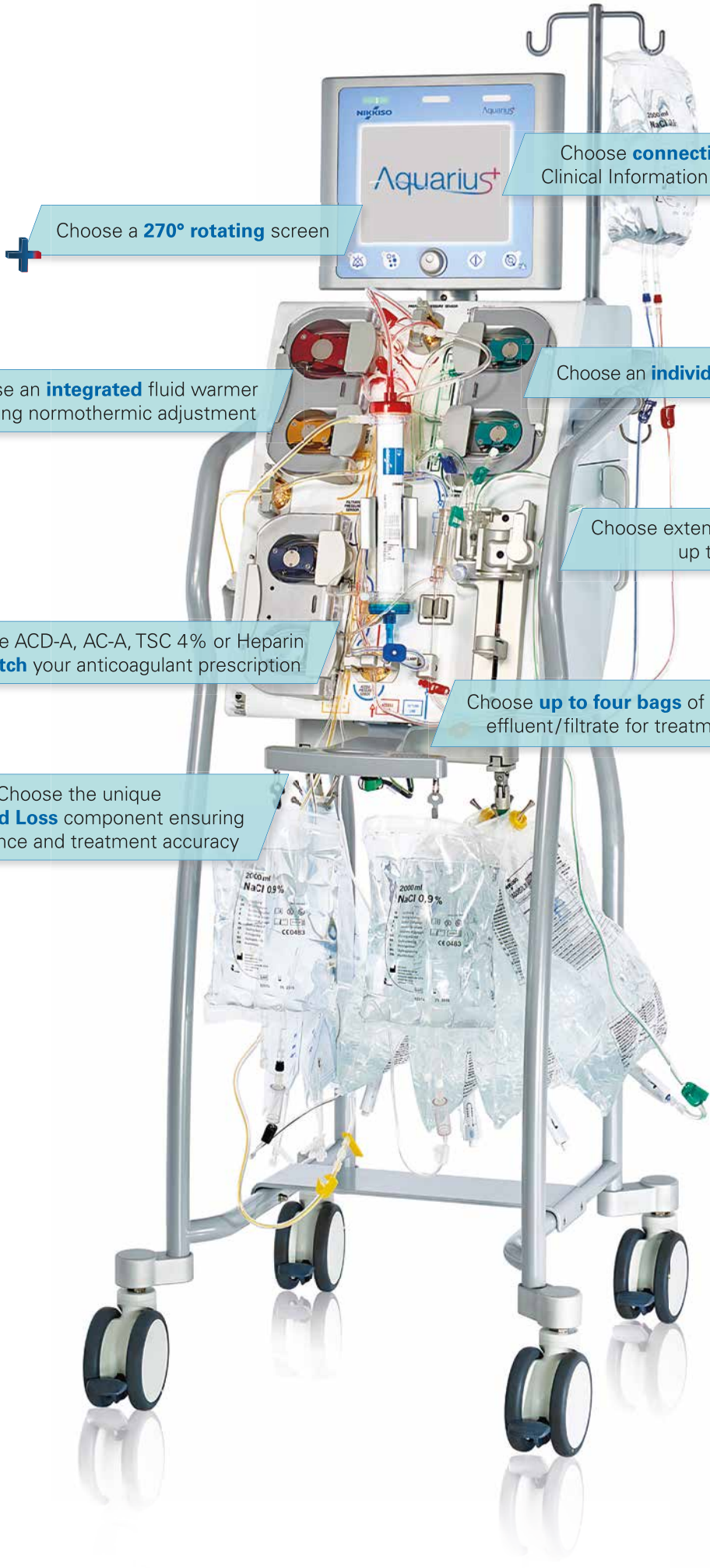
Aquarius™ System

with Aquarius+ Software

Accuracy + Simplicity

Aquarius+

Highlights+



Choose a **270° rotating** screen

Choose **connectivity** to Clinical Information Systems

Choose an **integrated** fluid warmer enabling normothermic adjustment

Choose an **individual** RCA prescription

Choose extended set-life capability - up to **100 hours**

Choose ACD-A, AC-A, TSC 4% or Heparin to **match** your anticoagulant prescription

Choose **up to four bags** of replacement/dialysate and effluent/filtrate for treatment without interruption.

Choose the unique **Total Fluid Loss** component ensuring fluid balance and treatment accuracy

Aquarius+ - Safeguarding your patients.

Treatment accuracy

The Aquarius+ contains a double feedback mechanism which ensures the pump **accuracy** is constantly monitored by the gravometric weight scale system. This ensures for every 5 L of fluid pumped, a maximum permitted deviation of 5 mL.

270° rotating screen

Visibility of equipment in Intensive Care Units is essential for staff to safely monitor their patients and support other colleagues.

The **rotating** screen of Aquarius+ allows the machine to be placed wherever is most convenient without compromising patient safety.

Integrated fluid warmer

Hypothermia has been associated with increased mortality in critical care patients[5]. It is also known to be one of the most common adverse events during CRRT[6]. It has also been noted that it is never safe to use CRRT devices without a fluid warmer[7].

The Aquarius+ and its associated disposables provides a complete solution with an integral fluid warmer and integrated heater coil in all line sets without adding any additional extracorporeal volume.

This safeguards patients by reducing the risk of hypothermia and **maintaining normothermia** whilst receiving CRRT.

Total Fluid Loss

Fluid balance is a key aspect of the CRRT prescription. The possibility of making fluid balance errors has been identified throughout the history of CRRT[8].

The unique, automated **Total Fluid Loss** (TFL) component provides total control over net fluid balance. TFL compensates for any net fluid balance variance ensuring all discrepancies are eliminated. Thus, helping to reduce the risk of hypo/hypervolaemia by avoiding fluid imbalance accumulation over time due to multiple balance alarms.

Principle - A balance alarm occurs when a +/-50 g difference (+/-20 g for low volume patients) 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 Treatment Start/Stop key.

Aquarius+ - Reducing your workload.

100 hours Set life

Circuit survival is intrinsically linked to treatment efficacy and cost of running CRRT. It has been hypothesised that RCA is linked to increased circuit survival compared with heparin or no anticoagulation[9].

Although the possible circuit uptime of the majority of the other commercially available sets is max. 72 hours, Aquarius+ provides the **unique, validated** option for a circuit lifespan of up to 100 hours.

This ensures **maximum treatment efficacy** for your patient coupled with potential economic advantages of **lower running costs**.

Flexibility of citrate dose

The dose of citrate required to anticoagulate each patient appropriately is your **individual** clinical decision.

Documented case studies and clinical protocols using a range of citrate doses from 2.5 mmol/L – 6 mmol/L are recorded[10,11]. Post-filter extracorporeal concentrations of calcium less than 0.35 mmol/L are usually sufficient for clotting activation to be minimal[11,12]. A higher citrate load can potentially be associated with an increased risk of citrate accumulation, especially in patients with marked hemodynamic instability and very high severity scores[10,13].

With Aquarius+, **the citrate and/or calcium dose can be adjusted quickly and simply during treatment**. This is achieved via the automatic blood/citrate pump link and dialysate/calcium pump link. Thus, maintaining a **simple and safe** ability to deliver an individualised patient prescription automatically.

Fewer Bag Changes

A complex workload is an ongoing challenge in the ICU environment.

Aquarius+ enables the user to hang from 5 to 20 L of replacement fluid **allowing minimal interventions and uninterrupted CRRT treatment**. For example, this could result in **only one** substitution/dialysate bag change alert in > 10 hours for an 80 kg patient.

Connectivity

Clinical information systems (CIS) help to reduce time spent on documentation, increasing the time available for direct patient care by automatically capturing the parameters from patient monitors in the ICU[14].

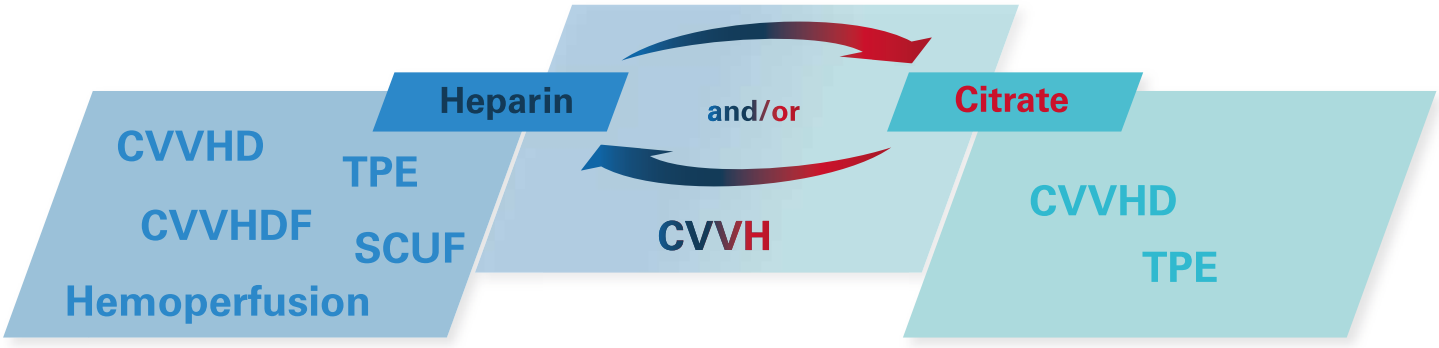
Aquarius+ is able to connect to all known Clinical Information Systems and provide a real time interface allowing the user to take advantage of these technologies, releasing **more time to care** for their patient.

Target your anticoagulant prescription based on the patient´s requirements.

Regional Citrate Anticoagulation (RCA) is the anticoagulant suggested by KDIGO[1] for use in CRRT for patients with no known contraindications.

However, citrate accumulation is the most feared and potentially lethal complication of RCA, representing up to 12 % incidence in citrate based CRRT therapies.[2,3,4]
Although when this occurs, it is still **crucial** the CRRT therapy is continued[4].

Swap between **Heparin** and/or **Citrate** during CVVH treatment without interruption.



During CVVH RCA, Aquarius+ is the only device to enable uninterrupted CRRT therapy without changing the line set or fluids, with the ability to utilise heparin or no anticoagulation*.

One line set = multiple choice

Consumables for the Aquarius™ system with RCA (GE-F095-00) - for Heparin and / or Citrate treatments

Irrespective of patient CRRT need, preferred anticoagulant, CRRT therapy, blood purification technique** or even store room capacity: the Aquarius™ system with RCA provides true flexibility with one Aqualine RCA/ Aqualine S RCA for all therapies.

A regular Aqualine or Aqualine S can also be used on the Aquarius™ system with RCA for treatments without citrate anticoagulation.

The choice is yours+

Sets for RCA therapy

	CITRASETSRCA07LV	CITRASETRCA12	CITRASETRCA19
Aquamax® filter	HF7+	HF12	HF19
Bloodline	Aqualine S RCA	Aqualine RCA	Aqualine RCA
Bloodline blood volume	70 mL	96 mL	96 mL
Ancillaries	1 effluent bag 5 litre + 1 empty priming bag 2 litre + 1 two-way connector		

Aquarius™ System with Aquarius+ Software

Technical Data

Product Code GE-F095-00 (SW 6.02.19 or above)	Adult	Low volume
Priming volume		
Bloodline	**Aqualine RCA**: 96 mL	**Aqualine S RCA**: 70 mL
Max. Treatment time		
	100 h	100 h
Scales		
Fluid balance alarm	±50 g	±20 g
Substitution / Filtrate scale max. load	20 kg	
Citrate / Calcium scale max. load	2.2 kg	
Fluid warmer		
Adjustable setting	0 (off) or 35 °C to 39 °C, by 0.5 °C	
Flow Rate		
Blood pump	**for all therapies** 30 to 450 mL/min, **except TPE** 30 to 250 mL/min and **CVVHD, CVVH with RCA** 30 to 300 mL/min	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	**for all therapies** 0 or 100 to 10,000 mL/h, **except RCA** 0 or 500 to 6,000 mL/h	0 or 100 to 4,000 mL/h
Dialysate pump	0 or 100 to 10,000 mL/h **RCA** 0 or 500 to 6,000 mL/h	**CVVHD** 0 or 100 to 6,000 mL/h **CVVHDF** 0 or 100 to 2,000 mL/h **CVVHD RCA** 0 or 100 to 4,000 mL/h
Filtrate pump	**for all therapies** 0 or 100 to 12,000 mL/h, **except RCA** 0 or 100 to 8,800 mL/h	0 or 100 to 7,000 mL/h
Plasma	**for all therapies** 0 or 10 to 3,000 mL/h, **except RCA** 0 or 500 to 3,000 mL/h	0 or 10 to 1,200 mL/h
Patient fluid loss	**CVVH, CVVHD, CVVHDF** -100 to 2,000 mL/h **SCUF and RCA therapies** 0 to 2,000 mL/h	0 or 10 to 1,000 mL/h
Citrate pump	0 or 20 to 650 mL/h	
Calcium pump	0 or 2 to 300 mL/h	
Anticoagulant settings		
Heparin pump settings	0 or 0.5 to 15 mL/h, by 0.1 mL/h	
Heparin syringe size	50 mL	
Bolus function	0.5 to 2.5 mL, by 0.5 mL	
Pressure Monitoring (in treatment mode)		
Access sensor	-250 to +350 mmHg	
Return sensor	+20 to +350 mmHg	
Pre-filter sensor	-100 to +450 mmHg	
Filtrate sensor	-400 to +450 mmHg	
Detection parameters and monitor		
Air detector	Ultrasonic measurement: air bubbles at a volume of 1 µ at a blood flow rate of 200 mL/h	
Blood leak detector	Measurement of clouding; 2 mL blood / 1,000 mL filtrate at HCT 32 %	
Display monitor	10.4" TFT color	

References

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4 Schneider, A.G., Journois, D. & Rimmelé, T. *Complications of regional citrate anticoagulation: accumulation or overload?* Critical Care, 2017. 21, 281.

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8 Ronco, C et al. *Management of fluid balance in CRRT: a technical approach.* Int J Artif Organs 2005 Aug; 28(8): 765-76.

9 Meersch M, Küllmar M, Critical Care Trials Group, et al *Regional citrate versus systemic heparin anticoagulation for continuous renal replacement therapy in critically ill patients with acute kidney injury (RICH) trial: study protocol for a multicentre, randomised controlled trial* BMJ Open 2019 9.

10 Morabito, S et al. *Regional citrate anticoagulation in CVVH: A new protocol combining citrate solution with a phosphate containing replacement fluid.* Hemodialysis International 2013, 17(2):P313-320.

11 Ronco C et al. *Renal replacement therapy in acute kidney injury: controversy and consensus.* Critical Care, 2015. 19:P146.

12 Fealy N Chapter 19 Regional Citrate Anticoagulation in Kellum J et al. *Continuous Renal Replacement Therapy (2nd Edition),* New York: Oxford University Press, 2016. P151.

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14 Lapinsky SL *Clinical information systems in the intensive care unit: primum non nocere.* Critical Care, 2009. 13 (1) 107.

* May not be available in all therapies. ** This includes TPE and adjunctive hemoadsorption therapies

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